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Current Comment

Unexplored Avenues

COMMONLY found in unexplored avenues are unturned stones. A few of the latter were cast gently in the direction of (though not at) the Amateur Radio movement by those two V.I.P.'s, Sir Noel Ashbridge, formerly Director of Technical Services B.B.C. and Dr. R. L. Smith-Rose, Acting Director of the N.P.L.

Speaking at the last Amateur Radio Exhibition luncheon, Sir Noel referred to the valuable contribution which the Amateur Radio movement has made to techniques generally, and he inquired whether anyone had yet essayed radar. The same thought must have passed through the minds of most people who have had anything to do with pulse techniques during the war (or after), but, so far as is known, no work is being done in amateur circles in this particular field. Admittedly there are restrictions in respect of the frequencies which may be used for pulse, and indeed getting equipment going in the u.h.f. spectrum involved is enough to deter those without laboratory facilities. Nevertheless, the hint, now that it has been dropped, is worth following up, first by thought, and then by deeds.

Dr. Smith-Rose was speaking at the dinner of the London U.H.F. Group when he threw out the suggestion that radio amateurs could make useful contributions in the almost literally unexplored avenues of radio astronomy. Interestingly enough, he paid tribute to the pioneer work done in this field by that well-known amateur, Denis Heightman, G6DH, years before solar noise phenomena were detected by radar scanners. Just one snag Dr. Smith-Rose did not mention: you won't get a QSL from Jupiter!

Dr. Smith-Rose also referred to the important work that can be done by amateurs in connection with u.h.f. propagation. It is known that a great deal of systematic observation is already going on in our 435 Mc/s allocation, and it is in this region (and in the few Megacycles higher) where information is still scanty. Some of it, gathered by radio amateurs, will be yet further proof of the practical contribution which the movement can make, if it has a mind to do so, to the general fund of radio knowledge.—J.H.

The Printing Dispute

ALTHOUGH work has been resumed in the London printing industry it has not been found possible in the short time available for preparation of this issue to produce a normal size BULLETIN this month. The very large back-log of work at the Society's printers has added to the difficulties. For these reasons, some features are again shorter than usual while others—such as *Forthcoming Events, Regional and Club News, Council Proceedings. Amateur Television* and certain contest results—have had to be omitted entirely. However, it is anticipated that the April issue will contain at least 48 pages and that all the regular features will be included.

It has been necessary to restrict once more the amount of space devoted to advertising and the inconvenience caused to those advertisers whose announcements have had to be omitted is much regretted.

Production of the April issue, both from the editorial and printing aspects, is well advanced and it should be published within the next three weeks. If present plans hold good, the May issue should follow about two weeks or so later.

Meanwhile, every effort has been made to produce a balanced issue within the compass of this month's 32 pages.—J. A. R.

AT LAST... ACOS G.P. 61

A CERAMIC PICK-UP CARTRIDGE

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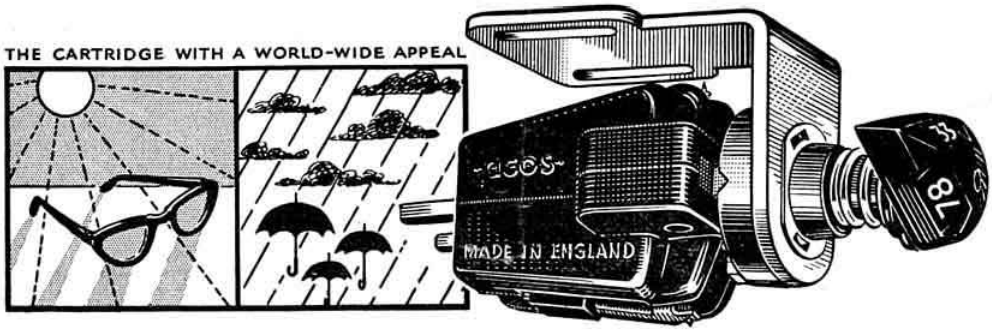
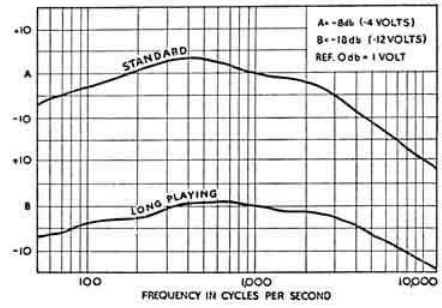


Here it is at long last — a ceramic gramophone pick-up cartridge that will readily withstand the rigours of climatic extremes of temperature and humidity and yet has all the other virtues hitherto not associated with ceramic-type pick-ups. Consider the features listed above; they add up to a very good pick-up by any standards and represent a genuine triumph for Cosmocord research and production. The G.P. 61 is of the turnover type and the easily replaceable cantilever styli are so designed and mounted as to damp out completely any stylus or other resonance.



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The Tesla Oscillator

A High Stability Circuit with Low Harmonic Output

By DAVID DEACON (G3BCM)*

The Tesla Oscillator has aroused considerable interest in recent years, but so far very little authentic information on its performance and construction has been published. The author of this article has had access to a technical paper submitted by the TESLA organisation to the C.C.I.R. (International Radio Consultative Committee). In addition, he has had considerable experience of the practical use of the circuit which is a feature of the transmitter section of the miniature amateur station with which he won the 1955 Amateur Constructors' Award at the R.S.G.B. Amateur Radio Exhibition.

AS the origin and theory of the Tesla oscillator circuit now gaining popularity in amateur as well as commercial circles is not widely known, a few details together with typical values for amateur operation may be of general interest.

The oscillator was developed by TESLA[1], a Czechoslovakian State organisation, from a circuit and a theoretical treatise attributed to J. Vackar[2]. Its overriding features are its stability and *low harmonic content*, coupled with the fact that its output is claimed to be inherently more constant over a wider band than is practicable with comparable oscillators.

Long-term stability in a production unit achieves a figure of ± 0.002 per cent, whilst in home-made equipment a figure of ± 0.01 per cent is readily attainable without extra precautions; a higher short-term stability of ± 0.001 per cent is considered feasible.

Factors Affecting Stability

The methods of achieving this stability are summarized by Tesla as follows:—

(1) The tuned circuit must be mechanically and electrically stable and have the highest possible Q factor.

(2) The impedance to earth between the grid and anode of the valve and either end of the tuned circuit should be as low as possible but sufficient to permit sustained oscillations.

(3) The valve should have the highest possible ratio of mutual conductance to the possible changes in its own capacity.

(4) The oscillator power level should be kept as low as practicable.

The Tesla combines the more desirable elements and properties of several circuits, including the Clapp[3] and the Sailor[4], from which it has been possible to achieve maximum stability together with constant oscillation amplitude over a broad tuning range of 1:1.5 or more.

It is perhaps worth noting here that in the Clapp oscillator the mutual conductance of the valve should change proportionally to the third power of the frequency tuned, hence this type of oscillator is inclined to stop oscillating at the high frequency end of its tuning range and be over-driven at the low frequency end, for a tuning range of 1:1.3. At the same time stability is much reduced at the extreme ends of the band covered.

The effects of harmonics in a tunable oscillator have been analysed by Tesla. This analysis shows that there appears in the anode current an abnormal fundamental frequency component, shifted in phase by 90 degrees to the normal anode current and grid driving voltage. This is caused by the monolinear behaviour of the valve, aided by its complex internal resistance and mutual conductance. Elimination of these effects can be achieved by the use of feedback circuits derived from the original Colpitts oscillator, thereby forming an effective low pass filter which attenuates the higher harmonics. The LC ratio is not a contributory factor to the attenuation of the higher harmonics in the Tesla circuit.

Stability can be improved by the use of voltage regulation to keep the amplitude of the oscillations constant so that the changes in the working conditions of the valve can be minimised, and the influence of non-linearity held to a fixed value. Commercially produced oscillators use dust cores, which are moved by a micrometric screw for tuning purposes.

On a typical production model covering 2.5 to 27.0 Mc/s, in six bands, figures for stability are quoted as follows:—

(1) A 10 per cent change in all feed voltages causes a frequency change of 0.0005 per cent.

(2) A 20 degree change of ambient temperature causes a frequency change of 0.0014 per cent.

*17 Lonsdale Road, South Norwood, London, S.E.25

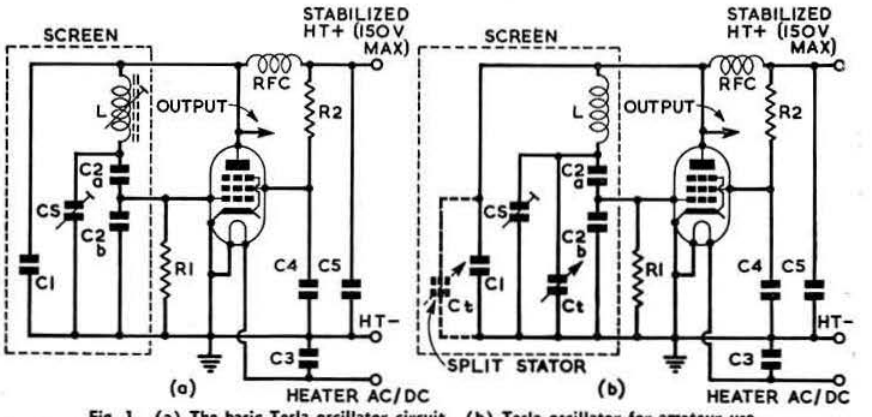


Fig. 1. (a) The basic Tesla oscillator circuit. (b) Tesla oscillator for amateur use. C1, C2a, b, Ct (tuning), Cs (bandsetting), L, see table of values; C3, 4, 5, 0.001 to 0.01μF; R1, 1000 to 10,000 ohms; R2, 27,000 to 75,000 ohms; RFC, 2.5mH. The most suitable valves are the 6AK5, EF54, 6BW7, EF80, 6AM6 and EF50. Other possibilities include the 2A5, 3Q4, 3V4, 6AB7, 6AH6, 6AK6, 6AK7, 6AM5, 6G6, 7AC7, 7AD7, 7V7, 1851, 5654, DL94, EF42, EL91, N77, N144, RK17, SP181, UF42 and Z62. It might also be possible to use a 12AT7 or 6BQ7A, one half as oscillator, the other half as cathode follower.

(3) A change of valve (mean square of 20 samples) causes a frequency change of 0.0015 per cent.

The oscillator may be equipped with a reactance modulator for narrow band f.m. (telegraphy or telephony).

The Circuit

The basic circuit is shown in Fig. 1 together with that adapted by the writer for use in amateur transmitters. For amateur purposes the oscillator can be constructed to operate on the fundamental frequency of all the h.f. bands. The greatest ratio of minimum to maximum tunable frequency occurs on Top Band, where it is 1:1.11 (28 to 30 Mc/s for comparison is 1:1.07). This is well inside the ratio which assures maximum stability together with constant oscillation amplitude. Because of this it is convenient to use a small variable condenser (Ct) for band spread purposes in lieu of the variable inductance used in the basic Tesla. A split stator with one half connected as for Ct and the other half shunted across C1 is infinitely superior, but its use may be conditioned by practical as well as other considerations.

As a guide for constructors a self-explanatory table of typical values and parameters for amateur use is given.

"C effective" in the Table of Values gives the total value of the shunt capacity (maximum: minimum) across L, from which the frequency coverage is determined.

The bands given in the table are those agreed at the Atlantic City Conference, 1947, for Region I with the exception of 72-73 Mc/s which is for doubling to 144 Mc/s.

Construction

Good quality components should be used. Silver ceramics must be tropicalized or protected against oxidization. The LC circuit should be shielded by a non-magnetic screen, but it is desirable to ensure a separation of at least two diameters between any part of the coil and the screen. The grid resistor R1 should be selected carefully as its value will affect, to some degree, the level of the harmonic content present in the output. The value of the coupling condenser from the anode to the following stage should not exceed 100 $\mu\mu$F.

Cathode keying for the purposes of break-in operation is practicable, but the writer prefers a back contact key or relay, which shorts the screen to earth on "space."

A crystal may be substituted for L, and with C1 removed the circuit can then be operated as a Pierce circuit.

Low heater-cathode insulation may cause a poor note in which case it is necessary to select a good valve from several of the same type and basing by substitution.

References

[1], 'C.C.I.R. S.G.1. Brussels, March, 1955. Doc 57E.
[2]*Tesla Technical Reports*, Doc 1949.
[3]*Proc. I.R.E.*, August, 1954.

Typical Values for Amateur Use

Band	L μH.	Turns 0·6" dia.	Wire (enam) S.W.G.	C effective $\mu\mu$F.	Single ended (grid) tuning Ct. C1 $\mu\mu$F.	C2a $\mu\mu$F.	C2b $\mu\mu$F.	Cgk + C2a + C2b $\mu\mu$F.	Ct Max. $\mu\mu$F.	Cs Max. $\mu\mu$F.	Split Stator tuning Ct. C1 $\mu\mu$F.	C2a $\mu\mu$F.	C2b $\mu\mu$F.	Cgk + C2a + C2b $\mu\mu$F.	Ct Max. $\mu\mu$F.	Cs Max. $\mu\mu$F.
1·8–2·0 Mc/s	25·0	46·0	30	254/312	565	4800	470	435	250	30	500	5000	480	464	115/115	25
3·5–3·8 Mc/s	13·0	33·0	28	130/159	285	2600	250	215	125	20	245	2350	235	213	70/70	12
7·0–7·15 Mc/s	7·0	24·5	24	70·6/73·6	140	1470	130	132·5	11·0	10	134	1250	125	114	7/7	7
14·0–14·35 Mc/s ...	3·5	17·0	22	34·8/36·8	68	700	68	62·2	11·0	5	62	600	58	545	7/7	3
21·0–21·45 Mc/s ...	2·3	14·0	20	23·8/25·0	44	475	37	43·2	5·5	3	41	350	33	316	5/5	2
28·0–29·7 Mc/s ...	1·7	12·0	18	16·6/19·0	31	300	20	27·5	11·5	2	26	210	21	19	7/7	2
72·0–73·0 Mc/s ...	0·7	7·7	14	6·71/6·86	8·5	130	*	12·4	1·5	—	7	150	*	14	2/2	—

* C2b will be critical at 72 Mc/s and should be made variable 2-8$\mu\mu$F. Cgk assumed to be 10$\mu\mu$F and allowed for in value of C2b. Cak assumed to be 5$\mu\mu$F and allowed for in value of C1.

Frequencies for Mobile Radio

IN a letter to the Association of Municipal Corporations, the G.P.O. has announced the setting up of a special departmental committee to review present policy on the allocations of frequencies for private mobile radio services. The demand for such services continues to increase.

Interference to GB2RS

MEMBERS with D/F equipment are asked to take bearings on the unmodulated, unidentified signal which persistently jams transmissions from GB2RS on Sunday mornings during the R.S.G.B. News Bulletin. Details of the results of such direction finding should be sent to Headquarters in order that the matter may be taken up with the G.P.O.

R.S.G.B. News Bulletin Service
GB2RS 3600 kc/s
Sundays—10.00 G.M.T.

A Modulator for the Newcomer to Phone

Straightforward Design using Popular Valves

By G. L. BENBOW, M.Sc., A.M.I.E.E. (ex-G3HB)*

This article, the second in a new series on the theory and practice of modulation, describes in detail the construction of a modulator for use with transmitters of up to 50 watts input. Although the design is perfectly straightforward and uses readily available valves, advantage has been taken of contemporary thought on the subject of restricted frequency response for communication purposes.

THE main factors to be considered in the design of a modulator intended for the beginner in Amateur Radio are:—

(a) Initial cost.

(b) Circuit complexity.

(c) Possibility of modification later to provide greater output.

(d) Size of power supply required.

To a large extent, these factors are incompatible and therefore any design tends to be a compromise.

From the point of view of complexity of design and size of power unit required, the most economical modulator output stage is a pair of push-pull tetrodes or pentodes operating in class AB1. The reasons for this are:—

(a) Valves operating in class AB1 do not run into grid current, so the speech amplifier is not required to supply "power"; it is therefore simply a "voltage" amplifier.

(b) The h.t. current does not vary over wide limits as in the case of class AB2 or class B operation. The power supply is therefore relatively simple.

Selection of the Output Valves

Perusal of the data on available valves shows that it is impossible to get more than 12-15 watts from miniature types when operated in class AB1, hence the next size of valve, with an anode dissipation of the order of 25 watts, must be considered. Fortunately in this range there are several types which will give 25-30 watts when operated in class AB1; for example, 6L6(G), 807, EL37 and KT66.

The Speech Amplifier

The design of the speech amplifier, which, as stated earlier, need only be a voltage amplifier, depends on the gain required, *i.e.*, whether a low output crystal microphone or a high output dynamic or carbon microphone is to be used.

There are many suitable valves available. However, as ordinary types are used in the output stage, little reduction in overall size is likely by the use of miniatures.

The speech amplifier may be either transformer or resistance-capacity coupled to the output valves. Coupling via a transformer having a centre-tapped secondary winding is simple, but is liable to pick up hum. RC coupling implies the use of a phase-inverting circuit in order to obtain the push-pull output voltage required; however, the cost of the resistors and conden-

*81 Anglesmede Crescent, Pinner, Middlesex.

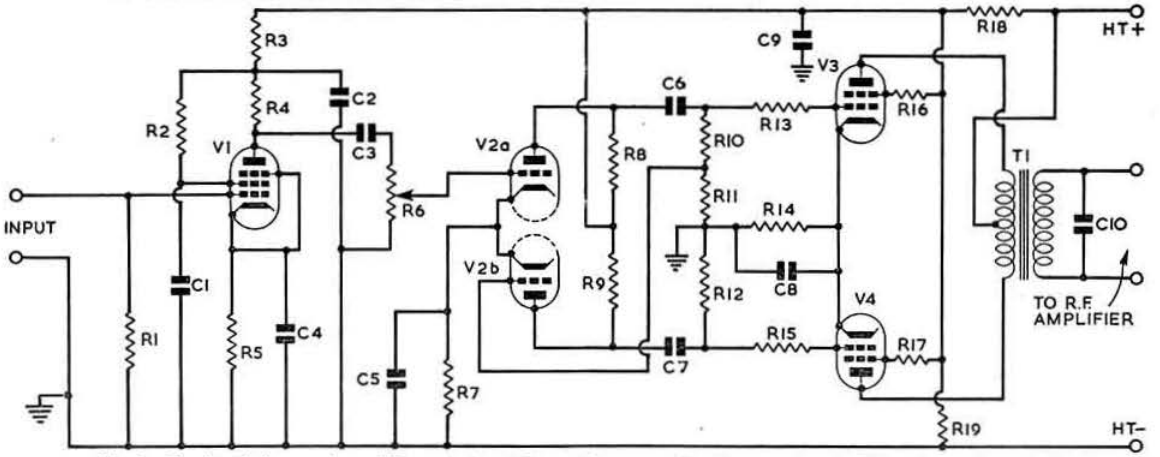


Fig. 1. Circuit of the speech amplifier and class AB1 modulator capable of approximately 25 watts audio output.

