MAY 1968

Radio Communication

JOURNAL OF THE RADIO SOCIETY OF GREAT BRITAIN

Don Miller, W9WNV, setting off for Nelson Island in the "Edward Bear", a 30ft Trimaran registered in New Zealand. This expedition started in December 1967.

incorporating RSGB BULLETIN

RADIO COMMUNICATION

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London, EC4
FLE 4353

RADIO COMMUNICATION (INCORPORATING THE RSGB BULLETIN) IS PUBLISHED ON THE FIRST WEDNESDAY IN EACH MONTH BY THE RADIO SOCIETY OF GREAT BRITAIN AS ITS OFFICIAL JOURNAL AND SENT TO ALL MEMBERS.

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MAY 1968
VOLUME 44 No. 5

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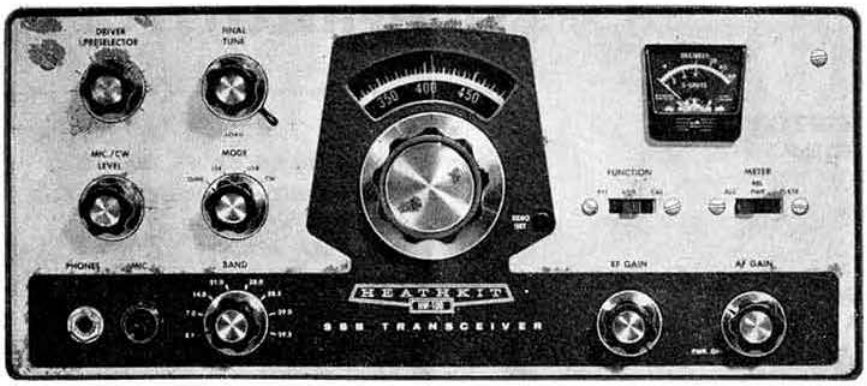

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TRANSMITTER. DC Power input: SSB: (A3a emission) 180 watt P.E.P. (normal voice: continuous duty cycle). CW: (A1 emission) 170 watts (50% duty cycle). **RF Power output:** 100 watts on 80 through 15 meters; 80 watts on 10 meters (50 Ω nonreactive load). **Output impedance:** 50 Ω to 75 Ω with less than 2 : 1 SWR. **Oscillator feedthrough of mixer products:** 55dB below rated output. **Harmonic radiation:** 45dB below rated output. **Transmit-receive operation: SSB:** PTT or VOX. CW: Provided by operating VOX from a keyed tone, using grid-block keying. **CW Side-tone:** Internally switched to speaker or headphone, in CW mode. Approximately 1000 Hz tone. **Microphone input:** High impedance with a rating of —45 to —55dB. **Carrier suppression:** 45dB down from single-tone output. **Unwanted sideband suppression:** 45dB down from single-tone output at 1000 Hz interference. **Third order distortion:** 30dB down from two tone output. **RF Compression (TALC):** 10dB or greater at .1 ma final grid current. **GENERAL. Frequency coverage:** 3.5 to 4.0; 7.0 to 7.3; 14.0 to 14.5; 21.0 to 21.5; 28.0 to 28.5; 28.5 to 29.0; 29.0 to 29.5; 29.5 to 30.0 (megacycles). **Frequency stability:** less than 100 Hz per hour after 30 minutes warmup from normal ambient conditions. Less than 100 Hz for ± 10% line voltage variations. **Modes of operation:** Selectable upper or lower sideband (suppressed carrier) and CW. **Dial calibration:** 5 KHz. **Dial mechanism backlash:** Less than 50 KHz. **Calibration:** 100 KHz crystal. **Audio frequency response:** 350 to 2450 Hz. **Front panel controls:** Main tuning dial. Driver tuning and Preselector. Final tuning. Final loading. Mic and CW level control. Mode switch. Band switch. Function switch. Meter switch. RF Gain control. Audio Gain control. **Side controls:** Meter Zero control; Bias; VOX Sensitivity; VOX Delay; ANTI-TRIP; Neutralizing. **Valve complement:** OA2 Regulator (150 V); 6AU6 RF amplifier; 6AU6 1st receiver mixer; 6AU6 Isolation amplifier; 6AU6 1st IF amplifier; 6AU6 2nd IF amplifier; 6BN8 Product detector and AVC; 6AU6 VFO Amp., 6CB6 2nd transmitter mixer; 6CL6 Driver; 6EA8 Speech Amplifier and cathode follower; 6EA8 1st transmitter mixer; 6AE8 2nd receiver mixer and relay amplifier; 6AE8 CW side-tone oscillator and amplifier; 6GW8 audio amplifier and audio output; 12AT7 Heterodyne oscillator and cathode follower; 12AT7 VOX amplifier and calibrator oscillator; 12AU7 Sideband oscillator; 6146 Final amplifiers (2). **Diode complement:** 6 Germanium Diodes: Balanced modulator, RF sampling, and crystal calibrator harmonic generator; 9 silicon Diodes; ALC rectifiers, anti-trip rectifiers, and DC blocking; 1 Zener Diode; cathode bias. **Transistors:** 2N4304 FET- VFO; 2N3393 — Voltage regulator. **Rear apron connections:** CW Key jack; 8 Ω output; ALC input; Power and accessory plug; RF output; Antenna; Spare. **Power requirements:** 700 to 850 volts at 250 ma with 1% maximum ripple; 300 volts at 150 ma woth .06% maximum ripple; —115 volts at 10 ma with .5% maximum ripple; 12 volts AC/DC at 4.76 amps. **Cabinet dimensions:** 14.13/16" W. × 6.5" H. × 13.3/8" D.

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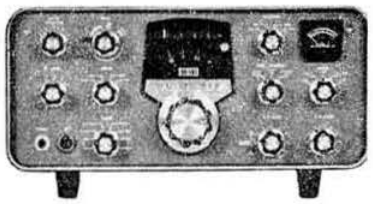

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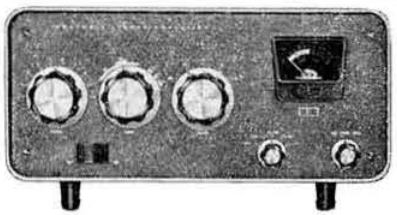

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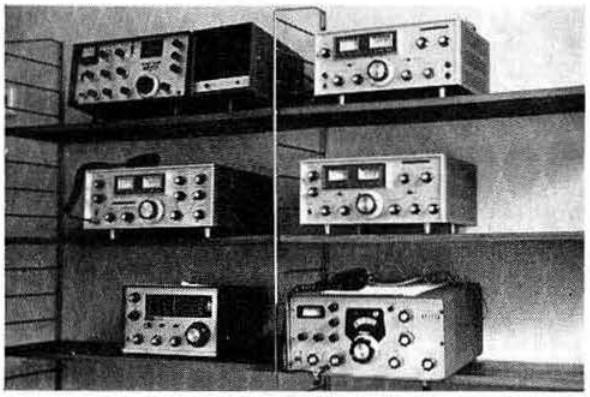

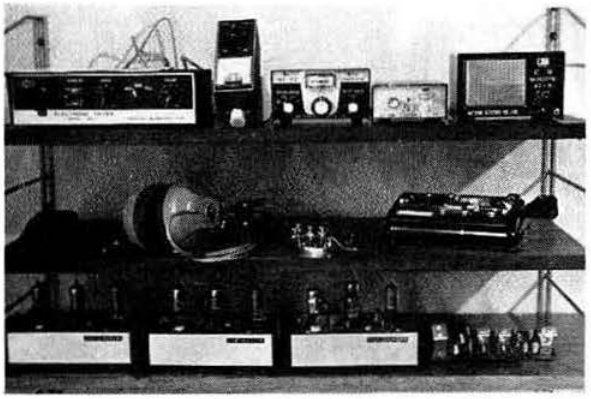

It's about time I had some pretty pictures in my ads., so here goes. My young son took some snaps around the shop and the above is the result. I hope they print well. Top left shows the Paros 3 band transceiver (£120), Sommerkamp FL-500 (£145), FT500 (£250), FR-500 (£130), Star SR200 (£40) and Star ST-700 (£135). For sheer honest-to-goodness value, I truthfully don't think they can be beaten. Top right shows a typical range of second hand stuff in part of the shop, which like all the stuff I flog, is in tip top condition, fully serviced, aligned and thoroughly checked. The lower left photo shows some of the goodies which include DA1 Electronic Keyer (£16), Hansen SWR bridge (£3.10.0.), Katsumi Speech Compressor (£7.15.0.), Katsumi Electronic Keyer (£7.15.0.), Katsumi Code Monitor (£7.15.0.) Teisco PTT dynamic mike (£2.15.0.), Alpha padded earphones (low impedance) (£2.2.6.), plain key (18/6d), bug key (£4.10.0.) and converters for 15 and 10 metres, with an Electroniques I.F. strip thrown in for good measure. The lower right shows more goodies—walkie talkies at £12.10.0. per pair, Hansen F102 transistor g.d.o. at £11.0.0. Hansen VT300 V.T.V.M. at £15.0.0. and Tech TE65 V.T.V.M. at £16.0.0. These prices include r.f. probe, by the way.

Of course, I have many more things in stock—obviously I can't show everything—a good range of test gear, surplus bits and pieces, small components, horrible surplus unmentionables and a good range of new and second hand Rx's and Tx's. So if you want something, given the chance I will do my best to get between you and your wallet.

Month before last I offered a free mike to the sender of the best classical quotation applying to Amateur Radio. I got an enormous response and the best will appear in Short Wave Magazine—Old Crafty Willie has conned Austin Forsyth into printing them, thereby conserving my advertising space! I think you'll get a kick out of them and you will undoubtedly realise the difficulty in picking the winner. Everyone will have different ideas, but in my opinion the winner is Ian Pritchard, Pontypool, with the Amateur's Lament:

" I sought him but I could not find him; I called him, but he gave me no answer."—Solomon 5 v.6.

Neat and to the point. To all of you lads who sent quotations, my very best thanks. I wish I could give you all a free mike—you all deserve one, but I do like to eat once in a while! To return to flogging stuff—if you get a chance, come along and have a look at my latest import—the Inoue line. All transistor Rx using FET's and companion transistorised Tx. Complete 80-10 Rx, Tx, psu for £180.0.0. I'm keeping this quiet for the present because the demand very much exceeds the supply (like most things worth having!) so if you're interested, get your name down on the waiting list right smartly!

A s.a.e. will get you my latest lists. Postage, please include plenty, any excess will be refunded.

Hire Purchase—Certainly—there has been no increase so it is still 25% down and the balance over 12, 18 or 24 months.

Service Department: John is winning the battle, so if you want a good servicing job give us a yell.

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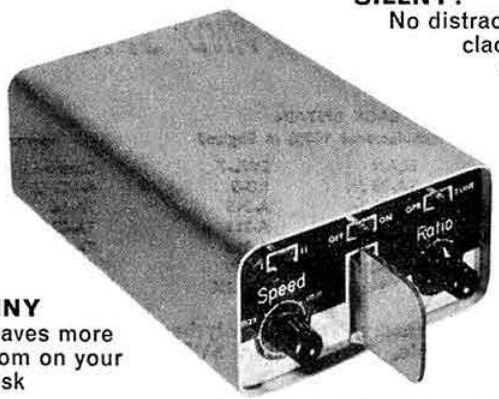

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Region 6.—South Central.	L. W. Lewis, G8ML, 34 Clevelands Avenue, Cheltenham, Gloucestershire.
Region 7.—London.	P. A. Thorogood, G4KD, 35 Gibbs Green, Edgware, Middlesex.
Region 8.—South Eastern.	D. N. T. Williams, G3MDO Seletar, New House Lane, Thanington, Canterbury, Kent.
Region 9.—South Western.	J. Thorne, G3PQE, Jessamine House, Chapel Allerton, Axbridge, Somerset.
Region 10.—South Wales.	C. H. Parsons, GW8NP, 90 Maesycoed Road, Heath, Cardiff, Glam.
Region 11.—North Wales.	M. Williams, GW3LCQ, " Dwyros," 12 Penrhos Avenue West, Llandudno Junction, Caerns.
Region 12.—North-East Scotland.	J. MacIntosh, FCCS, MIERE, FAIA, GM3IAA, Broom Park, Cradlehall, Inverness.
Region 13.—South-East Scotland.	G. P. Millar, GM3UM, 8 Plewlands Gardens, Edinburgh 10.
Region 14.—West Scotland.	N. G. Cox, GM3MUY, 191 Maxwell Avenue, Westerton, Bearsden, Glasgow.
Region 15.—Northern Ireland.	J. Thompson, GI3ILV, "Albany," Newry Road, Armagh, N. Ireland.
Region 16.—East Anglia.	W. J. Green, G3FBA, Meadway, Links Avenue, Brundall, Norwich, Norfolk, NOR 86Z
Region 17.—Southern.	L. Southwell, G3JLS, 15 Hollybank Road, Hythe, Southampton, Hants.

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RECORDED LECTURE LIBRARY CURATOR	G. S. Milne, G3UMI, 23 Linacre Road, Eccleshall, Stafford.

PROFILE

Continuing a series of Profiles of the Society's Council Members

Norman Caws, FCA, G3BVG

FOR some ten years the RSGB has derived very considerable benefit from the voluntary work undertaken by Norman Caws, G3BVG, particularly in his capacity as Honorary Treasurer. Keeping a close check on the Society's income and expenditure (on which there are many demands) is a time-consuming and very frustrating business. Yet his duties do not stop short there, for he is also an active member of several committees. One heavy demand on his time has recently been the intricate business of sorting out the finances in relation to the purchase of the new Society headquarters, issuing debentures and resolving problems with the Board of Trade. He is a director of the Lambda Investment Company, the wholly owned subsidiary of the RSGB established to handle the finances for the new Headquarters, and he was also a member of the Headquarters Ad Hoc Committee set up to investigate and negotiate the purchase of a suitable property. There is yet more work to be done in this sphere, and considerable enthusiasm will still be needed to see the project through to its conclusion.

Norman Caws' interest in Amateur Radio itself is quite deep-rooted, for he recalls his introduction to the hobby in 1923 at the age of 22. He received his education at the City of London School, where he studied accountancy, finally qualifying as an Incorporated Accountant in 1926 and as a Chartered Accountant in 1960.

In 1928 he married, and also opened a firm of Accountants, going into partnership with his brother in 1938. He became Director and Secretary of a Public Company at the same time, and during the war years took over control of this company.

At the end of World War II he was able to take an even closer interest in Amateur Radio. His membership of the RSGB began in 1946, and 1947 saw Norman take out a transmitting licence. His principal interest lay in v.h.f., being active on 2m and 70cm for many years. V.h.f. lent itself to his inclination towards construction of equipment, and this was supported by a comprehensive workshop. Present activity is on 2m and 80m.

His services to the Society began in 1958, when he was appointed Honorary Treasurer, serving also on the Finance and Staff and V.H.F. Committees. His next appointment was to a special committee established to organize the Golden Jubilee Celebrations. Norman had to forego his duties as Honorary Treasurer in 1963, the year of the Jubilee, when he was elected President of the Society. His activities spread further in 1964, when he joined the IARU Working Group, and he moved still further into the workings of the Society becoming a member of the Membership and Representation Committee. His close association with the running of the Society entitled him to attend important functions—in 1960, for example he went to the IARU Region I Conference in Folkestone and three years later, as President of the Society, led the RSGB Delegation to the Region I Conference in Malmo.

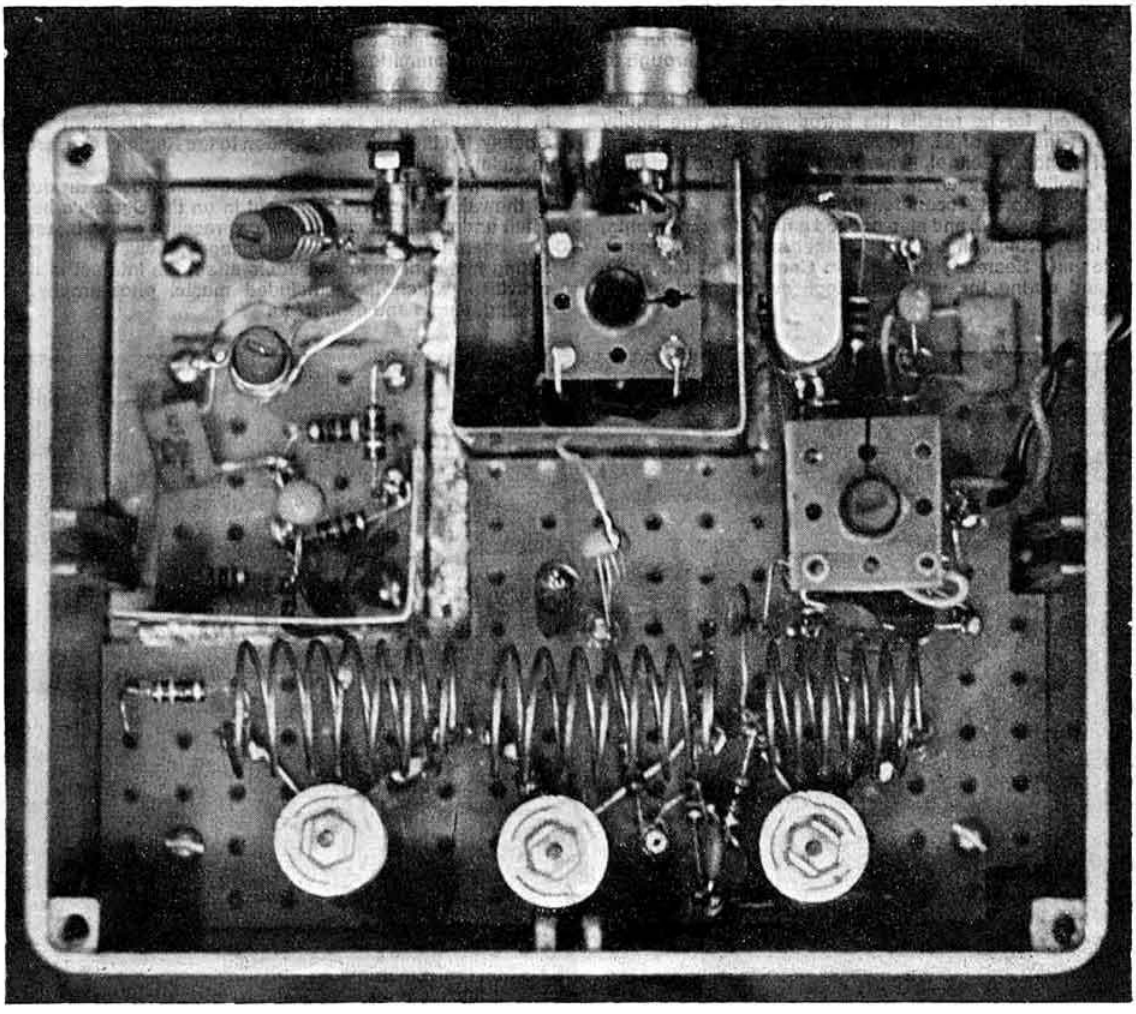
It is quite impossible to do more than provide an outline of the valuable effort he has put in on the Society's behalf, often under difficult circumstances recently owing to several eye operations. He always manages, however, to avoid letting his work and eye trouble affect his interest in other activities, which have included music, photography, ice skating, tennis and swimming.

A Transistorized Converter for 70 MHz

BY W. H. ALLEN MBE, G2UJ*
*24 Arundel Road, Tunbridge Wells, Kent.

THE law of diminishing returns is very apparent when designing and building radio equipment and one facet in particular, i.e., v.h.f. reception, often yields relatively small improvements for quite substantial financial outlay above a basic level. It seems, however, that we are rapidly becoming perfectionists at heart, for increasing numbers of transistor converter designs are appearing which are based upon expensive semiconductors and a proliferation of other parts. This the writer saw as a challenge, and so, to determine just how much one is alleged to be missing by adopting humbler techniques, he embarked on a project to build a single basic transistor 70 MHz converter using " modern " circuitry, but with the prime aim of keeping the cost down.

The outcome of this venture is a converter designed around four modestly priced Texas Instruments transistors of two types—the XM10 for the r.f. amplifier and mixer stages and the 2N3826 for the crystal oscillator and doubler, the transistors retailing at 8s. and 3s. 11d. each respectively. The performance has proved the point; some 40 stations were received



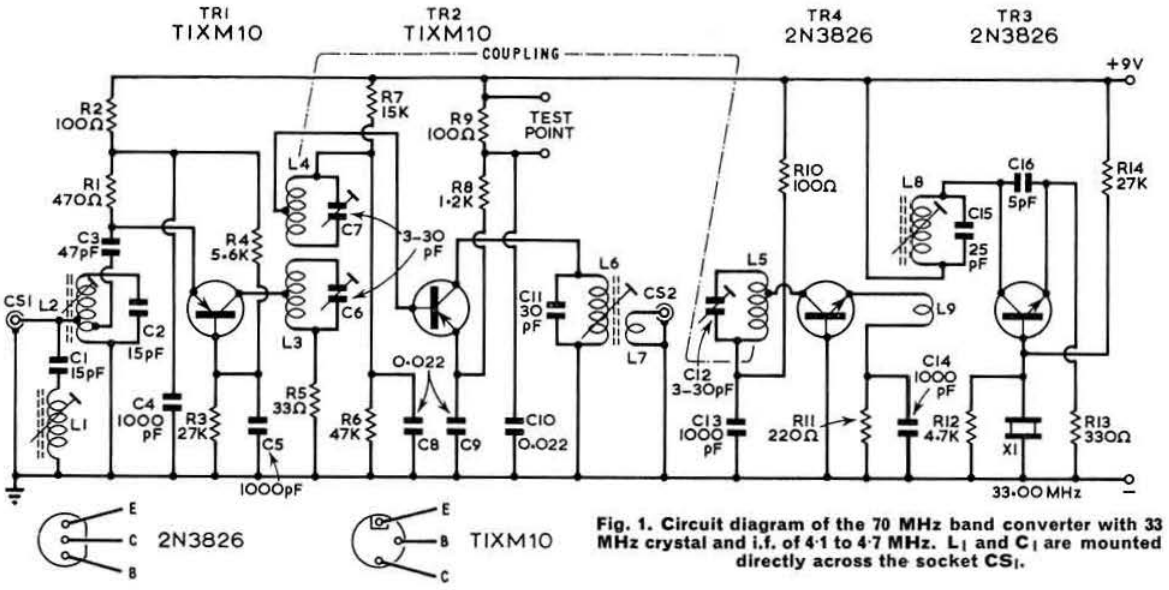


Fig. 1. Circuit diagram of the 70 MHz band converter with 33 MHz crystal and i.f. of 4·1 to 4·7 MHz. L_1 and C_1 are mounted directly across the socket CS_1.

during a contest, several being about 200 miles away, using an indoor dipole at a rather poor v.h.f. location. The total expenditure, using new parts throughout, was £5, and even running costs are low with a power consumption of 8mA at 9 volts.

The Circuit

The r.f. stage is operated in the grounded base mode to avoid the necessity for neutralization. The input is therefore of low impedance, rather lower, in fact, than the 75 ohms of the coaxial feeder from the aerial. The necessary matching is effected for both feeder and transistor input by tapping the inductance of the parallel tuned circuit L2, C2 at appropriate points. The series-tuned circuit L1, C1 is resonant in Band II and serves to eliminate interference from BBC frequency modulated stations should the receiver be sited close to one of the transmitters.

The signal is fed to the emitter of TR1 by C3 with R1, R3 and R4 setting the required bias conditions. The collector of TR1 is tapped approximately at the centre of L3 which is resonated by the concentric air-spaced trimmer C6.

All r.f. couplings are inductive, the r.f. stage collector, mixer input and frequency doubler tuned circuits being arranged in line in a manner similar to that adopted in the successful valve converter described by M. Gibbings, G3FDW, in the June, 1966 issue of the BULLETIN. L3 and L4 have their r.f. high potential ends adjacent while the earthy ends of L4 and L5 face one another.

The XM10 is a germanium p-n-p type transistor, requiring a negative potential on its collector while the 2N3826 is a silicon n-p-n type of opposite polarity. It will be seen from Fig. 1 how these requirements are met.

The mixer stage, TR2, operates with its emitter at earth potential for r.f., the base being connected to a tap at the centre of L4. The base bias is set by R6 and R7, and that for the emitter by R8. When first setting up the converter, a low-reading milliammeter may be connected across the 100 ohm resistor R9 to monitor the emitter current for correct oscillator injection as described later.

Some thought was given to the i.f. tuned circuit in the collector of the mixer stage in order to keep the output as constant as possible across the 600 kHz bandwidth centred on 4·4 MHz. The relatively low impedance of the collector of TR2 appears across the whole of L6 and the frequency response was further damped by making L7, the coupling winding feeding i.f. to the main receiver, larger than is normally specified for 75 ohm receiver input. There is no noticeable variation in response across the band. It might be necessary, however, to vary the number of turns in L7 to achieve this with other receivers.

Although the oscillator employs an overtone crystal, no tapped or inductively coupled tuned circuits are necessary to effect regeneration. The 33 MHz crystal is connected between base and ground of TR3, feedback is provided by C16 between collector and emitter, and the collector circuit is tuned to 33 MHz by L8 and C15. Emitter bias is provided by R13 and the base potential set by R12 and R14. TR4 acts as a doubler to 66 MHz and is driven on its emitter through the link winding L9. Emitter bias is supplied by R11 bypassed by C14.

This overtone oscillator circuit was first described by John Gazeley in the July, 1965 issue of the BULLETIN as part of a 70cm converter, and while very effective with overtone crystals, is not suitable as it stands for use with the majority of surplus crystals not designed to operate in the overtone mode. It may be found that some will oscillate on their third overtone when C16 is increased to as much as 40pF but the output of those tested was too small to be of use. It is strongly recommended, therefore, that a high frequency crystal designed for overtone operation be employed.

Construction

The components, most of which were obtained from *Radiospares*, are mounted on turret tags inserted into perforated paxolin sheet. Very little interconnecting wiring is

required apart from the wire ends of the capacitors and resistors. The paxolin sheet, roughly L shaped, as will be seen from Fig. 3, is mounted on and spaced about ¼ in. from, a piece of metal sheet, either brass or tinplate, to which the earthy ends of all components are soldered. The dimensions of this metal plate are shown in Fig. 2. The two sheets are fixed together with three 1 in. 6BA bolts, the required spacing being obtained by washers such as may be recovered from unwanted variable capacitors, or by the use of short lengths of metal or plastic tubing. The body of a ball-point pen offers a useful source of supply. A full nut is run on underneath the metal plate and serves as a spacer when the chassis is fitted in the STC-Electroniques die-cast aluminium alloy box, type 46R.043.B. The fourth bolt is screwed directly to the metal plate and, therefore, should be only ⅜ in. long. Half nuts on each bolt secure chassis and box together. Small rubber buttons, known to the trade as " buffers " and obtainable from most ironmongers, are pressed over the exposed bolt ends to serve as feet.

To make the earthy connections the wire end of the component in question is passed through an appropriate hole in the paxolin sheet and through a small hole previously drilled in the metal plate beneath. The end of the wire is then turned over and soldered to the metal. To avoid difficulties later, care should be taken to ensure that all wiring on the surface of the paxolin sheet is complete before fitting sheet and metal plate together and the earthy connections soldered. An iron of ample heat capacity ensures a rapidly made joint with less possibility of damage to components.

It will be noticed that both paxolin and metal sheets have pieces removed both at the corners and at the centre of each side to clear protuberances on the inside of the box. The object of the larger cut-out near the i.f. transformer is to clear also the shank of the coaxial socket, which should be mounted on the box previously together with a short length of flexible wire. Approximately ¼ in. of the shank on the coaxial socket should be removed, to clear the i.f. transformer, and under these circumstances it is even more important than usual, when soldering the connection, that a heat-sink in the form of long-nosed pliers or a suitable metal clip be used to prevent the heat from the soldering iron softening the insulation. It is also advisable to insert a plug into the socket during this operation to prevent any displacement of the central contact.

The U-shaped metal screen enclosing the i.f. transformer (see Fig. 2) was employed rather than the usual can for two reasons. Firstly, the use of the can would have necessitated making connections underneath the metal plate, where there is very little clearance, and secondly, any adjustment to the coupling winding, L7, to suit the main receiver in use, while a finicky job, is not impossible with the former *in situ*.

The screens have $\frac{3}{16}$ in. lips bent at right angles, and these should be drilled with several 8BA clearance holes. Three or four corresponding holes are drilled in the metal base plate and the screen bolted in position, first having tinned both surfaces. An iron of ample heat capacity should then be used to run solder around the lips and it will be found that the additional holes in the latter make this a very quick operation. If desired, the fixing bolts may then be removed and the vacant holes filled with solder.

The r.f. stage screen is fitted in a similar manner.

Construction of Inductors

L2 and the f.m. trap inductor L1 are both wound with

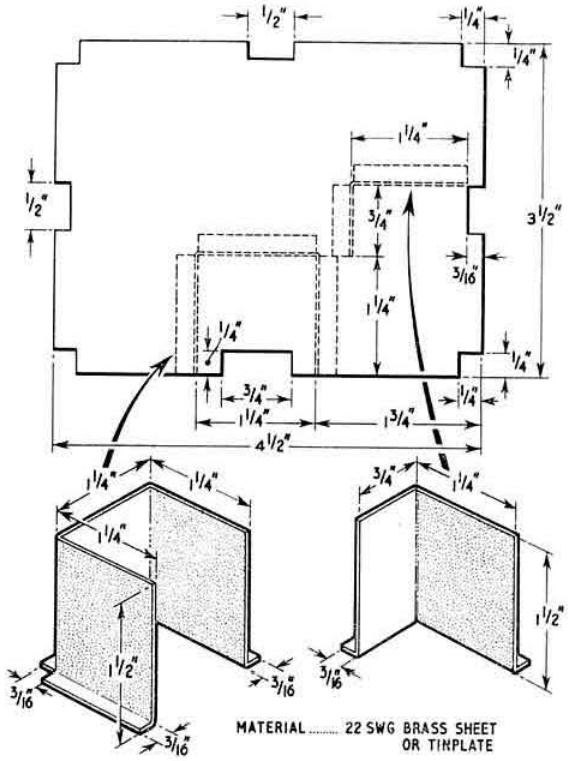


Fig. 2. Dimensions of the two screens and the base plate on which are mounted the two perforated paxolin sheets shown in Fig. 3. The i.f. transformer is mounted directly on the base plate inside the U-shaped screen. The r.f. stage is constructed on the smaller sheet and mounted adjacent to the L-shaped screen to the right of the base plate.

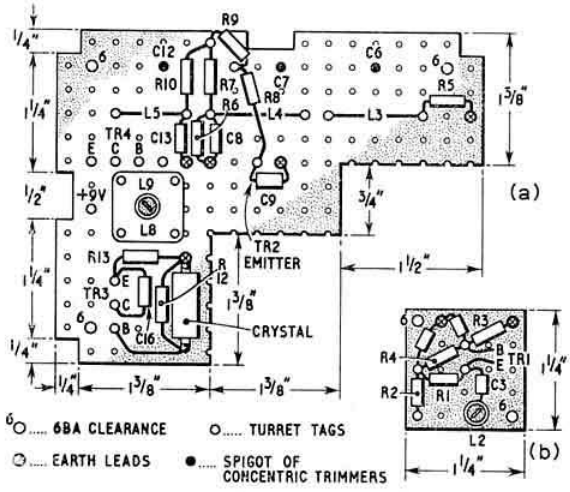


Fig.3. The two perforated paxolin sheets with the placing of the main components.

22 s.w.g. wire on a $\frac{7}{32}$ in. drill shank. On removal from the drill the coil is spaced to occupy the required length by passing a suitable drill-shank—say $\frac{1}{16}$ in.—between the first and second turns, and then screwing the coil past the shank. In both cases a 6mm diameter iron dust core is screwed directly into the turns of the coil for adjustment of the inductance so it will be appreciated that the " thread " of the coil must be the same in direction to that of the core.

