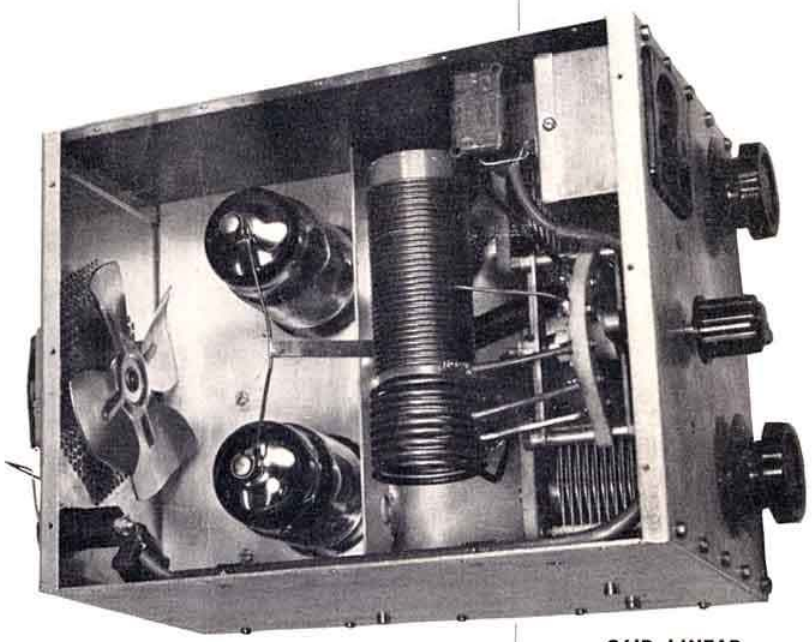
RSGB

BULLETIN

MAY 1964
VOL. 40, No. 5



G6JP LINEAR AMPLIFIER

JOURNAL OF THE RADIO SOCIETY OF GREAT BRITAIN

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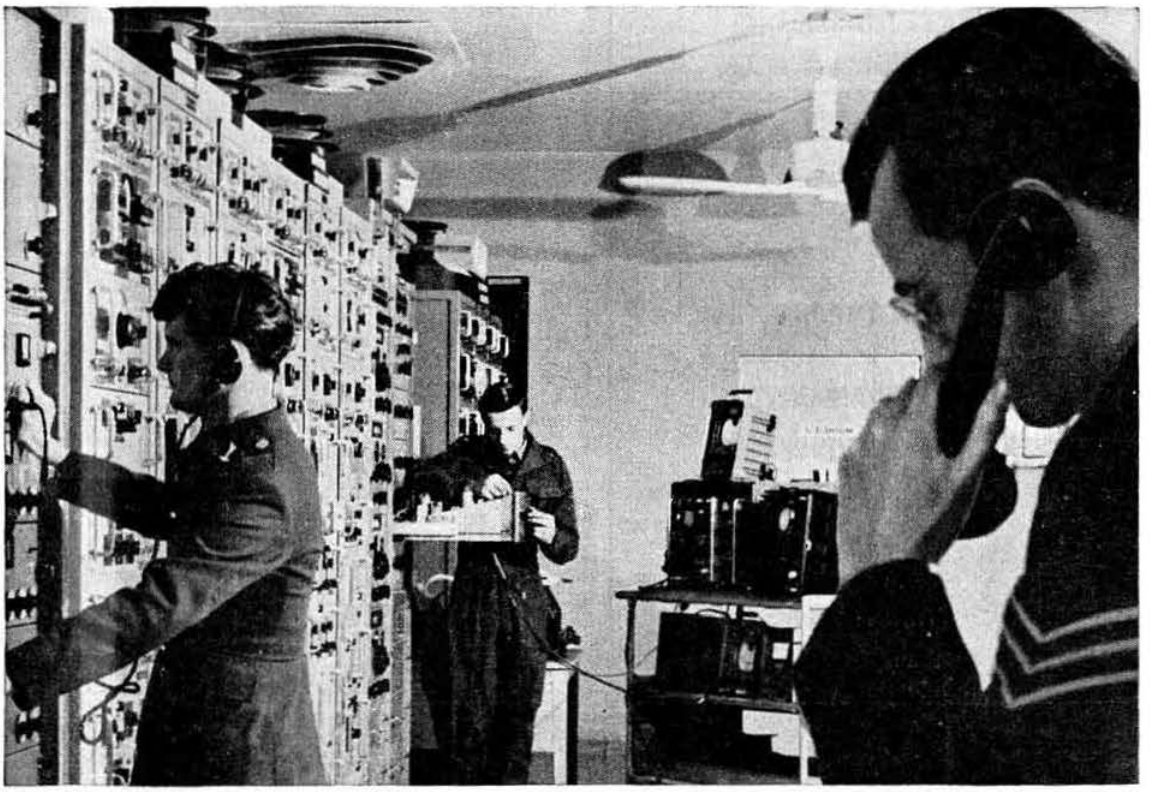

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Volume 40 No. 5

May 1964

3/- Monthly

R.S.G.B. BULLETIN

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Front Cover: The photograph on this month's front cover shows G6JP's linear amplifier for the h.f. bands. A description of the construction starts on page 286.

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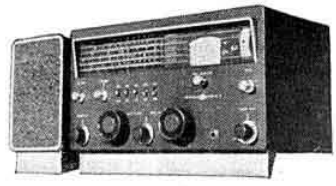

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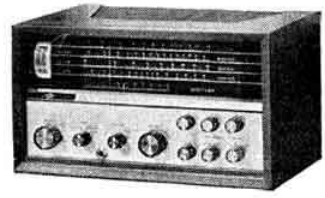

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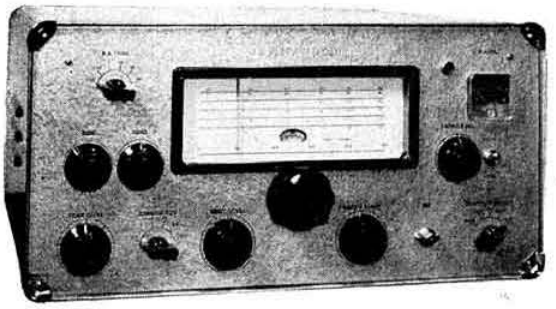

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Current Comment

discusses topics of the day

Articles of Association

THIS month's issue of the BULLETIN contains a special supplement which deserves the closest study by all who have the best interests of our Society at heart. This supplement is devoted to the new Articles of Association under which it is proposed the Society should operate once they have been approved by the Corporate membership at an Extraordinary General Meeting which is to be held at the Royal Society of Arts in London on Saturday, June 27, 1964.

After the new Articles have been approved by the members they will have to be registered with the Board of Trade.

The Society, as most members know, is in fact a limited company (limited by guarantee, i.e. without share capital). The reason for incorporation as a limited company is that it confers a number of advantages upon members and ensures that it is run by the Council (equivalent to the board of directors of an ordinary company) strictly in accordance with a set of rules which has been approved by the Board of Trade.

As a limited company, the RSGB is bound not only by its own Articles of Association but also by the terms of the Companies Act. Many companies find it desirable to recast their Articles of Association from time to time. Such is the present case with the Society.

The first such revision so far as RSGB is concerned took place in 1953 and produced a set of rules under which the Society has operated ever since. In the past ten years, however, a number of anomalies have come to light, not the least being the difficulty in deciding exactly what is intended. There are also several serious deficiencies in the present Articles.

The new Articles shown in the supplement are an attempt to profit from the experience of recent years and are the result of many hundreds of man-hours spent by members of the Council and Finance and Staff Committee and the Society's legal advisers. In addition, the Board of Trade has been consulted on a number of occasions and has now approved them for submission to the membership. It is the hope of all concerned that the wording so produced is both clear and unambiguous and will overcome certain difficulties that have occurred in the past.

The Regional Representatives discussed the draft at length with the Council at a conference held in Birmingham in November, 1963, and made a number of helpful observations. One in particular was to suggest that the Honorary Treasurer should be appointed by Council.

While it is not the intention to discuss the various changes in detail in *Current Comment*, it does seem right to draw attention to one of the most important. This is the new procedure for the election of the President, which has been brought into line with that used in most other scientific and learned societies. Similar changes have been made in connection with the Executive Vice-President and Honorary Treasurer.

A number of other important changes have been made and the attention of members is drawn to the explanatory notes on page 320. Alterations not specificially mentioned in those notes are in the main due to redrafting in clearer language and rearrangement of articles in more logical form.

The principal aim, however, has been to frame for the Society a constitution in tune with the requirements of the 1960s and 1970s and, it is hoped, even longer. It is believed that the result has been to produce rules which are clear to all without recourse to the services of a lawyer. In short, the new Articles are in the English of today.

More than seven weeks' notice of the meeting to approve the new Articles of Association is being given to allow the widest possible discussion by members. Meanwhile we commend to every member a careful study of the Society's proposed new constitution in the confident belief that all will agree that the changes are very worthwhile.

A TT21 Linear Amplifier for the H.F. Bands

Straightforward Design for 3·5—28 Mc/s

By G. R. JESSOP, G6JP*

BEFORE starting to design this linear amplifier, existing material on the subject was studied. There appeared to be almost a complete lack of information on two of the essential features, measured power output, and detailed constructional data. It is not intended here to criticize the previously published material, but rather to give as much information as possible on these particular aspects as they apply to this amplifier.

The measurement of power output is not as easy as is often imagined, and unless the constructor has access to reliable loads together with a power measuring instrument, the actual power may well be far from that anticipated. The use of lamps as loads for this purpose is unsatisfactory unless a calibrated comparator lamp is used in a light output matching arrangement, and the load lamps are of suitable impedance.† Allowance must also be made for any difference between the comparator and load lamps.

It is noteworthy that much of the advertised data on commercially made equipment for the amateur market is not very explicit on the matter of actual output power. Quite often the statement made is of the form of so many watts p.e.p., but it does not specify input or output. Quite clearly it can only be input since the valve used is incapable of delivering an output of the amount mentioned.

When one comes to make actual measurements one is likely to be somewhat depressed by the poorer efficiency of class AB1 r.f. amplifiers as compared with the relative ease with which good efficiency can be achieved in a class C stage. Obviously the efficiency of a class AB1 stage is lower than that of class C where 70 to 80 per cent may be achieved; only 50 to 55 per cent can be expected for class AB1. Also it must be appreciated that when a band-switched pi-anode circuit is used, it will give less output, due to lower efficiency, than an interchangeable plug-in coil arrangement. The various forms of multi-band tank circuits must inevitably be compromises.

Probably the best multi-band arrangement would consist of switched or variable capacitors and a continuously variable inductor, but a design of this kind is not possible at the present time, as apart from surplus units no variable inductors are readily available to the average amateur. It is, therefore, necessary to make the best of the tapped inductor and variable input and output capacitors as has been more or less standard practice for some time.

Another point which should be realized is that the output capacity of most suitable valves is quite high. When two or more are used in parallel, the anode pi-circuit will have to operate with an effectively higher loaded Q due to the use of excessive input capacity at the higher frequency bands, resulting in fairly heavy circulating currents which together with other losses may cause the tuning inductor to run quite warm.

The use of push-pull pi-circuits to reduce the effective capacity may be satisfactory for single band use, but it becomes complex when multi-band operation is required and is therefore not a practical alternative. The pi-circuit should be designed to suit the valves and operating condi-

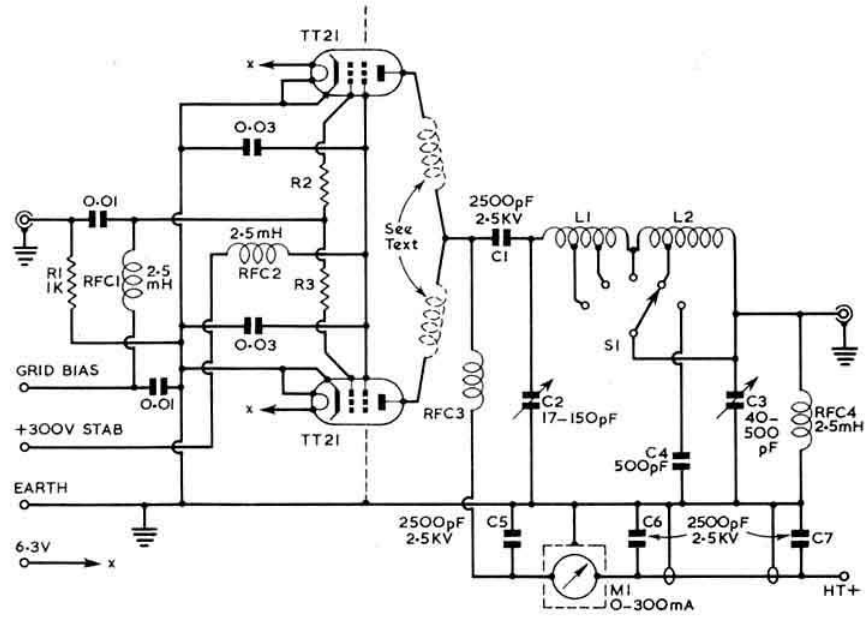


Fig. 1. Circuit diagram of the TT21 linear amplifier. RFC1, RFC2 and RFC4 are standard Eddystone 2·5 mH chokes. RFC3 consists of 100 turns of 24 s.w.g. enamelled wire on a ceramic former ¼ in. diameter and 2½ in. long. RI provides the correct operating load for the exciter.

* 32 North View, Eastcote, Pinner, Middlesex.

† "Lamps as R.F. Output Loads," G. R. Jessop, RSGB BULLETIN, August, 1962.

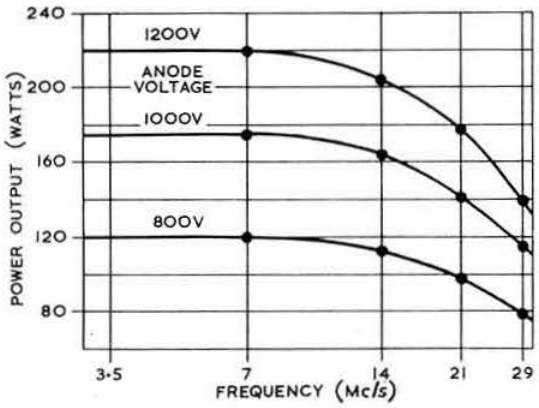


Fig. 2. Typical power output curves.

tions concerned. The method outlined in the BULLETIN* will provide the constants required.

The various methods of using r.f. tetrodes in linear amplifiers have been covered quite extensively elsewhere, but it may be worth mentioning that the passive grid arrangement used here offers a quite attractive and straightforward arrangement. The drive requirements are lower than that for a grounded grid and somewhat more than in a neutralized stage. The circuit of this amplifier is shown in Fig. 1 together with the various component values, and attention is drawn to the main r.f. choke which although simple has proved to be quite satisfactory.

Typical power output curves (Fig. 2) obtained with anode voltages of 800, 1,000 and 1,200 are shown. The screen voltage was set at 300V from a stabilized supply and the grid bias was set to a value which allowed the correct input to be drawn under no signal conditions. This is a convenient method of setting up the operating conditions; bias voltage is adjusted to give the anode current quoted in Table 2.

* "Simplified Design Procedures for Pi-Network Tank Circuits," G. C. Fox, RSGB BULLETIN, June, 1961.

TABLE 2

Performance of TT21 Linear Amplifier

Two Tone Tests at 7 Mc/s

Anode Voltage V_a	1200	1000	800
Screen Voltage V_{g2}	300	300	300
Grid Voltage $-V_{g1}$	39	37	34
Peak Grid Drive $V_{g\ peak}$	39	37	34
Anode Current $I_{a(o)}$	62·5	75	94
Anode Current (2-tone) $I_{a(sig)}$	180	165	160
Screen Current I_{g2}	8	10	12
*Grid Current I_{g1}	0	0	0
Power Output (2-tone) $P_{out\ load}$	110	87·5	60
Power Output P.E.P.	220	175	120
†I.M.D. 3rd harmonic —db	29	33	45
†I.M.D. 5th harmonic —db	43	46	46
†I.M.D. of input signal —db	54	54	54

* Grid current limited to 0·1mA.
† Intermodulation distortion.
Tests carried out using Furzehill Spectrum Analyzer.

The value of the projected bias voltage† is approximately given by $\frac{Vg_2}{\mu(g_1 - g_2)}$ which for operation at a screen voltage of 300 is −37·5 volts. This must, however, be varied to fulfil the valve input limits as the working conditions will vary between −34 and −39 volts for anode voltages of between 800 and 1,200.

The peak drive for start of grid current (0·1 mA max.) will be about 0·5 volts lower than the bias voltage to allow for the grid contact potential.

The power output curves (Fig. 2) show that the output and efficiency fall as the frequency is increased above about 10 Mc/s. This fall in power output is almost entirely due to circuit losses, and these form a significant part of the total

† The projected voltage for the grid bias is that voltage indicated by projecting the straight part of the $I_a - V_g$ curve to the base line.

TABLE 1

Performance of TT21 Linear Amplifier (Single Tone Tests)

Band (Mc/s)	3·5 and 7			14			21			29		
Anode Voltage V_a	1200	1000	800	1200	1000	800	1200	1000	800	1200	1000	800
Screen Voltage V_{g2}	300	300	300	300	300	300	300	300	300	300	300	300
**Grid Voltage $-V_{g1}$	39	37	34	39	37	34	39	37	34	39	37	34
†Anode Current $I_{a(o)}$	62·5	75	94	62·5	75	94	62·5	75	94	62·5	75	94
†Anode Current $I_{a(max\ sig)}$	270	260	210	250	230	190	250	240	210	235	215	210
†Screen Current $I_{g2(max\ sig)}$	18	18	19	14	16	16	15	16	16	14	16	16
‡Grid Current $I_{g1(max)}$	0	0	0	0	0	0	0	0	0	0	0	0
Power Input P_{in}	324	260	168	300	230	152	300	240	168	282	215	168
*Power Output Load P_{load}	220	175	120	204	167	114	170	140	98	130	115	80
$P_{in} - P_{load}$ (per valve)	52	42·5	24	48	31·5	19	65	50	35	79	50	44

† For two valves.
** Adjusted to obtain state $I_{a(o)}$.
* Measured with Marconi Type T1205 500 watt r.f. power meter.
‡ Grid current limited to 0·1mA.

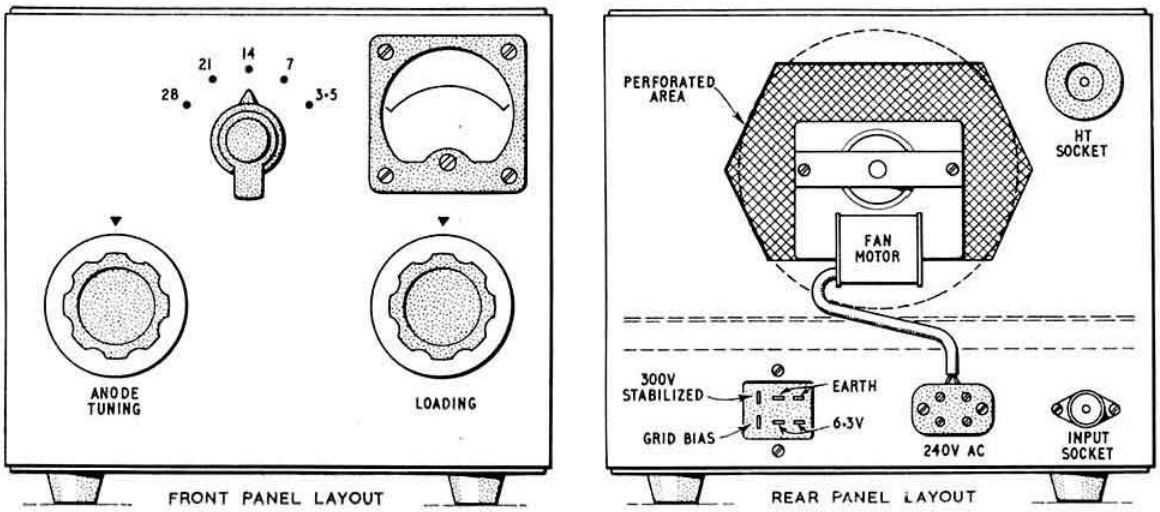


Fig. 3. Front and rear panel layouts.

input, especially in the 28 Mc/s band. This is caused by the valve and circuit minimum capacity being too high for proper operation of the pi-circuit input capacity as mentioned earlier. These factors should be taken into account when considering the maximum input. Because of the power which is absorbed by the circuit, it will be found that the coil on the higher frequency bands becomes quite warm (about 100°C at 29 Mc/s).

The results of the performance tests at 3·5 and 7 Mc/s have been combined in Table 1. These figures were in fact obtained, but at 3·5 Mc/s it was necessary to add a 50 pF fixed capacitor in parallel with the anode tuning capacitor to achieve correct matching as the tuning capacitor used in the prototype has a maximum value of 150 pF. Therefore in practice, a capacitor with a maximum value of 200 pF is required.

The grid circuit as shown in Fig. 1 consists of a 1,000 ohms 2 watt carbon resistor. During the tests a little instability was encountered and all that was required to prevent this was to use grid stoppers of 100 ohms (Fig. 1, R2, R3). Parasitic chokes in the anode leads were not found necessary; if any should be required, then two and a half turns of 16 s.w.g. wire on an Erie type 8 resistor (100 ohms) should be satisfactory.

The screen of each valve is by-passed at each valve socket by three 0·01 μF ceramic capacitors in parallel. Stoppers were not found necessary and an r.f. choke was used in the supply lead, but here again, if any are needed, 100 ohms in each lead should be satisfactory.

The drive requirements for the amplifier on all bands will be found to be less than 5 watts which can quite readily be obtained from a small exciter.

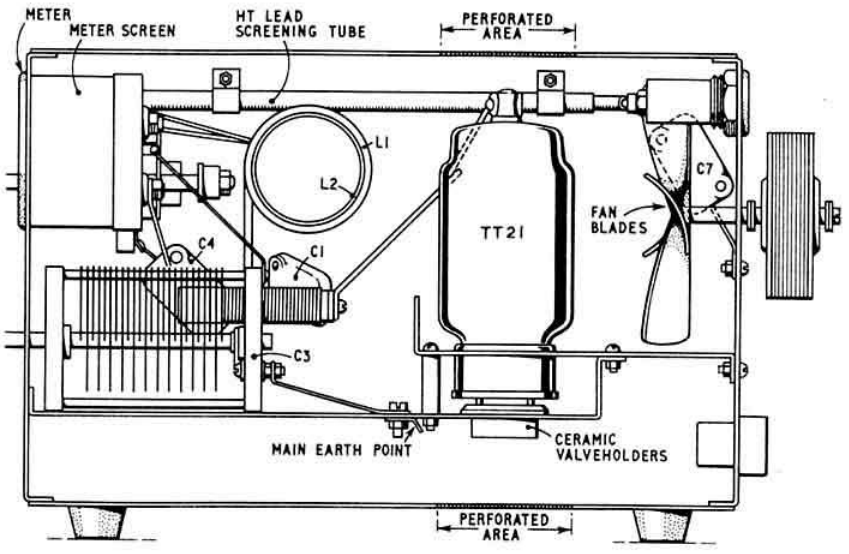


Fig. 4. General component layout. Note main earth point.

The linearity two-tone tests have only been carried out on 7 Mc/s at anode voltages of 800, 1,000 and 1,200 using a spectrum analyser. The results are given in Table 2.

Construction

The construction of this amplifier is quite straightforward, and with the aid of the various component layout drawings should not present any problem.

In general, the layout is quite conventional, but a good deal of care has been taken to avoid multiple earths. The earth returns of the anode pi-circuit and the valve cathodes and screen by-pass capacitors are connected to the same point on the chassis.

The particular tuning capacitors specified are of the ceramic end plate type and they allow their earth returns to be made at only one point. Also, as stated earlier, there are high circulating currents on the highest frequency range. In order to reduce the

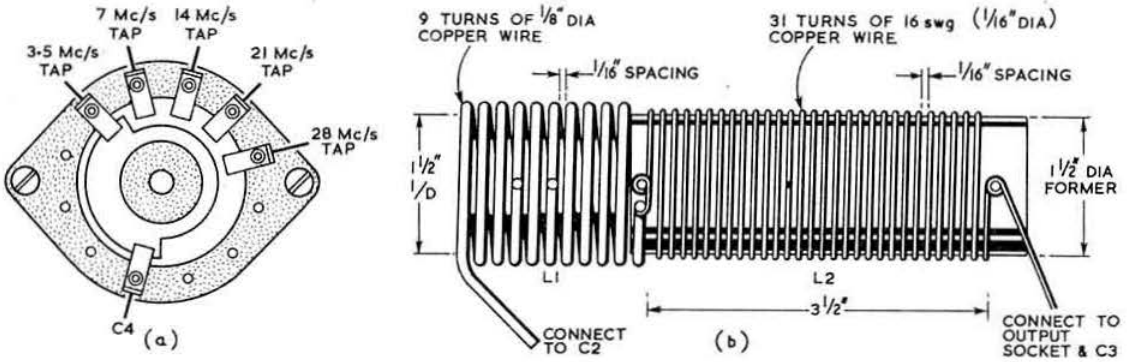


Fig. 5. (a) Details of anode coil tapping switch. (b) Constructional details of anode coil.

losses as much as possible, the anode pi-circuit returns and the feed connection are made of ⅛ in. 18 s.w.g. copper strip.

The band change switch is of a larger type than frequently used and was chosen for its lower capacity between contacts and its higher current-carrying capability. It is a standard five position ceramic wafer type with shorting plate and an extra contact to pick up C4. The switch may be obtained from Aviation Control Instruments, 138 Wardour Street, London, W.1.

It is possible that the switch used in the TU series of aerial tuning units could be used successfully, but it was felt preferable to specify a component which was available new, there being some uncertainty in the use of surplus components. For this same reason the coils were not wound on surplus ceramic formers of which there are at present some useful sizes available.

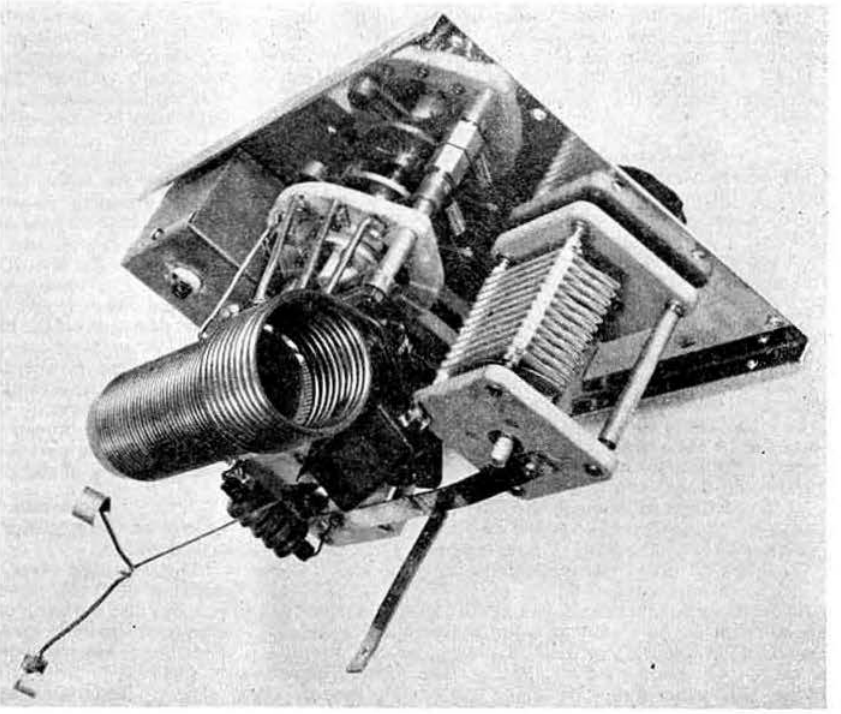
The method of constructing the cabinet is straightforward, and does not involve the use of any elaborate metal bending tools. Although a good metal bender is a help, the work can be readily done in an ordinary vice as the bends on any sheet of metal are along two parallel sides only.

The chassis is formed by two pieces which when fixed together allow the valve sockets to be submounted on the lower member, and these together with the front and rear panels will be found very easy to assemble. The complete box should be made with the sides fixed to the chassis by means of angle, and attached to the front and back panels by their bent-over edges.

The heat generated by the two valves operating at their maximum rating will of course be more than 100 watts. This, together with the circuit heating in the relatively small cabinet, makes it necessary to have a fair degree of air circulation, but a blower in the normal sense is, however, not needed.

In order to get free air flow the base and cover plates are perforated in the region below and above the valves, and the lower chassis plate is drilled around each valve socket. This, together with the fairly large clearance holes through which the valves are fitted, allows a free air flow around the valves. In addition, a fan has been fitted to the rear panel, which is also perforated, and draws air in through the panel and stirs the air within the cabinet, so that the temperature rise of the whole cabinet will be reasonable even after long periods of operation. The cabinet is mounted on rubber feet to ensure free air inlet through the bottom.

The fan specified is normally supplied with 6 in. diameter blades; these must be cut down to 4 in. diameter and re-



Rear view of front panel assembly.

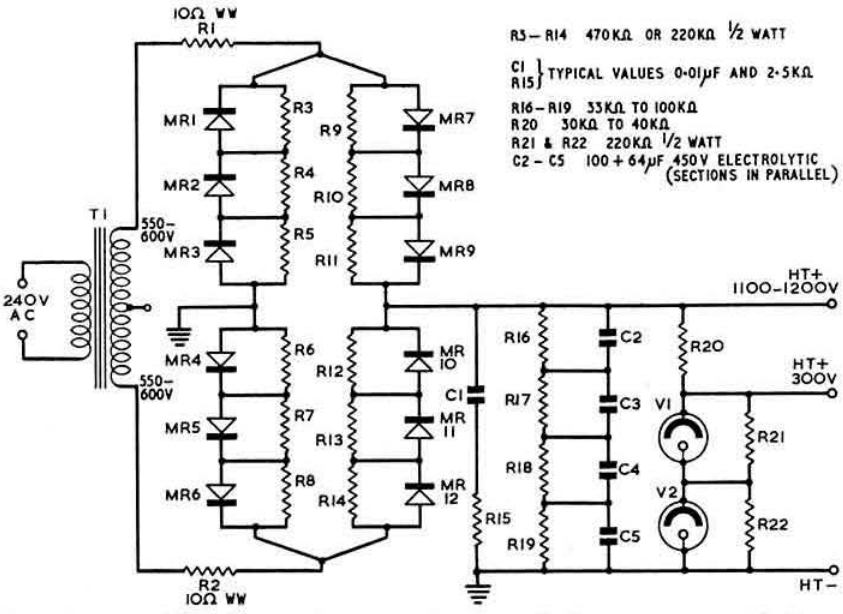


Fig. 6. Suggested circuit diagram of a power unit for anode and screen supplies. The effective smoothing capacitance as shown is 41μF, but the greater the value, the better the smoothing. Surge limiting components protect the rectifiers.

shaped to get satisfactory performance in the confined space. If space permits, the cabinet could be 2 in. higher, thus allowing the use of an unaltered fan. All the wiring of the fan motor is external to the cabinet and therefore should be free of r.f. pick-up. The fan is obtainable from Kenure-Holt Electronics, Vine Valley Road, Maidenhead, Buckinghamshire.

Pi-circuit Inductor and Choke

The anode pi-circuit inductor is made in two parts: L1 covers the three higher frequency bands, 14, 21 and 28 Mc/s, and L2 in series with it covers the two lower bands, 7 and 3·5 Mc/s.

L1 consists of nine turns of $\frac{1}{4}$ in. drawn copper, wound with an internal diameter of $1\frac{1}{2}$ in., and spaced $\frac{1}{16}$ in. between turns.

L2 consists of 31 turns of 16 s.w.g. on an epoxy resin former of $1\frac{1}{8}$ in. diameter; the turns are spaced to occupy $3\frac{1}{2}$ in. with spacing between turns of slightly less than $\frac{1}{16}$ in. The ends of the winding are fixed to the former by nuts and bolts. L1 is self-supporting and is mounted on the same axis as L2. The anode end of L2 is soldered to L1 at the point where the 14 Mc/s tap is made.

Tapping points for the various bands are as follows:

28 Mc/s 3 turns from anode end L1.
21 Mc/s 5 turns from anode end L1.
14 Mc/s 9 turns from anode end L1.

These connections are made of $\frac{1}{8}$ in. copper.

7 Mc/s 12 turns from anode end L2.
3·5 Mc/s output end of L2.

As mentioned earlier, the losses at the higher frequencies, especially on 28 Mc/s and to a lesser extent on 21 Mc/s, demand good soldering of these tapping points and should be carried out with a higher than average melting point solder. Ideally they should be " hard " soldered or brazed.

The r.f. choke which shunt feeds the circuit consists of a simple winding of 100 turns of 24 s.w.g. enamelled wire on a ceramic former $\frac{1}{2}$ in. diameter and $2\frac{1}{2}$ in. long. It is mounted below, and at approximately right angles to, the main inductor. This choke has been found to be entirely satisfactory, and no overheating has been encountered on any of the five bands.

Power Supply

As with all linear amplifiers it is important that the h.t. supplies should be adequately smoothed and of good dynamic performance in order to maintain the voltages substantially constant during the changing operating loads. This means low series impedance and high reservoir capacitance.

Probably the most satisfactory method of meeting these requirements is to use a full-wave bridge rectifier with either gas-filled valves or semiconductor diodes whose low forward impedance will keep down the series voltage drop.

To obtain good dynamic performance of the anode supply, a capacitance of not less than 24μF will be required in the smoothing circuit. This can be readily obtained by use of TV type electrolytic capacitors in series with bleeder resistors across each unit to assist in voltage sharing. It is most important to provide proper insulation for the outer cans of the capacitors not directly earthed. They should be completely covered with insulating material to ensure the safety of the operator and that he lives to use the amplifier!

The 300V screen supply should be stabilized by two gas-filled stabilizers in series and can be either a separate supply or fed from the anode supply through a suitable voltage dropping resistor. The use of a combined unit ensures that at no time can the screen supply be switched on without the anode and although there is some waste of power due to the loss in the dropper resistor, it is probably the most convenient arrangement for the amateur. A suggested circuit is given in Fig. 6.

The demands on the bias supply are small and the load is stable. Apart from ease of setting the output voltage to the required value, no special requirements are involved other than adequate smoothing. A half-wave rectifier circuit with resistance and capacity smoothing giving about 50 volts to the output potentiometer would be suitable. The potentiometer should be part fixed and part variable to facilitate accurate setting of the required voltage.

Input and Output Connection

Drive to the amplifier is fed in through a standard TV coaxial socket.

In the prototype a type N connector is used for the output but any other of similar power rating will be suitable. It should be noted that the earth connection of the outer is connected directly to the main earth point with copper strip although the fixing screws make an earth connection to the cabinet at the socket.

The h.t. lead from the insulated safety socket at the rear is run along the left side of the cabinet and front panel to the meter, and is screened by copper tube to prevent stray r.f.

pick-up. A six-pin Painton (Miniature Jones) plug handles the other supplies.

Operation

The maximum time allowable for tune-up with tone on at 1,200 volts should be limited to five minutes. During initial testing, periods in excess of 15 minutes without the fan running did not cause any valve distress. However, five minutes should be ample and will provide a good safety factor.

The resting current under each anode voltage condition allows for the same anode dissipation and is no worse for any of the voltages quoted. It was intentionally kept as high as possible to enable the best intermodulation distortion (i.m.d.) factor to be obtained. If these settings are significantly lowered, then some increase in i.m.d. will result.

Generators for NFD

By A. W. TOMALIN, G3PTB *

READING the NFD and V.H.F. NFD reports the writer was struck by the frequency with which certain comments appeared: "... apart from generator troubles, OK ... we were doing fine until the p.e. set packed in ... our late start was due, etc., etc."

Following a closer look at the report it seemed that either the prime-mover-alternator set is inherently unreliable.

With these thoughts in mind the following notes were written, specifically around the four-stroke petrol engine driving an alternator to give 250 volts. Variants of this do exist, e.g. diesel, paraffin or even steam engines driving d.c. generators at various voltages feeding the h.t. circuits directly, or low voltage a.c. generators followed by transformers.

The Engine

Let us accept the basic fact that a petrol engine in good mechanical condition with the correct air/petrol mixture supplied to the cylinder and a good spark produced at the right time in the right place, must function. Maintenance and fault finding is then only a matter of logic and patience!

However the outfit is obtained, it is a good idea before arriving at the site to run the set for at least an hour to prove that it will work. Before starting, the oil level should be checked—as also the contents of the fuel tank. In the absence of definite instructions, use oil of the SAE30 variety. As most of these types of machines are of low to medium compression ratio, super-wonderful grade petrol should not be used—ordinary commercial grade is satisfactory.

Several of these types of engine are started by the "Armstrong" method. If a handle is provided, check that the "dogs" on the end engage properly with the corresponding "dogs" on the engine. The cord-starter variety is somewhat easier to start if the cord is in one piece, with a knot at one end and handle at the other; a firm pull is usually more effective than a snatch. Some form of air restrictor may be fitted for starting (*Cf.* choke on a car), and its best setting is a matter for experiment. Remember to return it to the wide open position once the engine is running.

While the engine is being turned over, a check should be made for a reasonable resistance as the engine reaches the compression stroke. An engine which turns over too easily may be suffering from burnt valves or too small a tappet clearance: a figure of 5 to 10 thou. on a cold engine is usually satisfactory.

The engine speed is controlled by a governor, of which more will be said later; but it is worth checking that the adjustable stop on this is set such that the throttle is about $\frac{1}{8}$ in. open, or starting may be impossible.

The Generator

A voltmeter should be fitted, temporarily if not permanently, and an ammeter (not often provided) may explain why the rated voltage cannot be attained on load. A glance at the slip-rings or commutator will often prevent sudden loss of output at about 02.00 GMT. Assuming that the set is running, it is then necessary to set the engine speed by means of the governor screw such that the rated voltage appears at the output terminals.

Ideally, when running at the rated voltage and load the frequency should be that indicated on the specification plate. In practice it is usually necessary to compromise. An examination of the frequency on either an oscilloscope or power frequency meter is useful, but may frighten the observer! Alternators for 25 c/s or even higher frequencies, e.g. 400 c/s, are not uncommon and the result of using equipment designed for 50 c/s supplies on such machines can be illuminating. The output voltage, whether a.c. or d.c., should be set with the full load connected as in many cases the voltage can rise to around 300 on light load.

Installation

On arrival at the site the petrol and oil levels should be checked again, for someone may have left the oil drain plug out! It is obviously desirable from the point of view of ignition interference to locate the set as far from the receivers as possible, but bear in mind the voltage drop of a long cable. Ordinary five amp house cable is not suitable from this point of view for runs of more than a few tens of yards, and 15 amp cable is a reasonable minimum rating. A distribution panel with separate switches *and* fuses in each line for each outgoing circuit should be installed near the generator. A spare fuse bridge already wired and handy is useful in the early hours, as is a 15 watt bulb permanently connected across the generator terminals.

Some form of weather protection is advisable, but do not completely enclose the engine, for reasons of cooling. A canvas sheet, held about 2 ft. above the set on four poles, or even slanted into the wind to catch driving rain will usually keep off enough rain to prevent troubles in the ignition circuits.

Fault Finding—Engine

If it will not start, check the petrol level in the carburettor float-chamber, for the tap may be wrongly labelled. Remove and check sparking plug(s) for cleanliness, broken insulation or badly worn points. The gap should be about 20 thou. or, in the absence of more precise instructions, say two cigarette-packet cardboard thicknesses. The spark is usually generated by magneto, although coil and battery sets are not uncommon. The contact breaker gap in each case should be about 10 to 15 thou. Connect the plug lead, lay the plug on the cylinder head and turn the engine over. The spark should be audible and visible in all but the brightest day-

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(*Continued on page 293*)

Variations on the Yagi and Helical Aerials

By C. R. FRY, B.Sc., M.Sc., Grad.I.E.E., G3NDI *

A SHORT while ago some interesting papers came to the writer's notice which described work carried out on some new v.h.f. aerials. It was thought that a description of the experimental details and results might be of interest to those readers who are keen on trying new v.h.f. arrays with a better performance than the conventional Yagi parasitic aerial. One type is a variation of the Yagi aerial, the other is a specialized case of the helical aerial having linear polarization instead of circular polarization, but retaining the broadband characteristic of the helical.

The Zig-Zag Aerial

This type of aerial was described by Cumming [1] in 1955 and further results have been given by Sengupta [2]. Compared to the Yagi the zig-zag aerial produces superior results

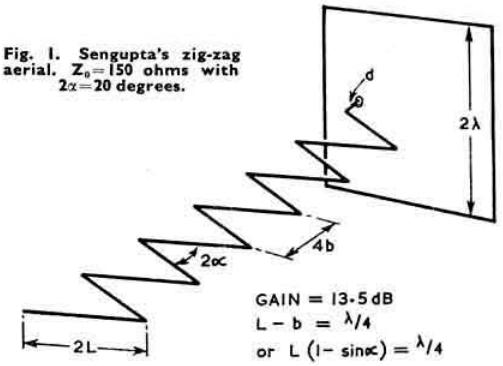

Fig. 1. Sengupta's zig-zag aerial. Z_0 = 150 ohms with 2α = 20 degrees.

from the point of view of broadband operation and directivity. From the practical side it is also probably easier to construct than the Yagi, as may be seen from Fig. 1.

The aerial is fed in the normal way through the plane reflector with coaxial cable having Z_0 = 150 ohms. The impedance, Z_0, will, of course, be influenced by changing the dimensions of the plane reflector. The bandwidth is of the order of 15 per cent of the centre frequency and varies inversely as the number of elements (two for each *V*) in the aerial. It is suggested that the aerial elements could be supported by a single rod of insulating material along the centre (preferably polystyrene, or if the power used is not too high, a dielectric having a worse power factor can be used without too great a loss) or one rod along each of the lines joining the apices of the *V*s. A simpler method, perhaps, would be to use four lengths of nylon cord from the corners of the reflector tied to some point along the aerial. The method used will, of course, depend on whether the aerial is situated in a loft or outside on a mast.

Cumming also described in his paper a double zig-zag aerial used at v.h.f. with 300 ohm ribbon feeder, which is shown in Fig. 2. The three-element linear reflector was found to improve considerably the front-to-back ratio. The length of the linear reflector may also be altered to vary the input impedance without appreciably affecting the pattern.

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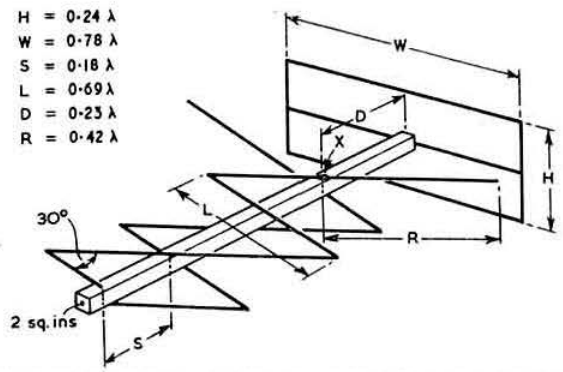

Fig. 2. The double zig-zag aerial. The 300 ohm feeder is connected to point X and the corresponding point on the other aerial. The bar, of cross section 2 sq. in., is made of insulating material.

Experimental results given in his paper show that it has a greater bandwidth than a Yagi of equivalent gain, with the s.w.r. varying between 1·3-2·1 over a range of 54-88 Mc/s.

The parameters α and *L* are chosen to ensure the addition, in phase along the axis, of the radiation from the *V*s. The aerial then acts in an endfire manner. It was found experimentally for the zig-zag aerial that if *d* has a value less than quarter wave there is no appreciable effect on the directivity pattern due to this part of the aerial. The aerials constructed by Sengupta possessed six *V*s and had values of 2α lying between 15 degrees and 30 degrees. It was found that the narrowest beamwidth could be obtained with 2α = 20 degrees, concomitant with the lowest sidelobe level. The operating frequency may be allowed to vary about the centre frequency by approximately ±5 per cent without serious degradation of the pattern.