C1, 0.1μF 250V wkg.
C2, 9, 8μF 500V wkg.
C3, 0.001μF 350V wkg.
C4, 5, 25μF 25V wkg.
C6, 7, 0.01μF 500V wkg.
C8, 25μF 50V wkg.
C10, 0.01μF 1000V wkg.
R1, 2, 470,000 ohms.
R3, 33,000 ohms.
R4, 330,000 ohms.
R5, 3,300 ohms.
R6, 250,000 ohms potentiometer.
R7, 4,700 ohms.
R8, 9, 100,000 ohms.
R10, 12, 220,000 ohms.
R11, 22,000 ohms.
R13, 15, 4,700 ohms.
All resistors ½ watt unless otherwise stated.
R14, 250 ohms 5 watts.
R16, 17, 100 ohms.
R18, 4,700 ohms 10 watts.
R19, 15,000 ohms 10 watts.
T1, Woden UM1 (see text).
V1, EF36 (see text).
V2, B65 (see text).
V3, 4, KT66 (see text).

sers required is appreciably less than the cost of a suitable transformer.

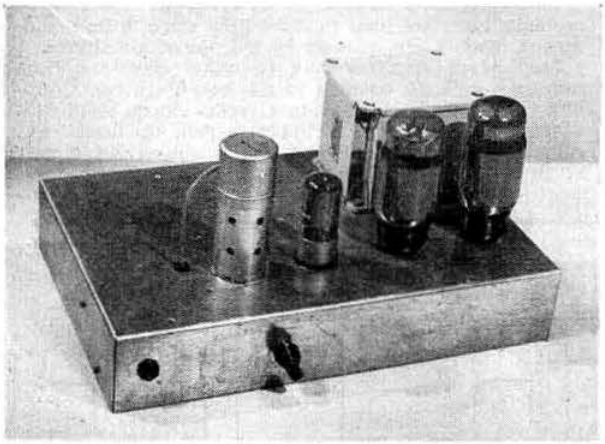
A Practical Modulator

The circuit of a simple modulator designed on the lines discussed above is shown in Fig. 1. This is a three-stage arrangement using a phase inverter and two KT66s in class AB1 giving an output of about 25 watts.

The input valve (V1) is an r.f. pentode type EF36. This is coupled via a 0.001μF condenser, C3, and the gain control, R6, to a twin triode, type B65, which acts as a " paraphase " phase inverter. The input to one of the output valves, V3, is obtained normally via C6 from V2a, while the other output valve, V4, is fed from V2b via C7. The driving voltage for V2b is obtained from the output of V2a by means of a tap on the following grid leak, which is made up of R10 and R11 in series.

Grid stoppers (R13 and R15) and screen stoppers (R16 and R17) are placed in the appropriate leads to the KT66s. The screen voltage for the output valves is obtained from a voltage divider, R18 and R19, across the h.t. supply. H.t. for V1 and V2 is also taken from this point. The modulation transformer is a Woden multi-ratio type UM1.

A 0.01μF 1000V condenser is connected across the secondary of the modulation transformer in order to reduce high frequency response. The low frequency response is restricted by the use of fairly low values for the grid coupling condensers C3, C6 and C7.



View of the modulator showing the layout of the valves and modulation transformer.

Construction

The modulator is built on an aluminium chassis, 14in. × 9in. × 2½in., thus allowing room for future expansion. The layout of the valves and modulation transformer and the position of the input jack (which should be screened) and gain control can be seen in the photograph. The wiring and under-chassis layout is not critical and is best accomplished by placing a small tag strip near each valveholder in order to act as an anchoring point for the d.c. components associated with that valve. The input wiring should be screened right up to the grid of the first valve, which should preferably have a screening can. The four grid stoppers should be mounted as close as possible to the appropriate tags on the valveholders. Tightly-twisted flex should be used for all heater wiring.

Power Supply

As the h.t. current drawn varies by only about 25mA between zero input and full input conditions, the power supply is not critical and may be a conventional transformer-rectifier arrangement using a condenser-input smoothing filter. Adequate smoothing would be given by a 20H choke and an 8 + 16μF condenser.

The maximum undistorted output of the modulator into a 6600 ohm load resistance was measured as 26.5 watts for an input of 0.05V R.M.S. to V1. The maximum d.c. input to the modulator is 420 volts at 147mA.

Circuit Variations

Many slight circuit variations are permissible by using valves other than those specified, but it is not possible to give details of all the changes in value of resistors and condensers which may be required. The best advice that can be given is to consult the valve manufacturers' data to obtain a comparison between the valves specified and those it is proposed to use.

Possible alternative output valves are the 807, 6L6(G) and EL37. V2 may be replaced by a 6SN7 or two single triodes type 6C5, 6J5 or L63. Practically any octal-based r.f. pentode may be used for V1.

If the modulator is required for use with a high output microphone, either the microphone output voltage must be stepped down by a potentiometer or the gain of V1 must be reduced. This may be done by decreasing the anode load, R4, and using the valve as a triode by connecting the screen grid to the anode.

Readers intending to use more than 50 watts input to their transmitters are advised to purchase a larger modulation transformer than that specified, such as a Woden type UM2 (which will be equally suitable for lower power work). Finally, a pair of KT66s has a maximum output of 50 watts of audio. This rating would require the minimum of alteration to the circuit described but the power unit would have to supply 525 volts at 80 to 175 mA for the anodes and 400 volts at 3 to 21 mA for the screens. The latter supply should preferably be stabilized.

East Midlands Regional Meeting

to be held on

SUNDAY, MAY 27, 1956

at

THE EMPIRE HOTEL

FOSSE ROAD NORTH, LEICESTER

Programme

Assemble	11.30 a.m.
Lunch	1.0 p.m.
Business Meeting	2.15 p.m.
Tea	4.30 p.m.

Followed by a draw for prizes

Tickets, price 15/- each, may be obtained from K. G. Chapman (G3AFZ), 292 Gwendolen Road, Crown Hills, Leicester, or W. A. Mead (G5YY), 82 Edward Avenue, Braunstone, Leicester, not later than May 19, 1956. Cars will be met at main road city limits on request. Mobiles will work on 1910 kc/s.

Messrs. C. H. L. Edwards (G8TL) and W. R. Metcalfe (G3DQ) will represent the Council.

Television Transmission for the Amateur

Part VI—R.F. Equipment

By M. BARLOW (G3CVO)*

Previous articles in this series were published in the November, 1952, February, April and September, 1953, and September, 1954 issues of the BULLETIN.

AMATEUR Television transmission in this country is permitted in the 70, 25, 12, 6 and 3 cm amateur bands; specialized techniques are necessary for these wavelengths even before the problem of transmitting wideband television signals is considered. It is suggested, therefore, that anyone wishing to build r.f. equipment should first of all read as much as possible of the literature on the subject. Since most of the Amateur Television activity in this country is on 70 cm, the present article will be confined to that band. Readers are reminded that a special licence costing £2 per year is necessary before radiating television signals.

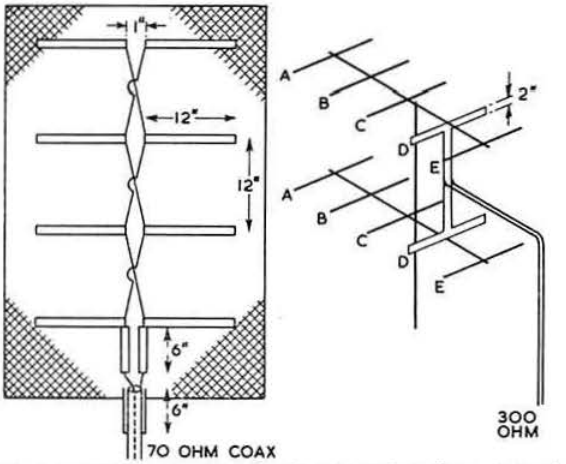


Fig. 1. (Left) A 16 element stack with wire netting reflector designed by G2WJ/T. The elements are $\frac{3}{16}$ in. diameter; as with all voltage fed arrays, this diameter is critical. The phasing section is made of two 6 in. lengths of $\frac{1}{4}$ in. diam. tube spaced $2\frac{1}{4}$ in. centre to centre. The balun is a 6 in. length of pipe which is a sliding fit over the cable and is soldered to the outer at the lower end. The wire netting should be at least 6 in. larger all round than the array, and spaced 6" behind it. (Right) A 5-over-5 after DL3FM (*DL-QTC* November, 1954) in which two Yagis are spaced vertically by $\frac{1}{2}\lambda$ (17 in.). All the elements are spaced $5\frac{1}{2}$ in. and are $\frac{1}{4}$ in. diameter. The lengths of the elements are A—12 in., B—$12\frac{1}{2}$ in., C—$12\frac{1}{4}$ in., D (half-length)—$12\frac{1}{2}$ in., E—$13\frac{1}{2}$ in. The Q bars are of 150 ohms impedance and may be $\frac{1}{4}$ in. rods spaced $\frac{1}{2}$ in. The gain of both arrays is of the order of 12–14 db.

The key to v.h.f. and u.h.f. TV communication is the aerial (Fig. 1). Inefficient transmitting valves, "lossy" feeders and noisy converters all conspire to lose a wanted signal very rapidly, and every decibel gained in the aerial systems at both transmitter and receiver is well worth while. As large an array as possible, as high and as in the clear as possible, should be erected; a 16 element stack, or a 5-over-5 Yagi, is the least that will be of use for ranges of over 5 miles. Due to the fact that a bandwidth of 3 Mc/s rather than 3 kc/s is required, there is a loss of 30db signal-to-noise ratio in the system. Put another way, S9 signals on a communications-style converter must be brought up to S9 plus 30db to produce an equivalent picture on a wideband converter; in general all this 30db has to be found in the aerials.

It is of little use having a first-class aerial if all the signal it picks up is lost in the feeder run. Semi-air-spaced co-ax, having a loss of about 2db per 100ft at 500 Mc/s, is not too expensive; Uniradio 70 standard $\frac{1}{4}$in. solid co-ax on the other hand may have a loss as high as 6db per 100ft (corresponding to a reduction in transmitted power of four times). Expense on the feeder, as on the aerial, is fully justified; if a "lossy" cable is unavoidable, there must be some compromise between aerial height and length of feeder.

The Transmitter

The design of television transmitters is highly specialized, and the reader is referred to the literature for

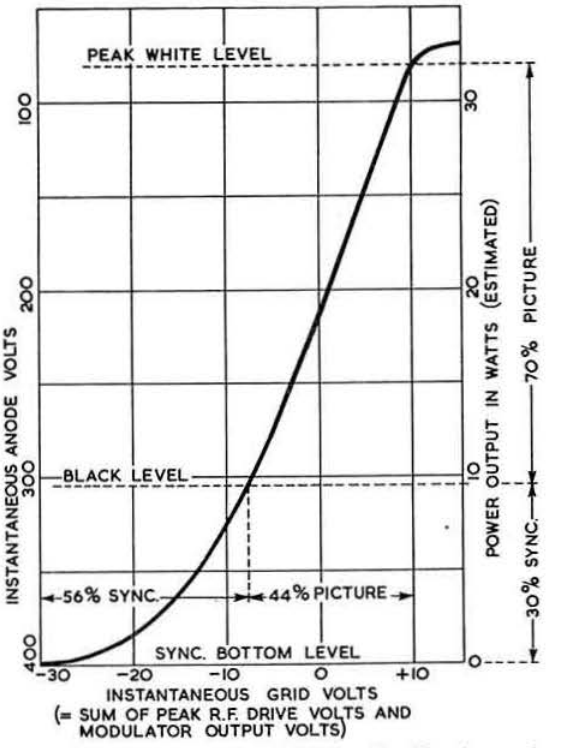


Fig. 2. Linearity curve for a QQV06/40 with 400 volts on the anode, 200 volts on the screen and a load of 1000 ohms. The figures for output power are estimated. As explained in the text, the picture content is kept on the linear portion of the curve, whilst compression of the synchronizing pulses at low grid voltages is corrected by pre-distorting the pulses to the ratio 44:56 picture: sync for a standard 70:30 output.

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details. Fortunately, at 70 cm at any rate, if the transmitter is designed along normal v.h.f. transmitter lines, it will be capable of running under TV conditions without too much modification, but this is a chance result that should not be taken too literally.

In Part V, mention was made of modulators, and it was pointed out that either anode or grid modulation could be used, but that grid modulation had advantages in economy of valves and h.t.; for this reason it is by far the most commonly used system. The modulator output must swing the p.a. from cut-off (at sync bottom) to maximum undistorted output at peak white (for positively modulated systems). The p.a. is not necessarily working in any of the well-known classes of bias, since it is usual to have the peak-to-peak r.f. drive voltage twice the total modulator output swing. Thus the p.a. is near class C conditions at sync bottom, but in class B at peak white. In order to determine the operating conditions, the load-line must be drawn on the characteristic curves for the valve. From the intersections of this line and the valve curves, a *Va-Vg* curve such as Fig. 2 may be drawn. This is called a "linearity" curve, and the choice of load-line is mainly determined to give as linear an output as possible over the power output range required. Further detail is outside the scope of this article.

Fig. 2 is the linearity curve of a QQV06/40 running with 400V on the plates, 200V on the screens; the load is 1000 ohms. The bandwidth of the valve alone under these conditions is 11 Mc/s between 3db points, but this will be affected by the bandwidth of the tank and aerial circuits. For an input of 76 watts, the valve being air-cooled, some 35 watts of r.f. should be obtained at the valve anodes, allowing for transit time losses. Referring to Fig. 2, the top of the straight part of the curve occurs at $Vg=+10V$, so this will be the peak white condition. (The use of correction circuits to extend the modulation swing is dealt with in the references.) *Va* here is 80 volts, and 30 per cent of the swing from h.t.+ will be black level, i.e., $Vg=-7.5$ volts. Cut-off occurs when *Vg* is about —30 volts, so that the total modulator swing required is 40 volts, and the r.f. drive required is 80 volts peak-to-peak. Note that in order to obtain the standard 70:30 picture:sync ratio at the output, the input from the modulator must be in the ratio 30—7.5: 10+7.5, i.e., 44:56. This shows that the syncs must be stretched to about twice their normal value in order to be sure of cutting off the p.a. A suitable circuit was given on page 133 of the September, 1954, issue of the R.S.G.B. BULLETIN.

At peak white, 11 mA of peak grid current flows when $Vg=+10V$, giving a grid current loading on the driver stages of $10/11 \times 1000 \times 4=3600$ ohms (the halves of the valve being in push-pull). In order that the p.a. linearity curve shall be correct, it will be obvious that the drive voltage must remain at a constant level (80V grid-to-grid) *whatever load is reflected back into the driver stages by the p.a.* There is a certain amount of fixed damping across the drive circuit due to valve-holder and circuit losses, but the 3600 ohms mentioned above only occurs when the p.a. takes grid current at about mid-grey. There are several ways of ensuring constant drive, the simplest of which is to damp the drive circuits still further with an additional resistor considerably smaller than 3600 ohms. Unfortunately, at 70 cm, drive is often rather scarce, and loading the driver with a

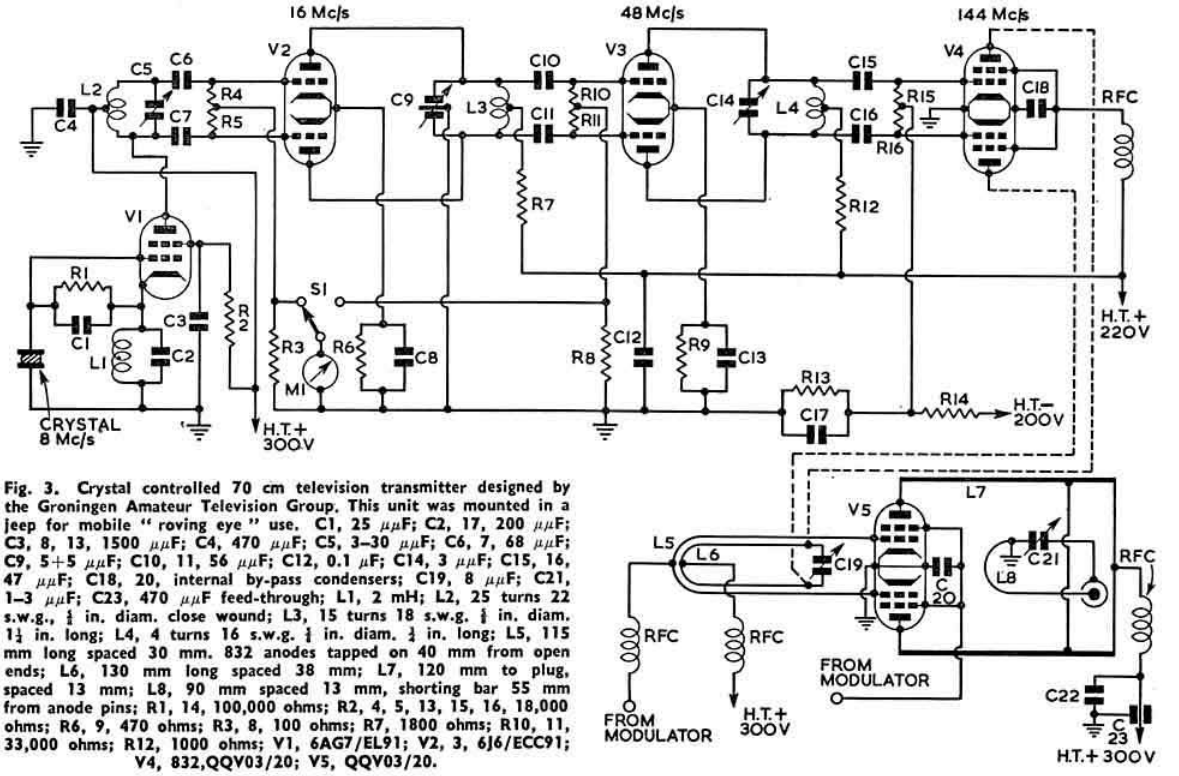


Fig. 3. Crystal controlled 70 cm television transmitter designed by the Groningen Amateur Television Group. This unit was mounted in a jeep for mobile "roving eye" use. C1, 25 $\mu\mu$F; C2, 17, 200 $\mu\mu$F; C3, 8, 13, 1500 $\mu\mu$F; C4, 470 $\mu\mu$F; C5, 3–30 $\mu\mu$F; C6, 7, 68 $\mu\mu$F; C9, 5+5 $\mu\mu$F; C10, 11, 56 $\mu\mu$F; C12, 0.1 μF; C14, 3 $\mu\mu$F; C15, 16, 47 $\mu\mu$F; C18, 20, internal by-pass condensers; C19, 8 $\mu\mu$F; C21, 1–3 $\mu\mu$F; C23, 470 $\mu\mu$F feed-through; L1, 2 mH; L2, 25 turns 22 s.w.g., ¼ in. diam. close wound; L3, 15 turns 18 s.w.g. ¼ in. diam. 1¼ in. long; L4, 4 turns 16 s.w.g. ¼ in. diam. ¼ in. long; L5, 115 mm long spaced 30 mm. 832 anodes tapped on 40 mm from open ends; L6, 130 mm long spaced 38 mm; L7, 120 mm to plug, spaced 13 mm; L8, 90 mm spaced 13 mm, shorting bar 55 mm from anode pins; R1, 14, 100,000 ohms; R2, 4, 5, 13, 15, 16, 18,000 ohms; R6, 9, 470 ohms; R3, 8, 100 ohms; R7, 1800 ohms; R10, 11, 33,000 ohms; R12, 1000 ohms; V1, 6AG7/EL91; V2, 3, 6J6/ECC91; V4, 832,QQV03/20; V5, QQV03/20.

damping resistor often reduces its efficiency so much that very little drive is available at all. The practical answer then is to disconnect h.t. from the p.a. stage, disconnect the modulator connection to the p.a. grids, and insert temporarily two 27,000 ohm grid leaks from each grid to earth. The drive is then adjusted until 1mA or more of grid current is obtained through the two resistors; various values of damping resistor in the region of 500 ohms can then be tried until exactly 1mA of grid current flows with full driver output. (Where resonant lines are used, care must be taken that the damping resistor is connected straight across the grids, and not tapped down the lines, which would upset the calculations.)