L3, L4 and L5 are all wound on a $\frac{1}{4}$ in. mandrel in the *same* direction and the turns spaced, as previously described, to occupy the required lengths. Sufficient wire is left at each end of the coil to enable it to be inserted into the appropriate hollow turret tag so that the bottom of the coil is $\frac{3}{8}$ in. above the paxolin sheet. It will be appreciated that with L3 and L4 the " hot " ends oppose one another whereas the " cold " end of L4 is nearest to that of L5. The three concentric trimmers are so wired that their spigots are connected to the " cold " or earthy ends of the coils and the tags to the " hot " or non-earthy ends. If the connections between the spigots and the coil turret tags are made with 22 s.w.g. wire it will be found that with the spigots located in the holes in the paxolin sheet as indicated in Fig. 3, no other fixing is required. It may be necessary to cut off a portion of each spigot under the paxolin sheet to prevent a short circuit to the metal plate below.

The i.f. and crystal oscillator transformers are both wound on 0·3 in. Aladdin-type formers with square bases and $1\frac{3}{8}$ in. high. A piece of perforated board $\frac{3}{4}$ in. square is drilled at its centre to be a push fit on the top of each former. A saw cut made from this centre hole to one of the sides will give enough spring to ensure a close fit. A turret tag, pointing downwards, is fitted at each corner and a length of 22 s.w.g. wire is passed through each tag into the corresponding eyelet in the base of the former and soldered in place. The ends of the windings are then terminated on these wires. The 22 s.w.g. enam. wire for L8 is first wound on to a $\frac{1}{4}$ in. drill shank and then transferred carefully on to the slightly larger diameter of the former and the ends made off to the vertical wires, the earthy end of the coil being uppermost to facilitate adjustment of the coupling winding L9. The latter is placed in position over the earthy end of L8 but should not be fixed permanently until the adjustments for oscillator injection are made later.

The i.f. transformer primary inductance, L6, being wound with finer wire, cannot easily be transferred to the former from a mandrel and must, therefore, be wound directly on to the former. The easiest method is to screw the former temporarily to a piece of wood or hardboard into which a pair of bolts about 1 in. and 2 in. long respectively have been fixed some two to three inches from the former. The wire is secured to the shorter bolt, the requisite number of turns wound on the former, and the end twisted round the longer bolt. The winding is then liberally coated with polystyrene cement. When dry, L7 is wound, in the same sense, over the earthy end of the primary, and in turn coated with cement. It would be possible to wind both coils on the former by putting a layer of sellotape, sticky side outwards, on the latter, and then winding the wire on to the tape, but in some circumstances the coating on sellotape has been known to damage the enamel insulation.

It will be noticed that two of the connections to the i.f. transformer are earthy. If it is arranged that these are made to wires diagonally opposite one another on the former base, these may be made sufficiently long to pass through holes drilled in the metal base plate and soldered, thereby securing the former. Care must be taken to avoid the two remaining wires short circuiting to the metal, and it is advisable to place a piece of thin card under the base before mounting.

Components List

All resistors Radiospares " sub-res " type $\frac{1}{4}$ watt, $\pm$ 10 per cent 0·26 in. × 0·11 in.
1,000 pF bypass capacitors, Radiospares disc-ceramic.
0·022 μF bypass capacitors WIMA 125v working 0·5 in. × 0·2 in.
Formers Aladdin-type 0·3 in. diam. $1\frac{1}{2}$ in. high.
Co-axial sockets Belling Lee type L604S.
Perforated sheet (small), Radiospares.
Turret tags (small), Radiospares. 29 off.
Concentric trimmers 3-30 pF, Radiospares. 3 off.
Iron-dust cores (blue) 6mm diam. $\frac{3}{4}$ in. long GEC. 4 off.
Transistors. XM10, germanium, and 2N3326, silicon, Texas Instruments.
Crystal. Third overtone HC-6/U. JAN crystals. Fort Myers, Fla. USA, or any similar type.
Crystal holder HC-6/U.
Die-cast box with lid, Electroniques-STC type 46R.043.B.

Coil Data for circuit of Fig. 1

L1	4 turns 22 s.w.g. bare or tinned copper $\frac{7}{32}$ in. diam. spaced approx. one wire diameter. Leads $\frac{3}{4}$ in. long.
L2	$5\frac{1}{2}$ turns 22 s.w.g. bare or tinned copper $\frac{7}{32}$ in. diam. spaced approx. one wire diameter. Earthy lead $\frac{1}{2}$ in. long. Lead from CS1 tapped 2 turns from earthy end, C3 connected $1\frac{1}{2}$ turns from earthy end.
L3, 4	7 turns 22 s.w.g. bare or tinned copper $\frac{1}{4}$ in. diam. spaced to occupy length of 1 in. Centre tapped.
L5	6 turns 22 s.w.g. bare or tinned copper, $\frac{1}{4}$ in. diam. spaced to occupy length of $\frac{3}{4}$ in. Tapped $2\frac{1}{2}$ turns from earthy end.
L6	65 turns 24 s.w.g. enam. on 0·3 in. Aladdin former with dust core.
L7	15 turns 24 s.w.g. enam. over earthy end of L6. Also see text.
L8	14 turns 22 s.w.g. enam. on 0·3 in. Aladdin former with dust core.
L9	$1\frac{1}{2}$ turns p.v.c. covered hook-up wire at earthy end of L8. See text.

Coil Data for circuit of Fig. 4.

L5	7 turns 22 s.w.g. bare or tinned copper $\frac{1}{4}$ in. diam. $\frac{3}{4}$ in. long tapped $4\frac{1}{2}$ turns from earthy end.
L6	24 turns 24 s.w.g. enam. on 0·3 in. Aladdin former with dust core.
L7	6 turns 28 d.c.c. or enam. over earthy end of L6. The number of turns may require adjustment to suit main receiver.

Adjustment

It can be assumed that the r.f., mixer and frequency doubler coils are sufficiently near to their correct values to tune, with the trimmers at about half capacitance, to the correct frequencies. If there should be any need to check this, on no account should it be done with a grid-dip oscillator in the ordinary way as the r.f. voltage induced into the circuit might damage the transistors. This does not mean, however, that a valve g.d.o. cannot be used with transistorized apparatus if due care is taken. Instead of relying on the meter in the g.d.o. for indication of resonance, insert a low-reading milliammeter, e.g., 1 mA f.s.d., across the battery leads to the unit, the battery, of course, *not* being connected. The g.d.o. tuning should be adjusted very slowly, watching for a slight reading on the auxiliary meter as the g.d.o. is brought gradually nearer the coil under test. It will be found that *very* much looser coupling than usual is required between g.d.o. and coil, readings normally being perfectly clear with a separation of two to three inches. As the output of g.d.o's can vary widely, this spacing should be taken only as a guide.

The tuning of the i.f. circuit is quite flat when the main receiver has an input impedance of approximately 75 ohms. Should the input impedance be higher, it may be necessary to add a few additional turns to L7 in order to achieve a flat coverage of the i.f. range. If any noise can be heard from the converter at this stage, it may be peaked with the core in L6/L7. Otherwise, placing a finger on the mixer coil, L4, should make a signal in the i.f. range audible, and the circuit may be peaked on that.

To adjust the crystal oscillator the core of L8/L9 should

be screwed in until a slight rise in the feed current to TR3 is observed, and the core set where the oscillator operates immediately upon switching on. The coupling between L8 and L9 should initially be as tight as possible and it should be checked that TR4 draws current when the oscillator is operative but not otherwise. A meter with f.s.d. of 5mA or so is now connected across R9 and trimmer C12 tuned for a rise in current. It has been found that the standing emitter current of different transistors of the same type, in the absence of oscillator injection, may vary in the range 0·6 to 1·5 mA and the rise, on tuning C12, should be approximately 25 per cent. This, however, is not a definite figure although the converter will operate successfully under these conditions. For the best performance the oscillator injection should be determined either with the aid of a noise generator or while listening to a weak modulated signal. The spacing between L4 and L5 should be ¼ in. and the amount of injection varied by adjustment of L9 in relation to L8. When the optimum position has been found, L9 may be secured with polystyrene cement.

Prior to the final adjustment of oscillator injection, the r.f. and mixer stages must be resonated. If a local source of signal is being employed, care must be taken to ensure that it arrives via the aerial and not by direct pick up on the mixer coil. First L2 should be peaked by means of its core, and the trimmers C6 and C7 adjusted for maximum signal strength. If it is found that the tuning of the r.f. amplifier does not hold over the whole band, the adjacent ends of L3 and L4 should be pressed closer together and a further check made. The core of L1 should be adjusted to eliminate any interference which may be experienced from BBC frequency modulated transmissions in Band II.

Appendix—Intermediate Frequencies other than 4 MHz

A version of this converter has been built employing an i.f. centred on approximately 27 MHz. An STC miniature wire-ended overtone crystal cut for 43·33 MHz provided sufficient mixer injection when L5 formed the oscillator tuned circuit. Certain alterations were made in the values of the bias resistors, and the final circuit is shown in Fig. 4. For ease of reference to the original circuit the same resistor and capacitor designations have been retained. Details of the new L5, 6, 7, will be found under " Coil Data."

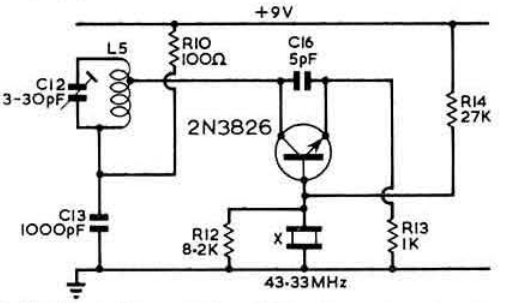


Fig. 4. An alternative crystal oscillator circuit for an i.f. centred on 27 MHz. It should be noted that although the components are numbered as in Fig. 1, some of the values differ. C11 across the i.f. transformer primary winding is changed to 10 pF.

To France on 2300

By Dr D. S. Evans, G3RPE*

AN attempt to cross the Channel on 13cm for the first time was triggered off by a recent letter to "Four Metres and Down" from F2FO, who had obviously been following the reports on 13cm activity in this country. A number of paths were considered, the most interesting of which was from Ditchling Beacon, 7 km. north of Brighton, to near St. Valery en Caux, 30 km. W. of Dieppe, a path length of 140 km. Further investigation showed that although the 800 ft. elevation to achieve an optical path was available at this end, this was not so on the French side. As challenging as the idea of trying a non-optical path of this length was, the picture of our travelling a long way to the coast (F2FO from Paris) in the bad weather conditions typical of February, and struggling with our rather incompatible equipment for hours on top of exposed hills, led us to consider an alternative path.

So a fortnight before the tests were planned to take place, F2FO and F9OE visited the Calais area while G3THQ and I looked at Dover. Here we had no trouble in finding sites: our preferred spot was 350 ft. high and even had disused brick buildings available in case the weather was bad. However, when we checked the 2m and 4m bands, strong pulse signals made a fearful racket. In case these were also present on 13cm, we investigated also sites overlooking Folkestone which were shielded from Dover and yet had a good take-off towards France. Meanwhile, F2FO had found a good site at Cap Blanc Nez, 15 km. west of Calais. More letters flowed covering frequencies, schedules and last minute cancellation procedures, and the date was fixed. The usual panic then set in: the equipment had to be checked and recalibrated, and a crystal to modify the converter had to be ordered from the States (it arrived two days before the tests). A colleague promised to build a transistorized transmitter consisting of an oscillator/amplifier, chopper modulator, and two separate stabilized inverters for 12 volt operation, all to be ready within a fortnight.

On the day it had been planned to link up on 2m at 13.00 hours or at half-hour intervals later. Unfortunately this did not reckon with the clocks going back one hour that day, having to attach a 4 ft. diameter dish to a Mini-Traveller while avoiding an essential 4m whip aerial mounted on the roof, and having to cross London from end to end on a day when the sun had brought out thousands of terrible Sunday drivers. We arrived very late. After a quick check on 13cm for pulse interference, the equipment was assembled and the 2m aerial and the dish erected. Priority was given to the valve transmitter which had to be allowed time to drift its usual 20 MHz before even slowing down. At 15.00 we just caught a schedule and called F2FO on 2m. There was a moment of terror as F2FO came back strength 9 but absolutely unreadable. Fortunately, due to either excitement or desperation, he was just overmodulating and thereafter we did not have too much trouble communicating with each other.

On 13cm, we transmitted first, using the valve transmitter

and amplitude modulation. Back came the report within seconds, 5 and 9 and very good quality. This rather caught us on the hop—it shouldn't have been *that* easy on 2300 MHz, and anyway our second transmitter, hurriedly completed the day before, would not key. A transistorized transmitter on 2300 MHz and we had the jack socket wired incorrectly! So it was a case of off with the bottom and a bodge. Meanwhile F2FO was getting worried as his generator was running out of petrol, and he was naturally anxious to transmit to us. After correcting a minor error in exchanging information, which led to our transmitting on two-three-fifty MHz and their listening on two-three-fifteen MHz, we compromised and they received us on 2320 MHz, 5 and 9.

Receiving their pulse transmissions was not quite so easy, although we had expected the reverse. The main problem was that my crystal-controlled receiver tuned only 2350 to 2352 MHz, and had a bandwidth of only 4 kHz. We had hoped that as his pulse transmission was probably 1 MHz wide, he would only have to be within 3 MHz for us to hear something. Now it is not for me to suggest that French MHz are different from English MHz, but it did take rather a long time for them to tune to within our listening band. Then the signal was there at good strength, and we wondered what all the worry was about.

Spare a thought for G3THQ. He had an independent set of equipment for contact number two, but his petrol generator wouldn't!

* 2 Juniper Green, Warners End, Hemel Hempstead, Herts.

The "QUICKSTARTER THREE" for Four

By JACK HUM, G5UM*

An easy-to-build Transmitter for the 70 MHz band to complement the earlier "Quickstarter" converter or the simple G2UJ converter described this month.

ASSERTIONS that ex-surplus and modified commercial units pressed into service on 4m inhibit original design are not without foundation: what is equally true is that without them the occupancy of our 70 MHz band could be considerably less than it is at the present time.

For the 4m operator who considers some of the ex-professional equipment that he sees around to be little better than an unsightly makeshift, deserving only of cannibalisation of its constituent parts, a straightforward design of transmitter is now offered. Using only three generally available valves, it provides a ready means of making a quick start on "Four" without complexity or undue sophistication (that word again!), allied to reasonable (indeed compact) physical dimensions.

The dimensions first: they are no more than 7 in. × 4 in. in the form of a standard Eddystone diecast case, the lid of which represents the chassis on which the transmitter is to be built.

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As for the transmitter itself, this utilizes a 12AU7 double triode crystal oscillator and doubler followed by a QQV03-10 tripler which in turn drives a further QQV03-10 power amplifier—all these valves, as already stated, being in ready supply.

The Circuit

There are several configurations of valve circuit that will produce reasonable output on 70 MHz; the choice of that shown at Fig. 1 was dictated by the desirability of using a 12·6 volt heater line to permit the use of the transmitter in a vehicle. In many districts where 4m is TVI-prone, equipment that may be employed outdoors—to get away from built-up television-infested areas—as well as at home when required, enables the operator to make maximum use of the band in his particular locality. For these reasons the present transmitter is arranged to derive its heater supply either from a car accumulator or (at home) from a couple of

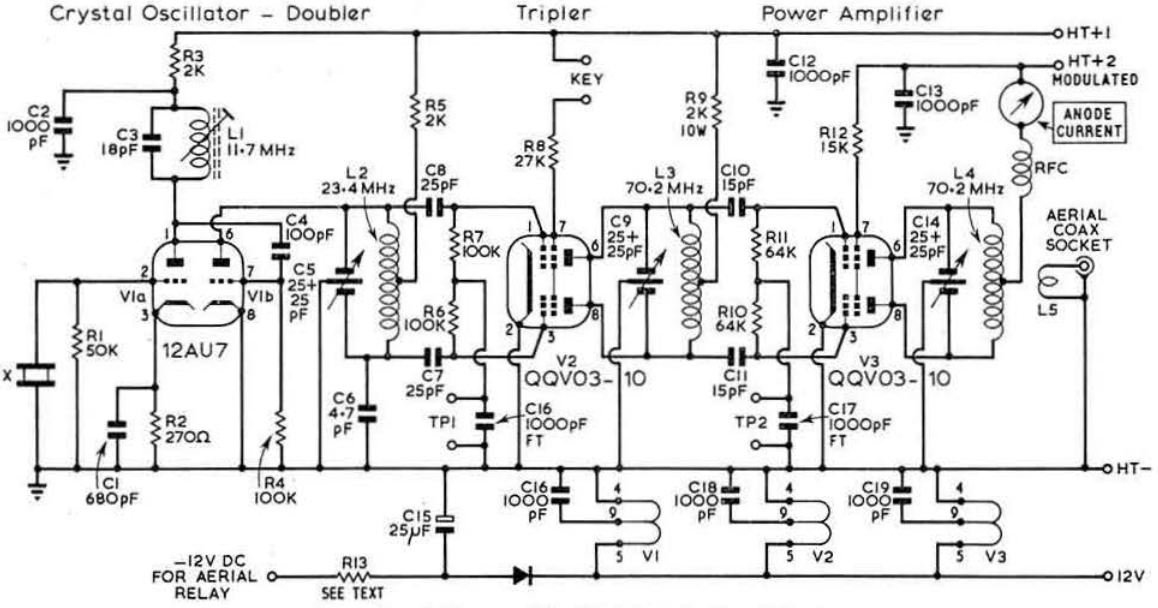


Fig. 1. Circuit diagram of the "Quickstarter Three" for 4m.

6·3 volt a.c. windings in series, these having been previously checked with an a.c. voltmeter to ensure that their outputs are in phase.

Lest it might be thought that the idea of specifying a QQV03-10 to drive a QQV03-10 savours of cracking walnuts with a steamroller, the explanation is simply that to sustain upward modulation in v.h.f. transmitters it is important to provide adequate drive at all times. It is failure to do so that produces the well known v.h.f. phenomenon of strong carrier but apparently inadequate modulation—though this is only part of the problem; the other part is undue converter noise at the receiving end.

With a 3-10 tripler, then, plenty of drive will be available at all times to the 3-10 final. This was not found to be the case when smaller valves were tried, for two EL91s in a tripler-into-doubler arrangement would provide little more than half a milliamp of drive into the 3-10 final; the 3-10 tripler delivered 1·75mA. Correspondingly, the level of r.f. output at the aerial socket of the 12AU7/3-10/3-10 arrangement was exactly double that of the smaller rig.

You do not get something for nothing; the heater consumption with the EL91/EL91/3-10 line-up is 0·62 A, while that of the 12AU7/3-10/3-10 line-up is 0·99 A, a marginal increase of 370 mA, hardly likely to be of much account when a car battery is the heater source—and of no account at all when 12·6 volts a.c. is.

Something else that assists towards the provision of adequate drive in the circuit shown at Fig. 1 is the use of a straight crystal oscillator in preference to the harmonic generator which is more frequently seen in v.h.f. designs. The first half of the 12AU7 as c.o. at around 11·7 MHz drives the second half into plenty of grid current to permit efficient doubling to 23·4 MHz (members who have only the 12AT7 available will find this to function adequately: the 12AU7 is a better c.o. and gives more drive).

It is at this point that phase-splitting action takes place to furnish push-pull input to the QQV03-10 tripler grids. The balancing capacitor is C6, which ideally should be a 2-8 pF variable, but for mechanical convenience is 4·7 pF fixed as shown. Ideally also, a twin variable capacitor should shunt the 23·4 MHz coil, its rotor grounded: but little will be lost and much space saved if this inductor is tuned by a common or garden concentric trimmer connected straight across its ends.

From this inductor there is capacitive feed into the grids of the push-pull tripler, whose grid current is measured at the junction of R6 and R7 down to baseline. The output of the tripler is similarly coupled into the grids of the p.a. To sharpen up the emitted bandwidth of the transmitter, thus reducing the level of spurious outputs, constructors might prefer to use double-tuned circuits in place of the simple single-ended ones shown. The two additional coils and butterfly capacitors which would be needed would extend the length of the chassis by a further two inches or so. With double-tuned circuits in a 2m transmitter it is not possible to achieve sensibly level output over the whole 2 MHz, but with a 4m transmitter where the requirement is to cover only 600 kHz, inductive inter-stage coupling is more feasible. The changes required for double tuned operation are shown in Fig. 2.

In accordance with the maker's recommendations, the screengrids of the QQV03-10s are not by-passed to chassis.

The final tank coil of the QQV03-10 p.a. is of the same

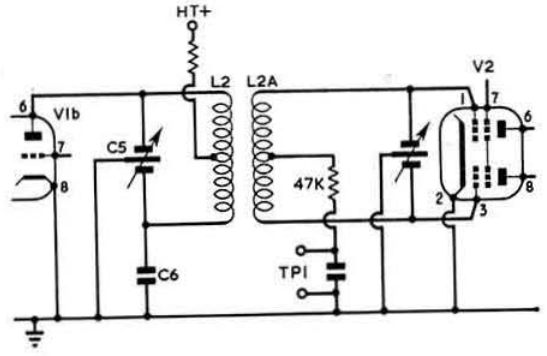


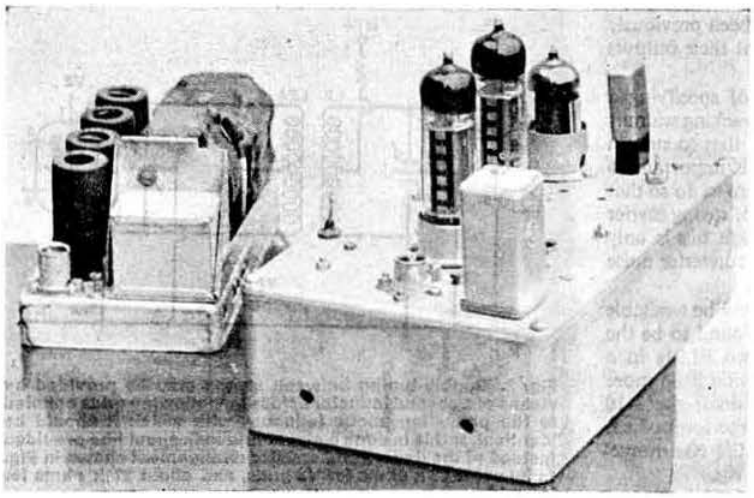
Fig. 2. Double-tuning between stages may be provided by means of a second inductor across the following grids coupled to the preceding anode inductor, with which it should be identical. If this is done a single grid leak should be provided instead of the double grid resistor arrangement shown in Fig. 1: its value 47 k ohms for V2 grids, and about 27 k ohms for V3 grids.

dimensions as the preceding L3. Because L3 and L4 are on the same frequency the possibility of self-oscillation by the 3-10 final cannot be discounted. An earthed screen placed across the centre of the valve socket to prevent L3 from "seeing" L4 is an effective precaution: in the design as constructed, the 3-10 remains perfectly stable even with drive removed under keying conditions.

A two-turn link L5 placed in the centre of L4 conveys r.f. output to the Belling-Lee co-axial socket. No trimmer was found necessary in series with the link. The co-ax lead should connect into one side of a suitable aerial changeover relay. When the transmitter is operated under portable conditions

Components List

X	Crystal 11·63 to 11·78 MHz.
R1	50 k ohms
R2	270 ohms
R3	2 k ohms
R4	100 k ohms
R5	2 k ohms
R6	100 k ohms
R7	100 k ohms
R8	27 k ohms
R9	2 k ohms
R10	64 k ohms
R11	64 k ohms
R12	15 k ohms
R13	200 ohms approx: adjust to hold relay on.
C1	680 pF
C2	1000 pF
C3	18pF crystal oscillator anode tuning (fixed).
C4	100pF
C5	25 × 25pF doubler tuning.
C6	4·7pF doubler balancing capacitor.
C7	22pF
C8	22pF.
C9	25 × 25pF tripler tuning.
C10	15pF.
C11	15pF.
C12	1000pF.
C13	1000pF.
C14	25 × 25pF p.a. tuning.
C15	25μF 25 volt working.
C16, 17, 18, 19	1000pF
L1	Crystal oscillator inductor: 35 turns 26 s.w.g. on ⅜ in. former with iron dust slug.
L2	Doubler inductor: 12 × 12 turns 18 s.w.g. airspaced ⅜ in. i.d.
L3	Tripler inductor: 9 × 9 turns 18 s.w.g. airspaced ⅜ in. i.d.
L4	P.a. inductor: 9 × 9 turns 18 s.w.g. airspaced ⅜ in. i.d.
L5	Aerial coupling loop: 2 turns plastic covered 30 s.w.g. inserted into centre of L4.
RFC	Any small r.f. choke, e.g. 100 turns 36 s.w.g. wound on a ½ watt resistor.



The author's " Quickstarter 3 " 4m transmitter, with a TR1986 modulator on the left.

the relay will receive its energizing voltage directly from the 12 volt d.c. accumulator. At home the l.t. supply will be 12 volts a.c. A small rectifier, which may be a BY100 for the sake of reliability and compactness, provides a d.c. supply for the relay. This is arranged to be negative-going so that a transistor converter may be powered from it if desired. The value of R13 should be selected to hold the relay on. A two pole switch may be included to actuate the relay line and the h.t. supply simultaneously.

Keying and Modulation

In the selection of a keying position it is desirable to break a low current circuit to reduce the possibility of local key-clicks. Breaking the screen grid circuit of V2 means that only 3mA are keyed. It also means that drive is removed from the final, but as this occurs only intermittently—when the key is up—it will not impair the valve, even though its anode current under key-up conditions doubles. If preferred, the screen of V3 may be keyed, thus avoiding the removal of drive.

In either case, it should be remembered that the key itself is at h.t. potential and should preferably be insulated, especially under field day conditions when a damp efficiently conducting subsoil may be beneath the operator's feet. The prudent may even decide to key the line via a small relay.

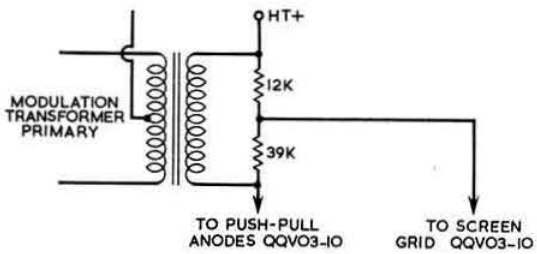


Fig. 3. Recommended circuit for applying anode-and-screen modulation to a QQV03-10 p.a. stage.

These minor disadvantages are outbalanced by the convenience of breaking the small screen current, much to be preferred to breaking a large cathode current with the cathode keying so often advocated.

To provide A3 facilities any small modulator may be employed, its transformer secondary inserted into the h.t.+2 line of Fig. 1. One of the well known " surplus " TR1986 modulators will serve admirably, heaters connected for 12 volts. Another convenient configuration, again for 12 volts, is a QQV03-10 driven by a 12AX7 phase-splitter cum microphone amplifier—though some operators have expressed dismay at the thought of using a 3-10 in an audio circuit!

The circuit at Fig. 3 shows a recommended arrangement for feeding the screen of a 3-10 final via a potential divider across the modulation transformer secondary that feeds the push-pull anodes.

Mechanical Arrangement

The lid of an Eddystone 7 in. × 4 in. die-cast box will conveniently accommodate the transmitter in a logical straight-through mechanical arrangement of the kind suggested in Fig. 4. By a slight economy of space it is possible to include a four-stage transistor converter on the same " lid-chassis."

It will be up to the individual constructor to decide

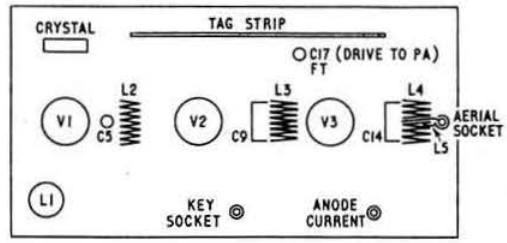


Fig. 4. Suggested mechanical layout for the " Quickstarter Three " reproduced about half size. If double tuned circuits are preferred they will occupy a further two inches of chassis length.

whether or not to include key and anode-feed sockets on the lid or to group these together with the changeover switch on a separate control panel.

If the transmitter is to be used outdoors each valve should be provided with a rubber holding-down strip, its ends secured beneath the valve-socket bolt heads.

Adjustment

To commission the " Quickstarter Three " for 4m, apply h.t. of about 200 volts to the 12AU7 only. Adjust the slug of L1 and listen for the crystal to come on by monitoring 11·7 MHz in the station communication receiver. A milliammeter inserted at the junction of R4 and chassis should read almost 0·5 mA, dropping to a small value when the crystal is removed.

Transfer the meter to TP1: it will show a small reading. Peaking up C5 will increase its value to 1mA or more. Transfer the meter to TP2, apply h.t. to V2 and rotate C9 until maximum current is shown in the grid circuit of V3. Apply h.t. to V3, rotate the tank capacitor C14, and a 0·3A bulb connected across the aerial socket will promptly burn out: so use a lamp of greater wattage.

"All so easy there must be a catch in it somewhere." There is: *are you sure you are on frequency*? It is possible to achieve drive into the tripler from the *third* harmonic of 11·7 MHz coming through V1B. And the tripler itself (probably half of it) will give small drive into the p.a. grid circuit on the wrong frequency.

These are such obvious pitfalls as to call for an apology for drawing attention to them at all: but as the " Quickstarter Three " may well be the first-ever v.h.f. transmitter the newcomer to " Four " has built, he should be fully aware that quite small movements of a variable capacitor at the frequencies we are considering are enough to put him outside the band by selecting wrong harmonics on the way up.

It is of course easy to select the *right* frequencies. There is no need to check where L1 is resonating: it can provide only 11·7 MHz. But L2 *must* resonate at 23·4 MHz, not at 35·1 MHz. Use a simple calibrated absorption wavemeter to ascertain that it is doing so. Sucking r.f. from it will cause a drop in the indicated grid current to V2. Similarly, sucking r.f. from any inductor will cause a drop in the current in the following grid circuit. Aligning the transmitter in this way with a *passive* absorption wavemeter obviates the need to build an *active* one such as a g.d.o. It goes without saying that the sucking device must be accurately calibrated in advance, its scale marked to show where unwanted harmonics come up as well as wanted ones.

Upon achieving r.f. output into a lamploads and having determined that the transmitter is set up correctly at 70 MHz, apply modulation. Adjust the aerial coupling loop until upward modulation is achieved. Then remove the dummy load and connect the aerial feeder. Retuning of the p.a. tank will be necessary, because few lamploads present the correct 80 ohm impedance to the output loop that the feeder does. Use either a " Monimatch " in the aerial feeder or an adjacent diode probe to sample the outgoing signal, and to permit accurate peaking up of the transmitter output and the sustaining of upward modulation. Switch off the modulator heaters and perform a keying test with a neighbour both to check the cleanness of the note and absence of spacer.

Now you are in business on " Four."

CQ W/VE

By A. O. MILNE, G2MI*

Lucy Milne and Jim Hemingway, VE7PW/G8ID on the bank of the Fraser river at Hope, B.C.

Bert Hayhurst, W8IZQ, Jack Lyon, W8YER and G2MI at Toledo, Ohio, with the nickelodian in the background.

THE trip to the United States and Canada, made by my wife and I last year, grew out of a half-facetious remark, made in mid-1966: "Why don't we go to see Expo '67?" Naturally, this would not occupy the whole of the trip, because the opportunity would be taken to visit numerous friends met on the amateur bands. For instance, when Francis and Betty Duffy, W9TV visited us back in 1965 we were informed that, if we came to North America and did not visit them, there would be an international incident!

It was through such friendships that the month's visit was made possible, in fact but for the generous hospitality of radio amateurs, many of whom had previously been our guests the trip could not have been made.

My wife, Lucy, and I left London on 9 September and flew to Vancouver. It is an odd experience to travel for the first time for 6000 miles in a westerly direction. At the speed of a modern Jet, time almost stands still and, by the sun, the day is a little over 30 hours long. By the clock, we left London at 12.00 and were being greeted by Jim and Olive Hemingway, VE7PW in Vancouver at 1920! Many London members will remember Jim as G8ID in the South London net, to whom he sends his warmest greetings.

After a drive round we caught up on some sleep, for it was already 04.00 BST. Next morning found us fresh and bright with the weather anything but! It just teemed down. however, Jim assured us that, in Kamloops, where they live, it would be fine and sunny, so we set off up the Fraser Canyon to see if he was right.

The splendid Trans-Canada Highway threads its way through magnificent scenery. It was appropriate that the first sign of a break in the weather was at the little town of Hope! From here onwards the scenery became even more breathtaking. On arrival in Kamloops we found a blue sky and brilliant sunshine.

