

R S G B



BULLETIN

OCTOBER 1964

VOL. 40, No. 10

RSGB INTERNATIONAL



RADIO COMMUNICATIONS EXHIBITION

OCTOBER 28-31, 1964

JOURNAL OF THE RADIO SOCIETY OF GREAT BRITAIN

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Radio Communications Exhibition

SEYMOUR HALL, LONDON, W.1. OCTOBER 28-31 1964, 10 a.m. to 9 p.m. daily

Offers of Equipment for Display

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

Competitions for Amateur Constructed Equipment

On the opening day of the Exhibition, several competitions for amateur constructed equipment will be judged. Members intending to enter any of these competitions must notify the Honorary Secretary of the Exhibition Committee, with details. Equipment already offered for display is automatically entered in the appropriate contests, with the exception of (d) below, where a specific entry must be received by the Exhibition Committee Secretary, together with the required declaration. Please note that all items for display or judging must be notified to the Exhibition Committee by *Friday, October 23*. No offers of equipment can be accepted after this date. All equipment for display or judging must be in the Exhibition Hall by 9.30 a.m. on Wednesday, October 28, or delivered to Headquarters by Friday, October 23rd.

Details of the various contests are given below:

- (a) **Horace Freeman Trophy**
The Horace Freeman Trophy will be awarded to the most original piece of equipment on show. Judging will be carried out by members of the Society's Technical Committee.
- (b) **Exhibition Organizer's Plaque**
A Silver Plaque awarded by the Exhibition Organizer, Mr. P. A. Thorogood, G4KD, will be presented for the best piece of equipment on show.
- (c) **"Other Regions Award"**
For the best exhibits by members residing outside Region 7, two prizes of vouchers to the value of ten and five guineas.
- (d) **Special Award for "Amateur" Amateurs**
A special award of a voucher for five guineas will be made for the best piece of Home Constructed Equipment entered by a member who is not, nor has been, employed in the radio or electronics industry. Entrants will be required to sign a declaration to the effect that they are not and never have been employed in the radio or electronics industry, that the item was constructed at their home, and that the design and construction is entirely their own work. It is emphasized that the smartest (in appearance) exhibit may not necessarily win the award.

Judging

Judging for items (b), (c) and (d) will be carried out by an "ad hoc" panel of members of the Exhibition Committee, who are not eligible to enter any of the competitions.

Junior Constructors' Competition

A new venture for this year's Exhibition will be the Junior Constructors' Competition to be arranged by the

Society's Education Committee. Entries for this competition will be in two sections, one for those under 16 years of age, and one for those between 16 and 21 years of age; and may consist of any type of home-built radio or electronic equipment. In addition, it is proposed to award a special prize for the most outstanding article or essay submitted to the judges by a person under sixteen years of age: the subject matter should be connected with radio or electronics.

Entries *only* for all junior competitions should be submitted via the Honorary Secretary of the Exhibition Committee at the address below by Friday, October 23. Equipment *must* be sent to RSGB Headquarters by the same date.

General

It will considerably assist Headquarters staff and members of the Exhibition Committee if those sending equipment for the show will bear the following points in mind:

- (i) Please pack equipment in an adequate manner to avoid damage.
- (ii) Please clearly mark all packages EXHIBITION.
- (iii) Please clearly label all equipment with your name and address, preferably on the base, under lid, or in some other position which will not require removal for display purposes.

When submitting entries, *please* give a brief description of your equipment, together with overall dimensions, to assist in planning the display.

The name and address of the Honorary Secretary of the Exhibition Committee is R. G. B. Vaughan, G3FRV, 9 Hawkins Road, Tilgate, Crawley, Sussex.

Exhibition Stations

During the period of the Exhibition two RSGB stations will be operating from the Seymour Hall, and contacts with members will be most welcome.

GB3RS will operate on 80/160m between 11.00 GMT and 20.00 GMT daily.

GB2VHF will operate on 4 and 2m, and on 70cm between 10.00 GMT and 21.00 GMT, depending on conditions and activity.

RTTY demonstration will be given by E. W. Yeoman, G3IIR, and other members of the BARTG, using 3.5 Mc/s and 144 Mc/s.

Please note that neither station will engage in multi-way QSO's, and stations are asked not to use break-in.

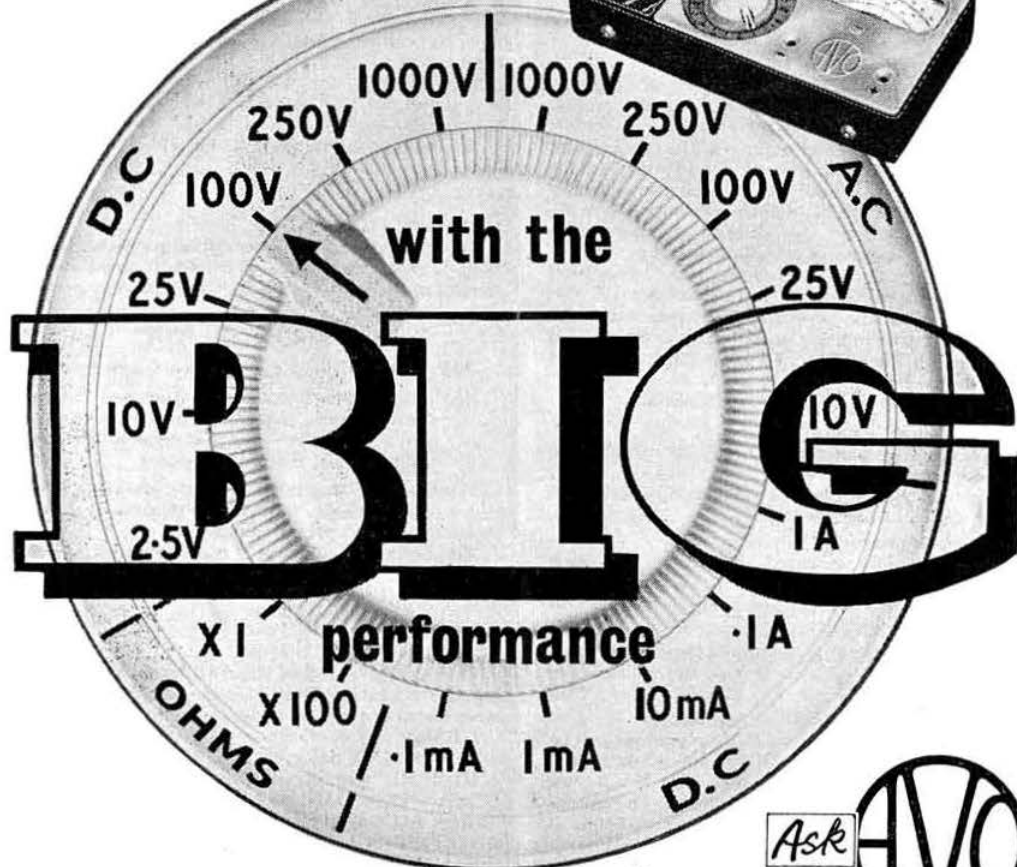
Contests Committee

During most of the Exhibition period, a member of the Contests Committee will be on the RSGB stand to answer questions and discuss members' suggestions concerning the many contests organized by the Society.

RSGB Council

During Exhibition hours, at least one member of Council will be available on the RSGB Stand to answer questions from members.

The little instrument



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Volume 40 No. 10

October 1964

3/- Monthly

RSGB BULLETIN

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The RSGB Bulletin is published on the first Wednesday in each month by the Radio Society of Great Britain as its official journal and sent to all members. © Radio Society of Great Britain, 1964.
The closing date for copy for the December issue is November 6.

GREEN &

NEW S.S.B EQUIPMENTS!

20-2

Green & Davis 20-2 transverter 2 metre single side-band adapter-converts, 14 megacycle sideband to 144 mc/s for use with both transceivers and separates.



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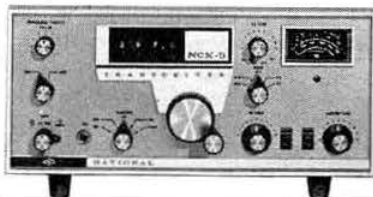
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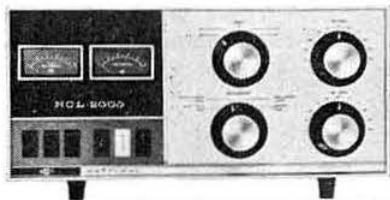
NCX-5

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RG-1



GC-1U



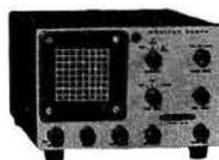
RA-1



DX-100U

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HW-12E



SB-400E



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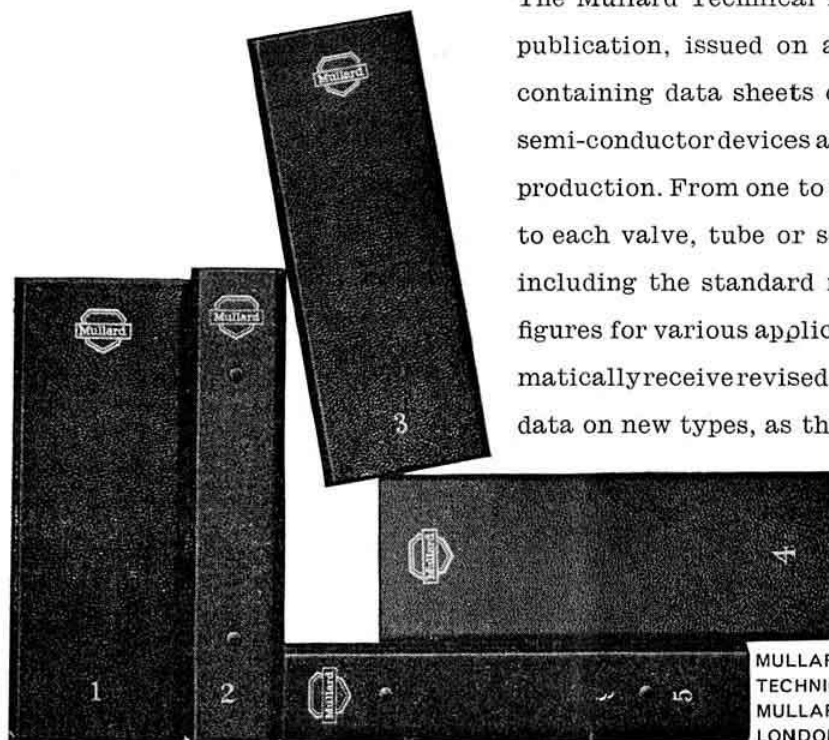
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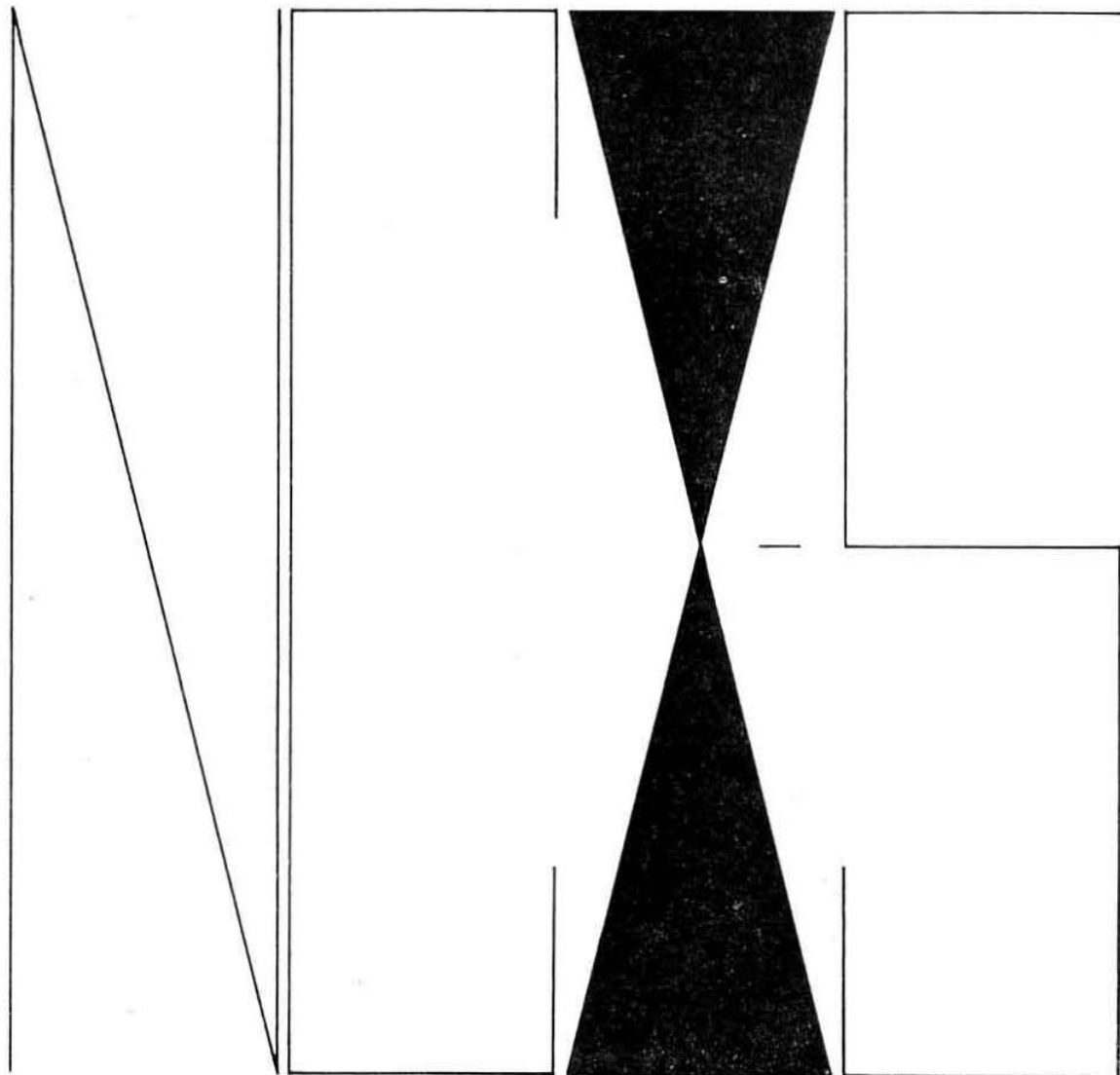


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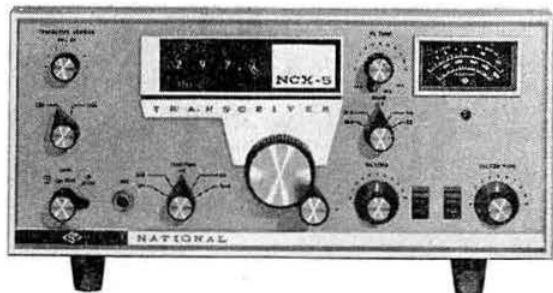
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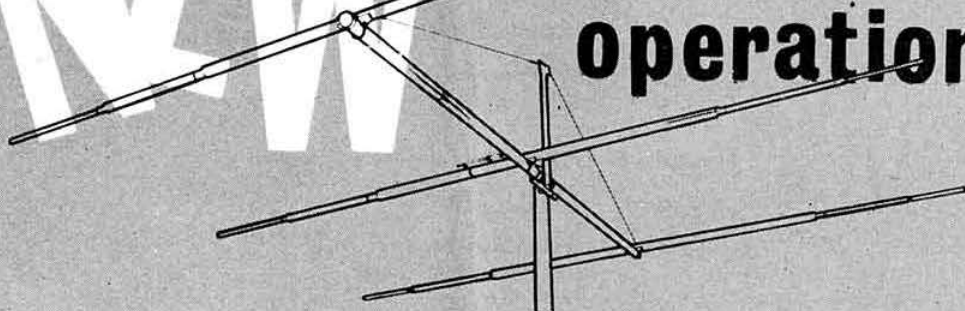
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Current Comment

discusses topics of the day



The Search for a New Headquarters

MEMBERS who visit the Society's present offices at Little Russell Street need no convincing of the urgent necessity to obtain larger premises to house the expanding work of Headquarters, not only in dealing with the steadily rising membership, but also with the increased publishing and book selling activities. The Council, in particular, is painfully aware of the position, as are the full-time staff who work in very cramped conditions.

The search for the new premises so necessary has been going on for some considerable time and we are aware from correspondence with members in all parts of the country that many people are under the impression that nothing is being done. This is of course quite untrue: as we pointed out in the December, 1963, issue of the BULLETIN, many potentially suitable properties have been inspected but for one reason or another have not, on closer investigation, proved quite what the Society requires.

Last month, however, a most desirable property in Palace Street, Westminster, came on the market and by every test seemed at last to be the answer to our quest for new quarters. Structurally it was sound, in all respects excellent, and, unlike so many others the Society has considered, planning permission for continued use as offices existed.

Of course, there was a snag: the property in question was to be auctioned. Professional valuation suggested that the price was likely to be out of the reach of the Society. Nevertheless, it seemed worthwhile to attend the sale and to try to obtain the building. At a special meeting of the Council very careful consideration was given to all the factors involved, and the President was authorised to bid up to £40,000.

At the auction, the President, accompanied by several other members of the Council, joined in the bidding and at £37,500 hopes rose high: it looked as though the Society had a new headquarters. At the very last moment, however, the auctioneer received another bid and a few minutes later the property was sold for just over £3,000 more than the limit set by the Council.

The search continues.

Let's meet at the Show

EVERY year at this time the BULLETIN gives a good deal of publicity to the RSGB International Radio Communications Exhibition. This year is no exception and full details and a preview will be found on pages 617 and 671.

In the past, one of the points we have made is that the Exhibition is a good deal more than just a display of equipment and new materials of the hobby of

Amateur Radio. It is also the greatest annual gathering of radio enthusiasts in the United Kingdom, combining in four days the advantages of a convention and an exhibition.

An important innovation of the show, which is to be opened at the Seymour Hall, London, on October 28, by Mr. E. D. Whitehead, will be the presence of members of the Council to meet members to discuss matters of RSGB and Amateur Radio interest. Representatives of the Contests Committee have also bravely volunteered to be on hand to deal with questions relating to the most controversial of amateur activities. Members of the Headquarters staff, too, will be there to meet members old and new.

Let's meet at the Show!

New Publications

EXHIBITION time is traditionally the time for the appearance of new Society publications. This year three are in preparation: the 1965 edition of the *RSGB Amateur Radio Call Book*, the first edition of the *Amateur Radio Circuits Book* and *S.S.B. Equipment*.

The 1965 *Call Book* will be the largest so far and will reflect more than 3,000 changes since the 1964 edition was published a year ago. New calls account for over 800 additions and changes of address for more than 1,200 alterations. The remainder refer to cancelled and re-issued calls. A copy of this issue of the *Call Book* will indeed be a necessity in every shack. It will be available, price 5/- (by post 5/6) from Headquarters and the Society's stand at the RSGB International Radio Communications Exhibition from October 28.

The *Amateur Radio Circuits Book* is a collection of circuits compiled by George Jessop, G6JP, who was responsible for the popular *Radio Data Reference Book* published two years ago. It is being specially bound to lie flat wherever it is opened. *S.S.B. Equipment* is a reprint of the articles describing the G2DAF S.S.B. Transmitter Mk 2 with the addition of a considerably condensed description of the G2DAF Linear Amplifier.

All three publications reflect the Society's continued policy of providing members with essential information inexpensively.

London Lecture Meeting
Friday, November 27, 1964, at 6.30 p.m.

"MOONBOUNCE"

By P. K. Blair, G3LTF

in the

Faraday Room,

Institution of Electrical Engineers,
Savoy Place, Victoria Embankment,
London, W.C.2.

Wavemeter, Field Strength Meter and Monitor

for 1.5 Mc/s to 150 Mc/s

By PAUL HARRIS, G3GFN *

As transmitters become progressively smaller, the faithful wavemeter, so essential when making preliminary adjustments, seems to become increasingly large and cumbersome, and at times cannot be easily coupled to the circuit under test. The design to be detailed provides a solution to this problem.

Ideally, a wavemeter should not impose any load on the circuit being investigated, and in addition, the distance between the wavemeter and the circuit should be such that it does not cause, by virtue of its proximity, capacity to be added to that circuit. As the frequency increases so these requirements gain importance.

When working with solid state devices not only does the physical size of a standard absorption wavemeter make

related to the Q of the circuit (see Appendix A). The greater the Q , the higher the voltage. Since current is virtually excluded, its resistive impedance at resonance must be quite high (see Appendix B). The metering circuit, on the other hand is a current operated device, and as such is low impedance. Connecting the metering system directly across the tuned circuit as in Fig. 1(a) is bound, therefore, to load the tuned circuit heavily to the detriment of its Q (see Appendix C). It will be seen that where the unloaded Q of a parallel tuned circuit is 100, when a metering circuit with a sensitivity of 1000 ohms/V—set to the 1V range—is connected across it, the Q drops to 4.

As the sharpness of the tuning, and hence the frequency discrimination of a wavemeter, is directly related to the Q of the tuned circuit, the first disadvantage of the arrangement of Fig. 1(a) is that the tuning becomes unacceptably broad. Fig. 2 illustrates this point particularly well. Secondly, and again due to the loss of Q , tight coupling between absorption wavemeter and the circuit under test is needed to produce acceptable deflection unless the circuit being checked is handling appreciable power.

What becomes apparent from Appendix D is that as the meter sensitivity is increased, so the situation steadily improves. However, short of using a valve voltmeter, it is never particularly good.

A considerable improvement in the accuracy and sensitivity of a wavemeter may be secured by using the circuit of Fig. 1(b). In this a separate winding L_B feeds the rectifier-meter system, and this removes, to a large extent, the loading effects which are apparent with Fig. 1(a). Since current is drawn from the winding L_B to operate the meter circuit, and L_B is coupled to L_A , the tuned circuit $L_A C$ still experiences some loading. This is inevitable. However it is substantially less than in the case of Fig. 1(a) and the

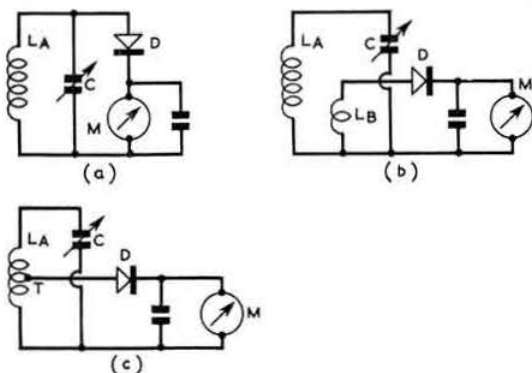


Fig. 1. Basic wavemeter circuits.

correct coupling difficult to achieve, but, due to the very low power levels normally found in such equipment, even the most sensitive meter indicator rarely produces adequate deflection—if any at all.

Since the absorption wavemeter is a passive device which draws power for its operation from the circuit under test, the "ideal" conditions can never be realised. The best that can be done is to use a wavemeter which requires only minimal power to produce acceptable deflection of its indicator, and to ensure that the lightest coupling is employed between the wavemeter and the circuit being checked.

Basic Wavemeter Circuits

Fundamentally all wavemeters are related to the circuit of Fig. 1(a) which consists of a simple parallel tuned circuit $L_A C$ across which is connected a rectifier and meter in series. While this works, it has two serious disadvantages.

When a parallel tuned circuit is at resonance, it is voltage which is present across its terminals, the value of which is

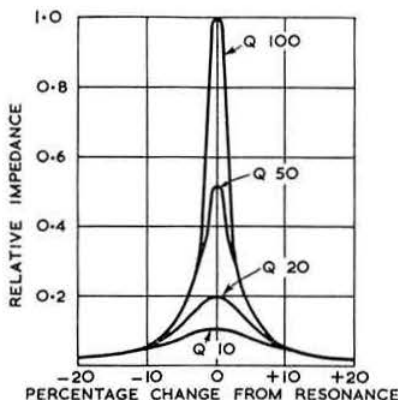
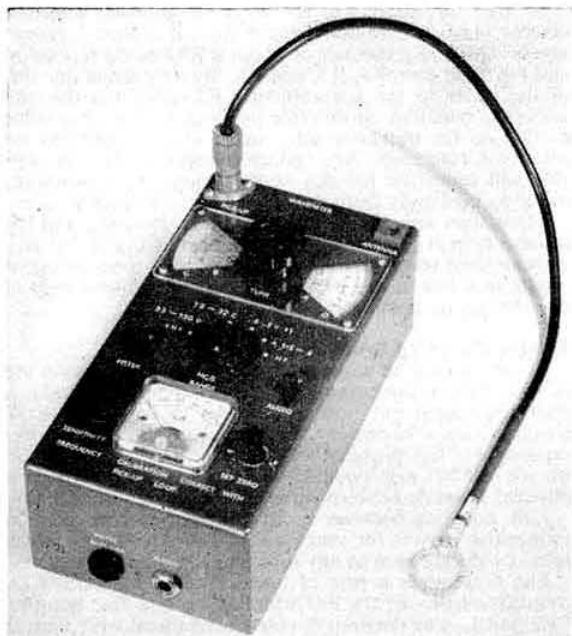


Fig. 2. Q versus frequency discrimination.

* 94 Aldwick Road, Bognor Regis, Sussex.



View of the transistorized wavemeter with a loop probe connected.
(Photo by G3GFN)

difference between the unloaded and loaded Q not so drastic. Provided that L_B is correctly terminated, the amount by which the Q is degraded will depend almost entirely on the current drawn from L_B , whereas in the case of Fig. 1(a), a parallel impedance is constantly "hung across" the tuned circuit $L_A C$.

The immediate effect of using the circuit of Fig. 1(b) is to substantially sharpen the tuning, and hence the ability of the absorption wavemeter to discriminate between closely related frequencies.

In Fig. 1(b) L_A and L_B may be considered as a transformer with a tuned primary winding. This being the case it will be appreciated that the number of turns on L_B can be adjusted so that it matches the rectifier-meter circuit. Under these conditions optimum power transfer will take place, and maximum sensitivity be achieved in relation to the meter employed.

Fig. 1(c) is a re-arrangement of Fig. 1(b). In this the coil L_A operates as an auto-transformer, the tapping point T being adjusted to match the rectifier-meter system. Which of these two circuits is used depends largely on mechanical considerations.

Just for the record, it should perhaps be mentioned that a low voltage low current pilot lamp may be substituted for the rectifier-meter systems in Figs. 1(b) and 1(c). Wavemeters using such an indicator are of relatively limited utility, their use being mainly confined to checking stages handling reasonable power levels.

Meter Sensitivity

By now it will be apparent that the higher the sensitivity of the meter indicator, then the less the loading imposed on the basic tuned circuit $L_A C$ whichever meter feed system is employed. As the loading is reduced, the working Q becomes progressively higher, and in turn this allows the wavemeter to achieve increasingly better frequency discrimination.

The possible applications of a wavemeter are largely

governed by (a) its ultimate sensitivity and (b) its ability to differentiate between closely related frequencies. Given sufficient sensitivity and selectivity, it can be used to detect spuriously generated frequencies, sources of self-oscillation, and the magnitude of close order harmonics. In fact it becomes a very useful instrument.

Unfortunately, meters follow Bungler's Law. This states quite simply, that the sensitivity of the meter movement, expressed in ohms/volt, when squared, produces a figure which is equal to the possibility of damage through human error for every hour of use. While meters with sensitivities of 100,000 ohms/volt are available, their cost, when equated with Bungler's Law, becomes prohibitive.

Current Amplifiers

What is required is a device which will magnify a small current input and produce a large linearly related current output which is then used to operate a rugged meter.

The transistor is just such a device.

Starting with valves which we know well, we can, in their case, plot how the anode current, I_a , changes as the grid voltage, V_g , is altered and show this as a graph. The resultant $I_a V_g$ curve is a picture of the valve's transfer characteristics. The gradient or slope of this curve, called mutual conductance, G_m , is expressed in mA/V.

In the case of a transistor, as this is a current operated device, it is normal to plot how the collector current, I_c , varies with changes of current into the base, I_b , the emitter being earthed. This gives a picture of the transfer characteristic of the earthed emitter configuration. The gradient or slope of the $I_c I_b$ characteristic is a ratio which can be expressed as a simple number, and this is its current amplification factor. Current gains may range between 30 and

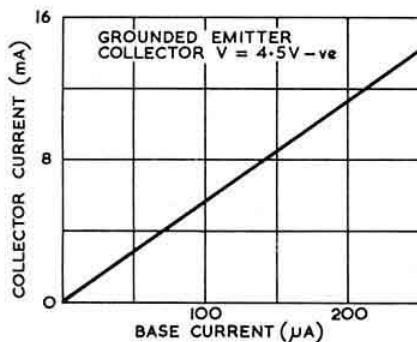


Fig. 3. Example of grounded emitter transfer characteristic.

300, with the spread for normally available transistors running between 30 and 150 according to type.

A typical $I_c I_b$ curve is shown in Fig. 3.

A word of warning is in order. Many of the "surplus" transistors are production rejects, and their gain figures are more than likely to be outside the range quoted for the particular type concerned.

Increasing Meter Sensitivity

If a circuit is arranged as in Fig. 4, when there is no current into the base of the transistor, and assuming that there is no leakage current through the transistor, then the meter in the collector will read zero.

If this transistor has a current gain of 50, and the meter a full scale deflection (f.s.d.) of 500 μA , then the meter's apparent f.s.d. will be modified by the current gain of the transistor so that, in relation to currents fed to the base of the transistor, its f.s.d. "appears" to become 10 μA . That is, 10 μA into the base of the transistor will cause full scale

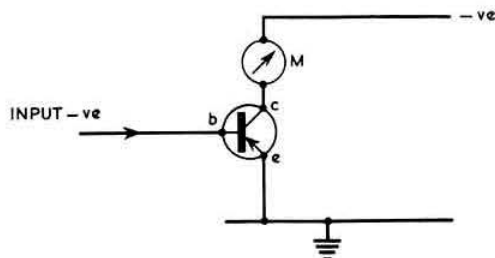


Fig. 4. Elementary transistor current amplifier.

deflection of the meter in its collector circuit. If the minimum acceptable deflection of the meter is 10 per cent of full scale, then a current of only $1 \mu\text{A}$ into the base of the transistor will produce this.

Taking the foregoing at its face value, the meter now "appears" to have a sensitivity of 100,000 ohms/V. If the current gain of the transistor were 100, then the meter would "appear" to have a sensitivity of 200,000 ohms/volt.

As a matter of interest, two transistors connected as a Darlington pair would provide a compound gain of many thousands and, in theory, provide phenomenal sensitivity.

Not All Plain Sailing

In practice, the operation of a transistor as a current amplifier is not as simple as has been stated.

First, all transistors show some leakage current. When

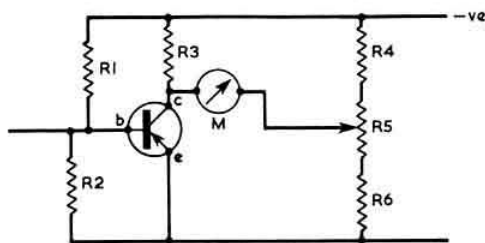


Fig. 5. Forward biased bridge-connected transistor current amplifier.

they are connected as in Fig. 4, and without any current into the base, the meter in the collector will indicate a small current flow, the amount depending on the voltage applied to the collector. This may be from $10 \mu\text{A}$ upwards, depending on the type of transistor. This results in a standing error on the meter which has to be allowed for when taking readings.

Secondly, and of greater consequence, there is an awkward little knee in the I_{cb} curve of a transistor at very low base currents. The effect of this is that, when the current input to the base of the transistor is just a few microamps, the collector current does not follow changes in the base linearly.

Thirdly, the optimum gain of a transistor is not secured until the collector current is within a certain range, and at very low collector currents is decidedly sub-optimum.

A method of overcoming these points is shown in Fig. 5. In this, the transistor is forward biased by means of the potential divider $R1, R2$. These resistors are so arranged that they feed a predetermined amount of current into the base of the transistor so that the standing collector current is "lifted" to a point on the I_{cb} curve where it not only changes linearly in relation to further changes in base current, but also, where the collector current is within the range which produces the desired current gain from the device.

So that the meter will not read the standing collector current produced by the forward bias, it is now arranged in a bridge circuit, one arm of which is $R3$ and the transistor, and the other arm, $R4, R5$, and $R6$. By connecting one side of the meter to the potentiometer $R5$, adjusting this will allow the potential on this side to be set to the same value as that on the transistor side, under which conditions the meter will read zero. Any further changes on the transistor side will upset the balance of the bridge, so causing the meter to read away from zero in the normal manner.

Transistors are somewhat temperature sensitive, and the leakage current given by the arrangement of Fig. 4 will vary with ambient temperature. Forward biasing to some extent offsets this, but in any event $R5$ permits the meter zero to be precisely set irrespective of such changes.

Solving Coupling Problems

By now it will be apparent that we can, through the use of a transistor operating as a current amplifier, make a relatively rugged and inexpensive meter movement have the sensitivity of a laboratory microammeter and so solve, inexpensively, the problem of meter sensitivity. However we are still left with possible difficulties in securing correct physical coupling between wavemeter and circuit under test.

Link coupling between tuned circuits has been used in transmitter circuits for years, and it is link coupling which provides the solution to any difficulties in this direction.

Fig. 6(a) shows a pair of tuned circuits $L_A C$ and CL_X coupled together by the link windings L_B and L_C . Ignoring CL_X and L_C this diagram is virtually identical with that of Fig. 1(b).

When $L_A C$ is tuned to the same frequency as CL_X , and assuming that this is an energised circuit, then current will flow through the link system L_C, L_B to the circuit $L_A C$.

If CL_X is actually the circuit under test in a transmitter, and $L_A C, L_B$ part of the wavemeter, and L_C placed on the end of a probe, then our coupling problems vanish. All that is required is to bring the probe link L_C to the circuit under test, and not the whole wavemeter.

The fundamental arrangement of this wavemeter design follows just this system and is shown in Fig. 6(b). $L_A C$ is the wavemeter tuned circuit, L_B the link winding on the wavemeter coil, and L_C , which is on the end of a length of co-axial cable, the search loop. The current monitoring circuit is arranged across the link line and consists of the diode CR

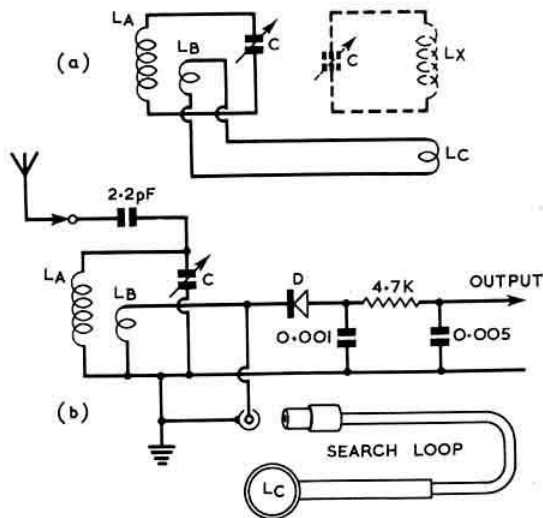


Fig. 6. Derivation of wavemeter circuit.

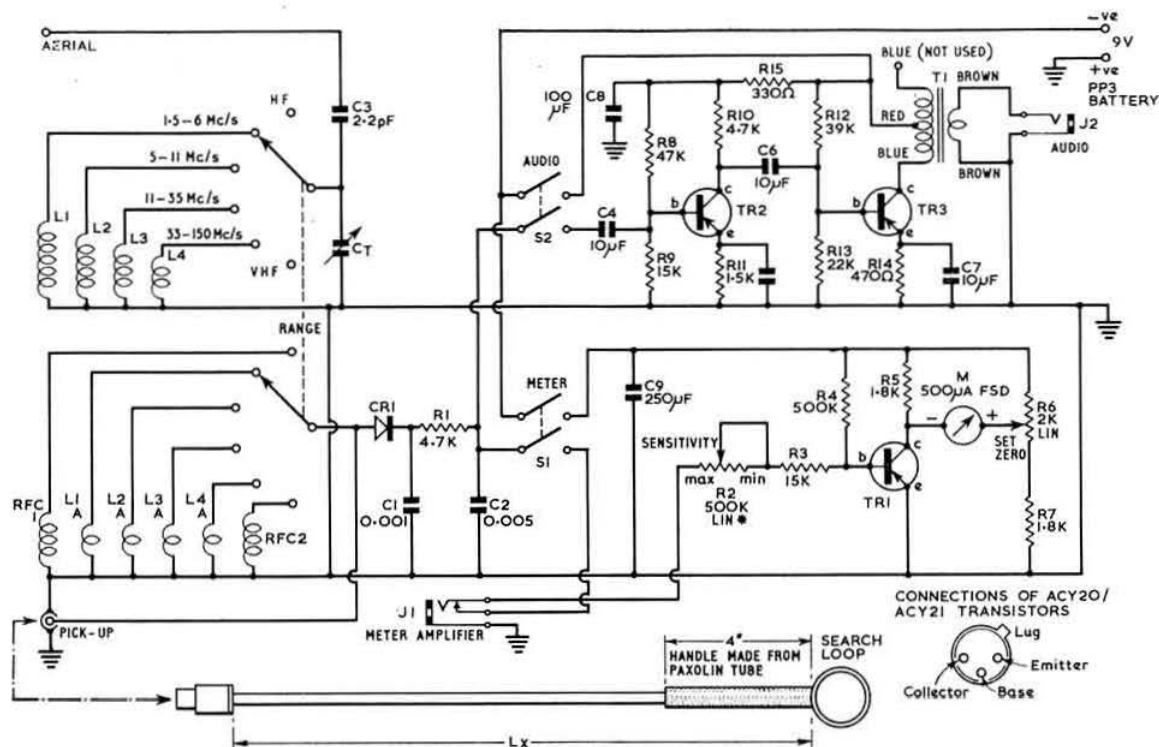


Fig. 7. Circuit diagram of wavemeter, field strength meter, and monitor. See Table I for details of components, and Table 2 for dimensions of search loops. * See text under "Operation and Use."

and its associated components. This samples the current on the line and feeds it to the current amplifier which in turn operates the meter indicator.

Circuit—General Notes

The complete circuit of the wavemeter is shown in Fig. 7. This follows the outlines detailed, and also includes a number of features to increase the overall utility of the instrument.

The frequency range of 1.5 Mc/s to 150 Mc/s is covered in four switched bands. To allow the instrument to be used as an untuned r.f. indicator, the bandswitch includes two positions designated h.f. and v.h.f., and details of these ranges are given later.

A small two stage transistor audio amplifier is included for monitoring a.m. transmissions and other purposes.

Meter Amplifier

The meter current amplifier TR1 is a simplified version of the circuit shown in Fig. 5. In the circuit of Fig. 7, a Mullard ACY20 transistor is fed with forward bias via the resistor R4. This results in a standing collector current of the order of 2mA. The meter, M, is connected in a bridge circuit to allow this current to be backed off. Adjustment of R6 will bring the meter pointer on to its zero. The value of R6 is such that there is more than adequate control to cover the full range of production spreads of the ACY20 in respect of the I_c likely to be produced by the fixed base current.

The ACY20 transistors have current gains of between 50 and 130 at a collector current of 50mA. As the I_c is fixed at about 2mA—for reasons of battery economy—the gain of TR1 is likely to be in a range somewhat lower than this, but not seriously so for our purpose. Out of a dozen

ACY20 transistors checked in the circuit of Fig. 7, none produced a gain of less than 50, and one sample had a gain of 120.

If exceptional sensitivity is required, the ACY20 may be replaced, without circuit changes, by an ACY21. ACY21

TABLE I

Notes on circuit components

All capacitors 15V working except C3 which is 350V silver mica.
All resistors $\frac{1}{2}$ watt 10 per cent.
Meter: 500 μ A Kyoritsu Electrical.
Antenna socket: 4mm banana plug socket.
Pick-up Loop socket: Co-axial.
S1 and S2: Double pole slide switches.
CR1, OA81.
J1: Double pole switched circuit jack socket.
J2: Standard jack socket.
T1: Radiospares T/T2 transistor output transformer.
Ct, 410 pF with built-in concentric slow motion drive (Jackson type O).
R2, 500K ohms linear (Radiospares miniature).
R6, 2K ohms wire wound (Radiospares pre-set).
TR1, Mullard ACY20/ACY21 transistor. See text.
TR2, TR3, Mullard ACY20 or OC71 transistors.
RFC1, 2.5 mH iron cored (Maxi-Q).
RFC2, 5.3 μ H (Eddystone Type 1011).

Coils

Remove all coupling winding. Place one layer of p.v.c. tape over earthy end. Wind on to tape 24 turns 32 s.w.g. enam. and terminate on original coupling winding tags. Unmodified. Leave coupling winding as supplied. Remove all but 4 turns of the primary winding, the turns that are left being at the earthy end.

L4, L4A See Fig. 8.

transistors have current gains ranging between 90 and 250. Three ACY21 transistors checked in the circuit of Fig. 7 showed gains of 190, 200, and 240 respectively.

There is a minor disadvantage in feeding the forward bias through a simple series resistor as in Fig. 7 rather than deriving it from a potential divider as in Fig. 5. With the series feed resistor method, the base current is not absolutely fixed as it is when a potential divider is employed, and as a result, the collector current may wander slightly from its nominal value with changes in ambient temperature. However, as the effect of this is only to move the meter pointer a few divisions, it is not serious and it can be easily corrected with the SET ZERO control. In view of this, it was decided that the extra battery consumption of a potential divider was not warranted.

The detector diode is arranged to give *positive* output into the base of the transistor via R1, J1, R2 and R3. If the diode were arranged to give negative output, before any change in collector current took place, it would have to produce a voltage in excess of that existing between the base and emitter terminals of the transistor. By using positive output, the slightest suggestion of any output from the diode begins to immediately cancel the fixed negative current into the base—derived through R4—and consequently the meter starts to indicate such changes at once.

Although primarily designing for maximum sensitivity, consideration has to be given to ways and means of reducing the sensitivity so that the instrument may be used with transmitter circuits handling appreciable power without having to keep the search loop a ridiculous distance away from the circuit under test.

There is no simple solution to this requirement that does not produce one undesirable effect or another. Of all the methods tried, that shown in Fig. 7, which is the simplest of them all, being a variable resistor R2 in series with the diode output, was the most satisfactory. The particular side effect produced by this method of sensitivity control shows as a shift in the meter zero as the sensitivity control is operated. The maximum deviation amounts to about 15 per cent which is well within the scope of the SET ZERO control.