The comments about grid current apply equally to the p.a. bias and screen supplies, and to the modulator, all of which must be capable of handling a sudden change of grid current (in perhaps 0.3 microseconds) without variation. Stabilized bias and screen supplies are obviously essential. The mean grid current "seen" by the modulator is about 2mA (assuming class B working and a 4:1 grid flow time), and this current flows through the modulator output impedance. If this is, say, 500 ohms, then 10 volts will be developed across it acting in opposition to the modulation—over 50 per cent of the picture content of the modulator output. This will obviously seriously upset the linearity of the transmitter, heavy clipping of whites occurring. For this reason the modulator output impedance should be as low as possible, a high-current cathode follower being used. If the drive is not constant, or if any of the supplies are not sufficiently stable, or the modulator has too high an output impedance, it is possible to pre-distort the video waveform to allow for this, but this will not be discussed here.

The above figures are all very well in theory, but they only apply if the p.a. is running into a load of 1000 ohms, and this is difficult to determine when the p.a. circuitry consists of parallel or co-axial lines. In theory (and at low frequencies) the best way to obtain correct loading conditions is to set the modulator output at the correct voltage for, say, black level, and then increase the aerial coupling until the anode current at resonance is the value determined from the load-line. At 70 cm however this is not so easy, and a process of trial and error (using a line sawtooth test waveform to check for non-linearity) to obtain maximum output consistent with linearity may be called for.

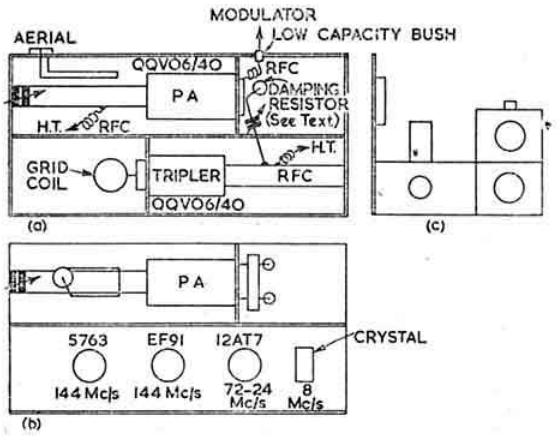
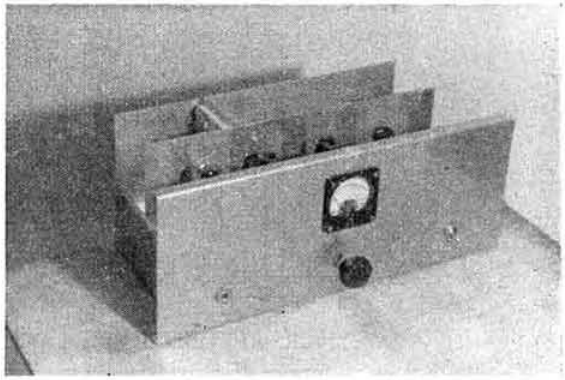


Fig. 4. Suggested layout for a 70 cm television transmitter.

The actual layout and circuitry of the transmitter should follow normal u.h.f. practice; the minimum possible tuning capacity should be used on circuits at 430 Mc/s, as otherwise the lines will become impossibly short and the transmitter bandwidth reduced. A crystal multiplier chain is normally used, although an m.o.-b.a.-p.a. arrangement is not out of the question.

A simple transmitter using a QQV03/20 power tripler (an 832 would be less efficient) designed by the Groningen Amateur Television group is shown in Fig. 3. The design should be easily followed by anyone familiar with v.h.f. equipment; the modulator for this transmitter appeared in Part 5. Fig. 4 sketches a suggested design for a transmitter with a QQV06/40 tripler driving a QQV06/40 p.a. The layout is designed to keep r.f. leads short, and also to allow a very short connection to the modulator output. A small blower should be incorporated to keep the glass seals cool. The anode lines of the QQV06/40s are made of ¾in. wide silver plated copper strip spaced ¾in., 5in. long, and are tuned with as small a condenser as possible.



A view of G3CVO's vision transmitter for 430.36 Mc/s. The line-up comprises an EF91 crystal oscillator/doubler (9 Mc/s crystal); 12AT7 doubler-doubler; EL91 doubler; 5763 buffer on 144 Mc/s; QQV06/40 tripler; QQV06/40 p.a. The blower was not mounted when this picture was taken.

The Converter

A great deal has been written on the subject of 70 cm converters for communication purposes, and much of the data is applicable to wideband converters. Due to the increased bandwidth, however, signal-to-noise ratio is all-important. R.f. amplifiers are not normally useful; indeed, if an improvement in signal-to-noise is brought about by the inclusion of an r.f. stage, this is a sure sign that the original converter was not as good as it could have been made. The mixer is normally a crystal diode, and the head i.f. amplifier determines the overall noise of the receiver. It is essential that this i.f. amplifier is low noise—a cascode is good. The local oscillator need not be crystal controlled, but care should be taken that only the desired frequency is injected into the mixer and not harmonics and sub-harmonics contributing to noise but not i.f. output. The intermediate frequency chosen will normally be the frequency of the local B.B.C. or I.T.A. channel. It has been found difficult in practice to obtain the best signal-to-noise ratio with different types of converter. That shown in Fig. 5, built by G3GDR, has out-performed most others. The mixer and local oscillator troughs are of 1in. side, with their open sides together. The mixer trough has a ¼in. diameter rod bolted and soldered to one end; this is 3¼in. long and has a ¼in. disc soldered onto the free end. A

2 BA screw carries a similar disc for tuning purposes. The aerial co-ax socket is mounted directly onto one side, and the crystal tap is so positioned that the lead from crystal to i.f. grid is as short as possible. The crystal itself is held in a small clip attached to a plate about ¾in. in diameter insulated from the trough wall by a thin sheet of mica, to act as an r.f. bypass condenser.

The local oscillator trough is slightly larger to accommodate a B9A valveholder. The oscillator uses one half of a 12AT7 but a 6J6 or a single triode could be used instead. The tuned circuit is made of ¼in. wide thin copper strip supported on a block of perspex half-way along the trough; the measurements given are for an oscillator frequency of 390 Mc/s. Tuning is accomplished by screwing in an insulated plunger to bear upon one end of the tuning strip; the tuning range is only two or three Megacycles. Other frequencies can easily be obtained by altering the length of the tuning loop. Coupling to the mixer is provided by mounting the oscillator trough above the mixer trough, with their open sides adjacent; the oscillator h.t. should be adjusted until the mixer current is about 200 microamps. The cascode head amplifier is quite straightforward, and may be aligned by using it as a pre-amplifier for the B.B.C. The feedback coil should be adjusted for minimum noise rather than maximum signal. Once the converter is aligned, care should be taken to prevent breakthrough by the B.B.C.

Corrections

Since this series was started 3½ years ago, some of the information has become out of date. In particular, camera tubes of the Vidicon type, as well as monoscopes, are now available in this country. The Mazda 27M2 photocell is a direct replacement for the 931A, and is fairly cheap.

In Part 2, the optical diagram is incorrect; lens 2 is a condenser lens and as such should be shown focusing the *aperture* of lens 1 onto the photocell. The second formula should therefore be $\frac{1}{d} + \frac{1}{b+c} = \frac{1}{f_2}$.

In Parts III and IV the cathode follower output stages will be more satisfactory if their cathode loads are made 3300 ohms plus a 220 ohm cathode bias resistor, the grid leak being returned to the junction of the two.

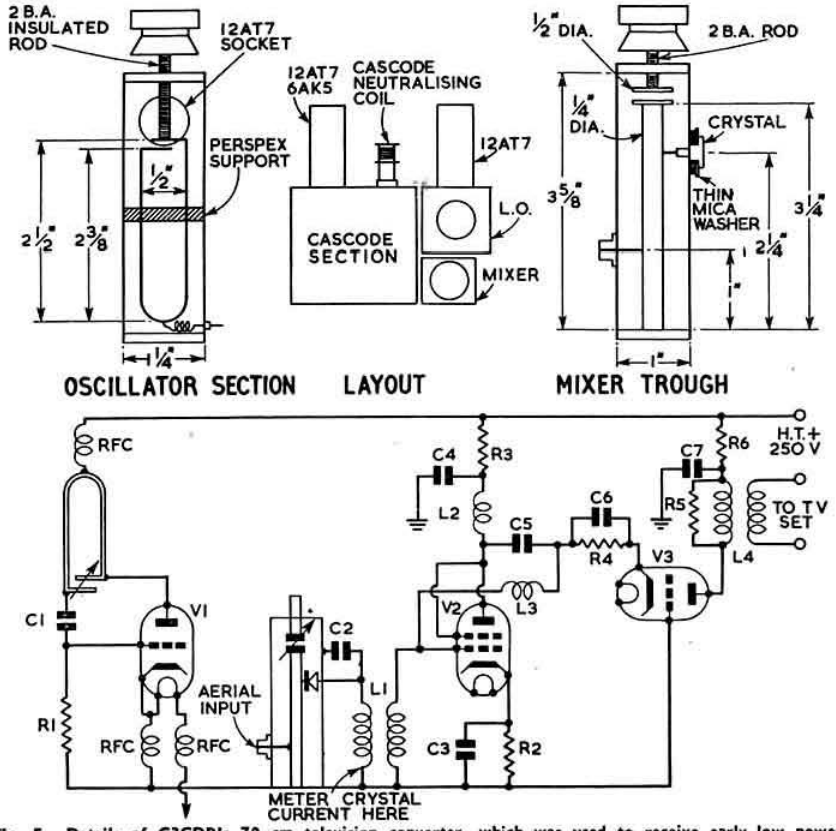


Fig. 5. Details of G3GDR's 70 cm television converter, which was used to receive early low power transmissions from G2WJ/T at a range of 31 miles.
C1, 10 μμF; C2, built into the crystal holder (see diagram of trough); C3, 4, 6, 7, 470 μμF; C5, 33 μμF; L1, primary 4 turns, secondary 14 turns 22 s.w.g.; L2 18 turns 22 s.w.g.; L3, 22 turns 22 s.w.g.; L4, primary 12 turns, secondary 4 turns (all coils close wound on Aladdin ¼ in. diam. formers with dust iron slugs); R1, 10,000 ohms; R2, 100 ohms; R3, 47,000 ohms; R4, 68 ohms; R5, 4,700 ohms; R6, 18,000 ohms; RFC, 12 turns 20 s.w.g. ¼ in. diam.; V1, ½ 12AT7/ECC81; V2, 6AK5/EF95; V3, 12AT7/ECC81. Crystal, CV102/CS2A.

Conclusion

This series of articles has of necessity been rather brief, and it is hoped therefore that the list of references will be of particular value. As so little has been written directly applicable to *Amateur* Television transmission,

interested readers may like to know that many of the topics mentioned have been dealt with at much greater length in the pages of the British Amateur Television Club's magazine *CQ-TV*, including a series of articles designed expressly to follow on from these in the BULLETIN. The author wishes to thank all those members of the B.A.T.C. who have so kindly helped with circuits and ideas for these articles.

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Propagation on the Amateur Bands

By J. DOUGLAS KAY (G3AAE)*

IN the March, 1955, issue of the BULLETIN there appeared an introductory article to the first of the monthly tables of frequency predictions covering the DX amateur bands. March, 1956, seems, therefore, to be a good time to survey conditions during that period, and discuss what may be expected to happen during the next twelve months. It is not intended to repeat here the derivation and *modus operandi* of the frequency prediction tables, but readers may care to refresh their memories by referring to the article last year. The comparison between the April, 1955, predictions and those made for 1956 is interesting.

As had been expected the summer of 1954 saw the end of the last sunspot cycle; since then the number of sunspots observed each month has increased very rapidly. At the time of writing† it is estimated that there are several hundred spots on the Sun's surface and at least some of these are large enough to be visible to the naked eye. Now, while an increase in the number of sunspots will result in increased M.U.F.s (maximum usable frequencies) groups of large sunspots can cause freak conditions to occur. These conditions can be expected to re-occur, but in decreasing magnitude, at 27-day intervals. Such freak conditions could result in extremely loud signals from the Antipodes, while signals on shorter routes—normally of good strength—would be inaudible. However, the main point is that the number of sunspots is increasing rapidly each month and is expected to do so for about the next two years, when the peak of the present cycle is expected to occur. This will mean that, although the L.U.F.s (lowest usable frequencies) will not vary greatly, the M.U.F. figures will soar and during the next two winters can be expected to be between 30 and 40 Mc/s on most circuits during the hours of daylight.

Looking back over the past 12 months, it seems safe to say that conditions on the three higher frequency amateur bands varied very much as had been expected, but there was a drop in the DX potentialities of 3.5 and 7 Mc/s. The upward part of the sunspot cycle is not expected to affect the L.U.F. figures appreciably, and it is, of course, the L.U.F.s and not the M.U.F.s that govern conditions on these two bands. However, it is difficult to attribute the poor performance of these two bands to anything other than increased absorption. Agreed there have been odd days when these two bands have been good, but no one will deny that they have not been as good as they were during the preceding 12 months.

14 Mc/s has improved greatly and the band is now capable of producing signals from all six continents almost every day. Stations in the Pacific area, Australia and New Zealand have been coming through well in the mornings, and the Far East, Asia, and Africa appearing in the afternoons—sometimes mixed in with a fair assortment of W6, W7 and KH6 signals. During the past few weeks there are definite signs of the approach of spring, because North, Central and South American signals have been coming through at great strength until late at night.

We have also seen a great improvement in the state of 21 Mc/s which can no longer be called a weekend band. During the past winter it was outstandingly good in the mornings to New Zealand, and the number of Pacific stations heard seems to grow monthly. The American 'phone band is rather different this winter: during Saturday and Sunday afternoons it is generally a solid mass of high-power stations interfering one another out of business. Last winter one could tune that portion of the band and hear nothing above S6.

Ten metres—to some it will never be 28 Mc/s—is with us again, and while it may not be a shadow of its 1947/50 self, do not underestimate what it may do during the next three years. It is thought that the coming peak will be higher than the last one, and this means that, given breathing room on the band, it will be possible to "work the world" with an aerial round the picture rail. However, the competition is going to be fierce—particularly at weekends—so better build a beam and be sure of your share of the good things. None of the other DX

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†Manuscript received February 22, 1956.

bands can hold a candle to 28 Mc/s when it is really open.

Returning now to 21 Mc/s, we have no experience of this band during the sunspot maximum period as it has become available to amateurs since the last peak. To what extent it will rival 28 Mc/s is difficult to say, but two things are evident: it will continue to improve, and while not producing quite the same signal strengths (on average) it will be open for longer periods of the day. It will also help to relieve the congestion on the bands on either side of it, and this is important, for when conditions are good and a great number of signals are audible the interference becomes a limiting factor.

14 Mc/s should follow a similar pattern to last year, but on an improved scale, and soon we can hope that, in addition to the VK and ZL signals, Pacific Coast American and Canadian stations will be back with us in the early mornings.

For reasons stated above, 7 and 3.5 Mc/s should not change very much with the increased sunspot activity, but it is hoped that they will perform more favourably during the next 12 months than they have during the past.

The outlook is that there will be a greatly increased amount of DX to be worked during the next few years which will mean that the bands will become increasingly congested. It is increasingly important, therefore, to ensure that our transmissions are confined to as narrow a bandwidth as is consistent with the form of transmission being used.

Predictions for April, 1956

BAND	NORTH AMERICA	CENTRAL AMERICA	SOUTH AMERICA	SOUTH AFRICA	NEAR EAST	MIDDLE EAST	FAR EAST	AUSTRALIA
28 Mc/s	1600—2000	1230—2030	1030—2100	0830—1900	0800—1930	0900—1700	1000—1700	0800
21 Mc/s	1200—2100	1000—2200	0900—2200	0800—2000	0700—2100	0800—1800	0800—1900	0730—1100 2100—2300
14 Mc/s	1000—0300	0900—0330	0800—0400	0730—0200	0630—0000	0730—2300	0700—2200	0700—2100
7 Mc/c	2200—0600	2200—0300	0000—0400	0000	2200—0200	0000	2200	1900—2100
3.5 Mc/s	0400	0400	0400	0000	0100	0000	2200	2000

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

"Keep Those Leads Short"

IN the article by "Senex" "Keep Those Leads Short" (January, 1956, issue) the inductance of a 3in. length of 16 s.w.g. wire was given as 1.39 μH, whereas the correct value is approximately 0.065 μH. The error does not affect the validity of the article because the inductance of the anode leads forms more than 20 per cent of the total inductance in the circuit.

The formula used to determine the inductance of a straight wire of circular cross-section is

$$L = 0.002\, l\, (2.303 \log \frac{4l}{d} - 1)\mu\text{H}$$

where length (l) and diameter (d) are in centimetres. For dimensions in inches, the formula is the same except that the term 0.002 becomes 0.0051. This formula applies at very high frequencies and is slightly different for lower frequencies.

The author thanks Mr. N. Ashton (G3DQU) for pointing out the error.

TVI Lecture

ON Wednesday, April 25, 1956, M. Smith will read a paper to the British Institution of Radio Engineers on "Radio and Television Interference—Its Growth and Effects" at the London School of Hygiene and Tropical Medicine, Keppel Street, Gower Street, London, W.C.1. The meeting will commence at 6.30 p.m.

Swedish Society

AMONG the officers elected at the annual general meeting of S.S.A. were P.-A. Kinnman, SM2ZD (President), Gunnar Svala, SM5AOG (Vice-President), Gunnar Lenning, SM5ANY (Secretary), Curt Israelsson, SM5AHK (QSL Manager), and Lennarth Anderson (Editor, *QTC*).