On the following morning, after a visit to Jim's thriving radio and television business, he took us by car down the Okanagan Valley to the town of Kelowna. Lake Okanagan, of which we had not previously heard, stretches a mere 92 miles and is wider than Loch Ness! Next morning, we left Kamloops and began our long journey east-bound for Calgary and VE6AO.

Scenic as is the train ride, the road runs at a higher level and gives an even better view, with the added advantage of being able to digress, and so we saw such wonders as Takakaw Falls, a great torrent of water which thunders down 1260 feet of sheer rock face, and Emerald Lake, a mountain-locked expanse of water of such limpid green that, if an artist put it on canvas, people would say: " Yes, very pretty, but who ever saw water that colour?"

Our first night was spent at the little town of Golden, on the Canadian Pacific Railway, high up in the Rockies. An interest in trains, second only to Amateur Radio, drew me down to the " Depot " and right along the track side was a pleasant house and garden ablaze with flowers, prettily topped off by an elegant three-element beam. Enquiries

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resulted in a meeting with Syl Shaw, VE7QC, the engineer responsible for the maintenance of the Rogers Pass section of the Trans-Canada Highway. A Swan 350 and a QTH several thousand feet above sea level seemed adequate compensation for being rather hemmed in, to judge by a glance at the log.

Continuing our journey east, we visited Lake Louise, near Banff Springs. This must be one of the most beautiful places on Earth. A pale green, placid, pine-flanked lake stretches away for several miles and at the far end stands a great mountain glacier, like some fantastic backdrop. The morning sun leaves the lake and the pine trees in shadow but illuminates the mountain like a gargantuan diamond. We also ascended Sulphur Mountain by cable car to see the magnificent view. On the peak of this mountain, some 9000 ft. up, is the Cosmic Ray Observatory, manned by VE6ADX who has his station alongside.

At Calgary we said good-bye to Jim and his family who were continuing their holiday in a wide circle back to Kamloops. We were soon chatting to George Sargenia, VE6AO, a senior director of Smalley's Radio, a large wholesale and retail business. George is a main dealer for RCA and has on his shelves a mouthwatering selection of amateur gear and, what is an unusual combination in England, a large stock of components, tools and accessories.

VE6AO is a tall, handsome man with a quiet, pleasant voice and endowed with a great personal charm. He is also a fantastic telegraphist. I heard him keep a regular sked QSO with a W7 at a level 65 w.p.m. I just sat back because it was much too fast for me!

From this station, we also made contact with Mike Hexter, W9FKC, in Highland Park, Chicago—our next port of call.

Calgary, a city of some 400,000 people, covers an area larger than Birmingham and approaching that of London. Most homes are largish bungalows with a roomy basement. It is usually here that one finds the Ham Shack and VE6AO was no exception. That evening we had the pleasure of meeting a number of VE6's who George had kindly invited along. Among them were some well-known DX calls: Bud McKeon, VE6AKV, George McPhail, VE6CT, Arnie Somerfield, VE6GN, Tony Manser, VE6KV and Russ Wilson, VE6VK.

To reach Chicago in time for the W9DXCC Dinner, at which I was " Visiting DX Personality," we had to make an early start on the Saturday morning. George drove us out to the airport in time for the 7.20 plane for Regina, Winnipeg, Minneapolis and Chicago. Flying conditions were excellent and we had a good view of the great Prairie area of Canada, arriving in Chicago on the tick of 16.01 to be greeted by Mike and Lucille Hexter, W9FKC; while Lucille took Lucy off in one car, Mike took me to the Holiday Inn in Chicago, in the other; registration numbers DX7388 and W9FKC respectively!

This dinner was a never to be forgotten experience. Meeting for the first time such old friends as Paul Niles, W9KXK, who had travelled down from northern Wisconsin, Ray Birren, W9MSG, the 9th District QSL Manager, Bill Halligan, W9AC of Hallicrafters fame, Alex Scherer, W9EU and once again " Duffy " W9TV was a particular pleasure.

About 130 top DX-ers sat down to dinner and then came my greatest ordeal for, as an introduction, Claude Ritchie, W9TKV, the Chairman, read out the entire content of Profile, G2MI, from the RSGB BULLETIN! I was invited to speak and talked about call-signs, the G licence, reciprocal

Francis Duffy, W9TV, at Ottawa, Illinois.

licences, DX-CC, the QSL Bureau, of course, and many other topics, all of which was very kindly received.

One highlight, which Mike had kindly arranged for me, was a visit to the Hallicrafters factory. The journey along the toll-way, on the following morning was enlivened by a multiway QSO on the car NCX5 with stations in W6, W7, W9, Mexico City and with one of the grand old men of Amateur Radio, Fred Schnell, W4CF, ex-W1MO, who now lives in Florida. He has a map of the Chicago road system, having lived there before he retired and contacts the same group of W9's each morning as they drive to work.

It was rather amusing being given road directions by someone nearly 1400 miles away! We were shown round the factory by Fritz Frankie, head of the Designs Department. We saw the whole process of production from prototype to finished article, through the preparation of printed circuitry, the production line itself to the exceedingly strict and thorough quality control and testing, at every stage.

On one line, a v.h.f./h.f. broadcast receiver was being made. The set was ready for testing, from a basic chassis, in only five stages. Each girl performs some 18 tasks, wiring in components, completely from memory. Hallicrafters have found that this type of assembly produces better results, makes for a more contented staff and, in fact, saves time and money. Much of the factory site is restricted, because of military commitments but we were allowed to see the labs, where equipment is subjected to extremes of temperature, air pressure, gravity and vacuum conditions.

One feature of such a trip as this, is the necessity, continually, of having to take leave of such nice people; the only compensation being that it is always to be " taken over " by someone equally friendly. So it was that we were transferred to the care of our good friends, W9TV and Alex Scherer, W9EU. We knew the Duffy family of old but, although Alex and I had been in correspondence for many years and had many contacts on the air, this was our first meeting.

First, we went to Alex's beautiful home in Ottawa, Illinois. The flat straight roads of Illinois and the fields of maize are in marked contrast to Western Canada. We passed

many a trim farmstead with its pretty garden, TV aerial towers and two-car garage set in a lush and provident countryside.

The shack is located in a capacious basement, and the rig runs a kilowatt to a beam on a tower some 80 ft. high. There is even an automatic stand-by power supply should the mains fail. Alex is the owner of the largest fleet of long-distance lorries in the middle-west and was to appear many times during our stay in Ottawa to help with our care and entertainment. It was with Francis and Betty Duffy, however, that we actually stayed; two of the most natural and happy people we have ever met. " Duffy " holds an important PR job with the Illinois Gas Board and they have a spacious bungalow set in a pleasant wooded residential estate.

The almost standard lattice tower and three-element beam grace the garden and the shack, in the basement, runs a variety of equipment. The whole room was panelled and decorated by W9TV himself.

One of the many trips on which we were taken was to Starved Rock, down on the mile-wide Illinois River. The odd name refers to a war between two Indian tribes. The warriors of one side were cornered on this flat-topped rock outcrop with the alternatives of starvation or a hundred-foot jump to certain death in the river below.

The Illinois river also runs through Peoria, the home of Henry and Wilma Klaus, W9AK and it was to here that W9TV and Betty drove us the next day, after a visit to Norway, a little township which houses the Trunk Switching Centre for the whole of the mid-western telephone system.

Henry and his wife have visited us several times. He is a main dealer for RCA and has an enormous family business covering most of Illinois and the adjoining states.

I am willing to bet that there were more colour TV sets in his warehouses than in the whole of the British Isles! W9AK runs a kilowatt to the Collins S-Line and a three-element beam. It was at Klaus Radio that I saw a strange sight: row after row of lattice towers stacked in tiers, for almost everyone has such a tower in his garden for the TV arrays.

Here we had a most interesting day out—to Springfield, the home and burial place of Abraham Lincoln, followed in the evening by a barbecue out in the countryside.

All too soon, we had to be on our way for Toledo, Ohio. Here we had been invited to stay the week-end with Jack Lyon, W8YGR, a friend of over 20 years of regular correspondence and many QSOs. At 20.00 that evening our train pulled into Toledo and we were greeted by Jack and his wife, Rowena.

Originally a Canadian and now an American citizen, Jack is with the Sunoco Oil Company. He is a real " personality " with a fund of dry wit which makes him a delightful host. I was able to put Jack's Hallicrafters station on 10m and had a number of contacts back to England. Here we also met Bert Hayhurst, W8IZQ whose hobby is repairing mechanical gadgets. He has a home full of clocks, musical boxes, melodeons, etc., and the *pièce de résistance* is a nickelodeon which he has rebuilt from a heap of junk and which is now in full working order—provided, of course, you put in your nickel!

On the Monday morning, Jack saw us to the Greyhound Bus Station for Detroit, Windsor and Hamilton.

To be concluded.

" Nowt as Queer as Folk "

PROGRESS REPORT ON THE NEW HEADQUARTERS

The wisdom of this Yorkshire saying is well illustrated by an unexpected result of the special letter on the Debenture offer—90 members who were interested enough to write for Application Forms have not yet returned them, despite a " reminder " letter. Perhaps an unexpected financial problem has led some of them—however unwillingly—to " think again." But surely this does not apply to the majority and if *you* were keen enough to write, we hope you will translate your good intentions into hard cash. There is still room for *you*, and £2475 worth of the Debentures remain to be taken up. For the record, no less than £2370 has been *donated* since July last, raising the total of donations to almost £5000—a saving to the Society of about £300 annually in interest charges. Whether you have been a donor or subscriber, you have helped your Society, and we are very grateful. A special word of thanks, too, to the groups that rose to the " Harrow Challenge " by buying Debentures and sending donations. As their resources vary so much it would perhaps seem invidious to make comparisons; we ask you to applaud impartially their efforts on your behalf. Meanwhile we are delaying publication of a list of contributory groups to give a further chance to those which have " never quite got round to it."

In addition to taking out a Debenture, Harrow itself is setting a hot pace towards its target of £1 donation for each of its 70 members—its present " score " is nearly £18—almost exactly five shillings per head. Individual donations are still reaching Headquarters and have been acknowledged by the Treasurer, who says " Thank you " to all—not forgetting the anonymous donor of ten shillings.

Work on the renovation and preparation of the building has now started, and Council's policy is to ensure first of all that the premises are sound and secure. This will be more economical in the long run than having to deal with renovations *after* we are in occupation, and should mean a minimum outlay on maintenance for some years. So the scaffolding is up for checking the roof, partitions are being moved to more convenient positions, and heating engineers have embarked on a comprehensive installation, while the premises as a whole are being brought up to the current standards of building and safety regulations. Meanwhile the telephone and power engineers are taking the opportunity of concealing their wiring while they have the freedom to do so.

In short, it's " All systems go! "

RSGB EXHIBITION

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Will your equipment be available for the Home Constructors' Display?

Split-Frequency Working with a Transceiver

By WILFRID BAKER, B.Sc., G3HDQ*

IF there is a drawback to transceiver operation it is the inability to work "split-frequency," i.e. to send and receive on different channels. Receiver incremental tuning, if provided, may be adequate for working the DX station that will not answer calls on its own frequency, but it is of little or no use for working US stations on the 75 metre band where the frequency allocations for Regions 1 and 2 are different or for working DXpedition stations who may be transmitting on 14,105 kHz and listening for replies on 14,190 kHz. While the need for split-frequency facilities is catered for by manufacturers who offer external v.f.o.s for use with their transceivers, these are a luxury and not essential when a stand-by receiver is available. Indeed, the use of a separate receiver had the advantage of avoiding the attenuation of the incoming signal that occurs with an external v.f.o. when the channel separation is large, owing to the signal frequency circuits of the transceiver not being accurately tuned to the frequency of the incoming signal.

A stand-by receiver can be easily wired up to allow split-frequency working, without loss of single switch control. All that is required is a co-axial relay with auxiliary contacts for muting the receiver, and a s.p.d.t. switch to select the mode of reception. Where a linear amplifier is in use a suitable semi-conductor diode may also be required.

The circuit is given in Fig. 1. It will be seen that when S1 is in the transceive position, relay RLA is energized; RLA1 connects the aerial to the transceiver, RLA2 mutes the stand-by receiver, and the transceiver functions normally. With S1 in the split-frequency position, RLA is not energized so long as the transceiver is in the receive condition; hence the aerial is connected to the stand-by receiver, the muting resistor is shorted, and reception is by the stand-by receiver. However, as soon as the transceiver is placed in the transmit condition, terminals A are shorted by the transceiver relay, thus energizing RLA which mutes the receiver and switches the aerial to the transceiver.

Note that on split-frequency reception the station relay supply voltage would, in the absence of CR1, appear at the auxiliary relay terminals A of the transceiver. However, the linear relay is also switched from these terminals, and unless it operates at the same potential as RLA it will be necessary to keep the two voltages apart. This is the function of CR1 which does not conduct in the receive condition, but as soon as its anode is earthed by the transceiver relay contacts on transmit, it starts to conduct and so energises RLA.

CR1 must have a current rating not less than the operating current of RLA, and a p.i.v. rating not less than the difference between the two relay supply voltages on open circuit, plus suitable allowances for switch-on surges. At G3HDQ, a Heathkit SB200 linear amplifier is in use in which the relay is operated by the 120 volt bias supply, while RLA is operated by a 24 volts negative supply, and a 200 mA, 400 volt p.i.v. silicon diode is used at CR1. RLA is mounted on a small box which contains the relay power supply and CR1, and from which leads run to the receiving mode switch conveniently placed on the operating desk, to the receiver muting terminals, and to the transceiver auxiliary relay terminals.

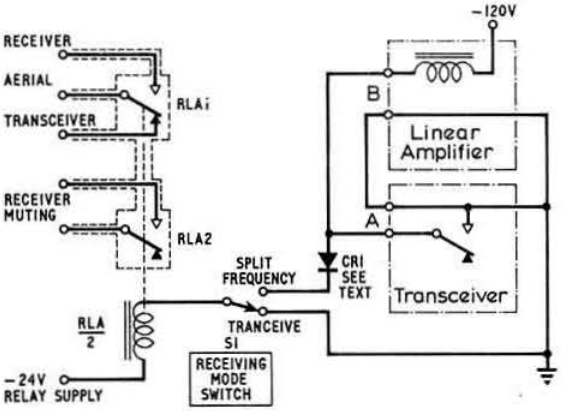


Fig. 1. Control circuit for split-frequency working with transceiver and receiver. RLA, coaxial relay with auxiliary contacts. CR1, silicon diode, see text. SW1, receiving mode switch. A, auxiliary relay terminals of transceiver. B, control terminals for linear amplifier relay. X, alternative position of CR1, see text.

If different operating voltages from those shown in Fig. 1 are used they must both be of the same polarity, either negative or positive, and CR1 must be connected in the lead having the lower potential to ground. It will be obvious that the circuit as shown can only be used with d.c. relays; also that CR1 will not be needed if both relays operate from the same supply, in which case, of course, a.c. relays may be used if desired.

The writer wishes to make acknowledgement to G3JJG, whose recent article in the BULLETIN on station control inspired him to devise the system described here. It has been in use for some months and has proved to be a great operating convenience. When split-frequency contacts are being made, one can listen on either channel and switch from one to the other by a flick of a switch, without any doubts as to whether the aerial is connected to the transceiver when going over to transmit.

Reference

" Modern Station Control," by G. F. Gearing, AMITPP, G3JJG, RSGB BULLETIN, September 1967.

* 148 Redditch Road, Alvechurch, Birmingham.

TECHNICAL TOPICS

By PAT HAWKER, G3VA

SOMETIMES one wonders if the time will come when we shall have almost completely " non-technical " amateur radio; when the hobby will be pursued solely for the very real attractions in operating rather than for any interest in developing the " black boxes " that make it all possible. This supposes always that the powers-that-be will continue to make available frequencies for this purpose.

As one who came into the game, as a schoolboy in the 'thirties, largely as a would-be " operator " but yet with some vague, though decidedly non-professional, interest in the techniques of radio communication, I for one regret that the trend still seems to be strongly against the old-time belief that the amateur should at least have a reasonable knowledge of, and interest in, the gear he uses—or would like to use.

Yet the signs from across the Atlantic—where the sheer weight of numbers inevitably determines the broad outline of the hobby—are not promising. One notes that even those amateur radio publications which a few seasons back were making strong claims to be concerned only with technical features now seem to fill many of their pages with transient " happenings " and the percentage of technical material continues to fall.

It is necessary to keep a balance in these matters but since a market research operation on behalf of ARRL a few years back seemed to reveal that interest in technical matters was waning, the weights have increasingly come down on the non-technical side of the fulcrum. One can no longer be certain that forward looking views on communication techniques can be found regularly in the journals reaching the vast majority of all amateurs.

It will surely be a loss to the hobby if the one-time half-humourous label of " plug-in appliance operators " should come to be revived in all seriousness.

FET Oscillators

It is already becoming widely recognized that field effect devices have a number of useful features when used as variable or fixed frequency oscillators; and can be used in almost direct equivalents of all the valve circuits. Like bipolar transistors the FET reaches thermal equilibrium and should be quite stable within 10 to 15 seconds, compared with the 10 to 15 minutes or so with thermionic valves. Both bipolars and FETs have extremely low power dissipation so that little heat is transferred to adjacent components even when these are mounted in close proximity. The temperature stability of the tuned circuit itself is thus the main limitation on the stability of the v.f.o.

The h.f. converter by G3HBW in the March *TT* used a FET crystal oscillator, and some further interesting applications of FETs to crystal oscillators are described in *Radio-REF* (February, 1968) by F2RG and F2FO.

F2RG has developed a versatile v.h.f. signal source providing appreciable output on 144 MHz from an 8 MHz crystal (sufficient output indeed to use it successfully as a mini-transmitter over a distance of 2·5 km). Although (possibly due to my French " translation ") F2RG seems to suggest this is an overtone oscillator, it looks much more like the familiar tritet/multiplier well known as a valve circuit; see Fig. 1. This would mean that there would be more spurious outputs than if the oscillator were operated as a true overtone unit, and in fact F2RG stresses that to avoid

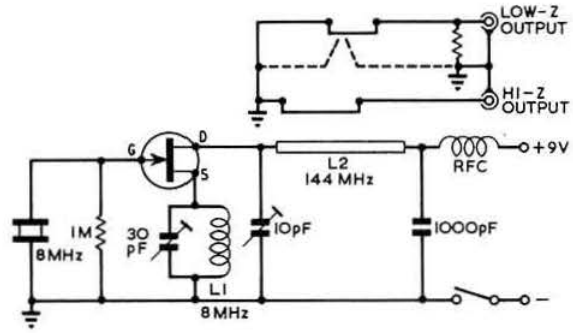


Fig. 1. The 144 MHz signal source developed by F2RG for junction FETs such as the 2N3819 or TIS34. L1 is 20 turns on 8mm former. L2 is a transmission line inductance using wire 3mm in diameter 12cm long. RFC is formed from 35 turns on a 6mm diameter former. The coupling links use 1.5mm diameter wire; with screening between the low-impedance pick-up and L2, allowing the output to be adjusted to the required value by opening or shutting the small gap.

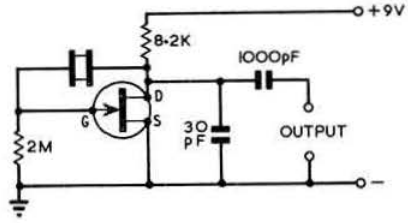


Fig. 2. F2FO's FET oscillator for FT241 series crystals (400 to 500 kHz).

FET OSCILLATOR PROVIDES OUTPUT ON 144 MHz—FET OSCILLATOR FOR FT241 CRYSTALS—OSCILLATOR NOISE—NOVEL TRANSISTOR P.A.—GATE DIP OSCILLATOR—THE MARCONI "HYDRUS" RECEIVER—BIASING MIXERS—FET POWER DEVICES.

spurious outputs the entire unit including battery and crystal should be enclosed in a metal box. The signal source is used by F2RG for such purposes as 144 MHz receiver adjustment and for testing aerial patterns, but it might be well worth investigating the circuit as a simple local oscillator for a 144 MHz converter or as the start of a 144 MHz transmitter.

The other circuit, by F2FO, is intended for use with FT241 series crystals between 400 and 500 kHz: Fig. 2.

Oscillator Noise

In his letter on parametric up-converters (*TT*, April, 1968), Walter Schreuer, K1YZW/G3DCU pointed out that even when signal handling characteristics of receivers have been so improved that they no longer represent a real problem, the adjacent channel performance will increasingly come up against the apparent limitation of oscillator and signal "noise."

Since the concept of oscillator noise may well be unfamiliar to many readers (it is mentioned in few text books), it is worth following up some references to this subject. K1YZW referred to the book "Vacuum Tube Oscillators" by W. A. Edson, published back in 1953. This has a most useful introduction to this concept—at that time of practical importance mainly in the field of microwave receivers.

Edson wrote: "It is well known that the small voltages within solid conductors and the corresponding random emission of electrons within vacuum tubes set a lower limit on the magnitude of electrical signals which may be amplified and detected . . . It is not so commonly realized that noise voltages also affect the operation of oscillators. It is true that in most oscillator applications the effects of noise are quite small; but in some cases, for example in microwave oscillators used in superheterodyne receivers, the noise sidebands seriously restrict the choice of i.f."

Edson shows that the output power from an oscillator spreads out over a band of frequencies in the type of curve one associates with high-Q tuned circuits. In microwave receivers the local oscillator may in fact have appreciable noise output on the signal and image frequencies, so limiting usable sensitivity.

This "noise" output represents a form of jitter in the oscillator, and if fed into the mixer means that the receiver will have some (though much reduced) response to signals over a range corresponding to the spread of oscillator noise power.

The purity of the output (that is the success with which oscillator output can be confined to a single frequency) is often referred to in terms of spectral lines as detected on a spectrum analyser. Purity increases with increase of oscillator output and selectivity and with decrease of frequency and inherent noise of the valve or semiconductor device.

Edson points out that in some circumstances it may be better to generate oscillations at an undesirably high level and then attenuate them before application to the mixer to achieve the required narrow spectrum. In view of the low output of many semiconductor oscillators this is an interesting thought.

In h.f. and v.h.f. practice appreciable oscillator output

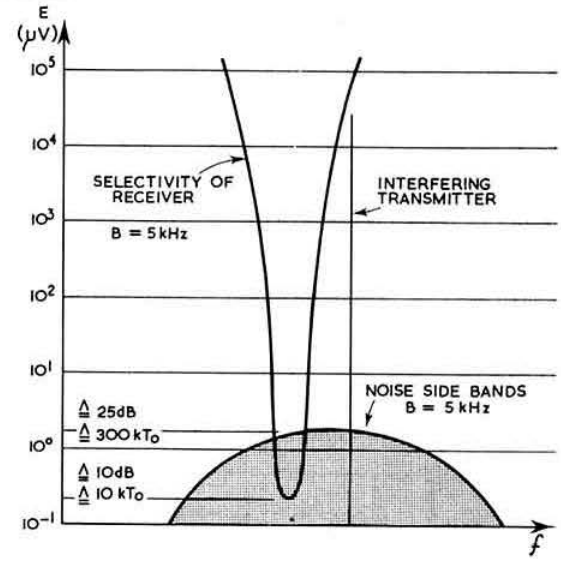


Fig. 3. Showing how oscillator noise radiation from a powerful adjacent channel transmission can limit weak signal reception even in absence of any cross-modulation—this is reproduced from the paper given to the IEE conference last year.

is hardly likely to spread to the signal frequency, but any significant jitter causes the receiver to respond to loud signals close to the desired signal frequency. Similarly if the transmitter v.f.o. has corresponding spread of output it will be amplified in the main transmitter stages and there will be actual radiation in adjacent channels, even though checked with normal techniques, the output may appear stable and apparently quite clean. At h.f., oscillator noise falls off very rapidly indeed and these effects only become apparent when trying to receive a very weak signal alongside a very loud one.

This point was well made in a paper at the 1967 IEE conference on frequency generation where it was emphasized that the purity of some of the complex frequency synthesizers now used in commercial practice was insufficient to prevent some interference into adjacent channels: see Fig. 3. It was suggested that the exciter of a transmitter needed roughly the same "signal to noise ratio" as the dynamic range of the receiver—put at about 130dB referred to a 1 Hz bandwidth, as well as rejection of specific discrete spurious frequencies better than 100dB.

Measurement of such parameters is not usually possible even with high grade laboratory instruments but the paper described a technique by which this could be done.

It must be stressed that at the moment in amateur practice oscillator noise is not usually regarded as a significant problem and represents perhaps the next but one hurdle—but it is as well to have some idea of what may be in store. Certainly,

designers of receivers for professional purposes are already talking about this as one of the important criteria.

It is certainly of major importance in the design of frequency synthesizers; and some of the new forms of u.h.f. and microwave oscillators, such as the bulk-effect Gunn diodes, tend to be judged in terms of spectral purity, usually being compared with the klystron with its reasonably low " noise," by microwave standards.

Novel Transistor P.A.

The problem of transistor power amplifiers that burst into destructive oscillation as the tank circuit is tuned off resonance is becoming well known. A technique which could conceivably help to overcome this problem is that described in *QST* (February, 1968) by Eric Carlson, W3MOO.

Basically this is an amplifier with a series tuned tank circuit between emitter and earth, with the output taken from the collector circuit by auto-transformer matching into 50-ohm line. According to W3MOO, when the tank circuit is tuned to resonance, the impedance between emitter and ground is very low and the stage functions as a grounded-emitter amplifier. With the series-tuned circuit off tune, the impedance rises rapidly and a feedback voltage developed which effectively reduces drive to the transistor, as well as output.

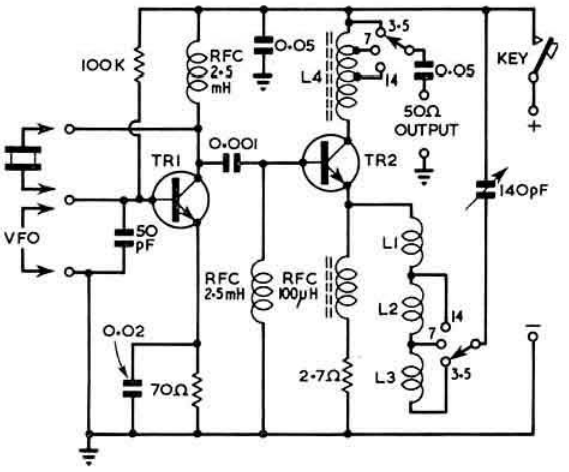


Fig. 4. The novel transistor p.a. arrangement put forward by W3MOO in *QST*. This forms a 1-watt transmitter for 3·5, 7 and 14 MHz using 2N3053 devices. L1, L2, L3 are conventional coils of reasonably high *Q* suitable for tuning to the band in question with C1. The matching auto-transformer L4 is 20 turns of No. 26 enam. close wound on a ¼ in. diameter powdered iron core 1 in. long, tapped at 10, 13 and 16 turns from supply end. The 100 μH RFC is formed from 100 turns No. 26 scramble wound on a similar former to L4.

Fig. 4 shows a low-power (about 1-watt) multi-band transmitter using this configuration. Whether with higher power transmitters the arrangement would prove basically more docile than the alternatives does not emerge very clearly from the article, but it might be worth investigating.

Gate-dipper for Novices

In *TT* (November, 1967) a simple FET gate-dip-oscillator was given, together with the reported view that FET dippers

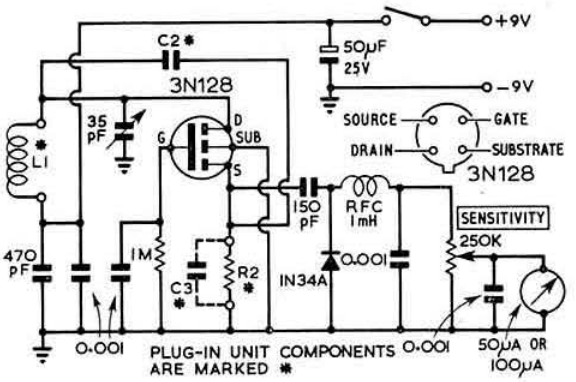


Fig. 5. The MOSFET grid-dipper described by W1ICP. Four-pin plug in coil formers (1 in. diameter) carry the tuning coil L1 and also C2, R2 and where used C3 (On 1·7 to 3 MHz, 50 pF in parallel with R2). MOSFET is RCA 3N128.

Coil table:

Band	Turns	Wire	C2	R2
1·7–3 MHz	115	30	22 pF	3·3 k
3–5	60	26	22	3·3 k
4·5–7·4	40	26	18	2·7 k
6·2–11	28	20	10	1·5 k
11–25	10	20	10	1·5 k
19–32	6	20	10	1 k
32–62	4	20	5	1 k

seem to be more effective than those using bipolar transistors. L. G. McCoy, W1ICP (*QST*, February, 1968) describes fully an FET dipper for the novice in one of his well-known series for newcomers. This differs in several respects from the earlier circuit, uses a MOS FET, and measures oscillator power rather than putting the meter directly into the gate circuit. The W1ICP arrangement is shown in Fig. 5. W1ICP stresses that the small metal ferrule on the 3N128 should not be removed while handling the device. It must be removed before soldering the unit into the circuit, and he recommends protecting the MOS FET while soldering by wrapping three of four turns of fine bare wire around the four leads right at the base before taking off the collar. This will also help serve as a heat sink, and can be unwrapped after the device has been soldered into circuit.

Marconi " Hydrus " Receiver

In recent months several references have been made to the current batch of receivers intended for professional applications. The quite large number of new designs in this area have been partly brought about by the wish to introduce techniques which are helping to overcome some of the problems of the " first generation " of fully transistorized receivers—including deficiencies in dynamic range, in a.g.c. characteristics, and the need for ever higher stability.

One of the latest receivers developed for commercial traffic handling is the Marconi " Hydrus " series which is roughly intermediate between the extremely high grade receivers used on main point-to-point links, and the rather less complex general purpose receivers. While it uses a frequency synthesizer, with crystal derived 1 MHz and 100 kHz points, it has a free-running v.f.o. which with the crystal points forms a heterodyne-type v.f.o. to provide the interpolation frequencies.

From an amateur viewpoint, however, the most interesting

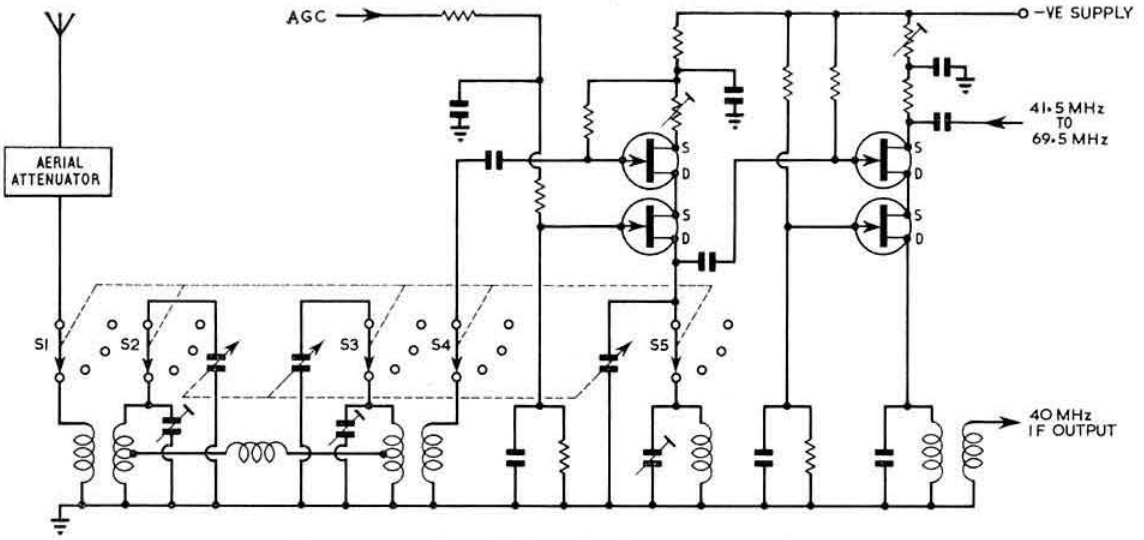


Fig. 6. Simplified circuit of the signal-frequency amplifier and mixer stages of the Marconi Hydrus receiver.

features are to be found in the front-end, and the extensive use made of FETs in r.f. stages, mixers and in i.f. stages. Fig. 6 is taken from an article on the receiver in *Point-to-point Telecommunications*, April, 1968 and shows in outline form the cascode r.f. and the cascode 1st mixer; unfortunately no device types or component values are given.