The Backfire Aerial

The configuration of this aerial may be seen in Fig. 3. The first description of it is due to Ehrenspeck [3] and its resemblance to the Yagi aerial is quite apparent. The wave-

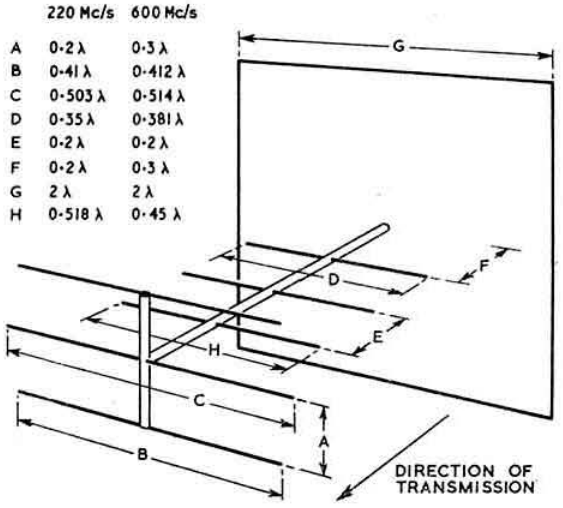

Fig. 3. The backfire aerial. For clarity not all the directors have been shown; at 600 Mc/s there should be five directors and at 220 Mc/s only three directors for the best performance. The length *H* refers to the driven element.

front propagated by the driven element travels along the aerial to the plane reflector where it is reflected back along the aerial, thus making it equivalent to a Yagi of twice the length. The backfire principle is capable of yielding an increase in gain of 4-6db over the usual Yagi array. Alternatively it would be possible to construct a backfire aerial which is smaller than a given Yagi but having the same gain. The plane reflector must be increased in dimensions as the length of the backfire aerial is increased. If this is not done, then besides the gain not being optimum, the backlobe will increase.

Results have been given by Ehrenspeck for an aerial 2·5 wavelengths long having instead a circular reflector of diameter 4 wavelengths where the 3db beamwidth was 16 degrees and the gain was 21db. The equivalent Yagi has a gain of 15db with a wider beamwidth and higher sidelobe level.

Strom and Ehrenspeck [4] have recently considered the backfire aerial at frequencies of 600 Mc/s and 220 Mc/s and a description of the 220 Mc/s aerial was given in the October 1961 issue of *QST* [5]. Aluminium tubing (⅝ in. diameter) was used for the boom and ¼ in. aluminium rod for the elements. The best spacing for the linear reflectors was found to be 0·3 wavelength. In *QST* there appears the only reference to the method of feeding this type of aerial. A 50-300 ohm balun was used, mounted at the back of the reflector with two pieces of 73 ohm coaxial cable, one to each half of the driven element, taped to the boom.

Matching Arrangements

Those readers who wish to alter the aerial parameters will require either to measure the new impedance and use a quarter-wave matching section, if necessary, with the appropriate transmission line or to use a matching device. A simple impedance bridge was described in *The Radio Handbook* [6] which, if carefully constructed, will give reasonable results in the v.h.f. range. The use of a gamma match, or preferably a Clemens match [7], is a better solution as the reflectometer [8, 9] inserted in the transmission line to find the optimum matching point is a null indicating device not depending on external calibration as required for the impedance bridge.

References

[1] Cumming, C. A. "A Non-resonant Endfire Array for V.H.F. and U.H.F.", *I.R.E.Trans.* AP-3, April, 1955.
[2] Sengupta, D. L. "The Radiation Characteristics of a Zig-Zag Antenna," *I.R.E.Trans.* AP-6, April, 1958.
[3] Ehrenspeck, H. W. "The Backfire Antenna, a New Type of Directional Line Source," *Proc.I.R.E.*, January, 1960.
[4] Strom, J. A. and Ehrenspeck, H. W. "Backfire Antennas for S.H.F., U.H.F., V.H.F. Bands," AFCRL-63-114, United States Air Force, L. G. Hanscom Field, Mass., April, 1963.
[5] Mavroides, W. G. and Orr, L. S. "The Backfire Antenna," *QST*, October, 1961.
[6] *The Radio Handbook*, W. I. Orr (Ed.), 15th Edition, Editors and Engineers Ltd., p. 738.
[7] *The Amateur Radio Handbook*, Third Edition, RSGB, p. 384.
[8] Hills, R. C. "Reflectometer for 145 Mc/s," RSGB BULLETIN, September, 1961.
[9] Ref. 6, p. 732.

Generators for NFD (Continued from page 291)

light. Lack of a spark may be due to a burnt-out magneto or coil, but is more likely to be due to dirty contact-breaker points or a break in the plug-lead inside the insulation.

Many books have been written on servicing petrol engines, and a prior visit to the library is not wasted time. Any faults more serious than those outlined require attention by the expert—who will not be reading this anyway.

The Generator

Minor faults in the generator are very rare, e.g. brushes sticking in the holder, or worn down to such an extent that the springs can no longer exert sufficient pressure. In both cases the remedy is obvious. More serious faults such as open circuit armatures are beyond repair on the site, except that very occasionally the lead out wires from the armature to the commutator or slip ring bars are thrown out by centrifugal force, and simply require soldering back into place.

The generator and engine are usually directly coupled via a flexible coupler, but sometimes the generator may be belt driven. In this case the belt tension should be checked if necessary. If lubrication points are provided on the generator bearings a few drops of thin oil should be given or the grease cups refilled as necessary.

On-Site Maintenance

Information is usually lacking on how frequently the engine oil should be changed, but once every 24 hours running time seems reasonable. The oil level should be checked when refuelling, but do not remove the oil filler plug with the engine running unless you *know* that you will not be showered with hot oil. Refuelling should only be carried out with the engine stopped; fires are fortunately rare but usually terminate proceedings finally. A fire extinguisher, preferably of the carbon dioxide gas or foam type (not soda-acid) should be kept with the generator set. Please do not site the generator in a tangle of long, dry grass or in the lee of a hay, corn or straw stack, and bear in mind that farm animals like their sleep.

Some of the more sophisticated sets have push-button starting from a battery which is charged via a rectifier from the generator output. In this case it is worth checking that the battery is actually being charged.

In conclusion it is hoped that this article may help to reduce the incidence of load shedding during portable operation. It may be mentioned that during the September V.H.F. NFD, G3PKF/P lost at least one hour with generator trouble!

OFFICIAL REGIONAL MEETING REGION 16

The Power Station, South Denes, Great Yarmouth, Norfolk.

SUNDAY, JUNE 14, 1964

Programme: The event will commence with a mobile rally, followed by the business meeting at 2.45 p.m. After a buffet tea, Major G. F. West, E.R.D., B.Sc., F.R.A.S., will lecture on "Astronomy." There will also be a display of home-constructed apparatus, and a "Raynet" exhibition.

Tickets, which include tea and three raffle tickets, are available price 6s. (YLs, XYLs and Jnr. Ops. 3s.) from the ***Regional Representative,*** *P. J. Naish, G3EIX, 6 Mildmays, Danbury, Chelmsford, Essex, and also from the* ***Deputy Regional Representative,*** *L. A. Jackson, G3HPR, 8 Arnott Avenue, Gorleston, Great Yarmouth, Norfolk.*

The Council will be represented by the Zonal Representative, Mr J. C. Graham, G3TR, the Executive Vice-President, Mr E. W. Yeomanson, and Mr J. C. Foster, G2JF.

Part 3

The G2DAF S.S.B. Transmitter Mk. 2

By G. R. B. THORNLEY, G2DAF*

IN Parts 1 and 2† of this article, the design considerations and construction of a multiband s.s.b. transmitter for the h.f. bands were described. This final instalment deals with the alignment and gives details of a suitable power supply.

ALIGNMENT

An ambitious project such as the construction of an " all band " s.s.b. transmitter is only likely to be undertaken by an amateur with past constructional knowledge. For this reason it is felt that step by step detailed alignment instruction is not necessary.

In the interest of valve life the 6146s should be run with the power supply h.t. switch in the 300 volt position—at least until the anode and grid tuning has been checked and the valves correctly neutralized on all bands.

The most satisfactory alignment procedure is to start at the back and finish at the front—that is from the p.a. tank coil back to the carrier oscillator—using a serviceman's signal generator as the signal source.

All oscillators should be checked for satisfactory operation and ideally the amplitude of r.f. output voltages should be checked with a diode probe valve voltmeter and compared with the values given in Table 4 on page 296.

All coils are in screening cans and a grid dip oscillator cannot be brought up to the coil to check alignment, neither is it possible to use the usual pick-up loop feeding into an absorption wavemeter. This may cause difficulty when it is required to set each of the pre-set trimmer capacitors across the final conversion oscillator coil L5, because it is important on some ranges to know that the circuit is resonant on the correct harmonic. There are two ways to overcome this limitation:

(i) a pick-up loop tucked into the wiring close to the valve anode will pick up sufficient r.f. to deflect a sensitive absorption wavemeter using a diode and 100 μA meter; alternatively the " signal " can be fed into the station receiver via a length of co-axial cable.

(ii) a pick-up loop can be constructed by winding 6 turns of 24 s.w.g. enamelled wire round the end of a 6 in. length of $\frac{1}{8}$ in. diam. systoflex sleeving, the loop connections then feeding back down the centre of the sleeving and terminating with a length of twin flex or co-axial cable. This " probe " can then be pushed down towards the dust core inside the former of the circuit to be checked.

The bandpass coupler made up of L2 and L3 is required to pass all frequencies between 5·0 and 5·5 Mc/s and offer considerable attenuation to all unwanted converter products outside the required passband. This bandwidth of 500 kc/s (3db points) is obtained by overcoupling the two circuits so that a double humped response curve is formed as shown in Fig. 14. Under these conditions, however, alignment would be most difficult because adjustment of one circuit would pull the other. To overcome this difficulty Philips concentric trimmer capacitors are used for " top capacity " coupling. Initially the two trimmers are fully unmeshed by rotating anticlockwise until the movable vanes are at the top of the screwed stem. The dust cores of L2 and L3 are then adjusted for exact resonance with a 5·25 Mc/s input signal. Finally the two Philips trimmers are each screwed inwards two complete turns.

After all other circuits are aligned and the transmitter is ready for use on the air, the bandpass coupler response can be checked by setting the bandchange switch to 20, 15 or 10m. Turn up the CARRIER INSERTION control to drive the p.a. to some pre-determined anode current—say 100mA. The v.f.o. tuning is then traversed completely across the 500 kc/s tuning range and if all is well the current should not drop more than about 3db (from 100mA down to 70mA) at the two ends of the tuning scale (over each of the seven switched bands, the tuned circuit connected to each of the anodes of the final converter, V11, is resonated at the centre band frequency. This rise in response compensates for the dip in the centre of the 5·0 to 5·5 Mc/s bandpass coupler to give a substantially constant gain). If the drop is greater than 3db the capacity of the two Philips trimmers should be increased *slightly*. It is most important that the bandpass coupler rejection to unwanted frequencies is not spoilt—and over-coupling must be avoided at all cost. Use the *smallest* amount of "top coupling" that will give the required bandwidth.

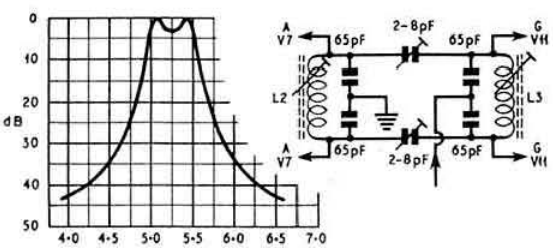

Fig. 14. Plotted response curve of the 500 kc/s wide bandpass coupler.

It will be noted that there are seven positions of the main bandchange switch, one each for the five bands from 160 to 15m and two for the 10m band to give a 28 to 29 Mc/s coverage. The anode circuit of V11 is pre-tuned at the centre band frequency for each of the switched ranges and there are seven separate coils. In regard to the anode circuit of V12, a variable tuning capacitor is brought out to a panel control knob, therefore one tuned circuit will cover the whole of the 10m band; there are six coils, the two 10m contacts on S6 being strapped across as shown.

POWER SUPPLY

An r.f. power amplifier can only operate in a linear manner and give an undistorted output if it is provided with grid, screen and anode voltages that remain constant in potential and do not vary under differing load conditions. Additionally, the heavy anode current demand is at syllabic rate and the main h.t. power supply must have good regulation under dynamic conditions.

It will be appreciated that the carrier of a s.s.b. transmitter

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† Part 1, RSGB BULLETIN, March, 1964.
Part 2, RSGB BULLETIN, April, 1964.

is attenuated in the modulator by a process of balancing, and that normally the modulator will give an attenuation of 40db or more. It will also be appreciated that any hum ripple, either on the h.t. supply to the carrier oscillator or to the audio valves, will unbalance the modulator and produce a hum modulated carrier that cannot be removed by the balancing control VR2. A rough "carrier" will also be produced if there is any 50 c/s mains ripple induced into the cathode of V2b from the 6·3 volt heater line. To overcome these difficulties it is good practice to provide (i) two-stage smoothing and a large value of reservoir capacity in the 300 volt power supply, (ii) a two-wire heater circuit that is balanced to earth.

In regard to the high voltage supply to the p.a. valves, the conditions are different because the anode current of a tetrode is almost independent of small changes in anode potential and hum ripple will not "anode modulate" the signal. However, dynamic regulation over the range of 50 to 250mA is important because a fall in anode voltage at the moment of peak current demand would prevent the p.a. handling the peak signal and could cause flat topping and distortion. In the 700-750 volt supply the customary smoothing chokes are therefore omitted and a large value of reservoir capacity is placed directly across the rectifier output.

The bias supply is made "stiff" by the use of a generously rated mains transformer and rectifier stack, together with ample capacity and a relatively heavy bleed current of approximately 20mA through the resistive load network (Fig. 5).

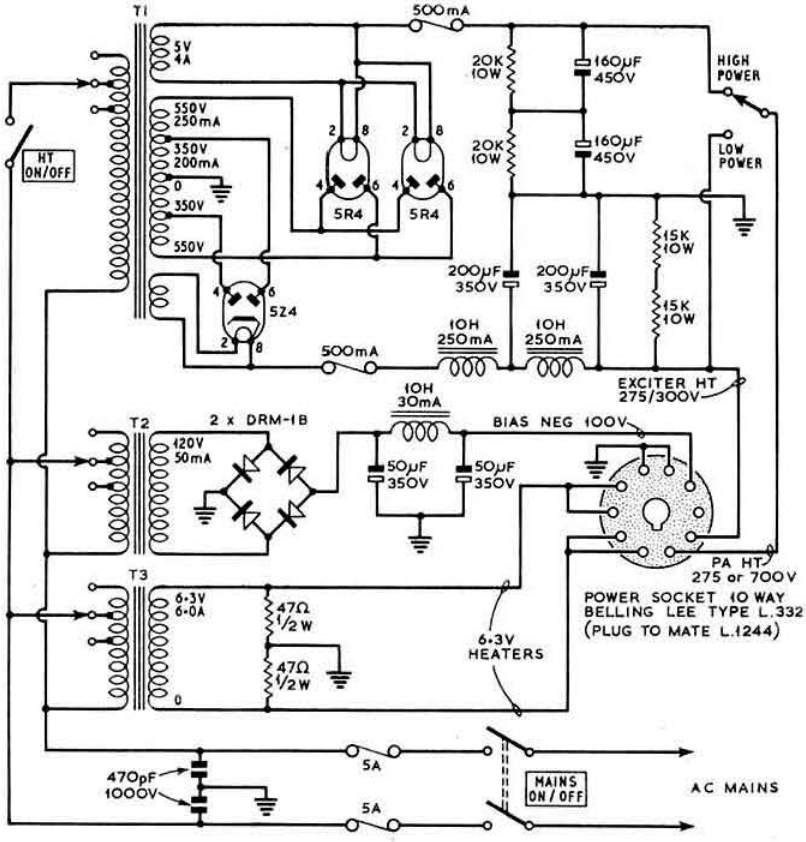

Fig. 15. The power supply for the G2DAF transmitter. The two 160 μF 450 volt capacitors are standard 100 + 60 μF electrolytics with the two sections strapped in parallel. T1 may be two separate transformers. The heater winding (T1) for the 5Z4 rectifier is 5 volts at 2 amps.

A circuit diagram of the power supply used at G2DAF is given in Fig. 15. All components can be mounted on an aluminium chassis of size 14 in. × 10 in. × 3 in. deep. Points to note are:

(a) The heater voltage of 6·3 volts a.c. is balanced and "floating" above earth. This prevents hum being induced into the bias and h.t. lines in the cable harness between the power pack and the transmitter, and also ensures that the heavy heater current is not superimposing 50 c/s ripple on the h.t. negative return connection.

(b) The bias supply is stiff and also provides a wide range of adjustment.

(c) The 50 μF capacitor between the 200 volt rail and earth ensures, together with the bleed through the series resistors and stabilizer valve, a stiff screen supply with a low impedance to the demand that will vary at audio rate (see Fig. 5).

(d) The high value of effective capacity of 80 μF across the 5R4 rectifier valves gives an output voltage of 700-750 from a secondary winding of 550 volts and ensures excellent dynamic regulation.

S1 is provided so that the anode h.t. can be reduced to permit operation on the 160m band without exceeding the licensed power limit. This switch must never be used for tuning and loading purposes on the other bands. A 6146 valve fully driven with a low voltage on the anode and normal voltage on the screen will take excessive screen current, the rated screen dissipation will be exceeded and the valve may be destroyed.

The transformer T1 is a standard item purchased on the surplus market, believed to have been made originally by Parmeko and often referred to as a "table topper" type. An alternative for T2 is a centre tapped secondary winding of 125-0-125 volts at 50mA with one DRM-1B rectifier in the usual full wave circuit. A suitable type may be obtained from BULLETIN advertisers or from Radiospares Ltd. through local retailers.

CONCLUSION

A3 operation is obtained by putting in a small amount of carrier with the aid of the carrier insertion control VR3. The output is single sideband with carrier and not true A3.

For c.w. operation the transmitter is best controlled by a "press to talk" foot switch. A key jack socket of the closed circuit type can conveniently be connected in the cathode return of the final balanced converter V11 (between the slider of VR6 and earth). The keying characteristic is clean and free from chirp. The audio gain control should be turned to

TABLE 4.

VALVE VOLTMETER R.M.S. CHECK VOLTAGES

Audio	Cathode of V2b	Gain control at maximum Gain control at normal	0·5V 1·5V
R.F.	Junction of each diode and VR2	Ratio of values will depend on setting of VR2	0·6V 0·67V
	Anode of V3a		12·0V
	Cathode of V3b		8·5V
	Oscillator input to T3	Measured at T3 side of coupling capacitor	5V
	V.F.O. input to T5		5·5V
	Oscillator input to L3	Measured at L3 side of coupling capacitor	7 to 15V depending on band in use
S.S.B.	Either grid of V11	V10 removed to disable osc.	2·4V
	Grid of V12	10m (28·5—29 Mc/s)	8·5V
		10m (28—28·5 Mc/s)	6·6V
		15m	8·0V
		20m	8·4V
		40m	10·0V
		80m	12·0V
		160m	6·0V
	Anode of V12	10m (28·5—29 Mc/s)	95V
		10m (28—28·5 Mc/s)	97V
		15m	120V
		20m	128V
		40m	134V
		80m	155V
		160m	170V

Audio and s.s.b. measurements are made with 1·25 kc/s audio input into the microphone socket and level set to give maximum output from the transmitter unless otherwise stated. When taking measurements at the anode of V12 the 150 pF capacitor is disconnected from the grids of V13 and V14 and the R.F. DRIVE control is adjusted on each band for maximum output.
All readings taken on a Salford Instruments Type BW211B valve voltmeter of input impedance 11 Megohms. NOTE: due to the input capacity of the diode probe the circuit under measurement will require to be re-resonated.

zero and the potentiometer VR3 advanced until the required amount of carrier is available at the transmitter output.

For the benefit of those amateurs who have—or can borrow—a diode probe valve voltmeter a table has been compiled of the r.f. and sideband voltage readings at different stages in the transmitter. The values quoted are r.m.s. values and were measured with a Salford Instruments Valve Voltmeter Type BW 211B. When measuring the voltages at the grid of the EF80 amplifier, V12, it should be remembered that the input capacity of the diode probe will de-tune the anode circuit of the converter V11 and give a false low reading. When the probe is in position each circuit must be brought back to resonance by unscrewing the dust core slightly until maximum reading is obtained. Similarly when measuring the voltage at the grids of the 6146 valves the diode probe should be connected to the V12 anode side of the 150 pF coupling capacitor and the capacitor should be temporarily disconnected from the grids of V13 and V14. This is essential, otherwise any peak r.f. drive that exceeds the negative bias potential (about 50 volts) will cause the p.a. valves to draw grid current, the input impedance will fall to a few hundred ohms and severely damp the resonant circuit thus giving a false low reading. Before taking the v.v. reading the circuit must be correctly resonated, with the diode probe in position, by the front panel GRID TUNING control.

The various oscillator output voltages are not particularly critical and are quite satisfactory if within plus or minus 20 per cent. If they are outside these limits they can most conveniently be adjusted by changing the value of the anode feed resistors.

A convenient method of plotting the sideband filter response curve—either for the h.f. or the l.f. filter—is to use an audio signal generator. The audio generator is connected to the microphone input socket and the AUDIO GAIN control VR1 advanced until the tone input is driving the transmitter at some convenient level. The valve voltmeter probe can be connected either to the anode of V4 or the grid connection to V13 and V14. The passband should be similar to the curve shown in Fig. 16.

The transmitter has considerable reserve of voltage amplification. On the lower frequency bands the R.F. DRIVE control is backed off and progressively increased as the operating band goes higher. It should only need to be fully on when operating on 10m. There is also reserve of audio gain (sufficient for a low level microphone). The correct setting of the audio gain control when using a normal crystal microphone is between half and two-thirds of the maximum position.

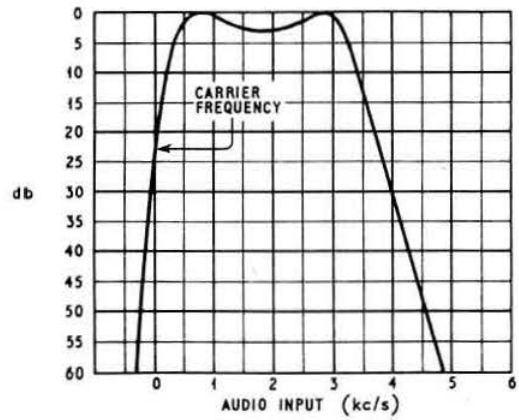

Fig. 16. Filter response curve plotted with an audio generator. In this diagram, zero audio frequency corresponds with the carrier frequency, nominally 25 db down the filter passband. Note that the slope on the carrier side is steeper than the actual filter response due to the bass roll-off in the audio amplifier.

In regard to performance, the unwanted sideband suppression at 1 kc/s (measured at the transmitter output terminal) for either filter is better than 55db. The low impedance diode modulators make the carrier balance particularly stable. The carrier suppression is better than 60db. Due to the use of double triode balanced converters in each of the frequency translation stages and negative r.f. feedback in the penultimate amplifier, the transmitter gives a clean output with a low level of intermodulation distortion pro ucts.

RSGB International Radio Communications Exhibition, October 28-31

In view of the number of enquiries received for stand space at this year's show it has been decided to open the gallery at the Seymour Hall to exhibitors. Firms who intend to take part are recommended to contact the organizer, Mr P. A. Thorogood, 35 Gibbs Green, Edgware, Middlesex.

STANDING WAVE RATIO METERS

By PAUL HARRIS, G3GFN*

OF all the initially simple pieces of test equipment that the transmitting amateur can construct, the standing wave ratio meter is probably one of the most useful. However, like all test equipment, it must be accurate if it is to be worthy of the time and effort spent on its construction. As is so often the case with simple circuitry, within the apparent simplicity of the s.w.r. meter are concealed a number of constructional pitfalls which can seriously affect its accuracy.

The purpose of this article is to describe in detail the construction of units for use on frequencies up to 150 Mc/s, examine the manner in which they operate, review typical applications and to provide information on a method through which the magnitude of any error in the meters may be accurately ascertained.

All of us who operate transmitters are not only interested in generating r.f. efficiently, but also in transferring the power available at the transmitter to the aerial with as little loss as possible in the process. It is usually at this point that our hoary—and often troublesome—friend "matching" raises his head. At the risk of boring the pundits, it is proposed to examine in basic terms what is implied by the terms *impedance* and *matching* when applied to aerials, transmission lines and transmitter output circuits, and through this, put the various problems into perspective.

Getting Down to Basic

The term *impedance* signifies the *effective* a.c. resistance of a circuit. The use of the word effective is particularly important and should be especially noted. In a circuit carrying a.c. we are not only concerned with simple resistance as we know it in circuits handling d.c., but also with two other effects peculiar to a.c., namely, inductance and capacity. (See page 21 etc, RSGB *Amateur Radio Handbook*.) The *effective* resistance to a.c. of an inductance or capacity bears no relationship whatsoever to its d.c. resistance, and the term *reactance* is employed to denote the a.c. resistance of such components. While the d.c. resistance of an inductance or capacity will remain constant, its *reactance* on the other hand will vary according to the frequency of the a.c.

In circuits containing both inductance and capacity, the reactances of the inductor and capacitor are in opposition to each other, and the term *impedance* is used to signify the net effect of all the individual component parts, and includes, where applicable, any pure d.c. resistance. As the actual reactances of the individual "components" vary with frequency, it is usual to quote, except in special cases, not only impedance but also the frequency.

While the terms inductance and capacity have been used in the foregoing, they are not meant to imply any deliberately used inductors or capacitors. The actual manner in which a.c. circuits are laid out can create inductance and capacity, often called self-inductance or self-capacity; and in fact it can be shown that a simple plain straight wire possesses some slight inductance when carrying a.c.

Impedance, then, which is expressed in ohms like d.c. resistance, is the reactance/resistance of a circuit at a particular frequency, except in one or two special cases where it remains sensibly constant irrespective of frequency.

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Aerials

The feed point of any aerial system—that is the point at which r.f. is fed in—has a definite impedance, and the aerial could be replaced at this point by a pure d.c. resistance when the effect, as far as the transmitter is concerned, would be the same as if the aerial were still connected. Different aerial systems have different characteristic impedances ranging from a few ohms to many thousands of ohms depending on type and how they are fed. It matters not whether the aerial is used for transmission or reception, the terminal point will always show a definite value of impedance.

Transmission Lines

Transmission lines, or feeder cables connecting transmitter and aerial together also exhibit, by virtue of their special construction, a specific impedance. However, these are very special cases, for, unlike ordinary wire, they have the important property that, as far as r.f. is concerned, the value of impedance remains sensibly constant irrespective of frequency or length of cable.

Matching—Aerials

Optimum power transfer between feed line and aerial will only take place when the impedance at the point at which the aerial is being fed is identical with either the point feeding it, or the feed line. That is when they are *matched*.

Since feed lines are only available in a limited number of specific impedances, whilst the feed point of aerial systems can vary considerably, it is invariably the case that some form of impedance transformer is used *at the aerial*, positioned directly between the actual aerial feed point and the transmission line.

There is absolutely nothing that can be done at the far end of a transmission line which will alter, make better or improve a mismatch between the aerial and feed line. One is dealing with two absolutely fixed values of impedance, and either they match, or they don't. It is usually because this fact is not appreciated that the majority of matching problems arise.

In long wire and similar aerial systems, the old faithful aerial tuning unit, or its more sophisticated friend the pi-network, are in reality frequency selective impedance transformers providing matching between aerial and transmission line, or aerial and p.a. In the case of directive arrays, a Pawsey stub (balun), quarter wave transformer, gamma match or some other system is used to the same end, namely, to match the array to the feed line.

When an aerial is perfectly matched to the transmission line it will behave as a pure resistance and absorb all the power available in the line.

Matching—The other end

If it is true that the aerial will only take maximum power from the feed line when the two are matched, then it must be equally true that the p.a. will only deliver maximum power

into the line when the output arrangements of that circuit are such that they also match the feed line.

The general effect of a mismatch between p.a. and feed line shows up as an inability to make the p.a. draw (load), but this could also be caused—unfortunately—by troubles at the other end of the line.

Let's have a Mismatch

But before we do, let us first consider a perfect system. If we assume that the point at which the aerial is fed " looks " like 80 ohms, the feed line impedance is also 80 ohms, and the transmitter output circuit adjusted to 80 ohms, then the whole system is matched and, in theory anyway, every last little bit of energy developed by the transmitter can be converted into useful radiation.

Now let's have our mismatch. Let us assume the aerial feed point " looks " like 100 ohms, the feed line is 80 ohms and the transmitter output matched to the feed line. It is obvious that there is a mismatch between feed line and aerial, and this being the case not all the power fed into the line will be taken by the aerial. What happens to the power which is not absorbed by the aerial? It is reflected back down the feed line to the transmitter and is wasted. Where the mismatch is severe, this reflected power can dissipate as heat in the feed line, and under certain conditions, cause dangerously high voltages in the p.a. It matters not whether the aerial impedance is above or below the feed line impedance, the result is the same, reflected power and consequent loss. The greater the mismatch, the greater the amount of reflected and wasted power.

It is this reflected power which gives rise to standing waves on a feed line, and since these are caused by a mismatch between the feed line and the aerial, there is absolutely nothing that can be done at the transmitter end of the line to reduce them.

Sorting out the Problems

While the following comments apply in the main to directive arrays—these usually being the most troublesome—they nevertheless hold good in substance for all aerial systems. By now it is apparent that of the three impedances concerned in coupling aerial to transmitter:

(a) aerial feed point impedance;
(b) feed line impedance, and
(c) transmitter output impedance,

only *one* is truly fixed, and that is the feed line impedance.

For the purpose of this exercise in mental gymnastics it is assumed that a home brewed array is to be used, and furthermore one in which the correct setting of any matching device is completely unknown. If a commercial array is employed the problems are not usually so great, but even these normally require some fine adjustment of their matching system. Of the two variables that we have to contend with, both have virtually an unlimited number of settings, and when paired, produce an astronomically impossible number of combinations.

The usual method of arriving at the optimum settings is a mixture of cut-and-try, high hopes, good judgment, and a strong dose of good luck, all aided and abetted by a field strength meter. It is neither very scientific nor easy on the nerves, and at the end of it all, more often than not, one is still left wondering whether the settings found really are optimum. How then can we be absolutely sure that (a) our adjustments are really being made progressively in the right direction and (b) that our final settings are those which cannot be bettered?

In discussing the effects of a mismatch between feed line and aerial, it was mentioned that when a mismatch occurred, power proportional to the extent of the mismatch was reflected back down the line towards the transmitter. If then we could find some method of quantitatively measuring the value of this reflected power, we would have a direct indication of how our matching adjustments at the aerial end were progressing.

Equally when discussing feed lines and the matching of the p.a. mention was made of the fact that maximum power would only be fed into the line when the p.a. output impedance matched that of the line. If then we could find some method of accurately measuring the power being fed into the line, we could quite easily set up the p.a. output circuit for a correct match by merely adjusting that circuit for maximum power into the feed line.

It will be noted that in both the foregoing requirements, the feed line—which is our fixed impedance anyway—is the common denominator. The measuring system must be able to accurately differentiate between FORWARD power from the p.a., and REFLECTED power from the aerial, and in the final analysis it is this ability which either breaks or makes any proposed method.

The S.W.R. Meter

The standing wave ratio meter fulfils precisely the two functions we require. It measures the forward power on the feed line and expresses this as a voltage across the feedline impedance. It also measures reflected power, expressing this also as a voltage. Subject to careful attention to layout, there is virtually no cross coupling between the forward and reflected indications.

The s.w.r. meter does more than just indicate random forward and reflected voltages on a feed line. It measures accurately the ratio between them, and so quantitatively indicates the power loss in the whole energy transfer system.

Due to the manner in which the s.w.r. meter operates, it is not only an invaluable aid in setting up aerials and coupling systems, but it also permits rapid checking of existing systems to ensure no failures have occurred or adjustments altered. This feature is especially useful in relation to directive arrays for it means that they can be checked from the ground without the need to lower the system—often a complicated operation.

Limitations

Although on the face of it, the s.w.r. meter appears to be ideal, it does have certain limitations which must be considered before construction is undertaken, and borne in mind when used.

Firstly, while in theory an s.w.r. meter may be constructed for any transmission line impedance, practice has shown that it has greatest accuracy when designed for, and used on, co-axial lines. This is largely because, with twin feeders, it is very difficult to avoid stray coupling between input and output connections to the meter. With co-axial lines where—when they are properly matched—all the r.f. is contained in a shielded conductor, any stray coupling is more or less automatically avoided.

Secondly, the s.w.r. meter is somewhat frequency sensitive in relation to the magnitude of its indications. That is to say on the lower frequencies it requires considerably more power to cause full scale deflection of the indicator than it does on higher frequencies.

Thirdly, depending on one part of the circuit, there is a frequency above which the meter should not be used as it becomes inaccurate.

In actual practice none of these limitations are troublesome provided that they are appreciated, and, when the s.w.r. meter is built, consideration is given to the frequencies upon which it is most likely to be used.

S.W.R. Meter Circuit

Fig. 1 shows the circuit of an s.w.r. meter developed by the writer from the original Monimatch design described in *QST*. Basically the device consists of a length of co-axial cable—*A*—of the same impedance as the feed line to be used,

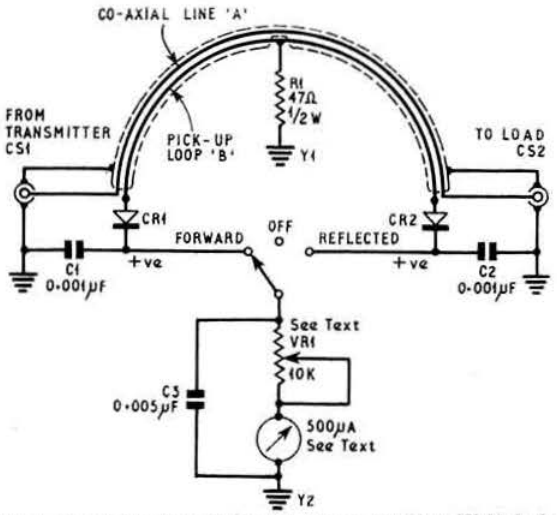


Fig. 1. Circuit diagram of the s.w.r. meter. For 50 to 150 Mc/s the co-axial line A should be 7 in. long, and line B a 9 in. length of 24 s.w.g. Formvar tough enamelled wire fitted as described in the text. For 28 Mc/s and below, the co-axial line A should be 16 in. long, and line B as for 50 to 150 Mc/s, but 18 in. long (see text). The diodes CR1 and CR2 should be a matched pair.

connected between two co-axial sockets CS1 and CS2. Underneath the braiding of this length of co-ax—that is between the braid and the inner conductor—is passed another wire—*B*—which is brought out through the braiding at *exactly* the centre of the length of *A*, and then fed back in again so that it also runs from CS1 to CS2 but with a centre tap point.

This wire *B* is the crux of the whole unit for it is on the arms of this, about the centre tap, that the forward and reflected power is picked up, and therefore it must be accurately balanced.

In the original design, a single diode was employed, being switched to either one arm or the other of the wire *B*. In practice, while this system undoubtedly worked, it was found that the minimum error could not be reduced below a figure which was considered unacceptably high, due to stray capacity across the switch. By fitting a pair of matched diodes, one permanently in each arm of *B*, and then switching the resultant d.c. as shown in this circuit, practically zero error can be achieved.

The metering circuit is a simple voltmeter fitted with a variable series resistor which acts as a sensitivity control. In respect of this metering circuit, the total resistance of the voltmeter circuit should not fall below at least twenty times the value of R1 otherwise accuracy will suffer. For this reason the meter used should have a sensitivity of not less than 1mA f.s.d. and should really be 500μA or better.

The upper working frequency of the s.w.r. meter is governed by the length of the cable *A*. The highest frequency on which the meter should be used is that where the length of *A* becomes about one-tenth of a wavelength, When *A* becomes more than this, capacity effects between *A* and *B* upset the required coupling co-efficient. In fact for highest accuracy it is preferable to limit the frequency to that where *A* becomes one-twentieth of a wavelength long.

Since the voltages induced into the secondary circuit *B* become greater as the effective wavelength of cable *A* increases, the sensitivity of the meter will increase with frequency. For this reason on the lower frequencies the meter will require progressively more power to give full scale deflection. It is usual therefore, to design s.w.r. meters for limited frequency coverage.

The circuit shown will operate in the range 50 Mc/s-150 Mc/s, this particular meter being developed for use on the 70 Mc/s and 144 Mc/s bands. For operation on 28 Mc/s, 21 Mc/s, 14 Mc/s and lower, the alternative arrangement for line *A* and loop *B* should be employed.

While the particular arrangement shown uses a built-in meter, there is no reason why a jack socket should not be fitted in place of the meter, and a common calibrated meter used in conjunction with a number of s.w.r. "heads." If this course is adopted, screened cable must be used between the meter unit and the various "heads" to avoid r.f. pick-up on the meter lead.

While a 10K ohms sensitivity control is shown at position RV1, if the meter is to be used with high power transmitters of the order of 100 watts or more, this may well have to be increased to 150K ohms or more to keep the deflection under control.

Construction

The complete unit is assembled in an Eddystone die-cast box measuring 4½ in. × 3½ in. × 2 in. deep. The lid of the box is used as a base and fitted with four rubber feet. The meter, which is a 500μA unit by Kyoritsu Electrical, is mounted permanently along with the other components on the body of the box.

The main drilling details are shown in Fig. 2. One hole is omitted, and that is the one used to secure the tag which earths the end of R1. The situation of this earthing point is important, and should be, in the case of the v.h.f. model, positioned so that R1 is at right angles to the lines *A* and *B*, and earthed by the shortest route, but ensuring that the path lengths from the actual earth point to CS1 and CS2 are the same.

When the alternative line is used, the tap point will be found to face towards the switch, since this has to be coiled up to fit into the box. To allow R1 to be earthed correctly on the h.f. model, using the longer line, the earth bar *Y*—see Fig. 3—is run directly between C3 and a tag point fitted dead centre on the front edge of the box. R1 is connected from the centre tap of line *B* to this earth bus bar by the shortest route.

In order to fit the pick-up wire *B* into the co-axial cable, the outer insulation is first removed, and a gap made at the dead centre of the screening. The screening is then carefully slid back from one end to this gap, and the pick-up wire fed in from the open end and out through the gap. The screening

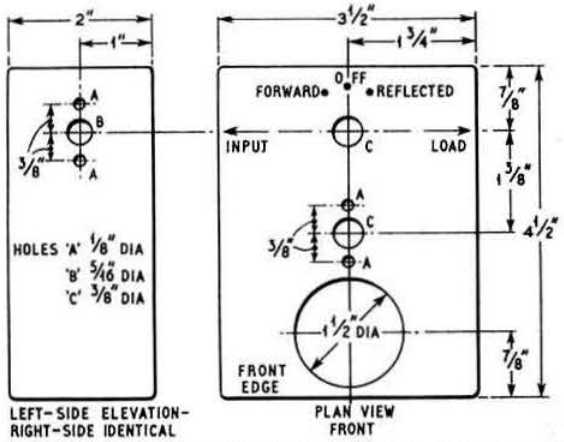


Fig. 2. Drilling plan for the Eddystone die-cast box. The removable lid of the box is fitted with four rubber feet and is used as the base. The original base becomes the panel, and is drilled as shown. The sensitivity control is a Radiospares pre-set type, and if a different pattern is substituted, the hole C2 with the holes *A* above and below it will have to be altered accordingly.

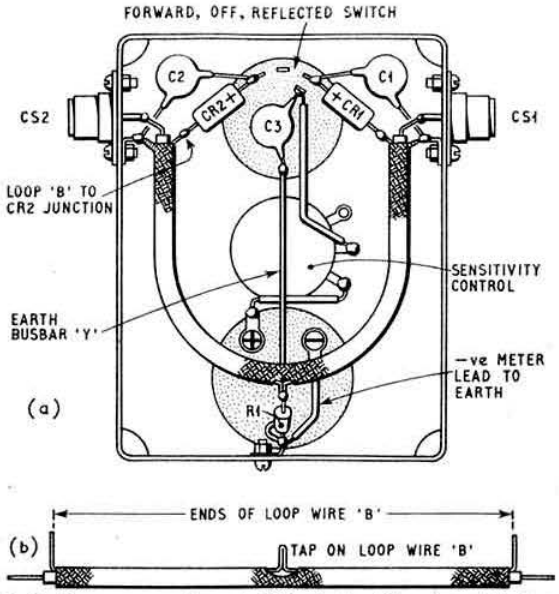


Fig. 3. The component layout within the box (above), and the form of construction of lines *A* and *B*, further details of which appear in the text and in Fig. 1.

is then smoothed back on this half. The screening of the other half is then slid back to the " gap," a hairpin loop made in the pick-up wire, which is then fed back in through the gap and out of the now open end, after which the screening is smoothed back into place.

In the case of the v.h.f. loop, it may be fitted directly, but the h.f. loop should be bound with a single layer of plastic insulation tape before it is coiled up and fitted into place.

Actual component positions are shown in Fig. 3. The object of the exercise is to ensure that, upon drawing an imaginary line down through the centre of the box, the left and right hand sides are exact mirror images of each other, especially in relation to CR1, CR2, C1, C2, and each half of the co-axial line.

Adjustments

The most satisfactory manner in which the completed meter can be tested and adjusted is by the use, at its outlet socket CS2, of a resistive dummy load equal to the line impedance. Once the meter reads correctly when running into such a load, it is bound to be correct when used in an actual system, for, when an aerial is correctly matched it appears to the line as a resistive load.

Fig. 4 shows the construction of two dummy loads, one rated at 10 watts, and the other at 50 watts, both of which have been found entirely satisfactory in use. These loads have been found invaluable on many occasions and are well worthwhile constructing for their own inherent utility.

Adjustments to the bridge should for preference be made at the highest frequency at which the bridge is to be used, for, as the frequency increases, the capacity effects on each side of the circuit about R1, will be at their greatest. It is unbalance in these stray capacities which are largely responsible for inaccuracies, and the object of the adjustments is to balance them. Perfect balance, which is usually impossible to obtain, would reduce the standing error to zero.

Initially the sensitivity control should be set to minimum—turned fully anticlockwise—a dummy load connected to the aerial socket CS2, and the transmitter connected to CS1. Set the selector switch to FORWARD. Switch on the transmitter and adjust the sensitivity control to give half scale deflection.

Adjust the output link or circuit of the transmitter to cause the meter reading to increase to the highest possible level, adjusting the sensitivity control of the meter to keep the meter indications under control.

Once this condition has been achieved, try different 47 ohm resistors at position R1, and also check the effect of various 39 ohm and 33 ohm resistors. The actual resistor which should be finally fitted is the one which, without altering the transmitter output conditions, gives the greatest deflection on the meter. Any violent jumps in meter deflection—which should not normally occur anyway—should be controlled by using the sensitivity control and not, repeat not, by adjustment to the transmitter.

Now set the sensitivity control so that the meter reads exactly full scale deflection in the FORWARD position, and then switch to REFLECT. In all probability some meter reading will be obtained. This represents the unadjusted zero error of the instrument, since as the load is for all intents and purposes resistive, no reflected reading should be obtained. The object of the following adjustments is to reduce this reading to an absolute minimum.

With a length of insulated rod, carefully adjust the position of the combined loops *AB*, one side at a time to secure minimum meter deflection. During these adjustments it is essential to switch to FORWARD from time to time to ensure that the meter continues to read *exactly* full scale. Naturally it is not much good reducing the reflected indication if the forward indication goes down as this would in any event reduce the reflected value!

If adjustment of one side or the other of the loop does not have the desired effect, vary the positions of CR2, C2, CR1 and C1, and in that order. If no amount of persuasion will reduce the error, then look to the dummy load, especially for any signs of overheating, and if this is the cause, reduce the transmitter output, but *not* by altering the output coupling arrangements. Rather do this by reducing the p.a. voltage, or if tetrodes are used in the p.a. stage, by increasing the

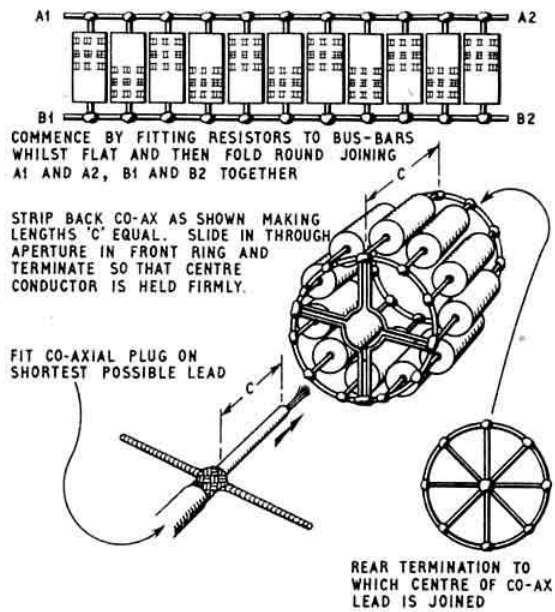


Fig. 4. The method of assembling the 75 ohm dummy load. For 10 watts dissipation, 11 820 ohm, 1 watt, 10 per cent carbon resistors should be fitted to form the " cage," and for 50 watts, 25 1800 ohm, 2 watt, 10 per cent carbon resistors should be used.

value of their screen resistors until the s.w.r. meter has been adjusted.