TWO METRES AND DOWN

By F. G. LAMBETH (G2AIW)*

WITH the co-operation of the London U.H.F. Group, the Society is arranging a V.H.F./U.H.F. Convention on Saturday, May 26, 1956, at the Bonnington Hotel, Southampton Row, London, W.C.1, on similar lines to those of the very successful meeting last year. It is hoped that as many v.h.f./u.h.f. enthusiasts as possible will be able to come. Dr. R. L. Smith-Rose has been invited to attend—his interest in this branch of Amateur Radio is too well known to need repetition. Continental v.h.f. personalities are also expected, including a party from France arranged by F9CQ.

The programme will include lectures of v.h.f./u.h.f. interest, plenty of time for "rag-chews," and an exhibition of amateur v.h.f./u.h.f. apparatus in which a prize of value is to be awarded for the most interesting piece of equipment shown. Members who have other suggestions for the programme are asked to write immediately to G2AIW, who is Chairman of the Society's V.H.F. Convention Sub-Committee, the other members of which are Messrs. R. H. Hammans, G2IG (President), W. A. Scarr, G2WS, D. W. Furby, G3EOH, H. F. Smith, G2DD, G. M. C. Stone, G3FZL, P. A. Thorogood, G4KD and John A. Rouse, G2AHL (Secretary to the Committee).

There will be a V.H.F. Dinner in Edinburgh on Friday, May 4. G2HCG will be there to talk about Slot Aerials.

Short Wave Magazine Two Band Contest

Well over a hundred 2m stations were active during the contest on March 10-11, when conditions from the Home Counties appeared to be only fair to the north and east although better to the west.

G6CW (Nottingham) and G2FJR (Sutton Bridge) were both very consistent signals but further north to Yorkshire and Lancashire, propagation was more spasmodic, and stations appeared and disappeared with bewildering irregularity. Bristol stations were well in the picture while G4GR (Marshfield) was audible. G2XV and G3WW (Cambridgeshire) and G3IEX (Felixstowe) were also consistent. Participants certainly had a good 24 hours, although the conditions did not help much from the DX point of view. At least one competitor worked over 100 stations. **G3XC** is thanked for the report on which much of the above is based.

First Live Amateur Television Contact

What is believed to be the first "live" television contact was made on March 8 between two of the leading exponents of Amateur Television, G2WJ/T (Dunmow, Essex) and G3CVO/T (Chelmsford). A third pioneer of the Amateur Television art also played a prominent part in the proceedings, for a major portion of the video equipment used by G3CVO/T was provided by G2DUS and was transported to Chelmsford especially for the purpose of making live contact with G2WJ. The frequency used was of course in the amateur 70 cm band, and the distance covered was thirteen miles.

This historical contact was "one hundred per cent" both ways, with good definition and the features of each operator fully recognizable at the other end.

All concerned wish to emphasise (states G5UM, in reporting the above) that credit for the first actual television contact goes to G5ZT and his helpers, who succeeded in making one four years or more ago, though it is believed that on that occasion, film was used, i.e., it was not a fully "live" contact both ways.

Band Conditions

"Now is the winter of our discontent," Shakespeare's famous line, taken out of context, very aptly sums up conditions during January, February and March. The atrocious weather kept operators out of their shacks and even for those stalwarts who braved the cold, nothing much seems to have happened. About February 5-7 the West Country stations had some fair G-DX to the north and north-east but from other parts of the country "the rest is silence." This was certainly one of the worst periods for v.h.f. propagation during recent years. However, there was still activity.

Station Reports

G8VN (Rugby) is moving to Leicester in the near future. Presumably the famous Rugby Indoor Aerial will go up again at the new location. **G6XM** (York) is also moving, and is expecting to end up somewhere between Nottingham and Leicester. '6XM found conditions during the period below normal most of the time; on some evenings no signals were heard at all. Against this, the Sunday sked with G5CP (Chesterfield) was 100 per cent while another sked with G4PS (Fleet, Hants) was successful three out of four Sundays, although this entailed much use of c.w. and many repetitions!

West Country stations seem to have been doing a fair amount of operating in spite of everything. **G3KPT** (Knowle, Bristol) found January 5-6 good, for G-DX stations as far away as Lancashire (G3EPW) and Devon (G2ADZ) were worked on this occasion—not so bad for an indoor aerial and 15 watts! **G3KHA,** also of Knowle, had little success in poor conditions. February 7 was the best, and stations in London and the Home Counties were worked as well as G3FKO/M in Hereford. '3KHA's 2m input is now up to 75 watts with a QQV06/40A as p.a. **G3FIH** (Bath) also found February 7 outstanding, and worked G6AG, G8AL, G6CW (Nottingham) and other stations.

G5MA writing from his new address ("Fircroft," Groveside, Great Bookham, Surrey) says he hopes to be operating again this spring. **G5YH** (Chiswick) is constructing a fanned Yagi for 2m which will have a bandwidth of approximately 25 Mc/s. ('5YH says "it follows that errors in the construction go unpunished"). As it can be built on the Meccano principle the need to work with tubular elements, always tiresome, is avoided. Further details are promised and are awaited with interest.

G3EMU (Canterbury) has devoted his time entirely to construction, and thinks that the ability to build or alter equipment is one of the ever-present delights of

*21 Bridge Way, Whitton, Twickenham, Middlesex.

v.h.f. work. '3EMU, has been receiving valuable assistance from G3BA in regard to neutralization of QV04/20 valves. It is now confidently expected that the high-power rig will be working shortly. **G4JJ/A/P** (Barnsley) has had little time to operate lately and when at the /A location (Chesterfield) has found little activity. The p.a. input (at present 8 watts) is shortly going up to 100 watts. **G3JGJ** (Plympton) reports that G3KFN (Plymouth) is now active on 2m. Both these stations hope to be portable soon. The only station heard in the Plymouth area for weeks has been G3AGA (Falmouth), whom many others would certainly like to hear!

News from Scotland

GM6WL reports that GM5VG has reappeared on 2m and puts a very good signal across to Edinburgh and Dunfermline. GM3FGJ has been worked for the first time and contacts had with '3DDE and '3DIQ. GM6ZV worked '3ENJ (Dunfermline), who, it is hoped, will again be heard more frequently. On February 6 EI2W was S9 on phone at GM6WL and was contacted about midnight; both parties were very pleased as it is the first time signals have been exchanged between Foxrock, Co. Dublin, and Glasgow. Previous QSOs have been from EI2W's mountain location. The aerial at GM6WL is an *indoor* 4-over-4 firing through a bow window facing south-west.

Seventy Centimetres

G2XV (Cambridge) has completed his high-power 70 cm transmitter which is working very well. Output is 12 watts against 5 before. **G8PX** (Oxford) has a blue print for a cavity for a 4X150A. Having got over the shock of all the machining involved he is looking around for bits of tubing.

GM6WL says that 70 cm activity around Glasgow is increasing. '6KH has finished his G3BKQ-type converter which is working well with a very good signal-to-noise ratio. GM3DYC has gone over to crystal control in the receiver with excellent results.

From the *Lea Valley Reflector* it is learnt that the following stations are currently active on 70 cm in London and the Home Counties: G2RD, '2WJ, '2WS, '2HDY, '2HDZ, '3FD, '3FP, '3MI, '3BVG, '3EOH, '3EYU, '3GDR, '3HBW, '3IRW, '5CD, '5DF, '5DT, '5HN, '5RD, '5UM, '6NF, '6NB and '8SK.

Twenty-five Centimetres

GM6WL has a 446A Lighthouse valve producing a quarter of a watt of r.f. in a dipole aerial. The transmitter is crystal controlled from the 70 cm transmitter. As soon as the weather improves an attempt will be made to radiate over a few miles. The 25 cm apparatus was demonstrated at the West of Scotland V.H.F. Group Meeting in Glasgow on February 16.

V.H.F./U.H.F. in Russia

V.h.f. bands now available to Russian amateurs are 38 to 40 Mc/s, 190 to 195 Mc/s, 1470 to 1520 Mc/s and 5650 to 5850 Mc/s. Obtaining permission for construction and operation on the "ultra short waves" is somewhat involved, and a maximum input of 10 watts is allowed. Ciphered calls of six characters are assigned to these stations. This information is from a translation, by W8FAZ, of an item in the Russian journal *Radio* quoted by *QST*.

Whilst it is interesting to know that Russian amateurs are allowed to operate on v.h.f./u.h.f. it is unfortunate that their bands in no way coincide with those in use in Europe, a fact which renders real v.h.f. DX in Europe well-nigh impossible of achievement in anything like the way it occurs in North America. Perhaps one day the U.S.S.R. will conform. It would be good to hear UA calls on 2m!

Solar Radiation

In the early morning of February 23 (British Time) an almost unprecedented increase of solar radiation was noticed at Greenwich Observatory. The full effects were not realised here, as the sun had not risen, but radiation activity was intense in the daylight areas, and radio communication was adversely affected for some hours. This phenomenon sometimes has a contrary effect on v.h.f. signals as it has often been accompanied by aurora formations, and many U.S.A. v.h.f. DX contacts over very long distances (up to 900 miles) have been realised by auroral reflection. We shall be pleased to hear from any operator experiencing unusual results which may be attributable to this occurrence. Reports from overseas will be very welcome, of course.

10,500 Mc/s

According to a report in the magazine *Old Man* (Basle, Switzerland), a phone contact has taken place between HB9PO and HB9RS on 10,500 Mc/s (about 3 cm) at a distance of 1500 metres (about 1 mile). The equipment used included a 723A/B klystron with a power of 0.003 watt!

V.E.R.O.N. V.H.F. Certificates

PA0BL tells us that V.E.R.O.N. (the Dutch Society) awards two v.h.f. certificates, known as the VHF25 and VHF6 respectively. The first can be gained by British stations who work 25 Dutch stations on v.h.f./u.h.f. The VHF6 certificate is awarded to those working amateur stations in six different countries.

Claims should be sent to the Traffic Department, V.E.R.O.N., c/o M. Smit (PA0LR), Stationsweg 70, Velsen ZD, Holland, from whom further details may be obtained.

London U.H.F. Group

At the Group's monthly meeting on April 5, 1956, Phil Thorogood, G4KD, was elected Chairman. Other members of the newly-formed Committee are Norman Caws, G3BVG (Honorary Treasurer), John Worrall, G3IWA (Honorary Secretary), Dennis Furby, G3EOH, and Ralph Royle, G2WJ (Committee Members). The Group meets at 7.30 p.m. on the first Thursday in each month at the Bedford Corner Hotel, Bayley Street, Tottenham Court Road, London, W.C.1. V.h.f./u.h.f. enthusiasts are always welcome.

European V.H.F. Contest, 1955

The following results of the European V.H.F. Contest, 1955, are quoted from *Das DL-QTC*:

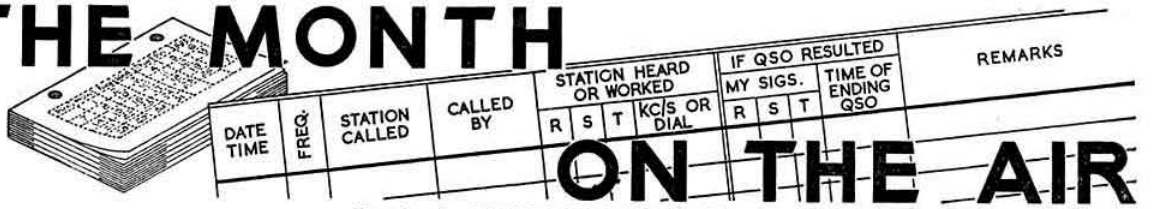
Posn.	Call-sign	Contacts	Points	Multiplier	Total
1.	DL3QAP	121	943	8	7544
2.	DL9QNP	100	911	7	6377
3.	HB1RD	128	883	7	6181
4.	HB1IV	108	765	6	4590
5.	DJ2KSP	85	742	6	4452
6.	G5KW/P	107	413	9	3717
7.	F9CQ/A	86	586	6	3516
8.	DL3YBA	91	632	5	3160
9.	DL6BU	83	552	5	2760
10.	DL6WU	87	507	5	2535
11.	DL9QD	86	435	5	2175
12.	DL1LS	78	393	5	1965
13.	G8IL	59	354	5	1770

Other British stations which took part were placed as follows:—22—G2DVD (1010); 24—G3IEW/P (956); 28—G5MR (753); 59—G2JF (160); 130—G2DHV (1).

* * *

Reports for the next issue of the BULLETIN should reach the writer as soon as possible.

THE MONTH ON THE AIR



By S. A. HERBERT (G3ATU)*

WHILE BULLETIN publication has been delayed, the bands have been behaving much as expected, with plenty of the more usual kind of DX available and even some really rare stuff popping up briefly, to delight the comparative few lucky enough to "make it." The unfortunate thing about these short appearances of really rare DX stations is that there are bound to be far more unfortunates than there are lucky ones.

Ten Metres

On the whole, things have been quiet on ten, compared with the burst of exceptional conditions during the solar flare of some weeks ago, but DX stations keep appearing from time to time. Most of the really strong signals come from U.S.A. and on week-ends when the North Atlantic path is open, the noise above 28.5 Mc/s is quite something. **G3IGW** (Halifax) has been busy making arrangements for his Easter portable trip to Scotland, but he found time to listen on ten phone to CR9AH, VS6HL and some VKs. **B.R.S.20135** (Newport, I.o.W.) found the band often open until quite late. Phone DX for him included VK2PQ, '2AKV, '6MK, VE4EO, CR7AL, '7BB, ZS, VQ3ES, ZD4BR, OQ5FV, VP6, VQ4, CX and HP. **B.R.S.20133** (Melton Mowbray), with 31Z and 97C this year, mentions CO1AF, CR7AF, MP4BBW, '4KAC, VP6HR and OQ5. **B.R.S.20487** (N. Finchley) is awaiting connection of the a.c. mains supply. Meantime, a 6 volt vibrator feeds his HRO on which he logged CR9AH, VE1PP and ZB1.

An interesting letter from **B.R.S.2292** (Hounslow) heralds his return to Amateur Radio after many years. He finds thing have changed very little in general since 1939—except of course that s.s.b has arrived, there are two metre techniques to master and—of course—there are far more stations active, even without the kind who have no business at all to be on an amateur band. '2292 uses an 840A with a very short vertical aerial and in a few months he has logged nearly as many stations as in four pre-war years, when he had an 0-V-1 receiver. Recent phones heard were VQ2HJ, ZD3BFC, ZE6JB and ZS, while c.w. brought in ZD6RM, W0 and, for good measure, ZB1EB, W2TE and W2WZ who were logged on four bands—ten, fifteen, twenty and forty! **B.R.S.20106** (Petts Wood) heard good ones on both A1 and A3. On phone he picked up VE4RO, '5RU, 7AJU, '7MT, KG4AV, TG9JW, VP2KB, MP4BBX, ZP5AM and CT2AG, while c.w. produced CT3AB, ZP9AY and JA4AH (08.26). **G3ATU** happened on c.w. items HK3PC, VS6CT and K2GMV/M/0, the latter in his car on a 6,000 ft. peak in Colorada. Phone activity was from VP5RR (Grand Turk), FG7XB (who answered a call on c.w.), VK5WO (11.00) and HI6EC, whose long conversations with his American friends invariably make interesting listening, but are no help at all to the "HI-less" many.

Fifteen Metres

Somewhat naturally, fifteen has been a more reliable proposition than has ten, though short skip tends to be troublesome on the lower frequency band. However, the DX is usually there, from early morning VK/ZL to evening North Americans. **G3AAE** (Barnet) added ZS9G, KR6PI, KA2KS and SV0WE (Rhodes) to his phone tally. The SV0 is active on 14, 21 and 28 Mc/s. QSL via "*The Courier*", Rhodes Island, Greece. **G6CJ** (Stoke Poges) worked ZD1DR (09.45), whose QTH is Dave Roberts, P.O. Box 66, Freetown. **G6UT** (Bishops Stortford) worked VU2HF on c.w. who turned out to be ex-G8RZ. He is looking for G6WR, '4NS, '3BW, '3SY, '2AUM, '2JMC and other Cumberland Gs on 21 and 14 Mc/s. **G2DHV,** now the proud father of a baby girl, has had some QSLs returned marked "Pirate". One was for VQ6LQ, who has not yet used 21 Mc/s. George still gets around with 30 watts to a B2, mostly crystal-controlled. **G3IGW** snapped up VQ2GW and ZD4BQ on the key, which mode netted **B.R.S.2292** VS6AE, '6CW, VP4LF, PZ1RM, MP4BBL, KZ5KA and ZB2I. He thinks 21 Mc/s is *the* DX phone band and supports the argument with VS2DB, VU2EJ, VS6CW, VP5RR, VE8MD, KG1FR, K5CTN/VE8 (Baffin Is.), FF8AK, ZS3S, VK, ZL and maritime mobiles W2ZXM and W3OZA (S. China Sea).

B.R.S.20135 instances KR6NP, VS1FE, VP8BF, VQ2SB, '5EK, CR7DI, ZD4BR, VP6JK, VK and ZL on phone, while **B.R.S.20133** heard ZS7C, ZS9G, OQ5EW, KP4 and KZ. **B.R.S.20487** used one leg of a dipole to log ZL2BE, '2AJB, '4HJ, EA8BF, VQ4 and W7. The pick of some considerable phone DX from **B.R.S.20106** centres around VP4TS, VP2DL, VP5RR, '5EM, VP3YG, '3HAG, VP7NG, VP8BS, VR2CG, KA2KS, FM7WQ, 'WN, ZD2JDV, VU2RX (18.17), ZB2P, EL12H, KH6ZA (19.00), '6CV, ZD6RM and KL7ZG. DX on c.w. was less plentiful, but Norman did hear UD6KAB, PZ1RM, CR6AI and MP4BBL. **G3ATU** throws in phones ET2FM and W7UZR (Wyo.).

Twenty Metres

Things are never dull for very long on the DXCC band, which remains the happy hunting ground for those whose interest lies in adding new ones to their country score. This month, while conditions on the whole have been patchy, there were times when short skip vanished, the Ws weak but all kinds of interesting signals appeared. **B.R.S.20317** (Bromley) collected a variety of phone, with HC8GI (Galapagos) heading the list and CR5SP, CR4AG, EL5A, HH1W, YS1MS, VP2KM, '3YG, '5AD, '5AK, '5KJ, '5AO, '9AK, YN1ARM, ZS3P and ZD4BF (s.s.b.). On c.w., Bill listened to APs '2C, '2Q, '2RH, DU1VQ, '7SV, Madagascans FB8BP, '8BR, '8BX, FB8ZZ (New Amsterdam), FQ8AY, FS7RT, KR6SC, LU1ZW, 4ZV, 9ZB (Melchior Is.), LU8XA (Patagonia), VP3AD, '3YG, '4LW, '8BK, VS9AS, W7DUE/KG6 and VR2BZ (19.15), plus JA and KH6 around that time.