Several points should be noted. The use of the rather unusual form of band-pass coupled tuning circuits in the aerial input, produces some 30 to 40dB attenuation at 10 per cent off-tune. The two junction FETs in cascode in the r.f. stage provide a noise figure between 4 and 7dB and has been preferred because of the good isolation between input and output, and the convenient a.g.c. using the gate of the second device.

The cascode mixer is biased to about half pinch-off voltage of the FET for optimum conversion gain. Oscillator injection is fed to the source at a peak-to-peak level equal to pinch-off voltage. An idea novel to me is that a.g.c. is applied to the mixer stage by the technique of reducing the oscillator injection as the a.g.c. voltage increases (that is a stage between the synthesizer and the mixer is a.g.c. controlled). This, it is stated, has the advantage of increasing the maximum signal which may be applied to the mixer gate as the received signal at the aerial increases.

Biasing Mixers

An interesting mixer technique, brought to notice by B. Priestley, G3JGO, was described in the *Hewlett-Packard Journal* (April, 1967). This indicated that the intermodulation characteristics of mixer stages can be appreciably improved by careful application of a little forward bias, as well as by adjustment of local oscillator injection.

The original article was concerned primarily with mixers using hot-carrier diodes, but it is stated that it can be applied to conventional diodes and also to IGFET mixers. G3JGO has found it useful with a GEX66 diode mixer. Basically the technique consists of applying an optimum forward d.c. bias (in the region of one volt or so), rather than the zero bias customarily used. Increasing local oscillator injection to an optimum value is also stated to have a beneficial effect on the intermodulation characteristics. Theoretically it is a matter of biasing the devices to a point where the fourth order curvature is zero and the sixth order are equal and opposite.

FET Power Devices

All the readily available FET devices are small-signal units, but a good deal of work seems to be going on to develop power devices for use in such applications as linear amplifiers for manpack s.s.b. transmitters. There have been American reports of MOS FETs under development by RCA capable of giving some 14 watts output (presumably p.e.p.) at 10 MHz. Siliconix are believed to have some devices (U221, U222) providing 0·5 watt output at 100 MHz in TO5 form.

At the Physical Society Exhibition in London recently, I saw some units—at present only in development stage—by Associated Semiconductor Manufacturers Ltd (the joint Mullard-GEC semiconductor research firm) using a combination of silicon nitride plus silicon dioxide as the gate dielectric. These devices in both *p* and *n* channel form can typically provide some 11 watts p.e.p. output at 20 MHz in a linear amplifier having −30dB intermodulation and more than 10dB power gain.

It would seem likely that for linear amplifiers such power FETs would have a number of advantages over bipolar power transistors. It should be stressed, however, that these devices are still largely at the experimental stage and not readily available.

Here and There

G3KKP gives a source of Fairchild μL914 SICs in small quantities: Apr-Lotus Electronics Ltd, Systems Division, 41 Thunder Lane, Norwich, Norfolk NOR 84S. He says the price is about 9s. 6d. post paid.

P. SIMPSON, G3GGK and B. ARMSTRONG, G3EDD

THE HALLICRAFTERS SX146 RECEIVER AND HT46 TRANSMITTER

ONE of the imported s.s.b. transmitter/receiver combinations which falls into the higher price bracket is the Hallicrafters SX146 Receiver and HT46 Transmitter. Designed and manufactured in the USA by the Hallicrafter Co., the equipment is sold in the UK by Electroniques (Prop. S T & C Ltd.), Edinburgh Way, Harlow, Essex. The prices are as follows:

SX146 Receiver	£137 5s. 0d.
Options:	
HA19 100 kHz Calibrator	£10 15s. 0d.
49-321 500 Hz C.W. filter	£15 9s. 0d.
49-319 5 kHz A.M. filter	£15 9s. 0d.
Loudspeaker	£10 15s. 0d.
HT46 Transmitter	£192 5s. 0d.
Options:	
HA16 VOX adaptor	£21 10s. 0d.
HA1 Keyer	£42 15s. 0d.
Aerial c/o relay	£2 5s. 0d.
Crystals for 10m	£2 10s. 0d. each

THE SX146 RECEIVER

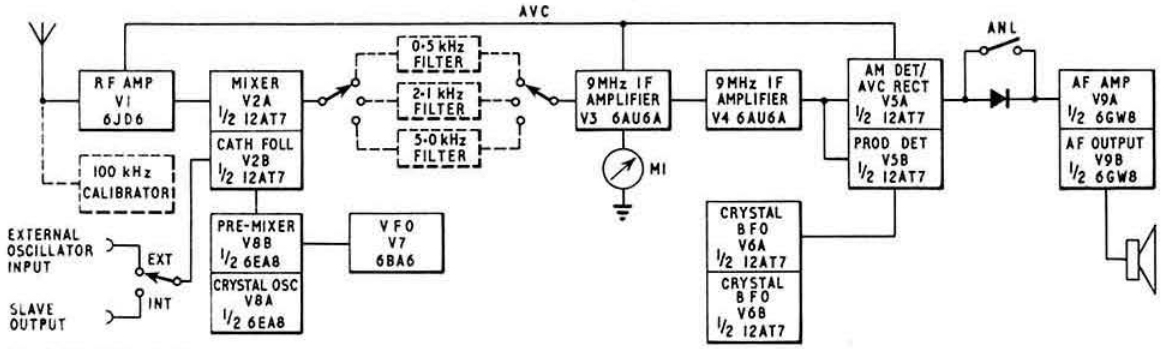
SX146 Receiver

General Description

The SX146 receiver is a single superhet with a 9 MHz six pole crystal filter, although a facility is provided for 500 Hz c.w. and 5 kHz a.m. crystal filters as optional extras. The mixer injection is either the basic v.f.o. frequency of 5-5·5 MHz for 80 and 20m, or the sum or difference of a crystal oscillator and the v.f.o. on the remaining bands. A premixer and cathode follower provide isolation between the oscillators and the mixer. Although facilities for full coverage of 10m are provided, three of the four 10m crystals are not provided.

The mixer injection frequency can be fed to a phono socket on the rear apron to supply the associated transmitter injection. Alternatively an external 5-5·5 MHz oscillator can be fed through a phono socket into the receiver.

Separate a.m. and s.s.b. detectors are provided and a switchable series diode limiter clips impulse noise on a.m. A.g.c. controls the gain of the r.f. and first i.f. stages. The a.g.c. time constant, the handbook claims, is fast attack, fast



The SX146 block diagram.

release on the first i.f. stage which has the S meter in its cathode, but has a longer time constant for the r.f. stage.

The loudspeaker is not supplied but is available in a matching case as an optional extra.

The two part perforated steel case is finished in grey crackle paint, and the plated steel chassis has the main component circuit references silk screened on it. Nylon cord is used to couple the v.f.o. knob, scale and capacitor, and the linear scale can be moved ± 15 kHz for calibration purposes. Total scale length is 6¼ in. and the tuning rate is about 38 kHz per tuning knob revolution. In order to economize on crystals the v.f.o. tuning direction varies with band. The tuning scale has the frequency marked every 100 kHz for all bands, with intermediate calibrations at 10 kHz intervals, but the travelling cursor is somewhat coarse and wide enough to cover the spaces between the 10 kHz calibration marks!

On the rear apron there are three screw connectors for speaker, ground and mute. A substantial terminal is also supplied for proper ground connection—a very good feature. In addition to the phono sockets mentioned above, a third one provides connection to an aerial. The S meter zero potentiometer and an internal/external oscillator switch are the remaining controls.

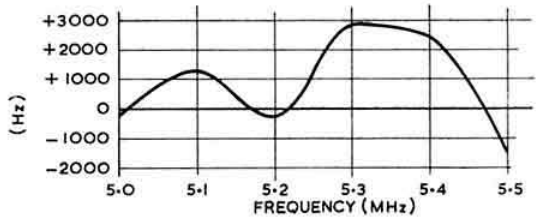
The a.c. input is 105-125 volts only. An auto transformer is supplied free by Electroniques for use on 220/240 volts.

TESTS

The V.F.O.

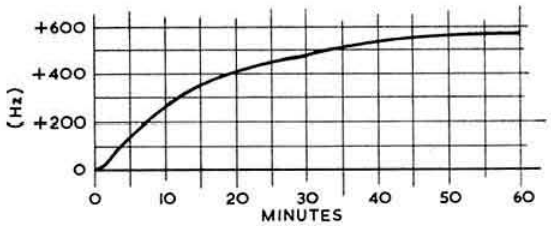
No optional crystal calibrator was supplied, so the adjustable scale was set centrally.

The linearity was as follows:



Nominal frequency (MHz)	Linearity ref. mid. scale (Hz)
5·000	−215
5·100	+1328
5·200	−275
5·300	+2818
5·400	+2440
5·500	−1440

These results show that for accurate frequency setting, crystal calibration must be used at each 100 kHz point and even then an intermediate 50 kHz point can be nearly 3 kHz out. The frequency drift measurements gave rather better results:



Time from switch on (minutes)	Frequency drift (Hz)
1	0
2	+32
3	+74
5	+144
10	+263
15	+351
30	+487
45	+551
60	+563

Resettability and backlash was better than 250 Hz which is quite good, bearing in mind the cord drive and the difficulty of putting the coarse cursor on an exact mark.

V.f.o. stability with ± 10 per cent mains voltage was excellent—better than 10 Hz and one of the best results recorded so far in any of this series of equipment reviews. As a point of interest, the u.s.b./l.s.b. switch does not " sidestep " the v.f.o. frequency to keep the calibration correct.

The Crystal Oscillators

Three l.o. crystals are supplied, with sockets for the other three necessary for full coverage of 10m. No trimming capacitors are fitted except on the b.f.o. crystals.

Nominal frequency (MHz)	Error
25·000	−1220
21·500	+456
32·500	+775
8·9987	−30
9·0015	−50

(Continued overleaf)

Signal-to-Noise Ratio and Sensitivity

Band (metres)	S/N Ratio 1 μV P.D.	Audio Output at 1 μV
80	26dB	1·1W
40	26dB	1·1W
20	26dB	1·2W
15	25dB	1·0W
10	27dB	220mW

These results are very good, and although the overall gain falls off on 10m, it is still adequate.

A.G.C.

Input relative to 1 μV P.D.	Audio output relative to that at 1 μV P.D.
+20dB	+8dB
+40dB	+13·5dB
+60dB	+17·5dB
+80dB	+19·5dB

The results were measured at 14 MHz on which the maximum overall gain was recorded. The a.g.c. performance on 28 MHz would probably not be as good.

The S-Meter

The handbook gives the S-Meter calibration as 50 μV (+ 34dB ref. 1 μV) for S9. This figure appears to be coming an international standard. On 21 MHz the calibration was correct and on the other bands, except 28 MHz, the calibration was good.

Meter Reading	dB Rel. to 1 μV P.D. at 14 MHz
S2	−7
S3	−1
S4	+4
S5	+10
S6	+15
S7	+20
S8	+26
S9	+31
S9 +10	+39
S9 +20	+47
S9 +30	+54
S9 +40	+60
S9 +50	+68

It is interesting that Hallicrafters appear to have decided upon 5dB per S point. The variation with band showed:

Band	dB rel. 1 μV p.d. to show S9
80 metres	+30
40 metres	+30
20 metres	+31
15 metres	+34
10 metres	+45

Birdies

The birdy performance was excellent. The only birdy found was on 21·330 MHz which was equivalent to 1 μV p.d.

Spurious Responses

The spurious response attenuation was on the whole very good. The worst was on 40m where a signal 9 MHz above the v.f.o. frequency produced a figure of 40dB. This is not a bad figure. The other spurious responses on all the other bands were 70dB down or greater—an excellent level for a tunable receiver.

Selectivity

The handbook gives selectivity figures for noise bandwidth, but no claims are made for skirt attenuation. The sales leaflet quotes a nose to skirt ratio of better than 1·8 : 1, but it is not said at which level the 1·8 ratio is taken. Conventionally (but not always) this is taken as the ratio of the −6 and −60dB bandwidths. Measurements showed 2·1 kHz at 6dB and 7·3 kHz at 60dB.

Strong Unwanted Signal Handling

The blocking performance was very good. The unwanted signal was fed in 20 kHz away from the wanted signal which was at such a level to give 14dB signal-to-noise ratio. The unwanted signal needed to be over 80dB above the wanted to degrade the signal/noise ratio by 3dB.

Intermodulation was measured as in previous reviews. The figure recorded was 56dB, a good result.

The HT46 Transmitter

General Description

The HT46 transmitter uses a six-crystal filter at 9 MHz. The i.f. is heterodyned to carrier frequency by an injection frequency which is generated in a manner identical to the SX146 receiver. For transceiver operation, the output from the mating SX146 receiver heterodyne mixer can be fed into the transmitter. The p.a. consists of a single 6HF5. Amplified a.l.c. is used to control the gain of the 9 MHz i.f. amplifier. As in the receiver the operation of the u.s.b./l.s.b. switch does not sidestep the v.f.o., so that on switching sidebands the v.f.o. frequency has to be retuned to the original carrier frequency. The v.f.o. is mechanically and electrically the same as in the SX146 receiver.

The microphone input has a sensitivity of 5 mV into a high impedance thus giving plenty of gain to suit all but the most insensitive microphones. VOX is not supplied as standard, but there is provision for an external VOX unit to be connected via a six way plug and socket. On c.w., keying is not break-in and there is no monitoring.

A rather surprising omission from the circuit is an aerial changeover relay. On the model supplied by Electroniques, a Magnetic Devices co-axial relay had been bolted to the rear of the case. The drive voltage for the relay coil had been extracted from inside the chassis as there is no external switching voltage available.

The transmitter is designed for fixed 50 ohm aerials and no loading adjustment is provided.

On the rear panel are phono sockets for injection frequency and aerial, a control outlet for interconnection to a mating receiver, VOX connection, bias adjustment, key jack socket, fuse and a large grounding terminal.

The a.c. mains input is for 105-125 volts only, so that an external auto transformer is required. This transformer is supplied free by Electroniques and is big enough to run both the SX146 and HT46.

THE HT46 TRANSMITTER.

TESTS

Power Output

As mentioned before, no loading adjustment is provided, but the results show that on 50 ohms at least this is not required. It is possible to drive the p.a. well beyond the maximum recommended input. In view of the fact that most amateurs will tune for " maximum smoke " and chance the possible unreliability, this method was chosen for the power output tests.

Band	C.W. Power Output	P.E.P. with 26dB IPs
80m	154 watts	80 watts
40m	154 watts	80 watts
20m	162 watts	128 watts
15m	154 watts	137 watts
10m	95 watts	54 watts

Carrier and Unwanted Sideband Suppression

These figures are controlled almost entirely by the crystal filter selectivity and balanced modulator suppression of carrier. The results on 14 MHz were good, being 47dB carrier suppression and 50dB unwanted sideband suppression. As supplied, the carrier balance controls had not been properly adjusted and the carrier suppression was only 30dB.

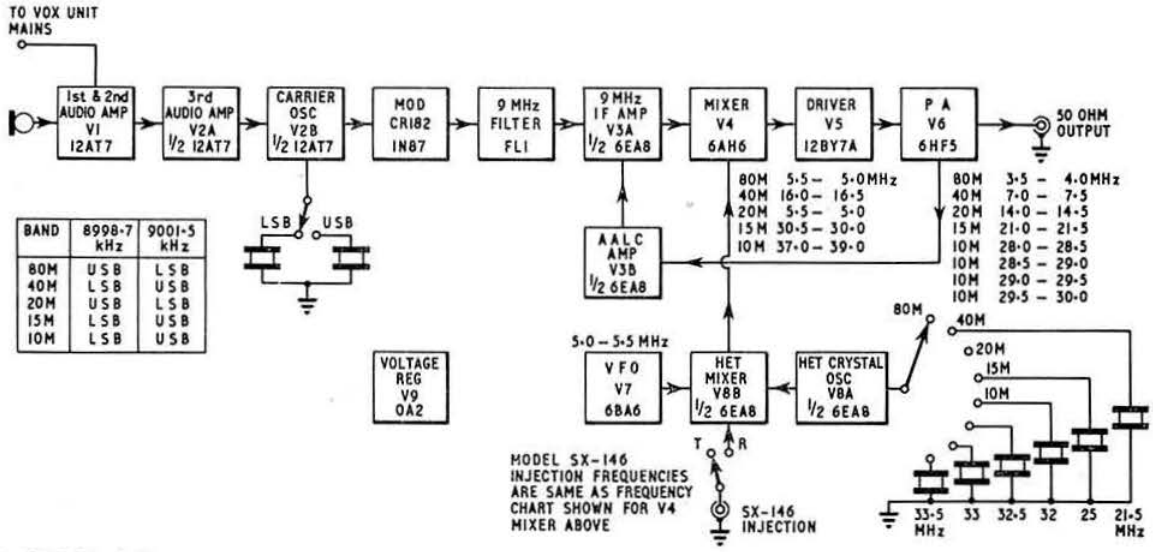
Transmitter Audio Response

The −3dB points were 620 Hz and 1·85 kHz with negligible ripple.

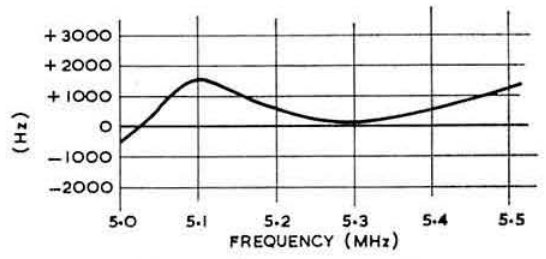
The V.F.O.

As in the receiver the scale was set centrally and the following measurements of linearity were taken.

(Continued overleaf)

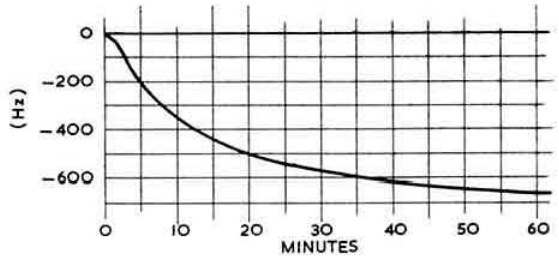


The HT46 block diagram.



Nominal frequency (MHz)	Error (Hz)
5·000	−579
5·100	+1652
5·200	+530
5·300	+70
5·400	+627
5·500	+1245

These results are considerably better than the receiver. The frequency drift pattern was very similar to the receiver, but curiously enough, opposite in direction.



Time from switch on (minutes)	Frequency drift (Hz)
1	−24
2	−45
3	−104
5	−197
10	−372
15	−454
30	−575
45	−628
60	−662

Both resettability and backlash were better than the receiver and rather better than one would normally expect with cord drive at 50 and 100 Hz respectively.

The variation of v.f.o. frequency with mains voltage was not as good as the receiver, but still very acceptable at + 20 − 60 Hz for ± 10 per cent variation.

The Crystal Oscillators

As in the receiver, only one of the 10m segment crystals is provided.

Nominal frequency (MHz)	Error (Hz)
8·9987	+20
9·0015	−379
21·500	+991
25·000	+596
32·500	+1170

TVI

The normal test site was used where, it should be remembered, Channel 1 is a barely acceptable picture. The results were the best of any equipment so far reviewed. The only channel not absolutely clear was Channel 1 which suffered slight interference from the HT46 on 10m and severe interference on 15m. Curiously enough the addition of a low pass filter to the HT46 and a high pass filter to the TV receiver made no difference.

MANUFACTURER'S SPECIFICATION—SX146

Frequency Coverage...	3·5 to 4·0, 7·0 to 7·5, 14·0 to 14·5, 21·0 to 21·5, 28·0 to 28·5*, 28·5 to 29·0, 29·0 to 29·5*, 29·5 to 30·0 MHz*.
* Crystals not supplied with receiver (optional).	
I.F.	9·0 MHz (8999·5 for 0·5 kHz filter).
Reception Modes	A.M.-C.W. and S.S.B.
Sensitivity, A.M.	Less than 1 μV for 10dB S/N ratio (30 per cent modulation).
S.S.B./C.W.	Less than $\frac{1}{2}$ μV for 20dB S/N ratio.
Selectivity	3 Positions: 500 Hz at 6dB down (not supplied). 2·1 kHz at 6dB down. 5·0 kHz at 6dB down (not supplied).
Stability	Less than 500 Hz drift in the first hour, after fifteen minutes warmup, and less than 100 Hz per hour thereafter.
I.F. Rejection.....	Better than 50dB.
Spurious Rejection ...	Better than 50dB.
In Band Birdies.....	Less than 0·25 μV equivalent c.w. signal, except 1 μV at 21·33 MHz.
Audio Power Output ...	$\frac{1}{2}$ watts with less than 10 per cent distortion.
Power Source	105 to 125 volts, 50/60 Hz.
Power Consumption	55 watts.
Number of Valves	10 (including calibrator tube) plus four diodes (including calibrator diode).
Aerial Input	50 to 70 ohms unbalanced; rear mounted jack accepts RCA type phono plug.
Audio Output Impedance	3·2 ohms; rear mounted screw terminals.
Headphone Output ...	50 ohms to 2000 ohms; panel mounted jack accepts standard $\frac{1}{4}$ in. phone plug.
Dimensions	5$\frac{1}{8}$ in. high, 13$\frac{1}{4}$ in. wide, and 11 in. deep
Net Weight	18 lb.
Shipping Weight	20 lb.

MANUFACTURER'S SPECIFICATION—HT46

Tuning Ranges.....	3·5 to 4·0, 7·0 to 7·5, 14·0 to 14·5, 21·0 to 21·5, 28·0 to 28·5*, 28·5 to 29·0, 29·0 to 29·5*, 29·5 to 30·0 MHz*.
* Heterodyne oscillator crystals not supplied with transmitter. (Transmitter will accommodate full set of crystals.)	
Types of Emission ...	S.S.B.—selectable u.s.b./l.s.b. with suppressed carrier. C.W.—keyed r.f. carrier.
Calibration Accuracy	Less than one pointer width error across the dial after indexing at 3·5 MHz.
Frequency Stability	Less than 500 Hz drift in first hour, after fifteen minute warm-up, and less than 100 Hz per hour thereafter.
Output Impedance ...	Fixed, 50 ohms. Rear chassis mounted receptacle accepts RCA type phone plug (supplied).
Power Input	S.S.B.—175 watts p.e.p. Maximum. C.W. 150 watts maximum.
Microphone Input	0·005V r.m.s. into high impedance load. Panel connector accepts standard $\frac{1}{4}$ in. three conductor phone plug.
Audio Response Overall	500 Hz (max.) to 2200 Hz (min.) at 6dB.
Distortion Products ...	26dB (min.) below p.e.p. reference.
Unwanted Sideband Rejection	50dB (min.) below p.e.p. output at 800 to 2200 Hz input.
Carrier Suppression Capability	50dB (min.) below p.e.p. output.
Power Supply Requirements	117V a.c., 50/60 Hz, 350 watts.
Dimensions Overall	5$\frac{1}{8}$ in. × 13$\frac{1}{4}$ in. × 11 in.
Net Weight	26 lb.

Keying

Keying is not break-in. It is very clean, the only slight criticism being a slight chirp.

HT46 and SX146

On the Air

The receiver handles well and the tuning control is smooth and precise despite the use of a cord drive system. The " S " meter rises very quickly and holds its reading long enough to allow accurate readings to be taken. Placing the equipments side by side gives a convenient layout since the panel arrangement of the receiver is a mirror image of the transmitter. One is able to have both tuning controls together or alternatively spaced sufficiently to enable both hands to be used.

Stations worked commented favourably on the speech quality and several stations were worked on 20m s.s.b. while using nothing more exotic than a trap vertical aerial.

On c.w. the absence of a monitor tone was an annoying drawback and it is surprising that on an equipment in this price range, no provision has been made.

Setting the v.f.o. near to the band edge was a rather tricky business and one feels that although the calibrator is an optional extra, it is most unlikely that anyone would use the equipment for very long before purchasing one.

The Handbooks

The separate transmitter and receiver handbooks are well presented and contain plenty of information on alignment and servicing. No handbook for any equipment previously reviewed has been better.

Guarantee

The guarantee lasts for ninety days from purchase, appears to be transferable and to cover labour and material. All transport charges have to be pre-paid by the owner. There is an understandable let-out clause concerning misuse, which is a point to bear in mind when tuning for " maximum smoke! "

Conclusions

There is no denying that the SX146/HT46 represents one of the most expensive combinations available on the British market. For this high cost it is not normally expected to have so many optional extras. However, the tests show that the units supplied meet the spirit of the quite extensive claims made by the manufacturer.

Electroniques Comment

The review appears to be very factual and fair, and the only point that we would make concerns the comment that the coaxial relay is not included in the equipment. These units are, of course, sold individually and not as a two-part transceiver, although of course they are of matching design and can be most conveniently used together.

BOOK REVIEWS

ELECTRONICUM*

Recently published in East Germany by a military printing organization this is described as an amateur communications and electronics handbook, but it would serve a very useful purpose on the bookshelves of many professionals in the electronics industry.

Just over half of the more than 700 pages are devoted to the fundamentals with full descriptive literature amply supported by the necessary mathematics without becoming too theoretical. Components are well covered and both valve and transistor circuits are dealt with. Most of the circuits used for illustration include component values. The latter half of the book deals with practical applications in the fields of line and radio communication, television, magnetic recording, radio links, measurements and measuring equipment, automation and computer techniques.

The book, to which a dozen or so specialist authors contributed, is well illustrated and those with sufficient knowledge of German and an interest in its contents would find it a useful addition to their literature.

Unfortunately, and it is to be hoped not typically, the specimen submitted for review had some 16 pages duplicated in place of the same number missing completely.

E. Glazebrook, G3KEW

** Edited by Ing. Karl-Heinz Schubert (DM2AXE) and published by Deutscher Militarverlag, Berlin-DDR. 780 pages, 8½ in. × 5½ in. Price 19.80 DM.*

ELEKTRONISCHES JAHRBUCH 1968*

Published by the same organization as *Electronicum* this pocket book is a collection of articles written by specialist authors with the interests of the radio amateur and electronics enthusiast in mind.

One wonders whether a book of this nature is a suitable medium for a political article on the Vietnam war, which this book leads with. One would not expect to find politically slanted quotations from the American magazine *Electronics* printed here and there throughout the book.

These considerations apart, the rest of the book is quite well presented. The first few articles deal with various aspects of electronics at the forefront of development. These are followed by some for the radio amateur including circuit techniques for direction finding, frequency measurement in the u.h.f. band and shortwave receiver circuits. Then come eight constructional features for the radio amateur and electronics enthusiast.

The last fifty of the 300 pages contain items mainly of interest to nationals of the country of origin. The 20 page appendix contains useful abacs, data and formulae relevant to Amateur Radio.

E. Glazebrook, G3KEW

** Edited by Ing. Karl-Heinz Schubert (DM2AXE) and published by Deutscher Militarverlag, Berlin-DDR. 315 pages, 7½ in. × 4¾ in. Price 7.80 DM.*

THE MONTH ON THE AIR

By JOHN ALLAWAY, G3FKM*

SINCERE apologies for three errors in recent *QTH Corners*—in the March issue the QSL Manager of ZF1DX is incorrectly given as K6KDX—this should have read K6KDS. Fortunately the address given was K6KDS's, so that cards sent to it have been directed to the right place. The second error concerns the QSL Manager given for VR2CC in the February issue—this was given as VE3DLC, but information received since has shown this to be incorrect and in fact VE6AKV is in charge of the matter. Lastly, a letter from George Barrett, ex-ZD7IP, points out that the address given in April *MOTA* is incorrect. Unfortunately the information concerning both his address and the QSL Manager for VR2CC were copied from other sources. Whilst every effort is made to repeat only correct information your scribe asks to be forgiven for repeating what appears to be genuine!

G3HCL, who was at one time 9M2LO/9M6CL, points out that the old Federation of Malaya is now split up into a number of separate units—9M2 (W. Malaysia), 9M4 and 9M6 (Sabah, formerly British North Borneo) and 9M8 (Sarawak) which together constitute East Malaysia for DXCC purposes. Reference to the old Federation on correspondence is no longer appreciated.

G3RIA reports a 148 minute QSO with W0NYJ on 15m c.w., and says that he would like to form a "Two Hour C.W. Club" with appropriate certificate of proficiency! Anyone interested is invited to drop him a line at 90 Christian Fields, London, SW16.

Standard Frequency Transmissions

Many amateurs seem unaware of the fact that there are a number of standard frequency transmissions audible in Europe besides the WWV/WWVH signals which have become less audible since their source (WWV that is) was moved to Colorado. MSF, Rugby, puts out continuous transmissions on 2·5, 5, and 10 MHz and transmits during the first and then each odd five minute periods of every hour. On 5 MHz transmissions are put out by HBN (Neuchatel) during the even five minute spells, and both HBN and MSF are silent for the five minutes before the hour to enable listeners to copy time signals from RWM-RES (Moscow). MSF and HBN transmit pulses at one second intervals. The 2·5 MHz channel is shared with OMA (Prague) which transmits a 1000 cycle note for four minutes commencing at 4, 16, 31, and 46 minutes after each hour. The Radio 2 (Light Programme) transmitter's frequency is held at 200 kHz with great accuracy for those requiring a lower frequency check. Fuller information on these and many other standards are to be found in the Society's *Radio Data Reference Book*.

News from Overseas

Roger, ex-VS9ATI, is now stationed in Cyprus and has a ZC4TI call-sign. He says that he would be grateful if all correspondence could be sent to him at his new address as given in *QTH Corner*.

SV1AB reports (via G3FNJ) that he has been having daily QSOs with ZE7JX on a.m. phone on 6m between 14.00 and 15.00. SV1AB has been working cross band, his own frequency being 21,360. ZE1AN has also been worked. Both Rhodesian stations are looking for European stations daily between 21,360 kHz and 21,370 kHz for more cross band contacts. The beacon stations ZS6VHF (50,100) and ZE1AZC (50,050) may be used to give an indication of propagation conditions. George says that propagation via the Van Allen belt is likely.

A letter from the Secretary of PZK (the Polish national radio society) points out that it is now easy to obtain a temporary SP licence. All that is needed is that applicants should send a photocopy of the UK licence together with their request (addressed to the Polish GPO—Ministerstwo Lacznosci, Biuro Koordynacji Lacznosci Radioweg, Warsaw, Plac Malachowskiego 2, Poland) when they apply to the Polish authorities in the UK for a visa. It is also advisable to send a copy of the application to PZK, who have very kindly undertaken to help at their end. PZK's address is Skrytka Pocztowa 320, Warsaw 1, Poland. It should be pointed out that only *fixed* licences are available—no mobile SP licences are issued. Your scribe would like to thank the Polish authorities for helping to further the cause of international friendship and understanding.

Information received from 9L1GQ (G3OPF) gives details of the successful trip made by 9L1's DW, GQ, JL, KZ, TL, and SL to Banana Island during the weekend of 23 March. The island is five miles off the coast of Sierra Leone, and the Radio Society of Sierra Leone was given the special call-sign 9L2SL for the station. They were on the air for a total of 22 hours 5 minutes, and made 360 contacts. Eleven of these were on 80m, GI3OQR, G3NJY, G3RJH, and GM3NKO being the only UK stations worked on this band. The equipment consisted of a KW2000 transceiver with a G5RV aerial for 20, 40, and 80m, and a ground plane on 10m. In all 45 different countries were contacted.

The UAMPT, which is a union of the French speaking African countries concerned with telecommunications, is reported by *NARS Newsletter* to be strongly in favour of Amateur Radio. At a meeting of the organization in the Niger Republic last November a resolution was passed

* 10 Knightlow Road, Birmingham 17. Please send contributions for the **June** issue to arrive by **13 May**, for the **July** issue by **12 June**, and for the **August** issue by **15 July**.

recommending that each member country permit Amateur Radio equipment to be imported duty free. It is not yet known whether any country has put this into effect, but it seems a very encouraging step towards greater activity from the African continent.