One word of caution: do not attempt to adjust the s.w.r. meter using a lamp as a dummy load. It just will not work. For these adjustments the load must be as near resistive as possible, and an ordinary lighting bulb has a considerable reactance.

In a typical case, the starting zero error on a 500μA meter amounted to 50μA, and by adjustment of the loop and C2 this was reduced to below 5μA. The maximum acceptable error in the case of a 500μA meter is of the order of 20μA.

Calibration

Provided that the meter circuit operates at a sensitivity of at least 1000 ohms/volt, the readings *v* s.w.r. values will closely follow those given in table 1. This table will hold good for any meter having a sensitivity of 1mA or better, and where the series resistor RV1 does not drop below 1K ohm.

Television Interference

While an s.w.r. meter may be left in the feed line all the time, and if set to FORWARD would monitor the power fed into the aerial, it is inadvisable to do so. At high power levels, the diodes can be pumped pretty hard, and this can cause TVI.

If it is desired to monitor line power in this way, it is better

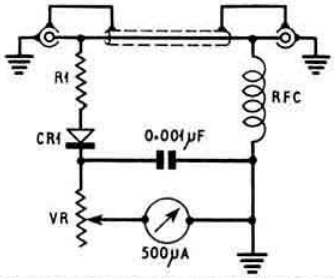


Fig. 5. The in-line r.f. voltmeter for monitoring power in a co-axial line. R1 is placed before the diode to reduce "pumping" of the diode and consequent harmonic distortion, and should be about the same value as VR. Both values will have to be determined experimentally, according to the line voltage present. A suggested common starting value is 10K ohms.

to use the simple voltmeter circuit of Fig. 5. In this, the current through the diode is limited by placing the resistor R1 before the diode. This simple but effective idea has been proved to eliminate TVI due to excessive pumping of the diode.

Applications

Briefly stated, the s.w.r. meter can be used in any application where it is required to couple r.f. energy from one circuit to another via a co-axial line, and it will indicate correct matching between the two circuits and hence optimum power transfer.

For a variety of reasons, perfect conditions where the s.w.r. is 1 : 1 are rarely—if ever—achieved. With aerial systems in particular, a ratio of 1·25 : 1 is considered excellent, while 1·5 : 1 is considered good, and the usual aim is to end up with an s.w.r. of 1·5 : 1 or better. While it is not supposed to matter whereabouts in the line the s.w.r. meter is connected, for aerial adjustments it should be positioned as near to the aerial as possible. When the adjustments are completed, transferring the meter to the other end of the line should show substantially the same readings, thus indicating a reasonably flat line. Some of the cheaper brands of television downlead are not particularly good in this respect, and the s.w.r. meter will soon show that it does not always pay to use this type of co-axial cable in power transmission applications.

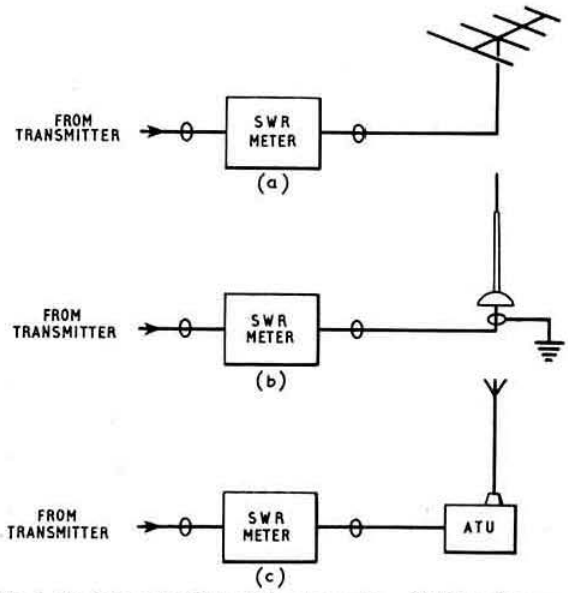


Fig. 6. Typical applications of the s.w.r. meter. (a) Using the s.w.r. meter for setting up a directive array. (b) Using the s.w.r. meter for matching a v.h.f. vertical aerial. (c) Using the s.w.r. meter to secure optimum settings for a long wire or other open type aerial.

Three typical examples of the use of the s.w.r. meter are given below, and illustrated in Figs 6(a), (b) and (c).

In Fig. 6(a), the s.w.r. meter is connected in the feed line of a transmitter coupled directly to a multi-element array, this aerial having its own built-in matching system. The meter is switched to FORWARD and the transmitter output coupling adjusted to give maximum meter deflection, reducing and adjusting the meter sensitivity control as required. Once this has been achieved, carefully adjust the meter sensitivity control so that the meter reads precisely full scale deflection. Switch to REFLECTED and adjust the aerial coupling device for minimum s.w.r. reading. Repeat these two operations until (a) no further increase in forward power can be achieved and (b) the reflected power is at its very minimum.

In Fig. 6(b), the s.w.r. meter is connected in the feed line between the transmitter and a vertical aerial. This is in fact a

TABLE 1

S.W.R.	Meter reading in REFLECTED position (Meter scaled 100 divisions)
1 : 1	0
1.25 : 1	10
1.5 : 1	19
2 : 1	35
3 : 1	50
4 : 1	60
5 : 1	68
10 : 1	82
20 : 1	90
50 : 1	95
100 : 1	98

typical 70 Mc/s mobile application. On this band, the majority of mobile installations employ a standard car type BC aerial with the dubious quality and impedance co-axial cable removed, and low loss 75/80 ohm cable fitted in its place, and the aerial itself fitted in one of the normally accepted positions. There is usually no attempt to match the base impedance of these nominally ground plane aerials to the feed line by an actual coupling device, but rather the length of the aerial is varied until its base impedance matches that of the feed line.

The use of an s.w.r. meter is almost mandatory in making such adjustments for it gives undeniably positive indication of when the base impedance of the aerial matches the feed line. With the meter in the feed line close to the base of the aerial, and the aerial adjusted to a calculated quarter wavelength, in the FORWARD position of the meter the p.a. coupling is set to give maximum power on the line. On switching to REFLECTED, the aerial length is varied for minimum s.w.r. The process is repeated until no further improvement can be obtained. In a typical case the s.w.r. was reduced to better than 1·25 : 1, and the radiated field, as indicated on a transistorized field strength meter some 200 feet away, showed double its initial value.

In dealing with cars and other vehicles, a word of warning is in order. Opening doors, boot lids and the like can cause detuning, and care should be taken to ensure that all measurements are taken under identical conditions, preferably when all closed up.

In Fig. 6(c), the s.w.r. meter is connected in the feed line between an l.f. transmitter and its associated a.t.u. The procedure is identical to that already described, and will provide a far more accurate indication of power radiation than the normal thermocouple meter, which, if left in, will confirm the settings found by using the s.w.r. meter in most cases. However a word of caution. Maximum current on a thermocouple meter " in the shack " does not always mean optimum radiation from the aerial. Fit an s.w.r. meter, enlist the assistance of a station—not too close—with an S meter, and then correlate the three readings. You may well be in for a few surprises.

Conclusion

Despite its minor limitations, the s.w.r. meter is such a useful little device that once one has used it, one wonders how on earth one got on without it. It cuts the slap-dash and comedy out of matching aerials, substituting positive knowledge for uncertainty, and perhaps best of all, it allows instant checking of lofty arrays while they are still up scraping the clouds.

Transmitter Ratings

FROM time to time members ask Headquarters how power input to a certain type of amateur transmitter is to be measured. Everyone is familiar with the method for A1 and A3 transmitters (p.a. anode voltage multiplied by the anode current in amps gives the input power in watts) but other systems, particularly single sideband and grounded grid amplifiers present a somewhat different problem.

Single Sideband Transmitters

The Post Office states that: " The peak r.f. power output from an A3a transmitter shall not exceed that obtained from the A3 transmitter working at an overall efficiency of 66 per cent. The power shall be measured by the following process:

(i) Apply a pure sinusoidal tone to the transmitter and adjust the input to 150 watts d.c.; the deflection on a cathode-ray tube by the r.f. envelope shall be measured. (D.c. input power is the total d.c. input to the anode circuit of the valve(s) energizing the aerial.)

(ii) Replace the tone by speech; the maximum deflection on the cathode-ray tube showing the r.f. output caused by the peaks of speech shall not be greater than twice the previously measured deflection for the tone input."

Frequency Modulation

The Post Office states that: " The carrier frequency [of an f.m. signal] must be at least 10 kc/s within the limits of the frequency band in use and that the maximum deviation of carrier frequency shall not exceed 2·5 kc/s. The maximum effective modulating frequency shall be limited to 4 kc/s, and the audio frequency input to the frequency modulator at any frequency above 4 kc/s shall be not less than 26db below the maximum input at lower frequencies."

Although the Post Office does not state the maximum effective modulating frequency for other types of phone operation, it is good practice to restrict the bandwidth to 4 kc/s or less (a frequency response of 500 to 2500 c/s is generally considered adequate for communication purposes).

Earthed or Grounded Grid Power Amplifiers

In the opinion of the Society's Technical Committee, the power input, effectively, to a grounded grid power amplifier stage should be reckoned as 10 per cent greater than the product of the anode voltage and anode current to that stage. One proviso is, however, that to prevent unreasonable driving power being used the power input to the driver stage should not exceed 50 per cent of the d.c. power input to the driven stage.

Pulse Modulation

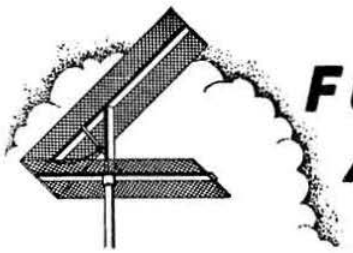
The use of pulse modulation is permitted in the bands 2350-2400, 5700-5800 and 10,050-10,450 Mc/s, the systems specified being P1, P2d, P2e, P3d and P3e. These may be defined as follows:

P1 —Telegraphy without the use of a modulating audio frequency signal.
P2d—Amplitude modulation of the pulse by audio frequencies for telegraphy.
P2e—Width modulation of the pulse by audio frequencies for telegraphy.
P3d—Amplitude modulation of the pulse by audio frequencies for telephony.
P3e—Width modulation of the pulse by audio frequencies for telephony.

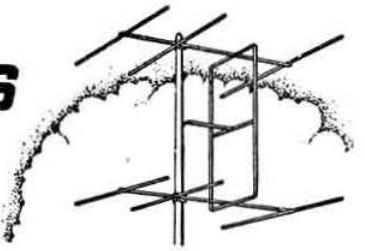
The maximum mean d.c. power input is 25 watts and 2·5 kW peak input power at the crest of the pulse. The limit of 2·5 kW peak d.c. input implies a maximum peak-to-mean ratio of 100 : 1, or a 1 per cent duty ratio.

The duty ratio is defined as the ratio between pulse duration and pulse repetition period. For example, if the pulse duration is t and the interval between the beginning of one pulse and the beginning of the next is T, then t/T is the duty ratio.

It is essential for a station employing pulse modulation to have a suitable cathode-ray oscilloscope in order to set up the transmitter. To display the envelope of the r.f. pulse, some of the r.f. output should be applied to the Y plates of the tube, the X plates being operated from the time base which should be locked at a sub-multiple of the repetition frequency.



FOUR METRES AND DOWN



Record Attendance at Scottish V.H.F. Convention

By F. G. LAMBETH, G2AIW *

THE Scottish V.H.F. Convention, organized by Bill Miller, GM3PMB, and held at Rutherglen, Glasgow, on Saturday, April 18, had a record attendance, with 62 at the Dinner in the evening. Considerably more were present for the lecture session in the afternoon, the first speaker being Tom Withers, G3HGE, who discussed the "do's and don'ts" of v.h.f. equipment construction with particular reference to problems he had experienced in manufacturing equipment for the v.h.f. amateur. His dry humour appealed to his predominately Scottish audience. As well as discussing some of his equipment, he also showed a Varactor multiplier, which is at present being manufactured for professional use. It gives an output of 6·5 watts at 375 Mc/s for 10 watts drive at 125 Mc/s (with no h.t. supply of course). It seems that such a device will be widely used by amateurs, especially as the price, although not quoted, is not likely to exceed £20, and will no doubt reduce as the prices of the Varactor diodes become less.

After a break for tea the Scottish transistor wizard Ed Murray, GM3SBC, described a fully transistorized s.s.b. generator which delivers 2 watts p.e.p. at 3·5 Mc/s (using this power he has worked GM2FHH on 80m) and has great potential both for h.f. and v.h.f. s.s.b. operators. GM3SBC does not consider s.s.b. worthwhile on v.h.f. in Scotland at present as a number of operators still use self-excited local oscillators. He also demonstrated his latest all transistor 2m walkie-talkie which delivers an output of 65 mW. Contact was made with GM5JU/M to give a practical demonstration of its performance. A transistor 144 Mc/s converter was also shown. We hope to be able to publish some details of this fine equipment in the BULLETIN later in the year.,

There was a good contingent from South of the border with the Council represented officially by Ray Hills, G3HRH, RSGB V.H.F. Manager, and Jim Foster, G2JF, the former replying to a toast to the Society ably proposed by Fraser Shepherd, GM3EGW, during the Dinner. The President of the Society, Geoff Stone, G3FZL, took the Chair at the Dinner and during the proceedings gave some details of the Lerwick IQSY experimental transmitter and other similar projects.

Austin Forsyth, G6FO, was unfortunately unable to attend but sent his regards to all present. Other Gs at the Dinner included G3HWR (London), G3JYP (Westmorland), G3OPX (London), G3NSJ (London), and, of course, G3HGE and G5JU. A number of members of the Glasgow RSGB Group, including David Macadie, GM6MD, and the Radio Club of Scotland, including Tommy Hughes, GM3EDZ and Albert Barnes, GM3LTB, were present. Other distant travellers included GM2FHH (Aberdeen), GM2UU (Stranraer), GM4HR (Dundee), GM2KYI (Dundee), GM3CEA (Stranraer), GM3EGW (Dunfermline), GM3FYB (Dunfermline), GM3IQL (Dunfermline) and GM3GZA (Campbeltown, Argyll). Of great interest is the news that the last mentioned is now active on a frequency around 145·8 Mc/s.

There is no doubt that interest in the v.h.f.s in Scotland continues at a high level; it is interesting to note that of the GMs that sat down to dinner 15 are active on 4m, 30 on 2m, 60 on 70 cm and 2 on 23 cm. Good news also is that more GM portable stations are planning to participate in v.h.f. field days this year. This follows the lead given by GM6XW who was presented with the Jock Kyle Memorial Award by G3FZL at the Dinner, in recognition of his portable work which also gained him the position of leading Scottish Station in V.H.F. NFD 1963. G3FZL also presented him with his RSGB certificate for this achievement. One portable station planning to be out on May 3 is jointly organized by GM3EGW and GM3FYB who will be operating near 145·9 Mc/s.

The trade supported the convention well, with exhibits from J-Beam Aerials Ltd., T. Withers, Green and Davis and Eddystone. There was also a display of home constructed equipment. Another very interesting exhibit was the original 23 cm equipment used by the late Jock Kyle, GM6WL.

In all a very successful event which is to be repeated next year in the Edinburgh area.

Four Metre Band to be Extended

The Society is pleased to announce that as the result of discussions by RSGB representatives with the Post Office, the 70·2 to 70·4 Mc/s band is to be extended shortly to 70·1 to 70·7 Mc/s.

The existing band is allocated until further notice to stations in the Amateur Service on a secondary basis on condition that they do not cause interference to other services. These conditions will continue to apply when the band is extended. Furthermore, use of the band will be subject to certain other conditions, including one which will permit disaster relief operation under Clause 1(1)(c) of the Amateur (Sound) Licence only on 70·375 Mc/s $\pm$ 25 kc/s. Frequencies between 70·1 and 70·3 Mc/s inclusive and 70·5 and 70·7 Mc/s inclusive shall not be used on the North West side of the line Firth of Lorne to the Moray Firth. Use of any frequency in the band must cease immediately on the demand of a Government official.

It is hoped to make a further announcement in the June or July issue of the RSGB BULLETIN.

* 21 Bridge Way, Whitton, Twickenham, Middlesex. Please send all reports for the **June** issue to arrive by **May 8**, and for the **July** issue by **June 5**.

Four Metre Reports

G3FDW (Gosforth) has been working s.s.b. with some success as more people are getting used to receiving it. There has been a two way contact with G3BA. There is now a daily sked at 06.30 GMT with G3BA and also at 07.30 on Saturdays and Sundays. This is proving quite successful, as is a weekly sked with GI3HXV at 10.15 GMT. Others may join in, as the band is always tuned after the skeds. There was a very strong auroral opening late in the evening of March 2. Many carriers could be heard up to S8 with the beam heading 330°, but calls for 1½ hours on c.w. with an input of 50 watts brought no results. The rig at G3FDW is now v.f.o. controlled and operation is full break-in on c.w. and s.s.b., with an effort to call stations on their own frequency.

G4OU (Sheerness), as a result of a 2m QSO with G3PNI (Margate) has remarked that there is much activity on 4m in Kent, including mobile. Through consistently working on the band, G4OU has established that G4XF, G3BPT, G3GGH, G3NGK, G3BSU, G3NES, G8BJ, G3POY, G3OYZ, G3GZJ (s.s.b.) and quite a few others are active; mobile stations include G3GGH/M, G3POY/M, G3GOX/M and a few others. From Essex and Suffolk one can hear and work G4AC, G3FIJ, G3PGN, G3SJO and many others, whilst from Sussex and Surrey one finds G3KMP, G3MEH, etc. All in all this discloses quite a bit of activity in the South East, and neighbouring areas. G4OU finds 4m far superior to Top Band for relatively local working up to about 30 miles (less noise and no wandering, nameless v.f.o.s!) The gear at G4OU includes a home-built transmitter running 12 watts to either a vertical 3-element Yagi, or a 3-element horizontal Yagi, at 26 ft. A home constructed crystal controlled converter (E88CC r.f., 6AK5 mixer, 12AT7 oscillator) into a CR100 tuning 1·8 to 2 Mc/s forms the receiver. Activity on 4m over the last few months has been seen to grow apace with the advent of surplus commercial gear, but there is still room for much more activity, for obvious reasons. The fact that Continental DX is lacking should not deter potential users. There can be a lot of interest (and DX) for 4m within these islands.

G3SGR (Horam, Sussex) is active on 70·260 Mc/s using a dipole at 30 ft. The equipment is a B44 Mk II modified by G3RTI (Eastbourne). This transmitter-receiver is also used mobile, and some fairly good reports have been received whilst travelling on the London/Eastbourne road. The other stations active locally are **G3KLX** (East Dean), **G3RTI**, and **G3KMP** (Hastings). There are also one or two who can only listen at present.

Two Metre News and Views

G5MR is shortly moving to a new QTH at Stelling Minnis, 7 miles North of Hythe (Kent) which is 475 ft. a.s.l. with a clear take off to north and east. There will be nothing between the aerial and the North Sea, which is quite a change! G5MR is hoping to find a little more spare time for 4m, 2m and 70 cm. Up to now, the local 2m skeds with F8GH, G2JF and BRS15822, have been the only activity possible. We should be glad to know who claims the longest distances worked on 23 cm.

We hear from G3MCN (Liverpool) that members of the Liverpool and District Amateur Radio Society will be operating **GW3AHD/P** from Carnarvonshire on May 23/24 on 2m and 4m. This will be the first of many v.h.f. DXpeditions this year and they hope to take part in all the v.h.f. contests.

A3016 (Lowestoft) reports that conditions have been poor recently, but that an excellent general coverage "G" opening occurred on March 11 when GB3VHF was S9 and G2DQ/M in Kent was heard at the same strength. Other stations heard include: G2FNW, G3BOC (Cheshire, 225 miles), G3DOV, G3FUR, G3GWL, G3GSO, G3IRQ, G3PHE, G3PSL, G3PTB, G3RMJ, G3RND, G3SAR, G3SJO, G5ZG, G6CW, G6OU (using n.b.f.m.), PA0BM, and PA0CML. The counties score is now 29, with 10 countries, the aerial still being a 4-over-4 slot at 30 ft.

G3JGJ (nr. Newton Abbot) has been keeping up the daily sked with G5ZT (Plymouth) and G3IEA (Torquay). G3KHU (Plymouth) is also occasionally heard. G6XD is now located near Teignmouth, but has not yet been heard from there. The sked with GC2FZC has been missed several times owing to the very cold weather, but he was heard on April 8 at RST 57/89, the strongest signal for a year. GB3CTC was heard on March 14 at RST 53/49. G3JGJ went portable at over 1100 ft. a.s.l. and heard G3MNQ/P (Somerset) and GW3MFY was worked with only 4 watts input! GW8UH was heard,

but only at RS56. G3IGV (Cornwall) was heard calling G5ZT. GC3OBM was heard at 18.25 GMT, also G5DW/M. On March 16 G3JGJ was again out portable, and G3IEA and G5ZT were both worked. On March 22, G3MVA was heard at RS59 and on March 23 G3IGV was worked at 19.30 GMT. On March 27, GC3PCR (Sark) came back to a CQ on c.w. and went on to phone at RS59+ (about 14.20). He was also heard several times during the next two days. On April 3 the temperature was 34°F at 07.00 and snow fell for about 20 minutes. It was also snowing on April 4 and 5. G5ZT was worked on phone, then G3RKH (Dawlish) for the first time on phone. G3OCB (working G3OJY) was heard at 20.00. On April 8 G3ICO (Yeovil) was worked.

G3MTG (nr. Bridgwater) says that all his activity was in the early part of the past month. Conditions on March 2 were good with several stations worked at good strength including G5LK (Portsmouth), G5HA (Hull) and G2HCJ (Liverpool) representing the north and south extremes.

Conditions during the 144 Mc/s Open Contest were not good and even the Home Counties stations were scarce and much weaker than usual. A score of 76 contacts was aided by a large number of local stations who came on.

G3OCB (nr. Truro) also says conditions have been very poor and the barometer low. Later in the period, slightly more settled weather brought some improvement, and QSOs have been made with G6GN, G3SHK, G3AHB, G3ICO, G3EGV, G3OBD, and G3GHI, as well as several locals. Reports suggest that his new linear amplifier is performing well, and up to expectations. Local activity is quite good, regular operators being G3XC, G3NVJ, G3IGV, G3EKM, occasionally G3OJY from Cornwall, G5ZT, G3KHU, G2BOT and G3BRJ from Devon.

G3LTF (Galleywood) has been running s.s.b. skeds with PAs in the Amsterdam and Hague regions. It appears to get through even in bad conditions. The gear runs about 200 watts p.e.p. with a new Yagi aerial (11 elements including 3 reflectors). This has been designed and cut to give low side-lobe levels, better than 18db all the way round, which G3LTF considers of prime importance in the QRM battle on 2m. On April 8 there was a slight opening on 2m, and F8VN was worked at 59, but conditions are not yet settled.

Seventy Centimetre Reports

A3016 (Lowestoft) has recently started listening on this band with an A2521 converter into an Eddystone S640 tuning 12/14 Mc/s, the aerial being a 4-over-4 slot at 33 ft. GB3GEC has been heard at S2-3 but no other stations have yet been heard. The Saturday 7 p.m. listening sked has been kept and A3016 has also been listening on Sundays for the Fens Amateur TV sked, but nothing has been heard.

G3LTF (Galleywood) reports a small opening on March 11 to PA, ON and F. F9NJ was S9+.

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

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

RSGB V.H.F. BEACON STATION GB3VHF

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

Date	Time	Error
March 24	... 10.05 GMT	1860 c/s high
March 31	... 18.17 GMT	3200 c/s high
April 7	... 15.20 GMT	1830 c/s high
April 14	... 10.00 GMT	1100 c/s high
April 21	... 10.50 GMT	1650 c/s high

LONDON U.H.F. GROUP

will meet at the

Bull and Mouth Tavern

corner of Bloomsbury Way and Bury Place, London, W.C.1,

at 7.30 p.m. on Thursday, May 7, and June 4, 1964

All v.h.f. and u.h.f. enthusiasts welcome

The Contests Committee reminds us that the first 430 Mc/s Contest will take place on May 30/31, and they hope for a bumper entry.

Twenty-three Centimetre Reports

G3LTF (Galleywood) now has 10 watts output from a 2C39A tripler in a very simple circuit. The aerial, at 45 ft., is really "wee"—only 2 ft. 6 in. square overall! It is fed by 75 ft. of cable (UR59 type) and G3LTF says "don't be put off by the myth of nothing left at the other end." Only a slight loss was noticed, provided that it was correctly matched.† This is very important. The reflectometer (G6LL and G6CJ) works well on 23cm using about 30 ft. of old 75 ohm TV type co-ax as a dummy load. Results include: G3NOX/T over a 28 mile path, with signals a good 58 and QSOs possible at any time. To G3LQR, also a 28 mile path, phone signals 57 and QSOs possible at any time. There was a first QSO with G3GDR at 539 (out), 559 (in), on March 27 over a 40 mile path. G8RW received G3LTF on March 29 at RST 5-3/4-9. G5DT received him on March 28 at 539. Tests with G3FP have not been successful as yet.

Two Metre Contests—Claimed Scores

Hereunder is a list of leading claimed scores in the 144 Mc/s Open Contest, 1964, and the V.H.F. Listeners' Contest, 1964. They are not official results, and are subject to checking.

GW3RUF/P*	3435	G3SHK	1850
G3GHI	2090	G3LLJ/A	1850
G3RMJ	1955	G3NUE	1840
G3GOZ	1920	G5MA	1750
G6GN	1905	G3MDH/P	1745

* Multi-operator station.

Listeners

R. A. Fuller BRS25985	1570
A. Blandford BRS18572	1300
W. Parmenter BRS22445	1225
R. Thomas BRS15822	1130
G. Rolland A3766	1055
G. Swan A3696	1005
R. Ham BRS15744	975
E. Crane BRS13336	790
M. Harrison BRS24733	770
J. Harvey BRS19682	755

PZK Trophy

In the European Region I V.H.F. Contest, held in September, 1963, G2JF came second in the overall classification, and top in the 2m fixed section, which won him the PZK Trophy.

Sark Operation

Between March 25 and April 1, an expedition station was operating from the island of Sark, using the call-

† The rated loss of UR59 cable at 1000 Mc/s is 7 db per 100 ft. On that basis, the matched loss of 75 ft. at 1296 Mc/s would be about 6 db, which should be noticeable.—EDITOR.

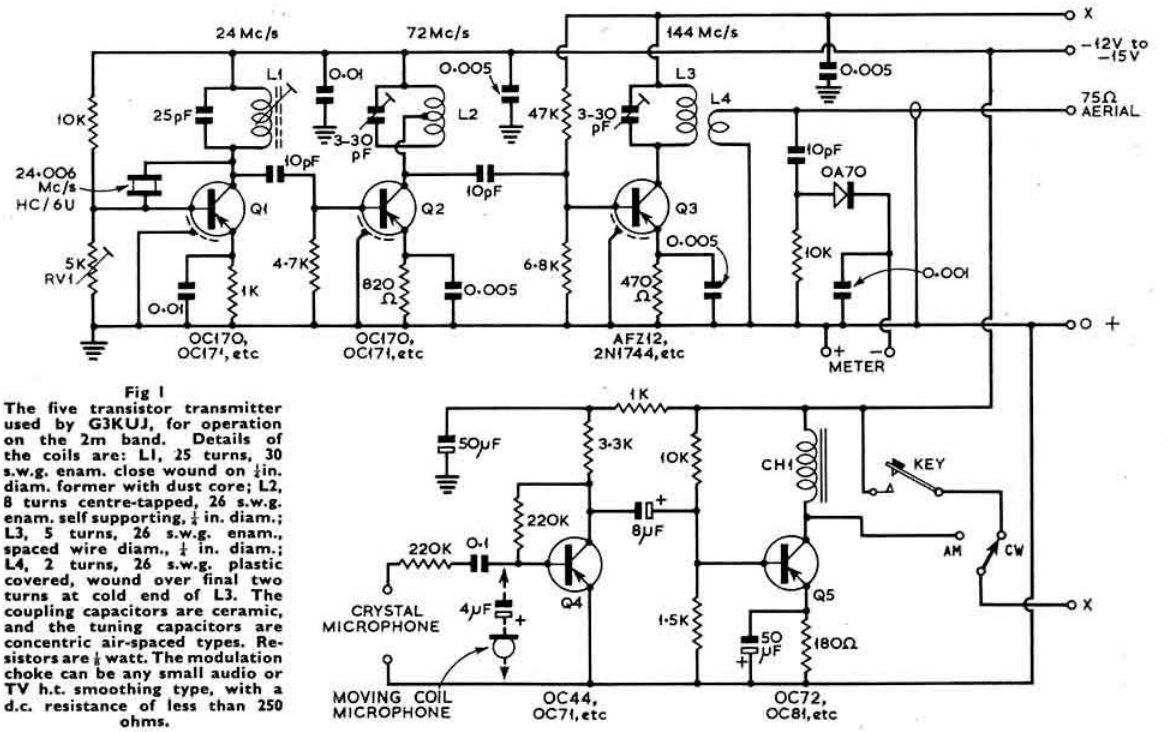


Fig 1
The five transistor transmitter used by G3KUJ, for operation on the 2m band. Details of the coils are: L1, 25 turns, 30 s.w.g. enam. close wound on ¼in. diam. former with dust core; L2, 8 turns centre-tapped, 26 s.w.g. enam. self supporting, ¼ in. diam.; L3, 5 turns, 26 s.w.g. enam., spaced wire diam., ¼ in. diam.; L4, 2 turns, 26 s.w.g. plastic covered, wound over final two turns at cold end of L3. The coupling capacitors are ceramic, and the tuning capacitors are concentric air-spaced types. Resistors are ½ watt. The modulation choke can be any small audio or TV h.t. smoothing type, with a d.c. resistance of less than 250 ohms.

signs GC3PCR on 2m, GC3ROP on 4m, and GC3ROO on 160m.

Four metres provided consistent communications with G3GUM in Worthing, and at times, phone was used. G3PHG, who is also approximately 140 miles from Sark, was successfully worked, and several QSOs were exchanged with G3OUF. G3MOT and G6NB were contacted, and G5ZT in Plymouth was worked on phone at RS59. Help, which was greatly appreciated, was received from G3GUM and G3JHM/A, who ensured that other operators were aware of the 4m activity.

Stations worked on 2m included G6GN in Bristol, GW8UH, GW3MFY, and GW8SU. G3SHY (Middlesex) and G6NB (Buckinghamshire), both 180 miles from the Channel Islands, were contacted with reasonable signal strengths, despite a certain amount of screening in the direction of London.

The party particularly wishes to express its thanks to G3HBW, who loaned his award-winning transistor communications receiver; G8PD for the loan of his 2m slot aerial; and to J-Beam Aerials Ltd., who lent a four element 4m beam.

Transistor Transmitter for 2m

A circuit of a transistorised 2m transmitter which has been built by G3KUJ is reproduced in Fig. 1. All necessary component values and coil details are given in the circuit and its caption, but as the layout can be safely tailored to suit most individual requirements, this has been omitted.

The alignment procedure is as follows. The station receiver should be tuned to the calculated output frequency, and L1 and RV1 adjusted until a signal is heard. RV1, L1, L2 and L3 can then be adjusted for maximum output. The aerial should then be connected and L3 re-adjusted for maximum output. Alignment should be carried out without audio modulation. If desired, the meter employed for indicating maximum output voltage can be wired in circuit, provided it has an internal resistance of at least 10,000 o.p.v. It should be borne in mind, however, that the maximum modulated output does not correspond to the maximum r.f. output as indicated on the meter.

OH-W Contact on 2m Reported

A new world record was made on April 11, 1964, between 15.00 and 16.00 GMT, when OH1NL worked W6DNG on 2m. ON1NL gave S2, and received an S3 report. The contact was recorded by W6DNG, who will submit the tape to ARRL. News of the contact came from OH2HK, the V.H.F. Manager of SRAL.

The QSO has already been confirmed by QSL cards. OH1NL used 800 watts input, and an aerial with a gain 20-21 db. The receiver is home-constructed. The contact was probably made by means of moonbounce.

Oscar III

In the April, 1964 issue of *QST*, W6SAI reported that the problem of the transistorized linear amplifier for Oscar III has been solved, bringing the satellite's launch a step closer. Two-tone tests at 144 Mc/s have indicated one watt p.e.p. output with intermodulation distortion products better than −27 db below peak output.

Oscar III will weigh about 25 lb, and will be 6½ × 12 × 17 in. in size. It will be powered by batteries. A 25 mW beacon on 145·85 Mc/s will be included in the satellite, and the "HI" keyer is included in the three planned telemetry channels. The repeater section will receive a 50 kc/s band centred on 144·10 Mc/s, and re-transmit this on 145·9 Mc/s at one watt p.e.p.

The launch date is not expected before July.

Mobile Column

By E. ARNOLD MATTHEWS, G3FZW *

THE mobile season's first rally, organized by the Society's Mobile Committee, was held at the Bedford factory of Texas Instruments Ltd. on April 5. Many of the 1,000 people who attended took the opportunity to look round the factory and were conducted round in small parties of eight or ten.

Although the weather was fine, many exhibits were sited in the large factory canteen, including trade stands by Green & Davis, K.W. Electronics, J-Beam Aerials, and Aveley Electric, on whose stand J. I. G. Brown, G3EUR, was giving demonstrations of hi-fi stereo reproduction. Outdoor attractions included a large demonstration by Bedfordshire Police, who had on show a police car and motorcycle, police dogs, a live demonstration of the radar speedmeter, a cinema show and a reaction time tester on which visitors could discover their own reaction times.

Talk-in stations on 2m and 160m were provided by members of Shefford and District ARS. The usual raffles were held, and about 70 prizes awarded. There was also a " lucky dip " for younger visitors.

Proceedings were recorded for subsequent transmission by the BBC and Anglia TV.

Free teas provided by the company were of a high standard. Thanks are due to Texas Instruments Ltd., and to their PRO, Mr. D. Brewster, for their many efforts to make this a very enjoyable event.

We understand that the Society has been invited to hold another rally there next year.

The first picnic of the mobile season for the Northern Amateur Radio Mobile Society was held at Sutton Bank, near Thirsk in Yorkshire. Despite the slight sleet and cold weather that persisted, there was a satisfactory gathering of about 25 vehicles, the majority of which were equipped for mobile working.

The first to arrive was G3KEP, who acted as a control station, using a 30 ft. vertical aerial for Top Band. He was joined by operators from a variety of areas including Bradford, Leeds, Middlesbrough, Bridlington, Tees-side, Stockton and Darlington, Harrogate, York and County Durham.

Trentham Gardens

The North Midlands Mobile Rally at Trentham Gardens on April 19 was a highly successful event, for 3,000 people in 718 cars attended: an increase of 50 cars over last year. There were at least seven or eight talk-in stations directing vehicles to the site, and exhibits ranged from floral decorations to several club and Services technical displays. A more detailed report will appear next month.

ARMS Rally

A preliminary notice from the ARMS Honorary Secretary, G3FPK, announces that that society will hold a rally at the RAF Station, Barford St. John, Oxon., on Sunday, June 7. The programme is to include a military band concert, tombola and trade stands. Talk-in stations will be on 2m, 160m, and s.s.b. on other bands.

Seventh Longleat Mobile Rally, June, 1964

The Longleat Mobile Rally is to be held on June 21 and promises to be the best yet. Longleat House and grounds always prove an attraction, and plenty of space is available for parking. This year some new attractions will be offered, including displays to interest the ladies.

Talk-in stations will be in operation on Top Band and 2m: G3JMY/A in the vicinity of 1885 kc/s and G3SJI/A on a Zone 2 frequency. These stations will commence operation at 10 a.m., and anyone uncertain of the route may request information over the air. Prizes and certificates will be awarded for the longest distance contacts with the control stations.

Among the many other Rally attractions will be a Concours d'Elegance for the best all-round mobile station and a Junior Op. Treasure Hunt.

The entrance to the Park and Estate lies on the Frome-Warminster Road (A362). An admission charge is payable for entry to the grounds, but there is no extra charge for admission to the Rally.

A party of members of NARMS, wrapped up and braving the cold at the picnic at Sutton Bank on Easter Sunday.
(Photo by G3MZC)

CQ UBA Rally, Ardennes

On August 29 amateurs from many parts of Europe will be assembling for the UBA Rally, which will this time be held in Ardennes, in Belgium. British amateurs are not excluded, as permission has been granted by the Belgian Authorities for holders of "G" calls to operate in that country for the duration of the rally, subject to the following conditions and procedures:

The applicant's full name, address and call-sign; the dates he intends to stay in Belgium; the make of car and registration number; a photocopy of his licence (not necessary if a Belgian Licence was obtained in 1963); and any previous Belgian call-sign obtained must be submitted before August 1 to the Directeur General des Radiocommunications de la RTT, rue des Palais, Bruxelles, 3, Belgium.

All amateurs who intend to take part in the rally must also send requests for participation, together with the following details and the registration fee, to Monsieur Lentz André, at the address below. The information required is the person's full name, address and call-sign; his temporary Belgian call-sign; the make of car and registration number; the transmitter power and frequencies to be used during the rally (3·5 or 144 Mc/s, or both); and the type of aerial. The registration fee is 100 Belgian francs, which includes insurance cover during the period of the rally.

Further details are available on request from Monsieur Lentz André, rue de Neufchateau, Villeroux-Sibret, Province of Luxembourg, Belgium.

DARC Third International Rally at Lake Constance

A very comprehensive rally, organized by the German Amateur Radio Club, will be taking place on the weekend of June 27/28, at Constance. The programme will include a Mobile Competition, Fox-Hunt, a " Ham " festival, and

* 1 Shortbutts Lane, Lichfield, Staffs.

Tombola. The organizer of this event is Rudie Kühne, 775 Constance-3, Mittleweg 12, Germany.

In the past, it has been impossible for British amateurs to obtain licences to operate in Germany, owing to the need for a " Postal Identity Card," which does not exist in this country. However, the German authorities are now prepared to accept a British passport in lieu of the Postal Identity Card, and the procedure for obtaining a licence for a rally is as follows:

An application for a licence must be addressed to the Oberpostdirektion of the place where the rally is to be held, at least four weeks in advance, and must be accompanied by an official certification of the person's existing licence. The applicant must also name the German Post Office at which the licence is to come into operation, and the date he wishes to collect it. It will be handed to him at the counter marked " Obholungsschalter für Postsendungen " when he presents his passport.

Applications for temporary licences for the International Rally of Radio Amateurs at Lake Constance should be addressed to the Oberpostdirektion Freiburg im Breisgau, Germany.

Operating Notes

An interesting solution to the problem of what to do with the microphone comes from **G3NQX,** who has made a boom support which fits in his jacket breast pocket. He first made a wire semi-circle of about 1·5 in. radius, and brazed a 12 in. length of similar straight wire ($\frac{1}{8}$ in. diam. spring steel) to the middle of the semi-circle to form a sort of inverted crutch. He then drilled a $\frac{1}{8}$ in. diam. hole into the end of a $2\frac{1}{2}$ in. × $\frac{3}{8}$ in. diam. dowel rod and taped a small crystal insert to the other end. A small bulldog type clip was slipped on to the straight wire and the dowel rod glued on to the top of the wire, thus making an assembly about 14 to 16 in. overall length. In use, the fork goes in the breast pocket to prevent any twisting, whilst the paperclip is clipped on to the lapel to hold the microphone in position. Might the compiler of this column suggest, however, that the lower end be improved by forming it into a " T " shape rather than a " Y," and covering the ends with rubber tube to avoid holes being worn in the pocket lining.

G2DHV, who operates a Hamobile II transmitter on 144·69 and 145·25 Mc/s, writes to say that he is now licensed as DJ0LJ/M for the DARC rally at Nordheim.

The Secretary of NARMS, Bernard Crisp, G3LHQ, lighting a fire to give a warm welcome to picnickers arriving at the meeting at Sutton Bank.
(Photo by G3MZC)

MOBILE RALLIES 1964

May 24 ..... **Northern Mobile Rally**

Harewood Park, near Leeds
Commencing at noon
G3OGV/A———160m: talk-in station

There will be several competitions, trade stands, and also a sale of surplus equipment.

Organized by the Northern Amateur Radio Mobile Society

June 7 ..... **ARMS Mobile Rally**

RAF Station, Barford St. John, near Banbury, Oxfordshire
2m and 160m talk-in stations

There will be a comprehensive trade show, tombola, and a military band will be present.

Organized by the Amateur Radio Mobile Society

June 14 ..... **Hunstanton "Bucket and Spade" Party**

Meet at 9 Lavender House, Seagate Road, Hunstanton, Norfolk
G3ANM/A———1·98 Mc/s: } talk-in stations
G3RED/A———145·2 Mc/s: }

Visitors to Hunstanton will be interviewed on Amateur TV as they enter Hunstanton, and monitor receivers will be placed adjacent to the talk-in stations at the car park. March ARS will be organizing the closed circuit TV system.

Organized by the Peterborough Amateur Radio Society

June 21 ..... **Longleat Mobile Rally**

Longleat Park, on the Frome-Warminster road, A362.
Commencing at 10 a.m.
G3JMY/A———1·885 Mc/s: } talk-in stations
G3SJI/A———2m, Zone 2: }

Prizes and certificates will be awarded for the longest distance contacts with control stations. There will be a frequency measuring contest, raffle, concours d'elegance, DX balloon race, jnr. treasure hunt, field strength test, and a longest double trip award.

Organized by Bristol RSGB Group

June 28 ..... **RSGB National Mobile Rally**

Wethersfield USAF Station

Full details will be published in the June issue of the Bulletin.

July 5 ..... **South Shields Mobile Rally**

Bents Park Recreation Ground, Coast Road, South Shields

Organized by the South Shields and District Amateur Radio Club

July 26 ..... **Cornish Mobile Rally**

Pentire Headland, Newquay, Cornwall

Organized by the Cornish Radio Amateur Club

August 9 ..... **Torbay Mobile Rally**

Britannia Royal Naval College, Dartmouth

Organized by the Torbay Amateur Radio Society

THE MONTH ON THE AIR

A CHRONICLE OF EVENTS ON THE HF AMATEUR BANDS

By R. F. STEVENS, G2BVN*

IN some quarters of the Amateur Radio world there exists a state of consternation over the approach of the next international frequency determining conference, whilst in some places a state of near panic is evident. Wild and inaccurate statements have been made on the air that certain frequencies are to be taken for other users, and the position has not been improved by the unhelpfulness of amateurs who should know better.

Let it be made quite clear that international conferences are not convened at the drop of a hat and many months of preparation are necessary before the next Geneva Conference can take place. At the time of writing it is most unlikely that any meeting will take place in less than three years. Organizations have been formed to safeguard the rights of the amateur, but none of these will be allowed to participate in any conference, and indeed suspicions have already been voiced as to their underlying motives. Complete support of IARU is the best safeguard for amateurs everywhere, and the rate of increase of membership of the Union is a heartening sign. In Region I of IARU (embracing Europe and Africa) continual work is being carried out to spread the gospel of Amateur Radio and introduce new members, and the presence of the delegates from the USSR at the Malmo Conference last year was a tremendous step forward. So far from losing frequency space, should not the IARU ask for additional frequencies to accommodate the vast numbers of newly licensed stations?

DXCC

The DX Century Club is again the target for criticism, and this time W6HVN, writing in *The DX'er*, says " I would check out some of the crowd who run five to fifteen kW because their sick outsized egos just can't stand to lose. If I had prima facie evidence I'd name a lot of the boys on the DXCC ' Big Board ' who run the big gas and have for years." In addition to this question of high power, it is alleged that certain QSL cards from a rare Indian Ocean country have been forged and then submitted for DXCC credit. Add to these undesirable practices that of the pervert who being unsure of a QSO, or not having made one at all, includes cash to a value of £2 or more with his worthless QSL, in an effort to " persuade " the operator of the rare station or his QSL manager. Whilst initially the DXCC was undoubtedly an excellent idea, how can one defend a scheme that has apparently brought out all that is bad in Amateur Radio?