G5BD (Mablethorpe),, well-known v.h.f. exponent, lowered his frequency for a time and worked ZP5HB (Box 512, Asuncion), whose buzz-saw T6 was the first

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

ZP '5BD had ever heard in 31 years activity. **G6YQ** (Liverpool) heard AC5PN calling CQ (RST578, 20.20) and duly landed him for a new one; the next day he worked another by pulling FS7AA from under the noses of a gaggle of calling Ws. All very heartening after six months of "marking time". '6YQ keeps his marathon *sked* going with VK4YP—now past the 1100 QSO mark! VK4YP says that YJ1DL has closed down, but two new YJs are expected shortly and should keep things going on the island. **G3AAE** agrees that time on twenty is well spent from the "adding" point of view and he dealt with FB8ZZ, VS9AS, ZD3A, VQ5GC, VR2BZ, VP8BS (South Shetlands) and LA7QE/P (Jan Mayen) on c.w. and FM7WF, TI2LDT, VP1EE, '1JH, '7BD, PJ2CH, HK4 and HR3HH on A3. The HR wants it known he is still looking for Gs on 1.8 Mc/s, incidentally. Although most of the "big guns" got FS7RT, the water pistol from '3AAE fell short! But more expeditions are planned to both sides of the island, so there is still hope.

Interesting news is that Stan Crow (ex-VQ4, VP5SC, etc.) has left for Ascension Is., so ZD8 should soon be available once more. **G3IGW** snapped up VP8BK (S. Georgia) and ZD6BX for quick ones on c.w. **B.R.S.2292** happened on HC1FG while the microphone was in the hands of our old friend G5RV. On c.w. he logged VP5MS, '9CE, ZD2DCP, ET3LF, FQ8AY, HH3AI, FF8AO and fantastic UU3XA. For **B.R.S.20133,** phone was from F9SC/FC, M1B, some Us and rarities FP8AP, VP5RR and K2HGU/KW6. **B.R.S.20135** also heard Us on phone and mentions the VK openings around 20.30. **B.R.S.20106** continues to fill his log with worthwhile prefixes. Firstly, some points of note are ZC5EC (07.10), called by a PY phone, ZK1BS (06.00) called on phone by VP5RR and VK9RH, also phone, called by 5A4TX (06.00). More A3 of interest is HE9LAA, VE6WW, VP1EK, '1JH, TG7CB, '9MB, VE5RO, HP2ON and EL12D. Notable c.w. items are FS7RT, '7AA, YN1AA, VR2BZ (19.00), AC5PN (19.00), XE1CM, UPOL5, MP4QAL, VP4LF, '8BH, ST2NG, OA4AH, UA0GF and some ZLs around 18.00-19.00 G.M.T. A mysterious station was heard, first on 21 Mc/s at 17.07, when Norman was intrigued to hear Nepal mentioned, while the operator remarked "It is 10.30 at night, here" and gave his call, which sounded like VJ1EJ. Next day, March 4 at 06.25, the same station was on twenty, talking to YI2AM, who can perhaps throw further light on the matter?

A.1328 (London, W.1) is getting used to his receiver/converter combination and pulled in phones CO7AA, OQ5BX, EA9AR, FM7WN, 4X4DK and GB2SM, whose signals, coming from such short range, must be positively ear-splitting! For **G3ATU,** the month was made by a QSO with FB8BR/FB, whose licence for Comoro operation had duly arrived, enabling him to appear rather unexpectedly. There was a sizeable pile-up round him nevertheless and '3ATU decided 10 kc/s low was a good place to be for a start—put the rig there and sent "G3ATU" twice to make sure the v.f.o. was on the right spot. It was—'8BR called '3ATU! Unexpected, but delightful! FB8BR's trip was a short one and his hours of operation were curtailed by a nearby 20 kW commercial sender. When it came on, '8BR had perforce to close down. However, it appears that the island will be visited fairly frequently—possibly once a month, so there should be ample opportunity for adding Comoro to sundry lists.

Forty Metres

No facetious comments this time—straight to business. **G3IGW,** for instance, talked on the key to VQ4AQ, '4EO, '4RF, '6LQ and heard ZS, PJ2BS *and* ZD9AD. On phone he worked SV0WD and YI2AM (RS58). **B.R.S.2292** found the c.w. band interesting if tough and emerged with VP2SH, VP8AL, CX6CM, EA9AY, KP4ACM, all W areas, ZB2Q, TA3FR and the still screened UM8KAA, UG6AN, UF6AA and UO5s. **B.R.S.20317** managed TF2GE, PY7 and AC4LP (21.00). **B.R.S.20106** mentions CT2BO, CE3DG, VP3YG (who is very active around the bands these days) and Ws '5LP, '5GHC and '0TKQ.

Eighty Metres

Eighty seems to be looking up of late and c.w. gave **G3IGW** QSOs with TI2BX and VQ2J, while he heard PJ2AJ, VP9CR, YV5BJ and EA8BF. **B.R.S.2292** logged 3V8AB and W4CDC, while **B.R.S.20106** overheard KZ5CS, TF3CM (18.10), KP4ADS, '4RE, '4DH and W6s 'DLX, 'LRU, 'AGO and 'GAL/7 (Ariz.). **B.R.S.20317** heard KP4QD on s.s.b. and W4FIP with W4MCO on A3.

One-Sixty Metres

DX activity has shown a sharp decline in conditions much poorer than last year, but some paths are open on occasion and **G3IGW** heard Ws '1BB, '1TIW, '2EQS, '8ANO and KV4AA. **B.R.S.2292** logged OKs, HB9CM, DL1FF and DL3OO, while **B.R.S.20106** settled for the DLs, W1BB, W2PP and W9PNE and heard G8FO calling VE1EZ (06.40).

GM3GZA writes from Mangersta Radio Station, Uig, Isle of Lewis, in the wind-swept Outer Hebrides. Mangersta is the home of a 150 kW Loran station, sending pulse on 1950 kc/s, which makes Top Band working almost impossible. However, '3GZA has a car with him and will be spending some week-ends at Stornaway, where he *can* work one-sixty and he welcomes skeds. He will be on 3.5, 7 and 14 Mc/s, mainly crystal controlled on 3510, 3550, 3587, 3580, 3725, 7020 and 7030 kc/s and prefers QSLs direct. As he says, "The mail-man is the most sought-after character in the district!"

Miscellaneous News

Tony Ernest (ex-A.1283) is now **ZC4AA** and will be on twenty, looking especially for GW (his home country). He says several new calls have been issued, so there should be more ZC4 activity shortly. **G3KCH** is now **VE3DXN** (Pembroke, Ont.) with a new G5RV rig, and is looking for Gs.

G3INW (Bradford) passes news culled from the Czech *Amaterske Radio* that UPOL5 (Soviet Polar Expedition) uses c.w. and m.c.w. on 14 Mc/s. US1KAE is their Geophysical Year Antarctic station and USAF is the U.S.S.R. ship *Slava*. UA0KTA is on 14 Mc/s from Kyzyl, Tuva, in Zone 23. **G3JFY** (Ampfield, Hants) returned on leave from the Merchant Navy and was pleased to find waiting a QSL from UQ2AA.

VS1GP reports increasing activity from that part of the world. VS1GZ is the R.A.F. Changi club and they use 14019, 14025 (R.A.F. sked channel), 14040, 14080 kc/s c.w. and 14199, 14280 and 14340 kc/s phone. VS1s 'HC, 'HD, 'GY, 'GH, 'BP (G8PF), ex-G3AFA and ex-G3KPA are also using these frequencies. Crystals cost but 2s. 4d. each and so are no problem!

DX Flash

VR1B (Danny Weil) is active from Br. Phoenix Is. and should be there until the end of April, when he leaves for Nauru. His c.w. around 14085 kc/s has been audible until mid-day, but the best time for Europeans to try for him is 07.00-08.00 G.M.T. VR1B normally listens some 20 kc/s lower for replies. Do *not* call on his frequency.

Mobile Column

By JOHN A. ROUSE (G2AHL)*

G3FZB raises the question again of stations signing /M while not actually mobile. The difficulty arises, of course, because under the terms of the Amateur (Sound Mobile) Licence a station fitted, as distinct from carried, in a car is considered to be a mobile station, whether or not the car is in motion. This, incidentally, is in line with normal practice. It does seem, however, that for purely amateur reasons such stations should make it clear that they are not on the move by some announcement such as " . . . G3XXX/M, stationary at. . . ."

G3FZB (Kineton, Warwick), accompanied by G3IEY, is getting good results on Top Band using 10 watts input to a transmitter comprising 6AG7 (e.c.o.), 6AG7 (b.a.) and 807 (p.a.). The clamp modulator line-up is 6SN7-6SQ7-6V6 whilst the aerial is a centre- and base-loaded whip (shorting out the base loading coil, tunes the aerial to 80 metres). The receiver, built by G3IEY, is a 7 valve superhet. Separate 12 volt vibrator packs are used. Recent contacts in the Birmingham-Warwick areas have been with G3HBX, G3FGT, G3KLD, G3KEY, G3JZF, G3HVX, G3AIX and G3ITH. On one occasion, contact was maintained with various fixed stations for five hours, which says something for activity in the Midlands !

G8GI (Martin, Lincoln) makes a plea for fixed stations to listen for mobiles on Top Band during the week. On one trip to Blackpool on a Sunday last year, he had contacts all the way, but on the return trip—on a Tuesday—no contacts were made from 8 a.m. to 6 p.m. despite CQ calls every half hour. This seems to be a case for mobile calling frequencies, a point also raised by GW4CG. It would also help if fixed stations listened on the calling frequencies at least every hour on the hour. This year there will be more mobiles on the roads than ever before and adoption of some simple arrangements such as this could well make all the difference to the success of mobile work for many operators.

The suggested Mobile Calling Frequencies, which are the same as the R.A.E.N. Emergency Calling Frequencies, are as follows: 1980 kc/s, 3600 kc/s, 7050 kc/s, 14100 kc/s, 21150 kc/s, 28200 kc/s and 145 Mc/s.

The Twin Noise Squelcher

All who have done mobile work will appreciate the value of a really good noise limiting device. One of the most effective is the " twin noise squelcher " (TNS), the circuit of which is reproduced in Fig. 1 by permission of Wayne Green (W2NSD), editor of *CQ Magazine*, who himself operates mobile using a Gonset Communicator.

Under severe noise conditions the TNS performs better than the full-wave series limiter so far as audio-to-background noise ratio and intelligibility are concerned, while the squelching action eliminates the tiring background, at the same time enabling the operator to find weak signals easily. Furthermore, the twin noise squelcher does not cause distortion and may therefore be a permanent feature of the receiver circuit. The unit may be built on a small chassis measuring only about 2½in. by 2½in. by 4in. or may of course be incorporated in new equipment.

As indicated in Fig. 1, the resistors R5, R6 and R7 across points A and G replace the detector load resistor in the receiver (Fig. 2). It should be noted that terminal G must be separately connected to the cathode pin on the detector diode, while the leads from A and D in the unit (input and output respectively) to the receiver must be *individually* shielded throughout their length.

For best results, different valves should be used in the detector and a.f. stages; valves such as the 6SQ7 which combine these functions are not really suitable owing to leakage through the common cathode.

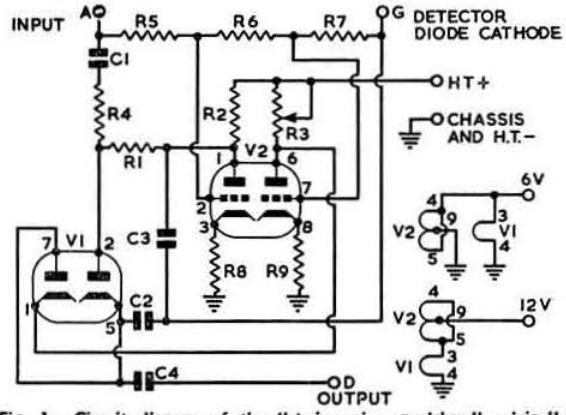


Fig. 1. Circuit diagram of the " twin noise squelcher " originally described in " CQ Magazine " in May, 1953.

C1, 4, 0.01μF; C2, 470μμF; C3, 0.1μF; R1, 1.5 Megohm ½ watt; R2, 470,000 ohms ½ watt; R3, 500,000 ohms pot.; R4, 220,000 ohms ½ watt; R5, 6, 47,000 ohms ½ watt; R7, 10,000 ohms ½ watt; R8, 9, 4,700 ohms ½ watt; V1, Brimar 6AL5; V2, Brimar 12AX7.

After the TNS has been installed, the squelch control (R3) should be advanced until all normal background noise disappears. In this condition, the squelch will automatically trigger when a station is tuned in, so that the audio component of the signal is heard. Cutting the carrier will immediately put the squelch in operation and silence the receiver. By backing off the squelch control to where it is rests at a critical level (i.e. where it does not " know " whether to silence the receiver or not) a weak carrier will trigger the squelch. The result is that the TNS not only eliminates the background noise but also enables one to find easily even weak stations—signals just pop out of the background !

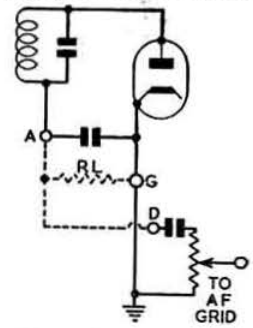


Fig. 2. Basic second detector circuit showing the connections of the " twin noise squelcher." The original load resistor RL is replaced by R5, R6 and R7 in the noise silencer unit.

Further information, particularly on the operation of the twin noise squelcher, will be found in the May, 1953, and May, 1954, issues of *CQ Magazine* and in the *Radio Amateur's Mobile Handbook*. Acknowledgement is also made to W3WAM who drew the writer's attention to the idea and demonstrated its effectiveness at the Mobile Rally in Oxford last year. Even in dense London traffic, the unit is a most useful aid to mobile reception and well worth a trial.

*Assistant Editor, R.S.G.B. BULLETIN.

Tests and Contests

V.H.F. Contests 1956

THE Council, acting on a recommendation of the Contests Committee, has agreed that the R.S.G.B. v.h.f. contests arranged for 1956 shall be held under R.S.G.B. Rules and *not* under the I.A.R.U. Region I provisional rules, as published in the December, 1955, issue of the BULLETIN.

After careful study of the I.A.R.U. rules, the Contests Committee reluctantly concluded that they contained features which past experience had shown to be undesirable both from the viewpoint of the contestants and also of the judges. The detailed criticisms are to be embodied in a paper to be discussed at the forthcoming I.A.R.U. Conference at Stresa, from which it is hoped will emerge integrated European rules for 1957 and later v.h.f. contests.

The Council and the Contests Committee are in full agreement with the other members of Region I that it is highly desirable that European v.h.f. contests should, wherever possible, be held simultaneously in order to stimulate inter-European working: this aim will to a considerable degree be achieved in 1956 since those Societies which have adopted the proposed I.A.R.U. rules will be running contests on May 5-6, June 16-17, August 18-19 and September 8-9, three of these dates coinciding with the R.S.G.B. events.

Rules for the R.S.G.B. events will be published in the BULLETIN as usual.

D/F Qualifying Events

THE first Qualifying Event of the 1956 season, organized by Slade Radio Society, will take place on May 6. Full details may be obtained by sending a stamped addressed envelope to T. A. Griffin, 11 Attleboro Lane, Water Orton, Birmingham.

Region 1 Field Day

THIS event is being brought forward this year in order to give groups the opportunity of trying out their N.F.D. gear. The date is May 13.

Copies of the rules have been sent to all Region 1 representatives and Affiliated Societies. Other members in the region may obtain copies on request from Basil O'Brien (G2AMV), 1 Waterpark Road, Prenton, Birkenhead.

There is a points premium for contacts with other portable stations and it is hoped that such stations will be operating in other parts of the country.—G2AMV.

Affiliated Societies' Contest, 1956

STOURBRIDGE and District Amateur Radio Society again came first in the Affiliated Societies' Contest, thus winning the Edgware Trophy for the third year in succession. Surrey Radio Contact Club was second and the R.A.F. Amateur Radio Society (G8FC) third. A full report will be published next month.

First Top Band Contest, 1956

W. A. Higgins (G8GF) was once more first in the Long Section and G3IEW second with G3BMY and G3IGW tying for third place. The Short Section was won by W. R. Steverson (G3JEQ), with G8GF and G3IEW joint second. A full report will appear in the April issue of the BULLETIN.

First 144 Mc/s Field Day, 1956

RULES for this contest remain substantially the same as for the 1955 events, with the exception that the exchange of National Grid references has been dropped in favour of an exchange of rising serial numbers. Attention is drawn to the necessity for quoting CORRECT National Grid References at the head of the log, and to the requirement that the same expression of station location must be used for each contact by portable stations, and must be as quoted at the head of the log.

A separate section has been introduced for mobile stations as an experiment, and it is hoped that if sufficient support is received this may become a regular feature of 144 Mc/s Field Days. It has proved particularly difficult to produce satisfactory rules and it is emphasised that the rules for this section are experimental and that comments will be welcomed.

Competitors should note that stations must be operated either " /P " for the main contest or " /M " for the mobile section, and that mixed logs will not be acceptable. Portable stations will compete only against other portable stations, and mobiles against mobiles. Check logs from non-competing stations will be appreciated.

Rules

(1) The event is open to all fully paid-up corporate members of the R.S.G.B. resident in Europe.
(2) Contacts may be made on telephony, c.w. or m.c.w.
(3) Entrants must operate according to the terms of their licences; the input to any stage of the transmitter must not exceed 25 watts.
(4) The station must be operated from the same site for the duration of the contest. The National Grid Full Six-Figure Reference must be given in all entries from G, GD, GM and GW. In all other cases, entries must show the latitude and longitude of the station location.
(5) Only one contact with a specific station, whether portable, mobile, fixed or alternative address, will count for points.
(6) Contacts with unlicensed stations will not be permitted to count for points. Proof of contact may be required.
(7) Entries should be written on lined foolscap or quarto paper, or typed on plain paper, on one side only, and must be set out in the form shown below:—

144 Mc/s FIELD DAY, MAY 6, 1956

Name ..... Call-sign .....
Home address ..... Claimed score .....
Site of station .....
National Grid Full Six-Figure reference (or Latitude and Longitude—see Rule 4) .....
Transmitter ..... Power input ..... Receiver .....
Aerial system(s) .....

Time G.M.T.	Call-sign of station worked	Report & Serial No. SENT	Report & Serial No. RECEIVED	Location	Estimated Distance	Points claimed
10.04	G3—/P	569001	559002	5NE Luton	10 miles	20
10.09	G5—/M	55-002	57-001	6N Watford	9 ,,	18
10.14	G4—	569003	559001	Enfield	16 ,,	16
					Total:	

Declaration:—I declare that my station was operated strictly in accordance with the rules and spirit of the contest, and I agree that the ruling of the Council of the R.S.G.B. will be final in all cases of dispute.