Any method of sensitivity control which produces a substantial change in the *total effective* resistance between the base and emitter of TR1 is bound to upset the forward biasing

TABLE 2

Details of probe loops and lengths of co-axial cable L_X

| Range | Coil | Loop turns | Wire | L_X length |
|---------------------|------|------------|-----------|--------------|
| A. 1.5 Mc/s—6 Mc/s | L1 | 12 | 26 s.w.g. | 30 in. |
| B. 5 Mc/s—11 Mc/s | L2 | 3 | 18 s.w.g. | 30 in. |
| C. 11 Mc/s—35 Mc/s | L3 | 1 | 16 s.w.g. | 18 in. |
| D. 33 Mc/s—150 Mc/s | L4 | 1 | 16 s.w.g. | 18 in. |

All loops are wound with an inside diameter of $\frac{1}{2}$ in.

A common loop is used for ranges C and D.

The cable used for L_X should be good quality, 75-80 ohms nominal impedance.

and consequently the collector current, and in turn the meter zero. When considering this problem it should be borne in mind that the external circuit resistance is in parallel with the actual base to emitter resistance of the device, and since this is fairly low, high resistance systems are likely to produce the least changes in static conditions.

A perfect solution was devised and this is illustrated in Appendix C. In this two transistors are operated as a balanced pair in such a manner that their base currents are identical under all static conditions. Signal drive is applied to one transistor only, the resulting unbalance in the otherwise identical collector currents causing the meter to deflect. While this configuration undoubtedly has applications in other equipment, its inclusion in this wavemeter was felt to be unwarranted.

Transistors

The "heart" of this wavemeter is its current amplifier, and for this reason it has been dealt with at some length.

The circular calls for either an ACY20 or ACY21 transistor and it is essential that one of these types is used. Do not substitute "surplus" transistors in this circuit, and then "go up the wall" because the circuit does not operate as specified. The few shillings required to purchase the correct transistor are a real and worthwhile investment.

Bandswitched Unit

Plug-in coils, while efficient, have a nasty habit of becoming divorced from the unit with which they are supposed to be associated. In addition, when frequency calibration is involved, they must be treated with the greatest care.

For the foregoing reasons, a bandswitched tuning unit was designed for this wavemeter, so making it self contained. With the exception of L4 and L4_A, commercially available coils—slightly modified—are employed and no difficulty should be experienced in duplicating the unit and its coverage. Details of the coils will be found in Table 1, while construction of L4 and L4_A are illustrated in Fig. 8.

It is essential to use a ceramic Yaxley type switch as the range selector otherwise some difficulty may be found in extending the coverage up to 150 Mc/s. A suitable switch may be produced from the parts marketed by Radiospares under the title "Makaswitch."

In view of the high capacity of the tuning capacitor C1, one was selected which has a built-in concentric slow motion drive. This has proved its worth, particularly when dealing with minute signal levels, and moreover allows a simple dial system to be used.

Search Loops

The general construction of the search loops is shown in Fig. 7. Separate loops are used for each range and this allows the number of turns on each loop, and its matching coil, to be adjusted for optimum coupling.

It is important that the length of the co-axial cable L_X does not become an appreciable fraction of a wavelength long at the highest frequency of the range upon which the

* Radiospares components may be ordered through radio retailers.

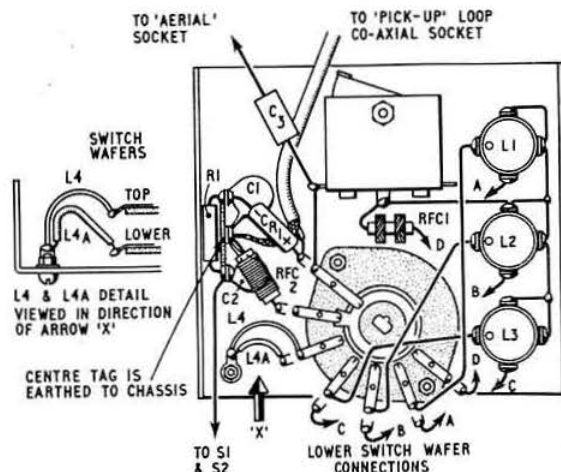


Fig. 8. Wiring of r.f. section and detector sub-chassis. L4, 1 in. length of 16 s.w.g. wire; L4_A, 1 in. length of 22 s.w.g. insulated wire adjusted for maximum pick-up. The wiring between L1, L2 and L3 has been expanded for clarity, and in practice the most direct route should be used.

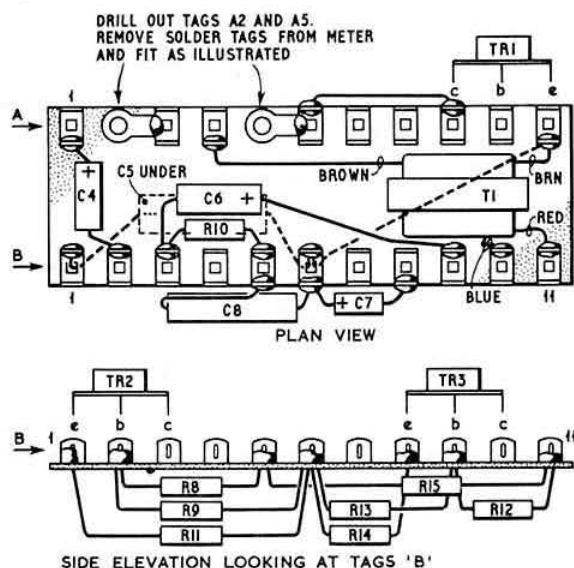


Fig. 9. The audio amplifier and part of the metering circuit assembled on a Radiospares miniature group panel cut to accommodate 11 tags each side. The pitch of the tags allows the completed board to be secured to the rear of the meter by its connecting screws and with the wiring arrangement shown the correct connections are made automatically. The fixing lugs of T1 coincide with the centre holes in the panel, and so can be passed through and bent back to secure the transformer.

probe is used. For this reason the dimensions for L_X given in Table 2 should not be exceeded.

Construction

Apart from the bandswitched r.f.-detector sub-assembly, the layout of this wavemeter is not critical.

The construction of the bandswitched unit is shown in detail in Fig. 8 and it is strongly advised that this is copied exactly, otherwise some difficulty may be experienced in duplicating the coverage given by each range, particularly

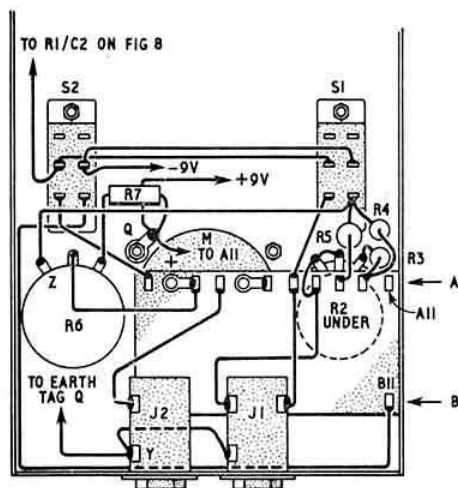


Fig. 10. Final assembly, showing wiring additional to that of Figs. 8 and 9. C9, not shown in this diagram for clarity, is positioned above R6 and connected between Z on R6 (—ve) and Y on J2 (+ve).

that associated with L4 and L4_A. It is again stressed that a ceramic switch must be employed for the range selector.

For those who wish to make an exact copy of the wave-meter in all respects, complete details of the wiring and layouts are given in Figs. 8, 9, and 10, while Fig. 11 details the metalwork.

The audio monitor, and part of the meter amplifier, are constructed on a miniature group panel (see Fig. 9); when the wiring of this group panel is completed, it is secured to the rear of the meter after this has been fitted into the case. The meter connecting screws are used for this purpose. As there is practically no weight in this group panel, no undue stress is placed on the meter by adopting this course.

As the balance of the wiring is mainly associated with the SENSITIVITY and SET ZERO controls, together with the two jack sockets, these are connected up after the group panel has been fitted. The wiring layout of these final stages is shown in Fig. 10.

Many operators fight shy of producing their own small instrument cases, believing, quite incorrectly in most instances, that it is beyond their capabilities. Provided that

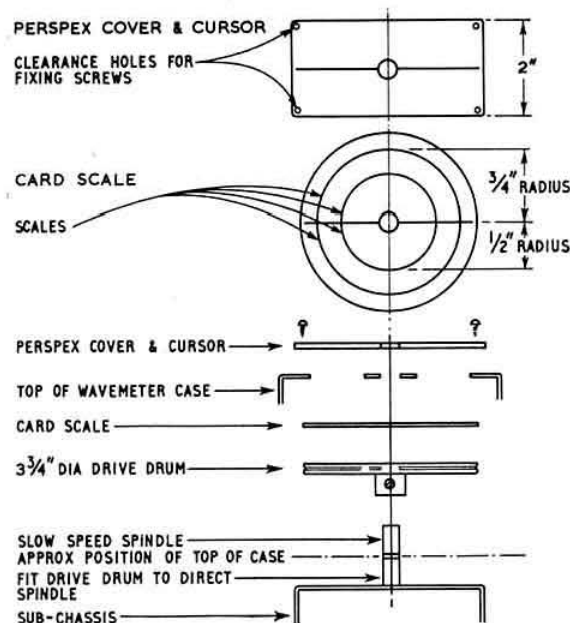


Fig. 11. Construction of case and sub-chassis.

there is a vice about the place, a few pieces of 2 in. by 1 in. timber to form up the folds, a fretsaw for awkward shaped holes, shears, drill, and a motley assortment of files, it can be done. These were the tools used to produce this wave-meter case. Details of the case, and the bandswitched unit sub-chassis, which are made from 20 s.w.g. half hard aluminium, are given in Fig. 12 on page 634.

Dial Assembly

This is simple but effective, and makes use of the two-speed spindle on the tuning capacitor. The component parts, and the order in which they are assembled are shown in Fig. 12 which should be largely self-explanatory.

In practice the card scale is secured to the drive drum by a contact adhesive *before* the arcs for the scales are drawn. This dial unit is then fitted to the direct drive shaft of the tuning capacitor, already fitted to the sub-chassis, prior to the sub-chassis being bolted into the main case. The Perspex

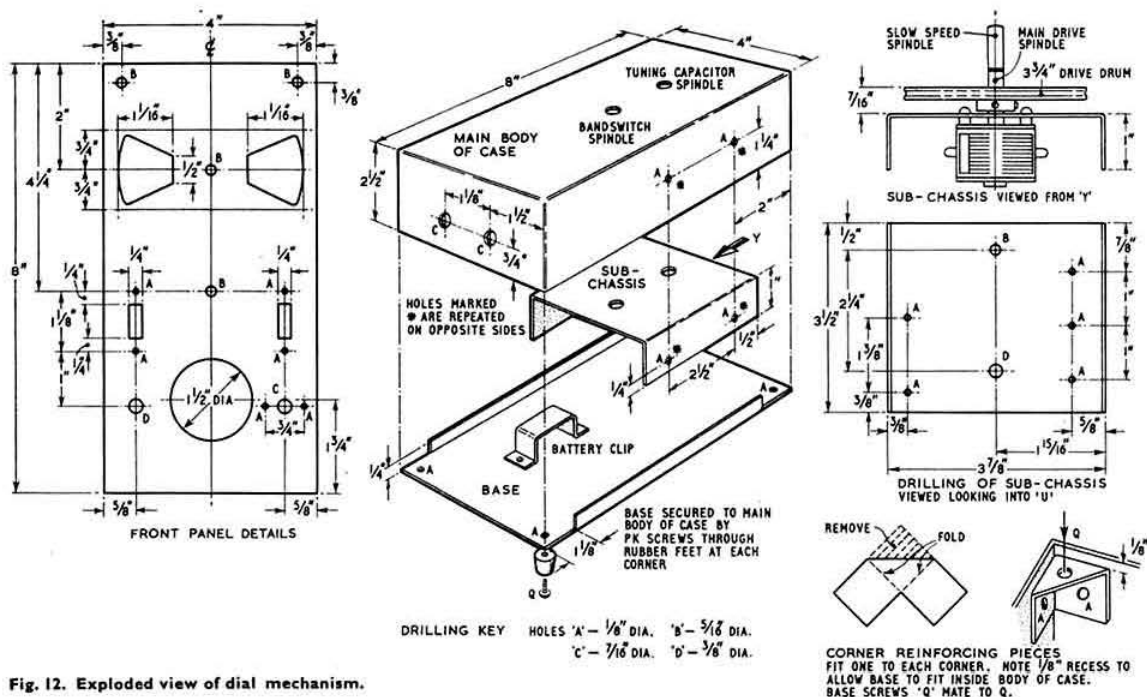


Fig. 12. Exploded view of dial mechanism.

cover, upon which is scribed the cursor line, is fitted after calibration has been completed.

Calibration

For calibration, an accurately calibrated source of r.f. covering the range 1.5 Mc/s to 150 Mc/s is required, and the most satisfactory method is to use a grid dip oscillator.

The sensitivity of the wavemeter should be set to maximum, and the lightest possible coupling used between the correct probe loop of the wavemeter and the g.d.o. The coupling should be adjusted so that the indicator of the wavemeter reads about 20 per cent of full scale when the frequency of the two units is the same.

The g.d.o. is set to the desired frequency, the wavemeter tuned until its meter shows a peak, and then a light pencil mark made on its card scale. Keep a separate note of the frequencies to which the marks correspond. Complete one range at a time, and this includes inking and figuring.

In the last analysis, the accuracy of the wavemeter depends almost entirely on the accuracy of the source used for calibration. This being the case, it is worthwhile to check the frequency of the g.d.o. against a receiver during calibration, at least over the range covered by the receiver.

Increasing Utility

While the basic wavemeter circuit is far from complicated, the unit does take some time and effort to construct, and it seemed worthwhile to include some simple additions which would increase its utility.

The easiest of these is the provision of the jack socket J1. This allows other wavemeter "heads" covering higher frequencies to be plugged in so that they may have the advantage of the highly sensitive meter arrangement of this unit. Connecting to J1 automatically disconnects CR1 and its associated components, but leaves the SENSITIVITY control still in operation. Screened cable should be used between any external wavemeter and the socket J1, and a positive output rectifier system must be provided in the external unit.

An audio monitor is included so that the quality of a.m. transmissions may be assessed, and also so that carriers may be checked for hum level—or other weird noises. No gain control is fitted to this amplifier as the audio level may be easily adjusted by controlling the r.f. pick-up.

A small rod aerial may be used with the wavemeter in place of the normal probe loops, and this is connected to the socket marked ANTENNA.

It is sometimes useful to have an r.f. indicator which does not require tuning, and which will respond to any locally strong r.f. field—in multiband operation for example. Two ranges are provided for this purpose, one marked H.F. and the other V.H.F. These place suitable r.f. chokes across the diode input instead of the link windings on the coils. When used in this manner, a short aerial should be connected to the socket normally reserved for the probe loops and *not* to the ANTENNA socket.

Operation and Use

The maximum sensitivity of this wavemeter will be quite a revelation, as will its ability to discriminate between closely related frequencies. At maximum sensitivity, and holding the correct range probe loop some 3 in. away from the local oscillator coil of a transistor radio, operating on the trawler band, should produce just about half scale deflection of the meter. When this test was made, the loading imposed by the wavemeter was found to be so small that no discernable change took place in the tuning point of the radio. Using a standard Heathkit g.d.o., full scale deflection was secured with the loop some 9 in. away from the g.d.o. coil. An ACY20 with a current gain of 100 was in use in position TR1.

This is *real* sensitivity!

While the range of the sensitivity control is such that the sensitivity may be reduced to a level which allows the wavemeter to be used with transmitter stages running reasonable powers, by combining the effect of this control and the spacing of the loop probe from the circuit under test, if

very high power stages are likely to be encountered, it may be advisable to increase R2 from 500K ohms to 1 Megohm.

The high sensitivity and good frequency discrimination of this absorption wavemeter allows it to be used for detecting spuriously generated frequencies and sources of self-oscillation. It will also respond to close order harmonics in transmitter output stages.

When adjusting multi-element beams for maximum forward gain, this wavemeter will be found invaluable. A simple dipole may be connected to the probe loop input socket, and the wavemeter spaced a considerable distance away from the array under adjustment, so avoiding the proximity effects usually encountered when the monitoring device is within one or two wavelengths of the aerial being tuned.

The mobile brigade—who are always seeking to squeeze the last little drop out of their aerial systems—will find it exceptionally useful, for even with their limited power outputs the wavemeter may be stood a long way off from the vehicle when making adjustments. On the lower frequency bands, a simple vertical aerial connected to the ANTENNA socket will be adequate. On 70 Mc/s and 144 Mc/s a resonant quarter-wave should be connected to the probe loop socket. Perhaps its utility in this direction is best illustrated by citing an actual case.

There is a strong 70 Mc/s mobile contingent in this area, and in association with the writer, a number of operators have employed this wavemeter to adjust their standard car radio aerials to a length which gave maximum radiation. With the aerial of one car connected to the probe loop socket of the instrument, and another car transmitting, the wavemeter car was driven away until the meter reading came down to half scale. This turned out to be about 100 yd. from the transmitting car. The transmitting operator then made adjustments to the length of the radiating aerial, and the transmitter output coupling, until maximum indication was secured in the wavemeter car. Horn signals indicated progress. One "honk" for up, and two "honks" for down. A good time was had by all!

The results were particularly interesting inasmuch as it was proved conclusively that one cannot just cut an aerial to length and call it a day. One operator found that the optimum length for his aerial was 48 in., while another found that 39 in. was the length that gave maximum radiation. Actual position on the vehicle, and the size of the vehicle seem to come into this somewhere. As a second check on the readings of the wavemeter car, a standing wave bridge was used in the transmitting car, and in all cases it was found that maximum field strength was reported when this meter indicated minimum s.w.r.

In conclusion a final word on calibration is in order. As the wavemeter was calibrated with loop probes, greatest accuracy will be secured when these are used. Some error is bound to arise when the ANTENNA socket is employed due to the nature of the coupling from this socket to the wavemeter tuned circuit, and this will be found to increase with frequency. For this reason, the frequency indicated when this socket is employed should be treated with reserve.

Acknowledgements

The author acknowledges, with thanks, the permission received to use the following illustrations: Fig. 2—The

American Radio Relay League Inc., and Fig. 3—Mullard Ltd.

Appendix A

Q of an unloaded parallel tuned circuit at resonance

$$Q = \frac{Z_{c.L.}}{R} \quad \text{where } Z_{c.L.} \text{ is reactance of capacitor or inductance}$$

R is residual d.c. resistance
both quantities being expressed in ohms

Assume $Z_{c.L.}$ is 250 ohms and R 2.5 ohms

$$Q = \frac{250}{2.5} \quad \text{therefore } Q = 100.$$

Appendix B

Impedance at resonance of a parallel tuned circuit

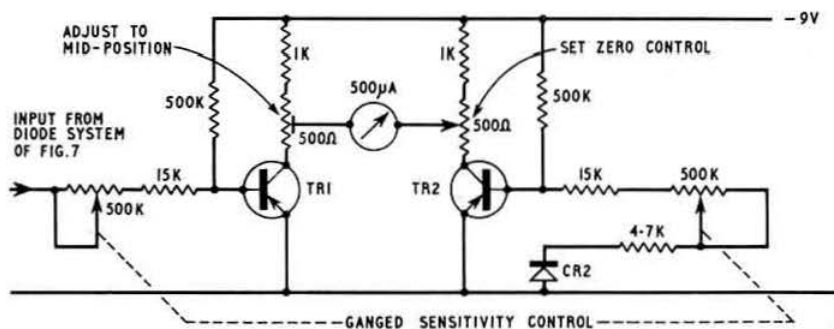
$Z_R = Q Z_{c.L.}$ where $Z_{c.L.}$ is as in Appendix A above
and Q is magnification as in Appendix above.

Assume $Q = 100$ and $Z_{c.L.}$ is 250 ohms—both derived from Appendix A

$Z_R = 100 \times 250$, therefore $Z_R = 25,000$ ohms.

Appendix C

Statically balanced pair



Appendix D

Q of loaded parallel tuned circuit at resonance—assuming that the majority of the power is dissipated in the parallel load.

$$Q = \frac{R}{Z_{c.L.}} \quad \text{where } R \text{ is the value of the parallel load and } Z_{c.L.} \text{ is as in Appendix A above.}$$

Assume parallel load is 1000 ohms/V meter set to 1V range. Then $R = 1000$ ohms and $Z_{c.L.}$ is 250 ohms (as in Appendix A)

$$\text{Loaded } Q = \frac{1000}{250} \quad \text{therefore loaded } Q \text{ is } 4.$$

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The ZE Beam Raiser

By T. G. MAIN-BAILLIE, ZE4JS (ex G3FZN) *

THE writer, being a firm believer in the old saying "the more firma the less terra," and having studied various methods of raising and lowering beam aerals, has finally evolved the following system.

The beam and rotator are mounted on a carriage which is a sliding fit on a steel mast (Fig. 1). This carriage, with the beam, is pulled to the top of the mast by means of a stout pulley and a double mast length of 5 cwt steel cable. A key is let into the mast, near the top, to correspond with a key-

* 45 Spruit Road, Hatfield, Salisbury, Southern Rhodesia.

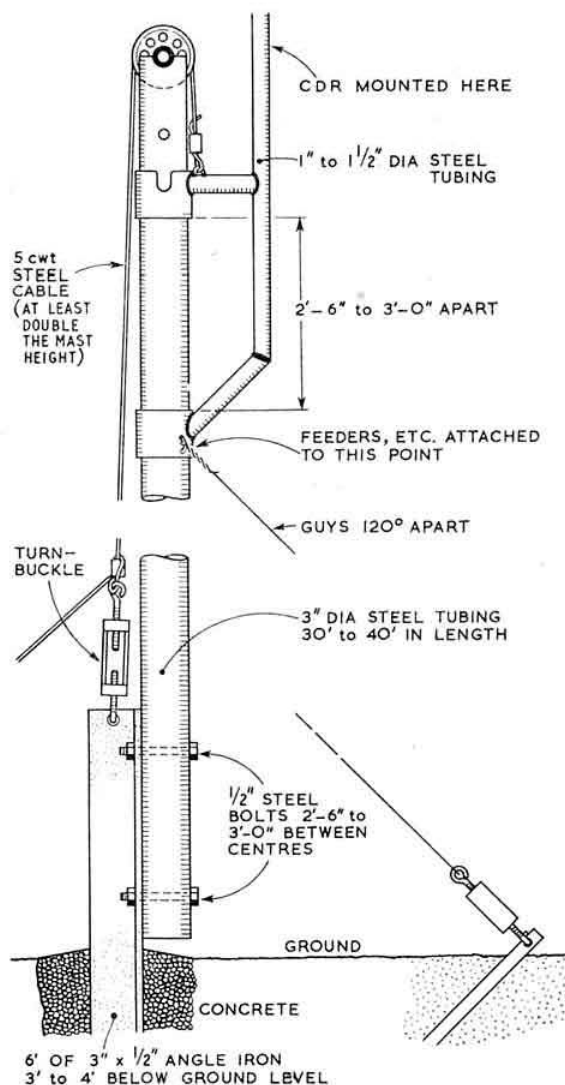


Fig. 1. General mechanical arrangements of the Beam Raiser.

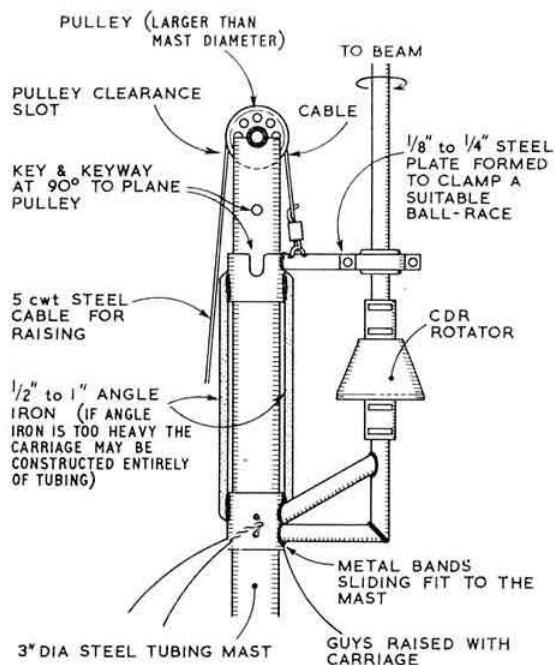
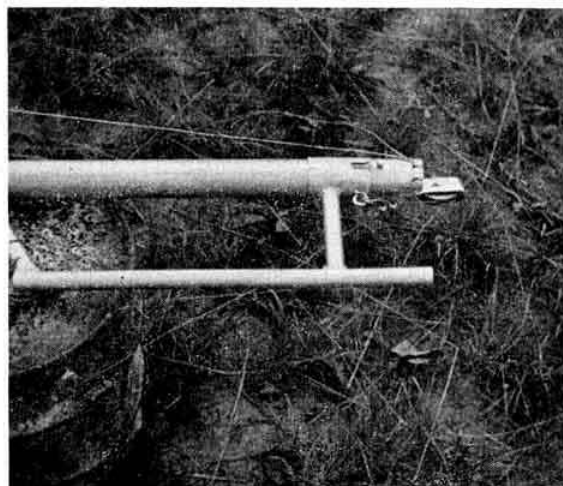


Fig. 2. Detail of additional bearing to reduce strain on rotator when exposed to constant high winds. See text.

way on the carriage; this obviates any movement of the carriage due to the turning momentum of the beam.

The mast must be firmly attached to a tabernacle made of at least 3 in. angle iron concreted into the ground. This is the only vertical support during raising and lowering operations, the guys being let in to avoid obstruction of the beam elements.

Since the motor cable and feeder are attached to, and raised with, the carriage, it is important to ensure that the



The masthead showing sliding aerial carriage, locating key, keyway and hoisting pulley.

feeder has sufficient slack to clear the top of the mast during beam rotation.

The Mark I mast, made of 2 in. galvanized water pipe, withstood two years of Channel gales at Southampton, supporting a two-band cubical quad, and may still be in use by G3KXW. The Mark II mast is much improved by the use of 2½ in. diam. high tensile steel (found at the local scrap merchants) together with a lighter carriage design.

This design is being successfully used by ZE1BK and ZE8JJ to raise "spider quads" to heights of 35 and 40 ft. respectively, each using a 3 in. steel mast. These masts are made from two lengths of 20 ft. piping welded together. If the beam is to be used at 35 ft. or above, and weighs over 50 lb., it is advisable to attach the guys to suitable lugs welded to the lower slider of the carriage. The guys may then be used to stabilize any swaying during raising or lowering. Forty feet is a fair height to raise a heavy beam and can be very hard on one's hands. A better and easier method is to mount a suitable pulley on the tabernacle; thread the free end of the hoisting cable through the pulley; attach this to the centre of a stout piece of wood and simply walk backwards, pulling horizontally on the hoisting cable. When the anchoring turnbuckle is within reach have someone hook it on to the tabernacle, or do the job oneself after tying the free end to a convenient tree or some other anchorage. The free end can then be untied and wrapped around the tabernacle for use whenever the beam has to be lowered.

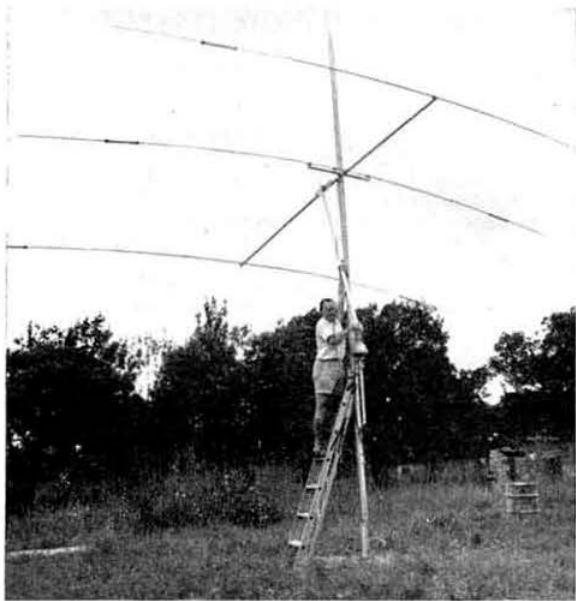
The complete cost of the mast and tabernacle was under £10, which included material, welding and cartage.

If the mast and CDR rotator are to be used in areas of high or constant wind, the bending strain on the rotator could be reduced by the addition of a bearing above the rotator suitably welded to the carriage (Fig. 2). This has not proved necessary in Southern Rhodesia although wind gusts of 60 m.p.h. are fairly common.

The writer regularly lowers and raises his TA33JR (now replaced by a three-band quad), plus CDR rotator, from 30 ft. down to step-ladder height in four minutes without undue strain and pain.



Anchoring arrangement at tabernacle.



The aerial assembly being prepared for hoisting.

Do's and Don'ts

- (i) Do not use doubtful materials for the mast, hoisting cable, pulley, anchoring arrangements or tabernacle.
- (ii) Do check the sliding and keying action of the carriage at ground level and attach the anchoring turnbuckle to the hoisting cable *within its adjustable length*.
- (iii) Do attach the hoisting cable to the carriage as closely as possible to the mast. This will ensure an easier sliding action.
- (iv) Do check every assembly and action after raising the mast, and *before* mounting the beam.

If you have not done any of these things, dig a fox-hole and wear a tin hat.

Food for Thought

W2AOA has made a statistical analysis of the distribution of Amateur Radio stations throughout the world. We give below some of his findings.

| | | | |
|----------------|---------|---------|--|
| World Amateurs | Approx. | 372,000 | |
| USA | Over | 250,000 | (including 4,000 in Hawaii, Alaska & other US areas) |
| UK | Approx. | 10,500 | |
| USSR | Approx. | 10,500 | |
| Canada | Approx. | 9,300 | |
| Brazil | Approx. | 9,000 | |
| Germany | Approx. | 9,000 | |
| Japan | Approx. | 9,000 | |
| Argentina | Approx. | 7,000 | |
| Australia | Approx. | 4,200 | |
| France | Approx. | 2,800 | |
| South Africa | Approx. | 2,550 | |

Only about one eleventh of the total amateur population is in the Southern Hemisphere.

W2AOA estimates that by 1972 the world amateur population may well reach the 750,000 mark! Who says there is QRM now! (Extracted from MARS Newsletter, February, 1964.)

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

By A. J. GIBBS, G3PHG*

THE block diagram of the transmitter was shown in Fig. 1 and the circuit details in Fig. 2 in the first part of this article.†

The line-up consists of a Colpitts crystal oscillator, V11, followed by a multiplier, V12, feeding push-pull p.a. valves V13, V14. The p.a. at all times functions as a straight amplifier.

The crystal oscillator, V11, has its anode circuit tuned to either the second or third harmonic of the crystal. In the range 60 Mc/s to 80 Mc/s, it is tuned to the third harmonic. The multiplier either doubles or trebles, and in the range 60 Mc/s to 80 Mc/s it operates as a doubler, the final output being at the desired carrier frequency. Capacity coupling is employed between the crystal oscillator and the multiplier.

The p.a. grids are inductively coupled to the tank circuit of the multiplier by a lumped inductive circuit consisting of L14a, L14, and L14b. Protective bias is applied to the p.a. so avoiding the damage which would occur in the event of failure of the drive.

The transmitter is liberally supplied with test points which permit the functioning of each stage to be easily checked. The circuits related to each test point are as follows: M—multiplier grid drive; P—multiplier cathode current; K—grid current of one p.a. valve; L—grid current of the other p.a. valve; H—cathode current of one p.a. valve; J—cathode current of the other p.a. valve.

Transmitter Crystal Frequency

The overall frequency multiplication which takes place within the range 60 Mc/s to 80 Mc/s is six times (c.o. \times 3; mult. \times 2). The crystal frequency is therefore equal to the carrier frequency divided by six. For a frequency of 70.32 Mc/s, the crystal frequency will be 11.720 Mc/s.

As it is possible to tune the multiplier so that it functions as a tripler, a multiplication factor of nine times can be secured (c.o. \times 3; mult. \times 3). Under these conditions, a 7.813 Mc/s crystal would produce a carrier frequency of 70.32 Mc/s. However, crystals in this frequency range should be avoided for two reasons. First, they produce TVI, and secondly, due to the increased multiplication factor, it is difficult to produce adequate drive for the p.a.

While the official procedure is to extract the third harmonic from the crystal oscillator, and double this in the multiplier when the final frequency lies between 60 Mc/s to 80 Mc/s—which of course covers the frequency range in which we are interested—with an 11.72 Mc/s crystal this means that the output of the crystal oscillator is on 34.26 Mc/s. This is dangerously near the vision i.f. of most television receivers. On the effective "goodness" of the TV receiver front-end, and the radiation from the B44—itsself a variable factor—will depend what patterning, if any, the transmitter produces. One way round this is to reverse the procedure, and to tune the crystal oscillator to the second harmonic of the crystal, and make the multiplier triple the frequency. In some cases, however, this tends to make the drive to the p.a.

a little short of the required amount, and in bad cases actually reduces the r.f. available.

It is suggested that the initial setting up of the transmitter is carried out in the official manner, and if patterning becomes a problem, to try the frequency multiplication the other way round.

Transmitter Alignment

In addition to a reliable wavemeter calibrated at 24 Mc/s, 33 Mc/s and 70 Mc/s, two other items are particularly well worth having when setting up the B44 transmitter. The first is a dummy load of about 75 ohms, and the other is an s.w.r. bridge. Attention is drawn to the article by Paul Harris, G3GFN, in the May, 1964 BULLETIN which describes suitable equipment. Failing an s.w.r. bridge, an r.f. voltmeter—also described in the May issue—can be used.

The dummy load should be connected to the transmitter output with the s.w.r. meter or r.f. voltmeter also in circuit. Failing any of this equipment, a lamp load can be used, but it is nowhere near so satisfactory for producing the maximum output. A 12 V 12 watt car tail lamp can be used.

A shorting link should be placed across the primary of the microphone transformer, T5, and a flying lead connected to the relay switch line at the microphone socket, the other end of which is provided with a crocodile clip. Connecting this clip to the chassis will trip the equipment from receive to transmit.

Turn the master switch to the TRANSMIT position, and insert the transmitter crystal. Inside the p.a. tuning compartment will be found a tag strip—G on Fig. 6.† Remove the link between tags 5 and 2. This disconnects the h.t. to the p.a.

Key the transmitter by connecting the clip on the flying lead to the chassis. Connect a meter set to its 5 mA range between test points M and N, M being negative. Tune C58 for maximum indication of the meter, and check with the wavemeter that L15 is resonant at about 33 Mc/s.

Transfer the negative lead of the meter to test point L, leaving the positive lead on test point N. Tune C54 for maximum indication on the meter. This should not be less than 3.5 mA, and will not be more than 4 mA. Check with the wavemeter that L14 is resonant at 70 Mc/s. This is most important for it could inadvertently be tuned to about 99 Mc/s, in which case the final transmission frequency is likely to be in association with some other service.

Now shift the test meter lead to test point K and confirm that the drive at this point is the same as that at point L. If it is not within 0.25 mA, then adjust either L14a or L14b, or both, until the readings at L and K are within this tolerance. *Caution:* Adjustments to L14a and b should be made either with the power off, or with a plastic rod.

Switch off. Restore the p.a. h.t. link between G2 and G5, and ensure that a dummy load is connected. Offer up the wavemeter to the p.a. tank circuit L13, C47. Key the transmitter, and quickly adjust C47 for resonance at 70 Mc/s as indicated on the wavemeter. Once the approximate position of C47 has been located, then either the s.w.r. meter, r.f. voltmeter, or light from the dummy load will indicate the progress of further adjustments.

If a resistive dummy load is employed, together with an s.w.r. meter, then the position of the link L13a and the tuning of the p.a. tank capacitor C47 can be adjusted for optimum power transfer into this load, after which no further adjustments will be required.

A final check is to measure the cathode currents of the p.a. valves. With a meter set to its 50 mA range, the negative lead connected to the chassis, touching the positive lead to the test point H should show a reading not exceeding 35 mA. Shifting the positive lead to test point J should produce a reading within 2 mA of that obtained at test point H. If this is not so, and assuming that the grid drive is within the

* 6 Dairyfields, Gossops Green, Crawley, Sussex.

† Part 1 of this article was published in the September issue of the RSGB BULLETIN.

tolerances given, then the output valves are badly mismatched and at least one will have to be replaced.

Modification 12—Increasing Transmitter Power

The transmitter power may be substantially increased by the simple expedient of changing the value of the p.a. screen grid resistor R31. The existing value, which is 27K ohms, should be removed and replaced by two 22K ohms $\frac{1}{2}$ watt resistors connected in parallel. R31 will be found connected between tag G4 and the base of V13.

This modification increases the carrier power output from 3 watts to approximately 10 watts.

Modification 13—Increasing Modulation

Once the carrier power has been raised, it is essential to increase the power output of the modulator to a level more satisfactory for the new p.a. d.c. input. This is accomplished by changing the microphone from an electromagnetic type to a carbon, and adjusting the polarizing voltage to produce the required peak output from the modulator.

The revised circuit is shown in Fig. 7(b).†

The screened lead which runs from the microphone input socket to the input transformer, T5, has its screening at the transformer end removed from the tag on the transformer to which it is connected. A new earthing point is fitted to one of the transformer retaining screws, and the braiding of this lead connected to it. This now leaves one of the transformer tags disconnected. From this tag a 50 μ F 50 V capacitor is connected to the new earthing point, with its positive, note, positive earthed. From this same transformer tag, a 470 ohms $\frac{1}{2}$ watt resistor is connected to the junction of R54/R55, and also from this junction another 50 μ F capacitor is connected to chassis—positive again to earth. A carbon insert microphone may now be used.

To avoid vibrator hash, the connection on the rear of the microphone input socket which links the switch line to the screening of the cable should be removed. The screened cable should only be earthed at the new tag point fitted by the transformer T5. No other earthing is required. This implies that the screening of the microphone cable shall not find any earthing through the plug and socket arrangement, from which it must be insulated. If a T-17 microphone is employed, the screening of the microphone lead must, of course, be connected to the metal of the handset.

The B44 should now be fully operational using crystal control in the receiver, and having one transmission frequency.

Modification 14—Improving the R.F. Amplifier

The gain of the r.f. amplifier of the receiver may be increased by reducing the value of the cathode bias resistor from 220 ohms to 150 ohms (R2). A worthwhile increase in small signal performance can be achieved by increasing the value of the coupling capacitor between L2/C2 and the grid of V1 (C3). The existing C3, which is 10 pF, should be replaced by a 50 pF capacitor.

Yet a further increase in small signal performance may be secured by transferring C3 to the "hot" end of L1. However, depending upon location, f.m. transmissions may appear within the passband of the receiver, and this modification should be undertaken on a trial and error basis.

Modification 15—Tunable Receiver

Converting the B44 into a continuously tunable receiver is, electrically, a simple task. The problems arise in relation to the fitting of a suitable dial.

Since both conversion injection frequencies are derived from one single oscillator, moving the frequency of this oscillator will shift both injection frequencies simultaneously, and by the correct amount. All that is needed is to convert the crystal oscillator V9 into a tunable Colpitts oscillator. The circuit is shown in Fig. 8.

† Part 1.

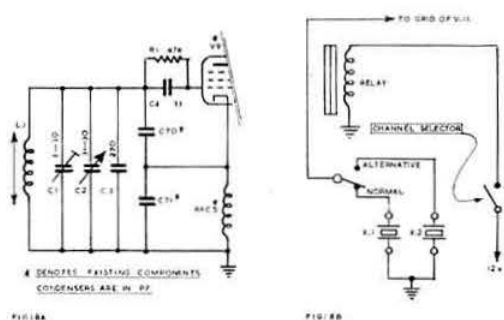


Fig. 8. (a) Revised circuit for converting receiver crystal oscillator to a tunable type. The coil L1 consists of 14 turns of 18s.w.g. wire wound on a $\frac{1}{2}$ in. former, the turns being spaced by the wire diameter. An Electronics type TOS may be used in which case C1 will not be required. (b) Circuit for providing an alternative transmitter channel.

One mechanical arrangement which has proved satisfactory is to remove the "hailer" socket, and to fit in its place the oscillator tuning capacitor. However, as the tuning is a direct drive, it does give it a slightly sharp feel, but not uncomfortably so, except perhaps where signals are right down in the noise. In such cases a small amount of reduction would be useful—but not essential.

Modification 16—Alternative Transmitter Frequency

With the increasing usage of the 70 Mc/s band, the provision of an alternative transmission channel is fast becoming a necessity rather than a luxury. At the time of writing it appears that two frequencies are being commonly used, 70.26 Mc/s and 70.32 Mc/s, the actual frequency varying from area to area. It would seem prudent to adopt these two channels for the B44 so that it can be switched to the local channel when moving from one area to another, and then treat the "foreign" frequency as an alternative. By this means one gets the best of both worlds.

The modification consists of fitting another crystal socket alongside the present transmitter crystal socket, and wiring these to a miniature 12 V single pole change-over relay. The relay wiring should be arranged so that the contacts are normally "made" in relation to the local channel, and when it is energized it changes over to the alternative frequency.

To make space for the crystal socket and relay, the support bar which runs from the top of the PSU cover to a point on the chassis adjacent to the crystal sockets is removed completely. The new crystal socket and relay can now be fitted.

Once the aerial filter unit has been removed, the press switch next to the meter no longer serves any useful purpose. This switch can be removed—note that it unscrews bodily from the front panel—and the meter wired permanently to the 12 V line which was connected to the switch. In its place a toggle switch should be fitted and used to operate the channel selector relay.

The circuit of the modification to give alternative frequency working is shown in Fig. 8B.

Modification 17—Increasing Receiver H.T.

As it stands, the receiver h.t. is fairly low, and its performance can be further improved by shorting out the resistor R51 (see Fig. 3) which has a value of 6.8K ohms. This resistor will be found on tag strip B—see Fig. 6.

Modification 18—Transmitter Crystal Drift

Certain B44 transmitters tend to drift quite badly. In all cases this is due to over excitation of the transmitter crystal.

(Continued on page 641)

Construction of a Crystal Receiver

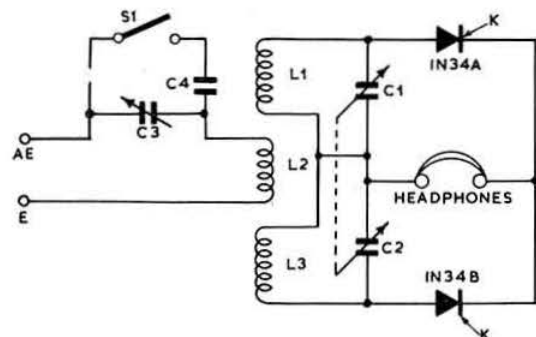


By FABIAN E. SONE STONE, FRS359 *

A CRYSTAL receiver serves well as a bedside radio. It may be left on even though the listener may have fallen asleep, and as headphones are used, other nearby persons are not disturbed by the radio. However, for successful operation, the following three points should be observed:

- The receiver should be located within 20 miles of broadcasting stations which it is desired to receive.
- An efficient aerial-ground system must be employed.
- The headphones should be of the high impedance type, for the higher the impedance, the more satisfactory will be the reception.