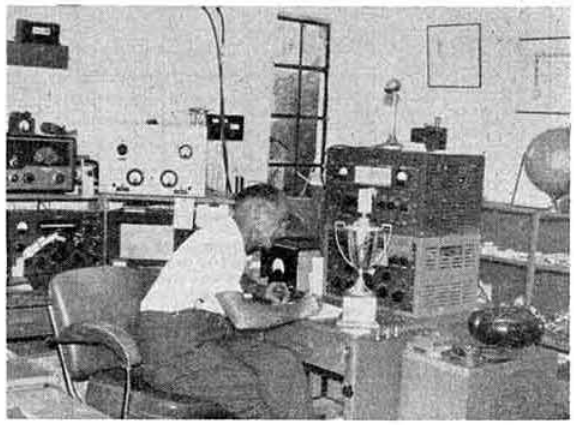
News from Overseas

ST2AR is temporarily off the air but hopes that this state of affairs will not be long lasting. He mentions that there may be some delay with QSLs but if the senders will exercise a little patience, all will be dealt with in due course. Similarly **9M2DQ** will be off the air between the end of April and the end of June, owing to a move from his present QTH.

With effect from January 1, 1964, a number of alterations to the licence conditions of **Swiss** stations have come into force and amongst these is the item that all stations operating portable must sign HB9 . . ./P. The Principality of Liechtenstein has a new prefix **HB0** instead of HE9 as hitherto. (G3EIO).

Whilst in S.E. Asia recently, G6LX learnt first hand from **VS1LP** of the piratical activities on 3·5 Mc/s using this call. The log of VS1LP shows that the only UK stations worked on s.s.b. on this band were G2PU, G5BJ, G5UG and G6LX, although VS1LP participated in BERU on 3·5 Mc/s and has submitted an entry. At one time VS1LP heard the pirate working GW3AX, although there was no propagation from **VS1** to Europe, but 4X4 and other Middle East countries were audible. VS1LP spends a considerable proportion of each month in Indonesia and doubts very much if the current crop of stations using Indonesian calls are even in the country.

VS1ME is the call of G3KLF now operating on 14 and 21 Mc/s from Singapore, using 150 watts on c.w. and KW77 and HRO receivers in conjunction with a TA33 beam and a G5RV dipole. A new s.s.b. transmitter is nearly finished, and in the meantime VS1ME looks for UK contacts around 16.00 on Saturdays on 14,050 kc/s, with a possibility of 21



E. (Robby) Robson, 5Z4/VQ4ERR, Nairobi, Kenya, in his shack from which he operated to gain the position of the second station in the world to earn confirmations for two-way sideband contacts with 300 countries. To the right of the operating table is the silver K6MLS trophy which was presented to him for his achievements in sideband DXing, and which was donated by the late Dr. George Stauch, K6MLS, of Sacramento, California.

* Please send all items to RSGB Headquarters to arrive not later than May 12 for the June issue and June 9 for the July issue.

Mc/s around 10.00. The 9M1 prefix appears imminent, but the effective date is not yet known.

VU2NR has sent the logs for the past two years to **G3MVV** who will be pleased to deal with QSL requests, s.a.s.e. or IRC are requested for direct replies, and at the present all incoming cards have been dealt with. Whilst VU2NR is anxious to meet all QSL requests via G3MVV, he is not keen to receive QSL's direct.

G3HCL has arrived in Kuala Lumpur and will be active as soon as house hunting chores have been completed. A 9M2 call is awaited and this will be used in conjunction with the equipment loaned to the RAFARS by WA2WUV and the LIDXA. QSLs will be despatched through the Bureau for each QSO, whilst those for the Americas will go via WA2WUV.

The following geophysical alerts are now being broadcast on c.w. from **WWV** during the first half of the 19th minute past each hour:

GEO	MMMMM	= magnetic storm
GEO	NNNNN	= magnetic quiet
GEO	CCCCC	= cosmic ray occurrence
GEO	SSSSS	= solar activity
GEO	QQQQQ	= solar quiet
GEO	WWWWW	= stratospheric warning
GEO	EEEEE	= no Geo-Alert.

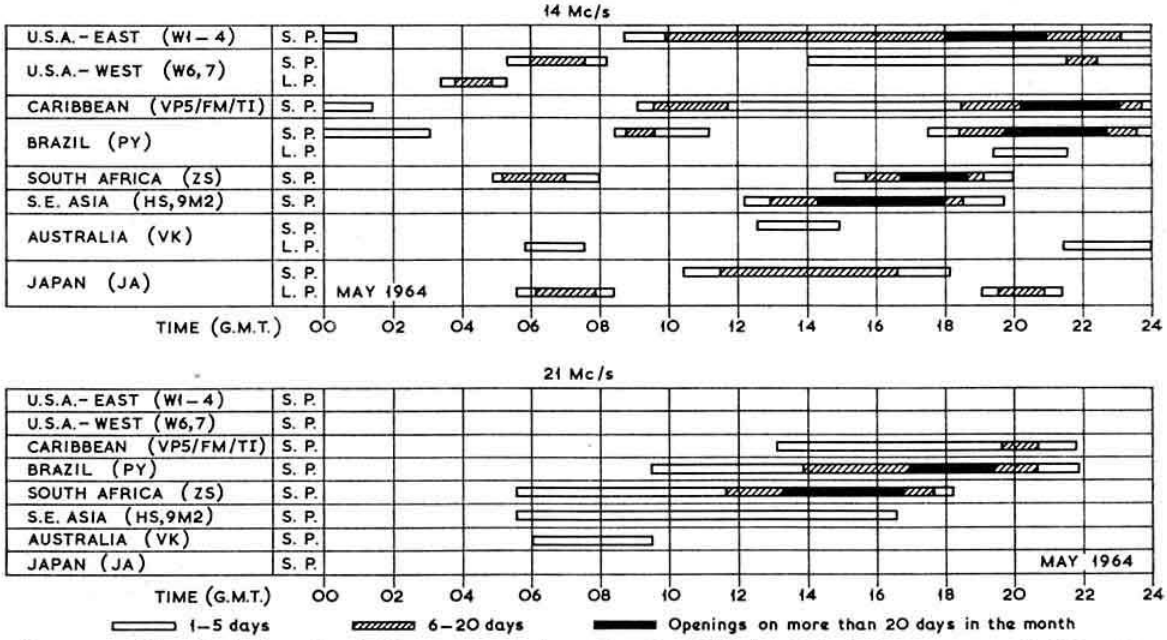
This information should be of particular interest to **IQSY** observers.

DXpeditions

ZC5AJ operating from Labuan was very active during the first half of April and with the departure of VS1LX for Singapore, the station then signed **ZC5AM.** It is hoped that operation from VS5LX will take place during the first two weeks of May, and thereafter **VS9MG** will be on the air from **Gan** for two weeks from May 27. Some time later the rig will be loaned to **VS4RS** at Kuching, for a period of intense s.s.b. activity. QSLs for all these operations will be despatched through the Bureau, except those for North America, which will be handled by WA2WUV. Direct application may be made to VS1LX (see *QTH Corner*). The rig used is on loan from WA2WUV and the LIDXA, and the continuous activity from ZC5 by Bob Milton, VS1LX, has filled a blank spot in many country lists. Preferred frequencies for the various VS1LX operations are 14,110 kc/s on s.s.b. and 14,050 kc/s on c.w.

After several false alarms **VQ8BFC** (VQ9HB) was due to arrive at S. East Is. of the Egmont group of the Chagos Is. during the weekend April 18/19. Navigation around the islands in this part of the world is a tricky business owing to the total absence of marker lights and progress is neces-

PROPAGATION PREDICTIONS



Summer conditions in the ionosphere build up progressively during the month of May and conditioned by the shorter nights, the night-time F2 m.u.f.'s are relatively high compared to those of the preceding seasons. This leads to a noticeable improvement in DX conditions on 14 Mc/s, particularly during the late evening and early hours of the night. The 28 Mc/s band will be of little practical use for DX, though on this band as well as on 21 Mc/s, contacts will be possible via short skip over distances of 500 to 1,100 miles. Normally it will not be possible to work North America and Japan on 21 Mc/s but in exceptional cases, however, North America may be heard via sporadic-E reflection and the most favourable period for this would be between 17.00 and 20.00 GMT. On days with strong geomagnetic disturbances it will be possible on 21 Mc/s, as well as on 28 Mc/s, to make European contacts via reflection from the Northern auroral zone.

The sporadic-E short-skip conditions, which in summer liven up the almost dead 21 and 28 Mc/s bands, can also interfere with DX on 14 Mc/s, mainly in the afternoon and early evening, due to QRM from European stations. As 14 Mc/s is appreciably lower in frequency than 28 and 21 Mc/s, so is the dead zone correspondingly less. There are, therefore, on 14 Mc/s far more European stations audible during short skip than on 21 or even 28 Mc/s. The summer conditions also produce additional DX contacts on 14 Mc/s via the long path, especially with Japan and Western North America. Contacts with the Western USA will normally be possible after the middle of the month, and remain, with a few interruptions, until August, with the early hours of the morning being the most favourable period. The increase in the atmospheric noise level with the approach of summer will lead to a slight worsening in DX conditions on 7 Mc/s. The noise level reaches a minimum during the early hours of the morning and therefore this is the most favourable time for DX on 7 Mc/s, provided that the greater part of the transmission path lies in darkness. The 3·5 Mc/s band will be little different from the previous month.

The provisional sunspot number for March 1964 was 14·5 with the period of greatest activity between the 12th and 16th of the month. The predicted figures for July, August and September are 13, 12 and 11 respectively.

QTH CORNER

CN8GB	via W2CTN.
CP3CN	via W2CTN.
CR7GF	after Jan. 1, 1964 via VE4OX.
EL2I	via W9UC.
FG7XS	A. Haikel, BP 110, Pointe-a-Pitre, Guadeloupe.
FS7AA	via WA8CHU.
FM7WS	via W4OPM.
FO8GJ	L. Cochet, BP 867, Papeete, Tahiti.
GB3RAF	via G2BVN
HR1OP	Box 93 Tegucigalpa, Honduras.
M1AC	via K8UZA.
MP4BEQ	Steven Gibbs, Box 144, Bahrain, Persian Gulf.
PJ5ME	via W2CTN.
PJ5SQ	via K. Bush, K0GZN, Box 186, Harper, Kansas.
SV0WGG	Box 998, Iraklion, Crete.
TL8SW	via W1BPM.
TN8AP	J. Fees, BP 310, Brazzaville, Congo.
TR8AD	BP 1025, Libreville, Gabon.
TR8AE	Y. Monfraix, SGCFG, BP 521, Port-Gentil, Gabon.
VK2AGH	G. G. Hall, 79, Kyle Pde., S. Hurstville, N.S.W., Australia.
VP2MJ	via W4SSU.
VK9GC	PO Box 55, Rabaul, New Guinea.
VP7NY	via Hammarlund DXpedition, PO Box 7388, New York, NY. 10001, USA.
VP8HJ	D. Hardy, PO Box 89, Port Stanley, Falkland Is.
VR3O/VR3S	now via WA6AYU.
VS1LP	R. Snyder, Mt. Elizabeth Flats, 53-P, Nutmeg Rd., Singapore 9, Malaysia.
VS1LX	M/Sig. R. Milton, 112/54 Wittering Rd., R.A.F., Changi, Singapore 17.
VS4RS	R. Skelton, A.C.T. Telecomms HQ, Kuching, Sarawak.
VS5CW	J. S. Francis, 3 Arabia Court, Wessex Estate, Singapore 5.
VS9AE	I. Dunbar, c/o BP (Aden) Ltd., Box 1184, Aden.
VS9MG	via VS1LX (above).
XT2D	G. Demangeat, BP 798, Ouagadougou, Upper Volta Rep.
ZC5AJ	via VS1LX (above).
ZD3A	R. Scarrow, Box 285, Bathurst, Gambia.
5A3CJ	via MP4BEQ (above).
5U7AC	Y. Anatole, BP 746, EAMAC/ASECNA, Niamey, Niger Rep.
7X2VX	via W4UWC, 1025 Nokomis Circle, Knoxville 19, Tenn., USA (after April 12, 1963).
9G1DV	via W2CTN.

RSGB QSL Bureau: G2MI, Bromley, Kent.

sarily slow. However, despite these hazards, VQ9HB was heard operating from Chagos during the evening of April 18. QSLs should go to **G8KS** with a s.a.s.e. or IRC.

VP8HF made about 1,250 contacts from South Sandwich Is. in appalling weather conditions which hampered activity and necessitated a departure before the scheduled date. It is expected that the logs will arrive at Hammarlund at the beginning of May.

The **Hammarlund DXpedition of the Month** organization announce a programme of activity from West Africa during the summer months of this year. **CR5SP** will operate on s.s.b. from Sao Tome, and as CR5SP/P from the Island of Principe, which counts as Sao Tome for DXCC purposes. Later trips will be made to Annonbon, each for a period of three days with operation on c.w. and s.s.b., and this operation will carry an EA0 prefix. Similar trips will be made to Fernando Po during the latter half of 1964, another rare DXCC country using an EA0 prefix. In an air of mystery, Hammarlund announce operation from a new country in Southern Europe " which will quell forever all rumours of operation from this location." No prizes for a correct guess. VP7NY cards are now being handled by Hammarlund, and mailing of ZD6PBD, MP4MAP and MP4TAX cards is now current.

VR1B (Tarawa) who is active on c.w. and s.s.b., left around April 26 for the Phoenix Islands, the journey to which should take about a week. He hopes to operate for a few days from here and also Christmas Island. **CR8AD** is on daily around 12.00 on 7, 14 or 21 Mc/s, but probably only has electricity for a few hours each night. (VK4SS).

During 1964 G3MWZ will be making four trips to Wales, and combining business with pleasure will again operate on Top Band from rare counties. **GW3MWZ/P** or **GW3MWZ/M** will be operating on the following days between 19.00 and 22.00 using either c.w. or a.m.: May 4, Anglesey; May 5, Montgomery; May 6, Radnor; May 7, Cardigan, and May 8, Merioneth. G3MWZ also plans to be in Wales between May 31 and June 6, but as yet has no plans.

From **ZS6BBB** via G4MJ comes the following information on his recent dxpedition: " We have now QSL'd all stations that sent IRC, and in the next two weeks will be sending out via the Bureau about 700 cards for stations that have either been sent direct without IRC, or via the Bureau. Should there be any stations that worked us and need either ZS8 or ZS9 cards, but have not sent cards, will they please do so now, as due to the expense of the dxpedition, it has been decided to QSL only on receipt in order to conserve costs."

Between March 25 and April 1 **GC3s PCR, ROP** and **ROO** operated from Sark working nine countries and 26 UK counties on Top Band, in addition to v.h.f. activity. Operation was unfortunately restricted to outside television hours.

A new operator is now on duty at Marion Island but the call remains unchanged as **ZS2MI.** Sideband equipment is in use but only a few QSOs have so far been made with UK stations. The preferred frequency seems to be around 14,265 kc/s with 14,310 also mentioned. For QSOs after March 2, 1964, QSLs should go to ZS5JY.

Angus Murray-Stone commenced operation as **HZ2AMS/8Z4** from the **Western Neutral Zone** between Iraq and Saudi Arabia on April 18, using 14 Mc/s s.s.b. This Neutral Zone has not been activated previously and will no doubt count as a separate country for DXCC purposes in view of the separate status that was accorded the Eastern Zone, from which operation took place using the 9K3 prefix.

DXCC News

ARRL announce the addition to the Countries List of the **Crozet Islands** which are located in the South Indian Ocean, some 750 miles North-West of the Kerguelen Islands. Confirmations for the Crozet Islands may be submitted, starting June 1, 1964.

It will come as a disappointment to many to learn that the ARRL have announced that they will not give credit for **XW8AW/BY** QSOs, the last operation undertaken by W4BPD before he left Asia.

UA2AO, Anatoly Moskalenko, who was the first sideband operator in Kaliningrad. Anly is active on the DX bands and his wife holds the call UA2YL.

Stuart Meyer, W2GHK, President of the Hammarlund Manufacturing Company, with Gus Browning, W4BPD, of South Carolina. Gus returned to America after two years of active DXpeditioning to the very rare spots on the globe for the purposes of assisting amateurs to contact these remote places. He covered 66 rare spots during the two years, and it is estimated that W4BPD completed approximately 200,000 contacts during his visits. Mr Meyer is the founder-director of the "DXpedition of the Month."
(Photo by WA2DIG)

Contests

The following are high *claimed* scores for the two sections of **BERU:**

High Power		*Low Power*	
5N2JKO	3,300	ZB1CR	2,340
G5WP	3,120	GW3JI	1,400
ZB1BX	3,035	ZD6OL	1,395
5B4IP	2,940	G3DYY	1,055
G3FXB	2,760	9L1TL	900
VS9AAA	2,655	ZB1J	780
G4CP	2,605		
VE7KX	2,595		
VQ2WR	2,560		
5B4KG	2,425		

In the **Receiving Section** high claimed scores are:

W. Wilkinson	BRS20317	2,650
E. Howell	BRS24775	2,170
M. Harrison	BRS24733	1,935
B. Curnow	A.2340	1,600
M. Hardy	A.2753	1,540
R. Thomas	BRS15822	1,530

High *claimed* scores in the first RSGB **Top Band Contest 1964** are:

GI6TK	700	G3RBP	653
G3BMY	675	G3IGW	624
G6BQ	673	GM3NYY	587
G3MXJ	672	G3FM	579
G3KLH	662	G3JML	578

The **Tenth European (WAE) DX Contest 1964** will take place as follows:

c.w. August 8 00.00 to August 9 24.00
phone August 15 00.00 to August 16 24.00

There have not been any alterations to the rules and the QTC-traffic feature will again be used in both sections. A leaflet giving full details of this contest and explaining the QTC feature may be obtained by sending a s.a.e. to G2BVN.

The South Bavaria District of the DARC will be holding an activity month during June, the purpose of which is to help operators to obtain the **Caesar and Cleopatra Certificates.** Basically the Caesar Certificate requires contacts with a specified number of stations (according to the class) in various DOKs. The Cleopatra Certificate requires contacts with XYL/YL operators. An activity plan covering 3·5 and 7 Mc/s between 19.00 and 22.00 has been prepared to guarantee operation from the various sections. The custodian of these certificates is DL9PU, 815 Holzkirchen, Kinestrasse 2, West Germany, who will be pleased to provide further details.

A reminder of the annual **CHC/HTH/FHC QSO party,** open to all operators, including SWL's, and running between 23.00 May 29 and 06.00 June 1. G2BVN has a small number of leaflets giving full details which are available by sending a s.a.e.

Conditions during the **CQ WW SSB Contest** were patchy, but there was a high level of activity. **9A1ZG, SV0WGG,** and the winner last year, **DL3LL,** were all heard giving high serial numbers. **GB3RAF,** the Headquarters station of **RAFARS** at Locking, scored 347,634 points from contacts with 186 different prefixes. 14 Mc/s was the band producing the best results with 148 prefixes and 3·5 Mc/s yielding 36, whilst timewise the initial three hours and the similar closing period were most productive. Amongst the high-scoring, single-operator stations was **G3KZQ** with 155,385 points from 135 prefixes.

Awards

The **9G1 Award** issued by the **Ghana Amateur Radio Society** requires that the applicant should:

(a) have made contact with five different 9G1 stations on at least two bands with no restriction as to mode of operation;
(b) send duplicates of the QSL cards he will have written for the five contacts to the Awards Manager;
(c) send 7 IRC with the application which should be sent to Ghana Amateur Radio Society, PO Box 3773, Accra, Ghana.

The **Antwerp CW-DX Club** announce the issue of a new certificate known as **"The Benelux Award."** This is available to transmitting amateurs and short wave listeners under the following conditions:

(a) European stations must supply proof of contact with seven Belgian, seven Netherlands and two Luxembourg stations;
(b) any mode or band licensed may be used and contacts must have been made after January 1, 1947.
(c) minimum signal reports exchanged must be RST448 or RS44.
(d) the application must show full details of the contacts and must be certified by either two licensed amateurs

The European Band Plan

The plan, which is voluntary and supported by all IARU Societies in Europe, is as follows:

Frequency Band Mc/s	Type of Emission
3·5 — 3·6	c.w. only
3·6 — 3·8	phone only
7·0 — 7·05	c.w. only
7·05— 7·1	c.w. and phone
14·0 —14·1	c.w. only
14·1 —14·11	RTTY and c.w.
14·11—14·35	c.w. and phone
21·0 —21·15	c.w. only
21·15—21·45	c.w. and phone
28·0 —28·2	c.w. only
28·2 —29·7	c.w. and phone

IIAB, Alfred Bella, who radiates a potent signal from his well-equipped station at Milan. The sideband transmitter is of Miniphase manufacture.

or an official of a recognized radio club or national society.

(e) the application, which must be accompanied by either seven IRC, one US dollar or the equivalent, should be sent to: Benelux Award Manager, ON5AX, Antwerp (OSA) CW-DX Club, PO Box 331, Antwerp-1, Belgium.

The PZK, in conjunction with the Jagellonian University in Cracow, Poland have established the " Universitas Jagiellonicae Cracoviensis " **(UJC) Award.** To claim this it is necessary that European stations should have contacted seven stations in Cracow between April 1 and September 30, 1964. Any band and any licensed type of emission may be used, with a minimum report of RST338. Applications showing complete details of the contacts and accompanied by five IRC should be sent to Polski Zwiqzek Krotkofalowcow, PO Box 606, Krakow 1, Poland to arrive not later than October 31, 1964.

Top Band News

The recent newsletter from **W1BB** marks the end of the DX " season " on this band, but W1BB will be pleased to keep any special schedules to test conditions to any area or country. During the last winter season W1BB QSO'd 130 different DX stations in 22 countries, an outstanding achievement. **W8JIN** makes comments to the effect that whilst some paths seem to be continually getting better on 160m, he found conditions to Europe worse than 1962/63, and wonders if the long haul DX on the East-West path is not following the general pattern. **VS1LP** reports hearing marker station DHJ peaking RST589 at 18.30 on a February day.

There is a most interesting report in the latest W1BB *News Letter* of tests made by W1BB and W1BDU to compare receiving conditions at the home QTH of W1BB and W1BB/1 about a mile distant. Summarizing the results, whilst W1BB/1 worked four G stations, the most that W1BDU could hear at W1BB was short snatches of c.w. Ignoring the difference in aerials, both believed to be good performers, it is thought that the 260 ft. height at the /1 site compared with 45 ft. at the home QTH puts the aerial above the electronic smog that blankets heavily populated areas. A first-ever QSO that took place after the ending of the " Tests " was between **GI6TK** and **HK4EB** at 06.30 on March 7. Austrian stations may now be heard around the following frequencies: 1823 to 1838 kc/s; 1854 to 1874 kc/s, and 1879 to 1900 kc/s with a maximum input power of 10 watts. The first transatlantic QSO was made by OE3LI and W1BB/1.

In sending in his last report for this season **6YACZ** mentions that he will be moving to VP3 land during April and will be staying for at least a year, and will be organized for the 1964/65 season on Top Band. 6YACZ has worked G3NYQ, G3OUV, G3RBP, G6BQ and DL9KRA recently, but heavy static and low signal strengths make reception difficult. His score for the last season is 16 countries and 26 states worked. In Europe there were nine QSOs with G, one with GI, two with DL and one with HB9.

PA0PN is in difficulties owing to the large number of direct QSL requests that he receives from UK stations that he works on Top Band. He is in great demand, being permitted to use a.m. on this band, and it would greatly help if QSL requests included a self-addressed envelope and an IRC (tks G2HKU). A QSP from G3MKR says that **UA3NB** is *not* active on 1·8 Mc/s and his call is being pirated.

Around the Bands†

As is to be expected at this time of year, conditions are changing rapidly. The l.f. bands are deteriorating, although 7 Mc/s is still providing DX. The 14 Mc/s band is now open up to 22.00 GMT or later and 21 Mc/s has improved considerably on the east-west path giving plenty of W/K working.

The detailed situation is well reported for most bands this month, so starting as usual with **1·8 Mc/s** we have our regular reporter **A2340** (Plymouth) who found many good loggings. Easter Monday produced excellent phone conditions with S8 from GI, GM, PA0 and other areas. Further afield produced W3MSK (06.00), W1BU (06.07), W1BB/1 (06.08), VE2ATU (06.09), 6YACZ (06.15), ZB2AF (21.05), OH2YV (22.10), OH3NY (23.11) and HB9TT (20.30). Much activity was recorded from GC3ROO with a report of 579 at 21.00 GMT. **BRS20317** (Bromley), not hearing much on 160m has concentrated on 3·5 Mc/s and 7 Mc/s this month.

On **3·5 Mc/s, BRS20317** (Bromley) reports that the USA comes over from 23.00 to 08.00 GMT. East Coast stations were predominant, but nothing was heard from W5, 6 or 7. KP4BJU and CC were S7 (05.45), and CE1AD fair to weak (06.24 to 07.00). This is only the second CE heard on 80m and the previous one was May 1958. A lot of activity resulted from a USSR Contest on March 22 when UJ8KAA (00.30) was logged for a new one. Also found was rare UH8AA (00.15) at 579, and UL7KBK (00.45). **G3HDA** (Stratford-on-Avon) heard good DX from HK4DP (07.30), VS1LP (23.00) and ZD3A (01.30) all on c.w. **A1798** (Winchester) reports s.s.b. from YV5BCJ (06.50) and ZL3UC (06.50), whilst **A2340** (Plymouth) adds YV1BRQ (01.25), EA8BQ (01.15), TI2JIC (07.06) and c.w. from LX3AX (09.29). Finally, some more s.s.b. heard by **Dave Gray (A2498)** (Croydon): PZ1AX (23.00), TI6AL (04.00), VE1 in profusion (23.00), VE3RX mobile at 06.00, VO1BR (00.05), VP9BN, CP, FJ (04.50 to 06.45), VQ2WR (00.00), 4W1B (21.30) and 5N2CKH (23.50). There were also countless W/Ks, many with S9 + 20 signals around 03.00 to 04.00 GMT.

The **7 Mc/s** band is still holding up well. **G3HDA** (Stratford-on-Avon) worked c.w. with CP5EZ (02.25), HK3LX (01.13), HS1AA (23.59), JA6AK (21.10), KC4VSK (23.05), KZ5MF (00.30), MP4BEE (23.25), MP4QBF (19.27), VP2KJ (22.33), VP8GQ (02.40), VS1LP (17.40), VS1LU (16.36), XW8AW/BY (22.35), ZD3A (19.20), ZL4JF (07.50),

†Compiled by J. G. Cottrell, G3PSY

5N2JKO (01.05). **G3HCT** (Solihull) worked CP5EZ (02.35), KC4USK (22.26), KV4CI (22.25), XW8AW/BY (22.38) and VP8GQ (23.05) all on c.w., and KC4USK (22.38) on s.s.b. **G3PVS** (Woking) found VS1LU (16.54), XW8AW (17.41), ZL4BO (19.02), KV4AA (22.57) and 6YAXG (23.04) also on c.w. **G3LPS** (Blackburn) has done very well on this band, as the following report shows: 7X2NJ (00.14), VK3XB (03.40), MP4BBE (20.15), 5N2RAM (22.00), 5N2JKO (00.05), VU2GG (00.30), 5Z4IV (00.35), VS9AAA (01.13), 5Z4AQ (19.40), VK2VN (07.38), VK3ZR (07.45), VK7SM (08.02), VK3XB (08.15), VK2RD (08.30), ZD3A (21.16), VP6PJ (22.20), KZ5FP (23.39), HK7AHM (22.17) and JA6AK (21.25). Also worked were many others listed earlier in this section and several W6s around 15.30 to 16.00 GMT. **G3SEP** (Great Yarmouth) remarks that although there is plenty of DX about, much of it is difficult to reach because of the QRM. He reports c.w. contacts with 5N2JKO (03.16), OH2BQ/MM (22.30) near Valencia, Spain, and OH8QJ/MM (22.38). Also OY2H at 16.15. **A3670** (Exeter) logged s.s.b. from MP4BBW (21.20), IT1TAI (21.21) and UD6BR (21.29). **A2498** (Croydon) adds PJ2AA (22.50) and CN8MT (22.50), and **A1798** (Winchester) reports OX3JV (18.45), VK5XB (07.30) and VK1ATR (07.40). **A2340** (Plymouth) adds some new ones: PX1CR/YL (23.10), PJ2AA and PZ1AX (22.30), 9G1DY and ZS3E at 09.10 on s.s.b. Also heard was c.w. from VP9BO (23.20), HK3LX (00.22), HK1BE (01.30), OD5LX (21.30) and 9L1KW (22.50).

Finally, for 7 Mc/s a continental round-up comes from **BRS20317** (Bromley) as follows:

ZE3JO, Mal Geddes, in Basutoland hat and blanket and with HRO and Ranger with which he made the first ever ZE-W QSO on Top Band. This contact was the culmination of three months of schedules with W1BB/1.

(Photo by W1BB)

Oceania: Path improving to good, especially long path working from 07.15 to 08.45, reaching S7; with best from VK3XB and ZL1AYF (S6 at 07.45). In the log appear a dozen VK2, 3 and 5s, and three ZLs; also VK4SS (15.40) calling CQ Europe at 469, VK3VX (18.30/19.30 at 469), but having great difficulty reading G (G2DC).

Asia: a marked decline, with no JAs listed or UA0s, a motley of UL7/UJ8, and also EP2AS (19.30), and MP4QBF-S7. A record for March was VS1LP (00.20 at 459).

Africa: Excellent, though a little scarce with signals averaging S6 or 7. Earliest was ZE2KL, 369, at 17.44 in QSO with JA; CR6AI (22.45 to 23.00), RST 469, EL8X, S7 (23.00), and 9G1EI and FE, both at S7 (00.00 to 01.45).

North America: Good but very changeable, with the East Coast S7 (from W3KIK at 19.45), and W5, 9, 0, were quite good, with excellent activity around 00.00, and W5 as late as 09.20. W6 and 7 at 05.50 to 08.00 were also very good, with 8W6DFY present at S6, EPZ, W7VGQ (00.55), and also a rare State, Nevada, W7DOS (07.20). Long Path W6 was again very irregular; noted last on March 30. Best signals were from K8WVF at S8 (23.30), and VE3BLU at S8.

Central America: A few rareties received: HI8NPI (23.15/00.00 at S5), XE1OK (05.00/07.15), XE2IT (00.40), HP1IE (00.00/07.45 at S4-6), CM2QN (23.15), VP7NQ (S7 at 23.20).

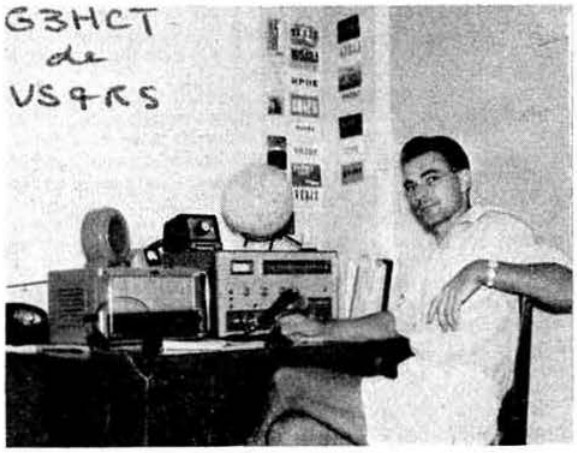
South America: FY7YK regular at S7 (00.50).

The **14 Mc/s** band has produced DX for everyone this month. **G2BOZ** (near Droitwich) has worked VP2KJ (20.40 on s.s.b.), VP8HF (19.30 on c.w. and s.s.b.), VQ9HB (16.45), VQ9HJB (17.00), and KW6ED (08.00) all on s.s.b. **G3SEF** (Walsall) exchanged c.w. with VK4JI (13.35), VE8NO (15.15), HZ2AMS (15.33), VE8OR (09.36), AP5HQ (13.34), CU1TA (17.10), TI2PZ (19.33) and CR7IZ (20.53). **G3III** (Chippenham) reports 5Z4IV, OY5S, IT1PA, CR6AI, EP2AS and ZE8JW. **G3AAE** (Loughton) worked c.w. with VP2KJ (19.50), KC4USK (19.00), ZS7M (17.10), VP8HF (19.05), VP8HD (20.00), HL9TB (08.45), BV1USK (09.00), ZS6AP/A (19.00), 7X3VW (19.10), PA5HQ (11.05), FR7ZD (16.30), VP8HO (20.15), TL8SW (20.50), OR4VN (18.15), ZC5AJ (17.15) and ZD6RM (17.45). ZS6AP/A is apparently a South African Research Station.

A3850 (Tunbridge Wells) comments that a.m. is still providing some good DX contacts, and he suggests that s.s.b. fans might be surprised if they were to revert to this mode. Very clear DX can often be heard early in the morning before the European skip gets going. A good example is KH6EJR (06.48) MM, 1,400 miles west of Hawaii conducting a phone patch test with KH6DUG (5 and 8). S.s.b.: ZL2UD (08.55), 6W8CK (10.35), ET3USA (15.14), 4X4MJ (15.53), EP2BY (16.30), KP4BLH (19.00), HI4XAB (19.05), 9Q5HF (19.10), VS9OSC (19.10), CN8MZ (19.15), YV5AXX (20.15), YV3BF (20.30), CN8MC (20.30), PY7VKN (20.45), W6HLH (20.45) and 6YAUC (20.55).

G3PUF (Middlesbrough) found CP5EZ (20.23), LU8DBX (21.23), UA0KIG (18.10) in Zone 19, UA0PY in Mongolia, UC2PV (14.24), VP6BW (10.43) in Barbados, amid many others. **G3HCT** (Solihull) lists FY7YJ (23.35), FY7YE (19.50), FU8AG (08.05), LA9MI/P (16.20) OA4FM (23.38), OA4BP (23.50), VP8HF (19.00), VS1ME (16.20). **G3PVS** (Woking) comments that 5R8AB, 5R8AI and 5R8AM have been regularly heard during the past month, sometimes all three on the same day.

A2498 (Croydon) has been very active, particularly listening for s.s.b., and amongst many others reports AP2AZ (15.40), CE3WN (20.40), CP1BH, BJ, 5AD (19.30 to 20.45), CR6FY (18.20), CR7GF (16.30), CX2AX (19.30), EL2Y (18.20), FG7XT (19.40), FM7WQ (10.20), FS7AA (19.50), FY7YF (20.40), HC2JT (21.15), HI8MVF (18.00), HL9ES (09.00), HR1SO (20.20), KA2LD (09.10), KA5MC (16.00), OA4PD (21.05), PJ2AA (20.10), PZ1AX (21.40), 6O6BW



Ron Skelton, VS9RS, is active on all modes on DX bands from Kuching, in Sarawak.

(Photo via G3HCT)

(19.15), 7X2SQ (09.35), 9K2AN (06.35), 9L1RO (09.10) and 9M2FR (15.50).

A3670 (Exeter) reports a.m. from EP2BY (16.10), 9K2AN (16.09), and LA7FF/MM (20.55). **G3LPS** (Blackburn) also did well and obtained contacts with many of the areas given above by others, notably XW8AW/BY (14.25), VS4RS (15.00), FM7WP (19.50), FG7XC (20.30), CP3CN (00.10) and 6O6BW (20.20). **G2BJY** (Walsall) found openings to practically every part of the globe including VK3CX (08.30), PJ2CZ (11.50), VP7BG (16.48), VE8DL (16.40), KV4DE (11.55) and ZS5UT/MM in Cape Town Harbour (18.35). **G8JM** (Chingford) found conditions average, but nevertheless exchanged reports with LA9MI/P (Jan Mayen), FY7YE, PZ1AG on c.w. and s.s.b. with FR7ZJ, YS1RRD, KW6ED and AP2AD in West Pakistan. **G3HDA** (Stratford-on-Avon) adds to the variety with ZC5AJ (16.30), 4W1B (06.53), 5T5AD (07.55), KG6AM (11.26), HR1SO (20.10) and FS7AA (14.38) all on s.s.b.

A great uplift of activity on **21 Mc/s** has occurred recently and much DX is reported. **G3AAE** (Loughton) worked c.w. with TU2AW (11.30), VS6EY (09.15), KR6ML (09.00), VP8GQ (17.00) and FR7ZD (09.17). **A3850** (Tunbridge Wells) reports that conditions have been good but variable. Some afternoons seem to be given over almost entirely to very strong signals from W/K whilst on other days African stations are prevalent. He reports hearing a.m. phone from JA6HK (08.00), 9K2AX (08.35), UM8KAA (08.50), JA2BGW (10.51), VU2FB (11.15), MP4BBA (11.25), ZD6RM (12.10), MP4DAA (13.55), LU6NC (13.55), HC2CI (14.05), VS1LY (14.10), VS1MA (14.15), YV3FJ (15.05), ZS1BV (15.05), 9Q5YL (15.05), VS9ARC (15.07), KZ5LW (15.55), K0JCG (18.40) and WA0ELL (21.10). **G3HCT** (Solihull) worked s.s.b. with XW8AW/BY (10.28) and c.w. with CR8AD (12.35) and VP8HF (18.12). **G3LPS** (Blackburn) worked c.w. with MP4QBF (11.31), 5H3HZ (11.37), 5N2JKO (12.17), ZB1J (11.55) and VU2GG (09.05). **A1798** (Winchester) also reports a.m. from VQ2DT (10.28), 5A1TK (17.30), YV5AGM (17.34), 9G1DM (17.55), CR6BC (17.50), PY1AGP (18.20) and 9Q5YL (17.55).

G3SEP (Great Yarmouth) considers this band underrated and says that patience and the ability to read weak signals will find plenty of DX. Commenting that QRM is negligible and standards of operating good he thinks that a Commonwealth c.w. net at the weekend would be very popular. He uses a 100 ft. long wire, end fed, or a 33 ft. vertical to bring in the DX, e.g., XW8AW/BY and ZS6EY.

A2498 (Croydon) found DX in profusion including a.m. from EL8X (14.25), LU5DZ (17.30), XE2AAW (21.35), 4S7BR (12.40), 9L1JR (18.30) and s.s.b. from CE3XA (18.50), OD5AX (14.30) and ZP5DD (15.55).

Activity on **28 Mc/s** still seems very slight. **G3SEF** (Walsall) worked VQ2BC (12.17) and received a 5-5/6-9 report. **G3III** (Chippenham) also heard VQ2BC working into the UK.

DX Briefs

A new prefix now used by stations in the Ukraine is **UY5.** UW4 stations are now also being heard, this being the same area as UA4.

VE4OX (647 Academy Rd., Winnipeg 9, Canada) is now QSL manager for **9G1s EO, EW, EX, GN** and **CR7GF.**

ZD3A asks for patience when awaiting QSLs as after a period when he was without cards he is now endeavouring to eliminate his backlog.

PJ5SA and **PJ5SB** will be the calls of K0GZN and K0GZO when operating from Saba Is. which has an area of five square miles only. This island counts as St. Martin for DXCC purposes, and QSLs should go to their home QTH (PO Box 186, Harper, Kansas, USA.).

K1KDS/AM based at Capodichino Airport, Naples, is now active on 14 Mc/s c.w. after over a year on 21 Mc/s phone. After more than 200 individual station contacts with the UK he finds that the QSL returns are just over the 60 per cent mark. (Do *you* owe a QSL to K1KDS/AM?)

From BRS24483 it is learnt that **VP8HR** will return to the UK in September 1964, whilst **VP8GX** will be returning in June 1964.

OY8KR is active from the QTH of OY7ML on 14 Mc/s s.s.b. and QSLs may be sent to the home QTH of OY7ML (Box 184, Torshavn) or via the bureau to OZ8KR.

VR4CM will be active from the Solomon Islands during the next few weeks, mainly on 14 Mc/s s.s.b., and it is believed that QSLs should go via K5HWV.

Rumours that the HB9TL portable s.s.b. rig will be sent from inactive **FB8ZZ** to FB8XX are probably untrue, owing to the lack of transportation for several months. **FR7ZJ** has acquired an HX50 transmitter and may be heard on the low end of 14 Mc/s. **FB8WW** on the Ile de Possession of the Crozet Group has not been heard in the UK for some time although reported active from South Africa and North America. Frequencies are usually 14,040 kc/s c.w. and 14,149 kc/s a.m.

* * *

The co-operation of correspondents is much appreciated and acknowledgement is made to the West Gulf DX Club *Bulletin* (W5IGJ), the LIDXA *Bulletin* (W2MES), *DX'press* (PA0FX), the *DX'er* (W6HVN), and the *Florida DX Report* (W4HKJ). Please send all items to RSGB Headquarters to arrive not later than **May 12** for the **June** issue and **June 9** for the **July** issue.

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.

LONDON MEMBERS' LUNCHEON CLUB

Owing to changes being made by the management at the Bedford Corner Hotel, the May luncheon will be the last to be held there. Arrangements are in hand to find suitable alternative accommodation, when a further announcement will be made. In the meantime, the Honorary Secretary of LMLC will notify regular visitors of any new venue.

IDLE THOUGHTS DURING BERU

By MICHAEL DRANSFIELD, 5N2JKO*

THE small paragraph in a Lagos newspaper caught my eye: "Id el Fitr public holiday, February 14 and 15." A check of the RSGB Contests Diary: BERU Contest, February 15 and 16. What a stroke of luck! For the very first time 5N2JKO would be able to enter a 48-hour contest without having to go to work on the Saturday. This was an opportunity not to be missed, and also a challenge; hadn't VS9AAA told me the other day that he would also be making an all-out effort to win?

Friday dawned—the first day of the holiday. Log sheets were prepared, a table for stations worked was drawn up (must remember to give more space for the G6's and G8's this year—ran out of space last time and had to use the GI column). Wonder if I should include a column for ZL? Bound to remain blank, but no harm in being hopeful.

A quick check of the transmitter on all bands showed that it appeared to be functioning normally. Better clean and adjust the bug key and tighten all locking nuts—not much c.w. has come out of 5N2JKO since he went s.s.b. Clean the *harmattan* dust out of the p.a. compartment. Wonder if a second 40m dipole at right angles to the existing one would help? Probably would, but a check in the junk box produced only 6 ft. of co-ax, so that idea fizzled out. Amazing how BULLETIN contributors always find just what they want in their junk boxes—5N2JKO never does! House-boy given an important instruction for the weekend:

"Ba ka tafi gidan radio ba!" (Keep out of the radio room). Meals arranged to coincide with probable spells of low activity. Convenient that African cooks have the ability to keep food hot for hours without spoiling it too much.

Count Down

15.00 GMT—nine hours to go. Took an early supper, then dismissed the servant and went to bed.

16.30—Neighbour called to sell tickets for the University opera; seemed a little shocked at my unconventional bedtime.

19.00—still awake; wonder why I can never sleep just before a contest.

20.00—never felt less like sleeping, so got up and watched "*The Saint*" on TV.

20.55—back to bed and finally asleep.

23.45. Alarm clock did its stuff, so rig warmed up, operator likewise. Freezing in the shack (well, nearly—temperature down to 60°F). Quick look on 20m showed only a few South Americans, so tuned up on 40. Exchanged reports with G3FPQ to confirm rig was working, and then. . . .

00.01 GMT—*WHAMMM*! 40m burst into activity. I had been keeping a channel warm so there was no trouble in making the initial contacts which give one confidence. G's seemed to be finding BERU stations hard to uncover, so 5N2JKO was kept busy.

The Contest Begins

After about three hours of this, 40 was becoming deserted, so a QSY to 80 was indicated. G3FXB was coming through weakly, but knowing that Al has a good pair of ears, gave him a call and got him. Where were the rest of the G's? VE3KE dominated the band, but very little else was coming through. Comforting thought that my current serial number was a bit higher than most others. 05.40 hours—a beautiful pinkish-orange African sunrise, and 80 started to peak up; quite a flurry of activity for half an hour, then the band went dead as the hot sun started its climb.

Now for the rat-race on 20m. Should find quite a few Africans and the G's would be coming through soon. What was that? ZB1BX giving me a number 20 more than mine? How did he do it, because I never even heard him on 40 or 80? 07.30—breakfast, and then put the beam long path to the Pacific. 08.30—still no Pacific DX in the log.

"Barka da Sallah, Maigida!" This was my garden boy greeting me in the hope of getting his Sallah present, so forked out five bob and told him to vanish for the day. Back to 20 and 15 metres. Tried to work ZB1BX and VS9AAA on 10m, but no propagation. Later heard some F and CT1 stations, and also ZB1BX, but Denzil must have returned to 15 as I was calling him on 10.