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

(8) Multiple-operator entries will be accepted provided that:—
(i) the call-sign and signature of the operator concerned is recorded for each contact;
(ii) the declaration is signed by only one operator, who will be regarded as the entrant.
(9) The event will start at 10.00 G.M.T. and finish at 19.00 G.M.T. on Sunday, May 6, 1956.
(10) Power supply must not be derived from public or private supply mains.
(11) No part of the station may be situated in any building existent on the site prior to the date of the event.
(12) No apparatus may be erected on the site prior to the day of the event.

(13) An exchange of reports (RST or RS) and a self-assigned three-figure serial number starting between 001 and 100 and increasing by one with each successive contact, together with the same expression of location as given at the head of the log, will be required before points may be claimed. THE EXPRESSION OF LOCATION SENT MUST NOT VARY DURING THE PERIOD OF THE CONTEST, and must consist of distance and direction from the nearest town or village, e.g. RST559002 5NE Luton (i.e. 5 miles north-east of Luton).

(14) Points will be scored on the basis of one point per mile for contacts with fixed stations and two points per mile for contacts with portable or mobile stations.

(15) Entries should be addressed to the Hon. Secretary, R.S.G.B. Contests Committee, New Ruskin House, Little Russell Street, London, W.C.1, and must bear a postmark not later than Monday, May 14, 1956.

(16) A miniature cup will be awarded to the winning station, at the discretion of the Council, and the runner-up will receive a Certificate of Merit. An additional Certificate of Merit will be awarded to the leading mobile station.

Mobile Section

All the rules for the portable stations will also apply to mobile stations with the exception of Rule 4, amendment of the log heading under Rule 7, and amendment of Rule 13, as follows:—

(4) Mobile stations must quote the location from which each contact is made in their logs, using the same expression of location as is sent to the station with whom they are in contact.

(7) **144 Mc/s FIELD DAY, May 6, 1956**
MOBILE SECTION

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

Home address ..... Claimed score .....

Vehicle Registration Number .....

Transmitter ..... Power input ..... Receiver .....

Aerial system(s) .....

Time G.M.T.	Call-sign of station worked	Report & Ser. No. SENT	Report & Ser. No. REC'V'D	Location SENT	Location REC'V'D	Esti-mated Distance	Points claimed
10.04	G3—/P	55–001	54–002	6SE York	5N Leeds	30 miles	60
10.12	G4—	58–002	55–001	6SE York	Leeds	35 ,,	35
10.19	G5—/M	54–003	44–001	4SE York	10N York	15 ,,	30
						Total:	

Declaration:—I declare that my station was operated strictly in accordance with the rules and spirit of the contest, and I agree that the ruling of the Council of the R.S.G.B. shall be final in all cases of dispute.

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

(13) The expression of location sent must consist of distance and direction from the nearest town or village at the time at which contact is established, e.g. RS55001 5NE Luton (i.e. 5 miles north-east of Luton).

Worked All Welsh Counties Award

FULL details of the Worked All Welsh Counties Award, which has been instituted by the Tops C.W. Club to mark the 10th Anniversary of the formation of the club may be obtained from J. Philip Evans (GW8WJ), 2 Ffordd Ty Newydd, Meliden, Flintshire, North Wales. The award is available to any radio amateur who has worked stations in each county of the Principality. United Kingdom amateurs are restricted to contacts on Top Band.

Reg Adams (G2NO) honourd by the Polish Republic

MR. Reg Adams (G2NO) was recently invested by the President of the Polish Republic (Mr. August Zaleski) with the Order of Knight Officer of the Polonia Restituta.

The award was made, primarily, on account of the assistance which Mr. Adams, through his Amateur Radio station, was able to give to Poland, particularly in the early days of the 1939-45 war.

Mr. Adams' many friends in the Society will wish to offer him personal congratulations on this signal recognition of his services to Poland. His address is Three Chimneys, Chislehurst Road, Petts Wood, Kent.

Contests Diary

1956

May 5–6	-	I.A.R.U. Region I V.H.F. Contest[4]
May 6	-	144 Mc/s Field Day No. 1[1]
May 6	-	D/F Qualifying Event (Slade Radio Society)[2]
June 2–3	-	National Field Day[5]
June 10	-	D/F Qualifying Event (Edgware)
June 16–17	-	I.A.R.U. Region I V.H.F. Contest[4]
June 17	-	420 Mc/s Contest No. 1
June 24	-	D/F Qualifying Event (South Manchester)
July 7–8	-	144 Mc/s Open Contest
July 8	-	D/F Qualifying Event (High Wycombe)
July 14–15	-	*Short Wave Magazine* All-European V.H.F. Contest
July 21–22	-	*Short Wave Magazine* All-European V.H.F. Contest
August 18–19	-	I.A.R.U. Region I V.H.F. Contest[4]
August 19	-	144 Mc/s Field Day No. 2
September 2	-	Low Power Field Day
September 2	-	1250 Mc/s Tests
September 8–9	-	European V.H.F. Contest (organised by D.A.R.C.)[1]
September 9	-	D/F National Final
September 9	-	420 Mc/s Contest No. 2
October 6–7	-	Low Power Contest
November 10–11		Top Band Contest No. 2
November 24–25		21 Mc/s Phone Contest

Unless otherwise indicated all contests are arranged by the R.S.G.B.

[1] For rules, see page 386.
[2] See page 386.
[3] For rules, see *Short Wave Magazine*, January, 1956.
[4] For rules, see page 285, R.S.G.B. Bulletin, December, 1955.
[5] For rules, see page 284, R.S.G.B. Bulletin, December, 1955.

Swiss Contest

THE Annual Helvetia 22 Contest organized by the Swiss Union of Shortwave Amateurs (U.S.K.A.) will commence at 15.00 G.M.T. on May 12 and end at the same time May 13. Stations outside Switzerland will try to work as many stations as possible in each of the 22 Swiss cantons using all bands from 3.5 to 28 Mc/s. Entrants will call "CQ HB" or "CQ H22" and will exchange five- or six-figure groups consisting of the signal report (RS or RST) and the number of the contact starting with 001. Three points will be scored for each contact with Swiss stations. The total number of points will be multiplied by the total number of Swiss cantons worked on all bands. The maximum multiplier possible per band is 44 (22 on c.w., 22 on phone).

Entries must be posted not later than May 31, 1956, to U.S.K.A., Box 1203, St. Gallen, Switzerland, from whom full details may be obtained.

John Wells (G3IZG)

MEMBERS of the Blackpool and Fylde Amateur Radio Society have built a small 5-watt transmitter for bedside use by John Wells (G3IZG) who is in Ward 4, Wrightington Hospital, near Wigan, for approximately one year. G3IZG/A is on the air on four frequencies between 7010 and 7055 kc/s and on 3510 kc/s approximately except during television hours.

Society News

The 7 Mc/s Band

ON the instructions of the Council, the Secretary recently wrote to the G.P.O. for an assurance that the United Kingdom would support the exclusive use of the band 7000-7100 kc/s by amateurs.

The Post Office in reply expressed the hope that as from April 1, 1956, broadcasting stations which had hitherto operated on frequencies in that band would transfer to alternative frequencies. The G.P.O. pointed out, however, that in view of the over-crowding in the broadcast bands resulting from the great increase in international broadcasting since the war, some Administrations, including the United Kingdom, will find it difficult under present conditions to replace all the out-of-band broadcasting services (although the U.K. now has none in the band in question) by the target date.

The G.P.O. have indicated that they will be prepared to take up any cases of interference to amateur operation in the band 7000-7100 kc/s "due to the use of frequencies notified to the Radio Frequency Record after the European Administrative Radio Conference."

Members are asked to report to Headquarters flagrant cases of out-of-band operation by broadcasting or other services. Reports should state time, date, nature of service, call-sign or description of station, and number of times observed.

Morse Test

The G.P.O. have been unable to accept a suggestion put forward by the Society that Morse tests might be conducted by radio amateurs who are Post Office employees.

The G.P.O. point out that it is important, if the tests are to mean anything at all, that they should be so conducted as to ensure as high degree as possible of consistency. The fact that a particular Post Office employee is a licensed amateur does not necessarily mean that his Morse operating skill is kept at the standard necessary for conducting an examination, nor that he possesses the other qualities required of an examiner.

For the Post Office to operate such a system in a satisfactory manner they would themselves have to institute an internal procedure for selecting, training and, from time to time, testing these additional examiners and this would lead to increased costs and ever higher examination fees.

Headquarters' Station

THE R.A.F. Amateur Radio Society has written regarding the statement made by the Hon. Treasurer at the Annual General Meeting in December, 1955, concerning the disposal of the R.S.G.B. Headquarters' station GB1RS.

The R.A.F. Amateur Radio Society states that a verbal offer of the station was made to them by the R.S.G.B. in November, 1954, and after most careful consideration was declined on December 15, 1954, in accordance with the policy of R.A.F. A.R.S. to use only amateur designed and amateur constructed transmitters on the amateur bands at the R.A.F. A.R.S. Headquarters' Station G8FC.

Mr. John Clarricoats, O.B.E., J.P.

AT the time this issue of the BULLETIN went to press, the General Secretary (John Clarricoats, G6CL) was still indisposed following a severe attack of bronchitis. He is now making good progress and we are sure all members will join with us in wishing him a speedy recovery.

Committees of the Council, 1956

THE following members have been appointed to serve on the Committees of the Council for the year 1956:—

Contests: Council Members: D. A. Findlay (G3BZG); W. H. Matthews (G2CD); Non-Council Members: R. S. Biggs (G2FLG), E. S. G. Fish (G2HCZ), S. E. Fryer (G3ERO), J. P. Hawker (G3VA), G. A. Leicester (G3IKC), T. L. Herdman (G6HD) and A. W. Timme (G3CWW).

Exhibition (Home Constructors' Section): Council Members: W. H. Allen (G2UJ), C. H. L. Edwards (G8TL); Non-Council Members: J. E. Hunter (G6HU), F. G. Lambeth (G2AIW), G. W. Norris (G3ICI), B. L. Rogers (G3ILI), R. L. Royle (G2WJ) and E. W. Yeomanson (G3IIR).

Finance and Staff: Council Members: H. A. Bartlett (G5QA), K. E. S. Ellis (G5KW), C. H. L. Edwards (G8TL), D. A. Findlay (G3BZG), R. H. Hammans (G2IG), J. H. Hum (G5UM), A. O. Milne (G2MI) and W. A. Scarr (G2WS).

G.P.O. Liaison: Council Members: R. H. Hammans (G2IG), A. O. Milne (G2MI); Non-Council Member: H. A. M. Clark (G6OT).

Membership and Representation: Council Members: H. A. Bartlett (G5QA), R. G. Lane (G2BYA), W. R. Metcalfe (G3DQ), H. W. Mitchell (G2AMG) and J. Taylor (GM2DBX).

Radio Amateur Emergency Network: Council Members: C. H. L. Edwards (G8TL), W. R. Metcalfe (G3DQ), L. E. Newnham (G6NZ); Non-Council Members: A. C. Dunn (G2ACD), C. L. Fenton (G3ABB), A. C. Gee (G2UK), E. Arnold Matthews (G3FZW), F. R. Peterson (G3ELZ), C. T. Wakeman (G4FN) and D. F. Willies (G3HRK).

Technical: Council Members: W. H. Allen (G2UJ), C. H. L. Edwards (G8TL), R. H. Hammans (G2IG), F. Hicks-Arnold (G6MB), J. H. Hum (G5UM); Non-Council Members: H. A. M. Clark (G6OT), D. N. Corfield (G5CD), F. J. Charman (G6CJ), A. H. Koster (G3ECA), S. K. Lewer (G6LJ) and J. W. Mathews (G6LL).

V.H.F.: Council Members: W. H. Allen (G2UJ), K. E. S. Ellis (G5KW), J. H. Hum (G5UM), W. H. Matthews (G2CD), W. A. Scarr (G2WS); Non-Council Member: F. G. Lambeth (G2AIW).

The President (Mr. R. H. Hammans) is an ex-officio Member of all Committees of the Council.

Region 10 Representative

THE Council is pleased to announce that Mr. Cyril Parsons (GW5NP) has agreed to undertake the duties of Region 10 Representative in succession to Mr. John Banner (GW3ZV).

Mr. Parsons, whose address is 90 Maesycoed Road, Heath, Cardiff, was licensed in 1937. During the 1939-45 War he served with the R.A.F.V.R., attaining the rank of Wing Commander. He is at present Senior Technical Officer of No. 3614 (County of Glamorgan) Fighter Control Unit, R.Aux.A.F.

Royal National Institute for the Blind

THE Council is pleased to report the receipt of a letter from the Secretary-General, Royal National Institute for the Blind, thanking all members of the Society who have rendered service to the Institution in connection with the Talking Book Library.

Society Blazer Badge

A SPECIALLY designed blazer badge of unique design is now available to Society members. The top left-hand quarter depicts the Great Bear constellation, representing Northern latitudes, the bottom right-hand quarter depicts the Southern Cross constellation representing Southern latitudes, the top right-hand quarter depicts a lightning flash symbolising Amateur Radio communication, and the bottom left-hand quarter depicts a globe symbolising the international aspects of Amateur Radio.

The background cloth is black. Dark blue cloth is used for the constellation quarters and pale blue cloth for the other two quarters. The surround of the shield and the lettering is worked in gold.

The badge (which was designed by Louis Varney, G5RV) is available from Headquarters, price 7s. post free.

R.S.G.B. QSL Bureau

MEMBERS who change their addresses are asked to mention the fact when sending new envelopes to the QSL Bureau, to ensure that envelopes with old addresses which may still be on file are not used.

R.S.G.B. Recorded Lecture Library

THE following recorded lectures are available on loan to R.S.G.B. Groups and Affiliated Societies:

"V.H.F.," by Sir Noel Ashbridge[1].

"The Engineer and Society," by Captain P. P. Eckersley, M.I.E.E.[1].

"TVI-proof Transmitter Design," by Louis Varney, A.M.I.E.E. (G5RV)[1].

"Interplanetary Travel," by W. A. Scarr, M.A. (G2WS)[1].

"Modern Disc and Tape Recording," by H. A. M. Clark, M.I.E.E. (G6OT)[1].

"Hints on Mobile Operation," by C. H. L. Edwards, A.M.I.E.E. (G8TL)[1].

"Radio Through the Years," by Captain P. P. Eckersley, M.I.E.E.[2].

"Receivers," by R. H. Hammans (G2IG)[1].

"Aerials," by F. J. H. Charman, B.E.M. (G6CJ)[2].

"Radio in the Antarctic," by Roth Jones (VK3BG)[3].

Applications to book lectures should be made as far in advance as possible and should be sent to Mr. E. Fish (G2HCZ), 107 Eton Road, Ilford, Essex. When applying, the type of recorder to be used for the play-back should be stated. Those borrowing tapes are asked to take great care of them and to return them promptly by registered post.

[1]Available for use on Scophony-Baird and standard twin-track recorders.
[2]Available for use only on standard *twin*-track recorders.
[3]Available for use only on standard *single*-track recorders.

Gloucestershire County Dinner

THE second Gloucestershire Dinner, held in the county town on February 4, 1956, was attended by seventy-eight members and their ladies.

A toast to the "Amateur Radio Movement" was proposed by Owen Rogers (G2HX) and replied to by Norman O'Brien (G3LP), the Region 6 Representative. B. Horton (G3CBH) proposed a toast to "The Ladies" which was replied to by Mrs. H. Brislin (wife of G3FRY). The evening concluded with a raffle and some "games and tortures" organized by E. Chell (B.R.S.19474). Those responsible for the arrangements were the C.R. for Gloucestershire and the T.R.s for Cheltenham, Gloucester and Stroud.

Birmingham District Meeting

NEARLY 70 members attended the Birmingham District Meeting held on April 7, 1956. The programme included a lecture on "The Antennamatch" by Council Member F. Hicks-Arnold (G6MB). Council was represented by the Executive Vice-President and Honorary Treasurer (Douglas Findlay, G3BZG) and Council Member Len Newnham (G6NZ).

During the proceedings Mr. Findlay presented the Desmond Trophy and the Metcalfe Miniature to Mr. W. A. Higgins (G8GF) for his success in winning the Long and Short Sections of the Second Top Band Contest, 1955.

Balloon and Kite Borne Aerials

MEMBERS who intend to conduct experiments with balloon borne aerials are reminded that the Air Navigation Order, 1954 (S.I. 829 of 1954), Article 38, provides, *inter alia*, that a captive balloon shall not be flown within the United Kingdom except with the permission in writing of the Ministry of Transport and Civil Aviation. Applications for permission should be addressed to the Secretary, M.T.C.A., Berkeley Square, London, W.1, and should be made as far in advance as possible.

V.O.A. Radio Amateurs' Programme

THE popular Radio Amateurs' Programme is again being broadcast by Voice of America stations on 7235, 9500, 11790, 11870, 11890, 15270, 15280, 17830, 21650 and 21730 kc/s at 18.45 to 19.00 G.M.T. every Saturday. A repeat is broadcast at 21.45 G.M.T. the same day. The best frequency for U.K. listeners is 9500 kc/s at the moment.

Slow Morse

LICENSED amateurs who can spare a few minutes each week to transmit Morse practices on Top Band for the benefit of newcomers to Amateur Radio are invited to write to Mr. C. H. L. Edwards, G8TL, 28 Morgan Crescent, Theydon Bois, Essex, stating times available and operating frequency.

In order to extend the present service and to relieve some of those who have been doing this valuable work for many years, offers are invited from all parts of the United Kingdom.

Radio Amateurs' Handbook

COPIES of the 1956 Edition of the A.R.R.L. Handbook may now be obtained from Headquarters, price 32s. post paid from stock.

LONDON MEMBERS' LUNCHEON CLUB
will meet at the Bedford Corner Hotel, Bayley Street, Tottenham Court Road, at 12.30 p.m. on
Fridays, May 18 and June 15, 1956.
Telephone table reservations to HOL 7373 prior to day of luncheon. Visiting amateurs especially welcome.

The European Band Plan

PLANNING of the high frequency amateur bands was originally put forward by the R.S.G.B. and unanimously adopted by the European Societies represented at the I.A.R.U. Conference in Paris in 1950, and confirmed by the Region I I.A.R.U. Conference in Lausanne in 1953. The plan, which is voluntary, is as follows.

Frequency Band	Type of Emission
3500— 3600 kc/s	Telegraphy only
3600— 3800 kc/s	Telephony only
7000— 7050 kc/s	Telegraphy only
7050— 7150 kc/s[1]	Telegraphy and Telephony
14000—14125 kc/s	Telegraphy only
14125—14350 kc/s	Telegraphy and Telephony
21000—21150 kc/s	Telegraphy only
21150—21450 kc/s	Telegraphy and Telephony
28000—28200 kc/s	Telegraphy only
28200—30000 kc/s[2]	Telegraphy and Telephony

[1]7100–7150 kc/s Shared with broadcasting which has priority
[2]To be 28200–29700 kc/s later

Northampton Mobile Rally

THERE was an attendance of nearly 200 at the first Mobile Rally of the season held at Overstone Solarium near Northampton on April 8, 1956. The programme included a field strength competition, 2m and Top Band treasure hunts and a "concours d'elegance" for the neatest mobile equipment. Prizes were donated by leading manufacturers.