Alan Hemming, ZD9BE, writes to say that there appears to be some pirate ZD9 activity. He has been receiving QSL cards for non-existent stations such as ZD9's AA, AH, AC, AL, AM, AR, DB, FV, MZ, and RA (AA, AL and AM *were* legal several years ago). The only genuine calls at present are ZD9BE (until June 1969), ZD9BG (until April 1968), ZD9BJ (until July 1968), and ZD9BH (Gough Is., until April 1968). All previous calls are now invalid and the next to be issued will be BK, BL, BM, etc. There are currently no applicants waiting for these calls. Alan says that he is now on 20, 15, and 10m when time permits, and hopes to have a tri-band beam soon. Due to the fact that he now runs the local broadcast service (on 3290 kHz) on Wednesday, Friday, and Sunday nights, and also because Tristan is no longer the charming, quiet place it was he is not as active as he would like to be. He suffers from intentional QRM from " breakers," but passes along a word of praise for the UK and US stations, whose behaviour provides a welcome contrast to that of some of the continental Europeans.

Top Band News

A special bulletin from Stew, W1BB, says that there was an excellent opening between the US and Kenya at sunset (US time) on 23 March. 5Z4LE's signals on 1827 kHz were audible from 23.20 to 00.10, peaking RST 589! During this opening Stew made the first W/5Z4 contact on Top Band (incidentally, his 99th country on the band) and was followed by six other W's, one of whom was on s.s.b. On the following day 5Z4LE's signals were much weaker and no W's were worked, but QSOs were had with G3SED and DL9KRA. The same day W1BB worked ZC4RB.

At the suggestion of G3SED some kind of Transcontinental DX tests are under consideration for the 1968/69 season. These would involve experiments over the Japan/Europe path and JA3AA is interested to hear from anyone with ideas on the subject. His QTH is Isaji Shima, 1137 Furuichi, Habikino, Osaka, Japan.

Awards

The Venice section of ARI is offering a certificate to those who can produce evidence of having contacted (or in the case of listeners, obtained confirmed reports from) at least 10 stations in Venice province since 1 January, 1963. Non-European applicants need only five QSLs for the award. Confirmations plus 10 IRCs should be sent to ARI, PO Box 181, Venice, Italy. The **Diploma Serenissima** may be applied for on phone, c.w., or mixed modes.

The **Worked Brazilian Regions** (WBR) Award is obtained by working the appropriate number of PY stations to obtain 80 " points." (Stations outside the Americas and Europe need only 50.) Each contact is worth the number in its prefix (e.g. a PY8 counts eight points). Brazilian CHC members count 10 points, and PY0s count nil. A certified list plus five IRC's should be sent to: PY2BDU, PO Box 92, Mococa. SP, Brazil. This certificate is also available to listeners.

To mark the 50th anniversary of the USSR the Central Radio Club is issuing the **" SSSR 50 " Award.** To obtain it European stations must contact at least 50 Russian stations during the period 1 November, 1967 to 31 December, 1968. These must include at least two in Leningrad, at least two in Moscow, and at least one in 10 of the republics. The republics consist of UA1-0, UB, UC, UD, UF, UG, UH, UI, UJ, UL, UM, UO, UP, UQ and UR. A detailed GCR list plus QSL cards for the stations worked should be sent to the Central Radio Club, PO Box 88, Moscow, USSR.

A number of awards are being given out by the " Algarve Gang " (Portugal). All should be applied for by sending a certified list of QSLs (signed by two amateurs or a radio club) plus six IRC's to the Algarve Gang, c/o Paulo Vieira, Apartado 93, Faro, Portugal. The **" Algarve Award "** is acquired by working two of the following: CT1s BN, HL,

Marcia Guest, WA4SBK, who was born in London and is a member of the Ex-G Radio Club.

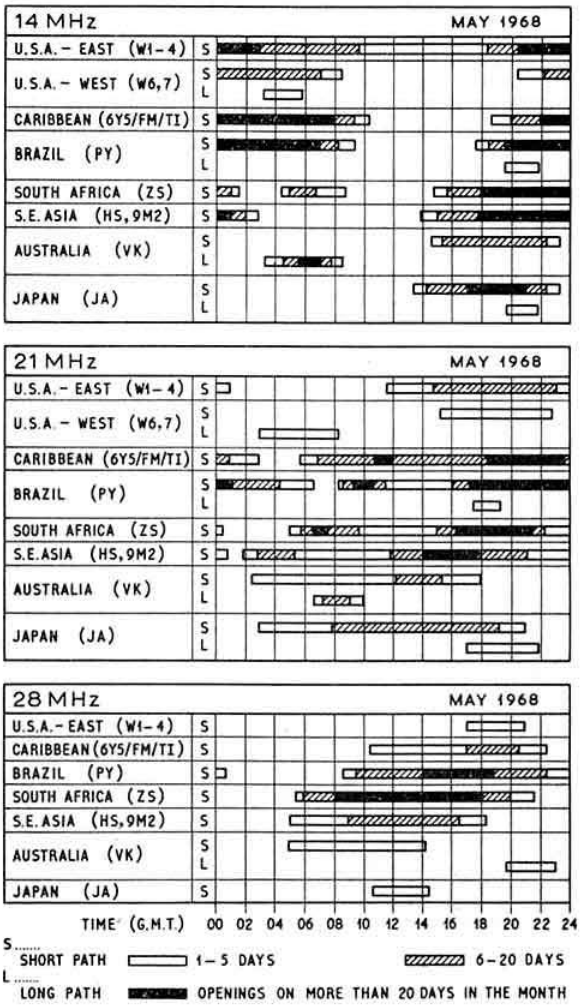
G3LQB/SP5—Ken, operating from the QTH of SPH5S last summer, was the first G officially licensed to operate in Poland (see text).

JR, LN, LQ, MU, NW, OD (1964/65), TO or HB (1960). The "**Algarve Community**" award requires contact with at least five members from this list with the addition of CT1s AW, NK, and OG, CR4s AG and BH, CR6s DX, DY, EQ, EU, EI, HJ, KT, JM, and GV, and CR7IZ and GV. The "W.5.O" is for contacts with Maritime Mobiles in 3, 4, or 5 oceans. The "W.10.MM.C" for contacts with /MM stations from 10 different countries.

Contests

The **YL International SSB'ers 1968 QSO Party** begins at 18.00 17 May and ends at 01.00 19 May (both phone and c.w.) the c.w. section ending at 01.00 20 May. The same station may be counted on different bands and modes for points but not multipliers. Besides single operator entries there are DX/W and YL/OM team categories. Exchanges consist of RST, Name, S.S.B. Number (if any), state or country, and zone. QSO points are as follows—between members four, member to non-member two, between non-members nil. C.w. contacts count double. Total score is total points times a multiplier which consists of the sum of different prefixes, countries, US states, VE provinces, zones, and teams (where both members have been worked). Logs must show six hours rest in each 24, and must be posted within 30 days to WA6MWG, 4040 Via Opata, Palos Verdes Estates, Calif., USA, 90274. Summary sheets may also be obtained from this address.

The **1968 CHC/FHC/HTH Annual QSO Party** is open to all amateurs and listeners and will take place between 23.00 31 May and 06.00 3 June. CHC members give QSO number, report, name, CHC number, state and county (or equivalent). Others give all but the CHC number, and are known as "HTH"ers. Contacts between CHC members count one point, CHC/HTH two points, CHC/Novice HTH three points, YL or FHC contacts are worth one more point. The multiplier in this case is the total countries, continents, VE provinces, and US states worked (KH6 and KL7 count as countries and states). There are several trophies awarded by



Propagation Predictions

Determined by the conditions of the ionosphere May is a typical summer month. In the northern hemisphere the F2 m.u.f's are relatively low during daytime and do not fall as far during the night as in winter. The low daytime F2 m.u.f's are most noticeable on 28 MHz with North American contacts. The almost certain possibility of making contact during winter becomes less and is limited to a few days only. For contacts with South America and Africa this effect is less pronounced, as the F2 m.u.f.'s remain relatively high around the equator, even in summer. Short-skip conditions usually set in during May, and quite suddenly and unexpectedly produce European contacts on 28 and 21 MHz at excellent signal strengths during favourable periods of the day. Signals will, however, disappear just as quickly as they appeared. Changes on 21 MHz are less marked. On favourable days there will still be opportunities for contacts with Eastern USA in the afternoon and evening. In the afternoon, however, the attenuation is still relatively high. The start of the southern winter is noticeable by the absence of contacts with South Africa in the latter half of the night on 21 MHz. In the afternoon the attenuation in this direction is mostly too great. Australia will probably be workable in the morning on this band via the long path. On 14 MHz most DX working will take place during the night. During the day the high attenuation will prevent DX contacts. In the afternoon, however, on favourable days contacts should be possible with South Africa, South-East Asia, Australia and Japan. In the morning Australia should be workable via the long path. On 7 MHz DX contacts are basically possible when the transmission path lies in darkness. However, the reliability of the contact will frequently be affected by atmospheric disturbances and QRM from European stations. 7 MHz is most suitable for local QSOs all day long. Indeed, signal strengths in the afternoon are greater than on 80m. On 3·5 MHz there will be good opportunities for local contacts throughout the day, without interruption by the dead zone in the latter half of the night, which happens frequently during the winter, especially during a sunspot minimum.

The provisional sunspot number for Zurich Solar Observatory for March was 92·4. Solar activity was greatest during the last week of the month. Predicted smoothed sunspot numbers for July, August and September are 115, 113 and 111 respectively.

England CHC Chapter 8—one each for the top European CHC'er, HTH'er and SWL. Frequencies to be watched are 3575, 7030, 14,075, 14,230, 14,340, 21,090, 21,330, 21,440, 28,090, 28,800, 28,690, and 29,140 kHz. It is advised that application forms be obtained from K6BX (s.a.e. and IRCs please), 3212 Mesa Verde Rd, Bonita, Calif., USA 92002.

REF announce a competition to commemorate the centenary of Dr Gustave Ferrie. This will run from 12.01 25 May to 18.00 26 May, and is c.w. and phone on all bands 3·5 to 435 MHz. Stations may be worked again on the same band on a different mode provided that there is a 15 minute period between the QSOs. Exchanges consist of RST plus serial number of contact. Points are awarded on the following basis: one per QSO, 10 for each band worked, and a further 10 for each mode of transmission on each band. Logs must show date, time, band, exchanges, and each QSO which gives surplus points (e.g. new band/mode) should be underlined. Logs should be sent before 1 July to REF, BP 49-01, Paris RP, France. Each participant will receive a commemorative card and the leader in each country an award.

A number of QSO Parties are due to take place during May, these include the **Nebraska QSO Party** (16,00, 4 May to 22.00, 5 May), the **Georgia QSO Party** (21.00, 1 May to 03.00, 13 May), and **Michigan QSO Party** (21.00, 18 May to 03.00, 20 May). These are all excellent opportunities for those seeking the more elusive US counties. Exchanges in all cases consist of report and QTH; and QSOs count for 3, 2, and 1 points respectively. Multipliers are the number of counties worked in the respective state. Frequencies to be watched are 7025, 14,070, 14,290, 21,070, 21,370, 28,050 and 28,600 kHz (Nebraska), 7030, 14,060, 14,290, 21,060, 21,410, 28,060, and 28,600 kHz (Georgia), and 7060, 14,060, 14,240/340, 21,060, 21,310/410, 28,060 and 28,750 kHz (Michigan).

DXpeditions

The projected **Brunei** expedition is now expected to materialize on 30 May and to be on the air until 2 June. Due to lack of funds VS5RCS will be operated by 9M2NF only, and he will deal with all QSLs.

The recent trip to **St. Peter and Paul Rocks** may be repeated in October. It is also reported that PY4BLR will be going to **Trindade Is.** on 10 May and will be on the air from there for 30 days using the call-sign PY0BLR. Frequencies to be used are given as 7005, 14,045, 14,196, 21,045 and 21,295 kHz, and operation is expected to be mostly on c.w. It is understood that Ton does not speak English.

Rumours continue to circulate concerning possible activity from **Farquhar Is.** One source suggests that VQ9DH will be going there for a week sometime during June or July, and another that VQ9B and VQ9V may appear from there at any moment.

WB4APC, at present in Saigon, hopes to make a short expedition during September or October. The actual location is not decided but Lord Howe Is., Thailand, and Taiwan are mentioned by Billy in a letter to G3FKM. He would appreciate information from readers on the licensing situation in Malaysia, Hong Kong, Singapore, as well as the three countries already mentioned, and would also very much like to hear from anyone in these countries who can lend him equipment or assist with reservations and operating permits. Information should be sent to: SSG Billy L. Nielsen, RA 17377233, HHC, 199 Inf. Bde. (SEP) (LT), APO San Francisco, USA, 96279.

One of the most consistent signals from the Pacific, Van, W4UAF/KH6 is very clear most mornings on 20m. He is, of course, a member of the Ex-G Radio Club.

DX Briefs

As previously mentioned Mexican stations are now using the special 4A1-4A3 prefixes to commemorate the 1968 Olympic Games. It is understood that a competition is being held to see who can work the most Mexican stations on all bands 80 to 2m between 31 March and 31 December. Stations may be worked once on each band, and gold and silver medals and diplomas will be awarded to the top scorers.

Although the Indonesian Government has not yet notified the appropriate authorities that its amateurs may contact stations outside Indonesia there is considerable activity from that country. A number of PK8s in Bandoeng, and PY7MAA in Semarang, as well as PK1SH have been worked.

Art, VR4CR, is due to leave the Solomon Is. in a few months time. His place as only active station from there will be taken by VR4EK who is stated in US news sheets to be the first permanent VR4 on s.s.b. and to be going to be on the island for two years.

HB0TU has now left Spanish Guinea, but another operator is expected to be on from EA0 soon. EA0AH has been quite active since mid-March and is said to have equipment for s.s.b. on several bands. It is believed that EA0TU QSLs are now being accepted by ARRL for DXCC credit.

Hal, G3NMH, reports that VP8IE, who has made many contacts from South Georgia, was due to leave there on 3 April.

UA1KFT appears to be located on Novya Zemlya (between Franz Josef Land and the Arctic coast of the USSR). Another currently active station in the far North is JW2BH, Bear Is. (part of Svalbard)—he is said to have a sked on 14,105 kHz at 15.00 every Saturday.

A new station is reported to be active from Swaziland. This is ZD5V, who is ex-G3UUK, and who has been on since 4 March with a KW2000A and a dipole. He hopes to have a beam up soon.

DXpedition of the Month hope to be sending out QSL for contacts with VQ9JW (since 1 March) in the near future. They are also dealing with cards for CN8GE.

According to K6KDS, the current " ZF1DX " is not legal. Only contacts between 20.30 23 October and 18.30 28 October were with the genuine licensee.

Band Reports

Many thanks to the few who observed the early deadline for this issue of *MOTA*. Would readers note that the dates given at the conclusion of this section are the absolute deadline, and material received one day later cannot be used? Contributors this month include G2HKU, GW3AX, G3NMH, G3SML, G3TBK, G3WBN, G3XDV, G4MJ, G5LF, G8JM, G8VG, BRS27683, BRS28198, A5390, A5459, A5637, A5662, A5801, and A5852.

The h.f. bands have really not provided the excitement expected this spring, and since the sunspot maximum appears to be upon us we must apparently accept the fact that the excellent conditions existing at the last maximum were in fact due to a peak in the 200 year cycle. However, with the very much improved equipment now available it should still be possible to work a great deal of DX regardless of sunspot activity. Some of the more interesting stations observed during the past month are listed below (c.w. stations in italics, the rest s.s.b.).

160m. PA0BRM (22.43), ZB2AY (22.40, on c.w. at 00.37), *ZC4GM* (22.30), ZC4RB (22.00, 23.00, S9+10dB).

80m. ZL5AA (Antarctica. 09.40).

40m. CR6IV (20.30), EA8EZ (22.00), JA2BTV (20.20), OA4NBU (06.31), OY7S (20.34), PX1PA (06.00), PZ1CF (21.15), TA1KG (21.30), TI2JIC (07.50), VQ9JW (20.30), ZS1JA (20.30), *3A0EJ* (23.48), 5Z4KL (20.48), 9M2NF (20.30), and 9Q5TO (20.22).

20m. Now open all night. CE9AT (S. Shetland Is. 00.20), CE3CZ/CE0 (07.04), CR4BL (21.42), DU1DBT (17.41), EA0AH (20.05), FB8WW (16.51), *FG7TG* (22.00), *FK8BG* (08.00), FO8BY (06.35), FR7ZN (21.00, PO Box 65, St. Denis, Reunion.), HK0BKW (21.35), HR6EB (22.14), JW5YG (16.29), JX6RL (20.25), KC4USA (19.00), KH6EDY (07.41), KJ6BZ (07.25), KL7's (07.30 and 21.40), KM6BI (07.03), KW6EJ (07.00, 16.00, 20.25), LU7MAL (L.P. 15.50), TA2BK (13.40), TR8AG (20.15), VE8RCS (16.37), VK8NO (07.00), VK9KS (07.17), VP1LL (YL op. 22.16), VP5CB (Caicos. 15.22), VP8HZ (L.P. 11.15), VP8JG (G3UAU on Stonington Is., Antarctica, 20.20), VQ9V (19.50), VR1L (07.00), W2ZXM/MM (Capt. Kurt Carlsen of *Flying Enterprise*), K8NHW/XV5 (Saigon, 21.30), ZD8J (22.00), ZD9BE (20.05), ZL5AA (08.59), 3A0EK (08.20), 4S7PB (16.40), 5W1AR (ex-ZK1AR, 09.47), 8R1S (23.45), and 9K2BV (19.10).

15m. CP6EK (21.55), FW8WR (16.35), HR1JMF (14.10), KG6ALI (12.55), KG6SC (Saipan. 12.23), KX6BU (11.50), KX6KJ (09.48), VK9GN (11.21), VK9LR (10.57), VK's (07.30-11.00), VP8AA (21.05), *VQ9B* (09.00), ZL's (07.45-09.30), 4S7SB (18.18), 5W1AS (09.41), and 9G1FV (09.20).

10m. CE8CH (19.45), CE0AE (Easter Is., 20.08), EA0FG (17.19), EL2AO (16.54), ET3USA (15.00), HC1PC (18.28), HS3DR (11.52), JW2BH (15.32), OA2AG (17.55), OD5LX (15.48), TI2IO (18.27), VK's (10.00-12.00), VP2SY (16.28), VP8HZ (13.59), VP8JB (18.27), VQ9JW (12.45), VS6CO (16.00), VU2KX (10.50), XW8BS (10.18), ZD7KH (14.32), ZD9BE (17.20), ZL3UY (09.33), 5LZ2PL (Liberian A.R.C.), 5R8AX (14.54), 9K2BV (14.38), 9N1MM (10.27), and 9V1OV (10.35).

Sincere thanks are extended to the following for their permission to use information from their publications: *DX'press* (PA0FX), *NARS News* (5N2AAF), the *L.I.DX.A. Bulletin* (W2GKZ), the *DX'er* (K6CQF), *DX News Sheet* (Geoff Watts), the *Ex-G Radio Club Bulletin* (W3HQO), *QUAX* (SM4DXL), the *DX'ers Magazine* (W4BPD), the *West Gulf DX Bulletin* (W5QK), the *Florida DX Report* (W4BRB), *CQ DX* (ARI), the *HKARTS Newsletter*, *QUA* (ZE1BW), *Canada* (VE3DLC), and *Auto Call* (K0NL). Please send all items for the **June** issue **to reach G3FKM** no later than **13 May**, for the **July** issue by **12 June**, and for the **August** issue by **15 July.**

QTH CORNER

AP2SG	Box 65, Lahore,W.Pakistan.
EA8CI	via K4DI, Gerald Martin, 1840 Hibiscus Drive, North Miami, Fla., USA.
FH8CF	PO Box 72, Moroni, Comoro Is.
HK0BMO	PO Box 18, San Andres Is.
HC8RS	via SM5EAC, Ake Broman, PO Box 6, Mjolby, Sweden.
IT7GAI	IT1GAI, Dr. G. Giudice, Via San Giovanni, Noto, Siracusa, Sicily.
JW2BH	via LA5YJ, Bjorn Hugo Ark, PO Box 3503, Trondheim, Norway.
KG6SK	PO Box 48, Capitol Hill, Saipan, Mariana Is., 96950.
VK1EC	VK2AWW, 27 Schultz Rd., St. Marks, NSW, Australia.
VK9RJ	R. J. Wirth, c/o OTC, Nauru Is., Central Pacific.
VQ8CS	Jules Labat, Commercial Centre, Rose Hill, Mauritius.
VQ8CJ	Jimmy Hassan, 38 Trotter Street, Beau Bassin, Mauritius.
VR2CC	via VE6AKV, 7612 23rd St. SE, Zone 21, Calgary, Alberta, Canada.
VS5RCS	via 9M2NF, D. A. Bowden, R. Signals, 1st Regt. Malaysian Sigs., c/o GPO Kuala Lumpur, Malaysia.
VS9ATI	Roger Beetham, BFBS, Dhekelia, Cyprus, BFPO 53.
ZB2BM	RAF Station, North Front, Gibraltar.
ZC4TI	see VS9ATI.
ex-ZD7IP	George Barratt, 92 Newport Road, New Bradwell, Wolverton, Bucks.
ZF1ES	(Direct Address) Box 293, Grand Cayman Is., West Indies.
4A2YP	via DL7FT, Franz Turek, Petunienweg 99, 1 Berlin 47, Germany.
4W1RC	via HB9RC, Max Matter, Bruekfeldstr. 38, Berne, Be., Switzerland.
7Q7BM	via WA0AGY, Harry Moon, 775 Union Av., Boulder, Colorado, USA.
7Q7PAX	PO Box 700, Blantyre, Malawi.
7Z3AB	via W4HEG, Willard Brown, 1606 May Av. SE, Atlanta 16, Ga., USA.
8P6BU	Now via WB2UKP, Charles Moraller, 70 Silverbrook Rd., Shrewsbury, NJ 07701.
9L2SL	via K4MQG, Robert Dixon, 1114 Crestview Dr., North Augusta, SC, USA.
9Y4DS	via K9KLR, Nick Lash, Box 1816, Gary, Indiana, USA, 46409.

RSGB QSL Bureau, G2MI, Bromley, Kent.

1968 COUNTRIES TABLE

	160m	80m	40m	20m	15m	10m	Total
G8JM	—	—	—	124	57	47	228
G3IAR	—	31	10	28	26	15	110
G8VG	5	15	17	15	26	38	116
G3TBK	—	1	14	9	12	14	50
G3VPS	11	14	5	16	—	—	46
G3ING	9	11	12	5	11	7	55
G3XDV	13	—	6	12	—	10	41
G3PQF	6	2	8	5	3	14	38
A4886	11	55	47	171	90	64	438
BRS25429	3	53	43	132	88	71	490
A5390	4	13	15	110	92	87	321
A5662	11	28	17	84	52	60	240
A5466	3	20	17	79	27	12	158
A5154	—	11	4	91	39	28	173
A3942	14	38	36	58	60	50	256
A5126	2	21	28	66	37	33	189
BRS28198	2	32	43	28	10	79	194
A5489	—	7	5	58	36	37	143
A5135	2	5	10	50	11	10	88
A5610	10	71	17	35	25	31	191
A5459	7	22	7	43	12	11	102
A5437	3	24	3	19	18	6	73

(This month's table is in order of 20 plus 40m totals)

FOUR METRES AND DOWN

By JACK HUM, G5UM*

THE Convention coincides with production of this number of *Radio Communication* so a report must wait until next time: but Convention aside, the big news in the past month has been the advent of Class B licensees on to 2m. It should be recorded that the date when this happened was Friday, 22 March. That day a few G8-plus-three men appeared on the band hard upon the news of the release of the facility in the *London Gazette*: but it was on the evening of the next day, Saturday, 23 March, during the Cumulative Contest, that the real impact of a large number of new stations on " Two " was felt, for there seemed to be almost twice the usual number of people around to be worked—and half of them were the welcome newcomers to the band, many already equipped, it was noted, with crystals for the correct 2m zone.

After the 2m Cumulative had run its 90 minute course there was a significant emptying of the band: it seemed fairly evident that a large proportion of the G8-plus-three operators had dived down to 70cm for the u.h.f. leg of the Contest. This should have given comfort to those who feared that to give Class B men 2m would cause neglect of 70cm, which they have been so instrumental in developing. It seems to us that after the first fine careless rapture of using " Two " has worn off there will be a balanced occupancy of *both* bands. In any event so many hundreds of G8-plus-three operators have a heavy equipment investment in " Seventy " that it seems unlikely that they will allow it to remain unused.

To increase the occupancy of *any* of our v.h.f. bands can do nothing but good (see what was said on this subject on page 112 of the February *Radio Communication*), and Class B members' activating of " Two " as well as 70cm is a welcome development.

Modes

In their enjoyment of the 2m band there is one area that will remain denied to the Class B licensees, and that is the c.w. segment from 144·0 to 144·1 MHz. The existence of this may well prompt many of them to go for the class A ticket if they detect activity going on there, and especially if they take note of the following:

" Measurements of signal-to-noise ratio required for c.w., s.s.b. and d.s.b. mode reception show that with an average operator c.w. has a 17dB advantage over d.s.b. and 14dB over s.s.b. From CCIR propagation curves it may be estimated that under usual conditions encountered in amateur service a signal increase of 1dB increases the average effective communication range of a station by more than 10km, this approximate rule being valid for 14 as well as for 430 MHz."

This is a quote from the latest IARU Region 1 Newsletter (thanks G2AIW) which discusses the advantages of the telegraphy mode of transmission. We quote further from it:

" To learn code and to build in a b.f.o. into the receiver is therefore by far the most effective and economical improvement possible. There are still many advantages to be gained by the use of c.w.: it is possible to work the same station with nearly 100-times less power than on phone and thus to reduce TVI, occupied bandwidth is reduced, reception may be more selective, equipment is very simple, etc.

" Moreover it may be supposed that re-introduction of c.w. to v.h.f. bands could help to overcome the lack of activity on v.h.f. bands by offering extended range and therefore new partners to the average v.h.f.-man who begins to be tired of talking repeatedly with the same v.h.f. stations."

Putting precept into practice, some of our Continental friends in advocating more c.w. operation in contests have plans for recommending that next year's March event should be all-telegraphy for IARU Region 1 countries. (Without wishing to anticipate any action which may be taken by our own V.H.F. Contests Committee one feels that this proposal might call for exchanging the RSGB January c.w. event with the traditional March " Open "—or even having *two* telegraphy events on " Two "!).

What is worth noting is that Czech licences have been endorsed to assign 144·0 to 144·15 MHz solely to code; and as for 70cm, modes other than c.w. are forbidden in the area 432·0 to 432·5 MHz—half a meg. for telegraphy. This regulation may well demand some rethinking of a proposal heard in the UK to put sideband on 432·1 " because that's where the Continentals look." In Czechoslovakia, at least, they don't.

* * *

Coming back to c.w. on " Two," someone who needs no reminding of its potential is Albert Latham, EI6AS, one time G3JLA. Out on a DX limb to UK operators, he would get few contacts if he didn't use it. Disappointed though he is to the response to the " Friday Night is All Ireland Night " concept, he nevertheless plugs away every Friday at 10 p.m. clock time in the hope that some of the men across the water will have heeded the often-voiced exhortation to turn beams westward.

" For most of the time I tune across the c.w. section," he says, " and use 144·050 MHz more often than any other frequency . . . now the winter is behind us a reminder about Friday nights may stir up some interest again."

* * *

To round off this piece about telegraphy on " Two " it should be reported that in the last of the Cumulative

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* Houghton on the Hill, Leicester LE7 9JJ. Send reports for the **June** issue to arrive not later than **10 May**, and for the **July** issue by **10 June**.

UK to US on "23"

In the April Earth-Moon-Earth transatlantic tests on 1296 MHz, Peter Blair, G3LTF, of Chelmsford, Essex, worked W2NFA, New Jersey, early on the mornings of 13 and 14 April. Full story next month.

The W2NFA moon-reflected signals were heard by OZ8EME and worked twice by HB9RG.

contests—that for c.w. only, on April 6—there was a noticeable increase in the level of activity between 144·0 and 144·1 MHz. " Conditions normal, and if anything GB3VHF is weaker than usual " said several Yorkshire operators; yet in spite of all, contacts-by-the-key extended to 200 miles or more.

Still in the contest field, over now to . . .

Century on "Seventy"

Saturday, 6 April, also saw the last of the 70cm Cumulatives. These, as was the case last year, may prove to show a larger turnout on 432 than on 144 MHz, though the point must be made that many people feel disinclined to tot up their contest scores over a period of the several weeks during which the Cumulatives operate. Rather, the opportunity is taken to enjoy the increased activity which they regularly promote.

Point is lent to this theory by the fact that both G8AKE and G8AWO, in Leicestershire and Hertfordshire respectively, had notched around the hundred mark in terms of stations worked during the 1968 Cumulative on 432 MHz. Although each must have worked many that the other worked, each must have netted also many locals not audible farther afield. In other words, there have been a large number of people around on 70cm during these fortnightly events. That's occupancy, and no doubt about it.

Coming up next month is another 70cm date quite new in the contest calendar, the first ever official portable event for this band. In slotting it into a conveniently contest-empty weekend at 23 June, the V.H.F. Contests Committee will be fulfilling a need clearly expressed by the large number of portable stations which have popped up in recent 432 MHz Open Contests. No doubt residual gremlins in equipment will have been laid by the operations during 4-5 May, in the First 1296/432 Open.

Video Front

Quite a small and perhaps even passing reference to amateur television is sufficient to bring to " Four Metres and Down " plenty of contributions about the art from many unexpected places. There was even one from Zambia in last month's mail asking for details of modifications to be made to a commercial receiver to tailor it for ATV. This one was passed on to the BATC, who regularly get—and are well versed to handle—enquiries of this nature from all over the world.

There is a spirit of enthusiasm and finding-out-things-for-yourself among UK amateur television men that prompts memories of the resourcefulness which was part of the radio transmitting scene in the early days, when QSOs were QSOs and not glorified landline nitter-natterings. Of course amateur TV equipment is vastly different from what was used " way back " and probably among the most complex in use anywhere in the amateur field, which makes its taming all the more of a challenge. Some of this equipment is donated or sold off cheaply by big manufacturers (bless them!), without whose altruistic attitude amateur TV would be made harder than it is.

Now to this month's round-up. Big date for all amateur TV men is The 1968 Amateur Television Conference on Saturday, 14 September. The venue: the ITA Conference Suite at 70 Brompton Road, London, SW3. Don Reid of BATC will be promulgating more info in a month or two. The thing to do now is to book the date.

Next, a flashback to the Wolverhampton V.H.F. Dinner in March. In an informal post-prandial discourse G8ACB, who was chairman for the evening, disclosed the surprising fact that " there are more hours of amateur television per week than there are of BBC-2 colour transmissions per week, which themselves add up to a considerable number of hours." Which goes to show what you can be missing on 70cm if you don't have a wide-band converter in addition to the communication one. And incidentally, make sure your 70cm aerial also is wide-band enough to accept television. The makers' spec will tell you.

* * *

Shepherds Bush in West London, noted source of activity on Seven Metres and Down video-wise, looks like becoming a centre of amateur as well as professional television. Several members of the BBC's own radio club, the Ariel Radio Group, have plans to set up a transmitting station in the district with the object of radiating amateur TV on 70cm on request, and if called upon to do so, to put out special material for exhibitions within the service area. The availability of studio facilities and several cameras is envisaged.

The man behind the venture is Peter Blakeborough, G6ACU/T, who hopes the Ariel Club TV station will be on the air within a few months from now. Co-operation with London area stations to assist in the early tests will be gratefully received; those who can help might care to drop a line to the Ariel Club honorary secretary, G3RRT (M. S. Dixon, Room 0127, Broadcasting House, London, W1, or Langham 4468, ext. 3740).

* * *

Still apropos amateur television, it seems to us that something that the video enthusiasts are a bit short on is contests. Certainly those who have G8-plus-3 call-signs can enter Cumulative and other official RSGB events, but it wouldn't surprise us at all to have them ask for a contest to be organized which had a video component to it, if you know what we mean. Video-to-video, perhaps, with serial numbers exchanged via caption cards; or even video-to-sound, with vision going out but an audio report coming in from 70cm operators equipped to receive pictures but not transmit them—and there are a lot. Any views (!) on the subject?

Swedish Beacon to give Auroral Alert

Advance information about the Swedish-German co-operation to put a beacon on 2m to function as an auroral alert was released some months ago. It is good news to learn that SM4MPI has now been commissioned at a location

60° 22′ north by 15° 8′ east, or if you like it in QRA Locator terms, HU46D.

The beacon transmits continuously, giving its call-sign every 60 seconds. There are 100 watts of r.f. at 145·96 MHz going into an array consisting of four six-element Yagis which are beamed at 330°, which is the significant direction for producing auroral bounce-back.