Dancing Girls

Now more interruptions. In UK, the carol singers perform in the evenings before the holiday; here in Northern Nigeria the kids visit the houses during the two days of the holiday to show off their new songs and dances. Bit off-putting to one's operating to have young girls doing a cross between the can-can and a belly-dance outside the window.

Throw a few pennies out and return to the contest. A quick shout of "Mun gode, Maigida" and they are gone, only to be replaced half an hour later by another troupe. This is most upsetting to one's concentration, so finally close the front door and hope that the next batch will assume that I am out.

14.00 hours. Getting pretty warm in the shack; the thermometer is up to 95°, but the transmitter seems to be running fairly cool. Wish the operator was! Have a cold shower before lunch, and wonder what has happened to the Far East stations. Found a couple of VS1's, but nothing from 9M2 or VK. Turn the beam to Canada and put out a directional call on 15. Not even a W came back, a sure sign that I wasn't getting out to North America. Back to 20m—Europeans should be getting stronger now. Yes, lots of G's looking for DX, so get down to a rapid routine of contest exchanges.

Oh no, not another knock at the door! This time it was the night guard wishing me "Barka da Sallah" and wanting *his* holiday dash. Gets kinda expensive, especially as these people expect presents at Christmas as well!

At long last the Canadians start coming through on twenty, and I collect some welcome bonus points. The G's faded out at sunset (17.40) and things quietened down. Haven't heard VS9AAA for some time—wonder how he is doing. Can't hear any other 5N2's being worked—am I the only one carrying the flag for this outpost of the Empire—sorry, Commonwealth. (No, BCRU doesn't have the same feel about it as BERU).

Might as well have a bath and supper now. Back on 20 at 19.00, but the band seems horribly quiet. Very few G's and no VE's. Another 29 hours to go—why did I ever start this Contest? Conditions seem to indicate a few hours sleep, so set the alarm clock for 02.00 and get into bed.

Sleep Claims the Operator

Sunday morning. Seems to be getting light—must be the moon. No, can't be—it was new moon yesterday when Ramadan ended. Look at the clock—05.00—what happened to my good intentions? The alarm seems to have gone off, but it failed to rouse 5N2JKO. That's ruined my chances of making a decent score. Hurry back to 80m to get a few points before diving into the maelstrom of 20 again. But what's all this din on 20? Key clicks from here to kingdom come, chirps, drifting T6 notes—another contest in full force. This is going to complicate things. Turn the beam to East Africa to remove some of the QRM and scrape up a few

* Institute for Agricultural Research, PMB 1044, Zaria, Nigeria.

points. 5Z4AQ is a good signal—wonder if he can hear the noise from the north? Run out of stations to the east so beam on Europe again; a few strong G's coming through, but worked those yesterday, so go for a walk to stretch my legs before breakfast. Quite a nice morning now the sun is up; pity I've got to waste it indoors!

Better have a look on 40m to get 25 points from one of the 9G1's.

A check on the serial numbers being exchanged on 20m reassured me that the leading operators must also have been to bed. What about 10m again? Should I waste precious moments in the hope of bonus points, or stop on 15 and rake in G's at 5 points a time? Finally announce to anyone who might have been listening that would now QSY to 28.1, and was delighted when ZB1CR came back to my CQ. Unfortunately, no one else did, so back to 15. No shortage of stations here—didn't realize that so many G's were contest-minded.

So the day wears on. More children come to dance in their holiday finery. Stock of pennies getting a bit low, and don't want to start dispensing shillings; these are the only coins in common circulation around Zaria. At 14.00 the expected opening to the Far East comes, and work VU, VS1 and VS4. Still no 9M2 or VK activity.

A Hausa trader with a huge pile of baskets on his head rings his bicycle bell. Perhaps he will go away if I pretend not to hear him. No, he is one of the persistent types, so finally get the houseboy to send him away.

Note from my record chart that I still haven't worked Canada on 15, so again beam in that direction. A W1 answers my CQ, so work him in the hope that some VE's are listening. Yes, here they come. Get VE3, VE2 and VE1 in successive contacts, all the while being called by dozens of W's plus a DJ6 plaintively crying " Wot is BERU?" Then the band closes like a clam to North America. A quick check on the transistor radio showed that the BBC was above average on 21470 kc/s, so there should be plenty more G's to work. Many stations on 15 seem to be giving better reports than they are getting from me—perhaps I should have re-aligned the receiver before the contest. Too late now, so press on as I can still hear them.

Back to 20m. What a racket after the peace of 15! All the available space seems to be filled by ZB1BX, VS1LP, VS9AAA, several 5B4's, 5Z4AQ and G8KS, but finally manage to squeeze in and continue exchanging reports.

18.00—a vivid red sunset with the smoke from a bush fire silhouetted against the sky. Six hours more of the 1964 BERU. Not feeling too tired thanks to my unintentional full night's sleep, so resolve to fill in some of the missing prefixes. Try 40m—a CQ brought back LZ, YO, YU, SP and SM. Try again. Still that YO with a T2 note. Better work him otherwise he will be bothering me with his buzzing all night. Heavens! That was fatal—now all Eastern Europe is calling me, so do a rapid QSY and try to work ZD3A and VS9AAA. Wonder why Bob and John attract only G's with their CQ's? Finally get ZD3A, but VS9AAA remains unworkable. I should have put up that other dipole after all. Scrape around 40 for a few more G's and also work ZB1CR —the only station whom I worked on all five bands.

19.30—finally gave up the effort on 40m and return to 20 with the beam westwards for VE and VP. Call " CQ BERU NO USA "—20 W's call me. Try " CQ VE ONLY "—this time 30 W's come back. Next try " QRZ VE? "—this brings back 40 W's. Finally find a VE off frequency who is calling, and very slowly manage to get rid of the pile of W's by working the more persistent ones, promising some others a QSO in their ARRL Contest next week, and threatening not to work those that wouldn't stop calling me. At last, the East Coast fades out, and the VE4-8 stations are audible. Quickly wrap up the remaining VE prefixes. Still no West Indies, though TI2PX gave me a fb report.

Two hours to go. Shall I call it a day and go to bed, or stay to the bitter end and try for a few more points. Finally decide to make some more coffee and slog it out on 80m until midnight. Get an unexpected bonus with my penultimate contact when I work VO1DX, helped along by a W3 who has to wait until BERU is over before I will work him.

What did I get out of it all? The satisfaction of making a large number of contacts and possibly being among the top six? Or was it the chance of working some of the old-timers who make an appearance in BERU and are seldom heard otherwise? Or do I like pitting my operating skill against others? I don't know. My first BERU was as recently as 1960, but even after such a short acquaintance with this contest it is the one event in the whole of the International Contest Calendar that I try not to miss.

BBC Shetland Television and V.H.F. Sound Relay Station

The BBC's new television and v.h.f. sound relay station at Ward of Bressay, near Lerwick, to be known as the Shetland Transmitting Station was brought into service on April 15. It radiates BBC Television (BBC-1) on Channel 3 (vision 56·75 Mc/s, sound 53·25 Mc/s) with vertical polarization and the three sound programmes with horizontal polarization, on the following frequencies:

Scottish Home Service	92·7 Mc/s
Light Programme	88·3 Mc/s
Third Programme/Network Three	90·5 Mc/s

Because of the difficulty of feeding the programmes to Ward of Bressay for re-transmission, the extension of the BBC's television and v.h.f. sound services to Shetland has involved considerably more work and taken more time than is normally required to build a relay station. A receiving station has been built at Fitful Head which picks up the programmes from the BBC's Orkney transmitting station. The television programme is then fed over a microwave radio link to the transmitting station at Ward of Bressay; the three sound programmes are carried by Post Office line.

At the World Fair, which opened in New York on April 22, an Amateur Radio Station with the call-sign K2US is operating from the Coca-Cola Company Pavilion, on 80, 40, 20, 15, 10, 6 and 2m. In the photograph, Herbert Hoover, Jnr., W6ZH (right), President of the ARRL, is testing the equipment, accompanied by John Huntoon, W1LVQ, the General Manager of the ARRL. Special QSL cards have been designed to acknowledge contacts with this station, which will be operated by volunteers and US amateurs visiting the fair.

QUA Associates

conducted by "JIX"

THERE are always those who are just beginning to take the first steps towards what will be perhaps a lifetime's interest in Amateur Radio.

Some may take up such activity fairly late in life but many others eagerly looking round the modern technical world find a beckoning call while yet still at school. The boys (and perhaps girls!) who start off this way find plenty of adventure and challenge in Amateur Radio, and one always hopes that the enthusiasm in young people will be maintained.

The Associate members of the Society fall into two broad divisions, the keen younger boys on the one hand and older more experienced types, perhaps at university, on the other. The division of know-how and experience is therefore very wide, even in this single grade of membership. However, correspondence is often received from "A" members requesting some information, informing us of a technical project achieved, or listing the interesting stations heard. If you have read so far and are keen, then we wonder what you may have to say.

A Simple Crystal Set

How about some of the keenest readers having a go at getting younger boys at school or club interested in radio? The crystal set shown in Fig. 1 would be a good start. The design was built by David Moerel, and he says it works fb

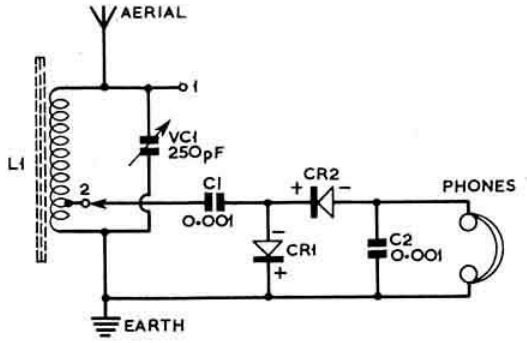


Fig. 1. The circuit of a crystal set devised by David Moerel. CR1 and CR2 are semiconductor diodes, such as OA81s, etc. L1 is a 3 in. long ferrite rod, on which are wound 35 turns of wire, tapped 5 turns from the earth end. VC1 is a 250 pF trimmer, with a small knob attached.

(fine business). The two diodes form what is known as a "diode pump detector." Try connecting the lead to the detector to points 1 and 2 in turn. Notice the effect on the selectivity.

Of course, if any of you haven't made a crystal set such as this, then why not go ahead? It would be interesting to hear of the best crystal set "DX," although the weak distant stations would no doubt require the main BBC transmitters to be closed down.

Transistor amplifiers can be added to this circuit at a later date.

QUA: here is news of... (International Q Code). This feature is compiled by Ken Smith, G3JIX.

Activities

Ronald Marchant **A2558,** of Leyton, has just received his licence (G3TAJ). Ron tells us that he hopes to be active on Top Band and to finish his oscilloscope construction project. GCE looms this summer, however. Best of luck, Ron.

Eric Northwood **A3805,** whose QTH is Harold Hill, wants more space in the BULLETIN devoted to "A" members. The

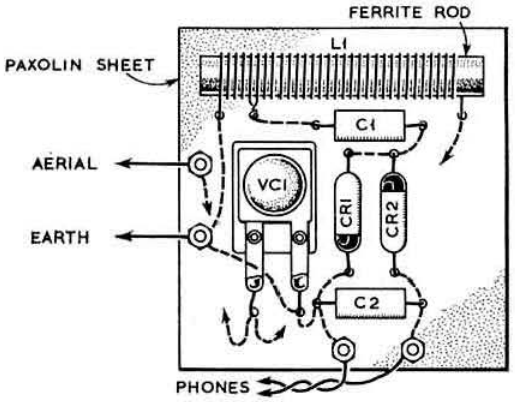


Fig. 2. A tried and tested layout of the crystal receiver. The components are mounted on a Paxolin board, with the wires pushed through suitably positioned holes, and the connections made beneath the board. The ferrite rod can be satisfactorily anchored with an impact adhesive.

trouble is, Eric, that everybody clamours for space to see their own ideas, but certainly you may see more of interest in the future as the membership increases (we can all help to enrol a friend).

Raymond Phipps **A3064,** of Leytonstone, informs us that he is working on engines for a generator. This is in connection with Field Day and camp activities. Raymond wonders if any other "A" members have experimented with engines for this kind of thing. Raymond planned the stand for the Roding Boys' Society which you may remember at last year's RSGB Radio Communications Exhibition.

Pamela Brayne **A4101** recently joined the Society and says that she is hoping to obtain her licence soon. Pamela is studying maths at London University at the moment and we wish her all the best in her studies and Amateur Radio.

It is possible to organize and run Amateur Radio weekends for young people at residential Youth Centres. We have thought about such things, but naturally nothing can be done unless you are keen to take part and help. Perhaps you have ideas and suggestions. For instance, what sort of activities would you propose in connection with such adventure projects.

* * *

This feature is intended for the younger "A" members, but comments from anyone interested would be welcome. Please send all contributions to Headquarters. See you again next month. 73 de JIX.

Representation

Deputy Regional Representatives

The following have been appointed Deputy Regional Representatives:

REGION 7
LONDON SOUTH
W. D. GILMOUR, G2VB, 35 Grangecliffe Gardens, London, S.E.25.
LONDON NORTH
M. A. C. MCBRAYNE, G3KGU, 25 Purlieu Way, Theydon Bois, Essex.

REGION 9
CORNWALL
J. N. WATSON, G3AET, Tully Crine, Corpaskus, Mabe, Burnthouse, Penryn, Cornwall.
DEVON
F. J. WADMAN, G2GK, 106 Warbro Road, Babbacombe, Torquay, Devon.
DORSET
M. SAVAGE, G6SV, "Thrae," Compton Valence, Dorchester, Dorset.
BRISTOL
A. J. RAWLINGS, G3PFC, 43 Mackie Avenue, Filton, Bristol.

Area Representatives

The following are additions to the list of Area Representatives published in the January issue:

REGION 1
PRESTON
G. LANCEFIELD, G3DWQ, 35 Brixton Road, Frenchwood, Preston, Lancs.

REGION 4—LINCOLNSHIRE
SKEGNESS
W. J. SPILMAN, G3OTD, 65 Wainfleet Road, Skegness, Lincs.

REGION 5—CAMBRIDGESHIRE
MARCH
R. E. LUDMAN, G3RGX/T, 5 Kingswood Road, March, Cambs.

REGION 6
GLOUCESTER
E. A. PERKINS, G3MA, 40 Calton Road, Gloucester.

REGION 7
BEXLEYHEATH
R. G. HOLLAND, G3BPE, 35 Bladindon Drive, Bexley, Kent.
CHINGFORD
J. H. LEVI, G3NQT, 9 Goldings Rise, Loughton, Essex.
CROYDON
S. A. MORLEY, G3FWR, 22 Old Farleigh Road, Selsdon, South Croydon, Surrey.
DORKING
W. WALSH, G3HZJ, 4 Meadowbrook Road, Dorking, Surrey.
ROMFORD
N. MILLER, G3MVV, 55 Kingston Road, Romford, Essex.
SLOUGH
V. E. W. WHITAKER, G3HRG, 50 Alderbury Road, Langley, Bucks.
WELWYN GARDEN CITY
J. HUM, G5UM, 9 Burnham Green Road, Bulls Green, Knebworth, Herts.

REGION 10
BLACKWOOD
K. A. KERTON, GW3CJR, 9 Old Pant Road, Newbridge, Newport, Mon.
PONTYPOOL
D. J. PEACOCK, GW3NOP, 6 Tennyson Close, Fernley Cross Estate, Caldicot, Chepstow, Mon.

REGION 14—LANARKSHIRE
MOTHERWELL
D. MENTEITH, GM3IWU, 20 Linksview Road, Motherwell, Lanarks.

REGION 15
BELFAST
P. G. BOWER, GI3OFT, 8 Richhill Crescent, Sandown Road, Belfast 5, Northern Ireland.

Affiliated Societies

The following societies and clubs are now affiliated to RSGB:

ARIEL RADIO GROUP, CAVERSHAM
c/o H. C. Peacock, 140 Kidmore End Road, Emmer Green, Reading, Berks.

BAGSHOT AND DISTRICT AMATEUR RADIO CLUB
c/o P. J. LeMoine, Laburnums, Chertsey Road, Chobham, Woking, Surrey.

BRISTOL AMATEUR RADIO CLUB
c/o H. W. Leonard, University Settlement, 43 Ducie Road, Barton Hill, Bristol, 5.

CHESTER AND DISTRICT AMATEUR RADIO SOCIETY
c/o R. S. Trickey, 31 Pensby Avenue, Upton by Chester, Cheshire.

DURHAM AMATEUR RADIO SOCIETY
c/o E. D. Watson, 5 Park House Road, Nevilles Cross, Durham City.

ECHELFORD AMATEUR RADIO SOCIETY
c/o C. B. S. Seaman, 40 Park Road, Ashford, Middx.

GEC (COVENTRY) APPRENTICE ASSOCIATION AMATEUR RADIO SOCIETY
c/o R. M. Harrison, GEC Apprentice Assoc., c/o Training Office, The GEC Ltd., Telephone Works, Copsewood, Coventry.

MEDWAY RADIO CONTEST GROUP
c/o J. E. Austin, 40 Cross Keys, Bearsted, Kent.

MULLARD SPORTS AND SOCIAL CLUB (MITCHAM) AMATEUR RADIO SOCIETY
c/o C. F. Buer, 12 Sea Lane, Pagham, Sussex.

RAF ABINGDON RADIO AND ELECTRONICS AMATEUR RADIO CLUB
c/o Fg. Off. Brown, G.G., Officer i/c Radio Club, Officers' Mess, RAF Abingdon, Berks.

RAF NEWTON AMATEUR RADIO CLUB
c/o Sgt. V. R. Gough, RAF Newton, Nottingham.

SUNDERLAND TECHNICAL COLLEGE AMATEUR RADIO SOCIETY
c/o K. Hogevold, Physics Dept., Sunderland Technical College, Co. Durham.

TRENT COLLEGE RADIO CLUB
c/o C. E. Freeman, Trent College, Long Eaton, Nottingham.

UNIVERSITY OF KEELE RADIO SOCIETY
c/o V. J. Reynolds, Communications Dept., University of Keele, Staffs.

UNST RADIO CLUB
c/o R. W. Anderson, J.S. School, Baltasound, Unst, Shetland.

WIMBLEDON AND DISTRICT RADIO SOCIETY
c/o E. N. Hurle, 156 Monkleigh Road, Morden, Surrey.

92ND ROYAL SIGNAL REGIMENT AMATEUR RADIO SOCIETY
c/o M. Francis, 8 Lipsham Close, Banstead, Surrey.

257 SIGNAL SQUADRON AMATEUR RADIO CLUB
c/o Staff Sgt. R. Walmsley, 257 Signal Squadron, B.F.P.O. 20.

Affiliated Society Representatives

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

BARNET RADIO CLUB
K. R. Clarke, G3KRC, 24 Galley Lane, Barnet, Herts.

BRISTOL AMATEUR RADIO CLUB
H. W. Leonard, 47 Windsor Road, St. Andrews, Bristol, 6.

CRYSTAL PALACE AND DISTRICT RADIO CLUB
E. W. Yeomanson, G3IIR, 32 Gaynesford Road, London, S.E.23.

DARLINGTON AMATEUR RADIO SOCIETY
R. J. Jackson, G2CKN, Ringfield House, Hurworth on Tees, Darlington, Co. Durham.

DORKING AND DISTRICT RADIO SOCIETY
W. T. Walsh, G3HZJ, 4 Meadow Brook Road, Dorking, Surrey.

EAST KENT RADIO SOCIETY
C. Berry, G3LZV, 4 Godwin Road, Canterbury, Kent.

THAMES VALLEY AMATEUR RADIO TRANSMITTING SOCIETY
A. Mears, G8SM, 4 Broadfields, East Molesey, Surrey.

HARTLEPOOLS AMATEUR RADIO CLUB
T. Luxmore, G3AWL, 40 Vane Street, Station Town, Wingate, Co. Durham.

(Continued on page 322)

Major Points of Difference between the present and proposed Articles of Association

New Article No. 7

Certain restrictions applicable to candidates for Corporate membership have now been removed (*Old Article No. 10*).*

New Article No. 8

Certain restrictions applicable to candidates for Associate membership have now been removed (*Old Article No. 11*).*

New Article No. 10

This is a new Article dealing with the President, and changing the procedure for election. In future, the incoming President will be ***appointed by the Council*** and named in the October before he takes office.

New Article No. 11

This is a new Article dealing with the Executive Vice-President and changing the procedure for election. In future, the Executive Vice-President will be ***appointed by the Council from among themselves*** at their first meeting in each year.

New Article No. 12

This is a new Article dealing with the Honorary Treasurer, and changing the procedure for election. In future, the Honorary Treasurer will be ***appointed by the Council.***

New Article No. 15

Candidates for election to the Society in future will be required to be proposed by ***one*** Corporate member or submit the name of ***one*** referee. (*Old Article No. 13*).

New Article No. 23

Subscriptions may be waived, at Council's discretion, in the case of Members who suffer from blindness ***or other disability.*** Previously blindness was the only reason for waiving subscriptions. (*Old Article No. 22*).

New Article No. 24

The Life Membership payment has been ***increased from £20 to £30*** (*Old Article No. 25*).

New Article No. 26

The office of Penultimate Past President has been ***discontinued*** and the status of the Zonal Representative has been more ***clearly defined.*** (*Old Article No. 27*).†

New Article No. 27

A candidate for election to Council must, in future, have been a Corporate Member for ***not less than three years.***

New Article No. 28

The procedure for filling casual vacancies on Council has been more clearly defined. (*Old Article No. 28*).‡

New Article No. 52

The new notification dates have been made necessary by the change in the date of publication of the RSGB BULLETIN. (*Old Article No. 55*).

New Article No. 53

In future Council Members may not nominate personally candidates for election to the Council. (*Old Articles Nos. 55 and 56*).

New Article No. 54

This new Article sets out the procedure for filling a casual vacancy in the office of Zonal Representative.‡

New Article No. 58

It is proposed to appoint a panel of 10 scrutineers at the Annual General Meeting, from which three will be drawn to serve for the purpose of any ballot that may be held for the appointment of Council Members at the next following AGM. (*Old Article No. 61*).

New Article No. 62

Powers of Attorney have now been introduced.

New Article No. 74

Borrowing powers are now defined.

New Article No. 75

Grounds for the ***disqualification of a Member of Council*** are now introduced.

New Articles Nos. 76 and 77

A statement regarding the Secretary has now been introduced.

New Article No. 78

A statement regarding the use and control of the Society's seal has now been introduced.

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* These changes have been made in order to broaden the Society's field of recruitment.

† The previous Article did not indicate that a Zonal Representative was a full member of the Council. This has now been clearly set out.

‡ The Council has power to fill any casual vacancy including that of a Zonal Representative who, under New Article 26, is an Ordinary Member of Council.

Society News

RSGB QSL Bureau Sub-Managers

Owing to his forthcoming transfer to a post abroad, Mr T. D. J. Miles has resigned as QSL Bureau sub-manager for calls in the series G3IAA to G3KZZ, BRS, and A numbers.

The new sub-manager is Mr G. L. V. Butler, 995 London Road, Thornton Heath, Surrey.

Members with call-signs in the G3T series are asked to note that their QSL Bureau Sub-manager is Mr E. G. Allen, G3DRN, 65a Melbury Gardens, London, S.W.20.

A New RSGB Recorded Lecture

"International Conferences and Amateur Radio" is the title of a new tape now available in the Tape Library. It is an edited recording of the talk recently given to the East London Group by Arthur Milne, G2MI. Included in the topics discussed are the organization of the International Amateur Radio Union, the International Telecommunications Union, short wave broadcasting, international conferences, and the International Amateur Radio Club at Geneva. The tape is recorded at 3¾ i.p.s. and runs for 55 minutes. All enquiries regarding this and other RSGB tape recordings should be addressed to the Honorary Curator of the RSGB Tape Library, N. C. Ta' Bois, G3HWG, 81 Snake Lane, Woodford Green, Essex.

RSGB Bulletin for January and February, 1964

The RSGB BULLETIN for January and February, 1964, is now out of print. Headquarters are urgently in need of a number of copies of these issues, and any member who does not wish to retain these issues is asked to return them to RSGB Headquarters.

Message from the President

I hope that every one of you will study the proposed new Articles thoroughly. If you have any questions in advance of the meeting I suggest that these be channelled through Area or Affiliated Society Representatives to our Regional Representatives who were briefed on the new Articles at a Conference held in November last year and who have also received further notes for guidance from RSGB Headquarters.

One point to stress is that it is for you to vote and approve or reject these Articles in June as they are presented to you now. By law no amendment can be taken at the meeting; the only possible action, should there be an unsatisfactory Article, is to reject the lot. However, we hope that with the vast effort that has already been expended by the Council and Finance and Staff Committee, together with the valuable advice given by the Regional Representatives, you will feel able to accept the Articles as they stand. I hope to see a good attendance at the Meeting on June 27, where I will do my best to see that any questions are answered.

G. M. C. Stone

Associate Members

Associate members still at school are invited to write to the Society's Education and Training Committee stating whether or not they are members of a school radio society.

Teachers in Schools

The Society's new Education and Training Committee will be pleased to hear from members who are teachers. Correspondence should be addressed to the Committee at Headquarters.

Radio Amateurs' Examination

To enable a comprehensive list of courses in preparation for the Radio Amateurs' Examination to be compiled, members are asked to send details to Headquarters as soon as possible.

Cover Photo

It is regretted that the portable station illustrated on the front cover of the April, 1964 issue of the BULLETIN was incorrectly described as G3LLG. This should have been G3LLJ.

Amateur Cinematography

We congratulate K. R. Clarke, G3KRC, on being awarded a Bronze Medallion at the London Amateur Film Festival (Daily Mail Challenge Trophy Competition) for his highly commended documentary, "National Field Day, 1963." The film runs for 14 minutes and tells the story of NFD in layman's terms and features the Edgware Group. A short animated sequence explains some of the rules.

The sound track is on tape and runs through a synchronizer. Music backing was made up from tape loops of piano and guitar rhythms of the letters NFD in Morse, and mixed with this is the explanatory commentary.

The film is 200 ft. of 8 mm Kodachrome II and Agfacolor. Cameras used were Yashica and Bell & Howell.

G3KRC is now making a film explaining Amateur Radio to the general public and is most interested in getting shots of the more unusual shack—under the stairs, or even under the kitchen sink. Would anyone in the London area who possesses such a shack, and who would be interested in having it filmed, please contact G3KRC direct.

More Pirates Fined

On November 11, 1963, at Bristol Magistrates' Court, Cecil Steven Manning pleaded guilty to a charge of using wireless telegraphy apparatus without a licence. He was found guilty, fined £5 and ordered to pay £2 2s. costs and to forfeit his equipment to the Postmaster-General.

On December 4, 1963, at Sutton Magistrates' Court, Roy Ingram Martin of 5 High Street, Sutton, Surrey, pleaded guilty to a charge of using wireless telegraphy apparatus without a licence. He was fined £10, ordered to pay £5 5s. costs and to forfeit the apparatus to the Postmaster-General.

On December 4, 1963, at Corsham Magistrates' Court, Raymond Roy Beswick of 63 Corshamside, Neston, Corsham, Wiltshire, pleaded guilty to a charge of using wireless telegraphy apparatus without a licence. He was fined £5 and ordered to pay £3 3s. Advocate's fee.

On December 4, 1963, at High Wycombe Magistrates' Court, Lawrence Edward Horwood pleaded guilty to a charge of using wireless telegraphy apparatus without a licence. He was fined £5, ordered to pay £5 5s. costs and to forfeit the apparatus to the Postmaster-General.

Held Over

Although this issue of the RSGB BULLETIN runs to 72 pages a number of technical and topical features have been held over due to pressure on space.

"Walkie-Talkies"

The Post Office has asked us to remind members that *any* use of radio communication in the United Kingdom must be licensed by the Postmaster-General. In this connection the Post Office has recently conducted successful prosecutions for the unlicensed use of "walkie-talkie" radio equipment operating on frequencies around 27·12 Mc/s. It may not be generally known that the Postmaster-General will not license the transmission of speech on these frequencies as the band has been designated for industrial, scientific and medical use.

Transistorized transmitter/receivers are also available working on slightly higher frequencies, e.g. 28·5 Mc/s but this frequency falls in one of the bands assigned for use by licensed radio amateurs. Before an amateur licence is granted the applicant has to pass the Radio Amateurs' Examination (Technical) and the Post Office 12 words per minute Morse sending and receiving test.

Dealers in particular would therefore be well advised to bear in mind, when offered "walkie-talkie" equipment using a frequency of 27·12 Mc/s or thereabouts, that the Post Office will not issue licences to purchasers of this equipment. Any use, including that for demonstration purposes without a licence, would be contrary to the law. Furthermore, equipment operated by licensed amateurs in the 28·0-29·7 Mc/s band must be capable of operating within the terms of the Amateur (Sound) Licence; for example, a satisfactory method of frequency stabilization must be employed in the sending apparatus and frequency measuring equipment must be provided capable of verifying that the sending apparatus operates within the frequency band 28·0-29·7 Mc/s.

Facilities are available for private mobile radio services using speech in the 80, 160, 170 and 460 Mc/s bands and suitable equipment which conforms to the relevant Post Office specification can be obtained through the trade.

It is also worth mentioning that most of the ex-Service mobile radio equipment on the market operates on frequencies not available for private mobile radio services in the United Kingdom, and could not be adapted to operate satisfactorily within the narrow v.h.f. channels available. The use of such equipment is, therefore, not permitted by the Post Office on private mobile radio services.

Amateur Licences

The total number of Amateur (Sound) licences in force on March 31, 1964, was 10,596. Of this number 1498 included licences for mobile operation. In addition there were 150 Amateur (Television) licences.

Receipts

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

Silent Keys

We record with sorrow the passing of the following amateurs:

A. Barlow, G3IOL, of Heywood, Lancashire.

George Golding, G6GG, of Rochford, Essex.

Leslie W. Hancock, GW2XZ, of Penarth, Glam.

Charles R. Kayman, G3MZH, of Kimberley, Notts.

Les. Ledward, G3PMS, of Stamford, Lincs.

Don Townley, G3GHZ, of Accrington, Lancashire.

Eric Warner, G3PTK, of Whittlesford, near Cambridge.

Will you be changing your address soon?

A new addressing system for wrappers for the RSGB BULLETIN and subscription reminders is to be installed at Headquarters and will come into operation during the next few weeks.

Members who expect to change their addresses in the near future are asked to notify Headquarters as far in advance as possible. Similarly, any member whose address on the wrapper for this issue of the BULLETIN requires any modifications is requested to inform Headquarters immediately, returning the wrapper with the notification if possible.

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.

Affiliated Society Representatives

(Continued from page 319)

HOUNSLOW AND DISTRICT RADIO SOCIETY
H. T. Rogers, G3NHR, 34 Hereford Road, Feltham, Middx.

NORTHERN POLYTECHNIC RADIO SOCIETY
P. G. Martin, G3PDM, Radio Society Students' Union, Northern Polytechnic, Holloway Road, London, N.7.

NORWICH AND DISTRICT RADIO CLUB
O. F. Simkin, G3HYJ, 15 Hillside Road, Thorpe-next-Norwich, Norwich, Norfolk.

PADDINGTON AND DISTRICT AMATEUR RADIO SOCIETY
A. B. Altschul, G3JDP, Beauchamp Lodge, 2 Warwick Crescent, London, W.2.

RADIO AMATEUR INVALID AND BEDFAST CLUB
W. Browning, G2AOX, 47 Brampton Grove, Hendon, London, N.W.4.

SOUTH DORSET RADIO SOCIETY
C. E. Biggs, G2TZ, 54 Prince of Wales Road, Dorchester, Dorset.

SOUTH LONDON MOBILE CLUB
L. W. Wendon, 112 Leathwaite Road, Battersea, London, S.W.11.

SOUTH SHIELDS AND DISTRICT AMATEUR RADIO CLUB
K. Sketheway, 51 Baret Road, Newcastle on Tyne 6, Northumberland.

SURREY RADIO CONTACT CLUB
S. A. Morley, G3FWR, 22 Old Farleigh Road, Selsdon, South Croydon, Surrey.

TORBAY AMATEUR RADIO SOCIETY
B. E. Symons, G3LKJ, 52 Reddenhill Road, Babbacombe, Torquay, Devon.

UXBRIDGE RADIO SOCIETY
J. F. Batten, BRS24871, 36 Collingwood Road, Hillingdon Heath, Middx.

WIMBLEDON AND DISTRICT RADIO SOCIETY
R. G. Baker, G6QN, 1 Boundary Road, Colliers Wood, London, S.W.19.

WOLVERTON DISTRICT RADIO CLUB
D. A. Shepherd, G3LCS, 35 The Crescent, Haversham Estate, Wolverton, Bucks.

Society Affairs

A digest of the business discussed at the February, 1964, meeting of the Council

THE February meeting of the Council was held at the Kingsley Hotel, London, on February 17, 1964, and was attended by Messrs. G. M. C. Stone (President), N. Caws, J. C. Foster, J. C. Graham, R. C. Hills, E. G. Ingram, R. H. James, A. O. Milne, L. E. Newnham, F. K. Parker, A. D. Patterson, R. F. Stevens, J. W. Swinnerton, L. Varney, E. W. Yeomanson (Members of Council) and John A. Rouse (General Manager).

Apologies for Absence were submitted on behalf of Mr. H. A. Bartlett who was indisposed.

Accounts

The Honorary Treasurer reported that a preliminary review of the Society's accounts for the six months ending December 31, 1963, showed that expenditure had exceeded income by approximately £400. Mr. Caws pointed out, however, that expenditure in the first half of the financial year is generally heavier than in the second.

Membership

The Council approved 172 applications for membership (119 Corporate and 53 Associate). In addition, 10 applications for transfer from Associate to Corporate grade were approved.

The Council granted affiliation to the Bristol Amateur Radio Club, Chester and District Amateur Radio Club, Durham Amateur Radio Society, University of Keele Radio Society, and the 92nd Royal Signals Regiment Amateur Radio Society.

Specialized Responsibilities of Council Members

It was agreed in principle that members of the Council should be given individual responsibilities as the need arose.

Glasgow Meetings

The President reported that arrangements had been made for Mr. Caws, Mr. Patterson and himself to attend the meeting of the Glasgow RSGB Group on February 21, and he hoped to meet officers of the Radio Club of Scotland over the weekend February 22-23.

British Standards Institute

The representation of the Society on four committees of the BSI was discussed.

Regional Meetings

It was agreed to authorize the holding of Official Regional Meetings in John O'Groats (Region 12) in September, 1964 and in Great Yarmouth (Region 16) on June 14, 1964.

Dundalk Convention

It was agreed that the Executive Vice-President, Mr. E. W. Yeomanson, G3IIR, should represent the Society at the Dundalk Convention to be held on April 18, 1964.

Scottish V.H.F. Convention

It was agreed that the Society's V.H.F. Manager, Mr. R. C. Hills, G3HRH, and Mr. J. C. Foster, G2JF, should represent the Council at the Scottish V.H.F. Convention on April 18, 1964.

New Members of IARU

It was resolved to record votes in favour of the admission to the IARU of the Jamaica Amateur Radio Association, the Radio Amateur Association of Greece, and the Radio Society of Ceylon.

Region I IARU

The Council gave careful consideration to a proposal put forward by the Stockport Radio Society that a paid secretary of Region I IARU should be appointed. However, it was considered likely that many European societies would be opposed to any increased expenditure. Bearing this in mind, and the fact that arrangements are being made to establish an IARU office in Geneva, it was decided the Council is unable to support the suggestion.

Appointment of Staff Advertising Manager

It was agreed to refer to the Finance and Staff Committee a suggestion that the Council should consider the appointment of an advertising manager on the Headquarters staff.

Visit of Mr. Gus Browning, W3BPD

It was agreed that Mr. Stevens should make the necessary arrangements for Mr. Gus Browning to lecture to the Society in the latter part of 1964 on his world wide Amateur Radio tour.

Certificate Claims

It was reported that a number of claims for certificates dated 1959-60 had been discovered at Headquarters and passed on to the Honorary Certificates Manager. Letters of apology for the delay in dealing with the claims had been sent. (Some 12 in all.)

Publicity

The General Manager was authorized to offer to the Methodist Youth Department copies of the leaflet " Amateur Radio an Exciting Hobby " for circularization to its 3,400 local clubs.

New York International V.H.F. Convention 1964

The Council agreed to request the V.H.F. Committee to prepare a paper on v.h.f. and u.h.f. work in the United Kingdom for presentation to the Convention.

Reports of Committees

The Mobile Committee met on January 3, to discuss arrangements for the rallies at Texas Instruments Ltd. and at the USAF Base at Wethersfield, Essex.

The following day the RAEN Committee considered a number of matters relating to the organization of emergency services including a new *RAEN Manual*, the re-registration of members and liaison with Hospital Management Committees.

At a meeting of the Finance and Staff Committee on January 18, the matters discussed were arrangements for binding a further large quantity of the *Amateur Radio Handbook*, the sale of the *Handbook* abroad, paper for the RSGB BULLETIN, staff matters, and office cleaning. The Committee gave special consideration to the position arising from the resignation of Mr. A. J. Reynolds with effect from February 14, 1964.

The Contests Committee at its meeting on January 30, dealt with correspondence from members, the rules for V.H.F. National Field Day 1964, the results of the RSGB 7 Mc/s DX Contests 1963, the Second 1·8 Mc/s Contest 1963, and the Second 70 Mc/s Contest 1963.

The GPO Liaison Committee met specially on January 31 to consider the drafts of new licences submitted for consideration by the Post Office. The Committee also gave urgent consideration to problems which had arisen at Peterborough in connection with wired television.

The Council also received a report on the issue of operating certificates and awards during 1963 prepared by the Honorary Certificates Manager.

* * *

The Council was in session for 4 hours 40 minutes.

Closing date for the June issue
May 8

Closing date for the July issue
June 5

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

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.

NFD Scoring

DEAR SIR,—At an informal meeting on February 12 of Belfast Group members particularly interested in NFD, it was agreed that the Rules as laid down for NFD 1964 are heavily biased in favour of stations in the South of England. It was felt that the change had been made this year, as a result of pressure from the larger groups in the above area. The meeting was not in favour of a bonus points system as previously employed and desired to make constructive proposals which may be acceptable to all parties: these proposals are outlined later. The present system of scoring so heavily favours Southern G stations that NFD should be renamed, as the title " National " no longer applies, if meant to imply " Great Britain."

The Belfast Group enters NFD in a competitive spirit and in our opinion operate stations as efficient as anywhere in the UK. Some five years ago we resolved to treat NFD as a contest and not just as a weekend's operating fun. Since we feel that GI is not in a competitive position under the present rules, we can no longer enter in a competitive position. One suggestion from the meeting was a mass resignation from the Society if the Contests Committee refuse to recognize the situation. This would be drastic action but indicates the feeling of the members. Withdrawal from NFD until further notice is more reasonable and very likely in the event of not getting satisfaction in the matter. The Group is very cognizant of the tremendous amount of work the Contests Committee does on behalf of the Society but if this contest is to continue to be called National Field Day then the rules must, in so far as is possible, give all participating stations an equal chance—otherwise the term " National " must be dropped. The Ballymena Group are NFD enthusiasts but enter strictly for fun and the changed rules are of no great consequence to them. We feel that Scotland is equally badly catered for with ourselves and they have no doubt said so in correspondence. GI and GM have been penalized because Port Talbot won NFD 1963—hardly logical?

We offer the following outline rules for NFD scoring for your consideration.

1·8 Mc/s	—	As for Top Band Contests i.e., extra points for working non-adjoining counties.
3·5 Mc/s	—	As for 1·8 Mc/s.
7·0 Mc/s	—	Equal points—as is.
14/21/28 Mc/s	—	No points for contacts in your own country. Contacts outside the UK—as present (in principle).

We feel that while these outline rules still favour Southern G stations, they do so to a much lesser extent than at present and are we feel simple and worthy of consideration. In fact why should Top Band scoring at NFD be different from that employed in Top Band contests?

Yours sincerely,
A. D. PATTERSON,
Zone F Representative

Belfast 5.

DEAR SIR,—On behalf of Members of my Group I am writing in support of the letter from P. G. Bower, GI3OFT, published on page 196 of the March, 1964, issue of the BULLETIN with regard to the scoring alterations for NFD.

It is fairly obvious that the Contests Committee has been rushed to panic stations by pressure from the all powerful large " G " groups following the unexpected first and second placing of Welsh stations in NFD, 1963. What has apparently been drastically overlooked is that our group has competed for 17 years and this is the first year ever that we have been in any of the first three places. Have we written letters of protest about this state of affairs? Certainly not, because although we go flat out to do well, win or lose, we enjoy ourselves and are not poor sporting enough to moan the odds if we lose, and we should hope to compete for the next 17 years without groaning. Also whilst on this subject no mention was made that 1963 was the first year that a GW station has ever taken the shield.

It is obvious that under no consideration do the G stations like being beaten by GW, but we do not recall this outcry when GM and GI won the Field Day. We are proud of the fact that even without bonus points we would still have run out winners, but if the Contests Committee members care to examine the facts closely, their intelligence should tell them that it was our score on 14 and 21 Mc/s (gained at a height of over 1000 ft.) which brought this about, not the so grudgingly given bonus points on the l.f. bands. Also, it should be easily seen that on 14 Mc/s, where things are evened out for all UK stations, Port Talbot has gained scores which cannot be reached by other stations, which must be due to our station efficiency and operating ability, and if geographic conditions were similar on the l.f. bands, the question of bonus would not arise.

Yes, Mr. Bower, it is the prerogative of only the G stations to gain the trophies, and would it be ludicrous of us to whisper " Braaten Trophy " at this stage. We in GW are so heartily cheesed off with the poor sportsmanship this year that I list the indignities which have been heaped upon us:

1. NFD. A little bird whispered that we had a good score before our entry went in. The result: letters of protest going in with the G group entries before our log was even in London. One group saw fit to write four pages of protests about bonus for GW—but they carefully omitted to mention that since they are in the South-East portion of England and within shouting distance of the Continent, they can work all the Continental portables at four points a time on 3·5 Mc/s throughout the 24 hours, whilst the rest of us do well to work a few of these stations.
2. MCC. Again a bird whispered that Port Talbot had a good score, and again came the cribs from the Gs that GW had to win—and should we say Stourgrapes. However, in this instance the *Short Wave Magazine* was quick to expose the flaws in the arguments.
3. Second 1·8 Mc/s Contest. Won by a Member of Port Talbot group, GW3FSP, and again came the implication from one competitor that the rules were all for GW. No doubt our little bird had been busy again. This competitor wrote to the RSGB BULLETIN, and I quote from page 191 of the March issue, "This should have been the winning log. It would have been under reasonable rules. The Committee ought to have been thoroughly ashamed of itself." In our opinion, this old hand at contests should be ashamed of himself for making such a comment.
4. V.H.F. Contests. The letter on scoring for V.H.F. Contests, on page 195 of the March BULLETIN, is yet a further example.

We could quote still further examples, but the above will suffice.

How about some suggestions from us now. Firstly, if you are afraid of GW only, why take the bonus from GI and GM, which seems to be a typically stupid example of the Headmaster caning all the boys in the class just to get at one boy. So if you want to keep the scoring as it was, why not give the extra points back to GI and GM, and ask Port Talbot to send in a check log. However, in this respect let me assure the Contests Committee that it must be easier for the G stations to score higher than us on 160 and 80m under no bonus conditions, for the simple reason that stations in the London area or the Midlands work all the strong stations around them first, and we have to sit patiently waiting for our turn. They also have a large bulk of fixed stations with poor aerials to score from, whom we cannot even hear.

Secondly, an alternative would be to drop all bonus points, and instead amend the rules so that the minimum permitted distance for any QSO would be 100 miles. This would then even things out and also remove the present advantage, under poor 28 Mc/s conditions, which the heavily populated Gs hold.

Thirdly, disqualify any station not prepared to abide by the spirit of the contest since there must be more losers than winners.

Finally, having said all this, I shall be doing my best to persuade my group to go flat out again this year, and since our motor mechanic qualifies for the certificate for ability to keep a P.E. set going for 24 hours, we might get close to the top again.

Yours faithfully,
R. EDWARDS, GW3BQY
Area Representative for Port Talbot

Maesteg, Glam.

DEAR SIR,—On behalf of the Dundee Group, I would like to add our strongest protests to the letter regarding NFD by P. Bower, GI3OFT, in the March issue of the BULLETIN.