The aerial should be at least 200 to 300 ft. long, and should be erected as high as possible. A water pipe may be used for



Circuit of the crystal receiver. See text for details of components.

the earth connection. If such a pipe is not handy, a rod driven into moist soil to a depth of at least 2 ft. will serve satisfactorily for this purpose.

The Circuit

In the circuit, two crystals are used. These crystals are operated in conjunction with two tuning circuits comprised of inductors L1 and L2 and their respective tuning capacitors

C1 and C2. The circuit arrangement is such that both alternations of the signal cycle are utilized, and the current flows through the headphones in one direction only.

The tuning inductor is comprised of three coils. The centre coil, L2, is the aerial coil which is straddled by two secondary coils, L1 and L3. All three windings are on the same former which has a diameter of 1 in. and is approximately 4 in. long. L2, the centre winding, is composed of approximately 45 turns of 32 B & S (36 s.w.g.) enamelled copper wire. The exact number of turns will depend on the length of the aerial. For use with a double section 500 pF tuning capacitor (C1 and C2), L1 and L3 should each be 125 turns, and for use with a double section 365 pF tuning capacitor the number of turns should be increased to 135. L1 and L3 are also wound with 32 B & S (36 s.w.g.), and are spaced approximately $\frac{1}{8}$ in. from L2. The smaller the spacing, the louder the signal, but the tuning will be broader. Hence, if the completed receiver does not have sufficient selectivity, the spacing between the primary and secondary coils should be increased. C3 may be either 350 pF or 500 pF, depending on the aerial attached. A value of 0.001 μ F is suitable for C4.

Operating Instructions

To operate the receiver, connect the aerial to terminal AE, and connect E to ground. Tune in a station signal with the ganged capacitor C1 and C2, and adjust C3 for maximum volume. If the frequency of the station is below 800 kc/s, close the switch S1 and observe whether the volume of the signal increases. If no appreciable difference in volume occurs, experiment with different values of C4.

Using the B44 Mk. 2 on 70 Mc/s

(Continued from page 640)

This can be substantially reduced by placing a 100 pF capacitor from the cathode of V9 to chassis.

It should be noted that the amount of drift, even in the worst case, will not be sufficient for the transmission to shift out of the bandpass of another B44, and that the amount of drift can only be determined with a selective receiving system.

Whether the 100 pF capacitor is fitted should depend on two factors. Firstly, as this capacitor results in a slight loss of drive to the p.a., if the B44 in question is already shy of drive, it is probably better left off. Secondly, it depends to what extent fixed stations are worked—as opposed to B44s—and the degree of selectivity which they employ.

Modification 19—P.A. Output Link

The p.a. link fitted to B44s has been found sub-optimum for working into a correctly matched 75 to 80 ohm load.

The existing link, L13A, should be removed and replaced by a single turn of 22 s.w.g. p.v.c. insulated hook-up wire. This should be positioned well into the cut in the p.a. coil former, and the ends which go to the terminating tags bent only slightly around the former as they depart from it. The one turn ends up looking like a bent U on its side. Once this new link has been fitted, the p.a. tuning capacitor should be re-trimmed. To get the last ounce out of the B44, there is no doubt that an s.w.r. meter is an invaluable adjunct when making adjustments to the p.a. link and transmitting aerial.

Conclusion

While the list of modifications may seem formidable, none of them can lay any claim to being complicated or difficult. The resulting improvement in performance makes them very worthwhile, and turns the B44 into a most useful piece of equipment which gives a very good account of itself on the 70 Mc/s band.

* Director, College of Engineering Technology, Muyuka, West Cameroon.

The BC453 as the Receiver Section of a S.S.B./C.W. Transceiver

By I. E. ELLIOTT, GM3HMB*

THIS article describes yet another use for the BC453 Command receiver. Though a little difficult to find these days, they can still be obtained. Since they first appeared as surplus many modifications have been described in an effort to improve their performance, but quite a worthwhile receiver results with the simple addition of an audio gain control and power supply. However, if the receiver is to be used for s.s.b. reception, the addition of a product detector and a.v.c. circuitry, with a suitable time constant, should be seriously considered.

At GM3HMB the BC453 is used in conjunction with a home-built exciter as a transceiver for 80m s.s.b. and c.w. working. Such a combination results in a compact and inexpensive station. The method of use is limited only by the frequency of the exciter v.f.o. In the writer's case the exciter is a phasing type with s.s.b. generation at 8 Mc/s. The first conversion is to 4.5-5 Mc/s with 3.0-3.5 Mc/s v.f.o. injection. A second converter, with crystal controlled injection, provides output on the other h.f. communication bands. The exciter employs a 6146 in the linear p.a. stage and is completely self-contained.

It is obvious that with a v.f.o. tuning range of 3.0-3.5 Mc/s it is a simple matter to provide transceiver operation on 80m with only one stage of frequency conversion ahead of the BC453. Transceiver operation on other bands requires an additional stage of mixing ahead of the 80m converter. So far this has not been put into practice, but a band switched converter for all bands is being built.

The block diagram in Fig. 1 shows the arrangement of the exciter and the receiver. Transceiver operation is obtained by setting the BC453 to 500 kc/s. However, there is the additional advantage of independent receiver tuning. Thus, the transceiver can be set up on a particular frequency and then

the BC453 tuned with the transmitter remaining on the original frequency. All that is required to lock the frequency of the transmitter and the receiver is to re-tune the BC453 to 500 kc/s. Actual locking of the two frequencies is in practice carried out by putting the exciter in the "net" position and tuning the BC453 for zero beat.

Various front-end conversions have been tried ahead of the BC453 and quite acceptable results have been obtained with

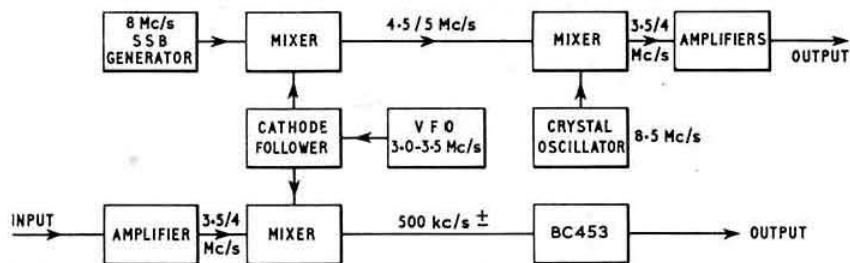


Fig. 1. Block diagram showing the operation of the exciter and BC453 to give transceiver working on 80m.

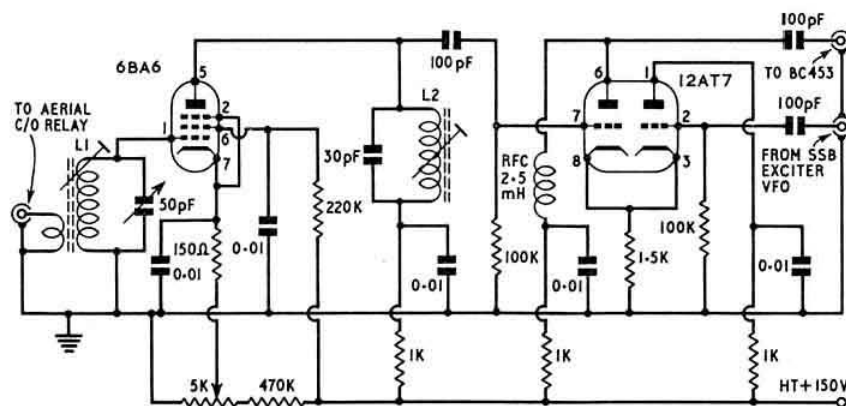
a single 12AT7 as a converter without any r.f. amplification, although two tuned circuits were used at the operating frequency to provide the necessary front-end selectivity. Fig. 2 shows the circuit of the converter which is at present in use. The tuned circuit in the anode of the 6BA6 stage is adjusted to resonate in the middle of the 80m band and only the grid tuning of the r.f. stage has to be adjusted to give the necessary band coverage.

The combination of the BC453 and s.s.b. exciter as a transceiver is put forward as a simple way of providing a more convenient method of s.s.b. and c.w. operation. It will be seen that most of the popular s.s.b. transmitters at present in use can be combined with the BC453 in this way. The only modification required to be made to the transmitter is the fitting of a co-ax socket for the v.f.o. output. As an example, if an s.s.b. signal is being generated at 450 kc/s by the filter method and is mixed with a v.f.o. signal tuning between 3.05 and 3.35 Mc/s to give

output on 80m, the BC453 will have to be tuned to the frequency of the carrier oscillator, i.e., 450 kc/s.

Recent commercial practice in the United States would seem to indicate that transmitters and receivers as separate items are becoming out-dated. At any rate, that is the current fashion.

One prominent manufacturer of amateur equipment has recently introduced an all-band transceiver in which independent receiver tuning is available, and it is assumed that a "walking i.f." is employed. The method of providing this facility with the aid of the BC453 will, it is hoped, encourage others to try the system.



L1 and L2 — 60 TURNS CLOSE-WOUND WITH 24 swg ON 1/2" DIA FORMER SLUG-TUNED

Fig. 2. The 80m receiver converter.

conducted by "JIX"

THE Editor recently suggested to me that the first one or two articles in this series had perhaps aimed a little low in standard. This was taken as a good sign, because to be in error in that direction is preferable to "blinding with science" so common in many so-called instructional writings these days. No young person or beginner can now say that he has never seen anything in the BULLETIN simple enough for him to understand throughout!

But perhaps G2AHL was right and we could lift the technical level a bit because you must have found little to challenge or debate, judging by the very small response from you in the form of suggestions or remarks. Perhaps you thought the other chap would do it; the trouble is there are no other chaps apparently! It was intended to make this feature yours in the sense that views, results and such things as a few "pen-pals" might be developed via the BULLETIN, which is the journal of the Society and you all are members. That brings me to a point: we have often wondered why you joined; was it to get something, or to serve a movement or what? This personal side is interesting and everyone is likely to have views about it whatever his interest. Another point, mentioned before in *QUA Associates*, is the hope that some readers will deliberately set out to help start up an interest in electricity and radio with younger people. Many of you must still be at school, and you may not have considered spreading our hobby in this way, but I hope you will allow these few words to encourage you. I suppose you will agree that it is easy for us to get carried away rather self-centredly with our own affairs, but to help a beginner to receive his first radio signal, maybe on a crystal set, has its own satisfaction; hence the simple start to this series.

Top Band seems to contain an increasing number of beacon stations of various types, at least that was how it

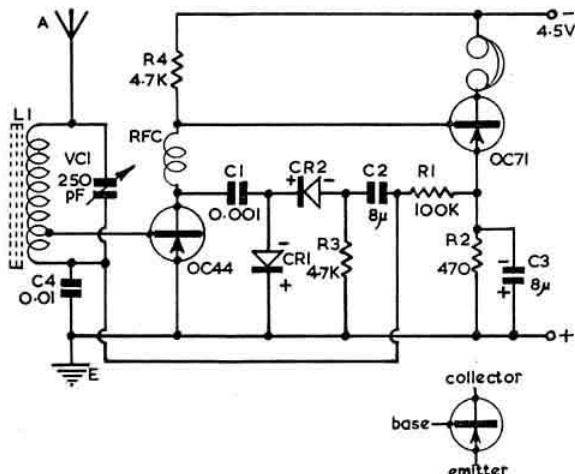


Fig. 1. The final two transistor reflex receiver shown here will pull in many stations; try it on Top Band. The symbol used for the transistors has been proposed as an alternative for junction types. The OC44 collector current should be about 0.5 mA and the OC71 current 2 mA.

seemed the other week listening on the club's receiver here in London. It may be that the band was open. A number of northern stations were heard, and a few GMS. Loran always comes up at night of course. The particular strength of these stations to you obviously varies according to where you are and I shouldn't think there are many places around this part of the world which are free from their effects.

It is interesting to note that under the new licence conditions, 2 metres will be useable with satellite relay systems.

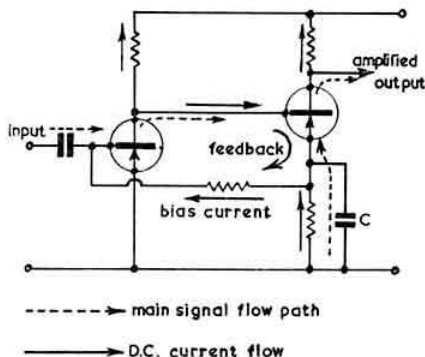


Fig. 2. The biasing arrangements for the transistors is shown here. The signal paths are normal, but no coupling capacitor is required between stages, the collector voltage of the first stage being that which is required for the base of the second.

One can visualize a QSO across the Atlantic using this band, with the directional aerial tilted to the angle of altitude of the satellite, varying all the time of course, and a fairly hurried final over as the satellite passes over the horizon out of range. Another point to ponder is the possibility of Amateur TV pictures bounced over the Atlantic via a satellite—a sort of amateur Telstar. I wonder who will be the first two amateurs to see each other's shacks direct in this way?

The Receiver

We come to the last part of the transistor receiver we have been describing: the addition of a further stage of a.f. amplification. The resulting two transistor receiver should have a good performance consisting, as it does, of an r.f. stage, detector and two a.f. stages.

The circuit to be described is more than the addition of a simple a.f. stage. It is an example of a very interesting transistor amplifier circuit known as the d.c. coupled pair. The coupling between the first and second stages is seen to be direct. The bias current for the first transistor base is obtained from the emitter circuit of the second stage. Notice that this means a complete loop can be followed round. Starting at the base of the first transistor, signals and d.c. level changes appear amplified at the collector and pass on to the base of the second transistor. Corresponding d.c. changes appear at the emitter of the second transistor, and the base of the first transistor varies, thus keeping the circuit stable.

The signals find an easy path via the decoupling capacitor; only the slow d.c. drifts are wanted in the emitter circuit of

the second stage. The output signals appear strongly amplified at the collector of this stage, however, and will operate an earphone or small loudspeaker. This circuit description is an example of *feedback*; in this case, negative d.c. feedback which keeps the currents flowing in the various parts of the circuit relatively steady in spite of temperature variations. Without this kind of stabilization against changes in temperature, the circuit could easily pack up if the set got too hot, or the transistors might even suffer thermal runaway and be destroyed. Valve circuits are not troubled with temperature effects in this way.

Now back to our set and to the first stage, which is still arranged to operate as a reflex r.f./a.f. amplifier, but as the bias is now obtained in the manner described above, no potential divider or emitter resistors are required. The currents flowing in the collector circuits should be about the values stated; if you have a milliammeter you could try measuring the currents in your particular set.

The set has been found to give good reception of medium wave broadcasters, a few local amateurs on Top Band (160 metres) and loudspeaker results on the strongest stations. The set works well with the ferrite rod aerial only—of course, you may obtain different results according to where you are. I hope you will have the same success and fun experimenting with circuits such as these as have the lads who built them with me.

What "A" Members are Doing

I hope you all have had or are having an enjoyable holiday. Did you see any new aerial arrays or mobile stations on your travels? I remember going round having a fine old look for likely Windows or rotary beams, before getting on the air. Even recently a tap on the door has resulted in a few minutes chat and a new friend made in a district never before visited. It is only fair, though, when making unexpected calls to ensure that no inconvenience is caused to your host (who may be busy at that moment). A quick "73" is all that is required, but Amateur Radio thrives on this kind of tactful friendliness and esprit-de-corps.

I visited David Smith, A4097, and had a long chat with him. David said that he didn't think "A" members could do much in the affairs of the Society because they cannot vote, anyway, and have not had enough experience. I didn't agree fully with David on this, there are many things boys can do, and should. As for lack of experience, the very involvement in helping to run things and taking a bit of trouble is experience itself. I find enthusiasm and loyalty to the movement the greatest assets in young people.

Philip Reilly, A4054, has been listening to Top Band since last January, but apparently his receiver has been performing well on the "image" frequency, because he reports hearing amateurs near the Welsh Home Service! No doubt these stations are twice the i.f. from Top Band: we haven't checked this, however!

Gillies Wylie, A3699, has been listening on the h.f. bands with a nine valve receiver. A3699 asks why is it that so few stations QSL? This is the age old problem for SWL's, and fewer stations in fact QSL anybody these days it seems, but really good reports containing useful data and perhaps some scientific observations (to the appropriate stations of course)* will still give rise to a fair return. Gillies goes on to say that he has a pen-pal in Canada who is also interested in radio.

Murray Wilson, A4223, has recently joined the Society and we would like to welcome him to membership. I have no doubt that we shall be hearing from him again, perhaps with the news that a new call-sign has been obtained!

I have been hearing from, and on occasion meeting one or

two of you, which has kept things lively. The question of the next A members' meeting has come up occasionally, and so perhaps those who would be interested in a further meeting would drop a line for a ticket (so that we know how many are likely to come). The next meeting will be in London, and please bring any friends who are keen on radio whether in the RSGB or not.

I met Geoffrey Ganford, A4178 of Barking-side at a meeting at Ilford. Geoff. is a keen Top Band listener and hopes to get his "ticket" sometime soon.

Arthur Hornby, GM3HBY, wrote to me from Glasgow. Arthur is the Area Representative, and would be very pleased to hear from any beginners in his area. We would therefore recommend our young Scottish friends to drop GM3HBY a card. His address is 93 Croftfoot Road, Glasgow, S.4.

Associates Stand at the Exhibition

The Exhibition at the Seymour Hall is nearly upon us. This year the younger members will have their own stand, and I hope you will make it a centre for meeting and perhaps making new friends. You may meet a chap who lives nearby in your own home town, or by contrast, from the other end of the country. A visit or letter after the show might mean a new friendship begun and later, on the air, memories and yarns to tell. Do not forget the A members' constructional work display, there is still a week or two left for you to enter something. Let us show the visitors what the young radio enthusiasts in Britain can do. Bring your pals who as yet are not members of RSGB, for we will be enrolling Associate members at our stand; you never know, your friend, brother or school mate may join. I hope to be around the A members' centre for much of the time, so if you would like a chat, turn up.

The Council of the Society has approved separate awards for Junior Constructors, one for the group under the age of 16, the other for Associates over that age. Please send your offers of equipment for exhibition to G3FRV. Also, if anyone can manage stand duty for one or more days of the exhibition, write to me; you should have a good time meeting the other lads in the Society, but a fair old effort is needed to deal with the queries, etc.! If you have any proposals in connection with the show; or want any advice drop me a line.

The Education and Training Committee asked the clubs and societies for information about local conditions and Amateur Radio facilities. One question concerned the possibility of finding an adult leader, perhaps a licensed amateur, for the young members, and whether a weekend conference for leaders could or should be arranged. There were quite a few clubs which were keen on this, and we hope to organize a conference in the near future. We would like to know what you, the younger members, think of this. For instance, how much say in the running of the club affairs for young members should be given to those members? Remember, there is another possibility which has already been mentioned in *QUA Associates*, and that is a weekend residential Youth Centre or Camp meeting for keen lads who would like to take part in Amateur Radio activities. Who would come along, that is the question?

I am writing this with sunshine all around the field in which I am sitting, and the little 34 c.c. JAP engine is popping away generating the power for the Top Band rig at the Roding Boys' Society camp. This annual week's camp is run by the boys of the RBS and we have had an fb time—so far! How many of you like camping? Take a rig with you one day, it's great fun! 73 for this month. JIX.

* A reprint of "The Beginner's Guide to DX Listening" which gives some good advice on sending reports to amateur stations may be obtained by sending an s.a.e. to Headquarters.

Reports for inclusion in this feature, which will be most welcome, should be sent direct to Ken Smith, G3JIX, 82 Granville Road, London, E.17.

Single Sideband

By G. R. B. THORNLEY, G2DAF*

At the present market price, Kokusai mechanical filters have become very popular and many amateurs are using these units as sideband filters in both transmitters and receivers. Notwithstanding this, many home constructors like to experiment, particularly when it is possible to use crystals purchased on the surplus market, and therefore there is still interest in high frequency sideband filters using the readily obtainable FT243 quartz crystals.

A keen experimenter who has done a lot of work with h.f. crystal filters is VK2AVA. The writer is indebted to G3AOO for forwarding the information given here.

The VK2AVA 5 Mc/s Crystal Filter

The circuit diagram is shown in Fig. 1, with the filter inserted between the mixer and the first i.f. valve (as it would

pole frequency. Anyone who is able to make this modification can then choose four crystals with identical characteristics, and increase the air-gap of two to make a perfectly satisfactory filter.

There should now be two crystals, X1 and X3 for f1 with about 2 kc/s between pole and zero frequencies and two crystals, X2 and X4 for f2 with somewhat less spacing between pole and zero. A crystal is needed for the carrier on a frequency at the 20db point, which will be about 700 c/s from the nearest filter crystal. For alignment, a signal exactly in the centre of the passband is injected and all tunable circuits peaked for maximum output. Any unevenness of response can usually be corrected by adjusting L3, the bifilar coil. This latter coil can be made from the powdered iron nut out of a surplus walkie-talkie coil. L3 should, incidentally be tuned to a higher frequency than the filter centre frequency, the amount corresponding to spacing between f1 and f2. This is to reduce the centre passband "valley."

VK2AVA is willing to answer any queries regarding his filter circuit, but we would ask that a stamped, addressed, envelope be enclosed with any correspondence.

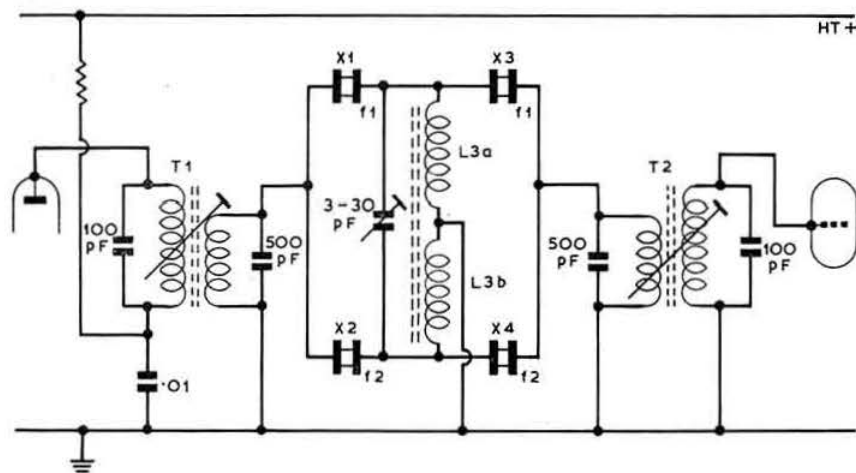


Fig. 1. The VK2AVA sideband filter using FT243 crystals on a nominal frequency of 5.5 Mc/s. L3, 20 turns of wire bifilar wound on a ferrite toroidal core. T1, T2, 45 and 15 turn windings on a 1/2 in. diam. former with dust core.

be used in a receiver). Both the input and the output transformers resonate at the filter frequency, the step-down windings being necessary to match the low impedance of the h.f. crystal filter.

It is advisable to have a good selection of crystals to find the best ones for use in the filter. The first check is for normal oscillator activity, then the pole/zero spacings are checked as well as spurious response frequencies, which is more important for receivers, as in a transmitter these spurious responses are usually outside the audio modulation range.

If the pole/zero spacing is more than about 2.2 kc/s the crystal is not considered satisfactory for filter use. The ideal situation appears to be when f1 pole frequency equals f2 zero frequency, although crystals are usable if f1 pole frequency is less than f2 zero frequency. Moreover, good crystals for f2 are those with the closest zero pole spacing, producing the steepest skirt. The zero/pole spacing can be altered slightly by changing the air-gap in the holder: a larger gap increasing the zero frequency and decreasing the

Carrier Suppression

It is quite common to hear on the 80m band an amateur protesting that the report he has been given, i.e., "There is a considerable amount of carrier on your transmission," cannot be corrected because there is no r.f. drive showing on the p.a. anode current meter.

But let us consider a final amplifier comprising a pair of 6146 valves. These are normally operated in class AB1 with about 700 volts h.t. supply and a static anode current of 50 mA. This represents an input power of 35 watts under zero signal conditions. In a class AB amplifier the anode current flows for approximately 200° of each r.f. cycle and under speech conditions the anode current meter reading

increases at syllabic rate. However, at low drive levels, where the negative cycle of the grid driving voltage is not taking the valve beyond the cut-off point, anode current is flowing for 360° of the r.f. cycle. The p.a. is therefore operating in class A, and the anode current meter will remain stationary just as it does in any other class A amplifier.

Assuming that the p.a. efficiency under class A conditions is 25 per cent (a fair estimate), and remembering that the steady power input to the p.a. is 35 watts, the transmitter can be radiating almost nine watts of r.f. carrier. This is quite an appreciable signal. If the power amplifier was larger—for instance an 813 with a zero signal input of 100 watts—25 watts of carrier could be radiated without any movement of the anode current meter.

It is obviously a mistake to attempt to adjust carrier balance and assess carrier suppression by reference to the p.a. anode current meter, or even the meter in a standing wave indicator (reading forward power) in the coaxial line; for neither meter is sufficiently sensitive to register at low r.f. drive levels.

Carrier balance can be adjusted satisfactorily in three different ways, (i) a sensitive absorption wave meter with a diode and a 100 μ A meter coupled to the transmitter tank coil,

(Continued on page 670)

* 5 Janice Drive, Fulwood, Preston, Lancs.

ONE is frequently asked by the newcomer to RTTY what literature is available on the subject, so this month we propose reviewing various sources of information, which will help not only the beginner, but also some of the more experienced RTTY enthusiasts, to a better understanding of this mode of communication.

First of all we would recommend a perusal of *Telegraphy*, by Freebody, published by Pitman. This is a large textbook on all methods of telegraphic communication and it is expensive, but a copy can be borrowed from your public library. They can get a copy for you, if they do not already have one. In it are excellent chapters on most of the current Creed Teleprinters, ancillary equipment such as perforators, auto-heads, power supplies and so on, and there is a good section on teleprinter communication theory, for those who like that sort of thing. This textbook is of course intended primarily for the professional, but the amateur will find much of use and interest in it.

BARTG Manual

Turning now to publications intended specifically for the amateur RTTY enthusiast, first we should mention the *RTTY Manual*, produced for members of the British Amateur Radio Teleprinter Group. We have mentioned this in passing several times before in these notes, but we do so again, as it has been most favourably commented upon by many who have read it. It is intended specifically for the beginner, containing sufficient theory to enable the reader to appreciate the technique of radio teleprinter communication, and then going on to describe the practical application of this to an Amateur Radio station. It consists of a collection of reprints of RTTY articles from the "Getting started on RTTY" series published some little time ago in the *Radio Constructor*; articles on RTTY technicalities by Wm. Brennan, G3CQE, from the *Short Wave Magazine* and several of the contributions to this series of articles by the writer, together with a number of other articles from various sources. The first edition—some three hundred copies—is nearly exhausted and a second, enlarged edition is in course of preparation. A few copies of the first edition are still available from the Honorary Secretary, BARTG, at 6s. post paid.

US Publications

The two major amateur RTTY publications come of course from the USA. *The New RTTY Handbook*, by Byron H. Kretzman, W2JTP, published by the Cowan Publishing Corp., publishers of the magazine *CQ*, is available from RSGB Publications at 30s. post paid. Whilst, of course, it covers primarily American practice, there is plenty in it of interest to British readers, and a number of American type machines do from time to time find their way into British Amateur RTTY stations. The section on Accessory Equipment in this book is of particular value and it is a publication which is a *must* for any serious RTTY enthusiast.

HAM-RTTY, by W2NSD/1 and W4RWM, Wayne Green and Fred DeMotte, is designed for the newcomer to amateur RTTY. Again, even though written primarily for the American amateur, much of interest to the European reader is to be found in its pages. It is well illustrated, both with photographs of equipment and line drawings of circuits, and a number of ideas will be found in it which do not appear elsewhere. A very useful bibliography of RTTY articles appears at the end of the book, together with a list of

technical manuals of interest to the RTTY enthusiast. It is available from the publishers of *73 Magazine*, Peterborough, New Hampshire, USA, price \$2.

The only Amateur Radio magazine devoted entirely to RTTY is that produced by the RTTY Society of Southern California. It is titled simply *RTTY* and is an excellently produced little magazine averaging 18 or so pages per monthly issue, well printed and well illustrated. A special feature is made of bringing to its readers all that is new in the field of Amateur Radio RTTY communication. There is also a RTTY-DX feature, which appeals greatly to the "country-chasing" fraternity and is right up to date—a difficult task in the sphere of "what's-the-latest" regarding RTTY-DX activity. Great credit goes to Merrill Swan, W6AEE, who has edited and produced this publication over a period of ten years and every keen RTTY enthusiast should subscribe to it if he wishes to keep up to date. It is available from RTTY Inc., 372 Warren Way, Arcadia, California, USA, at \$3 per year, plus overseas postage. It is well worth the trouble of getting it.

An RTTY Society for Europe?

When the British Amateur Radio Teleprinter Group was started in the summer of 1959—just five years ago—there was no RTTY activity in Europe at all. Those founder members of BARTG who carried out the first RTTY tests, viz., G3CQE, G3IAO and G2UK, were the first to introduce RTTY to the European Amateur Radio scene.

Now, however, RTTY is operative in practically every European country and the BARTG has members from most of them. Oddly enough, BARTG is the only society existing in Europe specifically organized to cover the interests of the RTTY enthusiast. It is not surprising therefore, that the suggestion has been made that a society should be formed to cover all RTTY interests in Europe. This would have a number of advantages such as bringing in RTTY enthusiasts in European countries outside Britain who do not feel they want to belong to some other country's "national" society. It would help to regularize RTTY operating standards in Europe; could organize RTTY contests and in many other ways could represent the European RTTY enthusiast's interests more effectively than any purely "national" group or society. Just how this European RTTY society could be formed and run is a matter for considerable thought. Naturally, BARTG with five years of experience could help greatly in formulating the constitution of such a society and the suggestion has already been made from some overseas members that it might form the basis of such an organization. BARTG Committee members are now considering the implications of this interesting suggestion.

RTTY News

From time to time, we have the pleasure of receiving letters from overseas RTTY amateurs, bringing us up to date with the news from their own countries. We recently had such a letter from IILCF, Dr. Franco Fauti, of Bologna. In it, he gives us the whole story of the development of RTTY in Italy, which makes most interesting reading. The first person to establish RTTY in Italy was, of course, IIRIF in Milan. His signals have been outstanding on the 14 Mc/s band, and he did in fact win both the 1962 and 1963 Worldwide RTTY Contests sponsored by the RTTY Society of California. Another Milan amateur, IIGMF, is also about to become active on RTTY. The Radio Club of Como mentions in its magazine that an RTTY section is being formed, but no details of activity are yet to hand. There are two active RTTY stations in Genoa, one of which is IIRKY, but the call-sign of the other station is not known to IILCF. IIRO is active in Modena and there is also some RTTY activity in Florence. Again, calls are not, at present, known.

Dr. Fauti goes on to say that in his own city of Bologna,

* Honorary Secretary, British Amateur Radio Teleprinter Group, "East Keal," Romany Road, Oulton Broad, Lowestoft, Suffolk.



IILCF's Siemens teleprinter which "introduced the RTTY bacillus into Bologna."

RTTY activity started in January 1964, when he acquired an old Siemens teleprinter. As he says: "This introduced the RTTY Bacillus into Bologna!" IIVH also acquired a similar printer, and IIAIJ and IISAB are just about ready to start RTTY operation. It is interesting to note that the input power of the transmitters is low—as foreign RTTY stations go—IIAIJ using 140 watts and IILCF and IIVN using only 40 watts, but they have made numerous QSOs with European and DX stations. It is also worthy of note that Italian stations have to use the International Teleprinter speed of 50 bauds.

Wilfred van Heddegem, ON4HW, writes to us from Bevere-Oudenaarde to say that earlier news of RTTY activity in his country was somewhat premature, but now something definite can be announced. Licences for RTTY began to be issued at the end of last June, and Wilfred worked FG7XT for his first RTTY QSO. A teleprinter speed of 50 bauds only is permitted with maximum frequency shift of 900 c/s.

At home, activity has shown its usual summer drop, but by the time this appears in print, it will no doubt be on the increase again, as a number of new stations have indicated that they intend being on 80m RTTY during the winter. The BARTG RTTY Test Transmissions have been carried on throughout the summer, and Arthur Owen, G2FUD, has joined G6CW and G2HIO in carrying the burden of putting them out each Sunday morning. G2FUD has also taken over

the production of the Group's Newsletter—and a very fine job he made of his first issue.

G2FUD made the first G/GI RTTY QSO with Harry Shaw, G12AFW, early in August, thus starting off RTTY activity in N. Ireland. G15AJ is also active on RTTY and we hope to be hearing more of him on the bands very soon.

BARTG AGM

The Annual General Meeting of the BARTG and the social evening which follows it, will be held at The Olive Branch, Homer Street, just round the corner from the Seymour Hall, at 6.30 p.m. on Saturday, October 31, the last day of the RSGB Radio Communications Exhibition. The meeting is open to visitors, but it would be appreciated if non-members of BARTG who intend to be at the meeting would inform the Honorary Secretary, Dr A. C. Gee, in advance.

* * *

Finally, a very interesting comment quoted from the *RTTY Bulletin*, from Florida, USA. A description of a demonstration of commercial gear for converting RTTY signals into Morse Code, reads as follows:

"Using the Frederick Electronics Corporation's Model 660A, he showed the group how the tape was fed through a tape distributor to the converter, which fed the signal into an external amplifier and speaker. He outlined the process of development of the converter and spoke of bigger things to come in this field. Vic, who is Chief Engineer of the Frederick Electronics Corporation, surprised the group when he pointed out that the use of c.w. was growing, not declining. He said: "More and more c.w. is being employed by those agencies who do not have sufficient traffic to make an RTTY installation pay. There are many who feel that just because we have RTTY, that the mode has been replacing c.w. circuits. We do not find this to be the case, for although RTTY circuits have been increasing, it is simply due to an increase in traffic load which has required expansion of many of the present circuits."

Interesting—this should please the c.w. fraternity!

CONTESTS DIARY

- | | |
|---------------------------|--|
| October 10-11 | - VK/ZL/Oceania Contest (c.w.). |
| October 10-11 | - VU2/4S7 Contest (phone). |
| October 17-18 | - Second 420 Mc/s Contest (see page 471, July, 1964). |
| October 17-18 | - VU2/4S7 Contest (c.w.). |
| October 21-22 | - YL RL Anniversary Party (c.w.). |
| October 24-25 | - CQ WW DX Contest (phone). (see page 684). |
| October 31- November 1 | - RSGB 7 Mc/s DX Contest (phone). (see page 328, May, 1964). |
| November 4-5 | - YL RL Anniversary Party (phone). |
| November 21-22 | - RSGB 7 Mc/s DX Contest (c.w.) (see page 328, May, 1964). |
| November 28-29 | - Second 1.8 Mc/s Contest (see page 539, August, 1964). |
| November 28-29 | - CQ WW DX Contest (c.w.). |
| December 5-6 | - RSGB 21/28 Mc/s Telephony/Receiving Contests (see page 472, July, 1964). |
| December 5-6 | - OK C.W. DX Contest. |
| December 13 | - 70 Mc/s C.W. Contest (see page 539, August, 1964). |

THE MONTH ON THE AIR

A CHRONICLE OF EVENTS ON THE HF AMATEUR BANDS

By R. F. STEVENS G2BYN *

IN accordance with the forecast of rising sunspot numbers during the initial months of 1965 it seems probable that the trough of cycle no. 19 will occur during November/December 1964. Whilst this is a good sign there will not be any startling and immediate reactions in so far as DX is concerned. When comparing cycles nos. 18 and 19, which began in 1944 and 1954 respectively, it is seen that the earlier cycle took three years and three months to attain its maximum whilst the present cycle took three months longer. Cycle no. 18 took six years and eight months to drop from its peak to minimum and it appears that this period will be roughly correct for cycle no. 19. The comforting thought to be derived from these figures is that once the trough of the cycle has been passed the sunspot activity will increase at twice the rate at which it deteriorated during the years after the peak had been reached. So out with the slide rule (or cheque book) and into the queue for a 28 Mc/s beam.

The 1964 holiday season has brought into London some distinguished overseas DX'ers and during the course of lengthy personal QSOs it has not been surprising to learn that in many quarters it is considered that the ill-mannered operating of a minority may well spell the end of the DX Century Club of ARRL. Forged QSLs, "bought" QSLs, relaying of signal reports by third parties, QSOs over a land line and phone patch and not from the operator's station, deliberate QRM, to name but a few of the evils that have been bred by the competition of DXCC and other prestige tables. These things have no place in the proper scheme of things, and if someone has the solution to the problem of retaining DXCC whilst stopping the inconsiderate operating of a vociferous few then we would all like to hear about it.

News from Overseas

The *Cyprus Mail* of September 4 carried the following paragraph: "The Council of Ministers meeting under the chairmanship of President Makarios decided to cancel all wireless licences possessed by amateurs." 5B4CZ/G3LWS, who sent the newspaper cutting, reports that all operators who were located in the Republic proper, as distinct from the Sovereign Base Area, have had their gear confiscated. One of the immediate results of this action, for which no reason has been given, is that the beacon station 5B4WR on 29,008 kc/s is off the air, to the disappointment of those participating in the TE and Sporadic E IQSY projects. The edict does not affect the stations in the Sovereign Base Area who may continue to operate but will revert to the ZC4 prefix, although at the time of writing the position is confused. Although it is questionable if the issue of licences by the Republic to operators in the SBA has been legally correct since August, 1960, it is a fact that the initial licence cost £6 and £4 per annum renewal. The Treaty of Establishment set up a joint committee to deal with communications matters of common interest, such as Amateur Radio, but this committee was not convened and the announcement by the

Cypriot authorities was based on a unilateral decision. Our Cyprus correspondents are thanked for their co-operation in providing information on which this paragraph is based, and it is hoped that we shall very soon hear them on the air once again.

Leaving another Mediterranean island after two and a half years residence, ZB1BX is now again G3KXF on the Sussex coast. Denzil finds the pace from the UK rather less hectic than that at Malta, and is currently enjoying a period of rag chewing compared with the high pressure QSOs made from ZB1BX. ZB1RM will be returning to Malta shortly, possibly with an SB10U to use with his a.m. rig, and ZB1CR is now in the UK after a tour of Canada.

Bob Milton, now 9M4LX, and various other dxotic calls, reports that all the operation from VS5LX, ZC5AJ and VS9MG have been QSL'd 100 per cent, with large batches of cards going through the MARTS Bureau. Any operator who does not expect to receive an outstanding QSL through one of the bureaux should apply to 9M4LX direct, together with the usual s.a.e. and IRC. Incidentally, first-class air mail to Singapore at Forces rate is 6d. for the first 1½ oz. ZC5AM is now in Hong Kong and will receive the expedition gear on loan as soon as he has settled in and will promote some VS6 s.s.b. activity. 9M4LX promises to be active during the RSGB 7 Mc/s Contest, and may be on from VS5 during that weekend. Bob was pleased to receive recently a certificate from the North Jersey DX Association for his services to the DX fraternity.

A note from K2UYG will shed some light on the current TT8AJ QSL situation. K2UYG has recently received a complete set of logs covering the last two years. These logs contain details of the c.w. and s.s.b. operation of operator "Yves," but another operator answering to the name of



W1BB/I 160m DX station in a stone house beside the Atlantic Ocean. The aerial is an inverted-V with the apex 260 ft. above a salt water ground-plane, and the equipment consists of a Valiant transmitter, and a Hammarlund HQ170 receiver with a Hallicrafters SX100 auxiliary receiver.

*Please send all items to RSGB Headquarters to arrive not later than October 9 for the November issue and November 18 for the December issue.

"Tom" operated the station during the autumn of 1963. Those who QSOd "Tom" should address their QSL requests to W0IFQ, but K2UYG will be pleased to handle cards for the regular operator Yves Melisi. The usual courtesy of s.a.e. and IRC should accompany direct requests.

Ex-DL2PB, DL2ZN and G3PRI is now at Sharjah in the Trucial Oman and is looking forward to resuming activity on 14 Mc/s a.m. with a call in the MP4T series.

G3DWE is the call of VS1JO who reports having QSLd all contacts up to December 18, 1960, mainly through the MARTS Bureau. Some blank cards are still available and enquiries regarding missing QSLs may be sent to the address in QTH Corner.

5A2CX is QRT after nearly five years of operation from Benghazi, and is living in the Belfast area. Enquiries concerning QSLs may be sent to his home address given in QTH Corner.

If you think that your aerial is large, possibly attracting scrutiny from neighbours and passers-by, what would be the reaction to the new quad of K4VCW which has eight elements mounted on an 80 ft. boom of 4 in. tubing. This monster, weighing about 150 lb., is mounted on a 90 ft. tower! Town and Country Planners, please note.

VK4SS reports conditions in Oceania as being at an all-time low, but mentions the following stations as active. Obviously local to VK4, but DX to the UK are VK9DR (Christmas Is.) heard often around 07.00 on 14,030 kc/s; VK9CJ (New Guinea) on 7 Mc/s around 09.00; VK9NM (Rabaul) on 7 Mc/s around 20.00; VK9RB (Norfolk Is.) heard on 14,040 and 14,085 kc/s around 07.00 (and later); FO8AG heard on 14 Mc/s around 07.00. FB8YY and FB8WW are reported to have a short sked on 14,040 kc/s at 05.00 daily, and thereafter both work DX for the next two hours.

Top Band news is lacking this month although reports of trans-Atlantic QSOs have filtered through. VK3BM, who recently worked W6VSS, and is looking forward to UK contacts this winter, uses a ground plane 126 ft. high with 16 radials, each 126 ft. long.

W8NRB/UA will be operating from Moscow between December 1 and January 10, 1965. This is a US Information Agency station using Hallicrafters equipment, but the operation from Kiev was not the first time that a US station



VK4SS operates on all bands from 10-80m on c.w. with an input of 40 watts. His aerials include a Bruce 4 element for 40m beamed on Europe. He has worked 261 DXCC countries and 407 prefixes for the WPX Award.