SM4MPI operated as a joint effort by the Max Planck Institut fur Aeronomie, Lindau, Germany, and the Swedish SSA, is a research project in which amateur reporting will play an important part. Report forms can be had on application to Lindau.

On auroral matters . . .

Auroral Contacts on 70cm

Just to show what can be done if you patiently lie in wait for an auroral manifestation was shown by SM3AKW at Harnosand upon working SM5BSZ at Stockholm on 432 MHz on 10 February. An interesting observation was that the signal reflected on 70cm was much weaker than that on 2m, about S5 compared with S9 plus—and it had a peculiar spread to it that stretched it over 15 kHz of the band.

Around the V.H.F. Groups

For their May meeting the Leicestershire V.H.F./U.H.F. Group have an out of the ordinary subject on the agenda: a talk billed as " The Mounting of V.H.F. Aerials and Rotators and some Information on Mast Loading Parameters " is to be given by Ian Hickling, who is professionally engaged in this line of business. Date: Thursday, 16 May, causerie at 7 p.m., lecture at 7.30 p.m., at the Regional College of Technology, The Newarke, Leicester.

Also in May, on the 10th, the South East U.H.F./V.H.F. Group have a meeting, the speaker being Peter Jones, G2JT, on the subject of " Aerial Power Tactics." The venue for the month is Wye College, University of London, Ashford, Kent.

Of the Bournemouth-Poole V.H.F. Group, there is no news of lecture-sessions but plenty about practical activities. They were planning to be in on the earth-moon-earth tests of last month on 23cm with 100 watts of r.f. and a 17 ft. dish —yes, seventeen feet, we are told—using that famed u.h.f. call-sign G6XM. Already G3OBD is on the point of activating 13cm, and parts are being collected for a 3cm station to work in conjunction with G3VPF, already radiating on this band with a 723 A/B klystron.

Going Up

Next band up in relation to 13cm is 3·4 GHz and above that 5·6 GHz, neither of which has produced much reported activity as yet. Then comes 3cm, which seems to exert a special fascination, judging from the various reports one hears from groups prepared to jump 3·4 and 5·6 and go straight for 10,000 MHz.

The other month we referred to the interest shown in 3cm by the South Coast and West Herts groups. Now we hear that G3SUE, who belongs to the Department of Electrical Engineering and Physics at Hatfield College of Technology, Hertfordshire has equipment operating on 10,000 MHz, and is keen to be put in touch with others who could co-operate with him on this band.

" Local chats " on 70cm

It has been said several times that if people would only equip themselves with slightly better stations than the basic ones some are content to use, the potentialities of our bands would be greatly extended. This goes especially for 4m. Apparently it also goes for 70cm on the Continent where, ON4HN tells us, many operators use their stations only for " local chats " as he puts it. Very low power, hardly any transistorization, and aerials fed with poor quality TV co-ax mean that even when conditions are quite fair many stations will not be heard. Some are so prepared to accept 70cm as a local band that they do not even bother to tune it, says Henri.

It is worth recognizing that at v.h.f./u.h.f. short haul is much more the rule than DX hunting. Even so, operators should be encouraged to use the best possible equipment for the purpose, in whatever country they live and whatever bands they work.

Guess the Date

". . . a brief outline of a peculiar system of radio telephony, which although it had its inception as far back as 1915 is little known except in highly technical circles . . . nothing is radiated when the microphone is not spoken into . . . mainly for commercial telephone services on long wavelengths but a fascinating and unexplored field for the experimenter who is limited to short wavelengths " (Part of an article describing single sideband generation, balanced modulators and the rest. When? Answer in " Here and There ").

Oddity for Ossie

When Alan Osborne, ZB2VHF, received a listener report from Archangel in North Russia on his 2m signals he was naturally a little sceptical. Yet everything tallied with a contact he was having with I1SVS at the time. As he puts it: " Could this be another *red* herring? "

In the context of trawlers-that-don't-trawl, possibly; for Ossie has his suspicions that he might have been heard at

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

Call-sign	Location	Nominal Frequency	Emission	Aerial Direction
GB3ANG	Craigowl Hill, Dundee	145·985 MHz	A1	
GB3CTC	Redruth,Cornwall*	144·10 MHz	A1	North-East
GB3GI	Strabane, N.I.	145·990 MHz	A1	N/SE
GB3GW	Swansea	144·250 MHz	A1	E.N.E.
GB3GM	Thurso*	145·995 MHz	A1	S
GB3GM	Thurso*	70·305 MHz	A1	N/S
GB3GM	Thurso*	29·005 MHz	A1	N/S
GB3GEC	W.London	434·00 MHz		
GB3VHF	Wrotham, Kent	144·50 MHz	F1	North-West

* Not operational.

RSGB V.H.F. BEACON STATION GB3VHF

The frequency of the Society's v.h.f. beacon transmitter at Wrotham, Kent, when measured by the BBC Frequency Checking Station, was as follows (nominal frequency 144·50 MHz):

Date	Time	Error
12 March	21.35 GMT	332 Hz low
19 March	10.30 GMT	190 Hz low
28 March	08.51 GMT	410 Hz low
3 April	09.25 GMT	240 Hz high

much closer range by " one of these spy ships in this area."

Meantime, he has had the listener's QSL framed to hang alongside his " Four Metres and Down " award!

On 2m affairs generally, ZB2VHF, in company possibly with ZB2BL, plans to activate both this band and " Four " during the summer—and by July it may be a lot more difficult to work The Rock when Alan Osborne leaves after his three year stint there, to assume once again his original and much " mobilized " call G3SLI.

Expeditionaries

Every Thursday night until September GW8ACG/P is operating from his favourite mountain top in Flintshire on 433·3 MHz. Even if you have worked his county give him a call to make his weekly expedition worth while.

Expatriate Ulsterman Willie McClintock, whose 4m signal from Chelmsford makes G3VPK one of the most potent on the band, is " going home " for three weeks in July, and will put all six counties on " Four " to the following schedul>: Antrim, Sunday, 14 July, then Londonderry on 15 July, Tyrone on the 16th, Fermanagh on the 17th, Armagh on the 18th and Co. Down on 19 July. A pause for breath, then headlong into the 70 MHz (Portable) Contest, perhaps even from EI, call-sign not known yet, but no matter: monitoring the l.f. end of 4m for c.w. will soon disclose it. Yes, GI3VPK/P will be using A1 exclusively unless conditions open up sufficiently to warrant the use of A3. With almost 50 watts input plus a 4-over-4, and in partnership with GI3HNM as additional operator, there should be every chance of giving the 4m mainland men several counties they may never have heard before. For c.w. schedules at any time between 18.00 and 00.00 *GMT* send a stamped addressed envelope to G3VPK at Longwood Chase, Little Baddow, Chelmsford, Essex.

To make a start on "Seventy"

How, asks G8BHA in the April " Four Metres and Down," may one best make a start on the 70cm band? Maybe the following, received from G8BGW, poorly sited deep in the Derbyshire dales at Matlock, may help provide part of the answer, and at the same time encourage those who are equally ill sited (and perhaps some who are not). He says:

" Initially, I had no idea at all about what gear to obtain for 432 MHz, but eventually I bought a converter to feed into the station AR88, and an eight-element beam. Get used to listening first, I thought, but I soon gave that up when I realized that if I didn't put out a signal then other stations would not beam in my direction. So, next, what kind of transmitter to use? I looked up in the RSGB *Callbook* (a must for any starter) and found the address of a G8 who lived nearby, and went to ask his advice. His help was, and still is, invaluable, and without him I would have been completely lost.

" He explained to me about having a 2m transmitter to feed into a tripler amplifier, suggested where I might get hold of the gear, lent me a crystal, explained the peculiarities of 70cm propagation and of the effect of barometric pressure, of humidity and temperature, arranged test transmissions with me, helped me with the tuning, told other operators I was on the band and asked them to look out for me, and gave advice on countless other matters, for which I remain extremely grateful.

" Having started, how do I feel? Somewhat disappointed. Being at a rather difficult QTH amid the Derbyshire hills I cannot make many good contacts, which means that 95 per cent of my CQ calls are not heard and that many of the successful ones result in Strength 2 Readability 2 reports. My only hope seems to be to go portable!

" My advice to starters, then, is: If you are determined to get going on 432 MHz find a local amateur and go to ask his advice. Do not be afraid to show your ignorance, for 70cm has its own particular technical problems. You will find help and friendship.

" The Society might consider publishing a booklet for the starter on 70cm, giving help on choosing the best gear, with advice on aerials and some fairly simple circuits for building preamps and other accessories. Having bought an eight-element beam in ignorance I now find that I need a much more elaborate array to bring the signals in. I suppose the eight-element will be useful if I go portable! "

Although G8BGW regards himself as what he calls " a very new starter on 70cm," it is clear that he has already been much helped by the fraternal ambience which u.h.f. and v.h.f. men radiate personally as well as over the air. What he hopes will happen now is that people will turn their beams Matlock-wards as often as possible, and particularly on Tuesday and Wednesday evenings after 19.30 GMT. He'll be on.

* * *

As a pendant to the above, G5VU of Nottingham asks for his thanks to be expressed " to all who offered advice in response to the call for assistance on how best to get started on ' Two ',' which appeared in this page in January. Some helped through " Four Metres and Down," others over the air, still others by correspondence. " Most gratifying . . . and I'm most grateful," says Stan Henton.

Tech Corner

From G8ANQ (Bill Burton of Whitby):

The transistor i.f. amplifier shown in the accompanying diagram is a useful addition to a valve converter where a long i.f. output cable is in use, or where the main receiver used as an i.f. strip has poor front-end screening. As it may be built into a very small space it can be tucked into a valve converter and derive its power from the latter's h.t. rail via a suitable dropping resistor.

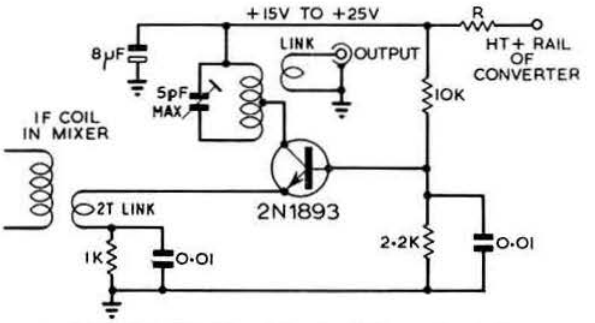

Fig. 1. G8ANQ's I.F. Amplifier for interposing between a converter and receiver.

In some samples of the 2N1893 specified the collector is connected to case, so keep it clear of the deck!

Coupling to the emitter input comes from a two turn link wound round the cold end of the mixer i.f. coil. The collector inductance L1 requires 20 turns, centre tapped, on a ¼ in. Aladdin former with slug to give an i.f. of 24 to 26 MHz. There is a two turn link on the cold end of L1.

The resistor R should be selected to give between 15 and 25 volts. The consumption of the pre-amp is 2mA at 15 volts.

From G3PKV (Rudd Thornton, Welwyn Garden City):

When my 2m beam was lowered last Summer I happened to mention to a local member that only quite a small amount of water was removed from the feeder. Ever since then he has been patiently persuading me into finding out some details of the water capacity of co-axial cables.

It had been intended to erect the J-Beam six-over-six temporarily, and the end of the feeder was not sealed, but as I strained my back in the process it stayed up for six months. When it was taken down I was surprised to find the braiding clean and untarnished, but nevertheless the cable was removed to be taken into my place of work to be dried out in a laboratory in a high vacuum dessicator. From the 35 ft. length 0·48 gram of water was extracted. This probably came from the water absorbed by the polythene outer, so the plastic end cover supplied with the beam had done a very good job of sealing.

For anyone with a good balance available a simple way to check on a length of co-ax would be to weigh it when new and keep a note of the weight. The weight of water which different types of co-ax would take up when saturated has been checked; vacuum drying for 10 days brought the samples back to the original weights.

Co-ax	*Water absorbed on immersion of a one-foot length*
¼ in. standard TV, solid core	0·63 gm
¼ in. Band 3, concentric holes	0·88 gm
$\frac{9}{32}$ in. u.h.f., cellular polythene	0·49 gm
$\frac{9}{32}$ in. u.h.f., concentric holes	1·18 gm

Here and There

Answer to "Guess the Date" (above): *Experimental Wireless*, no. 2, November 1923, from an article "Sideband Telephony," by E. H. Robinson.

* * *

Well before the above date, a.m. was already firmly established ". . . my first radio telephony signals were received from PCGG, Eindhoven . . . by then the time signals we had received from FL, Eiffel Tower, as far back as 1912 faded into comparative unimportance"—G8AQZ (now retired, see page 181, April).

* * *

Oxford have been many lengths behind Cambridge in the V.H.F. Stakes. Not for long, perhaps. To stir up more interest in v.h.f. the Oxford Club will participate in several of this year's contests. Members are building aerials: G8PX is providing 12 volt operated transmitter and receiver.

* * *

Do you prefer the Georef or the QRA Locator system of position spotting? The V.H.F. Committee are gathering opinions. If you would like to express yours write HQ for a copy of "Grid Questionnaire," fill it in and return it marked for the attention of the V.H.F. Committee.

QTC

C.W. SIGNING SPEED RAISED
GB5QM—POST OFFICE THANKED

Speed of Sending Call-sign

Following a request from the Society for modification of the existing licence condition which specifies that call-signs sent by c.w. shall be at a speed not greater than 12 w.p.m. the GPO has agreed that in future the maximum speed shall be 20 w.p.m. A *Gazette* notice giving effect to the alteration appeared on 19 April, 1968.

GB5QM

Californian radio amateurs have sent a special " thank-you " to the GPO men who enabled them to set up an Amateur Radio station on the Queen Mary now berthed in Long Beach.

Southampton post office engineers answered an SOS for help from the American radio enthusiasts just before the liner sailed on her last voyage to the US. The radio equipment was fitted into the ship by Southampton technical officer, Peter Buchan, assisted by the amateurs. It was tested for interference and reception by executive engineer Jim Ainley and the ship's radio inspector officer, Peter Richardson. Mr. Eric Godsmark, himself a radio amateur and a higher executive officer in the Radio and Broadcasting department in London attended and issued a formal licence immediately the installation and tests were completed.

Now the Post Office men have received a special certificate and plaque from the grateful Americans.

Knokke Convention

The Fourth International Ham Convention will take place at Knokke, Belgium, on 13, 14 and 15 September, 1968. A very full programme has been arranged and further details can be obtained from Lucien Vervarcke, ON4LV, Lippenslaan 284, Knokke 1, Belgium.

Taking Your Rig Abroad

Not wishing to be accused of discrimination, we would point out the RAC can provide similar facilities to the AA for members who take radio equipment abroad in their cars. The notice published on page 185 of the March issue of *Radio Communication* applies, in essence, to the RAC's requirements, their scheme being supplementary to the normal Foreign Touring Service and Cordon Bleu. Application should be made to RAC Touring Services, PO Box 92, Croydon, CR9 6HN.

Lee on Solent Air Day

The Royal Naval Amateur Radio Society will be participating in the annual " Air Day " to be held at the Royal Naval Air Station, Lee on Solent (*HMS Daedalus*) on Saturday, 15 June. Attractions will include a children's playground, static display of Fleet Air arm items, and an air display by some of the latest aircraft in use by the Royal Navy. Talk-in facilities will be provided on 160, 2 and 4m by GB3RN, and ample car parking facilities will be available. RNARS hope that members will make this a " definite " date in their calendar.

BATC Convention

The British Amateur Television Club will be holding its 1968 Amateur Television Convention in the ITA Conference Suite, 70 Brompton Road, London, SW3, on Saturday 14 September, 1968. We hope to publish more details nearer date.

National Eisteddfod of Wales—GB3NEW

This event will be held at Barry between 5-10 August. There will be a large exhibition devoted to the industrial growth of Barry, and the Radio Society of the Barry College of Further Education has taken space for operating an amateur radio station using the call-sign GB3NEW.

It is expected that the attendance will be in the region of 150,000 and the station will receive many visitors in consequence. To mark this special occasion it is intended to issue certificates of contact instead of the usual QSL card, and it is intended to work all bands down to two metres, using modern commercial equipment. Full details of this ambitious project will appear together with operating schedules in later editions of *Radio Communication*.

Heathkit /A and /M

With the appointment of a radio amateur on the staff of Daystrom's London showroom, signals on the h.f. bands and possibly v.h.f. will often be heard emanating from Tottenham Court Road, WC1, during shop hours. The call-sign is G3WCE/A and equipment is, of course, Heathkit!

Another venture by the same organization is the introduction of a mobile showroom which will visit rallies, exhibitions and clubs over the country to demonstrate the line of Heathkit products. Club secretaries and organizers to whom this is of interest should contact Daystrom Ltd., Gloucester, who will, we are sure, be pleased to arrange a visit in their district.

Assistance for the Blind

A request has been received from the Nuffield Talking Book Library for the Blind for assistance with the maintenance of cassette tape players used by these people. It is felt that members of the RSGB would have sufficient knowledge to assist, and may be willing to call occasionally and help should a machine give trouble or a cassette prove faulty. This would be unlikely to involve more than one hour per month. Would any volunteers or those wishing to have further information please write to the following address: Mr D. Finley-Maxwell, MIEE, G3BGA, c/o John Gladstone & Co. Ltd., Wellington Mills, Lindley, Huddersfield.

RSGB QSL Bureau

Cards for the series G3WAA to G3XZZ are now handled by Mr R. W. Martin, G3RWM, 76 St. Paul's Crescent, Coleshill, Warwickshire.

G3LUB S.S.B. Transceiver

Two potentially disastrous errors regrettably slipped through in the articles describing G3LUB's transceiver in the March and April issues. On page 160, March issue, the positive polarity symbols in the top right-hand corner of the circuit should be negative, and on page 222, April issue, the Zener diodes are also shown reversed in polarity. We sincerely hope that no one reached the point of switching it on without realizing the errors.

An FET Voltmeter

The circuit published on page 250 of the April issue did not incorporate the suggestions made by G3EJF in the accompanying letter; the diagram was, in fact, one supplied by G3LTZ indicating minor amendments to his original circuit. For the 2mA drain current rating to apply, the FETs must be MPF105s.

RSGB Dinner Club

The next meeting of the RSGB Dinner Club will take place on 17 May at 7.30 for 8 p.m. at the Kingsley Hotel, Bloomsbury Way, London, WC1. The hotel is only a short distance from RSGB Headquarters and the Dinner Club is completely informal.

Overseas visitors will be most welcome and bookings, accompanied by a remittance of 25s. per person, should be sent to RSGB Headquarters as soon as possible. It is hoped that a short cine film of Nigeria will be shown. This will be presented by Eric Lomax, 5N2ABG.

RSGB Tape Library

Mr G. S. Milne, G3UMI, curator of the Society's Tape Library, is taking up a three-year assignment in Burmuda. His father, Mr A. Milne, G2MI, the Society's QSL Manager, has kindly agreed to take over the Tape Library as from 1 June, 1968.

Special Events Stations

GB3PRC from the Northern Mobile Rally, Harwood, Leeds, 12 May 1968. Talk-in and demonstration station operating all bands 160m-2m. Special QSL via G3WGW.

G3UUP/A from Chiswick Town Hall on behalf of Brentford Evening Institute on 25 May. All bands 160m-4m operated by the Ealing and District Amateur Radio Society.

GBRHE. The South Shields and District Amateur Radio Club plans to run a station at a Hobbies Exhibition on 31 May, 1 and 3 June. The Exhibition is being organized by the Rotary Club of Newcastle-on-Tyne, and will be held at Gosforth Park Race Course. Operation will be on 160 to 10m, using a.m. and s.s.b.

Affiliated Societies

The following societies are now affiliated to RSGB:

University of Exeter Radio Club
Secretary: W. S. Watson, G3UDQ, Devonshire House, The University, Exeter.

Bangor and District Amateur Radio Society
Secretary: J. Campbell, GI3OLJ, 48 Abbey Drive, Bangor, Co. Down.

Havering Technical College ARS
Secretary: M. G. Foster, G3VOF, c/o Havering Technical College, Ardleigh Green Road, Hornchurch, Essex.

Ballymena Radio Club
Secretary: G. McDowell, GI3XDX, 46a Bridge Street, Ballymena, Co. Antrim.

Gloucester Amateur Radio Society
Secretary: E. A. Perkins, G3MA, 40 Calton Road, Gloucester.

Etessa Amateur Radio Club of Ongar Radio Station
Secretary: G. W. Morton, G3GTZ, c/o GPO Radio Station, North Weald, Epping, Essex.

Pudsey and District Radio Club
Secretary: R. Gaunt, 12 New Street, Morley, Nr Leeds, Yorks.

Southdown Amateur Radio Society
Secretary: L. E. Tagliaferro, 9 Tugwell Road, Hampden Park, Eastbourne.

Affiliated Society Representative

Newham Radio and Electronics Society
H. E. Reeve, G3JXZ, 284A Barking Road, East Ham, London, E6.

Change of Secretary

Bedford and District Amateur Radio Society
Secretary: K. V. Whitbread, G3XDU, 78 Pipit Rise, Bedford.

East London RSGB Group: R. Broadbent, G3AAJ, 94 Herongate Road, London, E12.

Southgate Radio Club: R. Wilkinson, G3TXA, 23 Ashridge Gardens, Palmers Green, London, N13.

SOCIETY AFFAIRS

A brief Report of the March 1968 Meeting of the Council

THE Meeting was held on Monday, 4 March, 1968 and was attended by Messrs. J. Graham, President, in the chair, B. Armstrong, N. Caws, J. Etherington, R. J. Hughes, A. Hunter, E. G. Ingram, H. E. McNally, L. E. Newnham, A. D. Patterson, J. Petty, R. F. Stevens, G. M. C. Stone, J. W. Swinnerton, G. Twist, E. Yeomanson (Members of Council), C. P. Pope (Secretary), A. E. Dowdeswell (General Manager) and T. R. Preece (Assistant Editor).

An apology for absence was received from Mr D. Thomas.

Membership and Affiliation

The Council approved the election of 107 Corporate and 32 Associate members. Council also approved Corporate membership to 11 Associate members.

Mr J. Robson, G3PAI, was granted Life Membership of the Society.

Council approved for affiliation:

North East Essex Technical College and School of Art Amateur Radio Society, G3OCQ.

RAF Akrotiri Radio Club (Cyprus).

RAE Accommodation

It was stated that because of present commitments, the RAE would be held in May at the College of Preceptors but the December examination would probably be held at the City University, Clerkenwell, where there would be accommodation for 200 persons. The charge would be similar to that at the College of Preceptors.

IARU

It was agreed to give an aye vote to the membership application to IARU of the Association des Radio Amateurs de la Principaute de Monaco. Mr Stevens reported that the last three countries voted for by RSGB had been accepted and that one of these was Bulgaria.

Recommendations of Committees

V.H.F. Contests Committee (5.2.68). Council approved the awards for the Fourth 70 MHz (C.W.) Contest as follows.

Section A winner: R. A. Hargreaves, G3OHH.

Section B winner: Albright & Wilson ARS, G3OXD.

Section C winner: D. Carden, G3RIK.

H.F. Contests Committee 16.2.68

Council approved the award of the Victor Desmond Trophy to Mr N. Graham, GW3OAY.

Exhibition Committee

Council approved the following recommendations;

(a) That Mr R. Broadbent, G3AAJ, be appointed Stand Manager for the 1968 Exhibition.

(b) That Council authorize, in principle, the holding of a reception for Overseas visitors at the 1968 Exhibition (2-5 October).

Film Library

Owing to the high cost of production, Council could not agree to the making of any new cine films on the subject of Amateur Radio, but it was stated that the Society's slides were suitable for Shows to various Clubs.

TVI

Mr Etherington gave a report on a TVI case, (G3DRF), which had been concluded satisfactorily. Council gave a vote of thanks to all the people concerned in settling this case.

Minutes of Committee Meetings

The following minutes were accepted as reports: V.H.F. Contests Committee (23.1.68), V.H.F. Committee (5.2.68). Mr Stone reported that to date, Mr Stanesbey of the GPO and Dr Saxton of the Radio and Space Research Station had accepted invitations to the 1968 V.H.F. Convention. Technical Committee (6.2.68), Membership and Representation Committee (9.2.68), Scientific Studies Committee (12.2.68), H.F. Contests Committee (16.2.68), Education Committee (17.2.68).

The Council was in session for three hours.

The General Manager . . .

. . . would like to point out to members that the Society does not operate a Technical Query Service—yet! Most of the queries raised could be answered by members themselves by reference to the usual collection of handbooks found in the average shack. A list of such publications handled by the Society will be gladly sent to anyone interested.

. . . requests members to keep their various enquiries quite separate when writing to HQ—even on separate sheets of paper if that is not being too extravagant! A classic example of how *not* to write to HQ was a letter received recently which asked three quite unrelated questions in one sentence!

. . . reminds members that time, labour and materials in answering correspondence costs money—*their* money! Moral: keep correspondence with HQ to a minimum and conserve our funds.

Ealing Society 70 MHz Mobile Contest

1. **When:** 14.00-18.00 BST on 23 June, 1968.
2. **Eligible Entrants:** All holders of current Amateur Sound Licence A.
3. **Mode:** A3 only.
4. **Power:** 50W maximum.
5. **Aerial:** Restricted to vertical ground plane or vertical dipole.
6. **Scoring:**

Working fixed stations to fixed station	1 point
Working /M or /P stations to fixed station	2 points
Working /M or /P stations over 20 miles to fixed station	10 points
Working /M or /P to /M or /P stations	3 points
(over 20 miles)	15 points

7. **Awards:** An RSGB Amateur Radio Handbook will be awarded to the leading club member station and leading non member.
8. **Contacts:** Each RS report shall be followed by an increasing serial number beginning with 001.
9. **Logs:** Must be sent to G3SGT, 16 Whitestile Road, Brentford, Middlesex, to arrive not later than 13 July, 1968.

Silent Keys

We record with sorrow the passing of the following Radio Amateurs:

J. W. Gill, G6OS, of Hull, Yorks.

A. V. Dyer, G6VV, of Bexley, Kent.

T. H. Davison, G3AGS, of Higher Crumpsall, Manchester 8.

F. A. Lynes, ex-G3DKZ, of Minster Lovell, Oxford.

C. F. Woodward, GW5WO, of Llandudno Junction, Caern.

R. H. Knight, of Bromley, Kent.

Radio Amateur Emergency Network

Honorary Registrations Secretary:
Mr R. A. Ledgerton, G2ABC
1 Latchingdon Gardens,
Woodford Bridge, Essex.

Honorary Secretary, RAEN Committee:
Mr E. R. L. Bassett, BRS16075
57 Upper St. Helens Road,
Hedge End, Southampton, SO3 4LG

By S. W. LAW, G3PAZ*

THERE used to be an apparently un-answerable question for the unwary—" Why is a mouse when it spins? " To the unbounded consternation of said unwary the answer came emphatically—'Because the higher the fewer!" Seriously, may we ask you this—" When is a Police Officer? " For a start, he need not be wearing a uniform—but he *will* carry a card which authorizes him to act in his official capacity. Do you carry your Registration Card—and is it stamped up to date? Furthermore the officer, whilst in uniform, may yet appear a little unusual to the close observer. In fact it may raise doubts in the mind of the keen-eyed as to the authority of the officer in question, particularly in view of the tightness of the " third party message " regulation that is embodied in our licence. The point of this preamble is to bring to your attention that there are not less than 5000 men in this country who are members of " private " police forces, but who carry the same authority as the regular police within the limits of their jurisdiction. These 5000 men do not come under the control of the Home Office, but are recruited, trained and paid for by the body by whom they are employed. As an example, the Port of London Authority has an establishment of 650 officers and men, most of them uniformed constables who operate within the five large docks lying along the Thames between Tower Bridge and Tilbury. PLA police powers extend to a distance of one mile from these docks, and a 1962 Act allows them—if in pursuit—to arrest someone beyond this limit. Other examples include the Atomic Energy Authority, whose officers have constabulary powers up to 15 miles from each establishment in cases involving the Authority. Space precludes a complete listing of such police forces here, but we feel that RAEN members should be aware that incidents which might occur within the jurisdiction of such a police force will, of necessity, come under such control and full co-operation will be a duty in emergency conditions as with the regular police.

Resignation

At the RAEN Committee meeting on 2 March a letter of resignation was read from Mr R. Ferguson, G4VF. A vote of thanks was recorded in appreciation of the unstinting work of 4 Victor Fox, and it was agreed that Mr Ferguson be asked to become a Corresponding Member of RAEN.

Watch It!

Few of us are able to suffer fools gladly, especially if the foolishness encompasses unhappiness or even danger to our fellows. What, then, can we say about the recent case in the London area when a transceiver was stolen from an un-attended ambulance and subsequently put on the air by the thief who apparently considered it highly amusing to completely disrupt the ambulance service for miles around by transmitting fake messages. Needless to say, the authorities brought him to book very quickly in view of the urgency of the situation—but what if it had been a RAEN mobile transceiver that had been stolen? Is yours safe when the car is un-attended? Give the matter some thought.

Two Won for the Eights

The Boat Race may give us a kick annually but for us the biggest news of late is the 2m concesssion to the G8 plus 3 chaps. Since 2m is so widely used by RAEN Groups, the G8 members will be able to join more fully in the activities and there will now be no danger of some feeling that they might be relegated to SWL rank within their Group. (Incidentally, are there any Groups using u.h.f. yet? We'd like to know). In this connection there is one point about 2m when used for RAEN— the Committee feels that it might be best for our purpose to concentrate on vertical polarization for working fixed-to-mobile for both 2m and 4m. The use of horizontal beams for fixed-to-portable naturally provides excellent service where this is required. For cross-country work between fixed installations (at User Service locations) the narrow beam horizontal will naturally be the first choice.

BST and Procedure

At an initial meeting of the RAEN Sub-committee on Procedure it was decided that the British Standard Time (BST) will in future be used on Message Forms. The question of the further simplification of the forms was minuted for the meeting on 8 March at 14.30 BST. The conclusions will be made known in due course.

Lecture Material

In order to widen the interest of RAEN lectures the Committee would like to accumulate a wide selection of material for projection. If any Groups have black-and-white photographs of RAEN interest which could be used to make slides, please send them to the Hon. Secretary (address above) who will undertake to have them processed on to transparencies should they be suitable. An s.a.e. would be appreciated should you require their return. Photographs for this purpose should be as large as possible and glazed (glossy). Also the Committee would be glad to receive gifts of transparencies which could be incorporated into RAEN lectures.

Ladies—Please!

Last month, in an endeavour to show appreciation of the efforts of the fair sex in the 1967 RAEN Contest, we inadvertently omitted to acknowledge one and (even worse!) changed the status of the other. Our humble apologies, therefore, to G3GOX (G2AVC/XYL) for the omission and to G3VDQ (YL) for the " X " that crept into the text.

Logs

The RAEN Contest logging was excellent on the whole, and the very few who did not appear in the results will no doubt have realised that their disqualification was only due to poor logs submitted. There is a moral here—this was only a contest, but had it been the " real thing " it could have resulted in an incorrect message. Remember, even in an exercise—*get it right.*

IARU Brussels

Great Britain is not the only country to realize the potential use of Amateur Radio in civil emergency.We hope to fly the flag at the next Region 1 meeting of the IARU in Brussels, and to this end a paper is being prepared which it is proposed may be read by one of our members on this occasion. More about this later.

British Red Cross Liaison

An invitation was extended to Mr E. G. Gregory of BRCS Headquarters to attend the RAEN Committee meeting on 6 April to discuss Red Cross liaison. Co-operation at this level is of the greatest value and we are grateful to Mr Gregory for his continued interest in our mutual endeavours to improve our service to the community.

Sophistication?

Doubts have been expressed in certain quarters as to the efficacy of amateur communications by comparison with the " sophisticated " systems now in use by many bodies in the public service. To the un-informed, the argument is very real—it takes an experienced electronics man to know that the more complex a system is, the more complete and utter the breakdown when it *does* occur. Modern systems tend to " choke off " and give up completely when overloaded, and a simple, uncomplicated system can win hands down. Remember a certain famous man who saved the day in America many years ago by using the steam whistle on locomotives when all other communications had been swept away! " Slow Morse " it's true—but our " steam radio " can put up a very good show to-day when all else has failed.