As AR, I have for many years been the chief organizer of the NFD effort in Dundee and I would like to say that we have only just enough licensed members to put on two stations. However, in the spirit of the occasion, to which we all look forward, we have always put on *A* and *B* stations even if some years we are really short of operators.

Like the Belfast and District members we realize that we have practically no hope of actually winning the contest, but in past years we have been very pleased to see our score get higher and our group move up the NFD table. This has been done by enthusiasm, organization, better aerials and slicker operating.

The bonus on 160 and 80 was a great boon to us and we went all out to provide better aerials and more efficient transmitters for these bands because we depended on them to try and make a reasonable score.

This year, however, our enthusiasm has been dampened and our morale so impaired by the loss of the bonus on 80, that the members in the Dundee area are saying " I wonder if we should bother going out? " realizing that we have now less chance than ever of getting to the top.

It is a fact that we have in Scotland only seven or eight groups competing in NFD, while in England this number of stations can be contained in a comparatively small radius. It would indeed be a tragedy if NFD were to lose the support of any of the Scottish competitors as there are few enough groups taking part in Scotland already. To lose them would indeed tend to make the NFD an all English affair.

I echo GI3OFT's closing remarks that irreparable damage may be done to the enthusiasm and morale of this group (and may I venture to say—other Scottish Groups?) by the loss of the bonus and, I say to the Contests Committee, " Restore the bonus on 80 before June 6-7, please."

Yours faithfully,

Dundee, Angus — GEORGE SOMERVILLE, GM3KYI

(The Council has already decided that the scoring system to be used in NFD 1965 is to be reconsidered, Meanwhile, constructive suggestions for improvement will be welcome.—EDITOR.)

The Amateur (Television) Licence

DEAR SIR,—A few operators are apparently under a misapprehension as a result of the publication of my call-sign as G3MEH/T in the 1964 edition of the *RSGB Amateur Radio Callbook*, and I should therefore like to clarify the situation.

I, in common with several other operators, hold both an Amateur (Television) Licence, and an Amateur (Sound) Licence, and am therefore fully entitled to operate on the usual h.f. and v.h.f. amateur bands.

In fairness to the compilers of the *Callbook*, I should also like to point out that in the introduction, it is merely stated that the /T suffix indicates that the operator is licensed to transmit television, and does *not* imply that the operator is licensed to transmit television *only*.

Yours sincerely,

R. E. PIPER, G3MEH, G3MEH/T

Old Coulsdon, Surrey.

Mobile Call-signs

DEAR SIR,—With reference to G3IDG and G3OMU's suggestion that mobile stations should display their call-sign on their vehicles, I would like to tell you of a very successful way of achieving this inexpensively.

If one gets a strip of fairly thick polythene and sticks on to it the self adhesive letters of the call-sign, which are easily obtainable for a few pence each at motor accessory shops for use on car number plates, one has a sign which stands out boldly against the darker interior when affixed to the front or rear windscreens. Such a sign can be fixed to the glass on the inside simply by pressing it on to it in the same way as plastic licence disc holders and can of course be taken off when not required.

Yours faithfully,

R. J. TARR, G3PUR

Worthing, Sussex

Can You Help?

● R. Hicklin, G3LWA, 13 Clive Road, Heath Park, Romford, Essex, who requires the manual, or any details, of the American Weston Valve Tester/Multi-range Meter Type 774/4, 774/5, or 744/4?

CONTEST NEWS

RESULTS — REPORTS — RULES

Affiliated Societies' Contest 1964

The Affiliated Societies' Contest took place on February 1 and 2, and was well supported, for entries were received from 54 Societies.

The battle for the Edgware Trophy was keenly fought, the lead changing hands several times during the contest. Finally, the Medway Amateur Receiving and Transmitting Society, G2FJA, operated by G3ORH and G3ORP, emerged as winners with 2490 points. Just 45 points behind was the Gravesend Society, G3GRS, operated by G3MXJ and G6BQ. The Reigate Amateur Transmitting Society, G3REI, which was third last year, retained the position with about 300 points fewer than the winner. G3RBP, for the Oxford and District ARS, would have gained third place had he not unfortunately been prevented by illness from sending his log in on time.

The contest generally seems to have been well enjoyed, but several people were unhappy with the scoring system. For example, G6BQ who operated at G3GRS, said, "Ten points given to local (non-AFS) QSOs would appear to give an almost insuperable advantage to the larger clubs." A few others made the same point, and an examination of the logs showed that there is some truth in the assertion. This will be carefully considered when the rules for the 1965 event are drawn up.

Comments from Logs

"Contest still too long and too late in the evening," G3AYC . . . . . "The whole thing is packed into about 30 kc/s, but there does not seem to be any remedy," G3TR . . . . . "Lost a bit of time when the el-bug paddle collapsed and the left foot was no good above 20 w.p.m.," G3BZU . . . . . "We draw attention to the key clicks which were extremely prominent from many stations," G2FJA.

Committee Comments

The Contests Committee was pleased to note a rise in the standard of the logs. Correctly laid out logs and cover sheets with all the required information on them save the Committee a considerable amount of time by making checking easier. Operators are particularly asked to bear in mind that for this contest, *inter alia*, are required: (*a*) Club name and call-sign on coversheet, (*b*) List of operators' names and call-signs, (*c*) Call-sign of the operator against the entries in the log of the QSOs he makes.

Check Logs

Thanks are due to the many stations who came on to give contacts to the AFS stations, and the Committee appreciated the helpful check logs that were received from G3EMO, G3LCS, G3LWQ, OK1OO, OK2QK and PA0PN.

RESULTS—AFFILIATED SOCIETIES' CONTEST 1964

Posn.	Name of Society	Call-sign	Points
1	Medway Amateur Receiving and Transmitting Society	G2FJA	2,490
2	Gravesend Amateur Radio Society	G3GRS	2,435
§	Oxford and District Amateur Radio Society	G3RBP	2,310
3	Reigate Amateur Transmitting Society	G3REI	2,187
4	Thames Valley Amateur Radio Transmitting Society	G3JEQ	2,065
5	Wolverhampton Amateur Radio Society	G8TA/A	2,037
6	Midland Radio Contest Club	G3RSR	1,994
7	Cheltenham Amateur Radio Society	G5BK	1,985
8	Stroud Radio Club	G3SDR	1,925
9	Sheffield Amateur Radio Club	G3RCM	1,880
10	Ariel Radio Group (Langham)	G3AYC	1,865
11	Harlow and District Radio Society	G3ERN	1,855
12	Surrey Radio Contact Club	G3SRC	1,820
13	Verulam Amateur Radio Club	G3STA/A	1,800
14	Royal Naval Amateur Radio Society	G3BZU	1,765
15	Royal Air Force Amateur Radio Club	GW3ITZ	1,745
16	Crawley Amateur Radio Club "A" Station	G3TR	1,735
17	Radio Society of Harrow	G3EFX/A	1,675
18	Midlands Amateur Radio Society	G3MAR	1,670
19	Royal Air Force Amateur Radio Society	G8FC	1,600
20	AERE Harwell Amateur Radio Club	G3PIA	1,590
†	Edgware and District Radio Society	G3ASR	1,555
21	Norwood Technical College	G3HFY/A	1,535
	Grimsby Amateur Radio Society	G4XC/A	1,535
23	Cotswold Radio Contest Club	G3SNS	1,530
24	Ainsdale Radio Club	G2CUZ	1,505
25	Burnham-on-Sea Amateur Radio Club	G3GIW	1,495
*	Basildon and District Radio Society	G3RQT	1,450
26	Amateur Radio Club of Nottingham	G3EKW	1,435
27	Stourbridge and District Amateur Radio Society	G6OI/A	1,420
28	Sutton and Cheam Amateur Radio Society	G2BOF	1,400
29	Derby and District Amateur Radio Society	G3ERD/A	1,395
30	Clifton Amateur Radio Society	G3GHN	1,355
31	South Shields and District Amatuer Radio Club	G3DDI	1,310
32	Wirral Amateur Radio Society	G3NWR	1,260
33	West Kent Amateur Radio Society	G4IB	1,245
34	Civil Service Radio Society	G3JUL	1,205
35	Acton, Brentford and Chiswick	G3IUU	1,200
36	Crawley Amateur Radio Club "B" Station	G3LHZ	1,195
37	Southport Radio Society	G3LSF	1,170
38	School of Electronic Engineering, REME, Amateur Radio Society	G3IHH	1,155
39	University College of North Wales Amateur Radio Society	GW3NWD	1,100
40	Paddington and District Amateur Radio Society	G3PAD	1,095
41	East Kent Radio Society	G3LTY/A	1,030
42	Portsmouth and District Radio Society	G3DIT	1,005
43	Ariel Radio Group (Bush House)	G3GDT	940
44	Scarborough Amateur Radio Society	G4BP/A	930
45	Ravensbourne Amateur Radio Club	G3HEV/A	850
46	Cray Valley Radio Society	G3RCV/A	847
47	Aquila Radio Club	G3BRK	840
‡	University of Keele Radio Society	G3COY/A	640
48	Manchester and District Radio Society	G3HOX	615
†	Bourneville Amateur Radio Society	G6BV	400
49	Magnus Grammar School Radio Society	G3PAW/A	395

§ Late entry.
† No power declaration.
‡ No declaration.
* No indication of society's name.

144 Mc/s C.W. Contest, 1964

Support for the annual 144 Mc/s C.W. Contest continues to grow, and this event, which took place on January 26, the sixth one held since 1959, is no exception. There was altogether a combined entry of 61 contestants, which represents an increase of 10 entries over last year's event.

The leading entrant in the high power section was V. J. Bartlett, GW5BI, who scored 1865 points from 52 contacts, in his first attempt. The second place was taken for the third time since 1960 by P. Blair, G3LTF, who made nine contacts in ON4, F, and PA, and achieved a score of 1610 points from 75 contacts. The Low Power section was won by C. Desborough, G3NNG, with a fine score of 1565 points from 72 contacts. G3NNG won this event in 1962, and has on two previous occasions gained third place. T. Leighfield, G3KEU/A, filled second place with a very creditable score of 1465 points from 69 contacts. Both stations used transistor converters.

Propagation

The general opinion on propagation was good for the morning and early afternoon, but conditions tended to deteriorate over the latter part of the period, although signal levels over the 150 mile range from well sited stations peaked S7, but tended to be very unstable.

Points of Interest

G3LRP and G3BJD logged contacts with GI5AJ and GM6XW/P respectively. An interesting and welcome entry which took 27th place was that from GC2FZC, who records contacts mostly with the South-West, G3SHK of Essex and GC3OBM of Guernsey. G3AGN had contacts with ON4MV and ON4DK. Mrs. Jean Hodgkins, G3JZP/A, from Catterick in Yorkshire, stayed with the contestants for about 2½ hours, and in that period had a number of contacts with stations chiefly in the northern area. It is hoped that she will be a regular participant.

It is interesting to note that the first contact recorded by G3LAS was ON4MV. Also of special interest is the log from GM6XW/P, as it gives some idea of the activity over the border during this event. He recorded contacts with 17 GM stations, and eight G stations including G3BA, G5JU and GW2HIY of Anglesey. G3KWK entered this contest a few days after making his first appearance on 2m and it is hoped that he too will join the ranks of the regular contestants.

The impression gained is that the scoring system is not favoured by a number of operators, and it would appear that the kilometres or miles per point system may have to receive some consideration by the Contests Committee. However, the general opinion is that most people enjoyed this very pleasant contest.

Check logs for this event were submitted by G3PD, GW2HIY, G2BQ, G3GVV and G2UJ, to whom the Contests Committee is very grateful.

HIGH POWER SECTION

Position	Call-sign	Points	Position	Call-sign	Points
1	GW5BI	1865	17	G3NZS	1050
2	G3LTF	1600	18	G3INU	995
3	GW3MFY	1570	19	G3PLS	990
4	G6GN	1555	20	G2AXI	975
5	G3JEQ	1505	21	G3BJD	850
6	G5DF	1475	22	G3LLE	810
7	G3HGE	1415	23	G2WS	785
8	G3NUE	1405	24	G3PYC	755
9	G3EDD	1370	25	G2BJY	700
10	G3JXN	1350	26	G3PIY	665
11	G3CCH	1320	27	GC2FZC	635
12	G3LRP	1245	28	G2BHN	630
13	G5JU	1230	29	G3NNK	595
14	G2XV	1225	30	G3AGN	585
	G4LU	1225	31	G3RQZ	525
16	G3EGK	1150	32	G3JZP/A	195

LOW POWER SECTION

Position	Call-sign	Points	Position	Call-sign	Points
1	G3NNG	1565	16	GM6XW/P	820
2	G3KEU/A	1465	17	G3YH	810
3	G3ICO/P	1440		G3HS	810
4	G3CHW	1300	19	G3SHZ	805
5	G3FUR	1260	20	G6TS	775
6	G8KL	1230	21	G3FNM	755
7	G3LAS	1225	22	G3JKY/A	730
8	G4CM	1100	23	G5UM	690
9	G2PL	1085	24	G2BLA	685
10	G3SHK	990	25	G3KWK	665
11	G3BOC	970	26	G3KWH	465
12	G2RD	920	27	G3FIJ	450
13	G3GVM	895	28	G3OJE	385
14*	G3GVV	855	29	G2DHV	295
15	G5YC	835			

* Multi-operator station.

Spilsby Hamfest and Junk Sale

Over 80 amateurs from all parts of Lincolnshire as well as from Leicester and the Home Counties attended the Hamfest and Junk Sale held at the Bull Hotel, Spilsby. This event has now become an annual affair and was the third to be held at this venue. G3BCA carried out the duties of auctioneer in a most efficient manner.

This gathering provides one of the rare occasions when the Lincolnshire amateurs are able to get together, and was therefore greatly appreciated.

The local Press gave a good report and printed photographs of the proceedings.

All the arrangements were made by G2ABK who says the good attendance made the effort worthwhile.

G-OK Exchange Visits, 1965-66

OK1XB would like to arrange a month's visit to the UK for his 21-year-old son in 1966 in exchange for a similar visit to his own home in 1965 by a young man of the same age group.

Would anyone interested in taking part in this exchange please write direct to: Antonin Kodeda, OK1XB, Benesov, Near Prague, Post Office, Czechoslovakia.

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.

Rules for the RSGB 7 Mc/s DX Contest 1964

Radio Amateurs throughout the world are invited to take part in the third RSGB 7 Mc/s DX Contest to be held on October 31-November 1 and November 21-22, 1964.

The rules for the 1964 Contest have been changed to give a greater opportunity to the DX stations and the attention of all entrants is particularly drawn to rules 1 and 9.

Rules

1. **Duration:** Each section of the contest will take place between 12.00 GMT on the Saturday and 18.00 GMT on the Sunday as follows:

Phone: October 31-November 1, 1964. **C.W.:** November 21-22, 1964.

2. The entrant shall submit a log covering the whole of his operation on the 7 Mc/s band between the above times.

3. **Eligible Entrants:** The contest is open to licensed amateurs in all parts of the world.

4. **Licence Conditions:** Entrants must operate in accordance with the terms of their licences.

5. **Contacts:** Contacts must be made in that portion of the **7 Mc/s band** for which the entrant is licensed. Contacts with unlicensed stations will not count for points. Proof of contact may be required. Only one contact may be made with a specific station, whether fixed, portable, mobile or alternative address in each section. Duplicate contacts must be logged and clearly marked as duplicate without claim for points.

6. **Contest Exchanges:** An exchange of RST (or RS) reports followed by a three figure serial number starting with 001 for the first contact and increasing by one for each successive contact and for each separate section (for example, 58002, etc.) must be made before points can be claimed.

7. Entries may be made as (i) Single Operator, (ii) Multiple Operator.

8. **Entries:** Entries (*a*) should be clearly typed or written on one side only of foolscap or International A4 size paper; (*b*) must be ruled in columns headed (in this order): (i) Date/Time (GMT); (ii) Call-sign of station worked; (iii) I sent him; (iv) He sent me; (v) Bonus points; (vi) Points claimed; (*c*) must be addressed to the **Contests Committee, Radio Society of Great Britain, 28 Little Russell Street, London, W.C.1, England,** the name of the contest being clearly shown on the top left hand corner of the envelope which must be **postmarked not later than December 14, 1964.** Log sheets are available from RSGB Headquarters.

SAMPLE COVER SHEET

RSGB 7 Mc/s DX Contest 1964 **Claimed Score** .....

Section ..... **Call-sign** .....

Name .....

Address .....

Transmitter ..... Aerial(s) .....

Receiver .....

DECLARATION: I declare that this station was operated strictly in accordance with the rules and spirit of the contest and I agree that the decision of the Council of the RSGB shall be final in all cases of dispute. I certify that the maximum input to the final stage of the transmitter was.....watts.

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

Failure to sign the declaration may involve disqualification of the entry.

9. **Scoring:** British Isles stations may not work each other for points. Overseas stations may only claim points for contacts with British Isles stations (G, GB, GC, GD, GI, GM and GW).

Each completed contact between a British Isles station and a station in any one of the six Continental areas will score as follows:

Contacts between British Isles and Continent of Europe	5 points
Contacts between British Isles and Continent of North America	15 points
Contacts between British Isles and Continents of South America, Africa and Asia	25 points
Contacts between British Isles and Continent of Oceania	50 points

Bonus Points:

British Isles Stations. A bonus of 20 points may be claimed for the first contact with each new country. For the purposes of scoring, the RSGB Countries List will apply with the exception that UA1, 3, 4, 6, all other U call areas, VE, VK, W/K, ZL and ZS call areas will each count as separate countries.

Overseas Stations: A bonus of 50 points may be claimed for the first contact with each British Isles country-numeral prefix, i.e. G2, G3, G4, G5, G6, G8, GB, GC2, GC3, GC4, GC5, GC6, GC8, GD2, GD3, GD4, GD5, GD6, GD8, GI2, GI3, GI4, GI5, GI6, GI8, GM2, GM3, GM4, GM5, GM6, GM8, GW2, GW3, GW4, GW5, GW6, GW8.

10. **Awards:** Provided that the log contains 20 or more valid contacts, certificates of merit will be awarded to the overall leaders and runners-up in each section and to the leading station in each of the other five British Isles countries. Certificates will also be awarded to the leading station in each overseas country, UA, VE, VK, W/K, ZL and ZS call areas counting separately as in Rule 9. If the leading entrant in any country is a multi-operator station, a certificate will also be awarded to the leading single operator station.

The closing date for posting entries is December 14, 1964.

Listeners' Section

1. **Duration:** Each section of the contest will take place between 12.00 GMT on the Saturday and 18.00 GMT on the Sunday as follows:

Phone: October 31-November 1, 1964. **C.W.:** November 21-22, 1964.

2. The entrant shall submit a log covering the whole of his operation on the 7 Mc/s band between the above times.

3. **Eligible Entrants:** The contest is open to short-wave listeners throughout the world. All entrants agree to be bound by these rules. Only the entrant may operate his receiving station for the duration of the event. Holders of amateur transmitting licences are not eligible to take part.

4. **Entries:** (*a*) To count for points, logs must show, in columns: (i) Date/Time GMT; (ii) Call-sign of station heard: (iii) Report and serial number sent by station heard: (iv) Call-sign of the station being worked; (v) Bonus points claimed; (vi) Points claimed.

(*b*) Entries must be set out on foolscap or International A4 size paper, must be postmarked not later than December 14, 1964, and must be addressed to the **Contests Committee, Radio Society of Great Britain, 28 Little Russell Street, London, W.C.1, England.** Log sheets are available from RSGB Headquarters.

(*c*) All entries must contain the following declaration:

I declare that this receiving station was operated strictly in accordance with the rules and spirit of the contest and I agree that the decision of the Council of the RSGB shall be final in all cases of dispute. I do not hold an amateur transmitting licence.

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

5. **Scoring:** British Isles entrants may only log *overseas stations working UK stations in the contest.* Overseas entrants may only log *British Isles stations in contact with overseas stations in the contest.* A station whether fixed, portable, mobile or alternative address may be logged once only for the purposes of scoring. *CQ or test calls will not count for points.*

Each completed log entry of a contact between a British Isles station and a station in the following continents will score as indicated.

Continent of Europe	5 points
Continent of North America	15 points
Continents of South America, Africa and Asia	25 points
Continent of Oceania	50 points

Bonus Points:

British Isles Entrants: A bonus of 20 points may be claimed for the first station logged in each new country. For the purposes of

(*Continued on page 329*)

Rules for the V.H.F. National Field Day 1964

Following the successful 1963 event the rules of the V.H.F. N.F.D. 1964 are only slightly changed. Cover sheets will be forwarded to all 1963 entrants; other groups should write to RSGB Headquarters as soon as possible. Formal registration of the intention to enter is not necessary.

Entrants are strongly recommended to operate within their local frequency zones in the 144-146 Mc/s, 432-434 Mc/s and 1296-1298 Mc/s bands.

Rules

1. **Duration.** From 18.00 GMT September 5, to 18.00 GMT September 6, 1964.

2. **Eligible Entrants.** Any group of RSGB members within the British Isles (which for the purposes of the contest comprise the prefix zones G, GC, GD, GI, GM and GW) may enter. The group may be any group of RSGB members, a club or an Affiliated Society.

3. **Operators.** Operators of portable stations competing in the contest must each hold a current United Kingdom Amateur (Sound) Licence and must be fully paid up Corporate Members of the RSGB at the time of the contest.

4. **Power Supplies.** Power for any part of the station shall not be derived directly from supply mains.

5. **Stations.** Each competing group will be permitted to place one or two stations ("A" and "B") in operation; these two stations must use different call-signs. There is no restriction on the combination of bands allocated to each call, but only one station may be operated on each band. Stations may operate from the same site or from different sites; it will be permissible for two groups within a single Region or in adjacent Regions to amalgamate for the purpose of scoring; if this is done frequency bands must be allocated between the two stations as detailed above.

6. **Apparatus.** No apparatus may be erected on the site prior to 12.00 GMT on September 5, 1964. This rule includes aerials and aerial fittings as well as accommodation for the stations, but does not apply to accommodation to be used for storage purposes.

7. **Contacts.** May be made on either A1, A3, A3a or F3 in the bands 70·2 to 70·4 Mc/s, 144 to 146 Mc/s and 420 to 450 Mc/s with an input not exceeding 25 watts to any stage of the transmitter; or in any amateur band above 1215 Mc/s with any power or type of emission permitted under the terms of the ordinary Amateur (Sound) Licence.

8. **Scoring.** Points will be scored on a distance basis in accordance with the following table:

Band	Contacts with fixed stations	Contacts with mobile or portable stations
70 Mc/s	1 point per kilometre	2 points per kilometre
144 Mc/s	1 point per kilometre	2 points per kilometre
420 Mc/s	3 points per kilometre	6 points per kilometre
Any other u.h.f. band	10 points per kilometere	20 points per kilometre
Cross-band contacts will not count for points		

9. **Contest Exchanges.** RST or RS reports followed by the contact number (starting at 001 for each station and continuing in sequence irrespective of band), and location. Location must be specified as a distance (in kilometres) and bearing from a nearby town for contacts between British stations. QRA locators may be exchanged with Continental stations. It is the responsibility of the receiving operator to obtain the information he requires to calculate distances correctly. Contestants are advised when calling to indicate on which band they are operating.

Only one contact on each band may be claimed with a specific station whether fixed, portable, mobile or alternative address. Duplicate contacts must be logged and clearly marked as duplicates without claim for points. Proof of contact may be required.

10. **Logs.** (a) Separate logs must be submitted for each band and tabulated in columns headed (in this order): date/time (GMT); call-sign of station contacted; our report on his signal and serial number sent; his report on our signal and serial number received; location of station contacted as received; operator's call-sign; distance; points claimed.

(b) The special cover and summary sheets provided for this event must be completed and signed by a member who will be responsible for the entry. These cover sheets are available from RSGB Headquarters on receipt of a large stamped addressed envelope.

11. **Entries.** Must be postmarked not later than September 28, 1964.

12. **Awards.** At the discretion of Council awards will be made to the overall winner and to the leading station in each band. Certificates of merit will be awarded to the runners-up on each band in which, in the opinion of the Contests Committee, there is sufficient activity, and to the leading station in each country of the British Isles for 70, 144 and 420 Mc/s.

RSGB 70 Mc/s Contest 1964

The rules for the contest to be held on June 20-21 will be published in the June issue of the Bulletin.

RSGB 7 Mc/s DX Contest, 1964 (Continued from page 328)

scoring the RSGB Countries List will be used, with the addition that UA1, 3, 4, 6, all other U call areas, VE, VK, W/K, ZL and ZS call areas will each count as separate countries.

Overseas Entrants: A bonus of 50 points may be claimed for the first station heard in each British Isles country-numeral prefix, i.e. G2, G3, GM4, etc., as listed in Rule 9 for the transmitting contest. A further bonus of **50 points** will be scored for each additional ten British Isles stations (in each of the categories in Rule 9 of the Transmitting Event) logged.

6. **Awards:** At the discretion of the Council **certificates** will be awarded to the British Isles leading entrant and runner-up and to the leading entrant in each overseas country.

CONTESTS DIARY

May 9-10	- USSR DX Contest (C.w.).
May 10	- D/F Qualifying Event (Manchester) (see page 258, April, 1964.)
May 16-17	- OZ CCA (Phone).
May 30-31	- CHC/HTH Party.
*May 30-31	- First 420 Mc/s Contest. (see page 258, April, 1964.)
June 6-7	- National Field Day (see page 381, December, 1963.)
June 14	- D/F Qualifying Event (High Wycombe).
June 20-21	- 70 Mc/s Contest.
June 27-28	- RSGB 1250 Mc/s Tests.
June 28	- D/F Qualifying Event (Derby).
*July 4-5	— Second 144 Mc/s Portable Contest.
July 12	— D/F Qualifying Event.
July 19	— D/F Qualifying Event (Wirral).
July 26	— D/F Qualifying Event.
August 8-9	— WAEDC (C.W.) Contest.
August 15-16	— WAEDC (Phone) Contest.
August 29-30	— All Asia Contest.
*September 5-6	— V.H.F. National Field Day.
September 5-6	— Labre (C.W.) Contest.
September 12-13	— Labre (Phone) Contest.
September 13	— D/F National Final.
September 20	— Low Power Field Day.
October 3-4	— RAEN Rally.
October 17-18	— Second 420 Mc/s Contest.
October 31-November 1	— RSGB 7 Mc/s DX Contest (Phone).
November 21-22	— RSGB 7 Mc/s Contest DX (C.W.).
November 28-29	— Second 1·8 Mc/s Contest.
December 5-6	— RSGB 21/28 Mc/s Telephony/Receiving Contests.
December 13	— 70 Mc/s C.W. Contest

** To coincide with Region 1 IARU Contests.*

CLUBROOM

A Monthly Survey of Group and Club Activities

News from the Newsletters

Articles on transistors are becoming fairly regular features in club newsletters: *QAV* has started a series called "A Child's Guide to Transistors," and Part 1 appears in Technical Supplement No. 10. The Cray Valley *Newsletter* discourses on some of the pleasures and technicalities of D/F contests. First Class Operators' Club *Circular Letter No. 192* reports proposals for increasing the club's activities. Grafton *Newsletter* describes a small audio amplifier which actually uses valves. The *Lothians Radio Amateur* gives details of a transitorized frequency marker, field strength meter, and crystal activity check meter all in one instrument; an ingenious looking aerial system is also described. *Mercury*, journal of the Royal Signals Amateur Radio Society, prints a very detailed and interesting article on the rhombic aerial. *NARC Challenge* emphasizes the need of being prepared, and keeping prepared, and reports Norfolk RAEN activities since the fateful storm at the end of January, 1953. More transistor theory appears in the North Kent *Newsletter*. *QUA* has also started a series of articles on transistors. *Radial* in its series on "Possum" describes an electric typewriter capable of operating at 30 words per minute and controlled by blowing in a mouthpiece. The Southgate *Newsletter* gives modifications to the Minimitter TR7 receiver for use with a long wire. *Spectrum* gives some useful hints on the design and construction of audio equipment, and also some constructive advice to short wave listeners. The WAMRAC *Circular Letter* covers the worldwide activities of the World Association of Methodist Radio Amateurs and Clubs. The MARTS *Newsletter* carries an introduction to cryogenics—the science of very low temperatures: perhaps the immersion of that p.a. tank coil in liquid helium might be a means of getting something for nothing.

Club Reports

Amateur Radio Club of Nottingham. Meetings are held every Tuesday evening, and occasional Thursdays, at 7.15 p.m. at the Sherwood Community Centre, Woodthorpe House, Mansfield Road, Sherwood. The new Honorary Secretary is R. W. Attenborough, Beech House, Chapel Lane, Epperstone, Nottingham.

Bedford & District ARC. An effort is being made to revive this club, and several members are known to be keen to get things moving again. If those interested will get in touch with the RR, S. J. Granfield, G5BQ, he will do everything possible to assist.

The President of the RSGB for 1964, Geoff Stone, G3FZL, is now the proud possessor of an "apparatus" which enables him to communicate on Bottom Band. He is seen examining the device after having been presented with it at the Crawley Amateur Radio Club's Annual Dinner on March 6. Also in the picture, left to right are John Graham (G3TR), Ceri Taylor (G3SGN) and Helen Franklin (XYL G3JKF).

(Photo by G3RXJ)

Bradford Radio Society. Recent events have included a lecture on "Simple Transmitters" by D. M. Pratt, G3KEP, and a visit to the ITA transmitting station at Emley Moor. Meetings are held on the second and fourth Tuesdays of each month at 7.30 p.m. at Cambridge House, 66 Little Horton Lane, Bradford 5. The Honorary Secretary is E. G. Barker, G3OTO, 63 Woodcot Avenue, Baildon, near Shipley, Yorkshire.

Bristol Amateur Radio Club. The club station, G3TAD, operates on Mondays and Thursdays from 8 to 10 p.m., and the club itself is open from 6.30 to 10 p.m. Morse classes are in progress and slow Morse transmissions are radiated on Sundays from 10 to 11 a.m. on 1875 kc/s approximately. Further details may be obtained from the Honorary Secretary, E. J. Davis, G3SXY, 72 North View, Westbury Park, Bristol 6.

Burton-on-Trent ARS. A party of members, including the Region 4 Representative, visited the Exide Battery Works at Clifton Junction, Manchester, on April 8. The Society's Patron, Mr W. T. Spencer, entertained members and guests to dinner at the New Bath Hotel, Matlock Bath, on the return journey. During the summer meetings will be held on the second Wednesday of each month. Honorary Secretary: H. Harrison, G3ACR, 38 Baker Street, Burton-on-Trent.

Bury RS. Members enjoyed an interesting visit to the Huncote Power Station. The March lecture was given by H. Whalley, G2HW, and dealt with transmitter and receiver testing. Members were invited by Eccles RS to judge their constructional competition, and this proved to be an enjoyable occasion for all concerned. Honorary Secretary: J. Bennett, G3PVG, 21 Harwood Drive, Elton View, Bury, Lancs.

Cambridge & District ARC. At the AGM, held on March 20, the following were elected: President, S. J. Granfield, G5BQ; Newsletter Secretary, F. A. E. Porter, G2CDX; Press, J. N. Carter, G3OWB; Minutes, S. Clark; Honorary Treasurer, J. B. Foster, G3IIT. Committee Members: H. Biltcliffe, G5HB; J. M. Bowman, G3PSA; M. Dighton; R. F. Pilkington, G3IAG; F. C. D. Taylor, G3RFP. The Annual Dinner took place at the Milton Arms Hotel, Cambridge, on April 3, when nearly 50 members and wives attended. The guest of honour was to have been T. A. St. Johnston, G6UT, but unfortunately he was taken to hospital a few days before the event. The Granfield Trophy was presented to P. Broom, G5DQ, by the donor, for his success in the 7 Mc/s Contest in two successive years.

Cheltenham Group. At the March meeting, M. Mason, G6VX, answered questions on s.s.b. subjects, and drew the attention of members to certain techniques and items of equipment that were completely new. There was still a great deal of interest in the idea of a Hamfest to be supported by clubs and groups in Gloucestershire later this year.

Chester & District ARS. Meetings are held every Tuesday at 8 p.m. in the YMCA, Chester. On May 12 there will be a lecture. G3EWZ will demonstrate his valve tester on May 19, and members may bring their own valves for testing. A pre-NFD discussion will be held on May 26. New members and visitors are most welcome.

Cannock Chase ARS. The Honorary Secretary is now G. M. Preece, G3RSX, 139 Owen Road, Wolverhampton, Staffs.

City & County of Bristol Group. On Friday, April 3, a most interesting talk was given to members of the Bristol Group of the RSGB by T. Withers, G3HGE. His subject was the construction of v.h.f. equipment and dealt mainly with 2m converters (thermionic and semiconductor) and transmitters. The attendance of just over 50, coupled with the February attendance of 62 indicates renewed interest in the Bristol area.

Civil Service RS. At the AGM the following were elected: President, Dr D. M. Follett, Director of the Science Museum; Chairman, D. E. Tomkinson, G3IIE; Vice-Chairman, J. Voller, G3JUL; Honorary Treasurer, J. Pigou, G3CRP; Honorary Secretary, G. Lloyd-Dalton. On May 25 there will be an informal meeting at which there will be an RSGB Tape Lecture by Bob Ford, AC4RF, on his stay in Tibet. The Society has received invitations for the National Physical Laboratory's Open Day in May at Teddington. Visitors and prospective members from the Civil Service and comparable employment are welcome

This photograph was taken during the Annual Dinner of the Thanet Radio Society on March 14. The guests at this table include F. G. Lambeth, G2AIW, and A. O. Milne, G2MI, with their wives.

to all meetings. The Honorary Secretary's address is: 2 Honister Heights, Purley, Surrey.

Clifton ARS. Clifton won the first round of the annual inter-club quiz held at Crystal Palace ARS. The first 3·5 Mc/s D/F Field Day will be held on May 10, starting from Badgers Mount (NGR TQ 496615) at 11 a.m. Honorary Secretary: J. Rose, G3OGE, 63 Broomfield Road, Beckenham, Kent.

Conway Valley RC. The RSGB Tape and Slide Lecture held on March 12 was well attended. Extra meetings for NFD arrangements have worked out well and equipment is now being tested. A visit to the Post Office Anglesey Radio Station is proposed for June 11. Details of transport arrangements are available from the Honorary Secretary, B. Clark, GW3HGL, Meadfoot, Tan-y-Bryn Road, Colwyn Bay.

Cornish Radio Amateur Club. At the AGM held on April 2, it was decided that the title " Cornish Radio & Television Club " should be discontinued and that henceforth the club will be known as " The Cornish Radio Amateur Club." The officers elected for 1964 are as follows: President, W. Locke, G3NKE; Chairman, C. Bowden, G3OCB; Vice-Chairman, A. Laidler, G3OJY; Honorary Secretary, W. J. Gilbert; Honorary Treasurer, K. Ledsham. The editorship of the *Cornish Link* will be in the hands of J. Watson, G3AET. The Honorary Secretary's address is: 7 Poltair Road, Penryn, Cornwall.

Crawley ARC. There was an excellent lecture recently by GPO Engineers on radio interference, followed by a discussion on TVI and BCI problems. Two further G3S. . call-signs have been issued to club members, and the 18 candidates who will be taking the RAE are expected to yield more licences in due course. Arrangements are proceeding for NFD and V.H.F. NFD, and a full programme of lectures and meetings has been arranged for the remainder of 1964. Honorary Secretary: R. G. B. Vaughan, G3FRV, 9 Hawkins Road, Tilgate, Crawley, Sussex.

Derby & District ARS. The society has recently commenced the reissue of its magazine, but it is regretted that there will be some delay in the issue of further copies due to the destruction of the stationery stock and copy by fire. Details of future meetings can be found in *Forthcoming Events*. Honorary Secretary, F. C. Ward, G2CVV, 5 Uplands Avenue, Littleover, Derby.

East London Group. Welcome guests at the March meeting were VE7AHT and VK2WA, as well as members of the local British Red Cross Division, when F. J. Barnes, G3AGP, gave a talk on " Electronics in Medicine." A great deal of equipment was displayed, and fortunately, the misgivings aroused by the description of some of the museum pieces and their uses, were dispelled by the up-to-the-minute transistorized apparatus. Honorary Secretary: M. McBrayne, G3KGU, 25 Purlieu Way, Theydon Bois, Essex.

Ex-G RC. The Ex-G Club now has a world-wide membership of exiles from the homeland. The recent postal ballot resulted in the following being elected for office for 1964: President, W3HQO; Vice-President, VO1DZ; Honorary Secretary/Treasurer, W8YHO; Board of Directors: VE3BQP, VE3BPV, WA4SBK, WA2EVH and W7IYW. The President has appointed the following Directors in addition to the elected members: W2PEO, ZS6BBB, ZB1A and K5QWZ. The club publishes a monthly bulletin which is mailed to all members. British amateurs can receive a copy just by sending s.a.e.'s to G4MY with a request to be put on the mailing list. Particulars of awards issued by the club can be obtained from W3HQO. World-wide nets are in operation as follows: 14,065 kc/s on Saturdays at 21.00 GMT and 14,350 kc/s on Sundays at 19.00 GMT. British stations are welcomed, as one of the main objects of the club is to keep in contact with the Home Country. The club is a staunch supporter of the RSGB and it is hoped that by 1965 the Ex-G Radio Club subscription will automatically include a copy of the RSGB *Amateur Radio Call Book*.

Flintshire RS. The visit to the ITA Moel-y-Parc Transmitter on March 16 proved very popular. In spite of snow, high winds and darkness, several car-loads of keen members made it to the site. On March 31, J. T. Lawrence, GW3JGA, gave a talk on servicing transistor receivers, and F. G. Humphreys-Jones, GW3CF, gave an impressive demonstration of his immaculately constructed el-bug. Local activity on 70 cm has increased recently with /T stations preparing for the amateur television demonstration. Weekly slow Morse classes are proving very popular, and details of these and of meetings which are held on the last Tuesday of each month may be obtained from the Honorary Secretary, A. Antley, Fairholme, Fairfield Avenue, Rhyl, Flintshire.

Halifax & District ARS. The Annual Dinner was held on March 31 at the Crown Hotel and was open to XYLs and YLs for the first time. Fifteen active local call-signs were amongst those present.

Radio Society of Harrow. Meetings are held every Friday in the Science Lab, Roxeth Manor Secondary Modern School, Eastcote Lane, South Harrow. Honorary Secretary: R. C. Ray, G2TA, Wintons End, Springfield, Bushey Heath, Herts.

Loughton & District RS. Field Day preparations are in full swing under the auspices of G8AB, whose mobile generator (conveyed in a wheelbarrow) will again be pressed into service. The latest acquisition is a 16mm sound projector which was obtained as a result of the efforts of the Entertainments Officer, B. Stevens. G3OPA has donated a plaque, miniatures of which will be awarded annually for the best piece of equipment constructed by SWLs. New members and visitors are cordially invited to the meetings held on alternate Friday evenings at Loughton Hall, Debden Community Centre, Rectory Lane, Loughton, Essex. Honorary Secretary: A. W. Sheppard, G3JBS, 11 Barfields, Loughton, Essex.

Luton & District ARS. This rejuvenated club is going from strength to strength. Total membership is 53 with an average attendance of nearly 30. The society now has its own call-sign, G3SVJ, and its headquarters in Crescent Road has a 5RV aerial, erected in anticipation of early operation.

Lothians RS. It is pleasant to see that the idea of holding meetings to which members of neighbouring clubs are specially invited is growing in this part of the world. On March 15, Dunfermline RS were host to the Lothians: there was an excellent tea preceded by talks and demonstrations, and followed by a film show and raffle. There have been lectures on s.s.b. and TVI.

Mansfield ARS. At the AGM the following were elected: Chairman, G3SBW; Honorary Treasurer, G3DBZ; Honorary Secretary, G8HX; Committee: G3DBF, G3RZW, and SWLs K. Radford, J. Simons, and T. Bucknell. Meetings are held every Friday at 7.45 p.m. at the " Hope and Anchor, " Union Street, Mansfield. Plans are being made to operate a club station. Honorary Secretary: F. N. F. Bewley, G8HX, 116 Westfield Lane, Mansfield, Notts.

Medway Amateur Receiving & Transmitting Society. Details of meetings may be obtained from the Honorary Secretary, D. G. Quarrington, G3KSL, 11 Mill Close, Strood, Kent.

Midland Radio Contest Club. Meetings will take place every weekend until NFD, in preparation for that event, and will be held at the club headquarters, Windmill House, Weatheroak, Wythall, Birmingham. Prospective members are welcome and are asked to get in touch initially with the Honorary Secretary, J. Lockyer, G3OVA, 23 Beechwood Road, Birmingham 14.

Northern Heights ARS. A very interesting evening was spent at the Tape Recording Centre in Halifax by kind permission of Mr T. Fawthrop. Demonstrations of stereo and hi-fi were followed by a discussion. On May 13 there will be a junk sale, and on May 27 there will be a talk on transistors by L. L. Cobb, G3UI. The annual visit to Manchester ARS has been arranged for June 10. Honorary Secretary: A. Robinson, G3MDW, Candy Cabin, Ogden, Halifax, Yorks.

North Nottinghamshire ARS. Meetings have been temporarily suspended due to the closure of the society's club rooms, but

the society will continue to function in all other respects. Honorary Secretary: M. Dann, G3NHE, 4 Wright Street, North Anston, Sheffield, Yorks.

Oxford & District ARS. Meetings are held on the second and fourth Wednesday of each month at 7.30 p.m. at the Cherwell Hotel, Water Eaton Road, N. Oxford. On May 13 there will be a lecture and demonstration of Heathkit equipment by Daystrom Ltd., and on June 10 a representative of Cathodeon Ltd. will give an illustrated lecture on quartz crystals. RAE classes are held at 7.15 p.m. on meeting days, and c.w. every Wednesday and Friday on 1860 kc/s at 7 p.m. New members and visitors are most welcome. Honorary Secretary: B. Green, G3PMI, 3 Barnet Street, Iffley Road, Oxford.

Paddington & District ARS. Recent meetings have included a demonstration by G3MHQ of his 8-band triple conversion receiver and his own version of a *Q* multiplier, and a talk and demonstration on troubleshooting in amateur transmitters and receivers. The society's station, G3PAD, is active on all bands from 160m to 10m, and also on 2m. Visitors and new members are welcome. Honorary Secretary: J. E. Alban, G3JEA, 2 Warwick Crescent, London, W.2.

Peterborough. Home construction of s.s.b. transmitters was dealt with by G3EEL and G3LOC at the March meeting, and G3HXR dealt with s.s.b. licensing conditions. At the April meeting, H. Neale, G3REH/T, spoke about Amateur Television, and J. Bransom, B.Sc., demonstrated 625 line closed circuit TV, which was compared with the 405 line system. Meetings are held on the first Friday of each month in the Electronics Block of Peterborough Technical College, and full details may be obtained from the Honorary Secretary, D. Byrne, G3KPO, Jersey House, Eye, Peterborough.

Plymouth RC. At a recent meeting there was a very interesting lecture on DX listening by B. J. Curnow, A2340. A picnic and general get-together is being organized in conjunction with the three other South Devon Clubs, Torbay, Exeter, and Kingsbridge, to take place during the early summer on Dartmoor. The winners of the G5ZT Trophy Competition were as follows: first, D. Brealy, 2m transmitter; second, R. Lees, Top Band transmitter; best effort, R. Hooper, G3SCW, preselector. Honorary Secretary: R. Hooper, G3SCW, 2 Chestnut Road, Peverell, Plymouth.

Preston ARS. A series of two talks entitled " Fundamentals of Transmission Lines and Aerials " has been given by A. B. Whatman, G2BQ. A visit to Ribble Generating Station has been arranged for May 12, and the meeting on May 26 will be devoted to NFD arrangements. Honorary Secretary: W. K. Beazley, G3RTX, 9 Thorngate, Penwortham, Preston, Lancs.

The Cupwinner in this year's Constructors' Competition held by the Welwyn Garden City Group was John Kirby, G3JYG, of Hatfield, here seen with the Top Band transmitter-receiver which secured for him " The G3EPK Challenge Trophy." Left: SWL John Galvin, and right, John Shardlow, the two members of the Murphy Electronics Lab. who judged the two dozen exhibits that were entered in this year's competition.

(Photo by G3BAC)

Reading ARC. A junk and surplus equipment sale will be held on May 30. On June 27 there will be a lecture by G3OLA on the testing and checking of receivers. Cups have been donated to the club by G2FZI and G3EJA, and a shield by Mr T. Bingham. Contests for these trophies will be held for members during 1964. Honorary Secretary: R. G. Nash, G3EJA, 9 Holybrook Road, Reading, Berks.