QTH Corner

| | |
|------------|--|
| DJ4EK/TA | via DL3RK, Hauberstr. 2, 138 Kaufbeuren, W. Germany. |
| FP8CK | via W2JAE, 22 Canterbury Rd., Livingston, NJ, USA. |
| FP8CX | via W6HS, 2153 Lyans Drive, La Canada, California, USA. |
| GB2JOG | via GM3SFH, A. J. Oliphant, 17 Rockwell Crescent, Thurso, Caithness, Scotland. |
| KG6SZ | via WA6ZIQ, 3716 Lankershim Way, North Highlands, Calif., USA. |
| KW6 Bureau | A. D. Samuels, PO Box 445, Wake Island. |
| KS6BN | Box 8, Pago Pago, American Samoa. |
| LX3BD | via DJ6SI, J. Classenstr. 40, 5 Koeln-Kalk, W. Germany. |
| MIFT | via DL7FT, Petunienweg 99, 1-Berlin-Rudow, W. Germany. |
| OA1U | J. B. Price, Casilla 128, Chiclayo, Peru. |
| SV0WGG | via K1EAT, 226 York Street, West Haven, Conn., USA. |
| VP2KT | T. Henry, Greenlands, Basseterre, St. Kitts, BWI. |
| VR2ES | PO Box 210, Nandi, Fiji. |
| ex VS1JO | W. G. Durham, Merdeka, Long Close, Ilminster, Somerset. |
| VS9PGM | D. Bushe, D.W.S. (F.O.), Aden/Perim, PO Box 5153, Maala, Aden. |
| W9WNV/XU | via K6EVR, 9861 E. Estrella Ave., Temple City, Calif., USA. |
| XW8AV | C. Jones, USAID/BPR, APO 152, c/o Postmaster, San Francisco, Calif., USA. |
| ex ZB1BX | D. S. Roden, 65 Ullswater Road, Sompting, Lancs, Sussex. |
| ZL1ABZ | via ZL2GX, J. White, 152 Lytton Rd., Gisborne, New Zealand. |
| ex 5A2CX | R. Joyce, 4 Kings Link, Knock, Belfast, N. Ireland. |
| 7G1L | via Hammarlund DXpedition of the Month QTH. |
| 9M2LO | D. E. C. Lockyer, Mindef, Rifle Range Rd., Kuala Lumpur, Malaysia. |
| 9M4MO | F/Lt. A. M. Jeenes, Officers' Mess, RAF, Tengah, Singapore, Malaysia. |
| 9Q5AB | via WA4STL, 3326 Sergeant Drive, Charlotte 8, N. Carolina, USA. |

RSGB QSL Bureau: G2MI, Bromley, Kent.

had operated from the USSR. G2YS is the owner of a QSL card which records a 28 Mc/s QSO on December 30, 1946, with W3JAK/U, located at Novorissk.

DXpeditions

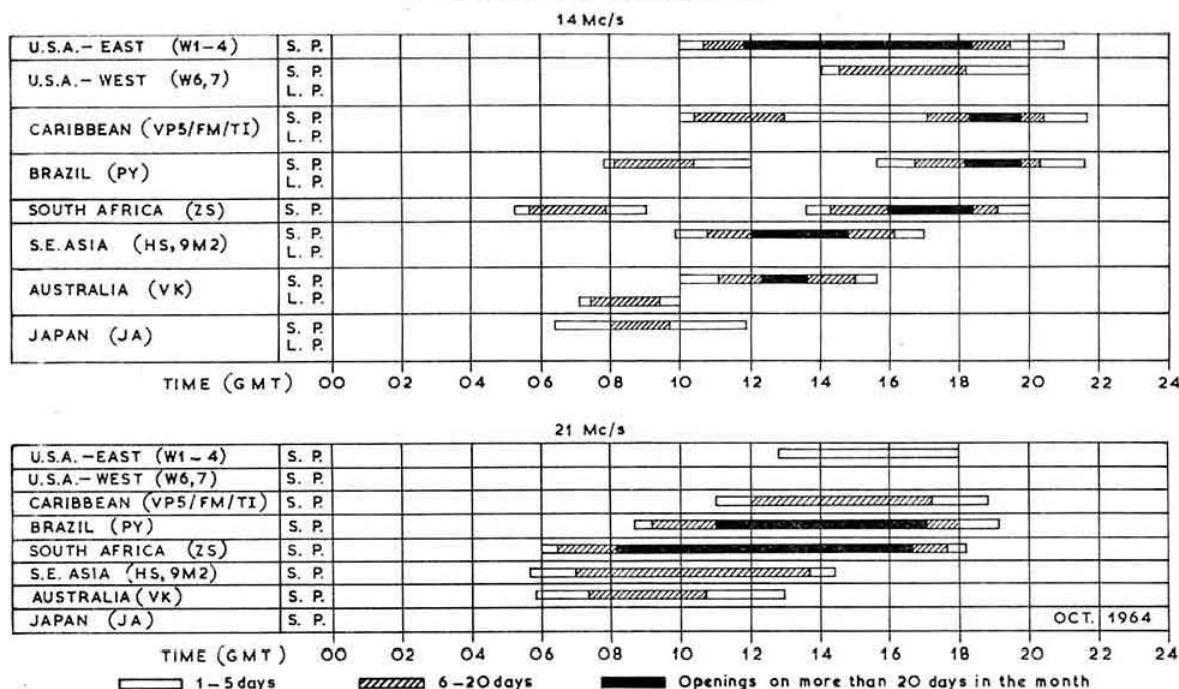
The latest news on the trip of Don Miller, W9WNV, to Cambodia is that he will leave the USA around September 22 and will be active for a period of five days between September 25 and October 25. Presumably more precise information will be available in due course, but it will obviously pay to keep an ear on the 14,050 kc/s spot previously used by W9WNV on his previous DXpeditions. The cost of this trip is considerable and any contributions will be welcome, and should be sent to the QSL manager, K6EVR.

From 9M4LX via G3MEA comes the latest information on the trip of G3NIR: October 28 to November 2, VR2; November 3 to 7, VR5; November 9 to 13, YJ1 and November 14 to 18, FK8. A Viceroy will take care of the transmitting side and the favoured frequency will be 14,112 kc/s \pm .

From VU2NR via G3MVV it is learnt that the trip to the Andaman Islands will commence around November 18 for a period of up to eight weeks. Home-built equipment will be used whilst the three-element beam will be on a 100 ft. mast forming part of the radio installation on the islands. QSLs should go to W4ANE, and the call to be used will be VU2NRA.

Both the present operators at ZL4JF (Campbell Is.) and ZL1ABZ (Kermadec Is.) will return to New Zealand in October. Two new operators are expected to go to Campbell Is. but there may not be any Kermadec activity next year. ZL2GX expects to loan a KWM2 for operation from Chatham Is. before the end of the year. Many stations have recently worked ZL1ABZ and during the course of one morning opening Ian worked over 70 European stations.

PROPAGATION PREDICTIONS



During the months of October and November in mean latitudes, DX conditions on the h.f. bands (21 and 28 Mc/s) reach their peak for the year, but during the present phase of the sunspot cycle, the improvement compared with the summer months will not be as pronounced as in years close to sunspot maximum. 28 Mc/s will, therefore, be of little practical use for DX, and only in exceptional cases may Africa come through between 13.00 and 16.30 GMT. The most favourable time for contacts with South Africa on this band is between 14.30 and 15.30 GMT. Short skip conditions on this band and on 21 Mc/s will now only occur in exceptional cases, but the possibility of European contacts on 28 and 21 Mc/s via auroral reflection will not, however, be affected. After a long summer break South America and Africa should certainly be heard again on 21 Mc/s but Western N. America and Japan will, however, probably not be heard. In contrast to 21 Mc/s all continents should be heard on 14 Mc/s. The shorter days will close this band for DX work between 19.30 and 20.30 GMT towards the end of the month. DX traffic will not be so frequently disturbed by European short skip during the coming months as it was during the summer. Conditions to Australia on 14 Mc/s will show an improvement compared with the summer, which should be very welcome in connection

with the forthcoming VK/ZL contest. KH6 will come through in exceptional cases between 05.30 and 07.30 GMT on the long path and between 16.40 and 18.00 GMT on the short path. 7 Mc/s will become the main band for DX after 20.00 GMT because of the closing of the 14 Mc/s band. From about 20.30 GMT on 7 Mc/s Eastern N. America should come through. In the latter half of the night a low m.u.f. will close the band for US traffic. Basically, contacts are possible on this band as well as on 3.5 Mc/s when the greater part of the transmission path lies in darkness, and this applies especially to 3.5 Mc/s. The longer autumn nights and the decrease in atmospheric noise, together with the low solar activity, favour DX contacts on 3.5 Mc/s. Local traffic on 3.5 Mc/s will still be frequently interrupted in the latter half of the night by the dead zone.

The provisional sunspot number for August 1964 was 8.9 with the period of greatest activity lying between August 12 and 17. Between August 22 and 30 the sunspot number was zero. The predicted figure for November and December is 7, whilst the figure for January, in showing a rise to 8, anticipates the passing of sunspot cycle No. 19, and the commencement of the new cycle.

QSLs for both these stations have been speedily dealt with by ZL2GX to whom a hearty vote of thanks is due.

DJ4EK is making a trip to TA, EP, YA and VU, and hopes to be active on s.s.b. from these countries. He has been worked by TA and is usually to be found between 14,250 and 14,270 kc/s. QSLs should go to DL3RK with the usual s.a.c. and IRC.

The previously announced trip of France, VQ8AM, to Rodriguez, is still to take place as planned and November 14 is quoted as the starting date. It is not yet known if there will be s.s.b. activity in addition to c.w. and a.m. The call to be used will be VQ8AMR, and the period of operation is expected to be about one week.

K1QHP hopes to operate from FL8 during the period November 5 to 25, using a KWM2. There will be c.w. activity in addition to s.s.b. Recent attempts to operate from this part of the world have not always been successful and it is hoped that K1QHP can work the oracle.

GD2HFD/A (G2HFD on holiday in the Isle of Man) had a successful period of not too intensive dx-ing and accounted for 71 countries during the course of 700+ QSOs. Conditions, although erratic, were better than expected, and 7 Mc/s produced some worthwhile s.s.b. DX in the shape of VK2, OX3, EP2, 7Q7, 7Z1, 9Q5 and W's. There was operation on all bands from 1.8 to 21 Mc/s, both s.s.b. and c.w., and QSLs should go to the home QTH.

The movements of W4BPD are shrouded in mystery at the time of writing, but it appears that the Caribbean trip has been cancelled and that AC3 and AC5 are the first stopping points.

Band Activities

It is felt that the prime *raison d'être* for this section is to list the fullest details of the less common DX stations that have been heard and worked from the UK on the various bands, so that other interested operators can see what



ZBIBX operating his station at Safi.

they have missed and probably make use of the time information to aid them in locating stations they particularly want to contact.

The method of presentation in *Around the Bands*, where each contributor's list was detailed individually was, it is felt, unwieldy and, apart from considerable duplication, was not the easiest form from which to extract information.

So this month a new tabulated format is being used in which frequency bands and modes will continue to be dealt with separately, but call-signs in each section are listed alphabetically for ease of reference. The reason for this change is purely an attempt to present the available information in a more convenient form to the reader and to conserve space—it certainly takes longer to prepare in this form—so comments and observations from members will be most welcome, and will be the factor governing whether this new system is retained.

The following survey is made possible by reports gratefully received from: G3AAE, G3GDC, G3PEK, G3SML, G8JM, G8PL, BRS20317, BRS25429, BRS25901, A2340, A3526, A3699, A4035, A4068, A4083, A4089 and A4177.

3-5 Mc/s C.W.: EP2BQ (0046), EP2RC (2240), FP8CA (0015), KP4BJU (0455), LX3BD (1800), PY1BTX (0200), TF5TP (2345), UL7CH (2050), VS1LP (2250), ZL3OX (0610), ZL4GA (0540), ZL4IE (0550), and 4X4KK (2340).

3-5 Mc/s S.S.B.: OY7ML (2310), VE1, VE2 (2200-0000), VO1BJ, VO1CK (2330), VP9FE (2350), ZB1BR (2310), ZL1AX, ZL2AAG, ZL2BCG, ZL2BY, ZL3RK, ZL4BX, ZL4LM and ZL4OD (all 0600-0630).

7 Mc/s C.W.: BY1PK (1800), CM6SG (0030), CO6JH (0035), CP5AQ (2335), CR7CD (1920), EP2RC (2105), FG7XC (2150), FP8CA (0010), FP8CK (0715), FY7YK (0015), HI8NPI (2245), HK3RQ (0525), JA6AK (1835), KC4USK Antarctica (2300), KL7PI (0650), KP4BJU (0450), KR6MO (1915), KV4CI (2300), KV4DB (0045), KZ5AW (2305), LU5ED (0700), LU6DJX (2200), LX3BD (1900), OA4EM (0615), OA4PF (0435), OH2AH/O, OR4VN Antarctica, OX3LP (1730), PJ3CC (0240), TI2CMF (0700), UA1KAE/1 Antarctica (2200), UA0s (1930-2240), VK1RD, VK2QL, VK2VN, VK3KS, VK3RP, VK3XB (all 0630-0740), VK3IT (1710), VK5JE (2120), VK5NO (1700), VK5ZP (1545), VP2KJ (2300), VP2LS (2245), VP6BW (0340), VP6CJ (0015), VP6KL (2100), VP7BG (2330), VS1LP (1650), W6s (0540-0640), YV3FB (0610), YV5AXA (2205), ZL3AAP (0655), ZL4JF Campbell Island (0625 and 0740), 5H3HD (1930), 5Z4IV (1930), 9M2LO (1850 and 2300) and 9Q5AB (2100 and 2215).

7 Mc/s S.S.B.: KP4BJU (2250), MP4BEQ (2025), OA4KY (0630), OY7ML (2030), TI6CAL (0640), VK1ATR (0700), VK2AQJ, VK2AVA, VK2NI, VK2NN, VK2PU,

VK3AC (all 0645-0705), VK3AHO (2040), VK3AM, VK3APF, VK3ATN, VK3BM, VK3IT, VK3XM (all 0700-0715), VK7CK (0640), VP6KL (2115), VS1LP (2335), YA4A (2115), YV5BPJ (0010), ZS1XX (2120), ZS1ZH (2040), 4W1E (2045), 5N2JKO (2120), 5N2RJO (2100), 5Z4AA (2045), 7Q7PBD (2030), 9G1DV (2145) and 9Q5AB (2235).

14 Mc/s C.W.: AP5HQ (1700), BY1PK (0915 and 1800), CE9AG Grahamland (2100), CP5EZ (1940), CR9AH (1320), DU1GF ex-OD5CT (1430), FP8CA (1940), FP8CK (1025), FR7ZD (1550), FR7ZI (1635), FU8AG (0950), HI4ARM (2140), HI8WSR (2140), HP1BR (2215), JT1AJ (1545), KC4USK (1800), KG6AA (0800), W5VWU/KJ6 (0715), KM6CE (1205), KR8AX (1430), KS6BN (0810), KW6EI (0925), LA3IJ/P (1154), LU1ZC Deception Is. (1910), LU8ZI Deception Is. (2015), NH4CL Antarctica (1845), OR4VN (1930) TA2BZ (1915), TN8AF (1710), UA1KED Franz Josef Land (1530), VK9RB Norfolk Is. (0800), VP1TA (2225), VP2AV (2045), VP7NY, VP8CW Grahamland (2040), VP8HJ (1824), VQ8AM (1520), VR1B Gilbert and Ellice Is. (0805), VR2DK (0900), VS4RS (1415), YA4A (1605), ZA2BA (1425), ZD3A (1945), 4X8JU exhibition station (2225), 6O6BW (1700), 7G1IX (1936), 7Z3AB (2119) and 9M4MO Singapore (1545).

14 Mc/s S.S.B.: AP2AD (1615), AP2MI (1630), CR6DB (2035), CR9AH, DJ4EK/TA (1230), FG7XL, FG7XP, FG7XT (1910), FH8CD (1500), FP8CK (2110), HC8FN Galapagos Is. (0000), HI8WFR (0000), HL9KH, HL9KU, HM1AX (1920), HP1SH, HR1SO (2135), HS1S (1720), KB6CS (0800-0900), KB6EPN (0920), KC6BK (0800-0930), KG4BX (2320), KG6IF Marcus Is. (0850), W7ZQX/KG6, KJ6CC (0900), W5VWU/KJ6 (0700), WA6BVS/KJ6 (0715), KH6FHF/KJ6 (0635), KM6BL (0640-0930), KM6CC, KM6CE, W0PI/KM6 (1000), KW6DS, KS6BL (0830), KW6EI (0800-0900), KX6DL (0730-0830), M1FT, TU2AU (2010), UA1CC/UJ8 (1755), UJ8KAA (2055), VK9RB (0830), VP2KD, VP2KM (2300), VP2KV (1955), VP4VP (2100), VP5LU (2325), VP7CC (2100), VP9WB (2045) VR1B (0830), VR2ES, VR2BG, VS9MB Maldives Is. (1655), VS9PDR Perim Is. (1455), XE1FFA (2100), XW8AD, ZL1ABZ Kermadec Is. (0740), ZS2MI Marion Is. (0715), ZS3HT (1810), 3A2CP (1700), 4UIITU (1810), 4W1D (1440), 6O6BW (1330), 6Y5UC (2105), 7Q7DS (2045), 7Q7PBD (2045), 7X3CT (1640), 7Z1AA, 9L1HX (0750), 9L1TR (1940), 9M4LP (1650) and 9N1MM (1605).

21 Mc/s A.M.: CE2CA (2030), CR6DL (1915), CR6GA



Stuart Meyer, W2GHK, Founder Director of DXpedition of the Month, addressing the DX Luncheon meeting of the First Pan American Congress of Radio Amateurs in Mexico City, April 18, 1964. To the left of the picture is Carlos de Leon, XE1CV, and on the right is Max Zeile, HI8MZ/KP4BOA/W2JBC.

(1820), CX4AQ (2035), EL1H (1805), EL5D (1825), ET3USA (1735), KP4BOJ (2030), KV4CX (2205), LX1DB (1245), TN8AN (2010), YV4IQ (2055), 5X5JK (1835), 6W8AE (2035), 6W8AG (1830), 9G1BN (1715) and 9L1WN (1710).

Apart from naming the specific islands in some cases, where they are of special "country" significance, no comment has been included in the above list, but even so, it is obvious that both 3.5 Mc/s and 7 Mc/s have been open in the morning to VK and ZL, and that many rare DX stations in the Pacific area have been worked on both 14 Mc/s c.w. and s.s.b. Likewise, it is obvious that nothing significant has been reported on 1.8 or 28 Mc/s and that little is happening on 21 Mc/s and that the bulk of what is occurs on a.m. All these significant facts are self-evident from the new tabulated presentation.

Your comments on this format will be read with interest, and may your compiler point out that when sending in reports GMT should always be quoted and that lists of stations should please be in alphabetical and numerical order for ease of compilation of the overall lists.

Contests

The 1963 SAC results show the following scores: *England*: G3NFV 1665 points; G3POI 1573; G3PSY 1515; G3LHJ, 1584; G3JFY, 594 and G2GM, 540. G13OTV registered 371 points, GM3DR, 115, and GW3MRI, 477. The Finnish society, SRAL, who sponsored the SAC in 1963, produced an informative booklet showing tabulated results and the rules for 1964, a model for some other contests, the results of which seem to circulate only by the grape-vine.

From G3JUL we have the results of the **OK Contest 1963**: Leading G stations were: All bands, G3EYN, 4500 points; 3.5 Mc/s, G3JUL, 1062; 7 Mc/s, G3FTQ, 238 and from Scotland GM3PAE (all bands), 1692. ZD6OL was top scorer in the world on 21 Mc/s with 888 points whilst ZB1BX collected 480 points from all band operation.

The results of the **1964 CHC/HTH/SWL-CHC QSO Party** show the following stations as winners of the awards sponsored by Chapter 8 (Surrey) of the CHC:

Highest CHC in Europe, OK3KAG; *highest HTH in Europe*, G3EYN and *leading European SWL*, A2340, Barry Curnow of Plymouth. Congratulations to all concerned, particularly A2340 for his second win.

All the DX you can work in a year is the object of the First Annual DXCC Contest being sponsored by the Long Island DX Association in order to stimulate DX activity throughout the world. This Contest will begin at 00.01 GMT, January 1, 1965, and end at 00.00 GMT, December 31, 1965. Contestants will be required to work as many different countries over 100 as possible in order to be eligible for the special prizes which will be offered by the LIDXA. Any mode and any band may be used but *just one confirmation* from each country will count. The Contest will be based on ARRL DXCC rules and the ARRL Countries' List will be followed.

The prizes to be awarded to the winners include: the Long Island DX Association Trophy, going to the top scorer in the world; six unique Trophies, one to be awarded to the top scorer in each of the six continents; and individual certificates to be awarded to the top scorers in each country from which entries are submitted as well as winners in each of the USA, Canadian and Australian Districts.

At the close of the Contest, participants will be required to submit just their lists of confirmed countries worked to "LIDXA Contest," PO Box 599, Lynbrook, New York, with postmarks no later than February 15, 1966. Potential winners will be notified and will be requested to submit all their Contest QSLs to the Contest Committee whose members are: Joe Hellmann, W2MES, Dorothy Strauber, K2MGE, Win Tames, WA2QNW and Marv Fricklas, W2FGD. A complete list of winners will be published as

soon as the Committee has completed the tabulation of the entries. For any additional information, contact the LIDXA Contest Committee members via PO Box 599, Lynbrook, New York.

Awards

The Malayan Amateur Radio Transmitters Society have been receiving applications for a MARTS DX Certificate, but unfortunately no such certificate exists. The Society issues only one award, **The Worked All Malayan Area Certificate**, the basic qualifications for which are: ten contacts with VS1/9M4; ten contacts with VS2/9M2; two contacts with VS4/VS5 and one with ZCS. Full information on this and other awards will be found in the *Directory of Certificates and Awards*, published by K6BX and obtainable in the UK by an order through G2BVN.

The Galician region of the Spanish national society, the URE, are offering the **Holy Year of St. James Diploma**, the basic qualifications for UK stations being ten contacts with stations in Galicia. This diploma is also available to SWLs. The period during which these contacts must be made is between July 25, 1964, and December 31, 1965. Full information is given on a leaflet obtainable from G2BVN.

For operators hunting Japanese awards a list of prefectures and cities is available from "The Beam," PO Box 46, Setagaya, Tokyo, and may be obtained by sending two IRC and s.a.e. (Tks OH2YV).

The Liga Dos Radio Amadores De Angola offer the **Z36A Award** to operators who produce proof of contacts with not less than ten call areas in Zone 36 plus at least five CR6 stations in five different districts. The call areas in Zone 36 are: CR5, CR6, EA0, TJ8, TL8, TN8, TR8, TT8, VQ2, ZD7, ZD8, 9Q5, 9U5 and 9X5. All contacts must be after May 28, 1964, and QSLs should show a minimum report of R3 T8. The cost of this award is ten IRC which should be sent with a full listing of QSOs and QSLs to Delegation of LARA, Box 1053, Nova Lisboa, Angola, West Africa.

Nearer home, the **Islands on the Air Award** has been announced by Geoff Watts, the publisher of the well-known *DX News Sheet*. The main object of this award is to promote DX activity, and to achieve some degree of stability in regard to qualifications, as islands, unlike DXCC countries, cannot become "out of date" or politically different! A leaflet giving full details of this award, in connection with which it is proposed to issue an IOTA Directory, in due course, may be obtained from Geoff Watts, at 62 Belmore Road, Norwich, Norfolk, 72T.

The latest DXCC Honor Roll lists the following UK stations: G4CP 311/335, G3AAM 311/335, G2PL 309/332, G3FKM 309/326, G8KS 306/324 and G3YF 304/326. An editor of *DXpress* and the first Netherlands station to achieve Honor Roll listing is PA0FX, Dick van Breen, with 302/322.

DX Briefs

DLIEE, the custodian of the WAE awards, is now to be found at Bernadottestrasse 27, 85 Nuernberg, West Germany.

Active from Jan Mayen on c.w. are LA2QJ/P and LA9PI/P.

It is believed that HB9TL is now responsible for QSLing all s.s.b. contacts made by FB8's WW, XX and ZZ.

KG6IC is active from Iwo Jima, usually around 13.00-14.00 on 14 Mc/s, whilst Marcus Island emanations stem from KG6IF on 14,300 kc/s s.s.b.

The South Shetland Is. are represented by LU1ZC and LU8ZI on Deception Is., and who are active on 14 Mc/s c.w. during the evening hours.

HS1X (QSL via US Embassy, Bangkok) is heard in the UK during the early afternoons on 14 Mc/s s.s.b.

KB6EPN is frequently heard on the high end of 14 Mc/s

(Continued on page 661)

Royal Signals Reunion

THE Princess Royal is the Colonel-in-Chief of Royal Signals, and June 28, the anniversary of the formation of the Corps, is known as Princess Royal Day. Falling on a Sunday this year it coincided with the annual Old Comrades Reunion weekend at Catterick Camp and the Royal Signals Amateur Radio Society set out to mark the occasion with the largest amateur radio programme ever attempted by Royal Signals.

The Society's special call-sign, GB3RCS, was brought out of cold storage and permission obtained for simultaneous operation on several bands. A signal through military channels invited amateurs serving in the Corps and in Commonwealth Signal Corps to participate, and publicity in the amateur radio press and over GB2RS passed on the word to ex-members of the Corps.

Bearing in mind the old maxim that an army marches on its stomach, several crates of beer were brought in to augment the coffee and sandwiches on which it seemed the seven operators were likely to have to live, and at 9 a.m. on Friday, June 26, we were off. First contact in the log was KG1AA at the USAF Base at Thule whilst the 80m station was busy working the first of many G stations including Royal Signals, Royal Artillery and REME amateurs.

Very little DX was worked during the day but during the evening an interesting three-way on 14 Mc/s s.s.b. took place with VE6AMX/SU and VE3RCS. The latter located at the Royal Canadian School of Signals was operated by G3ONU, Royal Signals, whilst GB3RCS was operated by VE1ADQ (alias G3SJB), Royal Canadian Signals, at present on a course at the School of Signals in Catterick.

By lunch time on Saturday only one Royal Signals station overseas had been contacted and remarks on the relative reliability of pigeons were being passed. Then wham! VS9ASS, VS1MB, VS1RS, 5B4CZ, all Royal Signals, and VS9MB of the RAF all within the hour and we never looked back. A change of operators, the quad swung northwest, and soon a Royal Canadian Signals net was in being. Meantime on 3.5 Mc/s things were getting hectic. Was it the pace or the beer that caused the mix-up over call-signs when GB3RCS worked GB3RS at the Mobile Rally at Wethersfield? An open day was in progress at 66 (Ulster) Signal Regiment TA at Belfast and G13PUE was being modulated by noises off from the various attractions. An item on the BBC Home Service programme *Eye Witness* after the 7 o'clock news on Saturday morning recorded in the club room the previous day stimulated 80m activity, several stations saying that they had heard the broadcast and come on specially to work GB3RCS.

If Saturday had been hectic Sunday was indescribable. In 12 hours 114 stations were worked on 80m alone. From the moment just before 9 a.m. when Jean, G3JZP, put out the first CQ there was never a dull moment. The pace was so hot that the operator had to be assisted by a log clerk, and yet when we requested a clear channel in order to work G3LPC's QRP phone from a Royal Signals unit in Oxfordshire we got one. This for 25 minutes on 80 on a Sunday morning! In the words of the operator at the end of the QSO, "Thank you Gentlemen."

G5PX and G3SZQ, visiting Old Comrades of the Corps, found themselves operating GB3RCS whilst the usual operators took a break. So it went on: G3EMO, an Old Comrade, was told he was AWOL and a cell was being reserved for him (the clubroom at Catterick is an old guard-room). An inspection of Air Training Corps units from Durham was being held at the neighbouring airfield and a group of their instructors, one of whom was G3CKC/M, dropped in to see where all the dB's were coming from.

On the h.f. bands things were also warming up, amid a gang of DL4s, mainly US Army Signal Corps, up popped a



L/Cpl Paul Scottorn, G3RFI, operating an LG300 and a Rascal RA17 at G3C10/GB3RCS, the HQ station of the Royal Signals Amateur Radio Society at Catterick, Yorkshire.
(Photo via G3EJF)

couple of MP4 stations. A QSO with 5B4CZ started on 14 Mc/s moved first to 21 then to 28 Mc/s. Who says Ten is dead? 5N2JKO, a very active member of the Catterick Club a few years ago, more Royal Canadian Signals stations until finally we wished 5X5JG, another ex-member of the Corps, 73 and GB3RCS closed down.

A total of 472 contacts with 50 countries had been made. Over a dozen Royal Signals units had been worked together with ex-members of the Corps in many lands. Up to five bands had been worked simultaneously from an area some twenty feet by ten feet and apart from short breaks during the nights at least two bands were worked at all times. All this was achieved by the seven operators who at other times use the call G3C10:—Derek G3TBP, Doug G3SJB, Iain G3SYW, Paul G3RFI, John G3OAZ, Jean G3JZP and her OM, Johnny, G3EJF. Jack G5PX and Val G3SZQ came to the Reunion and found themselves a job to do.

Now the aftermath is upon us, over fifty QSL cards and SWL reports, including one from a policeman and one from a prison, arrived in the first three days. Patience fellows, they will all be answered in due course. All stations identified in the log as being past or present members of the Corps will be QSL'd and all other contacts on receipt of their card.

The gear used for this marathon included: a Johnson Invader and a KW77; a Viceroy and an Eddystone 888A; an LG300 and a Rascal RA17C; a Vanguard and an AR88; an ex-RAF 2m transmitter and a TW converter working into an AR88.

The aerials used were a three band cubical quad on a 60 ft. tower, a three element tri-band Yagi on a 45 ft. mast, an 80m dipole 45 ft. high and running east-west, a 400 ft. end-fed running north-south, and a five element 144 Mc/s beam.

Membership of the Royal Signals Amateur Radio Society is open to all past and present members of the Corps. The subscription is 2s. 6d. per annum and the address is: Royal Signals Amateur Radio Society, 8th Signal Regiment, Catterick Camp, Yorks.

Radio Amateurs' Examination

The next City and Guilds of London Institute Radio Amateurs' Examination will be held on December 10, 1964. Applications to sit the RAE must be received by the Technical Colleges holding the examination not later than November 1, 1964.

NFD '64

REPORT AND FULL RESULTS

| | | |
|--|--|----------------------------------|
| NFD Shield | K.W. Electronics Radio Club (G6VC/P and G8KW/P) ... | 2185 points |
| Gravesend Trophy | Oxford and District Amateur Radio Society (G2DU/P and G8PX/P) | 2019 points |
| Scottish NFD Trophy | Ayrshire Group (GM5KF/P and GM4QK/P) | 1183 points |
| Bristol Trophy | Basildon and District Amateur Radio Society (G3OIT/P) ... | 1067 points |
| Leading 1.8 Mc/s Station | Ayrshire Group (GM5KF/P) | 390 points |
| Leading 3.5 Mc/s Station | K.W. Electronics Radio Club (G8KW/P) | 506 points |
| Leading 7 Mc/s Station | Oxford and District Amateur Radio Society (G2DU/P) ... | 620 points |
| Leading 14 Mc/s Station | Belfast and District Group (GI2KR/P) | 772 points |
| Leading 21 Mc/s Station | Belfast and District Group (GI3JXS/P) | 261 points |
| Leading 28 Mc/s Station | Chiltern Amateur Radio Club (G3BXS/P) | 71 points |
| Overseas station contributing most points to competitors ... | | Famagusta Group (Cyprus) 5B4IH/P |
| Most useful check-log from non-transmitting British Isles member ... | | M. Harrison, BR524733 |

NATIONAL Field Day has always been a popular contest and the 1964 event was no exception. For the second year running, there was an increase of 10 per cent in the number of contestants. The whole of this increase was accounted for by single-station entries whose total has risen from 40 in 1962 to 60 this year, while the number of double-stations has remained static.

Weather conditions were generally very bad but band conditions were reported as being reasonable on the whole, and better than average on 7 Mc/s.

The NFD Shield winner was K.W. Electronics Radio Club (G6VC/P and G8KW/P) with a total of 2,185 points. The runner-up and winner of the Gravesend Trophy was Oxford and District Amateur Radio Society (G2DU/P and G8PX/P) with a score of 2,019 points. Congratulations to K.W. Electronics on their performance in coming up from 23rd position last year to head some of the regular inhabitants of the top ten positions in the table. Oxford and District, who were sixth last year and seventh the year before, had a 177 point lead over Belfast and District Group, who were 11th in 1963. Port Talbot, the winners last year, took fourth place with a total of 1,796 points. This score was 48 better than Gravesend Amateur Radio Society, third last year and seldom out of the top five. If Gravesend had not had the misfortune to run into generator trouble which prevented them starting in the contest till 20.15 GMT they would surely have been higher in the table. Gravesend operated the equipment on mains power until 20.15, and stations they worked while on mains were not penalized.

The Scottish NFD Trophy was won, for the second year running, by the Ayrshire Group (GM5KF/P and GM4QK/P) with a score of 1,183 points. The Glasgow City Group (GM3SSB/P and GM3AXX/P) was the runner-up with 217 fewer points.

The Bristol Trophy, for a single station entry, went to Basildon and District Amateur Radio Society (G3OIT/P). This society, a newcomer to the event last year, thus retain the Trophy by the very small margin of six points over Stourbridge and District Amateur Radio Society (G6OI/P) which is better known for its efforts in the double-station section where it was fifth last year, winner the two previous years and second the year before that, 1960. Wolverton District Radio Club (G4CK/P), runner-up in 1963 was third with 1,018 points.

Band Leaders

On 1.8 Mc/s, and also on 3.5 Mc/s, scores were not so large as in 1963 and after a very close fight the Ayrshire

Group (GM5KF/P) just got home by two points over the Pontypool Group (GW3RNH/P) who amassed 388 points. The Conway Valley Amateur Radio Club (GW3RUA) filled third place with 13 fewer points.

K.W. Electronics Radio Club (G8KW/P) had a fairly comfortable win on 3.5 Mc/s with a score of 506 points. Second place went to Cambridge and District Group (G5PI/P) with 460 points, followed by Oxford and District Amateur Radio Society (G8PX/P) with a total of 439 points.

On 7 Mc/s the scores were rather higher than last year, while on 14 Mc/s the increase was not quite so great. Oxford and District Amateur Radio Society (G2DU/P) collected 620 points to become the winner, closely followed by K.W. Electronics Radio Club (G6VC/P) with 610 points, while Medway Group (G3ORH/P) was third with a score of 547 points.

Members of the Belfast and District Group (GI2KR/P) found conditions very much to their liking on 14 Mc/s where they scored 772 points. This was 104 more than K.W. Electronics Radio Club (G8KW/P), while Port Talbot Group, which has done so well on this band in the past, could do no better than third with its B station's (GW2AVV/P) score of 576 points.

Scores on 21 Mc/s and 28 Mc/s were down compared with 1963, though one station found 71 points on the latter band.



G8KW/P, the B station of K.W. Electronics Radio Club, winners of this year's National Field Day. The operators were Roy Taylor, G3KAP, and Stan Heard, G3IEW.

(Photo by G8KW)

| Posn. | Group | Call-sign(s) | | 1-8 Mc/s | 3-5 Mc/s | 7 Mc/s | 14 Mc/s | 21 Mc/s | 28 Mc/s | Total |
|-------|--|--------------|--------|-------------|-------------|-----------|------------|------------|------------|-------|
| | | A Stn.* | B Stn. | | | | | | | |
| 1 | K.W. Electronics Radio Club .. | G6VC | G8KW | 219* | 506 | 610* | 668 | 177* | 5 | 2185 |
| 2 | Oxford & District Amateur Radio Society .. | G2DU | G8PX | 343* | 439 | 620* | 518 | 92* | 7 | 2019 |
| 3 | Belfast & District Group .. | G1JXS | G12KR | 313* | 246 | 250* | 772 | 261* | 0 | 1842 |
| 4 | Port Talbot Group .. | GW4CG | GW2AVV | 356* | 383 | 327* | 576 | 154* | — | 1796 |
| 5 | Gravesend Amateur Radio Society .. | G3MXJ | G6BQ | 264* | 357 | 491* | 532 | 114* | — | 1772 |
| 6 | Croydon Group .. | G5XW | G6LX | 256* | 423 | 348* | 545 | 150* | 10 | 1732 |
| 7 | Medway Group .. | G3ORH | G2ZP | 254* | 343 | 547* | 398 | 162* | 0 | 1704 |
| 8 | Crawley Amateur Club .. | G2DP | G3TR | 272* | 327* | 443 | 295 | 138* | 0 | 1475 |
| 9 | Weston-super-Mare Group .. | G5UG | G8FC | 287* | 426 | 373* | 257 | 38* | 0 | 1381 |
| 10 | Wirral Group .. | G2AMV | G8BM | 234* | 176 | 265* | 544 | 131* | 0 | 1350 |
| 11 | Torbay Amateur Radio Society .. | G3GDW | G3NJA | 215* | 198 | 346* | 460 | 84* | 0 | 1303 |
| 12 | South Shields Group .. | G3BIK | G3DDI | 108* | 395 | 328* | 405 | 61* | 0 | 1297 |
| 13 | Edgware Group .. | G3VW | G5FG | 234* | 397 | 353 | 164* | 125* | 0 | 1273 |
| 14 | Guildford & District Radio Society .. | G3OLM | G3KMO | 234* | 368 | 291* | 242 | 129 | 0* | 1264 |
| 15 | Chelmsford Group .. | G6ZC | G4VF | 289* | 426 | 366* | 132 | 6 | 0* | 1219 |
| 16 | Radio Society of Harrow .. | G3FBN | G3EFX | 282* | 277 | 381* | 255 | 19* | 5 | 1219 |
| 17 | East Molesey Group .. | G5LC | G8SM | 259* | 363* | 355 | 214 | 9 | 0* | 1200 |
| 18 | Ayrshire Group .. | GM5KF | GM4QK | 390* | 233 | 331* | 177 | 52* | 0 | 1183 |
| 19 | Scarborough Amateur Radio Society .. | G5KA | G4BP | 215* | 319 | 467* | 125 | 44* | 0 | 1170 |
| 20 | Lymington & District Amateur Radio Society .. | G2DC | G3JAF | 228* | 367 | 352* | 192 | 29 | — | 1168 |
| 21 | Macclesfield & District Radio Society .. | G3LDT | G3ATK | 308* | 363 | 195 | 276* | 18* | 0 | 1160 |
| 22 | Darlington & District Group and Hartlepool Group .. | G3AWL | G2FO | 290* | 294 | 353* | 115 | 84* | — | 1136 |
| † | Exeter Group .. | G3ID | G3JW | 262* | 177 | 157 | 376* | 136* | — | 1108 |
| 23 | Chester Group .. | G3ATZ | G3EWZ | 310* | 422 | 219* | 145 | 8* | 0 | 1104 |
| 24 | Blackpool Group .. | G8GG | G5ND | 252* | 317 | 331* | 46 | 156* | 0 | 1102 |
| 25 | Slough Group .. | G3AHB | G3NLF | 276* | 296* | 246 | 201 | 61* | 20 | 1100 |
| 26 | Surrey Radio Contact Club .. | G2DN | G3DVQ | 247* | 200 | 459* | 122 | 70 | 2* | 1100 |
| 27 | City & County of Bristol Group .. | G2IK | G6GN | 231* | 380 | 231* | 185 | 68 | 0* | 1095 |
| 28 | Reigate Amateur Transmitting Society .. | G3RIM | G3REI | 299* | 321* | 277 | 66 | 131* | 0 | 1094 |
| † | Ilford Group .. | G3HIW | G6AH | 271* | 365 | 341* | 101 | 0 | — | 1078 |
| 29 | North Notts. Amateur Radio Society .. | G3RCW | G3OZN | 117* | 309 | 385* | 193 | 62* | 0 | 1066 |
| 30 | Bury & Rossendale Group .. | G2GA | G3BRS | 213* | 262* | 292 | 293 | 0 | 0* | 1060 |
| 31 | Norwich & District Radio Club .. | G2YU | G3IOR | 223* | 267 | 338* | 214 | 2* | — | 1044 |
| 32 | Ariel Radio Group .. | G3AYC | G3GDT | 203* | 207 | 158 | 276* | 187* | 3 | 1034 |
| 33 | Grimsby Amateur Radio Society .. | G4XC | G4GX | 216* | 290 | 221* | 190 | 115* | 0 | 1032 |
| 34 | Ballymena Radio Club .. | G13RXV | G13RNY | 238* | 169 | 259* | 347 | 0* | 0 | 1013 |
| 35 | Pontypool Group .. | GW3RNH | GW3NOP | 388* | 323 | 141* | 125 | 14* | — | 991 |
| 36 | Cambridge & District Group .. | G5PI | G5DQ | 177* | 460* | 283 | 27 | 20 | 0* | 967 |
| 37 | Glasgow City Group .. | GM3SSB | GM3AXX | 351* | 192 | 176 | 247* | 0 | 0* | 966 |
| 38 | Swindon Group .. | G3KAD | G2BRR | 324* | 248 | 198* | 165 | 27* | 3 | 965 |
| 39 | Purley & District Radio Club .. | G3FTQ | G3KTA | 180* | 415 | 206* | 56 | 80* | — | 937 |
| 40 | Chiltern Amateur Radio Club .. | G5WW | G3BXS | 160* | 190* | 171* | 265 | 77 | 71 | 934 |
| 41 | Chorley & Leyland Group .. | G3RFN | G3GGS | 266* | 344 | 119 | 95* | 97 | 0* | 921 |
| 42 | Derby & District Amateur Radio Society and Derby Shortwave Experimental Society .. | G3ERD | G3EEO | 310* | 304 | 188* | 71 | 44* | 0 | 917 |
| 43 | Clifton Amateur Radio Society .. | G3GHN | G3JKY | 133* | 274 | 261 | 177* | 55* | 3 | 903 |
| 44 | Plymouth Radio Club .. | G3PRC | G5ZT | 173* | 313 | 33* | 341 | 0* | 5 | 865 |
| †† | Barnsley & District Amateur Radio Club .. | G3LRP | G5IV | 202* | 395 | 167* | 66 | 30* | — | 860 |
| 45 | Portsmouth & District Radio Society .. | G6NZ | G3DIT | 346* | 183* | 248 | 71 | 6 | 0* | 854 |
| 46 | Cheltenham Amateur Radio Society and Cheltenham Group .. | G3CGD | G5BK | 215* | 292 | 210* | 131 | — | — | 848 |
| 47 | East Kent Radio Society .. | G3LTY | G4WK | 284* | 192* | 281 | 77 | — | 3 | 837 |
| 48 | Southampton Group .. | G8FW | G3SOU | 202* | 216 | 354* | 54 | 3 | 0* | 829 |
| †† | Reading & Arborfield Group .. | G3PGM | G3IHH | 352* | 304 | 13* | 159 | 0* | 0 | 828 |
| 49 | Dorking & District Radio Society .. | G3CZU | G5BT | 166* | 339 | 99* | 161 | 43* | 0 | 808 |
| † | Radio Club of Loughborough & District .. | G3RAL | G4BI | 215* | 239 | 98* | 185 | 64* | 1 | 802 |
| 50 | Liverpool & District Amateur Radio Society .. | G8DI | G3LNG | 310* | 246 | 132* | 83 | 0* | 0 | 771 |

| Posn. | Group | Call-sign(s) | | 1.8 | 3.5 | 7 | 14 | 21 | 28 | Total |
|-------|--|--------------|--------|------|------|------|------|------|------|-------|
| | | A Stn.* | B Stn. | Mc/s | Mc/s | Mc/s | Mc/s | Mc/s | Mc/s | |
| 51 | Amateur Radio Club of Nottingham | G3MP | G6CW | 292* | 310 | 82* | 37 | 38* | — | 759 |
| 52 | Ainsdale Radio Club | G8QG | G3LWK | 178* | 226 | 139* | 100 | 90* | 0 | 733 |
| 53 | Basingstoke Amateur Radio Club .. | G3TCR | G2UM | 242* | 306 | 132* | 36 | — | 3 | 719 |
| 54 | Southport Radio Society | G2ART | G3HWS | 173* | 279 | 212* | 48 | — | — | 712 |
| 5 | Stockport Radio Society | G6UQ | G3NBN | 225* | 328 | 77* | 35 | 4* | 8 | 677 |
| 55 | Royal Signals Catterick | G3JZP | G3CJO | 92* | 257* | 141 | 170 | 4 | 12* | 676 |
| 56 | Lothians Radio Society | GM3UM | GM3KIG | 119* | 184 | 169* | 107 | 34* | 0 | 613 |
| 57 | Dundee Group | GM3EUV | GM4HR | 99* | 153 | 200* | 100 | 32* | 12 | 596 |
| 58 | North Kent Radio Society | G3FBA | G6HD | 70* | 247 | 194* | 64 | — | — | 575 |
| 59 | East Worcestershire Amateur Radio Club | G3RZI | G3EVT | 243* | 133 | 75 | 71 | 0* | 0* | 522 |
| 60 | Mid-Lanarkshire Group | GM3PXX | GM3EHI | 179* | 107 | 141* | 87 | 0 | 0* | 514 |
| †† | Stoke-on-Trent Amateur Radio Society | G3GBU | G3UD | 0* | 362* | 10* | 89 | 0 | 0 | 461 |
| 61 | Thanet Group | G2JF | G2IC | 130* | 139* | 178 | — | — | — | 447 |
| † | Eccles & District Amateur Radio Club | G8VF | G3GXI | — | 162* | 151 | 131 | — | — | 444 |
| 62 | East Ham Group | G3ID | G3SIR | 261* | — | 175 | — | — | — | 436 |
| 63 | Preston Amateur Radio Society .. | G3DWQ | G3RUW | 96* | 73* | 93 | 36 | 0 | 0* | 298 |
| †† | Newbury & District Amateur Radio Society | G2CPM | G3LLK | 46* | 237 | — | 8 | — | — | 291 |

* The A station operated on bands marked thus.