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LETTERS

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

QRA Locators and the GEOREF System

From: T. Dvorak, OK1DE, Prague

Having read G3JKV's article on the disadvantages of the QRA Locator and the merits of GEOREF I am very sorry that I must completely disagree with the arguments and conclusions quoted by the author.

In the most important part of his article G3JKV tries to prove that the QRA system is not accurate enough for close won contests. Unfortunately his whole calculation is based on the wrong assumption that individual errors will simply add.

Let us investigate what really happens. When I try to determine with the help of a locator-type map the sum of distances worked, there are two sources of error inherent in the locator system used:

(*a*) the uncertainty of partner's location;

(*b*) the difference between my own true QTH and the point corresponding to the QRA Locator I am using.

As for (*a*), it is apparent that due to the random nature of partner locations within the smallest quadrangle of the grid used, these errors will tend to compensate. In other words, if I work 100 stations, I will measure 50 of them too short and 50 too long with the result that my sum of points will be very close to the correct figure.

Therefore, as far as the error caused by uncertainty of partner's location is concerned, any insufficient accuracy of QRA system is completely out of the question. The more stations I work, the less error will result, and it is possible to say that for the QSO numbers by which contests are usually won, grids far more coarse than the QRA could be used without affecting the correct placement of individual contestants!

As for (*b*), there are two cases in which practically no error results:

1. If my true QTH coincides or lies near to my QRA;
2. If the stations worked are distributed approximately equally in all directions around me (with top scorers this is the usual case as it would be difficult to win with part of the horizon barred).

Case 1 does not perhaps need any explanation; as for Case 2 it is again clear that there will be a statistical compensation of the eventual errors.

Only in cases not covered by 1 or 2 some error may therefore result in practice. Let us calculate what magnitude it may attain in the worst practical case for a QRA system.

The smallest QRA quadrangle is about 5 by 5 kilometres so that the maximum difference between QRA and QTH may be some 3·6 km if I am located in the corner.

Suppose a case which may be simplified into the following parameters: A station works only 180° around its QTH, so that there is no error compensation in the 90° direction. This 90° direction coincides with the direction of maximum error and the station makes one-third of its total number of QSOs in this direction.

Assuming that the errors of the remaining two-thirds of QSOs either compensate or are included in the one-third having the maximum error we get for 100 QSOs a total error of some 120 kilometres. In considering all the artificial assumptions we had to make to arrive at this error, it is well possible to say that the placement of stations with scores differing by more than 100-120 kilometres may, for all practical purposes, be regarded as correct.

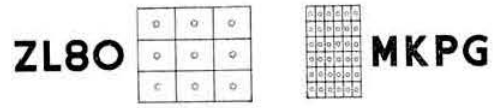
For stations with less difference than these 100-120 points we still have the possibility of using their exact location within the smallest quadrangle (this can usually be gathered from the data contained in their log) instead of their QRA. In this way it is then possible to eliminate practically any error which could be caused by the use of a coarse grid locator system. (There are naturally other errors which have nothing to do with the choice of locator system.)

As for the author's second argument concerning the ambiguity of the QRA system, this may well be true for military people. For amateurs, however, who supply the necessary additional information in their prefixes there is no ambiguity in using QRA. Or is it not clear enough that a G5 station with a ZL80b locator cannot be located somewhere in Siberian USSR? Only in instances where mobile stations are involved some ambiguity may result (e.g., a G5XXX/MM in the Atlantic) but this is so exceptional that it is not worth further consideration.

Another important point in the G3JKV article: while the QRA grid consists of approximate quadrangles the GEOREF grid is formed by rectangles of a 1:2 side ratio. The possible error in distance measurement in a GEOREF grid is therefore twice as big in the latitudinal directions than in the longitudinal ones! But this in turn means that we can no more fully use the benefits of statistical compensation, as there are two types of error with the GEOREF—one random, but the second systematic, which is not liable to any compensation effects.

It may be surprising that, in some cases, it may happen that due to this systematic error the use of the more accurate GEOREF will result in a greater total error than with the less accurate QRA.

Apart from these more or less theoretical points it is possible to quote many practical arguments against the use of GEOREF by amateurs. On the attached figure the smallest quadrangle of a QRA-grid is compared to its corresponding GEOREF rectangle. Both are taken from a 1 cm = 1 km map and are of actual size.



What do you think is easier and takes less time: to find ZL80b or MKPG1204? And do you think you could find accurately the 1204 point if the MKPG rectangle were blank with no fine subdivision? Remember that if you are unable to find exactly the 1204 point, much of the GEOREF accuracy gets wasted! More such points could still be quoted but I think it is time to save paper and readers' patience!

Reconsidering the whole problem it is perhaps possible to sum it up as follows:

The GEOREF system was devised for military purposes as a means for describing in simplified terms the geographical co-ordinates of a chosen point on the Earth's surface. For this purpose it is excellent and may be readily used.

For the purpose of amateur work, *e.g.*, for evaluating contests, its introduction cannot bring any significant advantages, but on the other hand it would mean considerable complications, not speaking of its impracticability.

Any attempt to substitute QRA by GEOREF is therefore to be regarded as an unnecessary waste of the already accepted QRA system which itself offers definite improvement over the description of one's QTH by words or by geographical co-ordinates.

The Amended V.H.F. Contest Rules

From: B. W. Wynn, G8TB, Surrey Radio Contact Club (V.H.F. Section)

Prominence has recently been given to the view that restrictions should be placed on the distance or the area that groups could go for the purpose of operating v.h.f. contests.

We believe this to be retrograde proposal. V.h.f. and more particularly u.h.f. field day operating requires high, clear sites for the best results. The number of sites within areas of high amateur activity, i.e., densely populated areas are limited and to try to restrict amateurs to a certain distance from their home QTHs would give rise to many stations operating in close proximity. Frustration and the subsequent lowering of the number of entries would result.

Our group goes to one particular site for only one contest each year, and it is therefore free for all-comers for the rest of the year's contests.

One object of a contest is the improvement in efficiency of equipment. We feel that if the suggestion is adopted that power limits be raised the opposite would be the effect.

We hope that V.H.F. NFD will continue on the same lines as in the past, and in the same spirit.

Modifications to the HW32A

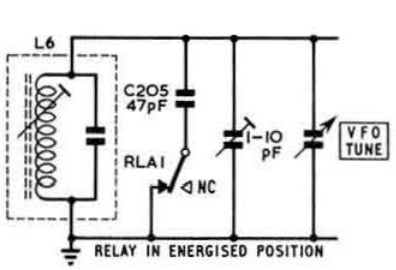
From: A. S. Barraclough, 115 Northway Road, Addiscombe, Croydon, Surrey.

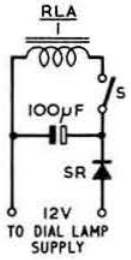
Very shortly after building up a Heathkit HW32A, I realized that even though this was really a superb piece of equipment at any price it did have a couple of shortcomings which I decided to attempt to rectify, these being lack of sensitivity and insufficient band coverage.

The first problem was remedied by removing the 1 megohm resistor in the screen grid line (R85) of V8A and replacing this with a 220 k ohm one; the result was a marked increase in the signal with no apparent increase in noise level. The indicated gain was in the order of 2½ S points on the meter, several contacts being made to check corresponding reports etc., and it was found that the S reading given here was more in accordance with the other station's power and not as before when I was being given S9 by a W station running 1 kW and raising my meter to only S6!

The second modification carried out was to increase the band coverage of the transceiver to cover as much of the 20m band as possible. There were several alternatives to choose from but after some thought and deliberation it was decided that the simplest method would be the best.

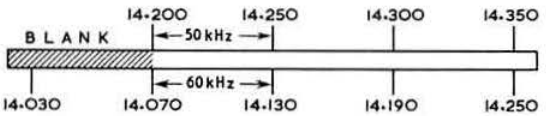
Basically all that was required was to open the earthy end of C205, the 47 pF capacitor in parallel with the v.f.o. coil. Disconnecting this changed the frequency coverage from 14070 to 14250 kHz, and one can draw in an extra section in the dial down to 14030 kHz as shown below, to extend the range further.





Reconnection of the capacitor will put the v.f.o. back on the original frequencies, i.e. 14200-14350 kHz. This is achieved with a subminiature 12V relay mounted on the lamp bracket using the holes already there. A small slider switch is mounted on the front panel operating vertically in a position alongside the meter. When mounting the relay care should be taken to keep the leads carrying r.f. as short as possible.

In practice this modification has greatly improved the performance of the rig and has enabled a good haul of DX to be worked. A new dial, 6s. from Daystrom, is fitted with the new calibrations marked on it. These should correspond to the diagram below, depending on how the v.f.o. was originally set up, which in my case covered the prescribed 14200–14350 kHz part of the band.



Daystrom Comment:

We know of several people who have carried out this v.f.o. modification in some manner. The only possible difficulty with this is that output at the band edges will be reduced; the design caters for 200 kHz bandpass coupling only.

The effect of the screen resistor value change has been checked—the results are (figures in brackets original figures):

For input signal of 2 μV with 1 Mohm in screen—17dB s/n ratio. For input signal of 2 μV with 220 k ohms in screen—audio output increase of 5dB with no effective change in s/n ratio.

For 20 μV input, S meter S3 (S 1·5). 200 μV input, S meter S9 (S8). 2m V input, S meter (S9 + 20).

The rise in cathode current is from 2 mA to 4·5 mA. While this is within accepted ratings, the life of the valve will be affected, and also there is possibility of instability owing to increased gain from the r.f. amplifier. An increase in cross-modulation effects could also be experienced.

Which Aerial?

From B. A. Watling, G3NL, Chatham, Kent.

I would like to use this opportunity to answer some of the comments made by G2DFN (*Radio Communication*, April, 1968) and comments from one or two other people. But before I answer these comments I would like to thank all other correspondents for their best wishes and favourable comments on the efforts of the Medway Amateur Receiving and Transmitting Society.

Let me begin by making it absolutely clear that we did not set out, as has been suggested, deliberately to run down the Joystick. We carried out completely independent tests. The fact that the Joystick *proved* to be a very large compromise was only one of the results of our experiments.

Let's be reasonable about this piece of copper tubing with a coil near the centre. Surely these people cannot *really* believe that the Joystick is designed to compete with a full size resonant aerial. One even said that it outperformed a 3-element beam!! Thinking about that statement I suppose it could, if it was a 10 metre beam lying on the ground and used on 160 metres!

Another point we were taken to task over was the fact that the Joystick was low compared to other aerials, and we only fed it with a short feeder. Taking the point about the feeder length first, it should be pretty obvious that once a single wire feeder is attached to the Joystick this feeder becomes part of the radiating system. If 100 ft. of feeder were used to a Joystick on top of a tower, this would have defeated the object absolutely. I doubt very much whether any difference would have been experienced if one changed the Joystick for a bucket under these conditions. The 15 ft. of feeder used was somewhat of a compromise; long enough to get the device away from the operating position yet not so long as to make the Joystick ineffective. Even so the feeder, being twice the length of the "aerial," must have been contributing to the radiation considerably.

Let's now consider the comments about the Joystick being low compared to other aerials. This is a very strange suggestion. It was used as a loaded vertical, and therefore was subject to the same conditions as our semi-vertical trap (which outperformed it in no uncertain terms). What would these people suggest, bearing in mind the length of feeder problem? The only way it could be hoisted up, would be to mount the matching unit up in the air also, and feed with co-ax to the transmitter. But this would not be very good because a vertical requires a good earth directly under it. Therefore we operated under reasonable conditions with a good earth, as the article explains, and with a good a.m.u.

One or two comments have been made about our error in that we used an s.w.r bridge. The arrangement was that the single wire feeder went to the a.m.u. and then co-ax fed, via an s.w.r. bridge to the transmitter. Again basic theory tells us that to get maximum power transfer from the transmitter to the aerial the impedance seen by the transmitter must match its output impedance. Manufacturers of transmitters also state that the load should have a less than 2 : 1 s.w.r. If these correspondents have discovered a way of doing this without an s.w.r. bridge then I will wait (impatiently) for the article to appear in *Radio Communication*.

Just a cursory glance at any handbook covering aerial theory will show that this device is a compromise, and that length is one of the most important factors governing the radiation efficiency of an aerial. For flat dwellers, with no space to erect a piece of wire, it may be just the thing, but I cannot see any point in a Joystick on top of a mast fed with 70 ft. of single wire feeder or the like. A semi-vertical trap aerial, as described in the article, takes up less space and will outperform the Joystick.

I submit therefore that we were fair in our evaluation. In fact we even put the Joystick in a more favourable position than the average user (flat dweller or the like) can do. The tests were designed to show just how much of a compromise this was, just as a trap dipole or G5RV etc., is a compromise to a certain extent. It has proved its worth as an occasional aerial for /A operation or similar circumstances, but one cannot expect to get a better performance than a full size aerial.

That Word—now official?

From: G. Sassoon, G3JZK, Warminster, Wilts.

I see that the odious expression "Ham" has finally gained the seal of acceptance into the English language. It has featured in *The Times* crossword.

Today's clue for 1 across is: "One who transmits from a Scottish island to SE13?". The answer, I suspect, is "Lewisham".

Rules for V.H.F. NFD, 1968

Essentially the rules for V.H.F. NFD 1968 are the same as for last year's event. The scoring system has, however, been changed to the " radius " scoring system which is in use for all current RSGB V.H.F./U.H.F. Contests. The use of QRA locators is optional on all bands, but the Committee urges that entrants know their correct QRA locator as those preferring this system may require it. Two receivers (or more) per band will again be allowed, but the Committee hopes that entrants will not attempt the confusing practice of working two stations at the same time.

After considerable discussion, it has been decided to retain the 25 watt power level for this year because the evidence presented to the committee shows that a majority of entrants prefer this limitation, in spite of the technical arguments in favour of no power restrictions. The Committee intends to respect the majority view and so, in order to assess the position after this year's field day, entrants are asked to answer the questionnaire in Rule 16.

Since last year's V.H.F. NFD several groups have asked that either a register of locations should be started or that the number of miles that entrants travel to their site should be limited, both measures being intended to discourage " foreign intruders " from the next county! No action has been taken for this year's contest, but see the questionnaire in Rule 16.

The Committee had considered changing the date of V.H.F. NFD, but it was obviously advantageous for the Contest to coincide with the Region 1 IARU Contest in order to take advantage of the high level of continental activity, should conditions (and of course the weather) turn out to be good. As last year, the contest will finish one hour before the end of the Region 1 contest, to allow time for packing up.

The Band Multipliers under the new scoring system are shown in Rule 8 and are so arranged that the bands will have about the same significance in the overall score as in past years. A new multiplier has been introduced on the 13cm band, which should make operating on this band quite attractive.

The Committee hopes that all entrants will have an enjoyable contest and that the weather stays fine this year!

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1. Duration. From 18.00 GMT, 7 September 1968 to 17.00 GMT, 8 September, 1968.

2. Eligible Entrants. Any RSGB member or group of members operating within the British Isles.

3. Operators. (a) Operators of portable stations competing in the contest must each hold a current British Isles Amateur (Sound) Licence and must be fully paid up Corporate members of the RSGB at the time of the Contest.

(b) Operators of Portable Stations competing in the contest may not give points to the station or group of stations for which they operate, by using their own call-signs.

4. Power Supplies. Stations may not use public supply mains. Power for *all* equipment must be derived from an *on site* portable generator or battery (i.e. dry battery, accumulator etc).

5. Stations. Each competing group will be permitted a maximum of three stations, each using a different call-sign. Only one station may operate on a given band, but there is no restriction in the way in which the bands are allocated. Only one transmitter per band is allowed. *Two* groups may combine their scores to form one entry but the bands must be allocated between a maximum of three stations. Groups may site their three stations at different locations, *but all stations forming one entry must operate with the same country prefix* (i.e. from the same country).

6. Setting up Time. No equipment or aerials for use in the contest may be installed or erected on the field day site prior to 12 hours from the start of the contest. This does not apply to the storage of equipment. The field day site is defined as a circle drawn within a radius of 1 km from the operating position during the contest.

7. Power and Modes. (a) On the 4m, 2m, 70cm and 23cm bands the d.c. input power (as understood by the terms of the licence) shall not exceed 25 watts to any r.f. stage of the transmitter. All modes may be used except A2 (m.c.w.).

(b) On the 13cm and lower wavelength bands any power or mode may be used.

8. Scoring. Contacts made between the distances given below will score as indicated.

Miles	km	Points
00–31·25	0–50	1
31·25–62·5	50–100	2
62·5–93·75	100–150	3
93·75–125	150–200	4
125–187·5	200–300	6
187·5–250	300–400	10
250–312·5	400–500	14
312·5–375	500–600	18
375–347·5	600–700	22
437·5–500	700–800	26
500–625	800–1000	34
Over 625	Over 1000	44

Contacts on borders score low. *Each* band is to be treated separately for scoring and serial numbers start from 001 on each band. The band score is then found from the following formula.

Band Score = Distance score × station multiplier × band multiplier.

The Distance Score is the sum of the points for the individual contacts.

The Station Multiplier is the number of contacts made over 50km (i.e. two or more points) plus half the number of contacts made at 50km or less (i.e. one point),

The band multiplier is: 2 on 4m. 1 on 2m. 7 on 70cm. 125 on 23cm. 500 on 13cm and lower wavelength bands.

9. Contest Exchanges. (i) RST or RS reports followed by a serial number. Serial numbers start at 001 and advance by one for each contact.

(ii) Contestants must send either their QTH or their QRA locator. Entrants may send both QTH and QRA if they wish. The QTH must be a distance in km and a bearing from a town which can be found on the Ordnance Survey "Ten-Mile Map." The QRA is the standard five-bit location fixing system.

It is the responsibility of the receiving operator to obtain the location information he requires for scoring.

10. Logs must be submitted on RSGB Contest Log Sheets and tabulated in columns as follows:

1. Date, and Time, in "British Standard Time." 2. Call sign of Station worked. 3. My report on his signals and serial number sent. 4. His report on my signals and serial number received. 5/6. Location of station worked. 7. Call-sign of Operator. 8. Distance score.

Separate logs must be submitted for each band—serial numbers commence at 001 on each band.

11. Contacts.

(a) Only one contact per band is permitted with a given station, for which points may be claimed.

(b) Contacts with stations that change their location (i.e., change from /P to /M, etc) may only be scored once. The best contact should be claimed.

(c) Crossband contacts will not count for points, but can be used to " set up " a single band contact.

(d) Repeat and crossband contacts should be clearly marked as such and the points column left blank.

12. Calling CQ. Contestants are asked to indicate on which band they are calling CQ and are strongly urged to state their tuning intentions.

13. Proof. Proof of contacts may be required.

14. Entries.

(a) Entries must be postmarked not later than 23 September, '68.

(b) Entries must be sent to RSGB HQ marked V.H.F. NFD in the *Top Left Hand* corner of the envelope and addressed to The Secretary, V.H.F. Contests Committee.

(c) Special Cover and Summary sheets are available for this contest and should be used. They may be obtained by sending a large s.a.e. to RSGB HQ.

(d) The Cover and Summary sheets must be completed and signed by one member of the group, who will be considered responsible for the entry.

15. Awards. Awards will be made to the overall winner and runner-up, to the leading entry from each country and to the highest scoring station on each band.

16. Questionnaire. All entrants are asked to answer the following questions. List the question number and part letter on the reverse side of the *summary* sheet. Place a 1 by your first choice and a 2 by your second choice.

continued opposite

Rules for IARU Region 1 V.H.F./U.H.F. Contests

One of the five official Region 1 IARU V.H.F./U.H.F. contests coincides with V.H.F. National Field Day on 7-8 September, 1968. Those who enter this contest must forward two extra copies of their NFD log to Headquarters, who will pass it on to the V.H.F. manager. The V.H.F. Contests Committee hopes that more portable stations and fixed stations will enter the IARU contest held on 7-8 September this year.

Rules

1. Eligible Entrants. All licensed radio amateurs resident in Region 1. Multiple operator entries will be accepted provided only one call-sign is used. Contestants must operate within the letter and spirit of the contest and at no greater power than permitted in the ordinary licences of their country. Stations operating under special high power licences do so hors concours and cannot be placed in the contest proper.

2. Contest Stations. The first, second, fourth and fifth contests will comprise the following sections:

i. Fixed stations, 2m.
ii. Portable/Mobile stations, 2m.
iii. Fixed stations, 70cm.
iv. Portable/Mobile stations, 70cm.
v. Fixed stations, 24cm.
vi. Portable/Mobile stations, 24cm.

The third contest will be operated on 70cm and 24cm only (Note 3). Portable/Mobile stations must operate from the same locations throughout the events.

3. Dates of Contests. The four general contests will take place during the first weekend of March, May, July and September each year; the third contest (70/24cm only) will take place during the last weekend in May (the sequence 31/1 or similar not to count).

4. Duration of Contests. The International Region 1 V.H.F./U.H.F. Contest will commence at 18.00 GMT on the Saturday and will end at 18.00 GMT on the Sunday, the exact times and/or time intervals being at the discretion of the organizing National Society, provided they fall within these two time limits. The sub-regional contests taking place during the first weekends of March, May and July will be held between 18.00 GMT on Saturday and 18.00 GMT on Sunday, the exact times and/or time intervals being at the discretion of the organizing national society provided that they fall within these time limits.

5. Number of Contacts. Each station can be worked once only on each band whether fixed, portable or mobile. If a station is worked again during the same contest on the same band only one contact will count for points, but any duplicate contacts should be logged without claim for points and should be clearly marked as duplicates.

6. Types of Emission. Contacts may be made on A1, A3 A3a or F3.

7. Contest Exchanges. Code numbers exchanged during each contact shall consist of the RS or RST report, followed by a serial number commencing at 001 for the first contact on each band and increasing by one for each successive contact on each band. This exchange must be immediately followed by the QRA Locator of the sending stations (example 579021YG46E). QTHs may also be exchanged if desired.

8. Scoring. Points will be scored on the basis of one point per kilometre. The final claimed score must be shown at the top part of the first sheet.

9. Entries. Entries must be set out as shown in the example below. In the case of the International Region 1 V.H.F./U.H.F. Contest, two copies of the entry must be sent to the National V.H.F. Manager concerned, postmarked not later than the second Sunday following the contest weekend. Late entries will not be accepted. The judging of the entries shall be the responsibility of the organizing Society whose decision shall be final. Submission of a log implies acceptance of the rules (Note 2).

10. Disqualification. Entrants deliberately contravening any of these rules shall be disqualified. Minor errors may result in loss of points. Errors in call-signs and code numbers will be penalized by deducting the following percentage of claimed scores for both stations.

One error: 25 per cent; two errors: 50 per cent; three or more errors: 100 per cent.

The claimed contact will be disqualified for (a) an obviously wrongly stated QTH, when no QRA Locator is exchanged; (b) a time error of more than 10 minutes (Note 1). Contest entrants will not be penalized for the failure of non-entrants to comply with these rules.

11. Awards. The winner of each section will receive a certificate. The top score on 2m, whether fixed or portable, will be awarded the Region 1 V.H.F. Trophy. The winner in the remaining 2m category will be awarded the PZK cup.

NOTES

1. In some countries it is customary to use a band identification letter (A for 2m, B for 70cm and C for 24cm). Should this letter be used or not used no penalty will be exacted.

2. Not later than the seventh Sunday following the International Region 1 V.H.F./U.H.F. Contest the V.H.F. Manager or properly constituted Contests Committee will forward to the Society organizing the Contest one copy for each entry, after examining the logs and certifying them to be acceptable to the best of their knowledge.

3. The May 70/24cm contest will be known as the IARU Region 1 U.H.F. Contest.

Sample Contest Log Sheet

Contest ..... Date ..... Claimed Score .....
Section ..... Call-sign .....
Name .....
Home address .....
Location of station ..... Latitude ..... Longitude .....
Height above sea level in metres .....
Transmitter ..... Input power ..... watts.....
Operating frequencies ..... Crystal or v.f.o. .....
Receiver ..... Aerials.....

Date/ Time	Call-sign	Serial Sent	Numbers Received	QTH	Emis-sion	Dis-tance km	Points claimed

Declaration

I declare that this station was operated strictly in accordance with the rules and spirit of the contest and I agree that the ruling of the organizing society shall be final in all cases of dispute.

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

V.H.F. NFD Rules continued

*Q.*1—Location Information—Which location information system would you prefer to use during V.H.F./U.H.F. Contests?

(*a*) QTH only (i.e. bearing and distance).
(*b*) QRA only.
(*c*) Both.
(*d*) Optional between QTH and QRA.

*Q.*2—Power—What maximum power level would you prefer for V.H.F. NFD? (n.b. Not including 4m).

(*a*) 10 watts.
(*b*) 25 watts.
(*c*) 50 watts.
(*d*) 75 watts.
(*e*) Maximum licensed power.

*Q.*3—Locations—In view of the comments in paragraph three of the introduction to these rules—which of the following would you prefer?

(*a*) Confine entrants to their own county.
(*b*) Limit the number of miles from clubroom to /P site.
(*c*) Introduce a register of sites based on past occupancy.
(*d*) Do none of the above (i.e. place no restrictions on entrant's locations).

*Q.*4—Date—Which of the following dates would you prefer for V.H.F. NFD?

(*a*) The present date (i.e. first weekend in September).
(*b*) Two weeks in advance of the present date.
(*c*) Four weeks in advance of the present date.
(*d*) Six weeks in advance of the present date.

CONTEST NEWS RULES—RESULTS

First 1·8 MHz Contest 1968

The first 1·8 MHz Contest of 1968 held on 17-18 February, attracted 43 entries compared with 48 received for the 1967 contest. The veteran of Top Band contests, I. T. Cashmore, G3BMY, emerged as winner with a score of 796 points and, subject to the approval of the Council, will receive the Somerset Trophy. The runner-up, just 14 points behind, was J. Christie, GM3FXM, while H. J. M. Box, G6BQ, took third place with 758 points and both will receive Certificates of Merit, again subject to the approval of Council. This result disproves the theory, expressed by many contestants over the years, that a Scottish station could not get near the top of this contest.

The Maitland Trophy, awarded to the Scottish entrant with the highest aggregate of points in this contest and the Second 1·8 MHz Contest 1967, will, subject to Council's approval, go to J. Christie, GM3FXM, with a total of 1,262 points. He finally had a margin of 50 points over W. G. Cecil, GM3KHH, who started this contest with a lead of 120 points over his rival. A Certificate of Merit for the best check-log submitted by a non-transmitting member will be awarded, subject to Council's approval, to A. A. Goacher, A3942, who must be congratulated for his excellent and accurate log.

Competitors were able to maintain a high rate of scoring during the early stages but later found contacts few and far between. There were many contacts with OK and OL and several entrants were able to get across to the States, while a few logs had rather wistful notes of Ws heard but not contacted.

Very few entrants made comments, but of those made the majority said the contest was too long. Nobody objected to the scoring system beyond suggesting that 6 points should be awarded for all contacts. As a matter of interest only two stations had more than 10 contacts with contestants in one county, G3VIP having 11 with YS and G3UFY the same number with SY. All comments and consideration of the point of change-over from 6 points to 3 points will be reviewed by the Committee in due course.

There is very little one can say about the equipment used by competitors beyond the fact that most stations had home-brew transmitters with the usual range of commercial receivers and a small sprinkling of transceivers.

On the subject of aerials, all the leading stations used half-waves in one form or another. There were three loaded verticals of 30 ft. or so, the remainder being quarter-waves and " bent " or " very bent " long wires.

Posn.	Call-sign	County	Score
1	G3BMY	SE	796
2	GM3FXM	FE	782
3	G6BQ	KT	758
4	G3SJJ	NM	756
5	G3BDQ	SX	750
6	G3OLB	GR	680
7	GM3KMR	MN	666
8	G3VIP	LN	651
9	G3OKA	CH	636
10	G3TAA	LD	612
	GM3KHH	BF	612
12	G3OVL	SY	606
13	G3TIR	SX	598
14	G3USE	BD	588
15	GM3UKG	BF	580
16	G3RSD	LN	576
17	G3IGZ	LD	564
18	G8AB	EX	546
19	G3HZL	MX	510
20	G3UFY	SY	483
21	G3PSB/A	YS	474
22	G3XDV	KT	472
23	GW3GWX	CV	466
24	G3NRU	KT	444
25	G3KMM/A	ST	438
26	GW3CW	DB	422
27	G3NSY	SE	414
28	GW3UCB	CV	406
29	G3CWW	YS	390
30	G3GJX	HF	332
31	G3WPO	SX	378
	G3WQP/A	LE	378
33	G3TUM	EX	372
	GW3WVG/A	MH	372
35	G3VYI	LD	360
36	G3JVL	HE	320
37	G3PHG	SX	254
38	G3VFD	KT	220
39	G3WRR/A	SY	198
	G3WSN	EX	198
	GI3JEX	DW	198
42	G3WUD	LE	180
43	G3PGJ	DN	138

Maitland Trophy

Position	Call-sign	Score Second 1.8 MHz 1967	Score First 1.8 MHz 1968	Total
1	GM3FXM	480	782	1262
2	GM3KHH	600	612	1212
3	GM3KMR	474	666	1140
4	GM3UKG	378	580	958

As usual, the standard of log keeping was first rate but there were a few entrants who did not use the RSGB Contest Log Sheets. Next time, please get a supply from HQ—it really does help the checking. The H.F. Contests Committee would like to record their appreciation of competitors' best wishes and thanks for organizing the contest.

Check logs are gratefully acknowledged from G2BTO, G3FM, G3RSO, G3WDS, G4AR, G4VF, OL1AGS and OK1AOV.

Affiliated Societies' Contest 1968

Posn.	Society	Call-sign	Score
1	Maidstone YMCA ARS	G3TRF	1735
2	Thames Valley ATS	G3TVS	1705
3	University of Keele RS	G3UOK	1695
4	Surrey RCC	G3SRC	1623
5	Verulam ARC " B "	G3NOH/A	1621
	GCHQ ARC	G3SSO	1621
7	Reigate ATS " B "	G3FM	1619
8	Harrow RS " B "	G3SHK	1594
9	Leyland Hundred ARG	G3GGS	1587
10	Stoke on Trent RS	G3GBU	1579
11	Edgware DRS	G3ASR/A	1576
12	Crawley ARC " B "	G3TR	1558
13	Verulam ARC " A "	G3VER	1552
14	Amateur RC Nottingham	G3EKW	1527
15	Chippenham DARC	G3VRE	1511
16	Midland ARS	G3MAR/A	1510
17	Reigate ATS " A "	G3REI/A	1502
18	Silverthorne RC	G3SRA	1501
	Bristol ARC	G3TAD/A	1501
20	Crawley ARC " A "	G3WSC	1485
21	Echelford ARS " A "	G3UES	1454
22	Royal Signals ARS	G4RS	1445
23	Stevenage DRS	G3SAD	1429
24	Moray Firth ARS	GM3TKV	1424
25	Cray Valley RS	G3RCV/A	1415
26	Coventry ARS	G2ASF	1406
27	Crawley ARC " C "	G3TNO	1376
28	Isle of Wight RS	G3SKY	1365
29	Marconi Apprentices AARC	G3JTW	1344
30	Sutton and Cheam RS	G3CDK	1289
31	Acton, Brentford Chiswick RC	G3IIU/A	1287
32	West Kent ARS	G3WKS/A	1277
33	Portsmouth D.R.S.	G3DIT/A	1258
34	R. Soc. of Chesham	G3MDG/A	1251
35	Salop ARS	G3SRT/A	1229
36	Mid-Herts ARS " B "	G3UMA	1225
37	Purley DRC	G3FTQ/A	1224
38	University College of North Wales RS	GW3UCB	1214
39	Farnborough DRS	G3XCH/A	1187
40	Grimsby ARS	G3NJF	1076
41	Addiscombe ARC	G3UFY	1072
42	Mid-Sussex ARS	G3BZO	1048
43	Wirral ARS	G3NWR/A	1046
44	Southgate RC	G3SFG/A	1012
45	Magnus GSRS	G3PAW	884
46	Mid-Herts ARS " A "	G3WGC	877
47	Havering ARC " A "	G3USZ	787
48	Lowland Royal Signals ARC	GM3TLR	772
49	Fareham DARC	G3VEF/A	756
50	Havering ARC " B "	G3TPJ	649
51	Echelford ARS " B "	G3SAZ	619
52	Barking RES	G3KBF	487
53	Bromsgrove DARC	G3VGG	401

The following entries were disallowed.