Reigate Amateur Transmitting Society. The programme at the March meeting included a tape recording from the RSGB Library on " Semiconductor Devices " and was illustrated by slides. G3NKS also showed some slides of recent club activities, covering the Annual Dinner and visits to members' shacks. On May 23, G3JKY will be speaking on " D/F Working " at the meeting to be held at the " George and Dragon," Redhill, at 7.30 p.m. Mobile activity is on the increase and visits to a number of the forthcoming rallies are being anticipated with pleasure. Honorary Secretary: F. D. Thom, G3NKT, 12 Willow Road, Redhill, Surrey.

Scunthorpe. It is intended to form an Amateur Radio Club in Scunthorpe. Would all those interested please get in touch with H. Holmes, G3MSB, 69 Crosby Avenue, Scunthorpe, Lincs.

Shropshire ARS. At a recent meeting, Dr K. E. Jones, G3RRN, gave a talk entitled " Man, Medicine, and Electrons," being an explanation of the electrical activity of the brain, heart, nerves, etc., and the extensive application of electronics to medical science. The talk was supported by films. Visits to the Shrewsbury automatic telephone exchange and Criggion GPO Radio Station are being arranged for May and June. Meetings are held at the Chatwood Tennis Club, Harlescott Crescent, Harlescott Lane, Shrewsbury. Honorary Secretary: Dr K. E. Jones, G3RRN, Greystones, Shrewsbury Road, Church Stretton, Salop.

South Birmingham RS. Most members joined in the annual contest with Sutton Coldfield RS on April 5 and trophies will be awarded to licensed members and SWLs. Highlights of the May meeting will be a return visit of T. Parton, whose February lecture on " Thirty Years as an Amateur " resulted in a unanimous request for a return visit with some items from his private collection of early equipment. A Sunday morning net is held, and the club station QSL's 100 per cent.

South Dorset RS. At the AGM held in April, the following were re-elected: Chairman, W. Burden, G3EAT; Honorary Secretary, C. E. Biggs, G2TZ; Committee member, M. Box, G3RZG. G. Watts, A1652, was elected to serve on the Committee. A visit to Poole Power Station has been arranged for the evening of May 15. Details of meetings may be obtained from the Honorary Secretary, C. E. Biggs, G2TZ, 54 Prince of Wales Road, Dorchester, Dorset.

Southgate, Finchley & District Group. Recent activities have included films on transistor circuit design, nuclear physics and radio propagation. On March 26 there was an attendance of approximately 20 at the meeting devoted mainly to SWLs when G3RPN demonstrated aligning a superhet without expensive test gear, and G3RMG put a Top Band station on the air. On May 14 there will be a lecture by a representative of Green and Davis on 2m equipment. Meetings are held at Atlasta Lodge, Tottenhall Road, Palmers Green, London, N.13, at 7.30 for 8 p.m.

South Shields & District ARC. Prizes were presented to the winners of both sections of the recent Transmitting and Receiving Contest. Equipment constructed by members was judged, and G3FSL won the magnificent silver cup presented by the Chairman, Councillor Sketheway, for his mobile transmitter/receiver. A mobile picnic at Finchale Abbey, Co. Durham, will take place on June 21, and a mobile rally at Harewood House, Yorkshire, will be held on May 24. Meetings are held every Friday from 7.30 to 10 p.m. at Trinity House, South Shields, and all interested in Amateur Radio will be welcomed. Honorary Secretary: D. I. Forster, G3KZZ, 41 Marlborough Street, South Shields, Co. Durham.

Torbay ARS. At the AGM held on April 11, the following were elected: President, W. B. Sydenham, B.Sc., G5SY; Vice-President, E. Hayman, G3ABU; Chairman, D. Webber, G3LHJ; Honorary Secretary, Mrs. G. Western, G3NQD; Honorary Treasurer, H. Cockrem, G3ZC; and PRO, B. Symons, G3LKJ. Committee Members: D. Beckett, G3SCH; R. Western, G3SXW; F. Bolton, SWL; P. Hunt, SWL. *Ex officio*: Honorary Auditor, A. Bullock, G3IEA; Vice-Chairman, F. Bolton, SWL; Contest Manager, R. Western, G3SXW. A talk on TVI was given at a recent meeting by B. Symons, G3LKJ. Honorary Sec-

retary: Mrs Gee Western, G3NQD, 118 Salisbury Avenue, Barton, Torquay, Devon.

University of Keele RS. Recently affiliated to the RSGB, the society is active on 160m and 80m, and expects to be active on 2m soon. Call-signs are G3COY and G3SMD. Meetings are held every Monday evening during the term. The society operated /M during the students' rag day and assisted with talk-in facilities at Trentham Gardens on April 19.

University of Manchester ARS. At the recent AGM the following were elected: Chairman, P. C. Taylor, G3RRG; Honorary Secretary, S. J. Gilbert, G3OAG; Honorary Treasurer, F. Coakley. The society, which now has about five licensed members, hopes to be active on the air in the near future.

University College of North Wales ARS. The AGM will be held at 2 p.m. on Thursday, May 7, in the large lecture theatre of the Department of Electronic Engineering, Dean Street, Bangor. Visitors are welcome and further details may be obtained from the Honorary Secretary, M. J. English, at the above address.

Wimbledon & District RS. On May 8 there will be a film show and lecture by Mr P. Jones of the Decca Navigator Company. Meetings are held on the second Friday of each month at the Community Centre, 28 St. George's Road, Wimbledon, London, S.W.19. Honorary Secretary: E. N. Hurle, 156 Monkleigh Road, Morden, Surrey.

Wirral ARS. On May 20 there will be a technical lecture, on June 3 NFD briefing, and on June 17 NFD inquest. A mobile treasure hunt, entitled " Basil's Outing," has been planned to take place somewhere in North Wales during the weekend of May 9/10. Honorary Secretary: A. Seed, G3FOO, 31 Withert Avenue, Bebington, Wirral, Cheshire.

Yeovil ARC. At recent meetings activities have included a quiz session and members of the Street RC were entertained. The club's Top Band transmitter has been overhauled in readiness for future events.

Club of the Month

THE RADIO AMATEUR INVALID AND BEDFAST CLUB

Recently affiliated to the RSGB, the Radio Amateur Invalid and Bedfast Club has been in existence for over ten years. Founded in February, 1954, by a handful of invalids who realized the need for some organization to hold them together in their common purpose, the constitution stated that the club's aim was " To provide added interest and help to invalids and blind persons who are genuine Short Wave Listeners or Licensed Radio Amateurs, and those disabled and blind persons who have expressed a very genuine desire to have Amateur Radio as their future hobby." Membership was free, and the monthly magazine minimum subscription was 4s. a year.

These aims have been adhered to over the years and there are now 170 eligible members of the club and a further 150 friends and helpers who support the club financially and are ready to help with the repair of equipment, the provision of study books, visits, and in many other ways as need arises. It is due to the generosity of the club supporters that it is still possible to keep the annual subscription for *Radial*, the club magazine, at the original figure of 4s.

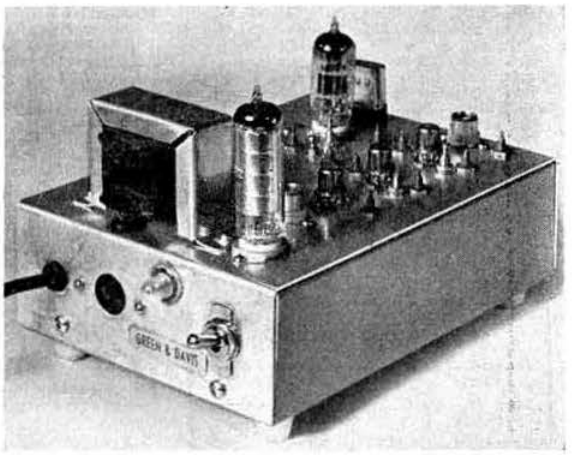
It is a noteworthy fact that the present honorary secretary and honorary treasurer are the first and only officials who are not themselves eligible for membership. A great proportion of the work that goes on within the club is done by members for one another. Information is put on to tape for blind members by invalids, the Library is run by an invalid, the Club Nets on the 80m band are run by an invalid, there is even an instance of a blind member teaching Morse to a sighted invalid. The job of the secretary of a club of this kind is not to arrange meetings, book speakers and organize rallies, but to arrange that a member who wants information on a certain subject is put in touch with another who can supply the answer, that those of similar interests are put in touch, and to ensure that all who require equipment are supplied with it and that it is kept in working order.

The monthly magazine, which goes to six countries, gives news of members and also contains articles on various subjects contributed mainly by members themselves. There are roughly equal numbers of short wave listener and licensed amateur members, and of both sections approximately half are blind and half invalid. While special attention is paid to those in hospital, a great deal of attention is given to the short wave listener section, especially in the provision of help to enable them to obtain their transmitting licences so that they are no longer cut off from those to whom they have listened so long and so eagerly.

Help comes from many and varied sources, well-known radio publishing firms and commercial radio organizations are unstinting with their concessions and generosity. Apart from the many individuals who are ready to help in their localities, such organizations as the South London Mobile Club and the Royal Corps of Signals ARS at Catterick have pledged their support in their areas. The RAIBC aims to have a network of help to cover every part of the British Isles where it is needed and at the same time to preserve the "family atmosphere" which means so much to its members.

Dexion Speedframe. Apart from the well-known types of steel and alloy slotted angle manufactured by Dexion Ltd., Empire Way, Wembley, Middlesex, a new type of framework structure system is now on the market under the name " Speedframe." It is based on 1in. square, 18 gauge enamelled bright mild steel tubing, which can be cut to any length up to 12 ft., and joined to form right-angled types of structures with a range of special connectors. These comprise a die-cast joint having wedge-shaped arms, over which a plastic " insert " is slipped to enable the joint to be forced into the tube with sufficient rigidity. A range of accessories is available which considerably increases the scope of the system.

Eyelet-Board. R. & E. Lamb, 17 Queens Road, Leytonstone, London, E.11, have produced a perforated laminated circuit board, $4\frac{1}{2} \times 2\frac{1}{2}$ in., and containing 200 holes, into which special tinned eyelets can be punched to enable components to be grouped together and wired as complete assemblies, e.g., prototypes. The perforated boards cost 2s. each, the eyelets 6d. per packet of 40, and plain boards 9d. each. Postage is 3d. on orders under 6s.



A 70 cm receiving converter, the 3N70, is a further addition to the Green and Davis range. Two 6CW4 Nuvistors comprise the r.f. amplifier, with a 6J6 and a 1N82 diode in the oscillator/multiplier chain. The mixer is also a Nuvistor, in the grounded-grid mode, and the output is between 14 and 18 Mc/s, although this can be altered to suit individual requirements. A stabilized power supply incorporating an OB2 is included on the same chassis. The price of this converter is 16 guineas.

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.

REGION 1

Ainsdale (ARS).—May 13 (Open Night), May 27 (NFD Discussion), 8 p.m., 77 Clifton Road, Southport.
Blackburn.—Fridays, 8 p.m., West View Hotel, Revidge Road.
Blackpool (B & FARS).—Mondays, 8 p.m., Pontins Holiday Camp, Squires Gate.
Bury (BRS).—May 12 (Demonstration Lecture by Pye Telecommunications Limited), 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., Gladstone Mission Hall, Queens Drive, Stoneycroft.
Macclesfield.—May 12, 26, 42 Jordongate.
Manchester (M & DARS).—Wednesdays, 7.30 p.m., 203 Droylsden Road, Newton Heath, Manchester 10.
Manchester (SMRC).—Fridays, 7.45 p.m., Rackhouse Community Centre, Daine Avenue, Northenden.
Morecambe.—May 6, June 3, 125 Regent Road.
Preston.—May 12, 26 (All meetings start with a 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.—May 6, 20, June 3, The Blossoms Hotel, Buxton Road, Stockport.
Wirral.—May 6, 20, June 3, 7.45 p.m., Harding House, Park Road West, Claughton.

REGION 2

Barnsley.—May 8 (Visit by Halifax and Sheffield Clubs), May 22 ("Transistors in Receivers," by Mr. W. W. Williams), 7.30 p.m., King George Hotel, Peel Street.
Bradford.—May 12 (Field Day Arrangements), May 14 (Lecture at Spen Valley Club), May 26 ("V.H.F. Operating," by G2HHV), May 30 (N.F.D. Trial Run), 66 Little Horton Lane.
Catterick.—Tuesdays and Thursdays, 7.30 p.m., Club Room, Vimy Road.
Halifax.—May 26 (Visit to Baird Television Ltd.).
Northern Heights.—May 13 (Junk Sale), May 27 ("Transistors," by Mr. L. L. Cobb, G3UI), 7.30 p.m., Sportsman Inn, Ogden.
Scarborough.—Thursdays, 7.30 p.m., Chapman's Yard, North Street.
Spen Valley.—May 12 (Visit to Bradford Club), May 14 ("Missilemen 1964," by M. A. Browne), May 21 (Visit to Research Electronics at Cleckheaton), May 27 ("RTTY," by David Pratt), Heckmondwike Grammar School.
West Hartlepool (HARC).—Mondays, 7.30 p.m., 42 Murray Street (rear entrance).
York.—Thursdays, 8 p.m., British Legion Club, 61 Micklegate, York.

LOOKING AHEAD

June 14.—Hunstanton "Bucket and Spade Party."
June 27.—RSGB Extraordinary General Meeting.
August 30.—G6UT's Ham Party.
September 20.—Surrey Radio Contact Club 2m D/F Hunt.
October 28-31.—RSGB Radio Communications Exhibition.
December 18.—RSGB Annual General Meeting.

REGION 3

Birmingham (MARS).—May 26 (Demonstration of Eight Communications Receivers), 7.30 p.m., Midland Institute, Paradise Street, Birmingham. **(MRCC).**—June 5, 7.30 p.m., Windmill House, Wetheroak, Wythall. **(Slade).**—May 8, 7.45 p.m., The Church House, High Street, Erdington. **(South).**—May 14 ("Closed Circuit TV," by G. Simonite, G3JAO), 7.30 p.m., Friends' Meeting House, Balsall Heath.
Cannock (CCARS).—May 7, 8 p.m., The George Inn, Walsall Road, Cannock.
Coventry (CARS).—Mondays, 8 p.m., Westfield House, Radford Road, Coventry.
Mid-Warwickshire (ARS).—June 1 (Visit to Radio Station, Bearley).
Stourbridge (ARS).—May 10 (A "Safari," G6OI/P on 80, 40 and 20m).
Stratford-upon-Avon (ARS).—Fridays, 7.30 p.m., Flat 1, Birds Commercial Motors.
Wolverhampton (ARS).—Mondays, 8 p.m., Neachells Cottage, Stockwell End, Tettenhall.

REGION 4

Burton-on-Trent (ARS).—Second Wednesday in each month, 7.30 p.m., Club Rooms, Stapenhill Institute, Burton-on-Trent.
Chesterfield (C & DARS).—May 6, 7.30 p.m., Newbold Observatory, Newbold Road, Chesterfield.
Derby (D & DARS).—May 6 (Surplus Sale), May 13 ("Our Society—Past, Present and Future," by F. C. Ward), May 20 (D/F Practice Run), May 27 (NFD Meeting), June 3 (Surplus Sale), 7.30 p.m., Room No. 4, 119 Green Lane, Derby. **(DSW Exp. S).**—Fridays, 7.30 p.m., Sundays, 10.30 a.m., Club Rooms, Nunsfield House, Boulton Lane, Alvaston, Derby.
Grantham (G & DARS).—Monday, 7.45 p.m., Club Room (rear of Manners Arms Hotel), London Road, Grantham.
Grimsby (ARS).—May 7 ("Fault Finding Using a Minimum of Equipment," by M. Knight, G3NJF), May 21 (NFD Final Arrangements), 8 p.m., Grimsby Model Engineers Club Rooms, Fletchers Yard, Wellowgate, Grimsby.
Heanor (H & DARS).—May 12 (Films), May 26 (Visit to Alpha Television, Birmingham), June 2 ("A Transistor P.S.U." by B. Sandall, G3LGK), 7.30 p.m., Room No. 5, Heanor Technical College, Ilkeston Road, Heanor.
Leicester (LRS).—Mondays, 7.30 p.m., Club Room, Old Hall Farm, Braunstone Lane, Leicester.
Lincoln (SWC).—First Wednesday in each month, 7.30 p.m., Lincoln Technical College, Cathedral Street, Lincoln.
Loughborough (RCL).—Fridays, 7.30 p.m., Corporation Hotel, Wharncliffe Road, Loughborough.
Mansfield (MRS).—Fridays, 7 to 9 p.m., ATC Headquarters, Sutton Road, Mansfield.
Melton Mowbray (ARS).—May 21 ("Seventy Centimetres," by J. L. Warrington, G2FNW), 7.30 p.m., St. John Ambulance Hall, Asfordby Hall, 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).—Fridays, 7.30 p.m., Club Headquarters, Corporation Yard, Victoria Road, Cambridge.
Luton (L & DARS).—May 5 (Club Visit), May 12 ("War-time Operating," by G2DPQ), May 19 (No Meeting), May 26 (Tape Lecture, "Radio over the years"), 8 p.m., ATC Headquarters, Crescent Road.
March (M & DRAS).—Tuesdays, 7.30 p.m., rear of Police Headquarters, High Street, March, Cambs.
Royston (R & DARC).—Wednesdays, 8 p.m., Manor House Social Club, Melbourn Street, Royston, Herts.
Shefford (S & DARC).—Thursdays, May 7 (Open Evening), May 14 (Final NFD Meeting), May 21 (Talk by Tom Hill), May 28 ("Two-way Morse Procedure for NFD"), 7.45 p.m., Digswell House, Hitchin Road.

REGION 6

Cheltenham.—May 7 ("Receivers," by C. W. Cragg, G2HDU), 8 p.m., Great Western Hotel, Clarence Street.
Oxford.—Second and Fourth Wednesdays in each month, 7.30 p.m. (RAE Classes at 7.15 p.m.), Cherwell Hotel, Water Eaton Road, N. Oxford.

REGION 7

Acton, Brentford & Chiswick (ABCRC).—May 12 (NFD Briefing), 7.30 p.m., AEU Club, 66 High Road, Chiswick.
Bexley Heath (NKRS).—May 14 (AGM), May 28 (NFD Preparations), 7.30 p.m., Congregational Hall, Chapel Road, Bexley Heath.
Barnet (BRC).—May 26, 8 p.m., Red Lion Hotel, Barnet.
Chingford (Group).—May 15, 29, details from the Hon. Secretary, Loughton 2397.
Chingford (SRC).—Fridays (Except first), 8 p.m., Friday Hill Community Centre, Simmons Lane.
Croydon (SRCC).—May 12, 7.30 p.m., Blacksmith's Arms, South End, Croydon.
Dorking (D & DRS).—May 12, 8 p.m., "Wheatsheaf," Dorking. May 26, 8 p.m., "Star & Garter," Dorking.
East Ham.—May 19 (Tuesdays fortnightly), 7.30 p.m., 12 Leigh Road, East Ham.
East Molesey (TVARTS).—May 6, Carnarvan Castle Hotel, Hampton Court.
Edgware & Hendon (EARDS).—May 11, 25, 8 p.m., John Keble Hall, Church Close, Deans Lane, Edgware. Interested new members contact G3VW, 10 Holmstal Avenue, Edgware.
Enfield.—May 21, 7.30 p.m., George Spicer School, Southbury Road, Enfield.
Gravesend (GRS).—May 20, 7.30 p.m., RAFA Club, 17 Overcliffe, Gravesend.
Guildford (G & DRS).—Second and Fourth Fridays in each month, 8 p.m., City Cafe, Onslow Street, Guildford.
Harlow.—Tuesdays, 7.30 p.m, Rear of G3ERN (G. E. Read), High Street, Harlow.
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, Hornsey, W.7.
Hounslow (HADRS).—(Mondays fortnightly), June 1 (Launching Callsign Club), 7.30 p.m., Canteen, Mogden Main Drainage Dept., Mogden Works, Isleworth.
Ilford.—Thursdays, 8 p.m., 579 High Road, Ilford (Nr. Seven Kings Station).
Kingston.—May 14, 8 p.m., YMCA, Eden Street, Kingston (Fridays—weekly Morse Classes at 2 Sunray Avenue, Tolworth).

LONDON MEMBERS' LUNCHEON CLUB

will meet at the Bedford Corner Hotel, Bayley Street, Tottenham Court Road, **at 12.30 p.m. on Friday, May 15, 1964.**

For details of subsequent luncheons, see page 315.

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

Leyton & Walthamstow.—May 26, 7.30 p.m., Leyton Senior Institute, Essex Road, E.10. Interested new members contact A. Rix, 17 Forest Drive East, E.11.
Loughton.—May 8, 22, 7.30 p.m., Loughton Hall (Nr. Debden Station).
Mitcham (M & DRS).—May 8, 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).—May 23 ("Working DX," by R. F. Stevens, G2BVN), CD Training Centre, Bromley Crescent, W.2.
Paddington (P & DARS).—Wednesdays, 7.30 p.m., Beauchamp Lodge, 2 Warwick Crescent, W.2.
Purley (P & DRC).—May 15 (AGM), 8 p.m., Railwaymen's Hall (Side Entrance), Whytecliffe Road, Purley.
Reigate (RATS).—May 16 (Club Night), May 28 (SWL Night), 7.30 p.m., George & Dragon, Cromwell Road, Redhill.
Romford (R & DRS).—Tuesdays, 8.15 p.m., RAFTA House, 18 Carlton Road, Romford.
Sidcup (CVRS).—May 7, (AGM and Junk Sale), 7.30 p.m., Congregational Church Hall, Court Road, Eltham.
Slough (SARS).—First Wednesday in each month, 8 p.m., United Services Club, Wellington Street, Slough.
Southgate & District.—May 14 (Talk by Green & Davis on their products), 7.30 p.m., Atlasta Lodge, Tottenhall Road, N.13.
St. Albans (Veurlam ARC).—May 20 ("Rigs for 160 and 2m," by T. Withers), 8 p.m., Hedley Road, St. Albans.
Sutton & Cheam (SCRS).—May 19, 7.30 p.m., The Harrow, High Street, Cheam.
Welwyn Garden City.—May 14 (Constructional Competition), 8 p.m., Conference Room, Murphy Radio, Bessemer Road, Welwyn Garden City.
Wimbledon (W & DRS).—May 8, 8 p.m., Community Centre, St. George's Road, Wimbledon, S.W.19.

REGION 8

Canterbury (EKRS).—May 12 (Open Night and Transmitting Night), May 19 (Lecture), May 26 ("The GPO," by E. Whitehead), June 2 (NFD Meeting).
Crawley (CARC).—May 13 (Informal meeting, for details contact G3FRV), May 27 (Film Show and NFD Arrangements), 8 p.m., Trinity Congregational Church, Ifield.
Worthing (W & DARC).—May 11 ("Hi-Fi Equipment and Techniques"), 8 p.m., Adult Education Centre, Union Place, Worthing.

REGION 9

Bath.—May 13, 7.30 p.m., Assembly Room, Technical College, Lower Borough Walls, Bath.
Bristol.—May 22, 7.15 p.m., Small Physics Theatre, Royal Fort, Bristol University, Woodland Road, Bristol 8.
Burnham-on-Sea (B-o-SARS).—Second Tuesday in each month, 8 p.m., Crown Hotel, Oxford Street, Burnham-on-Sea.
Camborne (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, May 5 (AGM), 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).—First 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.—May 24 (Visit to GPO Radio Station, Highbridge).

REGION 11

Bangor (UCNWARS).—May 7 (AGM), 2 p.m., Dept. of Electronic Engineering, Dean Street, Bangor. Details from M. J. English at this address.
Llandudno (CVARC).—May 14 (NFD Arrangements, and a demonstration of Collins "S" Line Equipment by G. Moorfield, GW3DIX), 7.30 p.m., Albert Hotel, Madoc Street, Llandudno. June 11 (Visit to Anglesey Post Office Radio Station), details from B. Clark, GW3HGL.
Prestatyn (FRS).—May 12 (Visit to Post Office Telephone Repeater Station at Colwyn Bay), 8 p.m., May 26 (RSGB Tape Lecture), 8 p.m., Railway Hotel, Prestatyn.

REGION 13

Edinburgh (LRS).—May 14 ("Small Vessels Communication," by W. R. Cook of Coastal Radio), May 28 (NFD Briefing), 7.30 p.m., YMCA, South St. Andrew Street, Edinburgh.

REGION 14

Ayrshire.—Third Sunday in each month, 7.30 p.m., Conservative Club, Sturrock Street, Kilmarnock.
Glasgow.—May 15, 29, 7.30 p.m., The Christian Institute, 70 Bothwell Street, Glasgow.

REGION 16

Basildon (BDARS).—Details of meetings from G3RQT, 59 Waldegrave, Basildon.
Chelmsford (CARS).—June 2 ("Marconi Autospec Teleprinter System," by A. W. Cole of the Marconi Co. Ltd.), 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.
Norwich (Norfolk ARC).—Meetings at The Branford Stores, Branford Road, Norwich. Details from G3NJQ.
Southend (SDARS).—May 29 ("Direction Finding Techniques," by K. Seabrook), Fridays fortnightly, the Executives' Canteen, E. K. Cole Ltd., Priory Crescent, Southend-on-Sea.

PRIVATE ADVERTISEMENT ORDER FORM

Please send advertisement to SAWELL & SONS LTD., 4 LUDGATE CIRCUS, LONDON, E.C.4

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Please insert above advertisement in RSGB BULLETIN

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OFFICIAL APPOINTMENTS

RADIO TECHNICIANS

Required by the GOVERNMENT OF NORTHERN RHODESIA, Civil Aviation Department, on contract for 1 tour of 36 months in the first instance. Commencing salary according to age and experience in scale rising to £1,580. Gratuity £450 approx. on completion of 3 year contract. Free passages. Liberal leave on full salary. Accommodation provided at low rental. Children's Education Allowances.

Candidates, under 45 years of age, should possess a services trade certificate or M.O.A. certificate of competency and have had sound training in theoretical principles in at least 2 of the following communication, navigational and surveillance systems:

(1) Medium powered H.F. shift keying; S.S.B. and D.S.B. equipment.
(2) Low and high powered V.H.F.D.S.B. and FM equipment.
(3) Medium and V.H.F. non-directional radio beacons visual omni-range, instrument landing system, V.H.F. direction finders, distance measuring equipment.
(4) Radar L. and S. band terminal PPI talk down equipment.
(5) Telephony: Audio and remote control equipment consisting of public address, airport magnetic tape recorder and inter-office telecom. equipment, underground and control cable, Impulse and DC switching systems.
(6) Teleprinter telegraphy (torn tape); radio and local circuits consisting of printers autoheads, perforators and line terminating systems.

Apply to CROWN AGENTS, 4, Millbank, S.W.1, for further particulars, stating age, name, brief details of qualifications and experience, and quoting reference M2/52209/RC.

NORTHAMPTON COLLEGE OF ADVANCED TECHNOLOGY

ST. JOHN STREET, LONDON, E.C.1

DEPARTMENT OF ELECTRICAL & ELECTRONIC ENGINEERING

REQUIRES LABORATORY TECHNICIANS

Candidates should have (a) 4 approved C.G.E. subjects at "O" Level or (b) obtained or be pursuing the O.N.C., course in Electrical Engineering. Junior Technicians normally receive a five-year integrated course in all branches of electrical engineering. Concurrently with practical training each Junior Technician receives part-time day release to study for the H.N.C. with a view to qualifying as Senior Technician in College, Industrial, Government and research laboratories.

Applications to Head of Department for details and conditions. Salary within the range £300 to £890 per annum according to age and qualifications. Subsequent promotion to higher grade subject to satisfactory service.

OFFICIAL APPOINTMENTS (continued)

NORTHAMPTON COLLEGE OF ADVANCED TECHNOLOGY

ST. JOHN STREET, LONDON, E.C.1

DEPARTMENT OF ELECTRICAL AND ELECTRONIC ENGINEERING

A SENIOR or CHIEF LABORATORY TECHNICIAN is required with experience of the installation and maintenance of Stage lighting, Public address systems and visual aids.

Applicant should have a Higher National Certificate in Electrical Engineering or Telecommunications, or equivalent.

Salary within the range £870-£1,270 subject to age, qualifications and experience. Permanent, pensionable.

Applications stating age, qualifications, experience and present salary to the Head of Department.

SITUATIONS VACANT

ELECTRONIC TESTERS

required

to work on H.F. and V.H.F. equipment, Data Transmission and Telegraph systems.

Apply for full details to:

Personnel Officer
A.T. & E. (Bridgnorth) Ltd
Bridgnorth, Shropshire

DO YOU WANT A HOBBY TO PAY

6 Sqn. 65th Sig. Regt. (T.A.) Barnet has vacancies for Telegraph and Teleprinter Operators. Interesting outdoor training. Apply: The Drill Hall, St. Albans Road, Barnet.

LABGEAR LIMITED have vacancies for both Junior and Senior Communications Engineers for designing and building transmitting and receiving equipment. Excellent working conditions in a modern laboratory with really attractive prospects for sound practical men. Applications which will be treated confidentially should give full details of previous experience whether professional or amateur. LABGEAR LIMITED, CROMWELL ROAD, CAMBRIDGE.

ELECTRONIC TECHNICIANS required for interesting and varied work on prototype equipment. Good salary. Pleasant workshop situated in the centre of Reading. Apply: E.M.T.I. Ltd., Prospect Works, Prospect Mews, Reading, Berks. (Reading 52975).

TEST & SERVICE ENGINEERS. Interesting work on well known equipment. Must be top rate technicians. SALES OFFICE MANAGER. Must have good technical knowledge. Apply in writing giving full details of experience.—The Personnel Manager, K.W. ELECTRONICS LTD., VANGUARD WORKS, DARTFORD, KENT.

AN ELECTRONIC TECHNICIAN required for construction of Test Equipment. Apply giving full details of previous experience to The Personnel Manager, CAMBRIDGE WORKS LIMITED, Haig Road, Cambridge.

SITUATIONS VACANT (continued)

BCC

have vacancies for

DEVELOPMENT ENGINEERS
TECHNICAL ASSISTANTS
and
DRAUGHTSMEN

of all grades

The successful applicants, who will work in modern premises and be engaged in all aspects of Radio Communication Equipment—Pack Sets, Mobiles and Fixed Stations—on both Commercial and Government contracts, will require knowledge and experience of one or more of the following:—

Transmitter and Receiver Design
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The salaries paid will be particularly good and will depend on the academic qualifications held and the practical experience of the applicant. Existing holiday arrangements will be honoured.

Apply in writing in the first instance, giving details of age, qualifications, experience and salary required to:—

The Personnel Officer,
BRITISH COMMUNICATIONS CORPORATION LIMITED,
South Way, Exhibition Grounds, Wembley, Middlesex.

TELEVISION/RADIO BENCH ENGINEER, fully experienced, to take charge of expanding service department. Excellent wage and opportunity. Permanent position. Apply: Spiegler Limited, 898 Garratt Lane, London, S.W.17. BALham 7516.

EXCHANGE

EXCHANGE new " CIMA " 8mm cine camera (cost £28) for Beam Rotator, mobile RX, or portable RX. Offers—QVO3/10's, TT21, 5763's, Acos Mike 40, Labgear wide band couplers. Box No. Y.7123, c/o RSGB BULLETIN, 4 Ludgate Circus, London, E.C.4.

SERVICES OFFERED

GO ONE BETTER. Have your cabinets, panels, etc., stove-enamelled and lettered to your own or original specification. —For by-return quotations, contact: The Universal Productions (Enamellers) Ltd., 22 Aston Road North, Birmingham 6. Tel.: Aston Cross 2987.

CASES, chassis, panels. ANYTHING in metal: send your drawings, for quote. Stove enamelled, hammertone, or plain, in any colour.—Moss Watson, 40 Mount Pleasant Street, Oldham, Lancs. (Main 9400).

WANTED

WANTED. 1930-1939 radio components, Telsen, Lissen, Wearite and Igranic. Coils, meters, condensers, valve bases, dials, & knobs, etc. British General radio tuner unit. Eddystone HF and V.H.F. components, bright emitter valves of any date. Magazine: Television & Short Wave World 1930-1940, bound or unbound, RSGB BULLETINS 1930-40, bound or unbound. Write to: A. Sullivan, G2DGF, 12 Glebe Road, Letchworth, Herts.

WANTED (continued)

WILL SOMEONE PLEASE SUPPLY a good, used course of home study for the R.A.E. Price, details to Box No. Y.7122, c/o RSGB BULLETIN, 4 Ludgate Circus, London, E.C.4.

V.H.F. RECEIVER, from approx. 100 to minimum 146 Mc/s. Must be in perfect working order, reasonable condition and price. Required for Flying Club. All replies answered. G3DUV, 28, Kempson Avenue, Sutton Coldfield, Warwickshire.

WANTED.—All types of communications receivers, test equipment, tape recorders, amplifiers, etc. Prompt cash payment.—Details to R. T. & I. Electronics Ltd., Ashville Old Hall, Ashville Road, London E.11. (LEYton 4986).

COLLECTING FOR PRIVATE MUSEUM.—Early Marconi tuners, detectors, spark coils, high voltage transformers, Leyden jar and plate condensers, keys, spark gaps, oscillation transformers. Commercial gear and commercially made amateur gear before 1920 especially tubes, magazines, catalogues and *QSTs*. RSGB BULLETINS before 1937. Old Post Office manual morse telegraph equipment including needle systems. All letters answered.—E. W. Freeman, KØMOA, Box 57, Yankton, South Dakota, U.S.A.

" CQ " to complete collection. January, March, April and/or June 1945, or complete 1945 volume. Your price if reasonable.—G3IDG, 96 George Street, Basingstoke, Hampshire.

WANTED.—Mosley TA-33Jr. beam; state condition and price.—G3RUX, 39 Park Lane, Pinhoe, Exeter, Devon.

SCANDINAVIAN AMATEURS still require (working or not) AR-88D, CR.100, BRT400, HRO, BC-348, PCR3, manual for 358X, amateur bands crystals, second-hand Eddystone and Hammarlund receivers, etc. Collection within 200 miles London.—Brian J. Ayres, 21 Grange Road, Chessington, Surrey. (LOWer Hook 2000).

WANTED. Manual for C.R.100.—H. Payne, 110 Parklands Road, Chichester, Sussex.

VANGUARD OR VALIANT with matching P.S.U. Must be excellent condition, 160-10m. Collected 150 miles Cardiff. Price and details to Box No. Y.7127, c/o RSGB BULLETIN, 4 Ludgate Circus, London, E.C.4.

WANTED, commercially built 50-100 watt transmitter. FOR SALE, Minimitter 8 band converter, £10/10. Box No. Y.7131, c/o RSGB BULLETIN, 4 Ludgate Circus, London, E.C.4.

WANTED. DX100 Transmitter, must be in perfect condition, not more than £60.—Clarke, Westaway, School Lane, Newton-with-Scales, Nr. Kirkham, Lancashire.

MECHANICAL FILTER (455 Kc/s) Sideband Transmitter or Transciever. 325—KWM KW 2000 Sonar or similar HX50 considered. G2ACT, 67 Bare Lane, Morecambe.

WANTED. Type 7 Teleprinter, in any condition, or good type 3. Offers to: Bennett, 66 Clewer Hill Road, Windsor.

PERSONAL

QSL CARDS. G.P.O. approved log books, cheapest, best, prompt delivery. Samples.—Atkinson Bros., Printers, Looe, Cornwall.

PATENTS and TRADE MARKS. Booklet on request. Kings Patent Agency Ltd. (B. T. King, G5TA, Mem. RSGB, Reg. Pat. Agent).—146A Queen Victoria Street, London, E.C.4. (Phone: City 6161.) 60 years' refs.

PERSONAL (continued)

LICENSED amateur needs room or flat—London area—with permission to construct and operate from early June.—Box No. Y.7125, c/o RSGB BULLETIN, 4 Ludgate Circus, London, E.C.4.

AN OXBRIDGE MAN (age 22) is tired of an existence in digs separated from active Amateur Radio and seeks accommodation (of any type) up to 15 miles from Slough, whence it would be possible to pursue once more his interests on the H.F. and also possibly V.H.F. bands. Any suggestions or offers please to Box No. Y.7129, c/o RSGB BULLETIN, 4 Ludgate Circus, London, E.C.4.

FOR SALE

SALE AR88LF as new, tools, manual, professionally re-sprayed and aligned June 1963, £42. Bray, G3SRN, 4 Ledway Drive, Wembley, Middlesex.

CR100 good condition with ATU manual and loud speaker. First offer above £17 secures. 'Phone Mr. Jones, WATerloo 6049, London.

HALLICRAFTERS SX101 Mark III and Collins 32S1 Exciter with high power 813 Linear Amplifier (complete with 3000v separate power supply), for £300. Also B & W T.R. Switch, Heathkit Hybrid phone patch, Mosley Triband TA33 Senior Rotary. Buyer collects. GI3CWY, Wilson, Dunlochan, Whitehead, Co. Antrim. Phone Whitehead 3260.

EDDYSTONE 840A 1962 model. Very good condition. £30 o.n.o. Buyer collects—5 Highfield Crescent, Blackheath, Birmingham.

MULTIBAND ANTENNA TRAPS 80 thro 10m high efficiency and superbly finished, only 45/- pair. Silicon Diodes 1000 PIV at 500mA, 9/-. OC.45, 44, 81, 81D, 3/6. OC.170, 4/-. OC.171, 4/6. BM.3 xtal mic., 37/-. HE.30 and HE.40 Communication Rx. All plus P. & P.—Wakeley, 70 Arnold Road, Binstead, I.W. Ryde 3231.

HALSON 3FIF MOBILE ANTENNA

Complete with coil of your choice 160m, 80m, 40m, or 20m £6.10.0. Extra coils £3.10.0. each.

From: **Halson Radio Services Ltd., Dover Road Works, Blackpool. Tel 62740.**

EDDYSTONE ACCESSORIES. Variable Condensers, 584 Butterfly 34X34 Pf, 588-27 Pf, 589-54 Pf, 583-Split Stator 25X25 Pf all at 3/- each. ERIE COMPONENTS 560 Pf Nut Fixing Feed Thro Condensers, 1000 Pf Miniature Tubular Ceramics, and 3000 Pf Tubular Ceramics all at 5/- doz. Bulgin 3000 Pf Trimmers, Ceramic 30 Pf Airspaced Trimmers and 5 Pf Airspaced Trimmers all at 9d. each. Resistors 10 ohm to 10 meg. in 2, 1½ watt, and miniature at 2/- doz. **OC16's matched pair 12/6d.** All items brand new and post paid. J. Birkett, Radio Component Suppliers, 9 Steep Hill, Lincoln. Phone 20767.

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

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.

FOR SALE—(continued)

CR.100, £14. TBY6 Transceiver, £4. Avo Osc., £1.—Wakeman, 13 Fairhaven, Yate, or Tel. Bristol 693054. 9-5.

HAMMARLUND Super Pro BC779-B with power unit and auto transformer. Offers.—G3CRB, 30 Wood Lane Close, Iver-Heath, Iver, Bucks.

888A for sale with mounting blocks, £68. **WANTED** KW 2000 or NCX3.—Franklin, 2 Berkeley Drive, Kingswinford, Staffs. Kingswinford 3879.

HRO Table Model, nine GC coils, PSU, speaker, K.W. converter, £30.—Wilson, Orchard House, Sutton Green, Guildford. (Tel.: Guildford 5783).

19 SET complete with power supply, £3. 19 Sets only, from 15s. No. 38 Set complete, 15s. 12v. vibrator unit, 250v. output, brand new, 25s. Buyer collects.—Main Road Garage, Billericay 297, Essex.

DX 40 U, little used, £25. T.F. 390G signal generator 16-150 Mc/s, with some components, £7 10s.—G3OXS, 64 Border Gardens, Shirley, Surrey.

R.B. 150 Recording Bridges, comprising 2 Deck Chassis, Panel, Cabinet, mains xformer, SEC. 265-230 volts C.T. at 150 M.A. 125 volts C.T. 30 M.A. 5 volts 3 amps twice 6·3 volts, 11 amps. Various other xformers, chokes, capacitors, valves, etc. £2.5.0 each or will dismantle. S.a.e. full details: Tynan, 29 Elm Walk, Stevenage, Herts. Phone Stevenage 1297.

MINIMITTER TRANSMITTER 150W. Phone/CW 80m to 10m. Mosley 3 element tri band ant. Telescopic mast for antenna. 3 speed 2 track tape recorder 7 in. spools, in black crackle cabinet used for monitoring RX and modulating TX. All above in use up to this week. Any reasonable offer, for each item accepted. Despatched by passenger train. Box No. Y.7126, c/o RSGB BULLETIN, 4 Ludgate Circus, London, E.C.4.

DX-100U for sale, very little used, £60. Delivered 100 miles.—J. Wilmott, 59 Green Lane, Eastwood, Leigh-on-Sea, Essex.

NO. 19 SET xtal calibrator with handbook, 40/-. FT241 xtals, 8 channel 345 and 3 channel 346, 22/-. Both post paid. Cossor model 339 scope and spare tube, £12. Power pack, gives 350v D.C., 250mA;—2KV, 5mA; 6·3V A.C., 10A, with leads and strong transit case, £6. Both o.n.o. and carriage extra, or arrange collection/delivery. Write first to: Advertiser, Wordsworth House, Cockermouth, Cumb.

FOR SALE. K.W. Viceroy Mk. 1 S.S.B. transmitter in perfect condition. Carriage paid to destination. Offers to:—Grier (GI3OZX), 44 Woodvale Park, Dungannon, Co. Tyrone.

FOR SALE: AR88LF, £32 o.n.o.? Prefer buyer collects.—Koester, 38 Manor Avenue, Hassocks, Sussex. Phone: Hassocks 3233.

6 FT. GPO rack. 33 ft. sectional steel mast. Mains transformers, masses other bargains. 7 in. LP tapes 12/6. Large s.a.e. list.—G3ERB, 56 Kings Lane, Bebington, Cheshire.

TU5B £1: TU8B, 15/-; B.C.453, £3; 2-metre converter, 50/-; DC. Avominor, 25/-; EMI. 1000 kc oscillator, 30/-; CR.100 valves, 4/-; pencil sharpener, 15/-; BULLETINS 1938-1950, 10/- volume, 1951-1960, 15/- volume; some additional copies, 1/6d.; SWM's 1946-1951, 10/- volume; 1952-1960, 15/- volume; QST's 1956-1959, 2/- copy; Handbooks, Jones Ninth Edition, 7/6. ARRL 1951, 7/6, Wilcox Gay, 5/-; 7 in. 4-band dial, 10/-. Add carriage.—G2HCZ, QTH.R.

FOR SALE—(continued)

WODEN Transformer 1250-1000-0-1000-1250v, 300 m.A., £4. 6·3v., C.T., 4A, 15/-. 7·5v. C.T. 5A, 15/-. 2·5v. C.T., 5A, 15/-. D.T.2., 10/-. Chokes, 5/25H., 250 m.A., £1. 12H, 350 m.A., 30/-. Geloso front end G2186, assembled C/W. P.S. and working, £9. 80 watt lightweight charging set, £7.—G3KEF, 86 Halford Lane, Coventry.

BC221 AE, £15. 300 and 450v power supplies on one chassis, £6 Variac Transformer 0-270v at 9 amps, £12/10/-. Various components HT/LT transformers, etc. List supplied.—Box No. Y.7128, c/o RSGB BULLETIN, 4 Ludgate Circus, London, E.C.4.

AR88 Diversity I.F. control, mint condition, spare set valves, £45. Two 6 volt 175 ampere hour batteries, brand new (sealed), £8. 200 T.X. and R.X. valves, what offers? Box No. Y.7130, c/o RSGB BULLETIN, 4 Ludgate Circus, London, E.C.4.

HEATHKIT RA1 receiver, as new, and ideal for mobile, £35 o.n.o.—Collins, "St. Decumens," Beeches Road, Crowborough, Sussex.

1155B for sale, perfect condition with PSU and Audio Amp, £8/10/-. Buyer collects.—G. McCallum, 1 Burnbrae Street, Faifley, Clydebank, Dunbartonshire.

80-METRE Command Transmitter, 50/-; Compact TX/RX BP5 1·9-8 Mc/s, £7.—G2DPD, 3 Raymond Way, Claygate, Surrey.