SINGLE STATION GROUPS

| Posn. | Group | Call-sign | 1.8 | 3.5 | 7 | 14 | 21 | 28 | Total |
|-------|---|-----------|------|------|------|------|------|------|-------|
| | | | Mc/s | Mc/s | Mc/s | Mc/s | Mc/s | Mc/s | |
| 1 | Basildon & District Amateur Radio Society .. | G3OIT | 258 | 387 | 422 | | | | 1067 |
| 2 | Stourbridge & District Amateur Radio Society | G6OI | | 421 | 362 | 278 | | | 1061 |
| 3 | Wolverton District Radio Club | G4CK | 251 | 384 | 383 | | | | 1018 |
| 4 | Stean Group | G8NF | 222 | 423 | | 350 | | | 995 |
| 5 | Cardiff Group | GW5BI | | 407 | 465 | 107 | | | 979 |
| 6 | Crystal Palace & District Radio Club .. | G3OOU | 260 | 213 | 405 | | | | 878 |
| 7 | Durham City Amateur Radio Society | G3DYY | 113 | 299 | 457 | | | | 869 |
| † | Lincoln Short Wave Club | G4BU | 280 | 359 | | 201 | | | 840 |
| † | Bagshot & District Radio Society | G2BB | 255 | 412 | | 124 | | | 791 |
| 8 | Gloucester Group | G3MA | 223 | 259 | | 301 | | | 783 |
| 9 | Southgate, Finchley & District Group .. | G5FA | | 423 | 286 | 34 | | | 743 |
| 10 | Caithness Group | GM3COV | 92 | | 132 | 506 | | | 730 |
| 11 | Surrey Radio Contact Club | G2AJS | | 182 | 354 | 177 | | | 713 |
| 11 | Enfield & District Group | G3FD | 145 | 398 | 170 | | | | 713 |
| 13 | Leicester Radio Society | G3LRS | 286 | 299 | 106 | | | | 691 |
| 14 | Stroud District Radio Club | G3SDR | 182 | 333 | | 164 | | | 679 |
| 15 | Sutton & Cheam Group | G8DF | 224 | 281 | 160 | | | | 665 |
| † | Retford Group | G3BTU | 276 | | 236 | 151 | | | 663 |
| 16 | Sheffield Amateur Radio Club | G3RCM | | 397 | | 252 | | | 649 |
| 17 | Conway Valley Amateur Radio Club | GW3RUA | 375 | 141 | | 121 | | | 637 |
| 18 | Burton-upon-Trent & District Radio Society .. | G3NFC | | 324 | 289 | 4 | | | 617 |
| 18 | Verulam Amateur Radio Club | G3STA | 276 | 230 | 111 | | | | 617 |
| 20 | Hull & District Amateur Radio Society .. | G3AMW | 213 | 229 | 163 | | | | 605 |
| 21 | Stevenage & District Group | G3SAD | 218 | 259 | 111 | | | | 588 |
| 22 | Cannock Chase Amateur Radio Society .. | G3PTO | | 247 | 218 | 118 | | | 583 |
| 23 | EMI (Wells) Group | G3ORA | 169 | 216 | | 197 | | | 582 |
| 24 | The Midlands Amateur Radio Society | G3MAR | 221 | 236 | 82 | | | | 539 |
| 25 | Grantham & District Amateur Radio Society | G3OWR | 277 | 222 | 38 | | | | 537 |
| 26 | Cray Valley Amateur Radio Society | G3RCV | 157 | 191 | | 175 | | | 523 |
| 26 | Dunfermline Radio Society | GM3EGW | 262 | 141 | 120 | | | | 523 |
| 28 | Aquila Radio Club | G3BRK | 179 | 252 | | 89 | | | 520 |

(Continued overleaf)

| Posn. | Group | Call-sign | 1.8 Mc/s | 3.5 Mc/s | 7 Mc/s | 14 Mc/s | 21 Mc/s | 28 Mc/s | Total |
|-------|---|-----------|-------------|-------------|-----------|------------|------------|------------|-------|
| 29 | Acton, Brentford & Chiswick Group | G3IIU | 176 | 207 | 132 | | | | 515 |
| 30 | Chingford Group | G4GA | | 166 | 35 | 309 | | | 510 |
| 31 | Southend & District Radio Society | G5QK | 105 | 219 | 185 | | | | 509 |
| † | Durlsey & District Radio Society | G3ONX | 210 | 242 | 55 | | | | 507 |
| 32 | Sheffield & District Amateur Radio Society .. | G2DPQ | 112 | 274 | 87 | | | | 473 |
| 33 | Loughton & District Radio Society | G8AB | | | 470 | | | | 470 |
| 34 | Burnham-on-Sea Amateur Radio Club .. | G3GIW | 259 | 170 | | 32 | | | 461 |
| | Great Yarmouth & District Amateur Radio Club .. | G3SEP | 94 | 205 | 162 | | | | 461 |
| 36 | Worcester & District Amateur Radio Club .. | G3NUE | 219 | 232 | | 0 | | | 451 |
| †† | Braintree Radio Society | G3MUL | 32 | 174 | 232 | | | | 438 |
| 37 | Luton & District Amateur Radio Society .. | G3SVJ | 190 | 212 | 20 | | | | 422 |
| 38 | Larbert Group | GM3OM | 295 | 115 | | | | | 410 |
| 39 | West Kent Amateur Radio Society | G2UJ | | 147 | 103 | 149 | | | 399 |
| † | Newmarket Group | G3IRM | 153 | 172 | | 55 | | | 380 |
| 40 | South Dorset Radio Society | G3SDS | 243 | 66 | | 59 | | | 368 |
| † | Skegness & District Group | G2ABK | 145 | 189 | 23 | | | | 357 |
| 41 | Harlow & District Radio Society | G3ERN | | 175 | 83 | 95 | | | 353 |
| 42 | Newark & District Amateur Radio Society .. | G3ELJ | 89 | 194 | 66 | | | | 349 |
| 43 | Bradford Radio Society | G4LD | 185 | 133 | 8 | | | | 326 |
| † | AERE Harwell Group | G3PIA | | 173 | 144 | 6 | | | 323 |
| † | Sole Bay Group | G3WN | 113 | 190 | 16 | | | | 319 |
| 44 | Kingston & District Amateur Radio Society .. | G3KIN | 168 | 68 | 76 | | | | 312 |
| 45 | Magnus Grammar School Radio Society .. | G3PAW | 114 | 151 | 25 | | | | 290 |
| † | Manchester & District Amateur Radio Society .. | G3HOX | 117 | 46 | 45 | | | | 208 |
| 46 | Sunderland Technical College Amateur Radio Society .. | G3STC | | 3 | 103 | 51 | | | 157 |
| † | Cornish Radio Amateur Club | G3OFN | 82 | 26 | | 38 | | | 146 |
| † | Yeovil Amateur Radio Club | G3CMH | | 108 | | | | | 108 |
| † | Carmarthen Amateur Radio Society | GW8MQ | | 90 | | | | | 90 |
| 47 | Ravensbourne Amateur Radio Club | G3HEV | 25 | | | | | | 25 |

† Late entry. ‡ Rule 19. § Rule 20. †† Cover sheet incomplete. ††† No power shown on cover sheet.

Belfast and District Group (G1JXS/P) with a total of 261 points led Ariel Radio Group (G3AYC/P) by 74 points, third place being filled by K.W. Electronics Radio Club (G6VC/P) with 177 points.

The Chiltern Amateur Radio Club (G3BXS/P), with the large total (for 28 Mc/s) of 71 had a margin of 51 points over the Slough Group (G2NLF/P), while Royal Signals Catterick (G3JZP/P) and Dundee Group (GM4HR/P) shared third place.

Equipment

After many years with only minor changes, transistors were employed in many ways in 1964.

Harrow Radio Society's A station used a fully transistorized transceiver, and a transistorized receiver was used at the B station. There were several other all-transistor receivers, and quite a few with transistorized a.f. stages. Several of the stations mentioned the easing of their power supply worries when using transistors in transmitters and receivers.

The main increase in their use, however, was in d.c.-to-d.c. converters. Such converters and vibrator packs each accounted for one-fifth of the power supplies while petrol electric and diesel generators were used on nearly half the stations.

The HROs and AR88s had their usual outing, and home-made transmitters outnumbered commercial units by nine to one. The dipole held pride of place in the aerial section.

Comments from Competitors

The Contests Committee was very pleased to note the considerable increase in the number of comments on the logs or

in letters to the Committee, and wishes to thank all who were responsible for them, in particular the people who found time to write quite long letters. Gravesend, as usual, sent the longest letter and, once again, it is impossible to condense the two and a half pages of foolscap into a few words for inclusion in this report.

Mention must be made of the trials and tribulations of the Plymouth Radio Club A station. Situated 11 miles inside the wilds of Dartmoor, the site, chosen after a dummy run (on a fine day) soon became a 9 in. deep lake in spite of a trench dug around it. The tent collapsed with half the club inside. Another small tent was erected with a platform inside, while guys were weighted with boulders. When things were ready to go it was found that the Top Band aerial was down, and with visibility only 20 ft. it was not easy to find the other end. The generator suppressor then packed up and operators had to deal with an S9 + 40db hash. Though signals were R2 and S9, they still gave the traditional R5 in true(?) contest style. In the middle of the night the mast snapped and the 40m dipole could not be erected. Then things went smoothly for 15 minutes until the generator cover caught fire. The club chairman suggested packing up but agreed to carry on when five SWLs threatened to drown him. The weather continued its onslaught till Sunday afternoon and by then everybody was all in. The operators would like to apologize to the operators of all stations that called G3PRC and did not get a reply. The enthusiasm with which the SWLs and younger members tackled their tasks was overwhelming and one fellow who was on his first NFD said he could not wait for next year.

It was expected that there would be a lot of comments on



The Belfast Group B station, operated by (left to right) G13HXV and G13OIC.



Fred Ward, G2CVV, RSGB Region 4 Representative, getting some well earned sleep after a long stint in charge of the generator for the Derby and District Radio Society's station.

(Photo by G3SZJ/T)



G5WP and G2NH doing Top Band exercises for G5LC/P, the East Molesey Group A station.

(Photo by G6CJ)



The Loughton and District Radio Club equipment, with operator G8AB/D (Rusty). All the apparatus including the generator was home constructed, and consisted of a double superhet; v.f.o.-b.a.-f.d.-p.a. transmitter; aerial tuning unit and aerial switching unit, which fed two 7 Mc/s collinear arrays and a ground plane.

(Photo by G8AB)



The Ayrshire Group's A station. Standing, in the background, are GM5KP and GM2BUD, with GM3OYH at the key and GM3NPR logging.

(Photo by GM3NZN)



The Crystal Palace and District Radio Club station G30OU/P manned by G3POI (left) and G30OU.

(Photo by G30JE)



G3EKD and G3GEW (with sea boots) operating G3SDR/P, the Stroud District Radio Club's station.

(Photo by courtesy of Gloucestershire Newspapers Ltd.)

the rules this year. There were—25. Five stations were happy with the rules, but four were unhappy with part of them. There were various suggestions for alterations, such as a ban on petrol electric and diesel generators (Newmarket, Ainsdale and Reading); points on a mileage basis or only over a certain distance (Conway, Ainsdale, Norwich and Dunfermline); no own-country working on various bands (Caithness and Scarborough); bonuses on various bands and for solid state rigs (Wolverton, Burton, Basildon and Dunfermline); limit p.a. valve or 5 watt maximum (Ariel and Sole Bay) and fixed number of points for all /P contacts (Reading). The Contests Committee was impressed by the honesty of North Notts. comment which was "Can't think of anything to give us an advantage over all the others."

Troubles: Ravensbourne—generator packed up—tent leaked—rain in i.f. transformers; Caterham—three petrol electrics broke down; Port Talbot—fed 300 volts a.c. to power pack which did not like it; Cheltenham—a.c. generator found to be not available at 10 a.m. on Saturday morning; Burton—batteries gave up at 14.30 GMT; K.W. Electronics—two and a half hour generator failure.

Comments on performance: East Kent—better results from new aerial with counterpoise; Burnham—better on 3.5 Mc/s when NE-SW dipole was turned to NW-SE and made into inverted-V; Durham—ground plane on 7 Mc/s FB.

On things in general: Norwich—automatic CQ machine helped weary operators; Hull—operating better this year; Gloucester—abhor practice of sending call-sign once only to whom they return after sending CQ; Yarmouth—good mannered operating; Plymouth—stations quibble too much

about duplicate contacts; Reading—three hours wasted on 7 Mc/s, gear not good enough—it's a lousy band, anyway; East Kent—hell is 7025 kc/s; Ariel—wish we could raise site 100 ft. above trees and houses; Reigate—shared field with donkey who broke into supply tent; Weston-super-Mare—no complaints even about Wx and ground heavily manured by cows; Eccles—first contact lost due to accident to original paper; Stevenage—is my one-finger typing better than hand-written? (Yes, thank you); Cheltenham—what aerial do you use to make contacts on 7 Mc/s? We can hear them! Sheffield—worked JTICA on 14 Mc/s; Southgate—regretted using 14 Mc/s instead of 1.8 Mc/s; Belfast—no failures in spite of low cloud.

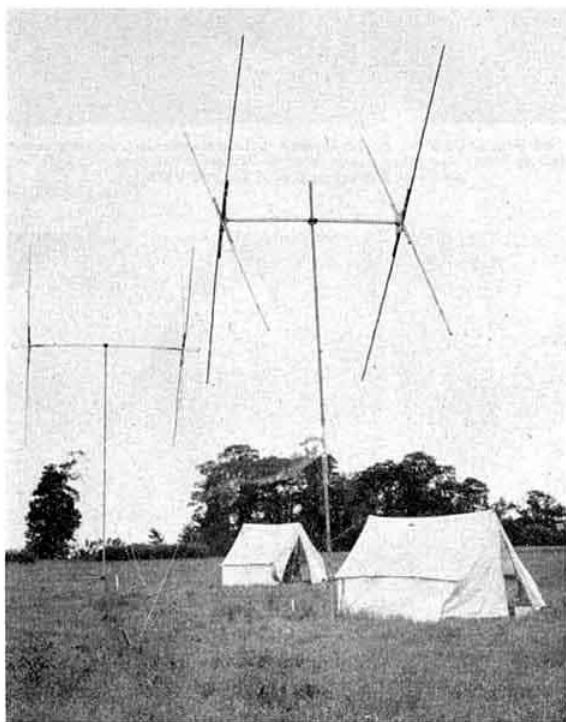
On the weather: censored.

Comments from the Contests Committee

The Contests Committee was very pleased to note a great improvement in the quality of the logs submitted and wishes to thank all who were concerned in the preparation. There was one log only that left a lot to be desired and the Committee would like to mention that it prefers to read the logs and not guess them.

In last year's report on NFD, mention was made of the lack of operator's call-signs on log sheets. This point was covered in the rules for this year's event (Rule 19) and yet quite a few entrants still overlooked it, with the result that their scores have been listed in the results table but have not been given a position. Also, please note that operators do NOT have to sign the logs but only the cover sheet, and if the person responsible for the entry loses the operator before he signs, perhaps due to holidays, it is quite in order to forward the signature at a later date.

Once again the Contests Committee draws contestants' attention to the last sentence of Rule 15. Please log duplicate



The array of aerials above the Basingstoke ARC station tents. (Photo by courtesy of Hants. and Berks. Gazette)

contacts and mark them as such. Several groups lost points because they failed to do just this. It appears that the practice of sending the original serial number when they are contacted for what they think is a duplicate contact is creeping in. But they may have made a mistake and the other station was not working them at the earlier time. If this station now sends the earlier serial number and does not log it at the correct time they have the wrong report in the received column of their log and the Committee do not often give points for incorrect reports. Sometimes, when it is seen, from the call-signs on the logs, that an operator is repeatedly being received as sending, say a figure 7, when his log shows he is sending a figure 8, the receiving station is not penalized for his error. This is another reason for operator's call-signs on the log sheets.

In the results table it will be seen that Reading and Aborfield Group have not been given a place and are shown as having broken Rule 11. On their cover sheet Reading explained that they were using a WD field transmitter with two power ranges and that the power switch developed a fault. As a result they felt they could not sign the declaration that 10 watts had not been exceeded and requested that the entry should be listed but not placed. Likewise Barnsley and District Radio Club did not show any power on their cover sheet and added a note that the declaration could not be signed "under the circumstances." However, no explanation of "the circumstances" was given and so, like Reading they have been listed but not placed. Better luck next year to both.

Check Logs

The Contests Committee was very grateful for the 34 check logs received this year, particularly the 21 from overseas stations.

The Famagusta (Cyprus) Group had a total of 88 contacts with contestants and win the certificate for the overseas station contributing most points to competitors.

Special mention must be made of the logs sent in by OH1AD/P, OK3KAG and OK3KLM. The first-named station, a club, was situated four miles outside Salo and was running with an input of 200 watts, all the equipment being home-made. They sent in their complete log for the period of the contest and among the 452 contacts shown were 91 with British Isles contestants. The log from OK3KAG, the club station of Kosice Technical University, was also a complete log of the 375 contacts made during the NFD period and had 89 with G stations. This log is the best ever seen by the writer during his quite long association with the Contests Committee. The last-named log, another club station at



Mike Birch, G3KMO, the operator of one of the Guildford and District Radio Society's stations.

(Photo by D. S. Chapman)

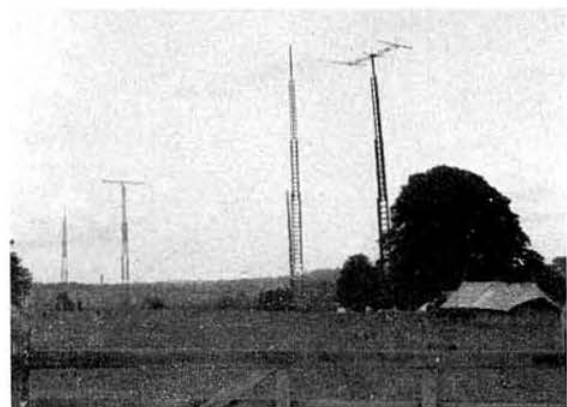
Liptovsky Mikulas, was for 3-5 Mc/s only and had 71 G's among the 169 entries. Certificates have been awarded to these stations to mark the Committee's appreciation of their efforts.

The logs from G2RO/P and G3RSR/P are from the Midland Radio Contest Club who asked for them to be included in this section as they used mains during the contest.

The check-log from GM3BCD/P is also worthy of special mention. The station was run by George Watson College Radio Club, Edinburgh, under NFD rules but closed down during the night. The station was manned by four operators (two of them ex-boys) and a number of BRS members.

M. Harrison, BRS24733, of Manchester, turned in his usual very useful listener's log of just under 500 entries and is awarded the certificate for the best check-log from a non-transmitting British Isles member.

Check-logs were also received from: G2ZR, G3JFF, G3LLM, G5AO, G6SW/P, G6VF, G8NN/P, GW3KPJ/A, HA5KFZ, LA2Q, OH3TA/P, OH3XZ/P, OH5TA/MM, OH5UX, OH7QZ, OH9RF, OZ7BW, SM3CUS, SM3TW, SM4DXL, VE3BLU, VE3DJF, ZE3JJ/P, ZE3JO, Z4JF/P and A2455.



The Crawley Amateur Radio Club aerial farm, consisting of a three element 10, 15 and 20m rotary array; a 250 ft. centre fed dipole for 160 and 80m; two half-wave dipoles for 40m, and a 40m ground plane.

The Month on the Air (Continued from page 653)

around 07.00-08.00 with good s.s.b. signals. QSLs should go c/o PM, USPO, Canton Island.

VQ8AM is now active on s.s.b. using the HB9TL rig. The usual method of operation is to use low end transmitting frequencies, listening around 14,250 kc/s.

A new edition of the RSGB Countries/Zones list has been prepared and may be obtained from Headquarters, price 9d.

Correspondents are thanked for their co-operation and acknowledgement is made to the West Gulf DX Club Bulletin (W5IGJ), the LIDXA Bulletin (W2FGD/W2MES), DXpress (PA0FX) and the Florida DX Club Report (W4HKJ). Please send all items to RSGB Headquarters to arrive not later than October 9 for the November issue and November 18 for the December issue.

Smuaintich Gu Mòr*

Radio Amateurs given Highland Welcome

THE programme of events arranged in connection with the Region 12 Official Regional Meeting held on Saturday, August 29, 1964, got off to a good start when members and their wives and families were given a civic reception in the Town House, Wick. The reception was jointly arranged by the Council of the Royal Burgh of Wick and the Caithness County Council. The Provost of Wick, Mr William F. Dunnett, welcomed the visitors and said that



Provost William F. Dunnett replying to the toast of the Royal Burgh of Wick and the County of Caithness proposed by Ted Ingram, GM6IZ. Seated, left to right, Barney Patterson, G13KYP, Zone F Representative, and Mrs. G2AHL.

he hoped that the meeting would be a great success. In reply the President, Mr Geoff. M. C. Stone, G3FZL, said that he had heard that Scotland began at Inverness and he was already convinced that this was true. The party then adjourned to the Station Hotel, Wick, for lunch and afterwards the ladies were taken on a bus tour to Dunnet Head, the most northerly point on the mainland, where they were shown round the lighthouse. After a stop for tea they had a conducted tour of the gardens of the Castle of Mey, the summer residence of H.M. Queen Elizabeth the Queen Mother. Meanwhile, the men travelled to John O' Groats for the business meeting in the Seaview Hotel.

Business Meeting

The RR welcomed the members to the meeting and noted that all Regions outside England and Wales were represented. He also suggested the Council might like to consider locating the new headquarters in Caithness! Sandy Oliphant, GM3SFH, Secretary of the Caithness Amateur Radio Society welcomed the visitors to Caithness. The President said that he always enjoyed ORMs and he admired the courage of the Region 12 RR in arranging the meeting in such a remote part of the country. He said that he was taking the opportunity of visiting the members in Shetland and the equipment at GB3LER while he was up north. He went on to say that the new Articles of Association had now been legally adopted and that Zone F was to be split into two parts—Northern

Ireland and Scotland—each with its own council member. Scotland would become Zone G. The subject of reciprocal licensing was of particular interest as there are at present four US amateurs resident in Caithness. Other subjects discussed included frequency allocations, the finances of the Society, and the new headquarters which the President said it was generally agreed should be in London. The work of the Scientific Studies Committee and the Education and Training Committee were also described.

Mr Patterson, G13KYP, said that it would be his last ORM in Scotland as ZR. He went on to discuss other aspects of representation, the content and coverage of the GB2RS news bulletins, methods of increasing membership and contests scoring.

The General Manager and Secretary mentioned the changes that had been and were being carried out at headquarters, the timing of issue and delivery of the BULLETIN, and the Intruder Watch. A lively discussion followed and besides the matters raised by the Council members, band planning, facsimile transmission, licence conditions and radio interference with amateur reception were considered.

Mr A. Mowat, Officer-in-Charge at Wick Radio, was present at the meeting and W6SEW and KN3MFW arrived in time for tea.

After tea a lecture on the Ionosphere was given by Mr W. D. Oliphant, BRS26076, in which he described the performance of the ionosphere under the various combinations of circumstances encountered in radio communication and a lively discussion followed. Barney Patterson, G13KYP, thanked the speaker in his inimitable manner and said that Mr Oliphant had given some very interesting information on a subject of interest to all the members.

Dinner-Dance

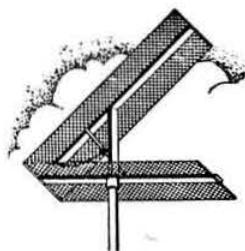
In the evening the members were joined by their wives and friends for a dinner dance. The toast to the Society was proposed by Dave Bartholomew, K7UAP, who made some humorous references to his fellow amateur Barry Goldwater, K7UGA. In reply the President said that we might soon see a beam appearing on the roof of the White House. Ted Ingram, GM6IZ, proposed the toast to the guests, the Royal Burgh of Wick and the County of Caithness and amused the company with his anecdotes. The Provost of



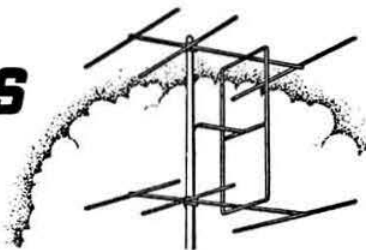
The toast of "The Ladies," proposed by John Walford, GM3POT, was replied to by Mrs. Sheila Oliphant, XYL of GM3SFH. Seated, left to right, GM3SFH, Mr. W. D. Oliphant, BRS26076, Mrs. GM5NW and GM3SYO.

(Continued on page 666)

* Gaelic for "Think Big," motto of the Caithness Amateur Radio Society.



FOUR METRES AND DOWN



By F. G. LAMBETH, G2AIW*

NEW WORLD RECORD FOR AMATEUR TELEVISION

On Thursday, September 3, 1964, at 08.30 GMT, a two-way simultaneous sound and vision QSO took place between G3NOX/T, nr. Saffron Walden, Essex, and G3ILD/T near Darlington, a path distance of 200 miles.

This is the first time that simultaneous sound and vision signals have been transmitted over such a distance by any Amateur Television station, and moreover, the first Amateur Television two-way QSO at this distance.

At G3NOX/T, vision was on 436 Mc/s with a power input at peak white of 150 watts. The vision aerial was a 64 element stacked array.

At G3ILD/T, vision was on 428 Mc/s with a power input at peak white of 100 watts. The vision aerial was a 24 element array.

Congratulations to both stations on a fine achievement.

Not satisfied with one "first," EI2W goes on to claim another, this time for an inter-EI QSO! On August 29, he worked EI2A, Nayan, Co. Neath, and to whom we say "Welcome to 4m." This now gives EI2W the very creditable total of 45 counties.

Four Metre Band Plan

Concerning the Four Metre Band Plan, G3JKY says quite forthrightly that he is another South Eastern station who doesn't want it either. In his opinion, any station, particularly one in a poor location, should be at liberty to use any frequency. He does not concede that it takes an interminable time to tune a mere 600 kc/s and so scan the whole band.

Perhaps with his tongue in his cheek G3JKY suggests that 70.1 Mc/s to 70.2 Mc/s should be reserved for c.w.—and it must be admitted that more of this mode might well bring some surprising results. He likes the idea suggested by G3HWR that 70.26 Mc/s should be used as a calling frequency.

G3GFN, Bognor Regis, considers that the plan has been devised too late, and is quite unacceptable; particularly to the very large number of 4m operators using fixed frequency mobile equipment. He comments that a unified calling frequency would seem to have much to commend it, always provided that it really was only used for calling purposes. He sees some difficulty in the choice of 70.26 Mc/s as this is extensively used by single frequency mobile units. Equally 70.32 Mc/s is not much better for the same reason. What is more, a number of fixed station local nets also use these two frequencies.

In view of this, G3GFN suggests that the only real solution is the prompt agreement of some other frequency

WHAT with V.H.F. NFD, and some very fine reporting by quite a number of stations, there is a lot of ground to be covered this month—so down to business.

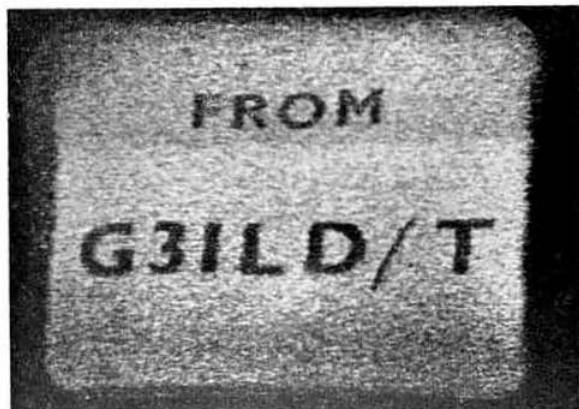
Four Metre Activity Notes

G3JKY went portable in Flintshire and Montgomery during the last week of July under the banner of GW3JKY, and managed to work all the stations that he heard. In all, twelve QSO's were made, but strangely, all the stations were in either Cheshire or Lancashire. As CQ calls were made in all directions, he would be interested to know if he was heard in any other county.

In the South of Scotland, activity has been low except on Sunday mornings. Nevertheless we hear that quite a bit of testing is going on. Odd things do happen though, as when GM3JJN found himself working G3OUV of High Wycombe who was operating as a GM/M from the vicinity of Dollar in Clackmannan.

G3OUF, in an initial report on GB2GC operation from Alderney between September 3 and 7, believes that they made the first 4m GC/GW contact when they had a QSO with GW4CG/P on September 5. Signals were RS58 both ways.

Yet another first is claimed by EI2W for an EI/GC contact. As a result of a long series of skeds with GC3OBM, Guernsey, C.I., contact was eventually made on September 13 at 12.37 GMT. During the skeds, each heard the other on various occasions, but not until that date was a solid exchange secured.



The picture received by G3NOX/T from G3ILD/T during their record-breaking two-way Amateur Television QSO.
(Photo by G3NOX/T)

* 21 Bridge Way, Whitton, Twickenham, Middlesex. Please send all reports for the December issue by November 6.

for unified calling, so leaving the established nets, whether mobile or fixed, undisturbed. He suggests that 70.39 Mc/s should be, by common consent, set aside for this purpose. Those who want to use this idea can equip themselves accordingly. He further suggests that it would seem prudent for mobiles to have both 70.26 Mc/s and 70.32 Mc/s frequencies available as this would (a) provide them with an alternative channel and (b) allow them to change their "prime" frequency when moving from one area to another.

Any comments on 70.39 Mc/s as a unified calling frequency?

If a Band Plan is devised, and adopted by common consent, EI2W asks the planners to remember that unlike the UK, EI amateurs are still limited to 70.2 Mc/s to 70.4 Mc/s. Any "planning" which closes this gap will result in the only "foreign" DX being restricted.

Two Metre News and Views

There has been a welcome re-opening of the 2m paths between Scotland and England recently. According to a report from GM3GUI, *Frickheim*, Southern stations have been heard on several occasions, but it seemed like one-way traffic, for, apparently, the G's didn't hear the GM's. After dogged persistence, GM3GUI did raise G5MA, G3KEQ and G2JF—who, incidentally, was calling GM2FHH, and showed that at least one southerner was awake to the opening! Over the month GM3GUI had quite a good time working: G2FO, G3LLE, G3PFR, G3EVV, G3MPN, G3HRH, G3BHW, G3BLP and G6NB. Stations also heard were: G2JF, G3CCH, G3LAK s.s.b. and G5YV.

GM3GUI again makes a strong plea that stations should identify themselves more frequently, and observes that even more stations are failing to use their call-signs correctly. There has certainly to be a big improvement in this direction when stations get their new licences—otherwise the chopper will fall on the offenders in no uncertain terms. GM3GUI reports hearing two s.s.b. stations who perpetrated this violation to its ridiculous and obvious conclusion. No call-signs whatsoever—not even at the end.

A newcomer to 2m is GM8AT, *Aberdeen*, who arrives in style using s.s.b. GM3GNR, *Fort William*, has a regular sked each night with GM3JFG, *Invergordon*, at 22.00, while GM3PIB, *Forres*, and GM3PIL, *Nairn*, are also active.

We opened with a record, so how about this for another? GM3GUI, *Frickheim*, has had a regular sked with GM3JFG, *Invergordon*, for two years, and only missed contact five times. Maybe it does not sound unusual until one remembers that the signal path is over the top of the Grampians, and the distance some 130 miles. Any claimers

for a more difficult path over a longer distance, and for a greater period of time?

Retreating back over the border we find G3RMB, *nr. Coventry*, commenting on the remarks by G2WS about peculiar propagation conditions. He suggests that the fading was due to ground reflections causing multi-path reception, and that the conditions required to produce the effect depends on the angle of the initial bending.

From Gt. Bookham, G5MA reports a fine tropospheric opening on September 1. The first indication that conditions were perking up came at 20.15 when the Scottish beacon, GB3LER, suddenly appeared at a good strength. Throughout the opening it put in an excellent signal, often peaking to S9. Stations worked were GM3BOC/A, *Brora*, in Sutherland, GM3GUI, *Frickheim*, GM3FYB, *Dunfermline*, GM2FHH, *Aberdeen*, and G5LH, *Newcastle upon Tyne*. Over the water, both SM6ANR and SM6SCO were worked—which only goes to show that it sometimes pays to look another way. G5MA also reports that the skeds with G3IOE, *Newcastle upon Tyne* are still going strong, and that he recently worked EI5AI/M, *Co. Wicklow*, and GB2GC on *Alderney, C.I.*

G2JF, *Wye*, worked GM3FYB, GM3DDE, and GM2FHH during the opening and comments that the GB3LER was audible at Wye between September 1 and 4 inclusive.

EI2W, *Dublin*, is closing in on his centenary—in counties worked that is. On August 29, he worked GM3BOC/A to clock up number 95.

Seventy Centimetre Notebook

Two members of the Welwyn Garden City Group were recently issued with the new "B" sound licences. BRS John Hazel was issued with G8ACE on August 13, and BRS Ted Garrett with G8ACP on August 21. Both hope to be active shortly on the Mid Herts Net frequency of 433.1 Mc/s. We wish them the best of luck in all that they undertake.

From the Midlands, G3NBQ, *Coventry*, reports that the "Nights on the Air" sessions held on Mondays and Thursdays are becoming very popular. Regular attendees are: G2WS, G2CIW, G3KEF, G3KFD, G3ENY, G3GTN, G3RMB, G3RYB/T, G6XMY/T and G6MXW/T. When the band opened on September 4, G3MCS, *High Wycombe*, was worked, and G3KEQ, *Sanderstead*, heard. Activity was a lot lower than expected, with some particularly strange effects noted on local stations, who were for the most part severely attenuated. For example, G3KFD and G3ENY, normally both S8 signals, became unreadable at times.

From G3OUF we learn that GB2GC, *Alderney*, had to abandon 70cm except for tests with G5ZT, *Plymouth*, on September 7 when that station was heard peaking up to S7 under poor conditions.

G3LTF, *Galleywood*, found a private little opening to the South East and worked DL3NI and DL3FM on c.w. There seemed to be nobody else about, despite the fact that these two stations were coming through for some time. On August 25 there was a good opening, and he worked PA0GER and PA0WB. The following day conditions improved still further and PA0COB, PA0DBQ, PA0VLP, ON4ZK and ON4RT were added to the haul. Between September 1 and 3, conditions again improved and SM6SCO was worked 569 both ways. Equipment? A varactor multiplier giving 7.5 watts!

We also learn of a possible 70cm "first" from G3LTF who tells us that GM3EGW had a contact with SM6ANR making what is believed to be the first GM/SM QSO on 70cm. We should like some more details of this interesting contact.

EI2W says that G13KYP and EI4Q have both received his 70cm signals, and he hopes that it will not be long before two-way contact is secured.

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 |
| GB3VHC | 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 |
|--------------|-----------|---------------|
| September 1 | 10.00 GMT | 700 c/s high |
| September 8 | 13.44 GMT | 700 c/s high |
| September 16 | 09.55 GMT | 1070 c/s high |
| September 22 | 11.00 GMT | 1020 c/s high |

Twenty-three Centimetre Jottings

During the 1250 Mc/s Tests, G3NBQ received G2RD/P 2 miles SW of Dunstable at 539, but unfortunately, was not heard in return. The distance between the two stations was some 56 miles. G3NBQ is now having regular contacts with G2CIW and G3KDF.

G2RD, Wallington, worked G3FP, Thornton Heath, and was heard by F8MX/A, but regrettably in this case it seemed to be one-way traffic, and they had to be content with a crossband QSO, 70cm/23cm.

Meteor Scatter

G3LTF had no luck in the Perseids. There was a near miss with UP2KAB, and another with YU1EXY. Nothing was heard from EA4AO, and only a little from UP2ON. Just to make it irritating, HB9RB and HG5KBP were heard on various skeds with other stations, and several bursts were received from unidentified stations.

From F9ND comes the news that during the Delta Aquarides—July 31 to August 1—F8DO, Lyons, achieved the first French Meteor Scatter QSO. Not satisfied with this alone, he made it with SP5FM, and there seems very little doubt that this sets a new French 2m distance record. Success breeds success, and on August 11, F8DO gave a repeat performance, but this time with YU1EXY during the Perseids, producing the first F/YU contact. A fine performance all round.

V.H.F. NFD

As many of the reports received for this feature contained comments relating to the V.H.F. NFD, it seemed worthwhile to group them up under one heading, sub-divided into the various bands.

4m NFD Reports. During the V.H.F. NFD on September 6, GM2CHN, Glasgow, tuned over 4m as a respite from the QRM on 2m—and found the venture very rewarding. Worked were G3OHH operating as GM3OHH/P, 1500 ft. up a mountainside on the Isle of Arran, accompanied by G3NNO and G3RWE. GM2CHN was particularly pleased about this contact in view of the high and rough ground along the signal path.

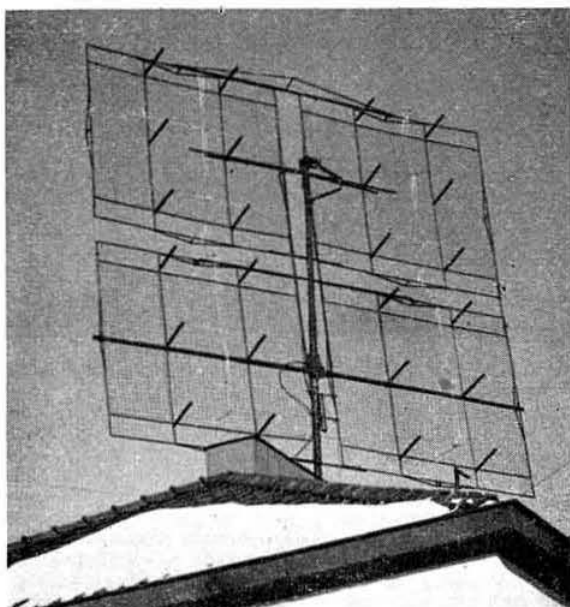
G2BJY, Walsall, really turned in some detailed and useful information. He found a lot of activity during the NFD period but considers that conditions were only poor to fair. Portable activity was high, but fixed stations seemed few and far between—which when one thinks about it, is as it should be on a Field Day!

Stations around the 100 mile mark from Walsall—and beyond—were consistently good, producing signals ranging from S7 upwards. Pride of place goes to G8RW/P for signal strength, and for operating both A1 and A3. Particularly good stations heard at G2BJY were G3FDW/P, Cumberland, G3KUJ/P, Somerset, G3FD/P, Bedfordshire, G3LTF/P, Bucks, G3REI/P, Sussex, G3PIA/P, Berks., G8NN/P, Yorks, G3HBW/P, Oxon, and G3EAT/P, Somerset. Many of these stations had passed the 100 mark by midday on Sunday. The best fixed station was G8SK.

G2BJY worked 24 portable stations, 19 of which were over 100 miles, the most distant being G3FDW/P, Millom, Cumbria. Phone stations called but not raised were: G3BAK/P, Cheshire, G2OI/P, Yorks, G3OJE/P, G3CBU/P, G3LHA/P, Northants, G3PMJ/P, G3IAM/P and G8SK, Essex.

Reports and comments for the Four Metres and Down column should be sent direct to G2AIW at 21 Bridge Way, Whitton, Twickenham, Middlesex.

Queries or requests for information on v.h.f. matters and awards, or on Society policy, should be sent to RSGB Headquarters for the attention of the V.H.F. Committee.



The 2m aerial used by OH1NL for the moonbounce contact with W6DNG on April 11, 1964. The whole assembly can be tilted between 7° and 39° above the horizon for accurately tracking the moon, and twelve horizontally polarized dipoles provide a gain of 21db. (Photo via G2HCJ)

Rounding off, G2BJY observes that he thinks it is a long wait until December 13, and would like to see another contest, this time for fixed stations only, on November 15!

2m NFD Reports. A particularly worthy effort was mounted by GM3SBC/P who operated a completely transistorized station. Although the input was a mere 65 milliwatts, he had many contacts. His location was near to that of GM3IQL/P at Kinross.

GM2CHN, Glasgow, reports that GM3NZI/P, nr Whitburn, W. Lothian, and GM3IQL/P, nr Kinross, were particularly fine signals. GM6XW/P together with GM2FHH and GM3KY1/P seemed to be doing Trojan work. Other stations heard were GM3KXM, GM5VG, GM2DPW, GM3GPK, GM3PMB, GM3HLH, GM6KH and GM4HX.

In Scotland, the weather was so terrible that many stations prudently delayed the start of their operations until the Sunday morning. This was an unfortunate handicap, giving the Southern stations a head start, although even in the alleged "Sunny South" it was far from a picnic, despite a promising start. In some places it seemed as though the barometer couldn't unwind any further.