The rally, the largest so far held in the United Kingdom, was organized by the Northampton Short Wave Radio Club.

C.C.I.R. Warsaw

THE VIIIth Plenary Assembly of the International Radio Consultative Committee (C.C.I.R.) will be held in Warsaw, Poland, from August 9 to September 13, 1956. The original dates were 15 days later than the new dates.

It is anticipated that I.A.R.U. Region I Division will be represented at the Assembly.

Physical Society Exhibition

THE Physical Society's Fortieth (1956) Annual Exhibition of Scientific Instruments and Apparatus will be held in the Old and New Halls of the Royal Horticultural Society, Westminster, from May 14 to 17. The size of the exhibition is expected to be similar to that of last year but the extra space available will make for easier access for visitors. The proportion of purely research exhibits will be considerably increased as a greater number of universities, colleges and research organisations are taking part.

Admission will be by ticket obtainable by sending a stamped addressed envelope to The Physical Society, 1 Lowther Gardens, Prince Consort Road, London, S.W.7.

Slow Morse Practice Transmissions

G.M.T.	Call	kc/s	Town
Sundays			
09.00	G3GYV	1900	Hartford, near Northwich
09.30	G3BKE	1900	Newcastle-on-Tyne
10.00	G6MH	1990	Southend-on-Sea
10.30†	G3DGN / G3GZB	1930	North London
11.00	G2FXA	1900	Stockton-on-Tees
12.00	G3LP	1850	Cheltenham
12.00	G3KAN	1850	Northampton
12.00	GI5UR	1860	Belfast
14.00	G5AM	1900	Witnesham, Ipswich
21.00	G2FIX	1812	Nr. Salisbury
22.00	G3ARM	1919	Guildford
Mondays			
19.00	G3NC	1825	Swindon
20.45	G3EKW	1915	Nottingham
21.00	G3BLN	1900	Bournemouth
22.15	G2BRH	1900	Ilford
Tuesdays			
18.30	G2FXA	1900	Stockton-on-Tees
19.00	G2HDR	1860	Bristol
20.30	G3GDZ	1905	Kingsbury, N.W.9
21.00	G3EFA	1855	Southport
21.45†	G3ETP / G3JMX	1875 / 1860	Lowestoft
22.30	G3IIR	1915	Norwood
Wednesdays			
18.30	G3GCY	1830	R.A.F., Dishforth
19.00	G3HUB/A	1902	Chelmsford
22.30	G3FBA	1910	Bath
Thursdays			
19.00	G3NC	1825	Swindon
20.00–†21.00	G2ABR / G3FCY / G3GWT / G3KTO	1919	Hull, Yorks.
20.30	G3JQM	1878	Barwick, Yeovil
22.30	G3ADZ	1940	Southsea
Fridays			
19.00	G3BLN	1900	Bournemouth
20.00†	G2FNI / G3EGX / G3ERB	1875	Wirral
20.30	G3ICX	1915	Sutton Coldfield
21.30	G3KLZ	1860	Bradford
	G3INW (or G3KSS)		Bradford
	G3KEP		Bingley
Saturdays			
13.00	G2FXA	1900	Stockton-on-Tees
21.00	G3HWI	1987	Blackburn, Lancs.

† *Alternately.*

Slow Morse transmissions are organized by Mr. C. H. L. Edwards (G8TL), 28 Morgan Crescent, Theydon Bois, Essex. Members using the service are requested to send listener-reports to the stations concerned.

Amateur Colour Television

ON April 8, 1956, colour bars from Grant Dixon's equipment were transmitted from G2WJ/T (Dunmow) to G3CVO/T (Great Baddow, Essex), a distance of 13 miles. The picture was of 150 line definition using sequential scanning. This is believed to be the first time colour has been successfully transmitted by an amateur station. Later, the equipment was changed over and colour signals transmitted from G3CVO/T to G2WJ/T.

The following day Mr. Dixon's lecture on "Colour Television" to the Chelmsford Group of the British Amateur Television Club opened with another successful colour transmission from G2WJ/T.

Nottingham Meeting

COUNCIL Member Frank Hicks-Arnold (G6MB) will give a lecture on "The Antennamatch" at the meeting to be held at the Mechanics' Institution, Mansfield Road, Nottingham (opposite Nottingham Victoria Station) on Sunday, April 29, 1956, commencing at 2.30 p.m. Following the lecture, there will be a film show, quiz, draw for prizes, and tea. Tickets, price 6s. each, may be obtained from M. Dransfield (G3JKO), 1 Cavendish Crescent South, The Park, Nottingham.

Representation

THE following are additions to the list of County Representatives published in the December, 1954, issue:—

Region 2—Yorkshire North
G. A. Kenyon (G3YK), 32 Emerson Avenue, Middlesbrough.

Region 6—Wiltshire
R. Reynolds (G3IDW), 136 Beech Avenue, Swindon.

Region 14—Ayrshire, Bute, Wigtownshire and Dumfriesshire
W. Jaap (GM3FLY), 156 Adamton Road, Prestwick, Ayrshire.

Region 15—Antrim
M. G. Williamson (B.R.S.7781), Avonmore, Antrim Road, Ballymena.

* * *

The following are additions to the list of Town Representatives published in the December, 1955, issue:—

Region 1—Cheshire
Chester
C. Rich (B.R.S.18644), 25 Kingsley Road, Great Boughton.

Region 2—Yorkshire East
Hull
G. W. Taylor (G3GWT), 124 Beverley Road, Hessle.
Yorkshire West
Pontefract
W. Farrar (G3ESP), 6 Hemsworth Road, Ackworth.
Doncaster
J. H. Wood (G3FFW), 74 The Grove, Wheatley Hills.
Slaithwaite
E. Wood (G2DBW), 6A Meal Hill.

Region 3—Staffordshire
Walsall
H. Peabody (B.R.S.20816), 56 Farringdon Street.

Region 4—Derbyshire
Derby
F. C. Ward (G2CVV), 5 Uplands Avenue, Littleover.

Region 5—Essex
Chelmsford
H. H. Lowe (G2HPF), Akabo, Main Road, Boreham.
Danbury
A. W. Butcher (G3KPJ), Rectory Cottage, West Hanningfield.
Norfolk
Norwich
P. C. Ives (G3ASQ), 10 Welsford Road, Eaton Rise.

Region 6—Oxfordshire
Oxford
C. Mather (B.R.S.20837), 5 Knolles Road, Cowley.
Wiltshire
Swindon
G. R. Pearce (G3AYL), 102 Kingshill Road.

Region 7—London South-East
Bromley & Beckenham
M. J. Frost (G3GNL), 15 Northbourne, Hayes, Bromley.
Bexley & Bexleyheath
H. Duthie (G3JBK), Whitehill Cottage, Fairway, Bexleyheath.
London South-West
Reigate & Redhill
L. Knight (G5LK), Radiohme, Madeira Walk, Reigate.
London East
Romford
N. O. Miller (B.R.S.19258), 55 Kingston Road, Romford, Essex.

Region 8—Kent
Maidstone
E. H. Bonner (G8LZ), 11 Sutton Road.
Tonbridge & Tunbridge Wells
F. Barnard (G4FB), 34 Springwell Road, Tonbridge.
Sussex
Hove & District
S. MacLintock (G3IPA), 66 St. Leonards Road, Hove 3.
Worthing
R. B. Forge (G3FRG), 2 The Plantation.

Region 9—Cornwall
Falmouth
L. Davey-Thomas (G3AGA), Braemar, Dunvegan Road, Penry.
Devonshire
Exeter
E. G. Bright (G3JW), Crockwell House, Exminster.
Dorset
Dorchester
K. G. O'Brien (B.R.S.18516), 18 St. Helen's Road.

Region 10—Glamorganshire
Neath, Port Talbot & District
H. G. Hughes (GW4CG), Clyne, Austin Avenue, Newton, Porthcawl.
Cardiff
R. Morris (GW3HJR), The Shack, St. Cenydd Road, Caerphilly.

Region 11—Denbighshire
Wrexham
R. G. Goulding (GW3GWA), 10 Earle Street.

Region 14—Ayrshire
Ayr & District
J. W. Wilson (GM3KJF), 3 Whitehill Crescent, Annbank.
Glasgow Area & Postal Districts
T. Hughes (GM3EDZ), 20 St. Peters Street, Glasgow C.4.

Region 15—Antrim
Ballymena
W. Davison (B.R.S.19828), 1 Clarence Street.

* * *

Vacancy

Mr. T. Orr (G3IV) has resigned as Representative for the County of Durham.

Nominations for his successor should be made in the prescribed form and sent to reach the General Secretary by not later than May 31, 1956.

Appointments for County Representatives will only be valid until December 31, 1956.

* * *

Correction

Mr. E. Arnold Matthews (G3FZW) is Area Representative for Rugeley, Tamworth, Cannock and Lichfield, and not T.R. for Lichfield alone as stated on page 292 of the December, 1955, issue of the R.S.G.B. BULLETIN.

Can You Help?

● E. Greaves (B.R.S.19680), 47 Anchor Grove, Darwen, Lancashire, who requires the alignment procedure for the R.1392A receiver for 2 metres and conversion and power supply details for the Bendix TA12C transmitter?

● R. Hicklin (B.R.S.20479), 13 Clive Road, Heath Park, Romford, Essex, who urgently requires the circuit diagram and manual for the receiver type R103 Mk.2 (ref. ZA3080)?

The World's finest Range of Magnetic Recording Tape

EMITAPE

'77' PEN TESTED

GENERAL '88' PURPOSE

and NOW—

'99' 'LONG PLAY'

Emitape '99' is the latest addition to the range. It is a specially developed thin base tape giving an increase of 50% recording time for long playing purposes, and is available on the range of plastic spools as listed.

Type No.	Title		Size	Length Approx.	Price
88/3	"Message"	GP	3″	175′	£0 7 6
99/3	,,	LP	,,	250′	£0 9 6
88/6	*"Junior"	GP	5″	600′	£1 1 0
99/9	* ,,	LP	,,	850′	£1 8 0
88/9	*"Continental"	GP	5¾″	850′	£1 8 0
99/12	* ,,	LP	,,	1200′	£1 15 0
88/12	*"Standard"	GP	7″	1200′	£1 15 0
99/18	* ,,	LP	,,	1800′	£2 10 0

★ Fitted with metallic contact strips and suitable for all Tape Recorders with Auto-Stop mechanism.
GP—General Purpose LP—Long Play

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RECORDING EQUIPMENT DIVISION

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Export enquiries for products mentioned in this advertisement should be addressed to:—

E.M.I. INTERNATIONAL LTD. (also at Hayes)

E8.92

EXCHANGE AND MART SECTION

ADVERTISEMENT RATES. Members' Private Advertisements 2d. per word, minimum charge 3s. (All capitals, 6d. per word, minimum charge 9/-). Trade Advertisements 6d. per word, minimum charge 9s. (All capitals 1/- per word, minimum charge 18/-). Write clearly. No responsibility accepted for errors. Use of Box number **1s. 6d.** extra. Send copy and remittance to **National Publicity Co., Ltd., 36-37 Upper Thames Street, London, E.C.4,** by **22nd** of month preceding date of issue.

AMPLIFIER for P.A. work, 50 watts, complete working order, £10. Modulator 75 watts, complete, working order, only £12.10.0. Transmitter, 150 W. Phone, 80 M only, TVI-proof, new, £50. New Brimar 5R4GYs, Boxed, 25/- pair, postage 1/6 extra. S.a.e. details, G8VB, 124, Carr Raod, Greenford, Middlesex. (999

AMPLIFIER, twin inputs, push-pull 6B5G Collaro turntable pickup, less Speaker, £8; SWM EF50 T.R.F., £3. Offers for unused Denco CT3 turret complete. Send for list. Fulcher, 171 Castle Road, Salisbury. (957

ARMY 12 transmitter, 25–35W (160–80–40–20), phone c.w., £13; R107, £10. (Both delivered 30 miles.) Wanted: 75–100W transmitter (Table Top), reasonable. 17 Thelwall Lane, Warrington. (938

AR88D r.f. unit complete with 2 r.f. osc and det. O.P. 455 kc/s, superb slow motion dial, little used, £8.15.0. Also 1155 receiver with O.P. stage added. New condition, £7.15.0. Both carriage included. Griffiths, 128 Oaktree Road, Bitterne Park, Southampton. (933

AR88D, £50. Hallicrafters S36, 27–145 Mc/s AM/FM,£40. Q–Max bandswitched table-topper, £30. All good condition with official handbooks. Offers considered. Box 969, National Publicity Co. Ltd., 36/37 Upper Thames Street, London, E.C.4. (969

A ZC1 Mk2 receiver/transmitter. No p.u. 2 wb, v.f.o. c.w.-rt 11 valves. Handbook. Good condition. £8. Transformer. Scope 1700V 375V 6V, £1. S.a.e. please. Green, 247 Halling Hill, Harlow, Essex. (925

BARGAIN. Howard 460 Receiver and L.S. £15. Hallicrafter 5/10, £12 o.n.o. Buyer inspects, arranges collection. Tel.: UPL 8895. (966

IMPORTANT NOTICE

All Exchange & Mart advertisements must be sent with remittance made payable to:

THE NATIONAL PUBLICITY CO., LTD.

36-37 Upper Thames Street, London, E.C.4.

The Society and its Advertisement Manager cannot intercede in any matters arising from advertisements appearing in this section.

BC221 Stab. P.S.U. perfect, nearest £30. AR88D, best offer. TCS12 transmitter, £4.10. TA12B b/new, 45/-. TA12C, 45/-. Armstrong 10-valve receiver, perfect, £8. 1/222/A. Sig Gene and crystal Chkd wavemeter b/new, £10. RA1B, b/new, £10. Furzehill audio B.F.O., £7. Triplett 10,000 ohm/volt multi-range meter and valve tester b/new, £10. BC614A, perfect, £8. Marconi V.V.M., £7. ARR2, b/new, 35/-. MN26C, b/new, £3. 3" Magslips, 10/-. All plus carriage. S.a.e. list including 200 valves, or state wants. Holland, 23 Elmsleigh Road, East Hill, S.W.18. (930

BC342N. 1.5/18 Mc/s six bands, crystal filter, ordinary mains, "S" metre, handbook. Hotted up front end. £18.10. Buyer collects. G2HKW, Erith 5886—evenings. (934

BC348N with internal power pack, £10 or offer. Brown-Greaves, Croft Avenue, Dorking. (942

BOUND to satisfy—BULLETINS bound, 7/- per volume. Post free. Attractive low-priced QSL cards supplied. Sample—H. W. Robinson, G2BBT, 35 Forty Acres Road, Canterbury. (931

B.R.T. 400 Serial No. 100323 perfect condition. No. mods. Seen by appointment only. G2FNQ, 19 South Street, Farnham, Surrey. (983

B28/CR100 Best offer over £17. 813, £2, 0/250mA meter, 4/6, B2 power pack, offers. Wanted: 7 Mc/s crystals: s.a.e. enquiries: 13 Chandos Street, Keighley. (956

COMMAND receiver 28–41 Mc/s fully modified. l.t 6.3V. Fitted tuning knob, phone jack, co-ax input. Extra Audio stage—6AG5 RF, 6J6 Mixer/Osc. Excellent for ten metres. £7. G. A. Jeapes, 129 Cambridge Road, Trumpington, Cambridge. (961

CR100 Perfect, Recrackled, Manual, £21. Top Band phone transmitter, power v.f.o., £10. Allband 35 watt phone transmitter, power, £12; v.f.o., £3. S.a.e. G3EQM, 10 Standard Road, London, N.W.10. ELG 6959. (974

C43 transmitter (Canadian), 300W, A.1, A.2, A.3, complete with P.S.U. new and unused in transit cases, with test sheets and handbook. Best offer over £50. Box 951, National Publicity Co., Ltd., 36/37 Upper Thames Street, London, E.C.4. (951

EDDYSTONE 358 receiver 300 kc/s to 30 Mc/s in 7 coil ranges. In original cabinet complete with power supply. S. London. £10 o.n.o. Box 926, National Publicity Co. Ltd., 36/37 Upper Thames Street, London, E.C.4. (926

EDDYSTONE 740, American RME Communications receiver 10-valve super—27 to 60 Mc/s. 50W transmitter, v.f.o. power packs. Large box full common receiving valves, transformers, capacitors, etc. All perfect, £50. G3DXK, 183 Lansbury Drive, Hayes, Middx. Tel.: HAY 2647—Evening or week-ends. (943

ET4336 transmitter—£50 o.n.o. CR100/2 receiver in brand new condition, not ex Govt.—£30. Wanted: 144 Mc/s converter. Fenton, Gay Bowers, Danbury, Chelmsford (Phone: Danbury 518). (953

EXCHANGE Viewmaster console chassis (S.C.) complete (no tube) for CR100 i.f's and components or UM3, or sell; offers. Edge, G6GD, Stamford Cottage, Malpas (Ches.). (935

FOR SALE Avo Wide Range Signal Generator as new, £18—cost £30. 150W Transmitter, home made, best materials, £20. Sold whole or in parts. Joel, 35 Limes Grove, Lewisham, London, S.E.13. (964

FOR SALE CR100 Radio Receiver. Good condition. 3 ohm output with separate speaker. Owner must sell. £17 or offer. View Eastern London. Box 965, 36/37 Upper Thames Street, London, E.C.4. (965

FOR SALE Eddystone 640, £17. 1954 B.S.A. Bantam Major motor cycle, accessories, £85. Wanted: Eddystone 750. G3HZK, 77 Manchester Road, Wilmslow, Cheshire. (927

FOR SALE, H.R.O. Senior receiver with a.c. mains unit, loudspeaker, coil cabinet and nine coils. 53 type transmitter, 250 watts output, 1.2 to 17.5 Mc/s phone/c.w. Heavy duty motor, reduction gearbox for rotary beam with magslips, control panel 100 yds. multi-core control cable. Viewed South West London and delivered U.K. Offers please to Box 948, National Publicity Co. Ltd., 36/37 Upper Thames Street, London, E.C.4. (948

FOR SALE—Panda, in excellent condition, regularly heard on air, for sale for first £90. Cliffe Metcalfe, 3DQ, Carr Farm, Flamborough, E. Yorks. Tel.: 346. (923

FOR SALE, 813 (2), £6. TZ40 (2), £4. 35T (2), £3. All unused. Would exchange any pair for modulator transformer suitable 150W rig. Also wanted: Mains transformer 1500V 300mA and good quality m.c. microphone. Curtis, 58 Queens Road, Felixstowe, Suffolk. (950

GO MOBILE on the beautiful Dorset lakes. Three cabin cruisers available for hire in Poole Harbour. Enquiries also invited for the Thames, Broads, Canals and Lake District. S.a.e. to "Hams Afloat," 88 County Road, Swindon, Wiltshire. (954

G3IDG needs "CQ" January, March, April, June, 1945. "QST" before August, 1923, "Radio" before 1936, "R/9" before 1935, "QMF" before June, 1952, "HAM NEWS" before 1952, "HAM TIPS" before 1950, "B.S.W.L. REVIEW" before 1942, September, 1948 to February, 1949, "QRP" November, 1949, "MONITOR" since September, 1955, F.O.C. "NEWSLETTERS" B.T.C.C. "QTC" before July, 1955, "QRV" before June, 1949, "RADIO ZS" before August, 1953, Lotts "BREAK-IN" (Before 1949), "AMATEUR RADIO" (before 1948). Pre-war "XTAL," "I.R.T.S. NEWS" since June, 1954. "CALLING CQ" (de Soto). 95 Ramsden Road, London, S.W.12. (978

(Continued on p. 399).