SERVICE SHEETS. Radio and Television, 3/6 post paid. S.a.e. with enquiries.—VEST AND EMERY, 17 Hallgarth Street, Durham.

PYE V.H.F. RADIOS—P.T.C. 703, £20; P.T.C. 116 "Reporters," £8 each; all less crystals and carriage extra—as previously advertised. One Hudson AM.108 c/w extension control unit—as new condition, £75, plus carriage. G.E.C. F.M. V.H.F. Equipment—two mobiles, fixed station, battery chargers, etc., £20 the lot.—Pendry & Kennedy, 6 Coed Celyn Road, Derwen Fawr, Swansea.

HALLICRAFTERS S-37 Receiver, 125 Mc/s-225 Mc/s, A.M./F.M. Mint. AR-88 Spares; Gearbox, Manual, Trimming Tools, Dial, Crystal, etc.; SX-62 Receiver, ·5 Mc/s-109 Mc/s, A.M./F.M.—S.a.e., Wright, 4A Nepal Avenue, Atherton, Manchester. Telephone 991.

HRO, 8 coils, 80, 40, BS, PSU. excellent, unmodified £15 o.n.o. DX-20 50 watts CW 80-10. Fb TX £15 o.n.o. Will send if unable to collect.—G3NXY, 160 Manor Farm Road, Bitterne Park, Southampton.

CLASS D Wavemeter, original carrying case, £5. 3 RF26s with Muirhead slow motion drives, one modified 70 mc/s, 30/- each. Xtal controlled 100 mc/s TX/RX 22 miniature valves, p/p, xtals, £4. Woden DTI, 60 watt mod. trany, 300 MA meter all in tub unit, 30/-. Valves QQVO6-40A, £1. QVO4-7, 6CL6, EY84, 10/- each o.n.o.—G3OCA, 216 St. Helier Avenue, Morden, Surrey. Mitcham 2592.

TRANSMITTER, professionally made, wonderful condition, 3·5 to 30 mc/s switched. ATU power supply and modulator, all metered 100 watts. AM, 120 watts. CW, VFO, £45 o.n.o. Valves, meters; 30 ft mast.—Winter, Hoathwood, Beckley, (315) Rye, Sussex.

MOVING QTH—clearing shack. Following for sale. No reasonable offer refused. DX4OU. TX., £20. Speech amp/modulator with separate PSU, £10. Labgear WB coupler unit, 50/-. Labgear tank coils, type DSL 10-80M 150 watts with base, links, split/stator condenser, 40/-. W1191a frequency meter, shabby appearance but O.K., 30/-. New RX/TX cabinet by Philpotts, size 16 in. by 12 in. by 11 in., grey, 45/-. 813 almost new, 20/-. Pair 866 rectifiers (new), 5/- each.—Box No. Y.7132, c/o RSGB BULLETIN, 4 Ludgate Circus, London, E.C.4.

FOR SALE—(continued)

TX. 150 watt Mercury Minimitter F.B. condx., £55. RX. AR88D no case, £29. Delivered 50 miles London area.—G5WG, (BUCkhurst 5499), 19 Beresford Drive, Woodford Green, Essex.

EDDYSTONE 770R v.h.f. receiver, 19-165 Mc/s/AM/FM/CW, excellent condition, £110, or offer. Free delivery Midlands, S. England.—D. Walch, 9 Pembroke Street, Oxford.

VALVES—number of each at 4/-, ECF80, ECH81, EF80, EF85, EABC80, EBC41, EL84, EM81, EM80, EZ80, ECC81, ECC82, ECC85. Meters 50μA. 2½ in. flush round by 'Weston' 'MIP' 'Ferranti,' brand new, boxed, 35/- post 1/3. 0-300 VDC moving coil 6 in. scale flush round by 'Record', sealed instruments, brand new, boxed, 55/- post 4/-. J. Cooper, 13 Churchfield Road, Outwell, Wisbech, Cambs.

HAMMARLUND HQ-145X with crystal calibrator, cost £145 when purchased, 48 hours' use only, £89. Ewert, 41 Hayes Chase, West Wickham, Kent. (Spring Park 5989, week-ends only).

BC312 Rx, 230/12v., as new £20? o.n.o. 2/813, metres, transformers H & LV, power supplies, etc. list. GW3FZV, Dolwerdd, Bwl Road, Nelson, Treharris, Glam. (Tel. Nelson 316).

RTTY SCOOP—a few still left—New unused ATM Model FSY terminal units, AFC/BFO units and power units. Ready for despatch from Sweden for cash, or exchange for good SSB and surplus gear, receivers, etc. Offers, with s.a.e. to—Owen, G2FUD, 184 Hale Road, Hale, Cheshire. (ALTrincham 1321).

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

FOR DISCERNING ENTHUSIASTS. Prompt service. High quality components. Mullard electrolytics for transistor circuits. Mullard Reference Manual of Transistor Circuits 12/6 + 1/- p & p. Mullard Industrial Semiconductors, e.g. OC84 8/-, OC170 8/6, OC171 9/-, AUY10 4·5W fl = 120 Mc/s 53/-. Exotic American transistors, some ex-stock, others to order. RCA 2N3053 60V 1A 5 Watts fT = 100 Mc/s 15/6, 2N1184 25/6, 2N711 (200 Mc/s) 12/9. Tunnel diodes from 51/-. Sprague 2N1742 fmax 980 Mc/s (min.) 24/6. Texas (low noise) 2G308 6/9. Also ST&C Thermistors (R53 21/-) & Transistors. Please send 3d stamp for list. C.W.O. Postage free over 10s, otherwise 6d please. J. Williams & Co.(R), 208 Hagley Road, Birmingham, 16.

HAMMARLUND Super Pro, 160-20 metres, manual and autotransformer: offers; VCR 97: 15/-; Command TX, 3-4 Mc/s: 30/-; German battery RX, 25-60 Mc/s: £2. G3LMJ, 1 Court Farm Road, London, S.E.9.

SELLING SBIOU, new £30. Heathkit Service Oscilloscope OS1, £10. Taylormeter 83A, £4. Wilson, 284 Verdant Lane, London, S.E.6.

RTTY. FB ATM Model FSR.1.1X (AP.66862) Terminal Unit, complete with plugs, circuit, etc., offered in exchange for commercial oscilloscope, tape recorder, or TDMS. Owen G2FUD, 184 Hale Road, Hale, Cheshire. (ALTrincham 1321).

MOVING to Mars for dxpedition—gear to be sold—BC221 L.M. type with original p/p metered and voltage compensating switching £18 o.n.o. K.W. 500 linear fitted with blower, £72 o.n.o. 20m full size hy-gain 3 element beam, £22/10/-. o.n.o. New from the U.S.A. 2 Eimac 3-400Z tubes with cooling anode caps, 1 base, 1 cooling chimney, £25 o.n.o.—J. A. Steele (G3KZI), 12 Broadwalk, London, E.18. (WANstead 2321).

SALE R107 Receiver, top condition, £14. P. V. Vedam, c/o The Department of Pharmacology, The University, Liverpool 3.

INDEX TO ADVERTISERS

RSGB Slow Morse Practice Transmissions

The following Slow Morse Practice transmissions are sponsored by the RSGB. Alterations and additions to this list should be sent to the Honorary Organiser, M. McBrayne, G3KGU, 25 Purlieu Way, Theydon Bois, Essex.

Time	Call-sign	kc/s	Town
Sundays			
08.00	G3KLT	1827	Birmingham
09.30	G3KZZ	1920	South Shields, Co. Durham
10.15	G3CGD	1875	Cheltenham
10.30	GI3JEX	1860	Belfast
11.00	G2FXA	1900	Stockton-on-Tees
12.00	GM3HBY	1903	Glasgow
12.00 †	G3HVI / G3OGD	1890	Stoke-on-Trent
12.00	G3SQU	1840	Margate, Kent
18.30	G3NCZ	1920	Blackburn, Lancs.
19.00	G3SEP	1980	Gt. Yarmouth
21.00	G3LKT / G3PLQ	1892	Salisbury, Wilts.
21.30	G3NQR	1875	Harrow Weald, Middx.
Mondays			
18.30	G3NC	1968	Swindon
18.30	G3NCZ	1920	Blackburn, Lancs.
19.00	G3MXS	1875	Birkenhead
19.30	G3LZV	1910	Canterbury, Kent
19.30	G3SRY	1920	Cheam, Surrey
20.00	G3HJG	1825	Manchester
20.00	G3IBJ	1910	Southampton, Hants.
20.00	G3PKZ	1930	London N.22
21.00 †	G3IRM / G3MWO / G3PHW	1981	Bury St. Edmunds
21.00	G3LKT / G3PLQ	1892	Salisbury, Wilts.
21.15	G3ADQ	1990	Bradford, Yorks.
21.30	G2BSW	1865	Studley, Warks.
Tuesdays			
20.00	G3RZO	1865	Redditch, Worcs.
20.00	G3PJI	1910	Southampton
20.00	G3AYJ	1925	Birmingham
20.30	G3NKX	1915	Loughton
21.00	G3LKT / G3PLQ	1892	Salisbury, Wilts.
21.30	G3HZG	1865	Redditch, Worcs.
22.00	G3LLM	1820	Bath
22.00	G3AWL	1980	Wingate, Co. Durham
22.00	G3HZM	1925	Manchester
Wednesdays			
18.30	G2FXA	1900	Stockton-on-Tees
19.00	G3GBS	1865	Moseley
19.00	G3GBJ	1870	Redditch, Worcs.
20.00	G3RQX	1840	Wolverhampton, Staffs.
20.00	G3KFE / G3SAD/A	1980	Stevenage, Herts.
20.30	G3KGU	1920	Theydon Bois, Essex
20.30	G3AGN	1875	Felixstowe
21.00 †	G3HVI / G3OGD	1890	Stoke-on-Trent
21.00	G3LKT / G3PLQ / G3POU	1892	Salisbury, Wilts.
21.00	G3KAD / G3SFO	1850	Doncaster, Yorks.
Thursdays			
18.30	G3NC	1968	Swindon
19.00	G3NUT	1875	Wallasey
19.30	G3LZV	1910	Canterbury, Kent
20.00	G3NHR	1900	Hounslow
21.00 †	G3IRM / G3MWO / G3PHW	1981	Bury St. Edmunds
21.00	G3LKT / G3PLQ	1892	Salisbury, Wilts.
21.00	G3ADQ	1990	Bradford, Yorks.
21.30	G3EVT	1865	Redditch, Worcs.
22.00	G3AWL	1980	Wingate, Co. Durham
Fridays			
18.30	G3NCZ	1920	Blackburn, Lancs.
19.00	G3LLM	1820	Bath
19.30	G3PWU	1850	Reading, Berks.
20.00	G3LLM	1820	Bath
20.30	G3PED	1920	Goodmayes, Essex
21.00	G3LKT / G3PLQ	1892	Salisbury, Wilts.
21.00	G3PKE	1920	Dorking, Surrey
21.30	G3RZI	1865	Redditch, Worcs.
21.30 †	G3RPW / G3KSS	1900	Pudsey, Yorks. Bradford
22.00	G3LLM	1820	Bath
23.00	GM3HBY	1903	Glasgow
Saturdays			
10.00	G3SQU	1840	Margate, Kent
13.00	G2FXA	1900	Stockton-on-Tees
14.00	GI3JEX	1860	Belfast
20.00	G3KPO	1980	Peterborough
21.00	G3LKT / G3PLQ	1892	Salisbury, Wilts.

†*Alternately*

Can You Help?

● M. J. Fisher, A3485, 64 Caldene Avenue, Mytholmroyd, near Halifax, Yorks., who requires the circuit diagrams and details of crystals needed for 4m for the B44 Mk. 2 transmitter-receiver, and also a copy of the December, 1955, RSGB BULLETIN?

● F. C. Ward, G2CVV, 5 Uplands Avenue, Littleover, Derby, who would like to buy or borrow circuit diagrams of the Canadian Type 52 transmitter-receiver and power supply?

● C. R. Plant, G5CP, 12 Nottingham Drive, Wingerworth, Chesterfield, Derbyshire, who wishes to borrow the circuit diagram of the Hamobile Mk.1/II?

● F. Matimong, CPO's Mess, HMS *Osprey*, Portland, Dorset, who requires information concerning the Hallicrafters Marine Radiophone type HT11B.

● A. W. King, BRS25193, 19 Rosslyn Road, Whitwick, Leicestershire, who requires information on using the US Signal Corps Radio Compass type PL118 as a beam indicator?

● J. V. Pearson, BRS22772, 43 Belle Vue, Wordsley, near Stourbridge, Worcestershire, who would like to hear from any member who has modified the 1·7-3·5 Mc/s HRO coil for band-spread operation on Top Band?

Radio Society of Great Britain

(INCORPORATED 1926)

Patron: H.R.H. THE PRINCE PHILIP, DUKE OF EDINBURGH, K.G.

Application for Corporate Membership

Radio Society of Great Britain,
28 Little Russell Street,
London, W.C.1.

I hereby apply for election as a Corporate Member of the Society and enclose a remittance for £1. 15s. 0d. being the amount of my first annual subscription.

I agree that in the event of my election I will abide by and observe the Rules, Regulations and Articles of Association of the Society and that in the event of my resignation from the Society given under my hand in writing, I shall after payment of all arrears which may be due by me at that period, be free from this obligation. I further agree to observe strictly the terms of any licence issued to me by the responsible authorities to operate transmitting or receiving apparatus.

Date..... *Signed*.....

PERSONAL DETAILS TO BE COMPLETED BY THE APPLICANT

Surname (BLOCK LETTERS).....

Christian Names in full (BLOCK LETTERS).....

Address for all correspondence (BLOCK LETTERS).....

.....

Nationality..... Age (if under 21).....

Current Call-sign (if any).....

Details of previous membership (if any).....

DETAILS TO BE COMPLETED BY THE TWO PROPOSERS

I wish to propose.....for Corporate Membership.

Proposer's Name (BLOCK LETTERS).....

Address (BLOCK LETTERS).....

Call-sign (or BRS No.).....

Signed .....

I wish to propose.....for Corporate Membership.

Proposer's Name (BLOCK LETTERS).....

Address (BLOCK LETTERS).....

Call-sign (or BRS No.).....

Signed.....

FOR OFFICE USE ONLY

Approved by Council .....

BRS Number Issued ..... First Subscription paid .....

Radio Society of Great Britain

NEW RUSKIN HOUSE,
28 LITTLE RUSSELL STREET,
LONDON, W.C.1.

May 6, 1964.

NOTICE IS HEREBY GIVEN that an EXTRAORDINARY GENERAL MEETING of the Society will be held at the Royal Society of Arts, John Adam Street, Adelphi, London, W.C.2, on SATURDAY, JUNE 27, 1964, AT 2.30 P.M. for the purpose of considering and if thought fit to pass the following Resolution which will be proposed as a Special Resolution.

" That the Articles of Association as hereinafter set out on pages (ii)-(viii) be and are hereby adopted as the Articles of Association of the Radio Society of Great Britain in substitution for the present Articles of Association."

A member entitled to attend and vote at the above meeting may appoint a proxy to attend and, on a poll, vote on his behalf. A proxy need not be a member of the Society.

By order of the Council,
John A. Rouse,
Secretary.

Notes (*a*) Forms for the appointment of proxies may be obtained from the General Manager and Secretary, upon request, price 3d. each, post free.

(*b*) The instrument appointing a proxy shall be deposited at the office of the Society not less than 48 hours before the time appointed for holding the meeting.

THE COMPANIES ACTS, 1908 to 1917

AND

THE COMPANIES ACT, 1948.

COMPANY LIMITED BY GUARANTEE AND NOT HAVING A SHARE CAPITAL

Articles of Association

OF

RADIO SOCIETY OF GREAT BRITAIN

(Name of Company altered from "The Incorporated Radio Society of Great Britain" to "Radio Society of Great Britain" by Special Resolution dated the 18th day of December, 1953.)

PRELIMINARY

1. These Articles shall be construed with reference to the provisions of the Companies Act, 1948 (hereinafter referred to as " the Act ") and terms used in these Articles shall be taken as having the same respective meanings as they have when used in the Act. " The Society " means Radio Society of Great Britain, " Secretary " means any person appointed to perform the duties of the Secretary of the Society. The Seal means the Common Seal of the Society.

2. For the purposes of registration the number of members of the Society was declared to be unlimited.

3. The Society is established for the purposes expressed in the Memorandum of Association.

MEMBERSHIP

4. The Society shall consist of Members and Honorary Members (hereinafter together called " Corporate Members ") and Associates.

5. The rights and privileges of every member of any class shall be personal to himself, and, subject to Section 136 of the Act, shall not be transferable or transmissible by his own act, or by operation of law.

6. The Society may admit such persons as may be hereafter qualified and elected in that behalf as Members, Honorary Members and Associates respectively, and the Corporate Members shall sign an agreement in the form contained in the Schedule hereto, or such agreement to the like effect as may from time to time be authorised by the Council.

CORPORATE MEMBERS

7. Candidates to be eligible for election as Corporate Members must be 21 years of age or over or must hold the permission of any competent Authority to install maintain and operate an Amateur Radio Transmitting Station.

ASSOCIATES

8. Candidates to be eligible for election as Associates must be under twenty-one years of age. Associates shall have no vote. On attaining the age of twenty-one years or on obtaining the permission of any competent Authority to install maintain and operate an Amateur Radio Transmitting Station under that age an Associate must apply for transfer to Corporate Membership.

HONORARY MEMBERS

9. Honorary Members shall be persons who have rendered outstanding service to the Society or have made acknowledged eminent contribution to Radio Research, Experimentation or Communication or a related subject and shall be elected by the Council. Honorary Members shall have all the rights and duties of Members except that they shall not have to pay an annual subscription under Article 20 hereof.

THE PRESIDENT

10. The President shall be any Corporate Member who has rendered outstanding service to the Society or who has made acknowledged eminent contribution to Radio Research, Experimentation, Communication or a related subject who is appointed by the Council to fill such office. Upon taking office the President shall forthwith relinquish any other office he may have previously held in the Society and shall be Chairman of the Council and shall serve for a period

of one year from the 1st day of January immediately following his appointment but shall not be eligible to serve as President for two consecutive years. He shall however continue to serve as a Member of the Council for the year following his year of office as President in the office of Immediate Past President. The Council shall publish in the Society's Journal in October of each year the name of the Member appointed to fill the office of President on the first day of January following as aforesaid.

EXECUTIVE VICE-PRESIDENT

11. The Executive Vice-President shall be a Member of the Council other than the President or Immediate Past President who shall be appointed Executive Vice-President at the first Meeting of the Council held after the 1st day of January in each year and shall serve in such capacity until the 31st day of December in such year. Such appointment shall not terminate his membership of the Council nor necessitate his giving up any office he may hold in the Society.

HONORARY TREASURER

12. Any Corporate Member may be appointed Honorary Treasurer provided that he shall have been a Corporate Member for not less than three years immediately prior to the date of his appointment. The Honorary Treasurer shall be appointed by the Council and shall serve for a period of three years from the 1st day of January immediately following his appointment. The retiring Honorary Treasurer shall be eligible for re-appointment.

VICE-PRESIDENTS AND HONORARY VICE-PRESIDENTS

13. Corporate Members who have rendered outstanding services to the Society are eligible to be elected as Vice-Presidents. Distinguished persons shall be eligible for election as Honorary Vice-Presidents.

ADMISSION OF MEMBERS

14. Honorary Members, Vice-Presidents and Honorary Vice-Presidents may be proposed at one meeting and a ballot for their election shall be taken at a subsequent Meeting of the Council and every such election shall be announced at the next Annual General Meeting of the Society. Not more than two Honorary Members may be elected in any one year.

15. Every candidate for election as a Member of the Society shall be proposed by a Corporate Member having personal knowledge of him but if the candidate is unacquainted with a Corporate Member who will propose him the Council may waive the foregoing requirement and as an alternative may require the candidate to furnish a suitable reference in writing from a person of standing by whom he is known.

16. The name of every candidate for election shall be submitted to the Council who shall approve or reject him. The Council may reject any candidate without giving any reason therefor. No entry other than the name, address and date on which his application is considered by the Council shall be made or kept in the records of the Society relating to any candidate whose application is rejected.

17. A candidate whose application is rejected will not be considered again for election within twelve calendar months of the rejection.

18. Every candidate elected to membership shall be notified of his election by the Secretary and such election shall not be effective unless and until the candidate so elected shall have paid his first subscription. The election shall be deemed to have expired unless the first subscription has been paid within three months of the service of notice of election.

TRANSFER FROM ASSOCIATE TO CORPORATE MEMBERSHIP

19. At the discretion of the Council Associates applying for transfer to Corporate Membership may be required to be proposed or to furnish a reference as prescribed by Article 15 hereof. In other respects proposals for transfer shall be dealt with by the Council in the manner prescribed herein in respect of candidates for Corporate Membership.

SUBSCRIPTIONS & RESIGNATION OF MEMBERS

20. The annual subscription shall be £2 10s. 0d. for Corporate Members and £1 5s. 0d. for Associates or such lesser sums as the Council may from time to time decide. Any increase in such maximum subscriptions shall be made only by a Special Resolution of the Society.

21. Subscriptions shall be paid annually in advance. The first payment shall be due on election and subsequent payments shall be due on the first day of the month in which the Member was elected in each year.

22. Every member of the Society desiring to resign from membership shall give notice thereof in writing to the Society addressed to the Secretary and shall be liable for all subscriptions due up to the receipt of such notice by the Society.

23. No member whose subscription is in arrear shall be entitled to receive notice of or to attend or take part in the meetings or other activities of the Society, neither shall he be entitled to nominate any person to serve on the Council or in any other capacity, or to propose any candidate for election to membership, or to vote at any meeting of the Society or upon any ballot. Any member who is three months or more in arrear with his subscription shall be deemed to forfeit his claim to membership and to all the privileges thereof, and it may be recorded in the Register of Members by order of the Council that his membership has been terminated but he shall, nevertheless, continue liable to pay the arrears of subscription due at the time of such termination. Notwithstanding anything in these Articles, the Council shall have the power to waive for a period of twelve months or longer, the subscription of any Corporate Member or applicant for membership who suffers from blindness or other disability, provided that the resolution so to waive the subscription is unanimously approved at a meeting of the Council.

The Council shall have power to reinstate any person whose membership has been terminated.

LIFE MEMBERSHIP

24. At any time after having been a Corporate Member of the Society for five consecutive years, a Member may, subject to the approval of the Council, commute all future annual subscriptions by a payment of Thirty Pounds, or such other sum as may from time to time be determined by Special Resolution. Such payment shall entitle such Member to all the privileges and rights of Corporate Membership, for the remainder of his life, subject to Article 25 hereof.

EXPULSION

25. At a meeting specially convened for the purpose, the Council may expel any Corporate Member or Associate who shall have acted wilfully in contravention of these Articles, or who shall, in the opinion of the Council, have been guilty of such conduct as shall have rendered it undesirable in the interests of the Society that he should continue a Corporate Member or Associate thereof, and the Council may remove from the Register of Members the name of any person who is expelled and any person so expelled shall not be entitled to have returned to him any moneys paid by him as entrance fee, subscriptions, life composition, or otherwise. No motion for expulsion shall be put to a Meeting of the Council unless three fourths of the Council Members are present and unless three fourths of such Council Members present vote in favour of expulsion the motion shall be lost. No person shall be expelled unless and until he has been given reasonable notice of the meeting at which his expulsion is to be proposed and is afforded a proper opportunity of being heard at such meeting in his own defence. No motion for expulsion shall be for more than one person but there is no limit to the number of motions for expulsion which can be proposed at any meeting of the Council.

COMPOSITION OF COUNCIL

26. The affairs of the Society shall be managed by the Council which shall consist of the President, the Immediate Past President, the Honorary Treasurer and not exceeding fifteen Ordinary Members of whom not more than seven shall be elected on a zonal basis. The zones and zonal boundaries shall be determined by the Council and may be changed from time to time.

27. No Member shall be eligible for election as a Council Member, other than as President, until he shall have been a Corporate Member for not less than three years immediately prior to the date of his nomination. All Council Members except the President and Immediate Past President shall serve for three consecutive years commencing on the 1st January following the Annual General Meeting at which they are elected. A Retiring Council Member not excluding the Immediate Past President, shall be eligible for re-election provided he complies with this Article.

28. The Council shall have power at any time and from time to time to appoint any qualified person to be a Council Member but so that the total number of Council Members shall not exceed the number fixed in accordance with these Articles. Any Council Member so appointed shall hold office only until the 31st December next and shall be eligible for re-election at the Annual General Meeting immediately preceding such date subject to Articles 52 to 54 hereof. The Council may make at any time an appointment to fill a casual vacancy in the office of—

(a) the Honorary Treasurer; any corporate member so appointed shall hold office only until the 31st December next and shall be eligible for re-appointment in accordance with Article 12;

(b) the Executive Vice-President in accordance with Article 11;

(c) the President; notwithstanding the provisions of Article 10 any person so appointed shall be eligible for re-appointment to that office for the ensuing calendar year.

MEETINGS

29. An Annual General Meeting shall be held in December of each year at such time and place as the Council shall fix and shall be specified as such in the notice calling it. All other General Meetings shall be called Extraordinary General Meetings.

30. The Council may convene whenever it thinks fit an Extraordinary General Meeting and Extraordinary General Meetings shall also be convened on such requisition, or, in default, may be convened by such requisitionists, as provided by Section 132 of the Act subject to Article 31 hereof.

31. The Council shall call an Extraordinary General Meeting on the requisition of not fewer than 500 Corporate Members or Corporate Members representing 5 per cent of the total voting rights of all the members then entitled to vote whichever is the smaller number. The provisions of Section 132 of the Act shall apply and be observed, subject to the variation involved in the foregoing provisions of this Article.

32. At an Extraordinary General Meeting no business other than that specified in the Notice calling the Meeting shall be transacted.

33. At least twenty-one days clear notice of the time and place of every General Meeting and of the general nature of the business to be transacted shall be given in writing to every Corporate Member of the Society who is entitled under these Articles to receive notices from the Society. No business other than routine business shall be taken at any Meeting without such a notice.

34. The Chair at a General Meeting or Meeting of the Council shall be taken by the President or, in his absence, by the Executive Vice-President. In the absence of the President and the Executive Vice-President, the Chair shall be taken by any Council Member present who is selected by the members present. Failing these (in a case other than a Meeting of the Council) the members present may elect any Corporate Member as Chairman.

35. No business shall be transacted at any General Meeting unless a quorum is present when the meeting proceeds to business. Save as herein otherwise provided fifty Corporate Members personally present shall be a quorum.

36. If within half an hour from the time appointed for the holding of a General Meeting a quorum is not present, the meeting, if convened on the requisition of members, shall be dissolved. In any other case it shall stand adjourned to the same day in the

next week, at the same time and place, or at such other place as the Council may determine, and if at such adjourned meeting a quorum is not present within half an hour from the time appointed for holding the meeting the Corporate Members present shall be a quorum.

37. With the consent of any meeting at which a quorum is present (and if so directed by the meeting) the Chairman shall adjourn a meeting from time to time, and from place to place, but no business shall be transacted at any adjourned meeting other than business which might have been transacted at the meeting from which the adjournment took place. Whenever a meeting is adjourned for thirty days or more, notice of the adjourned meeting shall be given in the same manner as of an original meeting. Save as aforesaid, the members shall not be entitled to any notice of an adjournment, or of the business to be transacted at an adjourned meeting.

38. At any General Meeting a resolution put to the vote of the Meeting shall be decided on a show of hands unless a poll is (before or on the declaration of the result of the show of hands) demanded—

(a) by the Chairman; or
(b) by at least five Corporate Members present in person or by proxy; or
(c) by a Corporate Member or Corporate Members present in person or by proxy and representing one tenth of the total voting rights of all the members having the right to vote at the Meeting.

Unless a poll be so demanded a declaration by the Chairman that a resolution has on a show of hands been carried, or carried unanimously, or by a particular majority, or lost, or not carried by a particular majority, and an entry to that effect in the book containing the Minutes of the proceedings of the Society shall be conclusive evidence of the fact without proof of the number or proportion of the votes recorded in favour of or against such resolution. The demand for a poll may be withdrawn.

39. Subject to the provisions of the next following Article if a poll be demanded in manner aforesaid, it shall be taken at such time and place, and in such manner, as the Chairman of the Meeting shall direct, and the result of the poll shall be deemed to be the resolution of the meeting at which the poll was demanded.

40. No poll shall be demanded on the election of a Chairman of a meeting, or on any question of adjournment.

41. In the case of an equality of votes, whether on a show of hands or on a poll, the Chairman of the Meeting shall exercise a second or casting vote.

42. The demand of a poll shall not prevent the continuance of a meeting for the transaction of any business other than the question on which a poll has been demanded.

VOTES OF MEMBERS

43. Subject as herein provided, every Corporate Member shall have one vote.

44. Save as herein expressly provided, no member other than a Corporate Member duly registered, who shall have paid every subscription and other sum (if any) which shall be due and payable to the Society in respect of his membership shall be entitled to vote on any question either personally or by proxy, or as a proxy for another member, at any General Meeting, or upon any ballot.

45. Votes may be given on a poll either personally or by proxy. On a show of hands a member present only by proxy shall have no vote. A proxy need not be a member.

46. The instrument appointing a proxy shall be in writing under the hand of the appointer or his attorney duly authorised in writing.

47. The instrument appointing a proxy and the power of attorney or other authority (if any) under which it is signed or a notarially certified or office copy thereof shall be deposited at the registered office of the Society, not less than forty-eight hours before the time appointed for holding the meeting or adjourned meeting at which the person named in the instrument proposes to vote, or in the case of a poll not less than twenty-four hours before the time appointed for the taking of the poll, and in default the instrument of proxy shall not be treated as valid. No instrument appointing a proxy shall be valid after the expiration of twelve months from the date of its execution.

48. A vote given in accordance with the terms of an instrument of proxy shall be valid notwithstanding the previous death or insanity of the principal or revocation of the proxy or of the authority under which the proxy was executed, provided that no intimation in writing of the death, insanity or revocation as aforesaid shall have been received at the registered office before the commencement of the meeting or adjourned meeting at which the proxy is used.

49. Any instrument appointing a proxy shall be in the following form as or near thereto as circumstances will admit:—

" Radio Society of Great Britain,
" I,
" of
" a member of the above-named Society
" hereby appoint
" of
" and failing him,
" of
" to vote for me and on my behalf at the (Annual
" or Extraordinary, or Adjourned, as the case
" may be) General Meeting of the Society to be
" held on the day of
" and at every adjournment thereof.
" As witness my hand this day of , 19 "

50. The instrument appointing a proxy shall be deemed to confer authority to demand or join in demanding a poll.

51. An attendance book shall be kept, which all members shall be required to sign when attending General Meetings of the Society.

NOMINATIONS FOR ELECTION TO THE COUNCIL

52. Not later than the 10th September in each year the Council shall send to each member entitled to vote a list of the duly qualified members whom the Council have nominated to fill the vacancies in the Council which will occur on the following 31st December other than the President and Zonal Representatives but including the Honorary Treasurer if he is due to retire.

53. After the issue of the Council's list of members

nominated and not later than the 10th October following any ten Corporate Members other than Members of the Council may nominate any duly qualified member, other than those nominated by the Council, by delivering in one closed envelope their respective nominations in writing addressed to the Secretary, together with the written consent of such member to accept office if elected but each such nominator shall be entitled to nominate only one member for election at each Annual General Meeting.

54. Candidates for zonal representation must be resident within the zone for which they are nominated and the nominators must be Corporate Members resident in that zone provided that where the office of Zonal Representative has become vacant otherwise than under Article 27 hereof the Council shall have power to fill the vacancy within the terms of Article 28 hereof subject to the aforesaid restriction on the residence of the candidate for zonal representation.

BALLOT FOR ELECTION TO THE COUNCIL

55. If any nomination in accordance with Article 53 hereof has been made, then and only then, and not later than 14 days before the date of the Annual General Meeting the Council shall send to each Corporate Member entitled to vote a ballot paper in accordance with Article 85 hereof, containing the names of all members duly nominated. Accompanying such ballot paper shall be a statement, stating which persons are nominated by the Council and setting out the names of the Members by whom every other person is nominated.

56. The ballot papers for Council elections shall provide a space in line with the name of each candidate thereon and each Corporate Member voting shall place a cross in the space against the name of each candidate for whom he desires to vote but so that the number of names so marked with a cross shall not in any case exceed the number of names to be elected to the respective offices. The ballot papers, marked as determined by the Council from time to time, shall be returned so as to reach the Secretary not later than seven days before the date fixed for the Annual General Meeting. In the ballot for Zonal Representatives no Member shall vote for more than one zonal candidate and both voter and the candidate for whom he votes shall be resident in the same zone.

57. Each Corporate Member may vote for fewer candidates than there are vacancies to be filled. Any ballot paper which does not comply with all the requirements of this and the preceding Article shall be null and void.

58. At any Annual General Meeting, the Members present shall choose a panel of ten Corporate members from whom the Council shall select by drawing by lot three scrutineers for the purposes of any ballot that may be held for the appointment of Council Members at the next following Annual General Meeting. The scrutineers selected shall at that time be Corporate Members who have the right to vote. No candidate for election shall be a scrutineer. The ballot papers shall be delivered unopened by the Secretary to the scrutineers, who shall open them and count the votes and report the result to the President or Chairman before the hour fixed for the Annual General Meeting.

59. In the event of the scrutineers being unable to report the election of the prescribed number of persons to fill the vacancies in the Council owing to an equality of votes, they shall submit the names of the candidates having the same number of votes to the Chairman of the Annual General Meeting who shall determine by his casting vote or votes which candidate or candidates having equality of votes shall be elected.

60. The Chairman of the Annual General Meeting shall announce the result of the ballot at the Annual General Meeting and declare the new members of the Council duly elected.

MEETINGS OF THE COUNCIL

61. The affairs of the Society shall be managed by the Council who may exercise all such powers of the Society as are not required, by the Act or by these Articles, to be exercised by the Society in General Meeting, subject, nevertheless, to any of these Articles, to the provisions of the Act and to such regulations, being not inconsistent with the Articles or provisions, as may be prescribed by the Society in General Meeting; but no regulation made by the Society in General Meeting shall invalidate any prior act of the Council which would have been valid if that regulation had not been made.

62. The Council may from time to time and at any time by Power of Attorney appoint any Company Firm or person or body of persons, whether nominated directly or indirectly by the Council to be the Attorney or Attorneys of the Society for such purposes outside the United Kingdom and with such powers authorities and discretions (not exceeding those vested in or exercisable by the Council under these Articles) and for such period and subject to such conditions at the Council may think fit, and any such Powers of Attorney may contain such provisions for the protection and convenience of persons dealing with any such Attorney as the Council may think fit and may also authorise any such Attorney to delegate all or any of the powers authorities and discretions vested in him.

63. Meetings of the Council shall be summoned by the Secretary or acting Secretary under the direction of the President or any three Members of the Council. The quorum necessary for the transaction of the business of the Council shall be seven except for the requirement of Article 25 hereof.

64. The Council may meet together for the despatch of business, adjourn and otherwise regulate their meetings as they think fit. They shall meet at least twelve times a year with not more than seven weeks between two consecutive meetings.

65. Questions arising at any Meeting of the Council shall be determined by a majority of the votes of the members present, and in the case of an equality of votes the Chairman shall have a second or casting vote.

66. Any Member of the Council who shall be personally concerned in a question under consideration shall declare his interest and shall retire during the discussion and determination of the same and shall not vote thereon.

67. If at any Meeting of the Council business be introduced of which notice has not been given either

at the previous Meeting of the Council or in the notice calling the Meeting, any Member present shall be entitled to require that no vote or decision shall be taken on such business until the next Meeting of the Council; but subject as aforesaid any business may be transacted at a Meeting of the Council without notice of such business having been given.

68. A Meeting of the Council at which a quorum is present shall be competent to exercise all the authorities, powers and discretions by or under the regulations of the Society for the time being vested in the Council generally.

69. The Council may delegate any of their powers to committees consisting of such member or members of the Council and/or Corporate Members as they think fit, and any committee so formed shall, in the execution of the powers so delegated, conform to any regulations imposed on it by the Council. The meetings and proceedings of any such committee shall be governed by the provisions of these presents for regulating the meetings and proceedings of the Council so far as applicable and so far as the same shall not be superseded by any regulations made by the Council as aforesaid.

70. All acts bona fide done by any meeting of the Council or of any committee of the Council, or by any person acting as a Member of the Council, shall, notwithstanding it be afterwards discovered that there was some defect in the appointment or continuance in office of any such member or person acting as aforesaid, or that they or any of them were disqualified, be as valid as if every such person had been duly appointed or had duly continued in office and was qualified to be a member of the Council.

71. The Council shall cause proper minutes to be made of all appointments of officers made by the Council and of the proceedings of all meetings of the Society and of the Council and of committees of the Council, and all business transacted at such meetings, and any such minutes of any meeting, if purporting to be signed by the Chairman of such meeting, or by the Chairman of the next succeeding Meeting, shall be sufficient evidence without any further proof of the facts therein stated.

72. The Members for the time being of the Council may act notwithstanding any vacancy in their body, provided always that if at any time the number of members of the Council shall be or be reduced below seven, the members for the time being may act for the purpose of filling vacancies in their body or of summoning a general meeting of the Society but for no other purpose.

73. A resolution in writing signed by all the Members for the time being of the Council or of any committee of the Council who are duly entitled to receive notice of a Meeting of the Council or of such committee shall be as valid and effectual as if it had been passed at a Meeting of the Council or of such committee duly convened and constituted.

BORROWING POWERS

74. The Council may exercise all the powers of the Society to borrow money, and to mortgage or charge its property or any part thereof and to issue debentures, debenture stock, and other securities whether outright or as security for any debt, liability or obligation of the Society or of any third party.

DISQUALIFICATION OF MEMBERS OF THE COUNCIL

75. The office of Member of the Council shall be vacated if the Member of the Council—

(a) would cease to be a Director by virtue of Section 185 of the Act; or
(b) becomes bankrupt or makes any arrangement or composition with his creditors generally; or
(c) becomes prohibited from being a Director by reason of any order made under Section 188 of the Act; or
(d) becomes of unsound mind: or
(e) resigns his office by notice in writing to the Society; or
(f) shall have been absent for more than six months without permission of the Council from meetings of the Council held during that period; or
(g) shall be requested in writing to resign by all the other Members of the Council; or
(h) is removed from office by a resolution duly passed pursuant to Section 184 of the Act; or
(i) who is a Zonal Representative has removed his residence outside the zone for which he is the representative; or
(j) ceases to be a Corporate Member.

SECRETARY

76. The Secretary shall be appointed by the Council for such term, at such remuneration and upon such conditions as the Council may think fit; and any Secretary so appointed may be removed by them. The Council may also appoint an assistant, temporary, or acting Secretary who may act in place of the Secretary during a vacancy in the office of Secretary or if the Secretary is ill or otherwise absent from his office.

77. No person who is a member of the Council shall be appointed to hold office as Secretary, Assistant Secretary, Temporary Secretary or Acting Secretary.

THE SEAL

78. The Council shall provide for the safe custody of the seal which shall only be used by the authority of the Council or of a committee of the members of the Council authorised by the Council in that behalf and every instrument to which the seal shall be affixed shall be signed by a Member of the Council and shall be countersigned by the Secretary or by a second member of the Council or by some other person appointed by the Council for the purpose.

ACCOUNTS

79. The Council shall cause proper books of account to be kept with respect to:—

(a) all sums of money received and expended by the Society and the matters in respect of which such receipts and expenditure take place;
(b) all sales and purchases of goods by the Society; and
(c) the assets and liabilities of the Society.

Proper books shall not be deemed to be kept if there are not kept such books of account as are necessary to give a true and fair view of the state of the affairs of the Society and to explain its transactions.

80. The books of account shall be kept at the office, or, subject to Section 147 (3) of the Act, at such other place or places as the Council shall think fit, and shall always be open to inspection by Members of the Council.

81. The Society in General Meeting may from time to time impose reasonable restrictions as to the time and manner of the inspection of some or all of the accounts and books of the Society by the members, other than Members of the Council, and subject to such restrictions the accounts and books of the Society shall be open to the inspection of such members at all reasonable times during business hours.

82. At the Annual General Meeting in every year the Council shall lay before the Society a proper income and expenditure account for the period since the last preceding account made up to a date not more than six months before such meeting, together with a proper balance sheet made up as at the same date. Every such balance sheet shall be accompanied by proper reports of the Council and the Auditors, and copies of such account, balance sheet and reports (all of which shall be framed in accordance with any statutory requirements for the time being in force) and of any other documents required by law to be annexed or attached thereto or to accompany the same shall be sent not less than twenty-one clear days before the date of the meeting to the Auditors and to all other persons entitled to receive notices of General Meetings in the manner in which notices are hereinafter directed to be served. The Auditors' report shall be open to inspection and be read before the Society in General Meeting as required by Section 162 of the Act.

AUDIT

83. At least once in every year the accounts of the Society shall be examined and the correctness of the income and expenditure account and balance sheet ascertained by one or more properly qualified Auditor or Auditors.

84. Auditors shall be appointed and their duties regulated in accordance with Sections 159 to 162 of the Act, the members of the Council being treated as the Directors mentioned in those sections.

NOTICES

85. A Notice or any other document may be served or sent by the Society upon or to any member either personally or by sending it through the post in a separate prepaid letter, or enclosed with or incorporated in the Society's Journal in a prepaid envelope or wrapper, addressed to such member at his registered address as appearing in the Register of Members.

86. Any member described in the Register of Members by an address not within the United Kingdom, who shall from time to time give the Society an address within the United Kingdom at which notices may be served upon him or other documents sent to him shall be entitled to have notices served upon him and other documents sent to him at such address, but, save as aforesaid and as provided by the Act, only those members who are described in the Register of Members by an address within the United Kingdom shall be entitled to receive notices and other documents from the Society.

87. Any notice, if served by post, shall be deemed to have been served 24 hours after the letter containing the same is posted, and in proving such service it shall be sufficient to prove that the letter containing the notice was properly addressed and posted as a prepaid letter.

INVESTMENTS OF THE SOCIETY

88. Such of the moneys of the Society as shall not be required for the immediate purposes thereof may be invested from time to time by the Council (either in the name of the Society or in the name or names of such person or persons on behalf of the Society as the Council may from time to time appoint) in any manner authorised by the Trustee Investments Act 1961 or in any security that may be approved by the Society in General Meeting or may be placed on deposit with the Society's Bankers; with power to vary such investments for others of like nature within the limits imposed above, provided that such moneys shall only be invested subject to such conditions (if any) and such consents (if any) as may for the time being be prescribed by law.

AFFILIATED SOCIETIES

89. The Council may admit other Societies interested in Radio Research, Experimentation, Communication or related subjects to such privileges of affiliation to the Society as shall be laid down by the Council from time to time.

90. The annual subscriptions to be paid by such Societies shall be fixed by the Council and recorded in its Minutes and a copy thereof shall be supplied to such Societies.

91. After due notification an affiliated Society which is three months in arrear with its annual subscription may be dis-affiliated by order of the Council but shall remain liable for the arrears of subscriptions.

WINDING UP

92. Clause 9 of the Memorandum of Association of the Society relating to the winding up and dissolution of the Society shall have effect as if the provisions thereof were repeated in these Articles.

THE SCHEDULE

I, the undersigned, agree that in the event of my election to Membership of the Radio Society of Great Britain, I will be governed by the Memorandum and Articles of Association of the Society and the rules and regulations thereof as they now are or as they may hereafter be altered; and that I will advance the objects of the Society so far as may be in my power; providing that whenever I shall signify in writing to the Society addressed to the Secretary that I am desirous of withdrawing from the Society I shall at the end of one year thereafter after the payment of any arrears which may be due by me at that period be free from my undertaking to contribute to the assets of the Society in accordance with Clause 8 of the Memorandum of Association of the Society.

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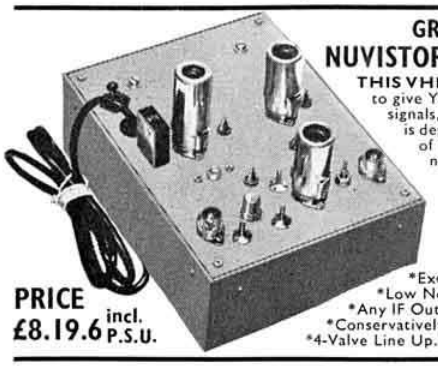

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