G3OCB, Truro, says the weather was dreadful, with a great deal of anxiety for the tents and equipment being buffeted by strong NW winds accompanied by heavy rain. G2BHW and G3NVJ even appeared to be in personal danger at times. Nevertheless, some 30 stations were worked, but all of them were semi-locals, except for G2JF, Wye.

70cm NFD Reports. G3NBQ, Coventry, had quite a good time working, among others, G3HBW/P, Oxford, G3OJE/P, Aylesbury, G3PIA/P, Wantage, GW3PZZ/P, Radnor, G3MCS and F8MX/A.

G3RMB, also of Coventry, managed to work 13 stations in the limited time available to him, the two most notable being GW3PXZ/P and F8MX/A.

G3OCB, Truro, had three QSO's: G5ZT, Plymouth, G3ARE, Plymouth, and G3MPS, nr Bridgwater.

G3LTF, *Galleywood*, had quite a number of contacts, the best of which were with **G3JQI/P**, **G3SVR/P**, **G3BAK/P** and the ever present **F8MX/A**. He also heard **G3MAR/P** and **G3KEU/P** but could not raise either station.

23cm NFD Reports. **G3NBQ** achieved a contact with **G3HBW/P** at a range of 45 miles and with **G3MAR/P** at 20 miles. However, tests with **G3PIA/P** and **G3SVR/P** were negative.

G3LTF comments that it was disappointing that so few people could switch from 70cm to 23cm. He expresses the view that he feels those operators who do work both bands should be able to effect a change-over in about one minute maximum. He managed five contacts on 23cm, the best of which was with **G2RD/P** near Brighton, a haul of some 63 miles.

Modulation

All who listened or operated during the V.H.F. NFD during the first weekend of September cannot have failed to observe the unnecessarily heavy modulation, which some stations appear to regard as essential to a good "contest" signal. The increasing occupancy of all our v.h.f. bands leaves no room for excessive sidebands and the selfish products of overmodulation, which contribute nothing to the score of the offending station and serve as a constant source of irritation to others trying to work within a few kilocycles. A little tailoring of the modulator audio response, together with a simple peak limiter to cope with the levels of various operators, would go a long way towards achieving a weekend of operating equally pleasant for all participating. Let us hope that the 12 months before the next contest will be profitably used.

Region I IARU Contest

Once again **G2JF**, *Ashford, Kent*, did some very excellent work indeed. Of a total of 179 contacts, there were 91 G, 7 GW, 1 GC, 32 PA, 12 ON, and 5 DL/DJ. A superb effort well in line with that which we have come to expect from this station.

Contest Note

Don't forget that the Second 420 Mc/s Contest will take place on October 17/18. Full particulars will be found on page 471 of the July BULLETIN.

Odds and Ends

EI2W makes a plea that all stations calling CQ on 2m and 4m should include their county in their call. He observes—and rightly—that a short CQ does not give time to check the location of the station in the *Call Book*, and if the call-sign is a recent one, there is a fair chance that it will not be listed anyway. Equally, portable stations working out of county would probably find this procedure to their advantage. Certainly it might well be helpful to those who operate "out of zone."

Turning to the inner man, the **Coventry Group** are holding an informal "Sausage and Mash" Supper on Wednesday, November 4 at the "Hawthorn Tree," Broad Lane, Coventry. Will all those interested let **G3NBQ** know. See *Call Book* for QTH. They will then be given the best route, and placed on a mailing list to be notified of future meetings.

Finally

There has certainly been a lot to report, and our thanks are due to those operators who have taken the time and trouble to keep us informed. If you operate on the bands 4 metres and down, do drop us a line, even if you haven't done so before—everybody will be pleased to hear from you.

Deadline for the December issue is November 6.

432-434 Mc/s ACTIVITY NIGHT
SATURDAYS at 7 p.m.

Smuaintich Gu Mór (Continued from page 662)

Wick replied and spoke of the early pioneering work carried out at the Wick Wireless Station, which is still in operation and known to Top Band operators as Wick Radio. He said he was pleased that Caithness had been chosen as the place for the meeting and that he was delighted to see that so many members had brought their wives and families. The toast to the XYs and Ys was proposed by John Walford, **GM3POT**, who complimented the ladies on their patience which they displayed to their menfolk who became engrossed in the hobby. Sheila Oliphant (XYL of **GM3SFH**) replied and said that it was generally accepted that the best way to a man's heart was through his stomach but the difficulty with hams was getting them to come to the table. During the dance the Swindle was held and every man received a prize and each lady was presented with six Caithness Glass tumblers, and a groatie buckie which is a rare shell found on the shore near John o' Groats. The prizes included a Joystick and two Joymatches from Partridge Electronics, a four-element Yagi aerial from J-Beams and many other excellent prizes given by members from within and without Region 12.

A special events station consisting of a KW2000, dipole and a Joystick, and using the call-sign **GB2JOG** (Go Back to John o' Groats) was in operation throughout Saturday and Sunday morning. The ZR and RR were on the air at 02.00 BST in an 80m net with a VE3, two VOIs, DJ, SM, PA, and two Gs. Many of the Region 12 members, in particular the Shetlanders, who were unable to be present were contacted. A collection for RAIBC realized £3 8s. 4d. Surplus cash was added to this and a cheque for £4 4s. was sent to **G3LWY**.

On the Sunday morning a convoy left John o' Groats for the Dounreay Experimental Reactor Establishment. Members and their wives visited the permanent exhibition and were taken on a conducted tour of the establishment, which included a visit to the Fast Reactor and a demonstration of radiation monitoring equipment in the Health Physics Building. The proceedings ended officially with lunch in the Royal Hotel in Thurso. All members agreed that the visit had been well worthwhile.

★ ★ ★

On the Sunday evening the President, the General Manager and a few members and wives visited the Thurso Technical College to look at the receiver and recorder operating on the **GB3LER** 10m frequency. Several meteor scattered signals were heard. Considerable assistance has been given on the IQSY project by Dr. R. H. Roberts, the principal.

G. B. W.



The President, **G3FZL**, left, and **GM3GUJ** operating **GB2JOG** at the Seaview Hotel, John o' Groats, in the small hours of August 30, 1964.

RAFARS at Earls Court, 1964

By Sgt. ROY HANDLEY, G3GJQ*

VISITORS to the National Radio and Television show at Earls Court, will know that the Royal Air Force normally supports this event. The RAF Amateur Radio Society is invited to provide part of the overall display presented to the general public.

RAF "hams," although enjoying this break in routine duty have long been frustrated by the rigid ban imposed upon live radio transmissions from the exhibition hall.

In an endeavour to provide a unique and interesting exhibit, escape the ban, and alleviate acute ham frustration a system of remote station control was evolved.

The plan was simple in conception. The headquarters club transmitter, G8FC, normally located at RAF Locking, near Weston-super-Mare would be operated from London. The "phone-patch" facility available on the headquarters Collins 'S' Line equipment had prompted the idea.

With Ministry of Defence approval and GPO permission, two pairs of lines were made available between the two points. These lines were extended into the shack at RAF Locking and on to the RAF stand at Earls Court. One pair carried incoming and outgoing audio, the other served as a "hot" engineering line between the crews at either end.

The system, apart from initial "bugs," worked in excellent fashion from the beginning. An obscure line fault caused feverish GPO activity on the eve of the show, and G5UG, our guiding genius, burnt the midnight oil in the London shack of G2CDN adding an extra emitter follower to his home-brew line amplifier, this stage being required to eliminate microphone matching problems.

No other major snags occurred, and fears of signal degradation due to line parameters soon dissolved on receipt of excellent quality reports.

The audio level available was unable to operate the home station VOX efficiently. However, once the drill was established between the two operating crews at either end of the line, changeover between transmit and receive became almost instantaneous. One feels quite naked, operating without a transmit/receive switch! Changeover involved a certain amount of mind reading on snappy breaks. We could not quite manage some of the current call-sign-less activity on parts of 80m. Guest operator G2DAF will testify to that.

Conditions were fairly kind and we managed some concentrated activity on 20m. In the 13 days some 1500 QSOs were made, in 90 countries. Without obvious searching, exotica such as HL9, KW6, KC6, XW8, HC8, CR9, KX6, KB6, 9Q5, etc., came our way. Mobiles, maritime mobiles, and one aeronautical mobile added to the impressive s.s.b. demonstration. A gentleman travelling mobile at 70 m.p.h. down the Pennsylvania Turnpike greatly interested the non-hams during one session.

Daily skeds with Commonwealth countries were successfully maintained and a particularly enjoyable, and consistent one, was with VE3WSB, the World Scouts' Bureau station in Ottawa.

The exhibit as a whole greatly attracted ham and non-ham alike. In fact, we met many more hams than normally seem to make themselves known at these National Radio shows. The visitors' book ranges from a visiting YJ1 (New Hebrides) to HELP (Harry Secombe). 11KND arrived from the Food Fair at rival Olympia. G3MRP and myself returned the

compliment and consumed large quantities of spaghetti on the Italian exhibit.

The clarity and strength of some of the s.s.b. signals caused some doubting members of the public to mutter such things as "He's got a tape recorder under there!"

The temperature and humidity in Earls Court became a trifle uncomfortable at times, and we envied K2US in their air-conditioned, sound proof booth at the New York World's Fair, during one contact.

A surfeit of watts (audio) from various beat groups on the live stage, did not improve our operating conditions.

In all it was an extremely useful technical exercise by RAFARS. It was the first time that UK amateurs had been allowed to use this type of facility. Another "first" for RAFARS!

We already have ideas for a repeat of a similar or more sophisticated system at future exhibitions.

The RAFARS team, both in London and Locking, was G5UG, G3GJQ, G3GNS, G3GPE, GW3KZE, G3MRP, G3OPD, DL2OX (G3POX) and D. Bates. Valuable assistance was rendered by G2BVN and G2CDN.

All contacts received a souvenir QSL. Anyone unlucky should contact G8FC, the HQ station at RAF Locking, Somerset.



The RAFARS "station" at the National Radio Show. Standing, left to right, are Mr. Seymour, MBE, G3GNS, and Sgt. R. Handley, G3GJQ. Seated at the desk are Sgt. K. Smethurst, G3GPE (operating), and Sgt. S. Butlin, G3MRP. The G5UG line amplifier is immediately to the right of the receiver loudspeaker.

* c/o HQ Station, G8FC, RAFARS Locking, Somerset.

Mobile Column

By E. ARNOLD MATTHEWS, G3FZW*

RSGB Woburn Abbey Mobile Rally

Cars, cars, cars, and people, over 2,000 of them, attended Woburn this year in perfect weather. Before lunch-time cars were spilling out of the roped off enclosure into the adjoining park land. Aerials everywhere, big ones, little ones, safe ones and unhappily the not so safe monstrosities that looked as if they were going to fall apart at the first bump in the road.

The Trades Exhibition, on a different theme this year with various surplus equipment dealers, was a roaring success. However, there were also opportunities to look at the more sophisticated products of J-Beam Aerials Ltd. who had a really eye-catching display vehicle, Daystrom for their ever popular Heathkits, Green & Davis, K.W. Electronics and Courier Communications.

The Society was indeed pleased to welcome the Canadian



In this view of the parking ground at Woburn Abbey, the junk sale and talk-in tent can be seen to the left. The tilt-over tower and caravan in the centre was a prominent feature of the J-Beam Aerials Ltd. display.

(Photo by G3NMR)

Director of ARRL, Noel Eaton, VE3CJ/G3SDA, who kindly presented the Certificates of Merit to T. P. Douglas, G3BA, for the best Home Constructed V.H.F. Installation; C. L. Fenton, G3ABB, for the best Commercial V.H.F. Installation; and V. C. Candall, G3FAU, for the best Commercial H.F. Bands Installation. Unfortunately, SWL Vernon Bannister had left the grounds before the presentation and was not able to collect his certificate for the best H.F. Bands Home Constructed Installation. The Organizers will therefore be glad if he will let the RSGB know of his address, so that the certificate can be forwarded to him.

During the afternoon, the Society of Model Aeronautical Engineers put on a most impressive flying demonstration which aroused tremendous interest. In the grounds of the Abbey, whippet racing provided an added interest for the spectators, and a fine performance by the Barbados Police Band and their special Steel Band section caused much favourable comment.

The Society is most grateful for all the help given by the Verulam Radio Club in running the GB3RS talk-in station on 1.8, 70 and 144 Mc/s; to G2DUS of Stotfold for providing the p.a. equipment; to His Grace the Duke of Bedford for letting us come to Woburn again this year and to all of the trade exhibitors and willing helpers who came for a day out and found themselves working hard!

Personalities noted at the Rally (there were too many to list everyone), included Noel Eaton, VE3CJ, VQ2AT, ZL3HD, SM5LL, PA0LQ, DL2XS, VE7AHT, the President

*1 Shortbuts Lane, Lichfield, Staffs.

of RSGB, Geoff. Stone, G3FZL, Members of Council, G3IIR, G2MI, G2BVN, G2YS, G6NZ, GM6IZ, G3HRH, G3FUR, G2AHL and Austin, G6FO, editor of *The Short Wave Magazine*.

Derby Mobile Rally

This popular event, held on August 16, was again well attended, and young people were catered for by a programme of races, a model aircraft display, an electronic "noughts and crosses" machine, a film show and dancing to "The Decoys" beat group.

G3ERD/A, operated by G3JFD and G3IFA, gave talk-in facilities on 1.8 Mc/s. Signals from incoming cars were checked by G3HEH using a Racal digital frequency meter (the writer was recorded as being 30 c/s off tune). 144 Mc/s talk-in was provided by G3EEO/A and a team of operators.

Prizes for a time-of-arrival competition were won by G4MK and G5CP. At this rally, Concours d'Elegance or other equipment competitions are not held as the organizers feel that these can be embarrassing to amateurs who cannot afford a "Rolls-Royce" type of rig.

Stands included an RSGB bookstall, and G5PP's Mobile Interest display which was a gathering point for many mobileers. There were trade exhibits by G3ZY, Taurus Electrical Services, G3EKX (who was displaying the "Sphinx" s.s.b./c.w./a.m. transmitter) and G3ABG.

The Prize Draw was conducted, with his usual unflagging aplomb, by G3FGY. RSGB personalities who attended included G3FUR and G4JW.

Cannock Chase Mobile Rally

This small but enjoyable rally was organized by G3ABG, and held on August 23 at a beautiful and remote part of Cannock Chase, which made sure that the talk-in station G3RSX/P was kept busy all day assisting drivers of the 40 or so cars which attended. Events included displays of control-line model aircraft and Go-Karts.

G5CP/M works ZL on 3.5 Mc/s

At 07.05 on September 13, G5CP/M (Chesterfield) made an s.s.b. QSO with ZL4OD (Invercargill) on 3.79 Mc/s whilst in QSO with G8PO. G5CP was using his KW2000 and Master Mobile whip. It would be interesting to know whether anyone else has previously made a /M QSO with ZL on this band, for it seems likely that this is a "first."

G5CP was on holiday in North Wales during August and September, and worked 10 Ws and 9 VEs, including 2 VE4s. Other DX worked recently includes 3A2 and VQ4.

G3HYP/M could be heard regularly during August from Cambridge, using a Pye S.S.B. 150 transmitter crystal controlled on 3784.8 kc/s, and a helical whip. G3KNB/M (Stafford) is now active on 70 Mc/s, using a B44.



A truly international group at the Woburn Abbey mobile rally. Left to right: VE7AHT, SM5LL, PA0LQ, G3NMR, VQ2AT, G8KW. (Photo by G3NMR)



Project Lerwick

By G. M. C. STONE, G3FZL, A.M.I.E.E.*

PROJECT Lerwick, which is the Society's principal contribution towards the IQSY, is officially recognized by the Royal Society as part of the UK contribution to the international scientific effort being made during the period of sunspot minimum. This is complementary to the IGY, a period of similar research, which took place during the sunspot maximum.

The project was born when R. G. Flavell, GM3LTP, a member of the RSGB Scientific Studies Committee and a professional scientist employed by the DSIR Radio Research Station, Slough, was posted to The Observatory, Lerwick, Shetlands, for a period which includes the IQSY. His duties there are concerned with several experiments associated with radio wave propagation at l.f. and h.f. and with cosmic ray activity. In his spare time he has, on behalf of the RSGB and with the valuable co-operation of RRS and the Observatory Superintendent, established an experimental transmitting station to be used for investigations into sporadic E and auroral reflection propagation on h.f. and v.h.f., and tropospheric propagation on v.h.f. The latter contribution was started by Mr. Flavell professionally when at RRS Slough, and is now carried out under the auspices of the RSGB Scientific Studies Committee.†

To obtain the maximum co-ordinated scientific effort in Europe during the IQSY, the Society placed the IQSY on the agenda of the IARU Region I meeting held in Malmö during the summer of 1963, and as a result the RSGB, and the Deutsche Amateur Radio Club, DARC, which had also made a substantial contribution during the IGY and after, were charged with the task of leading European Amateur Radio activities during the IQSY. Details of the DARC effort have been published in *DL QTC*, the Club's journal, and include the running of a beacon station, DLOAR, operating in the 29 Mc/s band and located at Lindau.

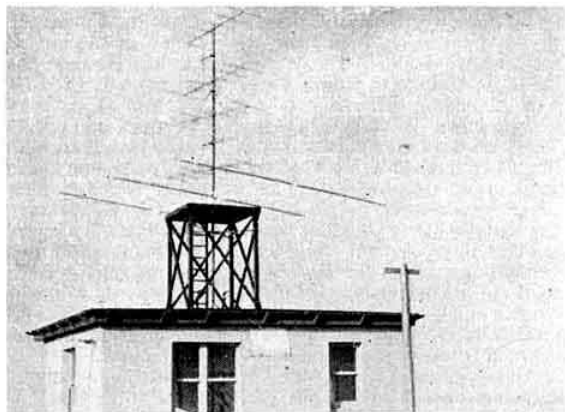
The Lerwick station, GB3LER, is now fully operational and is working well. It consists of h.f. and v.h.f. transmitters and aerials, with a common keying unit. The h.f. transmitter was specially constructed and supplied on extended loan to the Society by K.W. Electronics Ltd., of Dartford, Kent. It is crystal controlled and employs a 6146 power amplifier valve which delivers an output of 50 watts on a frequency of 29.005 Mc/s. The components of the transmitter are rated to allow for continuous operation. The aerial is a ruggedly constructed three element Yagi specially made by SVS Masts to a design supplied by R. F. Stevens, G2BVN, the Society's co-ordinator of IQSY h.f. activities. The aerial is beamed towards magnetic north.

Operation commenced during July, in time for a very high level of sporadic E activity, and was first heard by both G2BVN and G3FZL in the London area by this mode of propagation on July 24. Many other similar reports have been received, with several from as far away as south-west Germany. The v.h.f. transmitter is a slightly modified Pye

PTC704, originally designed for business radio use. The modulator has been removed. The p.a. stage is a QQV03/20A which delivers 15 watts r.f. output on a frequency of 145.995 Mc/s. Two J-Beam 6-over-6 slot fed Yagis are employed, one beaming to magnetic north and the other 10° west of south. R.f. is fed alternately to these aerials: two minutes to the north and one minute to the south. The send/receive relay in the PTC704 is being successfully used as the aerial change-over relay. The purpose of the change-over is to compare the signals received by tropospheric propagation with those reflected by the aurora borealis. As the latter phenomenon is relatively rare during sunspot minimum it is important that observers should be able to receive a signal for reference purposes, which is one reason for the southerly transmissions. Also, of course, the southerly aerial is used for the study of tropospheric propagation. Both transmitters are keyed simultaneously by a Government surplus keying device Type 1A, the call-sign being sent once per minute. V.h.f. aerial change-over switching is also controlled by this unit.

The equipment is located in a small spare room of a brick building which is on top of a hill close by the Observatory and some 350 ft. a.s.l. The aerials are mounted on a single mast on top of this building, the lowest being the 10m three element Yagi with the two 6-over-6 2m slot fed Yagis above. This mast is adequately guyed to withstand the very high winds, sometimes in excess of 100 m.p.h., experienced in the Shetland Islands. The outlook from this site is excellent to the south over the sea and to the north over land.

The transmitter became operational on July 26, 1964, operating only with the southerly aerial, but both aerials came into operation on August 12. Until September 1 the signals had only been received in Scotland, but on that day an exceptionally good tropospheric opening occurred and many



The v.h.f. and h.f. aerial systems at GB3LER.

(Photo by G3FZL)

* Chairman, Scientific Studies Committee.

† See *V.H.F. Weather*, RSGB BULLETIN, Part 1, March 1963, Part 2, March 1964.



Dr. R. H. Roberts, Principal of Thurso Technical College, left, watching Dr. J. M. Lyon, GM3GUJ, examining a pen recording of signals from GB3LER on 29.005 Mc/s.

reports were received from the south of England: not only from well situated stations but also those in town centres. Further reports of this opening will be welcome, particularly from the South Coast, SW England and Wales.

The receiving aspects of this project are covered firstly by a number of observers who have offered their services, and secondly by automatic receiving stations which operate 24 hours per day. The first of these is located at the Technical College, Thurso, Caithness, where Dr. J. M. Lyon, GM3GUJ, with the valuable co-operation of the Principal, Dr. Roberts, has procured and set up receiving equipment for the 29.005 Mc/s transmissions in one of the electronics laboratories. The aerial, a three element Yagi located in the roof of the building, feeds a crystal controlled converter constructed by C. E. Newton, G2FKZ, the Society's IQSY v.h.f. co-ordinator, and is followed by an AR88D, the output from which drives a pen recorder. First signals from GB3LER were received on August 30 during a visit by G3FZL; these were reflections, or "pings" from ionized meteor trails—a useful source of signals for check purposes.

An automatic receiving station for the 145.995 Mc/s transmissions is being set up by A. J. Oliphant, GM3SFH, also of Thurso, at his home. The equipment consists of a crystal controlled converter feeding a KW77 receiver which drives a pen recorder. The aerial is a J-Beam 4-over-4 Yagi. A further receiving station for monitoring both the 29.005 Mc/s and 145.995 Mc/s transmissions is being set up by W. D. Oliphant, BRS26076, at North Berwick, and will be operational shortly.

The existence of another automatic receiving station became known to G3FZL during a visit to the Convention of the International Amateur Radio Club in Geneva on September 5-6, 1964. This is operated by the German Post Office as an official project under the control of DL1UM. This station, operating on 29.005 Mc/s, is located in Darmstadt and employs a three element Yagi beamed on Lerwick. The German Post Office has now asked whether an additional aerial could be installed at Lerwick, beamed on Darmstadt, with the transmitter output being switched alternately between the northerly and southerly aeriels every five minutes. In return, the German Post Office would install another three element Yagi beamed north for auroral investigations, as the present aerial is only suitable for sporadic E propagation. Copies of all signal records would be made available to the RSGB. The German Post Office has already received signals from GB3LER during the intense sporadic E openings of the late summer months.

An additional aspect of the GB3LER project is a nightly s.s.b. net operated on about 3783 kc/s, at 18.15 GMT by GM3LTP and IQSY observers located in Scotland, Northern Ireland and England. Over this net GM3LTP passes a daily situation report concerning magnetic activity, as

observed by the magnetometers at Lerwick; the daily Geo-alert message, sunspot and solar flare data obtained from Ursigramme information broadcast twice daily from Paris on 91.15 kc/s and 10.775 Mc/s, a serviceability report on the transmitters; the likelihood of unusual tropospheric propagation and other relevant data. Stations in the net relay the information where necessary to any stations out of contact with GM3LTP owing to propagation conditions. This net has proved an extremely effective way of stimulating observers' interest by ensuring regular contact with the focal point of the project. All observers are thus kept up to date and are able to exchange information about their own particular observations with each other. In addition those not equipped for transmitting in the 80m band can also keep fully up to date by listening to the IQSY net in operation. In addition to the daily net, there is a weekly net on 3783 kc/s at 09.30 GMT on Sundays for a more general discussion on IQSY activities.

At present it is planned to keep GB3LER operational for at least two years, if not longer. Plans are also being considered to increase the power of the v.h.f. beacon experimental transmitter and also, subject to GPO approval, to install an additional transmitter and aerial system operating in the 70-1-70.7 Mc/s band. The latter would be extremely valuable in providing data on both sporadic E and auroral propagation, thus helping to fill the gap between 29.005 and 145.995 Mc/s.

Additional observers for this project are still required and details are available from the Scientific Studies Committee at RSGB Headquarters. All observers are kept fully informed of IQSY activities by means of a newsletter prepared monthly by GM3LTP and circulated by RSGB Headquarters. Any observer may contribute to this newsletter by sending information to R. G. Flavell, GM3LTP, The Observatory, Lerwick, Shetland.

The Society would, at this time, like to place on record its appreciation of the valuable work of Mr. Flavell and of the many IQSY observers who are regularly in contact either with him or the Scientific Studies Committee.

G3MHS in Hospital

D. H. W. Pratt, G3MHS, is in hospital and will appreciate receiving letters from members. His address is Ward 7, Block B2, Burton Road Hospital, Dudley, Worcs.

Single Sideband (continued from page 645)

(ii) an oscilloscope, and (iii) a diode probe valve voltmeter connected to the 75 ohm aerial output.

The valve voltmeter has the added advantage of giving a directly calibrated reading, and from this the sideband suppression in db can be easily calculated—that is, the ratio between the voltage reading due to the suppressed carrier, and the reading at maximum signal input (either tone input or a steady whistle into the microphone). Two useful valve voltmeter circuits are given in the RSGB *Amateur Radio Handbook*. These are relatively simple to construct without needing any expensive or "difficult" components, and may be calibrated against a workshop testmeter using 50 c/s a.c.

G2DAF Receiver Filter Circuit

The modified circuit diagram given for the G2DAF receiver filter, using a double triode frequency changer and a Kokusai Mechanical filter shown in *Single Sideband* last month unfortunately contains a circuit error. The bottom end of L2 is bypassed for r.f. with the 0.1 μ F capacitor and muting bias is series fed through the coil to the grid of V4. As drawn this bias would be shorted to earth. The connection between the earthy end of VC3 and the 150 μ F fixed capacitor should therefore be deleted.

BETTER STILL!

A peep at what's in store at the

RSGB INTERNATIONAL RADIO COMMUNICATIONS EXHIBITION

Seymour Hall, Seymour Place, London, W.1.

To be opened at 12 noon on Wednesday, October 28, 1964, by Mr E. D. Whitehead, M.B.E., B.Sc., M.I.E.E.

Director of Electrical Inspection, Ministry of Aviation

NOW truly international in character, with a wide range of previously unseen equipment and components from the USA and Japan, the forthcoming Exhibition promises to be the finest so far.

This is *your* Exhibition, and one in which you are bound to find something of absorbing interest. For example, to find out how really to run a station, what equipment to use and how to hook it all together, take a look at the Royal Navy stand where will be seen the communications room of an Aircraft Carrier. After writing out all the cheques, you may have no house nor contents—but you'll certainly work all the DX. The display will mark the fiftieth anniversary of the formation of the Fleet Air Arm.

Take a special look at the Balcony Stand of the Baden-Powell House Scout Amateur Radio Group together with that of the Roding Boys' Society. Both these exhibits show in unmistakable terms the enthusiasm of the "younger generation" and, to boot, that they are not all "mods" or "rockers."

In addition to the many well-known companies who have been stalwarts of this annual event, and who will once again be tempting us with their wares, it gives us particular pleasure to welcome several new exhibitors, the largest of which is the National Radio Company of America. A particularly interesting exhibit promises to be the latest "solid state" HRO.

For the avid members of the do-it-yourself brigade, Heathkits (Daystrom Ltd.) stand is a natural. In addition to the popular transmitter and receiver ensemble of kits, they will be showing a new range of test equipment particularly suited to the needs of the radio amateur along with various American Heathkit items which are available. Some longing glances will be cast in the direction of the stand of Green & Davis, where a wide range of Japanese components, test gear and equipment will be seen. If you have trouble in winding coils, or finding a suitable replacement for an "oddy," have a browse around the display by Electronics (Felixstowe) Ltd. If your soldered joints end up looking like putty, have a word with Enthoven Solders Ltd. If on the other hand, you want the low-down on relays, or are chasing an elusive type, then the stand of P. F. Ralfe is for you, for over 50 different types will be on display.

Webbs Radio will be displaying Eddystone equipment and components. Here the fully transistorised communications receiver, type EC10, is likely to attract a lot of attention. Want to take the "bashing" out of metal bashing and make it painless? Then see the stand of Philpott's Metalworks Ltd. Are you going "up the wall" with s.s.b. filter problems? A number of exhibitors have a solution for you.

In the ready-made department, K. W. Electronics, Webbs Radio, Green & Davis, Labgear, Withers Electronics, Spectrum Electronics, Minimitter (1964) Ltd., and newcomers, National Radio Company (USA), Ray Cross Electronics, Courier Communications and C. & N. (Electrical) Ltd., all have displays to whet the appetite. The modern presentation

of much of this equipment is a real object lesson in combining good looks and functional design.

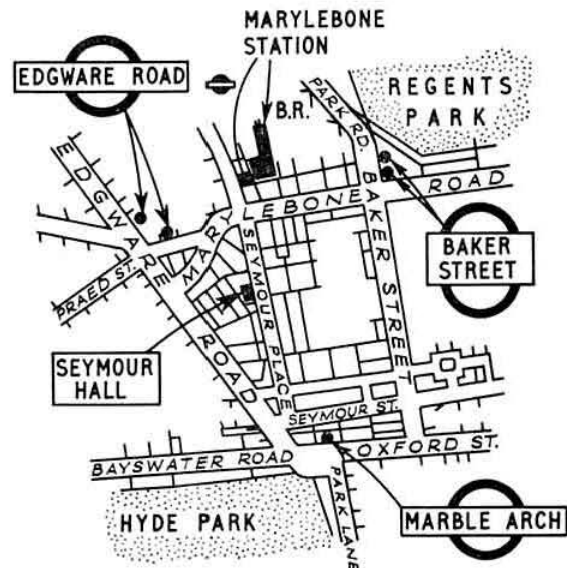
No doubt Sylvia, that redoubtable and eloquent champion of the Amateur Radio Mobile Society, will be on the war-path once again.

The British Amateur Television Club will be putting on its usual workmanlike and polished display and showing how near to the professionals the amateur can get without spending the odd million or two.

Publications covering practically every radio interest will be available from the stands of *Wireless World*, *Short Wave Magazine*, and the Society itself. Don't forget to collect a new *Call Book*—it's high time you got rid of that well-thumbed, tattered and torn, out-of-date edition! It rather shakes a pirate to be able to tell him who he *really* is.

What of the Society's own stand? Without letting the cat out of the bag, it seems that somebody has been letting their hair down. It promises to be quite a departure from the traditional arrangement. We have heard all sorts of rumours of "dark goings-on"—thumps in the night from certain workshops—secret meetings down dark alleys, and the like. Unfortunately your reviewer hasn't been able to pin anybody down, so we shall just have to wait and see.

There will, of course, be a chance to win an expensive



Map showing the position of the Seymour Hall. Details of parking arrangements are given on page 672

receiver in the RSGB's grand raffle—this time it will be a Hammarlund HQ170A.

As always, the three Armed Services will have representative displays, and they should bring home to us the more sombre aspects, and vital need for absolutely reliable communication under conditions so bad as to be beyond human imagination.

This exhibition not only provides an excellent opportunity to see the latest developments in equipment, and examine them at first hand—just see how the transistor has gained ground, for example—but more than this, to meet old friends, find out what sort of body has been parked on that well-known voice, and to chew over problems and ideas. The venue is well placed, and has good catering facilities.

If you are coming mobile fashion with the gear fired up and ready to go, and get lost in the ever-changing face of London Town, GB3RS will be operating on 80m and GB2VHF on 4m and 2m. Either station will be happy to put you back on the proper course.

Don't miss this exhibition—it really is a *must*. BCNU.

List of Exhibitors

Amateur Radio Mobile Society
Baden Powell House Scout Amateur Radio Group
British Amateur Television Club
British National Radio School
C. & N. (Electrical) Ltd.
Codar Radio Company
Courier Communications
Daystrom Ltd. (Heathkits).
Electroniques (Felixstowe) Ltd.
Enthoven Solders Ltd.
Formica Ltd.
General Post Office
General Post Office—Engineering Department
Green & Davis
Hammarlund Manufacturing Co. Inc. (K.W. Electronics Ltd.)
J-Beam Aerials Ltd.
K.W. Electronics Ltd.
Labgear Ltd.
Minimitter (1964) Ltd.
National Radio Co. of America (Ad Auriema Ltd.)
E. J. Philpott's Metalworks Ltd.
Racal Electronics Ltd.
Radio Society of Great Britain
RSGB Affiliated Societies' Display
Radio Stations GB2VHF and GB3RS
P. F. Ralfe Radio
Ray Cross Electronic Co. Ltd.
Roding Boys Radio Society
Royal Air Force
Royal Navy
Salford Electrical Instruments Ltd.
Short Wave Magazine Ltd.
Spectrum Electronics Ltd.
Territorial Army—65th Signal Regiment
World Association of Methodist Radio Amateurs and Clubs
Webbs Radio
Wireless World (Iliffe Electrical Publications Ltd.)
Withers Electronics
In addition to the above there will be an Educational Section.

Parking Arrangements

The Seymour Hall is situated in a parking meter area. Cars and/or vehicles may stop to load or unload and then move off during the *no waiting* periods which are:

8.30 a.m.-6.30 p.m. — Monday to Friday

8.30 a.m.-1.30 p.m. — Saturday

There are no restrictions before or after these times.

Long term parking meters are available in Bryanston Square, Montague Square and Park Crescent for which a payment of 2s. 6d. allows parking for five hours, and special arrangements can be made with National Car Parks Ltd. Arrangements are being made for parking meters on the Bryanston Place and Shouldham Street frontages to be suspended throughout the period of the Exhibition to enable loading and unloading, but this does NOT permit free parking for vehicles.

For further particulars contact the General Manager (Statics) Mr A. H. Webb, National Car Parks Ltd., 26 Queensway, Bayswater, W.2. (Telephone Bayswater 2411, 10 lines).

Bands Available

The following is a summary of the bands in which operation is permitted under the terms of the Amateur (Sound) Licence A, and the Amateur (Sound Mobile) Licence. Holders of Amateur (Sound) Licence B are not authorized to use Morse or to operate below 420 Mc/s.

| Footnote No. | Frequency bands (in Mc/s) | Classes of emission | Maximum d.c. input power |
|--------------|---|--|--|
| 1 and 5 | 1-8-2 | | 10 watts |
| 2 | 3-5-3-8 | | 150 watts |
| | 7-7-10 14-14-35 21-21-45 28-29-7 | | |
| 1 and 3 | 70-1-70-7 | A1, A2, A3, A3A, A3H, A3J, F1, F2 and F3 | 50 watts |
| 1, 4 and 6 | 144-145 | | |
| 6 | 145-146 | | |
| 1 | 420-450 | | 150 watts |
| 1 | 1215-1325 | | |
| 1 | 2300-2450 | | |
| 1 | 3400-3475 | | |
| 1 | 5650-5850 | | |
| 1 | 10,000-10,500 | | |
| | 21,000-22,000 | | |
| 1 | 2350-2400 | | 25 watts mean power and 2.5 kilowatts peak power |
| 1 | 5700-5800 | P1D, P2D, P2E, P3D and P3E | |
| 1 | 10,050-14,450 | | |
| | 21,150-21,850 | | |

Footnotes

1. This band is allocated to stations in the amateur service on a secondary basis on condition that they shall not cause interference to other services.

2. This band is shared by other services.

3. This band is available to amateurs until further notice provided that (i) only the frequency 70-375 Mc/s ± 25 kc/s shall be used for the purposes mentioned in Clause 1(1)(c) of this Licence; (ii) frequencies between 70-1-70-3 Mc/s inclusive and 70-5-70-7 Mc/s inclusive shall not be used on the North-West side of the Line Firth of Lorne to the Moray Firth; and (iii) use by the Licensee of any frequency in the band shall cease immediately on the demand of a Government official.

4. The following spot aeronautical frequencies must be avoided whenever this band is used, 144-0, 144-09, 144-18, 144-27, 144-36, 144-45, 144-54, 144-63, 144-72, 144-81 and 144-9 Mc/s.

5. RTTY may not be used in this band.

6. On and after January 1, 1965, in the band 144-146 Mc/s artificial satellites may be used by stations in the amateur service.

Society News

Mr E. W. Yeomanson, G3IIR, to be President during 1965

In accordance with Article 10 of the Society's Articles of Association the Council has appointed Mr E. W. Yeomanson, G3IIR, to the office of President with effect from January 1, 1965.

Mr Yeomanson has been a member of the Council since January 1958 and is at present Executive Vice-President and Chairman of the Exhibition and the Finance and Staff Committees. He is also a member of the GPO Liaison Committee, RAEN Committee, and TVI/BCI Committee.

Society Trophies and Premiums

The Council has made the following awards for 1963:
ROTAB Trophy to Mr. Peter Pennell, G2PL, in recognition of his consistent DX work for many years.

Calcutta Key to Mr. G. M. C. Stone, G3FZL, for outstanding service to the cause of international friendship through the medium of Amateur Radio.

Courtesy Price Trophy to Mr. A. L. Mynett, G3HBW, for his article on "Parametric Amplifiers" published in the June, 1964, issue of the RSGB BULLETIN.

Wortley Talbot Trophy jointly to Mr. P. K. Blair, G3LTF, and Mr. J. Stace, G3CCH, for their outstanding experimental work on the u.h.f. bands, particularly in connection with moonbounce on 440 Mc/s.

Ostermeyer Trophy to Mr. A. J. Shepherd, G3RKK, for his article "An Amateur Bands Communication Receiver" published in the July, 1963, issue of the RSGB BULLETIN.

Norman Keith Adams Prize to Mr. R. G. Flavell, GM3LTP, for his article "V.H.F. Weather" published in the March, 1964, issue of the RSGB BULLETIN.

Bevan Swift Memorial Prize to Mr. P. Harris, G3GFN, for his article "High Stability Variable Frequency Oscillators" published in the February and March, 1964, issues of the RSGB BULLETIN.

* * *

The Council has decided not to award the *Founder's* and *Varney Trophies* for 1964.

Proposed RSGB Trip to Europe during 1965

Members who might be interested in an organized Society trip to Europe next year are invited to write to Headquarters as soon as possible.

Victory for G3US

In September, 1963, Ron Shadlock, G3US, of Ackworth, near Pontefract in the West Riding of Yorkshire, applied to the Hemsworth Rural District Council for permission to erect a mast and rotary beam in his back garden.

After five months, however, permission was refused, but he appealed against this decision and a Ministry inspector conducted a hearing at the local council offices on July 29, 1964. In mid-September, G3US was informed that his appeal was successful, just 12 months after his original application. Much of the credit for this goes to Ron Strickland, G8KB, who legally represented G3US.

RSGB QSL Bureau Sub-Managers

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

| | |
|---|---|
| G2: | J. W. Russell, G2ZR, 45 Shakespeare Avenue, Bath. |
| G3, 4 and 5 two-letter calls & G6 and G8: | E. G. Allen, G3DRN, 65A Melbury Gardens, London, S.W.20. |
| | A. J. Mathews, G6QM, 62 Ashlands Road, Hesters Way Estate, Cheltenham. |
| G3AAA-BZZ: | C. C. Olley, G3AIZ, 157 Wanstead Park Road, Ilford, Essex. |
| G3CAA-DZZ: | C. A. Bradbury, BRS1066, 13 Salisbury Avenue, Cheltenham. |
| G3EAA-HZZ: | W. J. Green, G3FBA, 790 Rochester Way, Sidcup, Kent. |
| G3IAA-KZZ, BRS and A numbers: | E. G. Allen, G3DRN, 65A Melbury Gardens, London, S.W.20. |
| G3LAA-MZZ: | C. Harrington, BRS2292, 91 Brabazon Road, Hounslow, Middlesex. |
| G3NAA-NZZ: | C. R. Emary, G5GH, 133 Fairlands Road, Thornton Heath, Surrey. |
| G3OAA-PZZ: | J. H. Brazzill, G3WP, 43 Forest Drive, Chelmsford, Essex. |
| G3RAA-RZZ: | K. Walden, G3OLN, 250 Gloucester Road, Cheltenham, Gloucestershire. |
| G3SAA-TZZ | E. G. Allen, G3DRN, 65A Melbury Gardens, London, S.W.20. |
| GD: | T. R. Moore, GD3ENK, "Glyn Moar," St. John's, Isle of Man. |
| GI: | R. R. Parsons, G1HXV, 45 Erinvale Avenue, Finaghy, Belfast. |
| GM: | D. Macadie, GM6MD, 154 Kings-acre Road, Glasgow, S.4. |
| GW: | J. L. Reid, GW3ANU, 28 Waterston Road, Gabalfa, Cardiff. |
| DL2: | 4027469 C/T Griffiths, DL2OX, 212 Hohenzollern Str., Munchen Gladbach, Germany. |

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

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

Silent Keys

We record with sorrow the passing of the following amateurs:

F. C. McMurray, G2FM, of Worcester Park, Surrey.
W. S. Bligh, VE1BC, of Nova Scotia.

Obituaries

Fl.-Lt. T. Murnane, G3BXY and

H. R. Morey, G3GUA.

Amateurs in the Newbury area were grieved to hear of the passing, within a few weeks of each other, of two members of the Newbury & District Amateur Radio Society, Tommy Murnane, G3BXY and "Jimmy" Morey, G3GUA.

Tommy's great love was c.w. operation on the h.f. bands. His help with NFD in winking out the weak stations no one else could hear was invaluable and his infectious smile and chuckle were guaranteed to brighten any occasion.

Jimmy was a pre-war Marconi operator in the Merchant Service but his amateur radio activities were mainly confined to Top Band phone. He will long be remembered for his outspoken manner in fighting for principles he believed in.

The loss of these two amateurs leaves a great gap in the amateur community in the Newbury area. To their widows and families we extend our heartfelt sympathy.

J.A.G.

J. Mills, EI8P

With the death of Joe Mills, EI8P, on July 27, Amateur Radio in Ireland has lost a representative of whom it could be proud. During World War II Joe was an instructor at Cranwell, and with the end of hostilities, when licences were re-issued he was always to be found in Amateur circles.

He was a friend to everybody; anyone with an interest in radio was welcome in his home. He was always willing to listen to a radio problem from Ham or SWL, and because of his outstanding technical knowledge and ability could usually offer valuable assistance.

He had a long affiliation with the IRTS and RSGB. He was one of the first editors of the IRTS News, and until a few months ago was helping with the IRTS QSL Bureau. Last year, in failing health and in no little pain, he supplied and operated the main station for EIORDS at the Scientific Exhibition in Dublin, a gesture that was typical of the man.