HALLICRAFTER S20R, good condition, £16 o.n.o. Wanted good Tape Deck. Eburne, 55 Honiton Road, Wyken, Coventry. (997

HALLICRAFTER S38C receiver. 55/32 Mc/s as new with linecord, handbook. Also specially made 220/110V auto-transformer for above. Together or separately, £25 o.n.o. G3KSH, 60 Tenby Avenue, Kenton (WOR 5723). (922

HAM giving up! Large quantity gear. Includes R1155, R103 and R1132 sets. G.P. p/power output stage. Many transformers, chokes, valves, £20. S.a.e. details. Hammerlund, HQ120X, £40. J. Copson, 13 Welbeck Road, Southport. (996

HOLIDAY caravan, 4-berth, end kitchen. Sandy bay near Exmouth. Details, Bache, B.R.S.19133, 18 Weirfield Road, Exeter. (947

HRO National receiver. Excellent condition. Four coils, headphones, etc., £20. Delivered within 50 miles, apply 33 Firringhall Road, Frizinghall, Bradford. (937

HRO Senior complete. Power pack 5 coils, 900 kc/s to 30 Mc/s. Perfect No mods. Handbook. Black Crackle Speaker. Nearest £24. Or will exchange with cash for 750. Deliver Collect area. 5 Parkland Avenue, Langley, Slough.

HRO Senior fitted with noise limiter, and two coil packs; 3 Mc/s–7 Mc/s and 14 Mc/s–28 Mc/s. Slight attention needed to R.F. stage. £17.0.0. G. Newton, Murieston House, Medcalder, Midlothian, Scotland. (955

H.R.O. Senior, unmodified, complete with 9 general coverage coils, 50 kc/s to 30 Mc/s power supply and matching speaker, £24. J. Parker (G3ITP), 34 Glebe Road, Letchworth, Herts. (992

HRO Senior. 9 coils. b.s. 10–20–40–80. Complete with power unit matching speaker. H.R. phones–Manual–Mod. As per April BULLETIN. B7G front end, etc. First class condition throughout. Prefer buyer collects. But will deliver reasonable distance. T. G. Musgrove, Millbank Farm, Bedlington, Northumberland. Phone: 3326. (958

LABORATORY Oscilloscope, 6" tube, perfect working order, excellent condition, cost £245. Must dispose of, space wanted, best offer or would exchange for good Grundig recorder, or AR88D, can be seen London area. New R1155a with P/P and 6V6 output stage, useful modifications, excellent performance, £11, s.a.e. details. Box 932, National Publicity Co. Ltd., 36/37 Upper Thames Street, London, E.C.4. (932

LATE G5LH. Sale of complete station. "Minimitter" factory assembled 5 band transmitter phone/c.w. with Acos crystal microphone, almost new, cost £90. AR88LF receiver with matched speaker, mint condition. Spare set 14 new valves for AR88. Radiovision Preselector with p/p, 3.3 Mc/s–34 Mc/s. Class D Wavemeter—built-in audio unit, speaker and p/p. Rack mounting treble power supply, 750/350/Bias. Complete Top Band transmitter phone/c.w. with microphone and p.p. Eddystone Bug Key. Numerous other items including home built transmitter tuning units, power supplies, large quantity valves, meters, components, etc. S.a.e for list. Offers to Mrs. R. Mitchell, Croft House, Horbury, Wakefield.

LORAN APN.9 units wanted. Good price paid. Box 972, National Publicity Co. Ltd., 36/37 Upper Thames Street, London, E.C.4. (972

METALWORK.—All types cabinets, chassis, racks, etc., to your own specifications. Philpott's Metal Works, Ltd. (G4BI), Chapman Street, Loughborough. (99

MOBILES: overprint your QSL cards with a rubber stamp, 7/6. G2FSR, 2 Parkhill Road, Chingford, E.4. (940

MODERN 150W transmitter required. Would exchange 9.5mm/F1.9 Movie Camera, Tape Recorder. Offers. Box No. 985, National Publicity Co. Ltd., 36/37 Upper Thames Street, London, E.C.4. (985

MORECAMBE holiday. Overlooking Bay and Lake district mountains, Ham Shack. Write brochure. G3AEP, "Ferncliffe," Drewton Avenue, Sandylands, Morecambe. (962

NCI Mk 2, new, complete with phones and microphone, £10. B2 complete, £15. MCR1 complete with all coils and power pack, £6. LM13 complete with case, calibration book and power pack, £25. Offers for BC645A 420 Mc/s transmitter/receiver; Utah Wire recorder; Wilcox Gay v.f.o. new with book, s.a.e. to Poole, 13 Oldfield Avenue, Norton-Le-Moors, Stoke-on-Trent. (946

PANDA PR120V transmitter and Aerial Tuning Unit, very little used. Class D wavemeter. 30ft steel lattice mast suitable rotary beam; no reasonable offer refused. Could be delivered. G. Dimond, 111 Felixstowe Road, Ipswich. Tel.: 76547. (981

PATENTS and Trade Marks. Handbooks and advice free. Kings Patent Agency, Ltd. (B. T. King, G5TA, Mem. R.S.G.B., Reg. Pat. Agent), 146A Queen Victoria Street, London, E.C.4. Phone: City 6161. 50 years' refs. (98

QSLs and log book (P.M.G. approved). Samples free. State whether G or B.R.S. Atkinson Bros., Printers, Elland. (400

QY3–125, base, top, filament transformer; 1400 volt power supply. Offers—Roscoe, 24 Ballards Way, Croydon. Sanderstead 3139. (944

RECONDITIONED and modernised RME70 with two tuned circuit preselector, stabilised and improved r.f. oscillator, etc. Crystal calibrator incorporated. £25 o.n.o. G2PL, 122 Foresters Drive, Wallington, Surrey. Tel.: Wallington 1915. (921

RUBBER stamp QSL card. Call sign B.R.S., etc., send for samples. G2FSR, 2 Parkhill Road, Chingford, E.4. (939

SALE AR88D, rebuilt power supply. Loudspeaker. "S" Meter. Offers to:—G3JYV, 67 Fleming Mead, Mitcham, Surrey. (959

SALE: Buyer to collect. The following must be cleared. Can be seen by appointment Mon., Wed., or Friday after 7 p.m. or Sunday morning before 1 p.m. £50 o.n.o. the lot or would sell separately, no reasonable offer refused. R.C.A. 3 ins. C.R.O. with spare unused tube and manual. R.C.A. Junior Voltohmist and leads with manual. The above require step-down mains transformer only one available. Taylor Universal Meter Type 85A with manual. Mullard C x R Bridge type GM 4140 with manual. Wilsox-Gay crystal modified to Top Band (6AG7 & 807) and external modulation, with p/pack, less crystal. Rich & Bundy transformers (1) 1,000 V and (1) 4 V, 3 V and 7.5 V 6.5 A. Advance No. 3 Signal Generator 100 kc/s 30 Mc/s in 5 switched steps. External mod. int. mod. (10 and 30 per cent) C.W. and AF 400 cycles. Meters. R.F. 0/5 (5), 0/1 (1), 0/2 (2), 0/3 (2) amps and 1 Ernest Turner 0/1.5 amps. D.C. 0/1 (4), 1 each, 0/5, 0/30, 0/100, 0/150, 0/300 mA, and 1 each 0/100 and 0/500 microA Ferranti, as new. 1 Ernest Turner d.c. Voltmeter with multipliers, 0/50/500/2500. Valves Unused. 805 (2), 807 (6), 811 (2), 813 (2), 211 SPEC (4), PX25 (4), LS6A (2) and Marconi STV 280/40 (1). Metropolitan Vickers ¼ hp a.c. motor type BKS 2408, RPM 1425. E.M.I. Service Ltd. speaker in cabinet. Sundry chokes and power transformers and 3 partly stripped TU Units with transit cases. 1 30ft. wooden scaffold pole, painted and in good condition. 1 30ft wooden portable mast with guys, etc. 1 table 3ft 6ins x 2ft x 2ft 6ins with drawer. 1 table 3ft 6ins x 2ft 3 ins x 2ft 6ins with drawer, good operating table with 2 drawers. 1 heavy oak work table 4ft 6 ins x 2ft 6ins x 2ft 6ins with drawer trip fuse, 9 power points and 5ft fluorescent lighting. 1 set 0–6 BA taps and plugs in case, Lehmann, Archer & Lane Ltd., with tapdrills and extra Mocrite Tapholder. 1 100 kc/s octal base crystal, Quartz Crystal Co. Ltd. G2AIM, 64 Cecil Park, Pinner. (990

SALE. 1155N Receiver internal O/P stage; Denco 100/1000 kc/s crystal calibrator; VCR97; EHT transformer and rectifier. Priestley, "Cottage," Daniel Fold Farm, Rochdale. (977

STATION clearance BC348R, R1224, Class-D wavemeter and transmitting gear, £20 the lot; seen 57 Ventnor Road, Blackpool, after 7. Cannell, "Ardlea," Victoria Road, Brora, Sutherland. (945

SURPLUS equipment for sale. Nothing over £1. Transformers, microphones, rectifiers, electric motors, etc. Stamped addressed envelope for list to G6BS, 96 Hinton Way, Gt. Shelford, Cambridge. (920

SURPLUS to requirements, Collins Receiver 46159 (TCS-12) in f.b. condition and commercially re-crackled grey, £8. Valves unused, two 813, £2 each, four 811, £1 each, two 866A, 6/- each. Would exchange for 5B/254 Mc/s. Box 993, National Publicity Co. Ltd., 36/37 Upper Thames Street, London, E.C.4. (993

(Continued on p. 400).

EXCHANGE AND MART SECTION (Cont.)

SX24, 42 Mc/s–550 kc/s, good condition, £16. Hallicrafters H.T.7. Frequency Standard, built-in p.p., £7. R103, no p.p., £6. Class D wavemeter modified for 6 V a.c., £5.10. All car. paid. Hargreaves, 15 North Gate, Bispham, Blackpool. (994

SX28 Tuning mechanism needs slight attention, otherwise O.K., £30. Type 37 oscillator 20/100 Mc/s, £8. Type 145 oscillator and power unit, £5. London area. Box 998, National Publicity Co. Ltd., 36/37 Upper Thames Street, London, E.C.4. (998

TAPE RECORDER (Playtime) Portable complete with microphone and matched tape, unused, perfect condition. Nearest offer £25 secures. Box No. 924, National Publicity Co. Ltd., 36/37 Upper Thames Street, London, E.C.4. (924

TRIPOD mast, hollow wooden sections extending to 30ft, light, easily erected, suitable beam. £5 excluding carriage. Stevens, 51 Pettits Lane, Romford, Essex. (1003

UNIVERSAL Avominor, £5. RCA TE-149 wavemeter. No batteries, good order, £6. Stevens (G2BVN), 51 Pettits Lane, Romford, Essex. (976

URGENTLY required receivers BC-312 unmodified and BC-342. Z & I Aero Services Ltd., 19 Buckingham Street, London, W.C.2. Telephone: Trafalgar 2371/2 (929

VALVES, 7/6 each: EF91, PL33, PZ30, RL18, EF55, RK11, 6AQ5, 6AG7. At 10/- each: PL38, ECL80, 417A, 404A, 1B3GT, 6J4, 808. Also many others. Please add 3d. each post. G. A. Jeapes, 129 Cambridge Road, Trumpington, Cambridge. (991

WANTED: BC221 clean condition. Have AR88LF for sale. Will accept £20 plus BC221 in exchange. Wanted ET4336 and miniature valves all types. Box 963, National Publicity Co. Ltd., 36/37 Upper Thames Street, London, E.C.4. (963

WANTED BC348 I.F. transformers or similar type 915 kc/s. Copy of conversion of BC348Q, QST January, 1947. D. B. Lloyd, 7 Aldbourne Avenue, Earley, Reading, Berks. (982

WANTED BC610 Hallicrafters, E.T.4336 transmitters, and spare parts for same. Best prices. P.C.A. Radio, Beavor Lane, Hammersmith, W.6. (626

WANTED by amateur London area, 150 watt transmitter with or without power supply. Box 973, National Publicity Co. Ltd., 36/37 Upper Thames Street, London, E.C.4. (973

WANTED coil pack for Command receiver 1.5-3 or receiver less valves. 6 Shelley Road, Maidstone. (918

WANTED: HRO coils, receivers, power packs, AR88Ds, AR88LFs, SX28s, BC348s, AR77s, and many other types, also laboratory test equipment and R54/APR4, TN17, TN18 and TN19 units. Details please to R. T. & I. Service, 254 Grove Green Road, Leytonstone, London, E.11 (LEY 4986).

WANTED Radio Handbook, 12th edition, also pre-war Jones Handbook, and 7 Mc/s crystals. G8UA, 406, Higher Brunshaw, Burnley. (995

WANTED "Radio Marketing Service Engineer" "Electrical & Radio Trading" and "Trader" Service Sheets, especially of pre-war receivers. Full details with price per sheet to:—Watts, 62 Belmore Road, Thorpe, Norwich. (984

WANTED RBB. receiver type CRV 46147 range 0.5–4 Mc/s. Manufactured by R.C.A. with or without p. pack. Reply to Provan, Cromrach, Brooks Drive, Hale Barns, Cheshire. (988

WANTED TUB case complete, BC455 with/without valves but good condition, two BC348 type knobs. Good prices paid. G3HRH, 80 Longcroft Lane, Welwyn Garden City, Herts. (919

WANTED vibrator power unit as fitted in Z.C.1. Mk 11. Keeping, 26 Ellery Grove, Lymington, Hants. (949

WANTED Wheatstone Automatic Morse Sender. Also perforator for same. G3HBW, 52 The Rutts, Bushey Heath, Herts. (989

20 feet long Motor cruiser afloat Cheshire 2 berth 10 H.P. Brooke Marine engine, £125. Or exchange for first class 150 watt band switched phone transmitter and AR88 or similar receiver, or best 10 H.P. car offered. G4GH, 3 Daltry Close, Liverpool 12. (968

150 WATT Modulator. 807 in AB2 at 750 volts, speech amplifier, separate HT supplies oscilloscope, Phillip & Turner Microphones. 42" P.O. rack, £15. G5DM, 27 Beeston Fields Drive, Beeston, Notts. (941

150 WATT ELIZABETHAN built as specification complete. 2 power packs, built-in N.B.F.M. modulator, G5RV, speech clipper, aerial tuner, lowpass filter, harmonic indicator, D104 microphone, £40. Special Murphy receiver A.M.1471. 14 valve 2 r.f. stages, 5 cards 2.7 to 30 Mc/s, 4 crystal gate 0.25 to 3 kc/s, turret coils, bandspread, drum dial tuning, stabilized p. pack A.V.C. fast and slow, built-in speaker as new with handbook, £18. Class D wavemeter complete, £5. Phone: Hendon 7133 or contact on 20 metres any evening. G3JJL.

APPOINTMENTS SECTION

Situations Vacant

ASSISTANT SIGNALS OFFICER required by SIERRA LEONE Government CIVIL AVIATION for two tours each of 18/24 months. Appointment will be either (a) on contract with salary scale (including Expatriation Pay) £859 rising to £1,359 with gratuity up to £150 a year or (b) with prospect of pensionable employment with salary scale (including Expatriation Pay) £797 rising to £1,257 a year. Outfit allowance £60. Liberal leave on full salary. Free passages for officer and wife. Assistance towards cost children's passages or grant up to £150 annually for maintenance in U.K. Candidates should be experienced MF, HF, VHF, VHF/DF and ancillary equipment and should hold P.M.G. Cert. or equiv. Preference for C. & G. Cert. in Radio. Write to the Crown Agents, 4 Millbank, London, S.W.1. State age, name in block letters, full qualifications and experience and quote M2C/41565/RC. (1002

INSPECTOR OF WORKSHOPS required for BROADCASTING DEPARTMENT, GOLD COAST LOCAL CIVIL SERVICE for one tour of 18–24 months in first instance. Consolidated salary scale £990 rising to £1,230 a year with gratuity at rate £100/£150 a year. Outfit allowance, £60. Free passages. Liberal leave on full salary. Candidates must have up-to-date knowledge broadcasting equipment. Should have at least ten years experience workshop practice in radio including five years in large broadcasting organisation, preferably B.B.C. or five years in large manufacturing firm in radio industry. Write to the Crown Agents, 4 Millbank, London, S.W.1. State age, name in block letters, full qualifications and experience and quote M2C/41020/RC. (1000

RADIO TECHNICIAN required by CYPRUS GOVERNMENT for service as CHIEF INSPECTOR OF POLICE (Communications Mechanic) on contract for tour of four years in first instance. Salary according to experience in scale (including Overseas Allowance and present temporary allowance of 9 per cent of salary)—£967 rising to £1,000 a year. Gratuity at rate of £100 a year. Free passages. Liberal leave on full salary. Candidates of good education must have thorough knowledge maintenance of low powered VHF equipment, fixed and mobile, petrol driven alternators, etc., and good background workshop experience. Write to the Crown Agents, 4 Millbank, London, S.W.1. State age, name in block letters, full qualifications and experience and quote RI/37835/RC. (1001

TECHNICAL MANAGER. Imhofs, invite applications from qualified Electronic Engineers for the post of Technical Manager of their Radio and Television Service Division. Sound knowledge of modern electronic design and manufacturing techniques and experience in control of technical staff are required. Ability to develop new ideas and to design testing "Set-ups" will be an additional qualification. Work includes contact with customers and interpretation of their requirements. Salary in accordance with qualifications and experience. Pension Scheme. Applications in writing to:—The Secretary, Alfred Imhof Ltd., 112/116 Oxford Street, London, W.1 (970

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To Advertisers and Agents—I wish to thank you for the splendid co-operation given me during the recent dispute in the printing trade.

Yours faithfully,

H. FREEMAN,

Advertisement Manager, R.S.G.B. Publications.

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