Progressiveness was axiomatic with him. He was always abreast of developments in the field of radio and had the ability to assess them and make use of new techniques that might forward the development of Amateur Radio. Indeed, his own station was truly an experimenter's paradise where new techniques were tested; and the excellence of his signal and the multiplicity of his contacts in such a great number of countries show how his theoretical knowledge became practical achievement.

He will be missed, not only by the Amateur fraternity in Ireland, but by a wide range of DX friends.

EI4Q

David Rutherford, G1ZARS

It is with deep regret that we record the death of David Rutherford, G1ZARS, on August 11, 1964 at the age of 50 years. Dave had been in failing health for nearly a year.

He was a Signals Instructor with the Royal Artillery before and after the Second World War, and this was always evident in his operating on the amateur bands.

Dave made many friends and will be remembered by many, particularly in the South Down area.

To his widow, four daughters, father, brother and sister we offer our deepest sympathy.

R. J. C.

WAMRAC

The Rev. Arthur W. Shepherd, G3NGF, Honorary Secretary of the World Association of Methodist Radio Amateurs and Clubs, informs us that the address of WAMRAC Headquarters is now 1 North Street, Crewe, Cheshire (Telephone: Crewe 2885).

GB2RS SCHEDULE

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

| Frequency | Time | Location of Station |
|-------------|------------|--|
| 3600 kc/s | 9.30 a.m. | South East England |
| | 10 a.m. | Severn Area |
| | 10.15 a.m. | Belfast |
| | 10.30 a.m. | North Midlands |
| | 11 a.m. | North West England |
| | 11.30 a.m. | South West Scotland |
| | 12 noon | North East Scotland |
| 145.10 Mc/s | 9.30 a.m. | Beaming north from London |
| | 10.00 a.m. | Beaming west from London |
| 145.30 Mc/s | 10.30 a.m. | Beaming north west from Sutton Coldfield |
| | 11.00 a.m. | Beaming south west from Sutton Coldfield |
| 145.50 Mc/s | 11.30 a.m. | Beaming north from Leeds |
| | 12 noon | Beaming east from Leeds |

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

Special Events Stations

Members of the University of North Wales Amateur Radio Society will be operating GB2SFW during the Science Festival at Bangor, Caernarvonshire, from November 30 to December 4. C.w., s.s.b. and a.m. will be used on all the h.f. bands and 2m, and contacts and reports will be acknowledged with a special QSL card.

GB3BPH will be on the air from midnight on October 16-17, until midnight on October 18-19, from the foyer of Baden-Powell House, Queen's Gate, London, S.W.7. Four transmitters will be in operation, and the operators will be looking for contacts with other stations taking part in the Jamboree-on-the-Air.

GB3RN will be in operation on the h.f. bands from the Seymour Hall during the period of the Radio Communications Exhibition, from October 28 to 31. The station will be sited on the combined RNR/RNARS stand, and will be operated by members of the Royal Naval Amateur Radio Society.

On October 10 and 11, G13CDF, G13TK, G13CVH, G13ILV, G13RKE and G13KYP will be operating from Co. Fermanagh on 160, 4 and 2m under the call-signs G16TK/P, G13CDF/P and G13KYP/P respectively. Frequencies will be announced on GB2RS. Requests for skeds should be sent to G13CDF, G16TK or G13KYP.

The 1st Little Aston Scout Group (Sutton Coldfield), with the help of the Sutton Coldfield Radio Society, will be running a special station under the call-sign of GB3SP during the Jamboree-on-the-Air on October 17 and 18. Further details are available from R. J. Burrows, 131 Lichfield Road, Sutton Coldfield, Warwickshire.

Heathkit RA-1 Modification (Continued from page 636)

connections for a 12 volt heater supply, using an external h.t. power unit.

If the crystal calibrator is required, the modifications remain the same. However, the calibrator unit itself must be modified as follows. Disconnect the earthed heater pin of the calibrator valve, and reconnect it to pin 7 of the calibrator octal plug. Connect a 27 ohm 2 watt resistor between the other heater pin and an earth on the calibrator chassis. This then ensures correct heater balancing under 6 or 12 volt operation, whether the calibrator is plugged in or not.

Society Affairs

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

THE July meeting of the Council was held on July 13, 1964, and was attended by Messrs. G. M. C. Stone (President), N. Caws, J. C. Foster, L. N. Goldsbrough, J. C. Graham, R. C. Hills, E. G. Ingram, R. H. James, A. O. Milne, L. E. Newham, A. D. Patterson, R. F. Stevens, J. W. Swinnerton, Louis Varney, E. W. Yeomanson (Members of Council), John A. Rouse (General Manager and Secretary), and P. C. M. Smea (Minuting Secretary).

An apology for absence was submitted on behalf of Mr H. A. Bartlett.

Co-option of Mr E. G. Ingram

Mr E. G. Ingram was unanimously co-opted to serve on the Council until December 31, 1964.

(Under the Society's new Articles of Association, adopted on July 4, 1964, the office of Penultimate Past President, held by Mr Ingram since January 1, 1964, no longer exists).

New York International V.H.F. Convention

It was reported that Mr D. N. Biltcliffe, G6NB, had prepared a paper on v.h.f. activities in the British Isles for presentation at the International V.H.F. Convention to be held as part of the ARRL Convention in New York to mark the 50th anniversary of the League's foundation.

International Amateur Radio Club

The Council noted with satisfaction that the President had accepted an invitation to attend the IARC Hamvention to be held in Geneva on September 5-6, 1964, at which the future of Amateur Radio will be discussed. Means of helping the Amateur Radio movement in the emergent nations will also be discussed.

Region I Licences

It was reported that the survey of Amateur Radio licences issued by countries in Region I had commenced. The survey is being made to compare the various licensing regulations so as eventually to reduce existing differences in conditions within the Region.

Reciprocal Licensing

The President reported that no reply had been received from the Post Office in response to the Society's renewed requests for permission for foreign amateurs to operate while in the United Kingdom. Arising out of the discussion, it was agreed the General Manager should discuss the matter again with the Post Office officials concerned.

Membership and Affiliation

The Council approved 122 applications for membership (92 Corporate and 30 Associate). In addition, five applications for transfer from Associate to Corporate grade were also approved. The Council unanimously agreed to waive the subscription and grant membership to a blind applicant.

Affiliation was granted to the Glenrothes Amateur Radio Club.

Committee Correspondence

Arising out of a discussion of the procedure laid down at the May meeting, it was decided that inter-committee correspondence may be signed by the secretaries of committees and that routine correspondence on behalf of a Committee may be signed by the Committee secretary on the instructions of the Chairman.

Great Yarmouth Regional Meeting

The Council considered with great interest a report on the Region 16 Meeting held on June 14, 1964, presented by the Zonal Representative, Mr Graham.

Authorization of US Amateurs to operate G3NMS

The Council noted with considerable interest that the Post Office had granted permission for US licensed amateurs to operate the Amateur Radio Mobile Society's station at the Mobile Rally held at the USAF Base, RAF Barford St. John, on July 5, 1964.

Reports of Committees

The V.H.F. Committee met on June 8 to discuss matters relating to plans for a European Amateur Radio satellite, beacon stations, the transmission of the News Bulletin Service on 2m, and *Oscar III*. The Committee formally recommended that the tenth International V.H.F./U.H.F. Convention be held in London in 1965, a recommendation accepted by the Council. The date will be announced in due course. The Committee accepted a suggestion put forward by the Mobile Committee that vertical polarization of aerials should be adopted for 4m mobile operation.

On June 13, 1964, the Finance and Staff Committee dealt with matters relating to the proposed new Articles of Association, details of staff duties, Council members' travelling expenses, and allowances for meals for members attending meetings of the Council and Committees with a view to achieving economy.

At the meeting of the Committee held on June 27, consideration was given to the implications of the Offices, Shops and Railway Premises Act, 1963, various staff matters including the situation created by the resignation of a member of the editorial staff, and arrangements for the Extraordinary General Meeting called for the same day.

At its meeting on June 15, the Membership and Representation Committee discussed ways and means of increasing membership and heard a report on the results of a pilot advertising scheme in Northern Ireland. The Committee also drew up plans for a new information circular for Society representatives.

The RAEN Committee met on June 20 to discuss financial aspects of the new *RAEN Manual*, RAEN operation on the 4m band and arrangements for the RAEN Rally. Preliminary consideration was also given to a plan to hold a RAEN Regional Meeting in Surrey.

A meeting of the Mobile Committee was held at the USAF Base at Wethersfield, Essex, on June 21, to finalize plans for the Wethersfield Rally.

The Scientific Studies Committee at its meeting on June 22 discussed *BULLETIN* articles, the current tropospheric propagation studies, h.f. and v.h.f. transmissions from GB3LER, *IQSY Newsletter No. 5* and the distribution of solar activity and auroral warnings.

The Contests Committee on June 25 dealt with a variety of correspondence from members, rules for a number of contests and a report on the Affiliated Societies' Contest 1964. The rules of the new V.H.F. Listeners' Championship were approved for publication.

At its meeting on July 2, the Technical Committee gave detailed consideration to methods of evaluating equipment submitted for review in the *RSGB BULLETIN*. The Committee also reviewed the programme of technical articles for the *BULLETIN* and discussed the method of power rating for s.s.b. transmitters laid down by the PO. It was reported that a new draft of the instructions was being prepared although there was no question of altering the method.

The meeting ended at 11.15 p.m.

Vacancy on RSGB Bulletin

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

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

Applications for this interesting post on the Society's Headquarters staff should be addressed to the General Manager, Radio Society of Great Britain, 28 Little Russell Street, London, W.C.1.

CONTEST NEWS

— RESULTS — REPORTS — RULES —



First 420 Mc/s Contest 1964

The first 420 Mc/s Contest took place during a 24-hour period on May 30 and 31. At least that was the intention; what actually happened was something very different.

Conditions on the Saturday evening were quite good, and improved continuously until a peak was reached at about 03.00 GMT on the Sunday morning. At that time, contacts between the Midlands and the low countries would have been easy and contacts above 300 miles possible. But the graph of activity shows an abrupt drop after midnight, and no QSOs after 01.30 GMT on the Sunday, when PA0EZ worked PA0MZ at 15 km.

Some of the best DX QSOs that occurred after midnight (GMT) were G3LTF with PA0TBE at 272 miles and PA0OS at 186 miles; G3EGV/P with PA0DBQ at 256 miles and PA0TBE at 355 miles; G3OXD/A with ON4HN at 270 miles; and G3NNG/P with F9NJ at 214 miles and ON4LN at 270 miles.

The histogram is a plot of the average distance for all QSOs during each hour of the contest, and also the average of the best six contacts in each hour. It is noteworthy that although 60 contacts averaging over 150 miles were made between midnight and 01.00 GMT, only 13 contacts were made for the same average during the following hour. After that, almost everyone went to bed.

RESULTS

Transmitting Section

| Call-sign | Aerial | Power (watts) | NGR or Locator | Contacts | Score |
|-------------|-----------------------------------|---------------|--------------------------|----------|-------|
| 1 G3EGV/P | M 24 ele. | 100 | SU375618 | 54 | 5631 |
| 2 G3LTF | S 48 ele. | 150 | { TL707027 AL23B | 57 | 5483 |
| 3 ON4HN | S 64 ele. | 120 | BL79 | 32 | 3815 |
| 4 G3NNG/P | S 8/8 over 8/8 | 10 | { SU299864 ZL33H | 37 | 3276 |
| 5 G3LQR | S 16 ele. 2 λ spaced | 150 | TL045315 | 36 | 3237 |
| 6 G3OXD/A | M 16 ele. stack T 17 ele. Yagi | 24 | SO968887 | 31 | 2427 |
| 7 G3KEF/P | M 6/6 | 25 | { 43/509148 42/312818 | 31 | 2398 |
| 8 G2XV | S 40 ele. | 100 | 52/452530 | 31 | 2389 |
| 9 G3PSA/A | S 64 ele. Colinear | 150 | { TL366459 AL01 | 24 | 2211 |
| 10 ON4LP | S 8/8 J-Beam | 25 | BL79C | 22 | 1922 |
| 11 G2RD | S 24 ele. | 30 | TQ303643 | 38 | 1821 |
| 12 G3MEH | M 7/7 | 8 | TQ322573 | 27 | 1297 |
| † G3OBD/P | S 16 ele. | 24 | TL550576 | 12 | 1274 |
| 13 G3EDD | S 2 x 9 ele. Yagi | 6 | TL998276 | 22 | 1254 |
| 14 G3FIJ | S 13 ele. Yagi | 50 | 51/017197 | 16 | 1227 |
| 15 G3FD/P | S 6/6 slot | 6 | SPO16822 | 26 | 1097 |
| † G3BNL/P | S 8/8 slot Yagi | 70 | | 18 | 1031 |
| 16 G2CIW | S 16 ele. + 13 ele. | 25 | ST526935 | 17 | 1024 |
| 17 GW3ATM/A | S 4/4 + 2 slot | 15 | TM264495 | 11 | 988 |
| 18 G4AC | S 4/4 slot Yagi | 25 | TQ195909 | 10 | 712 |
| 19 G2FCA | S 2 x 7/7 slots | 150 | N17140E35770 | 27 | 707 |
| † G3YH | S 64 ele. | | NT106876 | 3 | 189 |
| 20 GM3FYB | | | | 5 | 132 |

Receiving Section

BRS15744 20

Check Logs

| | | | | |
|---------|----------------|----|----|------|
| PA0EZ/A | S 14 ele. Yagi | 50 | 37 | 4602 |
| G2WS | S 9 ele. Yagi | 26 | 5 | |

S Single Operator
M Multi-Operator

* No cover sheet.
† No NGR.
‡ No power declaration.

At 07.00 on Sunday, some stations began trickling back on to the band, and by 10.00 the band was back to normal leaving eight very weary hours until the end of the contest. The reason for introducing a 24-hour contest was that this would allow for any good conditions whenever they may occur, but unfortunately most 70cm operators are not prepared to work into the small hours of the morning even when conditions are superb.

Weather conditions in the south were dreadful. G3EGV/P on Walbury Hill, Berkshire, had to disconnect his aerial several times due to lightning. G3NNG/P on Uffington Castle was nearly struck on a number of occasions and hailstorms damaged the sealing on the aerial connection, letting rain into the co-ax. Even the sandwiches got wet. G3NNG suggests an award for devotion to u.h.f. in spite of his experiences of hazards in high places, and is also considering building a Faraday cage for the station.

Comments on the Rules

The Contests Committee is grateful for a series of constructive suggestions particularly from those stations which stayed on overnight and suffered the frustrations of a good, but vacant band. The main problem is to find something to do while waiting for conditions to change or for new stations to come on; what must be avoided is a repetition of the catastrophe of the first big opening coinciding with the 420 Mc/s Contest going to waste.

One interesting suggestion given by the Albright and Wilson Amateur Radio Society, G3OXD, is to divide the contest into two (or more) periods so that after, for instance, 12 hours, contacts can be repeated; this may not help people enjoying an English summer night on the top of their local mountain, but at least it will encourage activity on the second day.

There is also a popular suggestion that the contest should run for a very much shorter period purely as a domestic British Isles event.

As the rules for the Second 420 Mc/s contest have already been approved, any revisions will have to be made to 1965 v.h.f./u.h.f. contests. Any further suggestions will be very welcome.

The Results

A miniature cup is awarded to R. Staniforth, G3EGV/P as overall winner. With the assistance of G. Munden, G3NIL, he made 53 scoring contacts at an average of 111 miles, their's being one of the stations which stayed out overnight. Second this year is P. K. Blair, G3LTF, with 57 contacts. Normally his good take-off to the continent is to his advantage, but under the good conditions this proximity was not so favourable and his average distance per QSO was only 96 miles.

An unusual and very welcome series of entries were received from Europe. ON4HN, who came third overall shows contacts with five countries: DL, F, G, ON, and PA, with G3OXD/A as best DX. ON4LP in Ghent also worked the same five countries as ON4HW with G3NNG/P as best DX. PA0EZ operating /A at Bergen Dal submitted a check log of nine contacts with Gs, with a total score of 4602 from 38 contacts.

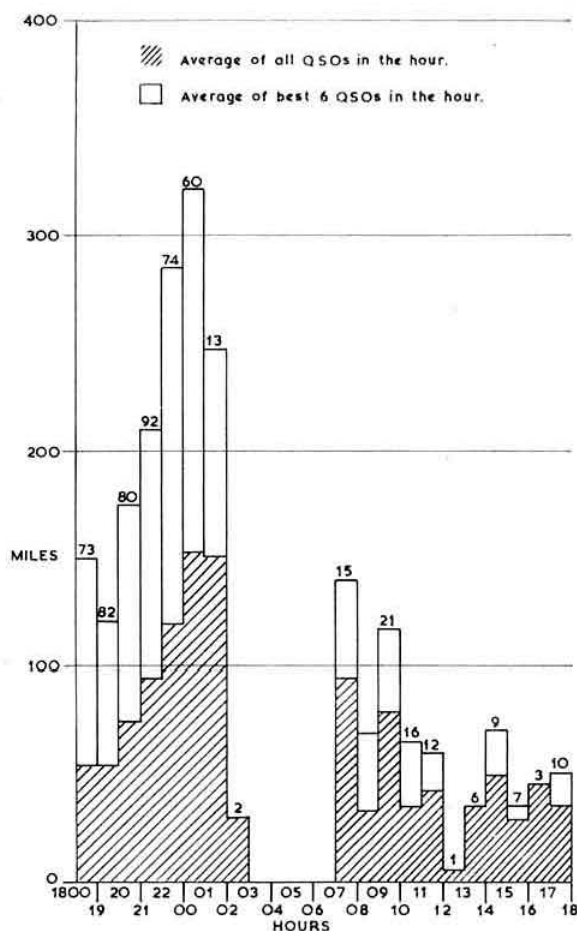
GM3FYB submitted a log of five contacts with his locals, while GW3ATM/A in Chepstow made 11 QSOs all with English stations.

An interesting check log was received from BRS15744, and this earns him a certificate of merit. He logged 20 stations, all in England, with G3OXD/A the best scoring DX at about 131 miles. ON4HN was also heard at about 176 miles, but as he was calling CQ this does not count.

Check logs are gratefully acknowledged from PA0EZ/A and G2WS.

Equipment

The table gives a summary of equipment used and also the NGRs, which may be of value to contestants.



Plot of entrants' average QSO distances during each hour of the First 420 Mc/s Contest 1964.

There is a marked increase in average power on this band. Transmitters above 100 watts use 4X150 or 4X250s in various circuits, while the rigs at or just below 100 watts use QV06-40s. The low power stations are more varied but the QV02-6 or QV03-20 are the most popular. On the receiving side, A2521s and EC88s are popular, but several stations are now using transistor front ends with AF139s or 2N1742s, sometimes as pre-amplifiers in front of the old valve converters.

70 Mc/s Contest 1964

The winner of this contest, held on June 20-21 was G3PIA/P—the call-sign of the AERE Harwell Group, operated by members G3NNG, G2HIF, G3HS, G3SJP and assisted by V. Marren, with V. J. Galpin logging. G3PIA/P scored 9033 points, achieved the longest distance contact and also submitted a log that was a pleasure to check. This was a very fine effort on the part of G3PIA/P, who will be awarded the V.H.F. Manager's Trophy. The runner-up was G8PD/A with 7267 points, operated by G8PD and G3HBW. Although G8PD/A's longest contact was 74 miles less than G3PIA/P's, they have the distinction of making no mistakes at all with their contacts or log entries. This too was a fine effort, and deserved a certificate of merit. Placed

third was G3AYT/P operated by G3AYT, G3ANH, G4HK, G3PMJ and G3FYE.

The Committee judged the listeners log sent in by A3278 to be the best for the Listener's award. This station, operated by Chris Wheeler of Worthing, recorded contacts throughout both days of the contest.

The longest distance contact was between G3PIA/P and GM6XW/P: a distance of 331 miles, followed by G3PIA/P and GM3EGW at 323 miles. Contacts over 200 miles were made by many contestants. G13HXV and GC3OBM were active for part of the contest but only had few contacts. G13HXU, hearing many carriers but being unable to resolve the modulation, wished that more stations would use c.w. at times.

Comments and Criticisms

G3PIA reports that many stations do not give QTH's which are identifiable on the 10 miles to the inch Ordnance Survey map, or quote indeterminate city centres. This is a point with which the Contests Committee wholeheartedly agrees. G3OCB suggests bonus points for portable operation although going portable may be considered a bonus in itself as it allows contestants to pick a good site. G3PHG, on the other hand, feels that fixed stations such as his cannot hope to compete with /P competitors, owing to difficulties of interference. He also suggests that this contest is too near National Field Day for the family man, and that the duration is too long. G3OCB prefers continuous operation as portable equipment needs a night watchman in any case, but suggests 9 a.m. to 6 p.m. on Sundays only as an alternative. G3MEH favours a band plan for Four Metres.

The Committee thanks the following for useful check logs; A3278, BRS13336, BRS20533, BRS24643, G3MI, G3DSA, G3IAG, G3PKO and G3SJT.

RESULTS

| Position | | Call-sign | Points | Contacts |
|----------|---|-----------|--------|----------|
| 1 | M | G3PIA/P | 9033 | 104 |
| 2 | M | G8PD/A | 7267 | 105 |
| 3 | M | G3AYT/P | 7177 | 82 |
| 4 | M | G3OXD/A | 6046 | 73 |
| 5 | M | G3FDW/P | 5963 | 53 |
| 6 | S | G3LMG/P | 5863 | 39 |
| 7 | M | G3OCB/P | 5815 | 69 |
| 8 | S | G3KEU/P | 5529 | 63 |
| 9 | M | GW3AHD/P | 5471 | 63 |
| 10 | M | G3OJE/P | 5078 | 83 |
| 11 | M | G3POI/P | 5010 | 77 |
| 12 | S | G3NIF/P | 4119 | 35 |
| 13 | S | G3NEO | 3885 | 36 |
| 14 | S | G3OHH | 3770 | 51 |
| 15 | S | G3MEH | 3673 | 73 |
| 16 | M | G5FK | 3641 | 73 |
| 17 | S | G2AII | 3593 | 79 |
| 18 | S | GM3EGW | 3270 | 28 |
| 19 | S | G3PHG | 3165 | 61 |
| 20 | S | GM6XW/P | 3108 | 28 |
| 21 | S | G3LQR | 3083 | 30 |
| 22 | S | G3BOC | 3069 | 35 |
| 23 | S | G2DSP/P | 2455 | 51 |
| 24 | S | G3OWA | 2309 | 55 |
| 25 | M | G3PUO/P | 2224 | 43 |
| 26 | M | GM3GDU/A | 2027 | 17 |
| 27 | S | G2AXI | 1784 | 32 |
| 28 | S | G3ORL | 1765 | 44 |
| 29 | S | G3CCM | 1634 | 48 |
| 30† | S | G3KCY | 1375 | 36 |
| * | S | G3RPE | 1373 | 41 |
| 31 | S | G3JDM/P | 1318 | 17 |
| 32 | S | G2BJY | 1255 | 14 |
| 33 | S | G2WS | 1228 | 18 |
| 34 | M | G3NDF | 1225 | 41 |
| 35 | S | G3HWR | 1120 | 36 |
| 36 | S | G3JKY | 912 | 40 |
| 37† | S | G4JW | 715 | 16 |
| 38 | S | G3YH | 523 | 9 |
| 39 | S | G13HXV | 472 | 8 |
| 40 | S | G3TA | 417 | 19 |
| 41 | S | GC3OBM | 322 | 3 |
| 42 | S | G3MFB/P | 238 | 16 |
| 43 | S | G3PJB | 209 | 12 |

M Multi-operator
S single operator

* Late Entry
† No Grid Ref. given

BERU Contest

Rules for the Twenty-eighth Event, February 20-21, 1965

RADIO amateurs throughout the British Commonwealth are invited to take part in the Twenty-eighth BERU Contest to be held on February 20-21, 1965. The Contests Committee is again arranging to secure the maximum amount of overseas publicity but invites the assistance of members in bringing the dates and rules to the notice of operators throughout the Commonwealth.

- Sections.** The contest is divided into two sections: (a) High Power—maximum licensed power; (b) Low Power—maximum input 25 watts.
- Duration.** The contest (both sections) will start at 00.01 GMT on Saturday, February 20 and end at 23.59 GMT on Sunday, February 21, 1965.
- Eligible Entrants.** The contest is open to all fully paid-up corporate members of the RSGB resident within the United Kingdom and to all amateurs licensed to operate within the British Commonwealth and British Mandated Territories. All entrants agree to be bound by the rules of the contest.
- Operator.** Only the entrant will be permitted to operate his station for the duration of the contest.
- Entries.** Entries should be set out, as shown in the example, on ONE SIDE ONLY of foolscap or International A4 paper. Entries must be postmarked not later than March 15, 1965, 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 on request.

BERU CONTEST, FEBRUARY 20/21, 1965

Claimed Score.....

Section: (High or Low Power).....

Name..... Call-sign.....

Address.....

Transmitter..... (D.c. input to any stage of the transmitter shall not exceed 25 watts in the Low Power Section)

Receiver..... Aerial(s).....

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.

SAMPLE LOG SHEET

| Date | Time GMT | Call-sign of station worked | I sent him | He sent me | Band Mc/s | Bonus Points | Points Claimed |
|--|----------|-----------------------------|------------|------------|-----------|--------------|----------------|
| 20 | 0005 | G3XXX | 569001 | 559002 | 14 | 20 | 5 |
| 20 | 0009 | VK2ZZZ | 579002 | 569004 | 14 | 20 | 5 |
| 21 | 0012 | GM3YYY | 569113 | 579102 | 14 | — | 5 |
| 21 | 0730 | GW8XXX | 589154 | 589164 | 21 | 20 | 5 |
| Total (Points Claimed + Bonus Points) 20 + 60 = 80 | | | | | | | |

- Bands.** Operation is restricted to the following bands: 3.5, 7, 14, 21 and 28 Mc/s. Transmission must be of type A1 (pure c.w.) only, and frequent tone reports of T8 or less may result in disqualification.
- Licence Conditions and Power Input.** Entrants must operate within the terms of their licences.
- Contacts.** Contacts may be made with any station using a British Commonwealth call-sign except within the entrant's own call area. British Isles stations may not work each other for points. Contacts with unlicensed stations will not count for points. The decision as to whether or not a contact is valid will rest with the RSGB Contests Committee. Only one contact on each band with a specific station will count for points. Duplicate contacts should be logged, but no points claimed.
- Scoring.** Each completed contact will score 5 points. In addition a bonus of 20 may be claimed for the first contact with each new Commonwealth call area (as defined in the Appendix) on each band. All British Isles stations (G, GB, GC, GD, GI, GM and GW) count as only one call area.

- Contest Exchanges.** Contest numbers must be exchanged and acknowledged before a contact can count for points. The contest number of six figures shall be made up of the RST report and three figures starting with 001 for the first contact and increasing by one for each successive contact, e.g., 559001 for the first and 439002 for the second contact, and so on.

Appendix

The following call areas are recognized for the purposes of scoring in the BERU contest:—

| | |
|--|-----------------------------------|
| AC3 Sikkim | VQ7 (Aldabra Island) |
| AP (West Pakistan) | VQ8 (Chagos) |
| AP (East Pakistan) | VQ8 (Agalega) |
| G, GB, GC, GD, GI, GM, GW—as one call area | VQ8 (Rodrigues) |
| MP4 (Bahrein) | VQ8 (St. Brandon) |
| MP4 (Muscat and Oman) | VQ8 (Mauritius) |
| MP4 (Qatar) | VQ9 |
| MP4 (Trucial Oman) | VR1 (Gilbert & Ellice Islands) |
| VE1 | VR1 (British Phoenix Islands) |
| VE2 | VR2 |
| VE3 | VR3 (Christmas Island) |
| VE4 | VR3 (Fanning Island) |
| VE5 | VR4 |
| VE6 | VR5 |
| VE7 | VR6 |
| VE8 | VS1 |
| VK0 (Australian Antarctica) | VS4 |
| VK0 (Heard Island) | VS5 |
| VK0 (Macquarie Island) | VS6 |
| VK1 | VS9 (Aden) |
| VK2 | VS9 (Maldives Islands) |
| VK2 (Lord Howe Island) | VS9 (Kamran Island) |
| VK3 | VU2 |
| VK4 | VU4 (Laccadive Islands) |
| VK4 (Willis Island) | VU5 (Andaman and Nicobar Islands) |
| VK5 | ZB1 |
| VK6 | ZB2 |
| VK7 | ZC5 |
| VK8 | ZD3 |
| VK9 (Admiralty Island) | ZD7 |
| VK9 (Christmas Island) | ZD8 |
| VK9 (Cocos Island) | ZD9 (Gough Island) |
| VK9 (Norfolk Island) | ZD9 (Tristan da Cunha) |
| VK9 (Nauru) | ZE |
| VK9 (New Guinea and Bismarck Island) | ZK1 (Cook Islands) |
| VK9 (Papua) | ZK1 (Manihiki Island) |
| VO | ZK2 |
| VP1 | ZL1 |
| VP2 (Anguilla) | ZL1 (Kermadec Island) |
| VP2 (Antigua and Barbuda) | ZL2 |
| VP2 (British Virgin Islands) | ZL3 |
| VP2 (Dominica) | ZL3 (Chatham Island) |
| VP2 (Grenada & Dependencies) | ZL4 |
| VP2 (Montserrat) | ZL4 (Auckland & Campbell Islands) |
| VP2 (St. Kitts and Nevis) | ZL5 (NZ Antarctica) |
| VP2 (St. Lucia) | ZM6 |
| VP2 (St. Vincent & Dependencies) | ZM7 (Tokelau) |
| VP3 | ZS3 |
| VP4 | ZS7 |
| VP5 (Cayman Islands) | ZS8 |
| VP5 (Turks & Caicos Islands) | ZS9 |
| VP6 | 4S7 |
| VP7 | 5B4 (ZC4) |
| VP8 (Falkland Islands) | 5H3 |
| VP8 (Grahamland) | 5N2 |
| VP8 (Sandwich Islands) | 5X5 |
| VP8 (South Georgia) | 5Z4 |
| VP8 (South Orkney Islands) | 6Y5 |
| VP8 (South Shetland Islands) | 7Q |
| VP9 | 9G1 |
| VQ1 | 9K2 |
| VQ2 | 9L1 |
| | 9M2 |

11. **Awards.** At the discretion of the Council, the BERU Senior Rose Bowl or miniature will be awarded to the winner of the High Power Section, and the Colonel Thomas Rose Bowl will be awarded to the leading British Isles station in the High Power Section. The winner of the Low Power Section will be awarded the Junior Rose Bowl or miniature. Certificates will be awarded to the first three entrants in each section. In addition a certificate will be awarded to the leading entrant in each call area regardless of the number of entrants in his call area provided that his score exceeds 1,500 points in the High Power Section or 750 points in the Low Power section. A certificate will be awarded to the runner-up in each call area in which there are ten or more entrants, provided his score exceeds 1,500 points in the High Power section or 750 points in the Low Power Section.

Rules for the BERU Contest Receiving Section, 1965

The rules for the Receiving Section of the BERU Contest 1965 are as follows:

1. **Eligible Entrants.** The contest is open to all fully paid-up members of the RSGB resident within the United Kingdom and to all short wave listeners resident within the British Commonwealth and British Mandated Territories. All entrants agree to be bound by these rules. Only the entrant may operate his receiving station for the duration of the contest. Holders of amateur transmitting licences are not eligible to take part.
2. **Duration.** The contest will commence at 00.01 GMT on Saturday, February 20, 1965 and end at 23.59 on Sunday, February 21, 1965. The BERU Contest for transmitting amateurs will take place during the same period.
3. **Entries.** (a) To count for points, a station outside the entrant's own call area must be heard in a contest contact and the following details

logged in columns headed as follows: (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) Band in Mc/s; (vi) Bonus Points Claimed; (vii) Points Claimed. CQ or Test calls will not count for points.

(b) Entries must be set out on ONE SIDE ONLY of foolscap or International A4 paper. Entries must be postmarked not later than March 15, 1965 and must be addressed to the Contests Committee, Radio Society of Great Britain, 28 Little Russell Street, London, W.C.1. Log sheets are available from RSGB Headquarters on request.

(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.....

4. **Scoring.** Each complete log entry will score 5 points. In addition, a bonus of 20 points may be claimed for the first station heard in each new Commonwealth call area (as defined in the Appendix on page 678 of this issue of the BULLETIN) on each band. The British Isles (G, GB, GC, GD, GI, GM and GW) count as one call area only as indicated in the Appendix to the rules of the Transmitting Section. A station may be logged only once on each band for the purpose of scoring. Where both stations in a contact are heard, they should be logged separately; points may be claimed for both entries.

5. **Awards.** At the discretion of the Council, the Receiving Rose Bowl or miniature will be awarded to the winner and a certificate of merit to the runner-up in each of the IARU continents.

BOOK REVIEWS

PRINCIPLES OF RADIO AND ELECTRONICS. By E. H. Jones, B.Sc., A.M.I.E.E., A.M.I.E.R.E. Published November 1963 by Cleaver-Hume Press Ltd., London. 342 pages. 45s. net.

This volume is specifically aimed at preparing students for Part A of the graduation examination of the British Institution of Electronic and Radio Engineers, although in parts the work is somewhat beyond this. In a book with this title and size it is obvious that it does not aim at completeness. It assumes an intelligent reader of about good GCE O Level Mathematics standard but assumes no technical knowledge and begins with the fundamentals of electricity and magnetism progressing to a good 30 page chapter on a.c. theory. This is followed by three clearly written chapters totalling about 70 pages on networks, lines and oscillatory circuits before embarking on electronics on page 154.

There is a good 27 page outline on transistor theory but amateurs will be disappointed with the 10 page chapter on transmitters and with the sentence on page 279—"Small mobile radio-telephony transmitters consist of a single choke modulated self-oscillatory valve stage"—despite the qualifying sentence. Neither is there any discussion on single sideband systems. The text concludes with a well written 32 pages on measurements, 17 pages on electrical machines, and a short index.

Elementary mathematics, with some calculus, is widely used throughout the text and this, together with the many worked examples and chapter questions, emphasizes rightly the importance of measurement. A number of numerical exercises were checked.

Some of the diagrams are rather small and one or two faulty. Factual errors are few; many, including Morecroft and Terman, disagree with the stated effect of a broken strand in Litz wire on page 147, and on page 189 the high impedance should be low. The provision of short references or hints for further reading at each chapter end would considerably enhance the study value of the book. Only one chapter is so provided.

All in all the book can be recommended as a sound course for its purpose, and although many think 45s. rather a high price, surely if this means an examination success, as well it may, then it is value for money. L.E.N.

RADIO AND TELEVISION. By C. A. Quarrington, A.M.B.R.I.T.I.R.E. Published by the Caxton Publishing Co. Ltd. in four volumes. Price £10.

This is an expensive publication, but the purchaser receives full value for his money. If I were to be asked to recommend suitable books for a youth who intended to make radio and television either his hobby or career, I would not hesitate to name these volumes.

Volume 1 deals with basic principles in a clear, non-mathe-

matical manner and then continues with complete chapters on each of the basic building bricks of radio receiving systems, r.f. amplifiers, frequency changers, detectors, output stages, etc.

Volume 2 covers hi-fi sound reproduction and complete radio receivers, and includes a finger-nail sketch on transmitters. The rest of this volume introduces the reader to television and its specialized circuitry.

Volume 3 commences with an excellent chapter on the mechanical construction of equipment, a subject rarely covered in this type of work. Test gear and test procedures are thoroughly covered, and the remaining 16 chapters describe common faults, their symptoms, and their cure.

Volume 4 is devoted to data filled with useful tables, a technical dictionary, and an interesting collection of typical commercial circuits.

The volumes are well printed and bound, and the plates and illustrations are clear, and useful. Errors appear to be few, though the reader will find the spelling "Colepitts" in Volume 1 a little unusual. The author reverts to the more common "Colpitts" in Volume 2. The BBC TV transmitter at Crystal Palace is unfortunately described as double sideband, instead of suppressed sideband. R. T.

SHORT WAVE AMATEUR RADIO. By J. Schaap, PA0HH. 166 pages including 12 appendices, 8 plates, 6 pull-out circuit diagrams and numerous line diagrams. Published by Philips Technical Library and distributed in the United Kingdom and Eire by Cleaver-Hume Press Ltd., 10-15 St. Martin's Street, London W.C.2. Price 21s.

This book provides a useful introduction to amateur radio and includes much useful information despite its small format (8 in. by 5½ in.). This does not detract in any way from the clarity of the text, which has been admirably translated from the original Dutch. Some basic theory is given but generally the emphasis is biased towards the practical side and simple apparatus. The contents include brief information on typical components, building a straight and a super-heterodyne receiver, simple transmitters, power supplies and modulators, aerials and test equipment, together with notes on station planning and building. There is also a chapter on amateur operating procedure and conduct on the air. The 12 appendices deal, among other things, with coil and bandspread calculations, the colour code, amateur frequencies and abbreviations, a list of countries and prefixes, the RST-code and the more frequently used Q signals. The majority of dimensions have been translated into English measurements. W. H. A.

Receipts

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

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.

Carrier Suppression in S.S.B. Exciters

DEAR SIR,—Other readers may be interested in how I cured excessive carrier level in my 9 Mc/s exciter. The design is basically that of the phasing exciter on page 305 of the *RSGB Amateur Radio Handbook*, but with the output of the balanced modulator fed into a 6AV6 amplifier which then drives a pair of 5763s as a high level mixer to 144 Mc/s. The whole balanced modulator and 6AV6 grid circuit was built into one compartment, screened from the 9 Mc/s oscillator and all other parts of the circuit. The balanced modulator appeared to pull well but was troubled by excessive carrier insertion. This was found to be due to 9 Mc/s energy bypassing the balanced modulator and coupling directly into the 6AV6 grid circuit, even though they were physically well separated. This was cured by placing the 6AV6 grid coil, its associated tuning capacitor and damping resistor in a screening can above the chassis with a short connecting lead to the grid pin.

The adjustment of the balanced modulator then became so sensitive that the existing 1 K ohm potentiometers were replaced by 100 ohm components with a 470 ohm resistor at each end.

Yours faithfully,

P. K. BLAIR, G3LTF

Galleywood, Essex.

C.W. Call-sign Speed

DEAR SIR,—Many amateurs using semi- or automatic keys send their call-signs at speeds greater than 12 w.p.m. As stipulated in the licence, this is not allowed.

The ARRL *Radio Amateurs' Handbook* states that:

$$\text{w.p.m.} = \frac{\text{dots per minute}}{25}$$

An ordinary wrist watch beats five times per second, i.e., 300 dots per minute,

$$\therefore \text{w.p.m.} = \frac{300}{25} = 12$$

If the dot speed of a key is in synchronism with the tick of a watch, you cannot go wrong, provided a good dot-dash-space ratio is maintained.

Your faithfully,

RONALD G. WHEATLAND, G3SZW

Bracknell, Berks.

Band Occupancy during Contests

DEAR SIR,—Once again my weekend has been thoroughly ruined by yet another contest. I like scratching around for a little DX, but, like many others, I am frequently forced off the bands through every single cycle of our meagre allowance of space in the spectrum being taken up by people calling CQ Test.

Many people are unable to take part in tests while others choose not to do so. If a person who, through work commitments, cannot spend his time at weekends taking part in contests he should be able to scratch around on the bands quite unmolested. This, with monotonous regularity, he is not able to do. Should he be able, in the depths of contest chaos, to find a kindred soul with whom to speak he is bedevilled by someone in our fraternity plonking himself right on the frequency transmitting CQ TEST with, more often than not, a badly operated bug and a horrible note spreading about six miles over the dial.

Seriously, it is time contests were regulated on an international level. The CHC QSO Party was a fine example of a well run contest. Frequencies to be used, plus or minus 10 kc/s, were nominated and so there was plenty of room for people not competing to be able to pursue their hobby.

I suggest that one weekend in each month be set aside for contests, and that 20 kc/s bands be nominated in the rules for

each contest on each frequency and for each mode of transmission; these two points to be discussed at international level at the earliest opportunity.

With the way contests are increasing there seems to be a very real danger that in the near future non-competing DXers might just as well spend their weekends in bed for all the results they are going to get.

Yours faithfully,

D. DAVID DAVIES, G3SJK, ex-ZD8RN

Clanfield.

Slow Morse Transmissions

DEAR SIR,—I am writing to thank you for the Slow Morse Practice Transmissions service which you provide, for, despite difficulties of reception that short wave listeners encounter, it is much appreciated by those struggling to obtain their licences.

Earlier in the year I was able to listen to a local member of the RSGB who, although he has been QRT for the summer, provided a regular and consistent programme. However, although it was possible to read his signals, it is impossible to receive many other amateurs appearing in the BULLETIN list, and in addition some only keep to irregular schedules. Whilst an extension to the Slow Morse Transmissions is greatly to be desired, it is the regularity of keeping to schedules which is so important.

If only more amateurs, members of the Society, could put aside a little time during the week, I am sure that Mr McBryne, G3KGU, could extend his valuable assistance to more listeners like myself.

Yours faithfully,

S. de F. SHORE, BRS22713

Virginia Water, Surrey.

(We agree with Mr Shore's comments, and would particularly like to have more volunteers in Wales, Scotland and Ireland.—Editor.)

Aerial Materials

DEAR SIR,—On reading G4LU's article in the April BULLETIN on a lightweight aerial for 144 Mc/s, I see that he suggests that using $\frac{1}{8}$ in. aluminium welding rods for the elements, which, in some cases, need to be welded together, as welding rods come in 3 ft. lengths.

Senmor & Co. Ltd., 35 St. John's Road, Isleworth, Middlesex, sell $\frac{1}{8}$ in. aluminium alloy rod at 3d. a foot, cut to any length. Using this rod would eliminate any difficulty of trying to find a garage able to weld aluminium.

Yours faithfully,

J. N. R. MASSARA, A3407

Milton Abbey, Dorset.

Reciprocal Licensing

DEAR SIR,—In connection with the world-wide discussion on reciprocal licensing, the following is a translation of §22 of the new Amateur Radio Act issued by Polish Ministry of Telecommunications on April 13, 1964:

"Temporary permission for installing and operating an Amateur Radio station on the territory of Poland can be obtained by any person with citizenship other than Polish, provided that the applicant possesses an Amateur Radio licence issued by his own authority."

As a matter of fact, temporary /SP licenses are free to all amateurs of the world. We are looking forward to similar conditions in other countries!

I hope that this information will be interesting to UK amateurs planning their holidays in Poland. Applications, with a photograph of the original licence, should be sent to the Ministry of Telecommunications, Radiocommunication Department, 2 Plac Malachowskiego, Warsaw, Poland.

Yours faithfully,

K. J. SŁOMCZYŃSKI, SP5HS

Warsaw, 86

Please mention the
RSGB BULLETIN
when writing to advertisers

CLUBROOM

A Monthly Survey of Group and Club Activities

The Baden-Powell House Scout Group will have its next meeting on the eve of the Jamboree-on-the-Air, October 15, when it is hoped to provide a demonstration of an Eddystone EA12 receiver that is being loaned for the event by Webb's Radio. The group hopes that a large number of amateurs interested in scouting will either visit the Jamboree station on October 17-18, or provide a wealth of contacts for G3BPH. Honorary Secretary: A. H. Watts, G3FXC, 8 Thorneycroft Court, Kew Road, Richmond, Surrey.

The Basingstoke ARC had its share of troubles during the V.H.F. NFD, when the generator broke down, meaning a loss of three hours. The next meeting on October 10 will be a constructors' competition, and will be held at the Emanuel Hall, Wote Street, Basingstoke. Visitors will be very welcome, and further details may be obtained from the Honorary Secretary, P. Jackson, G3ADV, 11 Oaklands Way, Basingstoke.

Bedford and District ARC. J. R. Clarke, G3OWQ, 12 Robin Hill, Brickhill, Bedford, would like to hear from amateurs in the Bedford area who would be interested in becoming members of the club. A special meeting will be held in the near future.

Bristol. On August 28, members of the Bristol Group enjoyed a very interesting talk, with demonstrations, given by Bob Palmer, G5PP. The subject of his talk, which contained much useful information, was mobile operation and test equipment, with particular emphasis on Top Band.

Cambridge and District ARC. The club has acquired an Eddystone 750 receiver, and now plans to completely re-build the station during the coming Winter. One major difficulty which members are now facing is an acute lack of space, which was particularly noticeable at a sale of surplus equipment held on September 4, when the main room was apparently "jammed." G3TGE did, however, manage to dispose of some first-rate items in brisk style.

Chester and District ARS. A comprehensive selection of subjects for meetings in October has been arranged. There will be a 160 and 2m net night on October 6; on October 13, H. Morris, G3ATZ, will lecture on "Aerials"; on October 20, B. Fallows, G3OWY, will lecture on "Receiver Selectivity"; and on October 27 a representative of the GPO will acquaint members of the society with methods of interference detection. Meetings are held regularly on Tuesdays, except the first in each month, at 8 p.m. in the YMCA, Chester.

Ex-G Club. The Sunday nets on 14-345 Mc/s at 19.00 GMT are now in full swing, and all British amateurs are welcome to call and work other amateurs at that time. Ex-G Club members

who visited the UK during August included 9G1BF and 9G1DY, and others expected during September were VE3EPL, VE3CYL, VE6HM and K5WZA. Any British amateurs going abroad are invited to contact members of the Ex-G Club, and to help in this respect a complete list of call-signs and QTHs is available from G4MJ or W3HQO, on receipt of an s.a.e.

Crawley ARC. Amongst recent activities a junk sale was held, which made a healthy profit for club funds, and the annual mobile evening on the Hog's Back attracted a good attendance. The club boasts three more successes in the RAE, and looking to the future, G3PHG is once again starting his RAE Course at the local evening institute. The subject of the October meeting had not been arranged when this copy was submitted for publication, but it had been decided to change the date to the third Wednesday of the month to avoid a clash with the Radio Communications Exhibition at the Seymour Hall. Honorary Secretary: R. G. B. Vaughan, G3FRV, 9 Hawkins Road, Tilgate, Crawley, Sussex.

Echford ARS. Society members have been operating the station GB2ASH at the Ashford (Middx.) "Scoutorama" on September 19 and 20, and the same call-sign will be used when a station is again put on the air during the Jamboree-on-the-Air on October 17 and 18. At the meeting on October 28, F. Charman, G6CJ, will be giving his famous talk on "Aerials," and members and visitors should assemble at 7.30 p.m. at the Grammar School, Ashford, Middlesex. The Honorary Secretary is L. Seaman, G3ATF, 40 Park Road, Ashford, Middlesex.

Grafton RS. Plans are now being laid for the 1964/65 season, after the summer recess. An interesting programme of practical work, combined with talks and demonstrations is envisaged, and it is also intended to carry on the recently introduced idea of occasionally circulating specially prepared data sheets on technical subjects with the Newsletters to members. Grafton RS meets on Friday evenings at 7.30 p.m. at Montem School, Hornsey Road, London, N.7. RAE and Morse Classes are held on Mondays and Wednesdays. Full details may be obtained on receipt of an s.a.e., from the Honorary Secretary, A. E. Bristow, 37 Tyndale Mansions, Upper Street, London, N.1. Tel. CANonbury 7003.

Kingston and District ARS. A last-minute communication from the present secretary of the society read as a final plea to enable the club to remain in existence. It appears that so far no members have been willing to fill two vacancies which will shortly appear among the officers of the society, those of Honorary Treasurer and Honorary Secretary. The AGM will be held on October 15, but if no members are prepared to fill the positions, this will be the last meeting. It will begin at 8 p.m. at the YMCA Annexe, Eden Street, Kingston.

Lichfield ARS. A cup for D/F contests presented by T. Painter, G3NUE, has been creating considerable competitive interest. A contribution to activity during the V.H.F. NFD was made by members when a station was operated at Castle Ring, and a film show was scheduled amongst the activities for September. Meetings are held on the first and third Tuesdays in each month at the Swan Hotel.

Liverpool and District ARS. The October and November meetings should cater for a wide variety of interests, with a film show on October 13; a talk on "Fire Precautions," by G3LIU on October 20; a hi-fi night on October 27; a construction contest on November 3, and a junk sale on November 10. Honorary Secretary: H. James, G3MCN, 448 East Prescott Road, Liverpool 14.

Lothians RS. The Society has pointed out that a couple of errors occurred in references to their activities in the August and September Clubrooms, and we should therefore like to apologize for these mistakes, and put matters right without more ado. First, the President of the Lothians Radio Society, Owen McCusker, holds the call-sign GM2CFU, and not GM2FCU; and meetings are held at 7.30 p.m. on alternate Thursdays at the YMCA, South St. Andrew Street, Edinburgh.

Loughton and District RS. With the holiday season drawing to an end the society will be reverting to the regular programme on October 9, when Miss M. Clark will give a lecture, with demonstrations, on studio film processes: not strictly radio, but



GB3NRC, the Magnus Grammar School Radio Society station at the Newark Rotary Club Hobbies Exhibition, being operated by G3TBK.

it is expected to interest members. On October 23, F. C. Judd, G2BCX, will give a talk on "Transistorized Transmitters," and also provide some information on raising the efficiency of loaded aerials. Honorary Secretary: A. W. Shepherd, 11 Barfields, Loughton, Essex.

Magnus Grammar School RS. When GB3NRC was operated from the Newark Rotary Club Hobbies Exhibition, at the Town Hall, Newark, over 100 QSOs were made during the four days. The operators were satisfied with this, for there was apparently a very high noise level most of the time. Unfortunately, however, as the QSL cards were not available at the beginning of the school summer holidays, they could not be sent off immediately.

Northern Heights ARS. There has been much club activity during August, with the running of several demonstration stations, and an outing to the Jodrell Bank Radio Telescope. The programme for the coming month will include preparations for operating G3MVH during the Scout Jamboree-on-the-Air on October 17 and 18; a recorded lecture on "Top Band DXing" by W1BB on October 21; a ragchew on October 28, and a visit to the RSGB International Radio Communications Exhibition on October 31. A film by Mullard Ltd. will be shown on November 10. The Honorary Secretary is A. Robinson, G3MDW, Candy Cabin, Ogden, Halifax.

North Notts, ARS. The new clubroom, kindly donated by W. H. Curtiss Ltd., at 13-15 Gateford Road, Worksop, Notts., was opened on September 3 when about fifty amateurs and SWLs attended. The club station G3RCW provided Top Band talk-in to the premises, where there was a display of 40 years old receivers, and some of the latest u.h.f. valves manufactured by STC Ltd. An RAE Course, free to members, was due to begin on September 15, and would be held on all subsequent Tuesdays. Meetings are held on Thursdays. Honorary Secretary: M. Dann, G3NHE, 4 Wright Street, North Anston, Sheffield.

Peterborough. A windmill has been acquired, and will be used as the new club Headquarters. Visitors will be very welcome to the meetings, held on Friday evenings beginning at 7 p.m. Further details may be obtained from D. Byrne, G3KPO, Jersey House, Eye, Peterborough.

Preston ARS. Meetings are held on the second and fourth Tuesdays in each month at St. Paul's School, Pole Street, Preston, at 7.30 p.m. The meeting on October 13 will be devoted to putting the club station in order and on October 27 a talk entitled "My Approach to S.S.B." will be given by Norman Horrocks, G2CUZ. Honorary Secretary: W. K. Beazley, G3RTX, 9 Thorneygate, Penwortham, Preston, Lancs.

Reading ARC. The next meeting will be held on October 31 at 7.30 p.m., when the subject of BCI and TVI will be dealt with at great length, which it is hoped will be of special interest to newly licensed stations in the area. The Annual Dinner will be on January 10. Meetings, at which visitors are always welcome, are held at the Palmer Hall, West Street, Reading. Honorary Secretary: R. G. Nash, G3EJA, "Peacehaven," 9 Holybrook Road, Reading.

Reigate ATS. On September 9, a party visited the South Thames Control Grid Centre of the CEBG, which was found to be a very instructive evening. At the George and Dragon, in Cromwell Road, Redhill, on October 17, it is proposed to hold a sale of surplus equipment, and there will be a jumble sale in aid of club funds at the St. Philips Hall, Reigate, on October 24. Honorary Secretary: F. D. Thom, G3NKT, 12 Willow Road, Redhill, Surrey.

Royal Naval ARS. The AGM will be held at 4 p.m. on October 31 at the Seymour Hall, where the society will, as usual, be exhibiting on a combined RNR/RNARS stand, and will be operating GB3RN.

South Birmingham RS. The September Newsletter contained much information on activities during August, which included two exhibition stations and a visit by members to the Derby Mobile Rally. A trial meeting was to be held at new headquarters, a church hall, on September 3, but it is not yet known whether this QTH will be adopted permanently. The AGM will be held on October 15, and three films on transistors by Mullard Ltd. will be shown on November 19. The Acting Secretary is A. E. Bishop Jnr., 40 Cecil Road, Birmingham 29.

South Manchester RC. A visit was recently made to the Nuffield Radio Astronomy Laboratories at Jodrell Bank, and members found this particularly interesting as the new Mk. 2 telescope was undergoing tests. An activity night will be held on October 9; the subject of the October 16 meeting had not been decided; on October 23 there will be a discussion on home constructed equipment; and on October 12 there will be a lecture, and a Mullard film on "Thermionic Oscillators."



The party of Northern Heights Amateur Radio Society members who visited the Nuffield Radio Astronomy Laboratories at Jodrell Bank on August 16.

Honorary Secretary: M. Barnsley, G3HZM, "Greenways," 11 Cemetery Road, Denton, Manchester, Lancs.

Southgate, Finchley and District Group. The mobile treasure hunt which the club held on August 23 was obviously very enjoyable, but the organizers were rather disappointed: only eight mobiles participated. Nevertheless, undaunted they plan a similar event next year, and we wonder whether perhaps if details can be supplied to us for publication in *Clubroom* in advance next time, more amateurs could be induced to take part. The next meeting will be on October 8 at 7.30 p.m., at Atlasta Lodge, Tottenham Road, Palmers Green, London, N.13. Honorary Secretary: R. Wilkinson, 33 Amberley Road, Palmers Green, London, N.21.

Skegness and District ARG. The group's annual meeting and junk sale will be held on October 16 at 7 p.m. at the Bull Hotel, Spilsby.

Surrey Radio Contact Club. At the next meeting on October 13, Clem Jardine, G5DJ, will give a talk on "Cables." Honorary Secretary: S. A. Morley, G3FWR, 22 Old Farleigh Road, Selsdon, South Croydon, Surrey.

Uxbridge Radio Society. On October 17 and 18, the society will be taking part in the Jamboree-on-the-Air, when it is hoped to operate on all the h.f. bands and 2m. Immediately after, on the 19th, there will be a junk sale. Meetings are held on the first and third Mondays in each month at 8 p.m. at St. Andrew's Church, Scout Hut, Uxbridge Road.

Wimbledon and District RS. At the August meeting, K. Bailey, G3EPU, gave members a very interesting talk on receivers, and there was also a film show. A junk sale will be held on Friday, October 9, and the AGM is scheduled for December 11. Visitors are always welcome at the meetings. Honorary Secretary: E. N. Hurle, G3RZN, 156 Monkleigh Road, Morden, Surrey.

Wirral ARS. Five teams turned out for the Society's D/F Contest held on August 19, and all participants appeared to enjoy themselves. The AGM will be held on October 7, and October 21 will be the club film night.

Yeovil ARC. The first of the August activities was a visit by club members to the Mobile Rally held at the Royal Naval College at Dartmouth. A tape lecture with slides on "Introduction to Electronics" was enjoyed by members.

Affiliated Societies

The following Clubs and Societies are now affiliated to RSGB:

IPSWICH RADIO CLUB,
c/o R. J. Wells, 43 Clench Road, Holbrook, Ipswich, Suffolk.

MOUNT SCHOOL RADIO SOCIETY,
c/o The Secretary, Newark Church of England Secondary School, Newark, Notts.

RAF STEAMER POINT AMATEUR RADIO CLUB,
c/o Officer I/C, RAF Comcen., Aden, BFPO 69.

RODING BOYS' SOCIETY,
c/o K. Smith, G3JIX, Wanstead Community Centre, The Green, Wanstead, London E.11.

Forthcoming Events

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

LOOKING AHEAD

- October 28-31.**—RSGB Radio Communications Exhibition.
December 18.—RSGB Annual General Meeting.
May 30, 1965.—RNARS Mobile Rally at RN Signal School, HMS Mercury.

REGION 1

- Ainsdale (ARS).**—October 14, 28, 8 p.m., 77 Clifton Road, Southport.
Blackburn.—Fridays, 8 p.m., West View Hotel, Revidge Road.
Blackpool (B & FARS).—October 12 ("My Sailing Trip to Lisbon," by R. Cavill, G3AOI), October 19 ("My Experience with Backyard Vertical Antenna," by A. Floyd, G3PNQ), October 26 (Questions and Answers), November 2 (Tape lecture "International Conferences and Amateur Radio," by A. O. Milne, G2MI), 8 p.m., Pontins Holiday Camp, Squires Gate.
Bury (BRS).—October 13 (Construction Competition), 8 p.m., Knowsley Hotel, Kay Gardens.
Chester.—Tuesdays, 8 p.m., YMCA.
Eccles (E & DAC).—Tuesdays, 8 p.m., The Congregational Mission Church, King Street.
Liverpool (L & DARS).—Tuesdays, 8 p.m., Conservative Association Rooms, Church Road, Wavertree.
Macclesfield.—October 13, 27, November 10, 42 Jordongate.
Manchester (M & DARS).—Wednesdays, 7.30 p.m., 203 Dryolsden Road, Newton Heath, Manchester 10.
Manchester (SMRC).—Fridays, 7.45 p.m., Rackhouse Community Centre, Daine Avenue, Northenden.
Morecambe.—October 7, November 4, 125 Regent Road.
Preston.—October 13, 27 (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.—October 7, 21, November 4, The Blossoms Hotel, Buxton Road, Stockport.
Wirral.—October 7, 21, November 4, 7.45 p.m., Harding House, Park Road West, Claughton, Birkenhead.

REGION 2

- Catterick.**—Tuesdays and Thursdays, 7.30 p.m., Clubroom, Vimy Road.
Halifax.—October 27 (AGM), Beehive & Cross Keys Hotel.
Northern Heights.—October 14 (Discussion on the Scout Jamboree on the Air), October 17, 18 (Jamboree on the Air), October 21 (Recorded lecture by WIBB on "Top Band DXing"), October 28 (Ragchew), October 31 (Visit to RSGB International Radio Communications Exhibition in London), meetings at Sportsman Inn, Ogden.
Scarborough.—Thursdays, 7.30 p.m., rear of 3 Trinity Road.
Spenn Valley.—October 1 ("Transistors," by M. Taylor, of Baird Television), October 15 (Visits from other Radio Societies), October 29 ("Radio Astronomy," by W. J. Baggeley, Sheffield University), 7.30 p.m., Heckmondwike Grammar School.
York.—Thursdays, 8 p.m., 61 Micklegate.

REGION 3

- Birmingham (MARS).**—October 20 ("Amateur Tape Recording Techniques"), 7.30 p.m., Midland Institute, Paradise Street. (South).
 October 15 (AGM), 7.30 p.m., Friends Meeting Hall, Moseley Road.

- Coventry.**—Mondays, 8 p.m., Westfield House, Radford Road, Coventry.
University of Keele (RS).—October 10 (Students' Mart in the Students' Union), 10 a.m., October 12, 7.30 p.m., Club Room, Sneyd Annexe.
Redditch (EWRG).—October 8 (Films of NFD and Past Exhibition Stations), 8 p.m., Old People's Centre, Redditch.
Stourbridge (S & DARS).—October 6 (Film: "Transistor Applications"), 7.45 p.m., Foley College, Stourbridge. October 23 (Annual Dinner), Bell Hotel, Stourbridge.
Wolverhampton (WARS).—October 19, 8 p.m., Neachells Cottage, Stockwell End, Tettenhall.

REGION 4

- Burton-on-Trent (B-o-TARS).**—Wednesdays, 7.30 p.m., Club Rooms, Stapenhill Institute, Burton-on-Trent.
Chesterfield (C & DARS).—October 7, 7.30 p.m., Newbold Observatory, Newbold Road, Chesterfield.
Derby (D & DARS).—October 7 (Surplus Sale), October 14 (Visit to Fire Service HQ, Ascot Drive), October 21 (Social Evening), October 28 (Junior Night: Committee Meeting), October 31 (Trip to Radio Communications Exhibition), November 4 (Surplus Sale), 7.30 p.m., Room No. 4, 119 Green Lane, Derby.
(DSW Exp. Soc.).—Fridays, 7.30 p.m., Sundays, 10.30 a.m., Club Rooms, Nunsfield House, Boulton Lane, Alveston, Derby.
Grimsby (GARS).—October 8, 22, 8 p.m., Model Engineers Club Rooms, Fletchers Yard, Wellowgate, Grimsby.
Heanor (H & DARS).—October 13 (Surplus Sale), October 20 ("V.H.F. Transmitter Construction," by B. Sandall, G3LKG), October 27 (Films), November 3 ("Receiver Alignment," by E. West, G3KTP), 7.30 p.m., Room No. 5, Heanor Technical College, Ilkeston Road, Heanor.
Leicester (LRS).—Mondays, 7.30 p.m., Sundays 10.30 a.m., Club Room, Old Hall Farm, Braunstone Lane, Leicester.
Lincoln (LSWC).—First Wednesday in each month, 7.30 p.m., Lincoln Technical College, Cathedral Street, Lincoln.
Loughborough (RCL).—Fridays, 7.30 p.m., Club Room, Corporation Hotel, Wharnclyffe Road, Loughborough.
Mansfield (MRS).—Fridays, 7.30 p.m., ATC Headquarters, Sutton Road, Mansfield.
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.
Peterborough (P & DARS).—Fridays, at the new QTH, The Old Mill, London Road, Peterborough.
Workshop (NNARS).—Tuesdays (RAE Course and Beginners' Night), Thursdays (Club and Lecture Night), 8 p.m., Club Rooms, 13-15 Gateford Road, Workop, Notts.

REGION 5

- Cambridge (C & DARS).**—October 9 (Guest Speaker—to be arranged), October 16 (Activity Night, "Station"), October 23 (Quiz—G3TEJ), October 30 (Informal), Fridays, 7.30 p.m., Club Headquarters, Corporation Yard, Victoria Road, Cambridge.
Haverhill (H & DARS).—Mondays, 7.30 p.m., Secondary Modern School, Haverhill, Suffolk.
Luton (L & DARS).—October 13 (Bring and Buy Sale—G3HEO), October 20 (Quiz—G3RXW), October 27 (Visit by Sheffield Club, Debate, Film Show, and Junk Sale), Tuesdays, 8 p.m., ATC Headquarters, Crescent Road, Luton, Beds.
March (M & DARS).—Tuesdays, 7.30 p.m., rear of Police Headquarters, High Street, March, Cambs.

- Royston (R & DARS).**—Wednesdays, 8 p.m., Manor House Social Club, Melbourn Street, Royston, Herts.
Sheffield (S & DARS).—October 8 ("Liberation of Greece," by W. G. Western), October 15 ("GPO Telecom Station," by J. Harper, G3RLJ), October 22 ("Artificial Respiration," by the St. John's Ambulance Brigade), October 29 (Mullard Film Strip Lecture), 7.45 p.m., Town Recreation Centre, Hitchin Road, Sheffield, Beds.

REGION 6

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

REGION 7

- Acton, Brentford & Chiswick (ABCRC).**—October 20 ("NFD Lectures & Discussion"), 7.30 p.m., AEU Club, 66 High Road, Chiswick.
Ashford (Midx.) (Echelford ARS).—October 28 ("Aerials," by D. Charman, G6CJ, 7.30 p.m., Ashford Grammar School.
Bexley Heath (NKRS).—October 8, 22, 7.30 p.m., Congregational Hall, Chapel Road, Bexley Heath.
Barnet (BRC).—October 27, 8 p.m., Red Lion Hotel, Barnet.
Chingford (Group).—October 9, contact the Hon. Secretary, Loughton 2397.
Chingford (SRC).—Fridays (except first), 8 p.m., Friday Hill House, Simmons Lane.
Croydon (SRCC).—October 13, 7.30 p.m., Blacksmiths Arms, South End, Croydon.
Dorking (D & DRS).—October 13, 8 p.m., "Wheatheaf," Dorking. October 27, 8 p.m., "Star & Garter," Dorking.
East Ham.—Tuesdays fortnightly, 7.30 p.m., 12 Leigh High Road, East Ham.
East London (Group).—October 11 ("Moonbounce," by P. K. Blair, G3LTF), 2.30 p.m., Lambourne Road, Ilford Town Hall.
East Molesey (TVARTS).—October 7, Carnarvon Castle Hotel, Hampton Court.
Edgware & Hendon (EARDS).—October 12 (NFD Film), October 26 ("Oscillators," by Mr. Crapp), 8 p.m., John Kebble Hall, Church Close, Deans Lane, Edgware.
Enfield.—October 15, 7.30 p.m., George Spicer School, Southbury Road, Enfield.
Gravesend (GRS).—October 21, 7.30 p.m., RAFA Club, 17 Overcliffe, Gravesend.
Guildford (G & DRS).—October 12, 26, 8 p.m., Guildford Model Engineering Society in Stoke Park.
Harlow (DRC).—Tuesdays, 7 p.m., rear of 11 High Street (G3ERN).
Harrow (RSH).—Fridays, 8 p.m., Roxeth Manor County School, Eastcote Lane, Harrow.
Holloway (GRS).—Mondays and Wednesdays, (RAE and Morse 7 p.m.), Fridays (Club, 7.30 p.m.), Montem School, London, N.7.
Hounslow (HADRS).—October 19, Canteen, Mogden Main Drainage Dept., Mogden Works, Isleworth.
Ilford.—Thursdays, 8 p.m., 579 High Road, Ilford (Nr. Seven Kings Station).
Kingston.—October 22, 8 p.m., YMCA, Eden Street, Kingston. Fridays, Weekly Morse classes at 2 Sunray Avenue, Tolworth.
Leyton & Walthamstow.—October 27, 7.30 p.m., Leyton Senior Institute, Essex Road, London, E.10.

LONDON MEMBERS' LUNCHEON CLUB

will meet at the White Hall Hotel, Bloomsbury Square, London, W.C.1 at 12.30 p.m. on Fridays, October 16 and November 20, 1964
 Telephone table reservations to HOL 7373 prior to day of luncheon. Visiting amateurs especially welcome.

Loughton.—October 9, 23, 7.30 p.m., Loughton Hall (Nr. Dabden Station).
Mitcham (M & DRS).—October 9, 7 p.m., "The Cannons," 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).—October 17, CD Training Centre, Bromley Road, Catford, S.E.6.
Paddington (P & DARS).—Wednesdays, 7.30 p.m., Beauchamp Lodge, 2 Warwick Crescent, London, W.2.
Purley (P & DRC).—October 16, 8 p.m., Railwaymen's Hall (Side Entrance), Whytecliffe Road, Purley.
Reigate (RATS).—October 17 (Sale of Surplus Equipment), October 24 (RATS Jumble Sale), 7.30 p.m., George & Dragon, Cromwell Road, Redhill.
Romford (R & DRS).—Tuesdays, 8.15 p.m., RAFTA House, 18 Carlton Road, Romford.
Scout (ARS).—October 15 (Discussion), 7.15 p.m., Baden Powell House, Queens Gate, Cromwell Road, South Kensington.
Science Museum (CSRS).—October 20 (Informal Meeting, GB25M "On the Air"), 6.30 p.m., Science Museum, South Kensington.
Sidcup (CVRS).—November 5 (Le Grande Vendre), 7.30 p.m., Eltham Congregational Church, 1 Court Road, Eltham.
Slough (SARS).—First Wednesday in each month, 8 p.m., United Services Club, Wellington Street, Slough.

Southgate & District.—October 8, Atlasta Lodge, Tottenham Road, London, N.13.
St. Albans (Verulam ARC).—October 21, 8 p.m., Hedley Road.
Sutton & Cheam (SCRS).—October 20 (Green & Davis range of equipment), 8 p.m., The Harrow, High Street, Cheam.
Uxbridge.—October 19 (Junk Sale), Railway Arms, Vine Street.
Welwyn Garden City.—October 8 (Tape Night by MRSC), 8 p.m., Backhouse Room, Handside Lane, Welwyn Garden City.
Wimbledon (W & DRS).—October 9, 8 p.m., Community Centre, St. Georges Road, Wimbledon, London, S.W.19.

Exeter.—First Tuesday in each month, 7.30 p.m., George and Dragon Inn, Blackboy Road, Exeter.
Plymouth (PRC).—Tuesdays, 7.30 p.m., Virginia House, Bretonside, Plymouth.
South Dorset (SDRS).—First Friday in each month, 7.30 p.m., Labour Rooms, West Walks, Dorchester.
Torquay (TARS).—Last Saturday in each month, Club HQ, Belgrave Road, Torquay.
Weston-super-Mare.—First Tuesday in each month, 7.15 p.m., Technical College, Lower Church Road.
Yeovil (YARC).—Wednesdays, 7.30 p.m., Park Lodge, The Park, Yeovil.

REGION 8

Crawley (CARC).—October 7 (Informal), for details contact G3FRV. October 21, 8 p.m., Trinity Congregational Church, Ifield.

REGION 9

Bristol.—October 23, 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.

REGION 13

Edinburgh (LRS).—October 8, 22, 7.30 p.m., YMCA, South St. Andrew Street, Edinburgh.

REGION 16

Basildon (BDARS).—October 19 (Film: "Amateur Radio in Eire"), November 3 (Social Evening at the Van Gogh). Details from G3JIB.
Chelmsford (CARS).—November 3 ("A History of Transmitting," by B. N. McLarty, O.B.E.), 7.30 p.m., Marconi College, Arbour Lane, Chelmsford.
Great Yarmouth (GYRC).—Fridays, 7.30 p.m., Manager's Office, The Old Power Station, South Quay, Swanton's Road, Great Yarmouth. Details from G3HPR.

CQ World Wide DX Contest 1964

The following is a résumé of the rules for this year's World Wide DX contest arranged by *CQ Magazine*.

Period: phone section; 00.00 GMT October 24 to 24.00 GMT October 25. C.w. section; 00.00 GMT November 28 to 24.00 GMT November 29.
Bands to be used: 1-8 to 28 Mc/s.

Type of competition: 1. **Phone Section.** (a) Single operator; (b) Multi-operator single transmitter; (c) Multi-operator multi transmitter. 2. **C.w. Section.** (a), (b) and (c) as for Phone Section. 3. **Inter-Club (DX Clubs affiliated to a national body.)**

Serial numbers: Phone stations will exchange serial numbers consisting of 4 numerals, the first 2 being the RS report and the last 2 their own Zone number. C.w. stations will exchange serial numbers consisting of 5 numerals, the first 3 being the RST report and the last 2 their own Zone number. Stations in Zones 1 to 9 will prefix their Zone number with 0.

Points: Contacts between stations on different continents will count 3 points. Contacts between stations on the same continent but not in the same country will count 1 point. Contacts between stations in the same country will be permitted for the purpose of obtaining a Zone and/or Country multiplier but no QSO points can be claimed. Only one contact with the same station is permitted per band. A multiplier of 1 for each Zone contacted on each band and a multiplier of 1 for each country worked on each band.

Scoring: The score of each single band is the sum of the Zone and country multipliers for that band, multiplied by the total contact points on that band. The total all band score is the sum of the Zone and country multipliers of all bands multiplied by the sum of the contact points on all bands.

Those sending in logs for a single band are eligible for a single band award only. If a log is sent in for more than one band, indicate which band is to be judged otherwise it will be judged as an all band entry. Single operator contestants must show a minimum of 12 hours operating time to be eligible for an award. If a contestant operates more than one band and wishes to be judged for a specific single band he must show a minimum of 12 hours on that band. Contestants using the 21 or 28 Mc/s bands will be required to show a minimum of only 8 hours. Multi-operator stations must show a minimum of 24 hours of operating time to be eligible for an award, and will be judged only on the basis of an all band score.

The log forms and report forms follow the pattern of previous years. Zone numbers and countries should be filled in on only the first occasion of a contact. All times to be in GMT. All logs must be postmarked not later than December 1, 1964, for the phone section and January 15, 1965, for the c.w. section, and should be sent to CQ, 14 Vanderventer Avenue, Port Washington, L.I., N.Y. 11050, USA (Attention Contest Committee).

Letraset Circuit Symbols. Instant dry transfers of electronic circuit component symbols are available from Letraset Ltd., Valentine Place, Webster Street, London, S.E.1, in addition to the standard range of lettering and plain colour transfer sheets. Sheets in the range X30 to X38 each contain one of the following types of symbols: resistors, capacitors, rectifiers, valves (pentodes), chassis, transistors, switches, diodes, and transformers/coils, in that order. A further sheet, No. S1396, contains a selection of the above symbols and some additional types. Each sheet costs 7s. 6d., and an Aerosol 101 protective coating spray is also available, price 7s. 6d.

K. W. Corner No. 4

Viceroy Works. Plans have been made for the removal of our Production line to the new factory on 3rd October 1964. It will take a little time to become established but, by the end of the year, our present output should be doubled and trebled by next Easter.

Two new callsigns have joined the KW staff recently, Ron Sykes ZLIAHO and Arthur Tuckfield VQ2AT, both are due to get 'G' callsigns. This brings the number of callsigns at KW to 14.

The space at present occupied by Production at Vanguard Works will become a development laboratory. This will mean increasing our laboratory staff and we are now ready to receive applications from top rate radio communications design engineers for permanent and interesting work. Those interested apply to the Managing Director—G8KW.

Exhibition 1964. Some of our plans for 1965 will be seen at the Radio Communications Exhibition in London at the end of October. In addition, you can see the greatest range of radio amateur equipment ever to be assembled in this country at Stands 21 and 31. Be sure to call and see our equipment and perhaps meet some of the KW staff. Remember, your interest and patronage helps us to develop the best and most up-to-date equipment with built-in reliability; this in turn helps our export drive.

Lerwick Beacon GB3LER. This beacon participating in the R.S.G.B. IQSY programme operates day and night on 29,005 k/c. The transmitter, a special crystal controlled KW "Vanguard" has been in continuous operation since early July without one single breakdown (touch polythene and whistle!).

K. W. ELECTRONICS LIMITED
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Closing date for the December issue

November 6

Copy received after this date may be held over to the following issue if still topical

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| Radio Data Reference Book | 14/- |
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| A Guide to Amateur Radio (Tenth Edition) | 4/- |
| Service Valve Equivalents (Fifth Edition) | 3/6 |
| Communication Receivers | 3/- |
| The Morse Code for Radio Amateurs (Third Edition) | 1/9 |
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'JOY' NEWS No. 2

FOR TRANSMITTING AMATEURS and S.W.L.s

From the U.S.A. comes nothing but praise for the "JOYSTICK" V.F.A. Chuck Schuauers, W4VZO who reviewed the "JOYSTICK" on behalf of "CQ", the Radio Amateur's Journal, reports in the July 1964 issue:

"I am one of those hams unfortunate enough to live in an apartment house where I cannot use the roof for an antenna. I've tried all sorts of inside antenna contraptions, from a dipole draped around a room to a wire dangled out the window. Can you by the smallest chance help me with my antenna problem?"

I know what it is like to be a "cave dweller" and a ham. I would recommend that you try out the JOYSTICK ANTENNA made by Partridge Electronics Ltd., 7 Sowell Street, Broadstairs, Kent, England. This antenna (patents pending) was designed for indoor as well as outdoor use and has no U.S. counterpart. . . . I tried the JOYSTICK out with HB9ACN's help and found that it performed remarkably well. Four different receivers showed improved performance over a dipole when the JOYSTICK was mounted high on the outside wall of an apartment house. A little drop-off in signal was noted when the antenna was layed against the wall on the inside. For transmitting the antenna will take a KW. . . .

WIBB, the TOP BAND EXPERT is full of praise for the "JOYSTICK" V.F.A. both for transmitting and receiving. " . . . the JOYSTICK on receiving in MANY cases, gave a MUCH BETTER SIGNAL TO NOISE ratio than the big outside VEE—which made it easier to read stations."

WN5IQG reports: "I am AMAZED with the performance of my "JOYSTICK", FANTASTIC RESULTS!!" Jerry N. Barnes. W9DNE writes: "We used the antenna on our vacation with good results. We made many contacts and we were pleased with the reports we received." E. A. Crowell, M.D.

If you already own a STANDARD "JOYSTICK" 25/- will make you mobile in seconds on all bands 160 through 10.

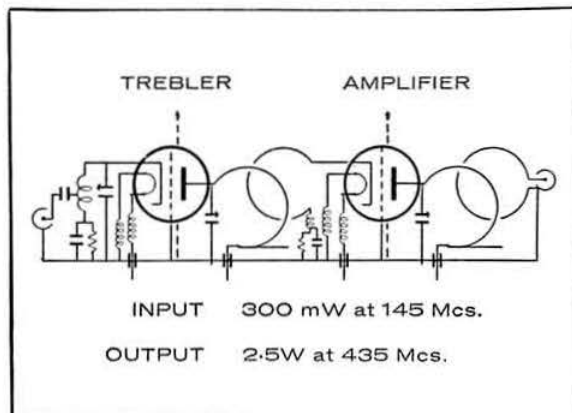
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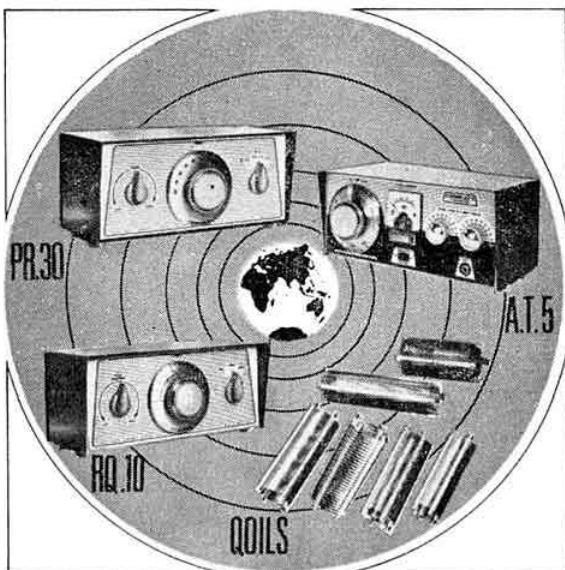
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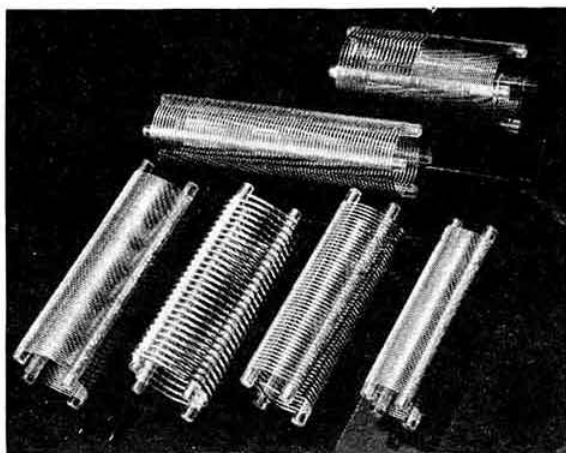
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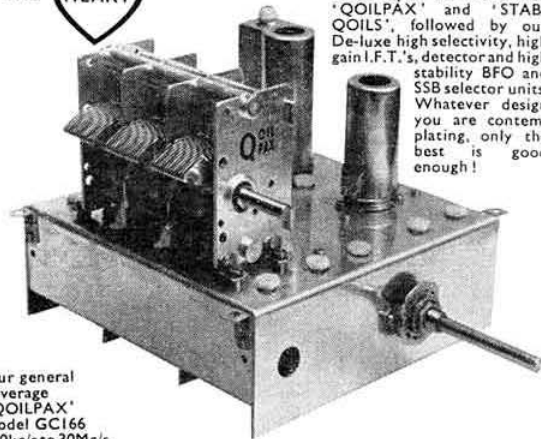
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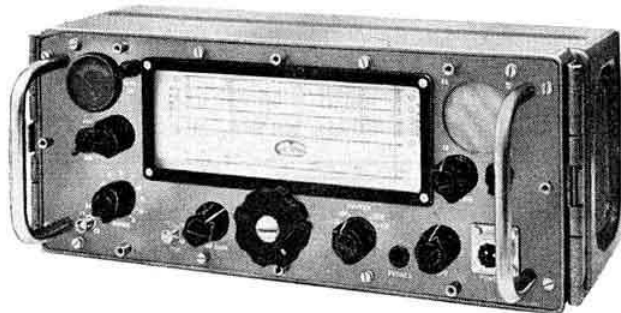
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J. AYRES (G3DQT) Brighton Road, Surbiton, has now moved to larger premises at 9 Park Road, Kingston-on-Thames, Surrey. Phone KIN 2913. Components and Equipment stockist. (There is no connection with the firm of Brian J. Ayres).

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WANTED RAE Correspondence Course in excellent condition also 2 Metre Converter. Box No. D.7156, c/o RSGB BULLETIN, 4 Ludgate Circus, London, E.C.4.

WANTED: Command Receiver, type BC453. Preferably unmodified. —G3SEE, 48 Wilmer Way, London, N.14. ENT. 1343.

URGENTLY WANTED—AR88D, 888, BRT400, 680X, and most other types of receivers, also transmitters. Cash payment and collected 200 miles London. —Brian J. Ayres, 21 Victoria Road, Surbiton, Surrey (Elmbridge 2833 or Lower Hook 2000).

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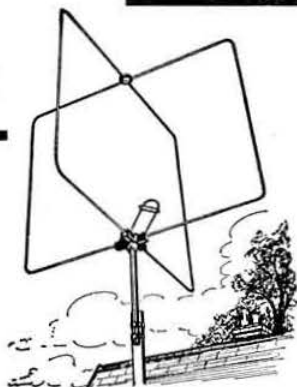
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FOR SALE (contd.)

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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.

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| 1R4 | 5/6 | 6B17 | 11/6 | 12A18 | 11/- | 959 | 12/6 | EC81 | 6/6 | EN31 | 7/6 | PCF86 | 13/6 | U403 | 7/6 |
| 1R5 | 5/6 | 6B18 | 5/6 | 12A17 | 5/- | 958 | 8/6 | EC83 | 7/6 | EN31 | 8/6 | PCF86 | 13/6 | U403 | 7/6 |
| 1R4 | 5/6 | 6B17 | 11/6 | 12A18 | 11/- | 959 | 12/6 | EC81 | 6/6 | EN31 | 7/6 | PCF86 | 13/6 | U403 | 7/6 |
| 1R5 | 5/6 | 6B18 | 5/6 | 12A17 | 5/- | 958 | 8/6 | EC83 | 7/6 | EN31 | 8/6 | PCF86 | 13/6 | U403 | 7/6 |
| 1R4 | 5/6 | 6B17 | 11/6 | 12A18 | 11/- | 959 | 12/6 | EC81 | 6/6 | EN31 | 7/6 | PCF86 | 13/6 | U403 | 7/6 |
| 1R5 | 5/6 | 6B18 | 5/6 | 12A17 | 5/- | 958 | 8/6 | EC83 | 7/6 | EN31 | 8/6 | PCF86 | 13/6 | U403 | 7/6 |
| 1R4 | 5/6 | 6B17 | 11/6 | 12A18 | 11/- | 959 | 12/6 | EC81 | 6/6 | EN31 | 7/6 | PCF86 | 13/6 | U403 | 7/6 |
| 1R5 | 5/6 | 6B18 | 5/6 | 12A17 | 5/- | 958 | 8/6 | EC83 | 7/6 | EN31 | 8/6 | PCF86 | 13/6 | U403 | 7/6 |
| 1R4 | 5/6 | 6B17 | 11/6 | 12A18 | 11/- | 959 | 12/6 | EC81 | 6/6 | EN31 | 7/6 | PCF86 | 13/6 | U403 | 7/6 |
| 1R5 | 5/6 | 6B18 | 5/6 | 12A17 | 5/- | 958 | 8/6 | EC83 | 7/6 | EN31 | 8/6 | PCF86 | 13/6 | U403 | 7/6 |
| 1R4 | 5/6 | 6B17 | 11/6 | 12A18 | 11/- | 959 | 12/6 | EC81 | 6/6 | EN31 | 7/6 | PCF86 | 13/6 | U403 | 7/6 |
| 1R5 | 5/6 | 6B18 | 5/6 | 12A17 | 5/- | 958 | 8/6 | EC83 | 7/6 | EN31 | 8/6 | PCF86 | 13/6 | U403 | 7/6 |
| 1R4 | 5/6 | 6B17 | 11/6 | 12A18 | 11/- | 959 | 12/6 | EC81 | 6/6 | EN31 | 7/6 | PCF86 | 13/6 | U403 | 7/6 |
| 1R5 | 5/6 | 6B18 | 5/6 | 12A17 | 5/- | 958 | 8/6 | EC83 | 7/6 | EN31 | 8/6 | PCF86 | 13/6 | U403 | 7/6 |
| 1R4 | 5/6 | 6B17 | 11/6 | 12A18 | 11/- | 959 | 12/6 | EC81 | 6/6 | EN31 | 7/6 | PCF86 | 13/6 | U403 | 7/6 |
| 1R5 | 5/6 | 6B18 | 5/6 | 12A17 | 5/- | 958 | 8/6 | EC83 | 7/6 | EN31 | 8/6 | PCF86 | 13/6 | U403 | 7/6 |
| 1R4 | 5/6 | 6B17 | 11/6 | 12A18 | 11/- | 959 | 12/6 | EC81 | 6/6 | | | | | | |