Chester DRS	G3GIZ/A	(*)
Junior Leaders Regt.	G3UWQ	(*)
RAF Gatow REC	DL5YZ	(†)
South Shields DARC	G3DDI	(†)

(*) No operators' call-signs on log (Rule 8)
(†) Only one operator during Contest (Rule 1).

Check logs are acknowledged, with thanks, from the following stations: G3EFX/A, G3JFY, G3SKC, G3TZM, G6OI/A.

The 1968 event was again won by the Maidstone YMCA Amateur Radio Society (G3TRF) with a checked score of 1735 points. Close behind was the Thames Valley Amateur Transmitters' Society (G3TVS) with 1705 points; last year Thames Valley were in fourth place. The University of Keele (G3UOK) came up from tenth place in 1967 to take third position.

The notable point, from the H.F. Contests Committee's angle, is the very poor standard of accuracy in the logs for this year's event. Some very large alterations in scoring have been made by the adjudicators, and so most groups will find their checked score to be different from that claimed. The inaccuracies reflect an increasing tendency to abandon accuracy in favour of speed—the errors found ranged from wrongly logged call-signs through inaccurate exchanges to contacts that just did not check at all.

Four entries had to be disallowed; we were particularly sorry to have to include the RAF Gatow Club in this category. Many entrants would not believe the " AFS " they had from DL5YZ—as it happened he was " OK for points".

Two groups commented on the rule restricting operation to sites within a 10 mile radius of Club or group Headquarters. Isolated instances have occurred where stations with only two operators have operated from sites considerably differing from the normal sphere of activity of the Club they claim to represent. Since the purpose of this Contest is to encourage Club and Group activity, the H.F. Contests Committee does not feel such entries are in the spirit of this particular Contest.

Two regular participants, Harrow " A " (G3EFX/A), and Stourbridge G6OI/A) suffered aerial difficulties and had to withdraw from the Contest at an early stage; better luck next time.

Comments from groups: " Used inverted Vee Dipole with centre at 60ft..." (Maidstone YMCA). " Conditions not very bright, especially on Sunday " (Reigate ATS). " Surely OK/DL QSOs are worth more than one point?" (Leyland Hundred). " Very Hard Going " (Moray Firth).

A couple of dedicated operators, G3TWJ (front) and G3GKF, operating the Purley & District Radio Club's station at Reedham School during the AFS contest. *(Photo by G3FTQ)*

Listeners' 1·8 MHz Contest 1967

A total of eight entries were received for the Listeners' Top Band Contest, 1967, held on 18 November coinciding with the first three hours of the transmitting event. The H.F. Contests Committee was impressed by the high standard of the logs, and by the speed and accuracy with which the listeners recorded the necessary information.

The winner of this contest, by a clear margin, was A. A. Goacher, A3942, of Storrington, Sussex. Tony has forwarded check logs for many Top Band contests in the past, and he is also well known in v.h.f. listeners' contests. Tony used a CR100 receiver and a 66 ft. aerial. The runner-up was T. A. Gardener, A5035, of Nottingham, who had an Eagle RX-80 receiver with a Codar *Q* Multiplier, and a ¼λ aerial.

" The use of BK tends to make things rather exasperating for the listener... three hours is just about right," A3942. " I hope that there will be sufficient entries for the contest to become permanent," A5035. " Five hours next time please," BRS15822. " A lot of people let their bugs run away with them," A5271. " Two local stations caused considerable QRM and cross-mod," A5579. " I enjoyed the contest very much," BRS29884.

Position	Name	BRS/A No.	Score
1	A. A. Goacher	A3942	480
2	T. A. Gardner	A5035	432
3	R. W. F. Thomas	BRS15822	336
4	B. Crook	BRS21008	282
5	M. R. Arnold	A5271	210
6	Miss J. S. Jarvis	BRS29517	198
7	J. H. Quarmby	A5579	108
	E. F. Jacobs	BRS29884	108

Subject to Council's approval, A. A. Goacher will receive a Certificate of Merit as the winner.

High Wycombe D/F Qualifying Event

Sunday, 12 May 1968.
Assembly: 13.00 BST for start at 13.20 BST.
Map: Ordnance Survey, sheet 169 (Aldershot area).
Call-signs and frequencies: to be announced at the start.
Starting point: NGR 857715; a fork 200 yards North of the B3034, 1 mile east of Binfield.
Organizer: T. Gage, 1 Garden Cottages, Sutton Road, Cookham, Berks.
Entries and Tea: Intending competitors are requested to notify the organizer of the number in the party requiring tea.

Salisbury D/F Qualifying Event

Sunday, 26 May, 1968.
Map: Ordance Survey Sheet 167
Assembly: 13.00 BST
Location: Stonehenge, NGR 122423
Frequencies and Call-signs: To be announced at the start.
Organizers: Sir Evan Nepean, G5YN, and A. C. A. Newman, G2FIX, 74 Victoria Road, Wilton, Nr. Salisbury, Wilts.
Entries and Tea: Intending competitors are asked to notify the organizers as soon as possible stating the number in the party who will require tea.

Rugby D/F Qualifying Event

Sunday 30 June, 1968.
Map: Ordnance Survey, Seventh Series, Sheet 145, Banbury.
Assembly Time: 13.00 BST for first transmission at 13.20.
Location: 2 miles south of Preston Capes NGR 574 524.
Frequencies and Call-signs: To be announced at the start.
The Rugby Cup will be awarded for the year 1968 to the winner of this qualifying event.
Tea: Intending competitors are asked to advise Mr J. J. Grant, 23 Holbrook Avenue, Rugby, Warwickshire, of the number in their team requiring tea.

Second 144 MHz (Open) Contest 1968

Entries for this contest show a steady decline from 46 in 1966, to 38 in 1967 and to 27 in 1968. There is a strong possibility that the poor conditions accounted for this drop; operators did not think it worth sending in logs containing only a small number of contacts. Certainly, there were more than twice the number of stations active than were shown in the logs, but many well-known call-signs were absent from the list of entrants.

No EU contacts were reported except that of G3DAH with PA0KWY, and best DX was 325 km which is a good indication of the poor propagation prevailing.

The new scoring system seems to be welcomed by most entrants with the noticeable exception of GW3NUE/P who dislikes the "steam roller" tactics of the Committee in introducing the new rules, dislikes zonal scoring and dislikes multipliers but says that he is prepared to tolerate them.

Winners and runner-up have already been announced over GB2RS and are as shown below.

G3FRV reports that some stations obviously do not QLM, for he was on 144·008 MHz but a number of stations announcing "QLM" were called several times before they came back with 559. G6RH asks where the North and North/West stations were. Liverpool and York were worked with 579 and 589, but no others. G5DF bemoans the abandonment of the Band Plan during the contest and dislikes the crowded conditions at the l.f. end which resulted. He notes the difficulty of contacting distant stations (G3OUL for example) under QRM conditions and contrasts this state of affairs with the G3BA/G3BHT expedition to EI/GI where operation was within the Zone and in the clear. This aspect of the contest was noted by several competitors. Comments to the V.H.F. Contests Committee please.

Subject to Council approval, Certificates of Merit will be awarded to the Winners in each Section and to the runner-up in Section A. There were not enough entries in other Sections to justify an award (see General Rule 3A).

Position	Call-sign	Contacts	Multiplier	Points	Best DX (km)	QTH	Rx Input	TX Power Watts	Aerial
1	G3NEO	35	33·5	5226	315	Sheffield	6DS4	150	10 ele Yagi
2	G3FRV	50	41·5	5146	315	Crawley	2N3819	150	10 ele Yagi
3	G3IMV	43	40	4414·5	280	Bletchley	6CW4	75	8/8 slot
4	G6RH	40	35	4270	307	Bexley	2N4416	125	9 ele Yagi
5	G5DF	39	35	3800	256	Reading	6CW4	100	16 ele stack
6	G5UM	34	33	3328	230	Leicester	6CW4	20	10 ele Yagi
7	G2WS	31	28	2912	275	Weston-super-Mare	6CW4	75	4/4 slot
8	G3USB	33	30·5	2867	248	Cambridge	EC88	120	10 ele Yagi
9	GW3FSP	26	24·5	2866·5	310	Pencoed	—	150	10 ele Yagi
10	G3NNK	36	29·5	2714	300	Romford	6CW4	90	6/6
11	G4CM	35	28	2324	316	Coulsdon	6CW4	12	6/6
12	GW3MFY	21	19	1520	310	Bridgend	TIXMO5	90	6/6
13	G3NJF	18	17·5	1375	325	Grimsby	—	120	6/6
14	G2BHN	20	18·5	1165	287	Yeovil	—	42	4/4
15	G3COJ	21	15·5	806	325	HighWycombe	GMO290	100	8/8
16	G3UUT	13	12·5	662·5	294	York	6CW4	80	6/6
17	G3IDG	5	3·5	24·5	58	Basingstoke	—	19	Indoor dipole
Section B									
1	G3OUL	34	33·5	5929·5	316	Liverpool	6CW4	150	8 ele Yagi
2	G3NNG	44	42·5	5652·5	308	Faringdon	TIS88	10	6/6
3	G3TGL/A	37	35·5	4650·5	270	Dudley	6CW4	90	10 ele Yagi
4	G3TIR	40	33·5	3417	320	Crawley	6CW4	100	8/8
Section C									
1	GW3NUE/P	54	53·5	11930·5	310	Pandy	A2521	140	10 ele Yagi
2	GW3LE/P	28	27·5	3327·5	320	Dorchester	2N3819	50	10 ele Yagi
3	G3JCZ/P	32	29·5	2183	215	Bletchley	—	10	8 ele Yagi
4	G3RCV/P	24	22	1496	250	Ditchling	—	20	6/6
5	G3VPF/P	19	20	1280	224	Dorchester	—	25	4 ele Yagi
6	G3TXR/P	13	12·5	362·5	148	Evesham	AFZ12	20	8 ele Yagi

Listeners' V.H.F./U.H.F. Championship 1967

The number of entries received this year was very nearly the same as for the 1966 event, with 13 listeners taking part. 144 MHz was the most popular band, thanks no doubt to the bonus points available from the continental stations; 432 MHz entries increased, and the first log was received for 1296 MHz. Seven listeners were active during V.H.F./NFD, two of them (BRS26234 and A3942) operating portable equipment.

This year's leader, and winner of the Hanson Trophy is E. MacDuff BRS26234, of Ashington, Sussex. The runner-up is R. Ham, BRS15744, who will receive a Certificate of Merit. The V.H.F. Contests Committee has also recommended that a Certificate of Merit be awarded to A. Goacher, A3942, for his outstanding performance on 144 MHz during V.H.F. NFD, when he logged 125 stations in no less than 28 QRA rectangles. These awards are subject to approval by Council.

The leading operators have both pointed out the advantage of 432 MHz operation and suggested that the band multiplier be reduced. Several entrants have requested that scoring should be based on distance. Both of these recommendations have been adopted. Several entrants report QRM from nearby portable stations but they should remember that some listeners have to "live with" high power fixed stations all the year round.

Comments: "One person, not in the contest, made a lot of chit-chat about what he was running. In a contest nobody is interested if he is running 10 watts or 10,000 watts!" (A5082). "If the suggestion about multiplier systems for height a.s.l. is used for listeners, I shall go back to the l.f. and h.f. bands" (A4871, 810 ft. a.s.l.).

All entrants are thanked for their interest and suggestions and it is hoped that the number of entries will be maintained or increased during the 1968 season.

Position	Entrant		1st 144 MHz	1st 70 MHz	2nd 144 MHz	2nd 70 MHz	3rd 144 MHz	1st 432 MHz	4th 144 MHz	3rd 70 MHz	2nd 432 MHz	NFD 70 MHz	NFD 144 MHz	NFD 432 MHz	2nd 1296 MHz	3rd 432 MHz	4th 70 MHz	Total
1	E. MacDuff	BRS26234		462	1232			552	1141		1518			1566	870	1107		7434
2	R. Ham	BRS15744		509	1466	905	837	1479	1011					1266				6964
3	C. Baker	A5032		278	1270	417	641		884	527	954	547	847	1293		829		6077
4	A. Goacher	A3942	1059		1085		317		1219				1878					5241
5	T. Cooper	BRS28005		110	353	618	375		780	635	270		1038			897		4238
6	R. Thomas	BRS15822	284	350	1103	758				493							512	1866
7	A. Watts	A4871			792		612		996									2200
8	P. Briggs	A4752		261		606				582								1449
9	A. Grove	A5124							341			357	479					1177
10	R. Whitbread	A4674		455		623												1078
11	D. Poulter	A4048		593														593
12	T. Plumb	A5082							372				60					432
13	M. Arnold	A5271			222													222

No entries were received for the First 1296 MHz Contest. Scores are totalled as described in Rule 3.

First 144 (S.S.B.) Contest, 1968

Congratulations go again to G3BA for winning the first 2m s.s.b. contest this year, held on 8 January. Like the " experimental s.s.b. Contest " last year, conditions were rather poor, but activity was high despite the few logs received. The list below gives the call-signs of the stations that were known to be active.

It would seem from the few entries received that the results of the questionnaire which followed the first experimental s.s.b. contest no longer hold, the opinions of the entrants being that repeat contacts should definitely be dropped. This will be considered for the next contest in June. Also under consideration is the allowance of club and /A stations in the contest. The V.H.F. Contest Committee wishes to thank all those who took part in the contest.

The stations known to be active during the contest were: G2DQ, G2JF, G2NH, G2PL, G2AFD, G2ATM, G2DCG, G2HIO, G3BA, G3MP, G3BHW, G3BNL, G3COJ, G3DIV, G3FIH, G3GWZ, G3HGE, G3IOE, G3KEU, G3KTU, G3LLJ, G3LTF, G3MED, G3NAS, G3NEO, G3NOC, G3PDT, G3PWJ, G3RME, G3SHK, G3STL, G3USE, G3VZN, G4MN, G4QU, G5VU, G5AHK, G6CW, G6TA, GI3GXP and GW3RBM.

Posn.	Call-sign	Score	Power
1	G3BA	22000	600
2	G3JWZ	8432	400
†	G3VZN	7800	600
3	G3BHW	5822	300
4	G3DCG	4384	200
5	G3COJ	1944	100
6	G2NH	406	100

† Club station

General Rules, V.H.F. Contests

The wording of V.H.F. Contests General Rule No. 4 as published on page 58 of the January issue of *Radio Communication* contained an error. The correct wording should have been as follows:

" Contacts on borders score low. When the total distance score for the contest has been found, it is multiplied by the station multiplier which is the number of contacts made over 50 km (i.e. two or more points) plus half the number of contacts at 50 km or less (i.e. one point).

First 1296 MHz (Open) Contest

1. Date and Time. 4 May from 17.00 BST to 5 May, 17.00 BST.
2. All **logs** should be sent to the adjudicator at: V.H.F. Contests Committee, 20 Pembury Road, Bexleyheath, Kent.

In addition the following General Rules will apply: 3a, 4, 5b, 6b, 7a, 8a, 9a, 10a, 11 to 21, 23 to 28 (Rule 22 does not apply).

First 432 MHz (Open) Contest

1. Date and Time. 4 May from 17.00 BST to 5 May, 17.00 BST.
2. All **logs** should be sent to the adjudicator at: V.H.F. Contests Committee, 20 Pembury Road, Bexleyheath, Kent.

In addition the following General Rules will apply: 3a, 4, 5a, 6a, 7a, 8a, 9a, 11 to 21, 23 to 28 (Rule 22 does not apply).

Fourth 144 MHz (Portable) Contest

1. Date and time. 19 May from 10.00 to 18.00 BST.
2. All **logs** should be sent to the adjudicator at: V.H.F. Contests Committee, 80 Argyle Road, Ealing, London, W.13.

In addition the following General Rules will apply: 3b, 4 5a, 6a, 7b, 8a, 9a, 10a, 11 to 19, 25 to 28.

Second 432 MHz (Portable) Contest

1. Date and time. 23 June from 10.00 to 18.00 BST.
2. All **logs** should be sent to the adjudicator at: V.H.F. Contests Committee, " Summerleigh," Beltinge Road, Herne Bay, Kent.

In addition the following General Rules will apply: 3b, 4, 5a, 6a, 7b, 8a, 9a, 10a, 11 to 19, 25 to 28.

Copies of RSGB V.H.F./U.H.F. General Rules and the new V.H.F. cover sheets are obtainable by sending a large s.a.e. to The Secretary, V.H.F. Contests Committee at RSGB Headquarters.

CONTESTS DIARY

4-5 May	—First 1296/432 MHz (Open) Contest
4-5 May	—(RSF), 3·5-28 MHz, C.W.
12 May	—High Wycomde D/F Event (page 327)
19 May	—Fourth 144 MHz (Portable) Contest
26 May	—Salisbury D/F Event (page 327)
1-2 June	—(DARC) 3·5-28 MHz, C.W.
8-9 June	—(UBA), 1·8-28 MHz, C.W.*
8-9 June	—National Field Day
23 June	—Second 432 MHz (Portable) Contest
24 June	—Fifth 144 MHz (S.S.B.) Contest
30 June	—Rugby D/F Event (page 327)
6-7 July	—Summer Top Band Contest
13-14 July	—High Power H.F. Field Day (see page 254)
14 July	—Stratford-on-Avon D/F Event
21 July	—Third 70 MHz (Portable) Contest
28 July	—St. Albans D/F Event
3-4 August	—Sixth 144 MHz (Open) Contest
10-11 August	—(DARC), 3·5-28 MHz, C.W.
11 August	—Oxford D/F Event
1 September	—(DARC), 3·5-28 MHz, C.W.*
7-8 September	—(DARC), 3·5-28 MHz, Phone
7-8 September	—V.H.F. National Field Day (provisional date)
15 September	—80m Field Day
21-22 September	—(SSA), 3·5-28 MHz, C.W.
22 September	—D/F National Final
28-29 September	—(SSA), 3·5-28 MHz, Phone
5-6 October	—Third 432 MHz (Open) Contest
12-13 October	—28 MHz Telephony Contest
12-13 October	—Second 1296 MHz (Open) Contest
19-20 October	—11th Jamboree on the Air
26-27 October	—7 MHz Phone Contest
7-10 November	—7 MHz C.W. Contest
11 November	—Seventh 144 MHz (S.S.B.) Contest
16-17 November	—Second 1·8 MHz Contest
1 December	—Fourth 70 MHz (C.W.) Contest

* Restricted to Members only

LOOKING AHEAD

19 May—Northern Radio Societies' Convention, Belle Vue, Manchester.

Mobile Rallies

5 May—Medway Mobile Rally, British Uralite Works Ltd., Higham, Kent. Talk-in stations GB2FJA on 160, 4, 2m and 70cm a.m., and s.s.b. from 2.30 p.m. Covered accommodation with various entertainments will be provided should the weather prove unsettled.
12 May—Thanet Mobile Rally, Cliff Top site, Ramsgate.
12 May—Talk-in on 160m, 4m, and 2m a.m.
12 May—Northern Mobile Rally, Harewood Park, Nr Leeds.
26 May—Cardiff Mobile Picnic, Porthkerry Park, Nr. Barry, Glam. Talk-in 160m and 2m. Open from 11.30 a.m. with 160m. D/F Hunt at 2.30 p.m. Further details from T. J. Brooke. GW3GHC, 32 Elgar Crescent, Llanrumney, Cardiff, CF3 9RU. Tel: 78166.
26 May—East Coast Mobile Rally, Spa Hall, Bridlington.
26 May—Talk-in stations, G3GBA/A on 160m and G3PEJ/A on 2m, both from 10.30 a.m.
16 June—Painton Mobile Rally, Bembridge Drive, Northampton.
19 June—Mid-Sussex Mobile Evening, Clayton Windmills, South of Hassocks.
23 June—RSGB National Mobile Rally, Gilwell Park, Essex.
30 June—11th Longleat Annual Mobile Rally, Longleat Park, Wilts.
6-7 July—Cheltenham Festival Rally, Pittville Park Cheltenham.
7 July—South Shields Mobile Rally.
14 July—Worcester Mobile Rally, details later.
16 July—Worcester Mobile Rally, Hill County Secondary School, Upton upon Severn.
21 July—Cornish Mobile Rally, Pentire Head, Newquay, Cornwall.
18 August—RSGB National Mobile Rally, Woburn Abbey, Beds.
25 August—Swindon Mobile Rally, Lydiard Park.
2 September—Peterborough Mobile Rally, River Bank, Peterborough.
2 September—Peterborough Mobile Rally on Riverside.

CLUB NEWS

REGULAR FEATURE

Please send all information direct to Regional Representatives, giving full details of future meetings, and any snippets of activities which would be interesting in print. When listing meetings, please be sure to include the date and time, the meeting place, the lecturer's full name and the call-sign to whom prospective members can refer. The last day on which Regional Representatives can accept letters for inclusion is the first of the previous month.

IN the March edition we gave credit to the joint club journal *Wiltshire Hams* published by the **Cheltenham ARS, Nailsworth and District ARS, Oxford and District ARS** and the **Swindon and District ARC.** The last edition, which seems to have snowballed, has a change of title to *Circuit* and included in its 28 pages are 10 photographs and 24 line drawings; a true example of what a joint effort can produce. We only wish we had more space to publish greater details.

Monthly we receive a number of Newsletters from organizations rather than what could be termed as the local "radio club". These Societies publish newsletters and faithfully send them along, but although they are gratefully received space just does not permit us to review them in detail. Should Secretaries of these groups wish for details of Special Events to be included we will be pleased to do so if submitted in a letter and not hidden in anything up to 40 foolscap pages! This was the length of one *professional* newsletter received last month. Acknowledgement is now given to the following for submitting copy. The **Royal Signals ARS, British Railways ARS, RAIBC,** and the **Royal Naval ARS.**

REGION 1

Ainsdale (ARC).—8, 22 May, 5 June 8 p.m., 77 Clifton Road, Southport.

Allerton (Liverpool) (SRHS).—Thursdays, 8 p.m., 3rd Allerton Scout Group Headquarters, Church Road, Woolton, Liverpool.

Ashton Under Lyne (AUL & DARS).—Fridays, 7.30 p.m., 6 Stamford Street, Stalybridge.

Blackburn (ELARC).—2 May, 6 June, YMCA, Limbrick, Blackburn.

Blackpool (B & FARS).—Mondays, 8 p.m., Pontins Holiday Camp, Squires Gate. Morse tuition from 7.30 p.m.

Bury (B & RRS).—14 May, Annual Dinner (Film by G2BTO & XYL). Secretary—A. Cooper, G3VVQ, 411 Holcombe Road, Greenmount, Bury.

Chester (C & DARS).—Tuesdays, 7 May (Net Night), 10 May (Annual Dinner—Guest of Honour RSGB President, John Graham, G3TR), 14 May (" Computers " by G. Williams), 21 May (Inter Club Quiz), 28 May (Pre-NFD Meeting), 4 June (Net Night), 8 p.m., YMCA, Chester.

Crewe & District.—6 May, 3 June, 8 p.m., 80 Albert Street. All enquiries to the Area Representative, R. Owen, 10 Circle Avenue, Willaston, Nantwich, where visitors are welcome.

Eccles (E & DRC).—Tuesdays, 8 p.m., Patricroft Congregational Schools, Shakespeare Crescent, Patricroft. Every Thursday Club Top Band net 20.30 hours.

Leyland Hundred Amateur Group.—Weekly Net each Thursday at 19.15 GMT (1915 kHz).

Liverpool (L & DARS).—Tuesdays, 8 p.m., Conservative Association Rooms, Church Road, Wavertree.

(NLRC).—10, 24 May, 7 June, 8 p.m., Landsbury House, 13 Crosby Road South, Liverpool 22.

Macclesfield (M & DRS).—7, 21 May, 4 June, 8 p.m., The George Hotel, Jordangate.

Manchester (M & DARS).—Wednesdays, 7.30 p.m., 203 Droylsden Road, Newton Heath, Manchester 10. G3TJX.

(SMRC).—Fridays, Daine Avenue, Northenden, 5 May (Activity Night), 10 May (To be announced), 17 May (Activity Night), 24 May (AGM), 31 May (Activity Night), 7.45 p.m., Rackhouse Community Centre, Daine Avenue, Northenden.

North West V.H.F. Group.—Mondays and Tuesdays, 8 p.m., Club Headquarters, Chapeltown Street, Manchester 4.

Preston (PARS).—2, 16, 30 May, (Talk by G2FOS), 13 June, " Windsor Castle " (Private Room), St. Paul's Square.

St. Helens (SES).—14, 28 May, 11 June, 7.30 p.m., IVS Centre, 55 College Street.

Southport (SRS).—Wednesdays, 8 p.m. and Sundays, 2.30 p.m. The Esplanade.

(73 S.S.B. Society).—Tuesdays, 8 p.m., (All commencing with a talk on part of the RAE Syllabus), 73 Avondale Road North, Southport.

Stockport.—1 May (" Computer Control " by Ewan Walker of Ferranti), 15 May (" Jodrell Bank " by Reg Lascelles, G3AKX), 29 May (" The RSGB " by Basil O'Brien, G2AMV, Region 1 Representative), 8 p.m., Royal Oak Hotel, Castle Street, Edgeley. On 19 May at the Convention at Belle Vue, Manchester, the Society will have a display depicting the educational side of Amateur Radio. Also a " Try your hand at Morse " competition.

Warrington-Culcheth (CARC).—Fridays. 10 May (" Getting an extra S point on Top Band " by Mr A. Rigby, G3FGI), 7.30 p.m., Chat Moss Hotel, Glazebury. Hon Sec.—A. N. Edwards, 6 Ellesmere Road Culcheth.

Westmorland.—3, 17 May, 7 June, 7 p.m., The Allen Technical College, Sandes Avenue, Kendal.

Wirral (WARS).—8 p.m., Harding House, Park Road West, Claughton, Birkenhead.

1 May (" How to win V.H.F. National Field Day " by Liverpool University Group, GB2GC), 15 May (" Linear Amplifiers " by John Share, G3OKA), 5 June (NFD Arrangements). March meetings comprised a very interesting lecture, with demonstrations on the production of printed circuit boards, singly or in small batches, by the use of opaque adhesive tape or by the silk or nylon screen technique, given by R. Stanford of Liverpool University. This was followed by a demonstration of the modified G3HBW Transistorized Dip Oscillator by B. O'Brien G2AMV, and N. Kendrick, G3CSG. It is hoped to arrange a " bulk purchasing scheme " in order that more members may build this instrument. *G3PXX.*

REGION 2

Barnsley (B & DARC).—Second and fourth Friday's in the month, 10 May (Taped Lecture—Semi-Conductor Devices), 24 May (NFD Arrangements), 7.30 p.m., King George Hotel, Peel Street, Barnsley.

Bradford (BRS).—7 May (NFD Arrangements), 9 May (Visit to Spen Valley ARS. Talk by RSGB President, J. C. Graham, G3TR), 21 May (" Lightning, its Nature and Effects," by K. Walton, G3IKS), 7.30 p.m., Bradford Technical College, Great Horton Road, Bradford.

Halifax (H & DARS).—2 May (Visit to Tetley Brewery, Leeds), 12 May (Possible visit to Harewood Mobile Rally), 17 May (Visit from members of the Pudsey RC), 26 May (Visit to Pudsey RC), 8 p.m., Sun Inn, Rastrick. Morse lessons still take place for interested SWLs.

Hull (H & DARS).—3 May (Members' Activities discussed), 10 May (NFD Procedure explained), 17 May (" The Class D Wavemeter," by G3AGX), 24 May (" Mobile Interference Suppression," by G3GBH), 31 May (" The B40 Receiver," by G3LNH), 7.45 p.m., 592 Hessle Road, Hull.

Leeds (P & DRC).—7 May (NFD Arrangements), 9 May (Visit to Spen Valley ARS. Talk by RSGB President, J. C. Graham, G3TR), 21 May (" Lightning—Its Nature and Effects," by K. Walton, G3IKS), The Game Cock Hotel, Pudsey Road, Leeds 13. The Club recently held its AGM and accepted with regret, the resignation of Eric Barker, G3OTO who served the Club for 4 years as Secretary. Members express their thanks to Eric. G3RXS.

Northern Heights.—8 May (Visit to Yeadon Airport), 22 May (" Building an Electronic Organ," by P. Allan, G3USH), 5 June (Visit to Manchester and DRC), 7.45 p.m., Sportsman Inn, Ogden, Halifax. At the Sale of Surplus Equipment, G8CP once more made a valiant effort to sell sand to the Egyptians in spite of shortage of QRK This was one of the best attended meetings in the history of the Society.

Scarborough (SARS).—Thursdays, 7.30 p.m., rear of 3 Trinity Road, Scarborough.
South Shields (SS & DARC).—10 May (Film & slide show of events, and members' activities), 17 May (Description of 2m converter by G3WOM and 10m converter by G3RKR), 8 p.m., Trinity House Social Centre, Laygate, South Shields.
Birstall (SPARS).—2 May (Visit to Leeds City Signal Box), 9 May (Visit of President of RSGB, G3TR), 16 May (Visit to Home Office Equipment Repair Depot at Kippax), 9 May meeting at 7.30 p.m., Heckmondwike Grammar School, all local Clubs are invited. The Annual Dinner was held on 27 April to celebrate 21 years of the Spen Valley Amateur Radio Society. Guest Speaker was J. W. Swinnerton, G2YS, President-elect of the RSGB, supported by J. R. Petty, G4JW, Zonal Representative. The Swindon Cup, donated some years ago by G3JO was presented to A. Petts, G3PFX whose 2m converter was judged the best built piece of equipment. Two "Coming of Age" cakes decorated with the Society Call-sign were baked by wives of two members, and a large supply of radio components were raffled.
York (YARS).—6 June (Visit to local glass works). Meetings Thursdays, 7.30 p.m., British Legion Rooms, 61 Micklegate, York.

REGION 3
Birmingham (MARS).—Third Tuesday in the month, 7.45 p.m., Midland Institute, Margaret Street, Birmingham 3.
(South).—1 May (RSGB Film Show), 7.30 p.m., The Scouts Hut, opposite Bob's Cafe, St. Stephens Church Hall, Pershore Road, Selly Oak.
(Slade).—Fortnightly, 7.45 p.m., Committee Room, The Church House, High Street, Erdington. Secretary—D. Grant, 85 Stanford Avenue, Great Barr, Birmingham 22a.
Coventry (CARS).—3 May ("Aerials," RSGB Tape Lecture), 10 May (Club preparation for NFD), 17 May (Visit to GPO Transmitting Station, Hillmorton, Nr Rugby), 24 May (Night on the Air with club KW2000 transceiver), 31 May ("Aircraft Receivers," by G3TFC), City of Coventry Scout Association, City Headquarters. Secretary —G. Jaynes, 20 Belgrave Road, Wyken, Coventry, CV2 5AY.
Dudley (DRAC).—3 May (Oscilloscopes and Uses), 17 May (Tape Recording Contest), 31 May (Cricket Match, Dudley ARC v. Albright & Wilson ARC at A. & W. Sports Field, Langley), 8 p.m., Art Gallery, St. James Road, Dudley. If visitors attending the Cricket Match require refreshments would they please contact G3PWJ.
East Worcestershire (EWRC).—Second Thursday in the month, 9 May, Old People's Centre, Park Road, Redditch. Bob Palmer presented his well known mobile lecture to the March meeting. *See Photo. G3WJN.*
Hereford (HARS).—First Friday in the month, meetings may be at a new QTH, otherwise, Mortimer Hall, Mortimer Road, Hereford.
Lichfield (LARS).—First Monday and third Tuesday of the month, 6 May (Talk "Around the World," by G2RO, this will also be a Ladies Night), 21 May (Film), 7.30 p.m., Swan Hotel, Lichfield.
North Staffs (NSARS).—Third Tuesday in the month, Moorland Road, Junior School. At a special General Meeting on 19 March it was decided to amend the title of the Society from the Burslem ARS to the North Staffs' ARS. It is hoped as a result that membership will expand to accommodate radio amateurs in the North Staffordshire area.
Salop (SARS).—9 May (Visit to ATE Bridgnorth, departure 1 p.m. from Welsh Bridge. Those travelling independently must arrive at Bridgnorth by 2 p.m. The tour will conclude at 4.15 p.m.), 23 May (Club Station), Old Post Office, Hotel Street, Shrewsbury.
Stourbridge (STARS).—7 May, 7.45 p.m., The Library, Longlands School.
Stoke on Trent (SoTARS).—Thursdays, 7.30 p.m., 2 Racecourse Road, Oakhill.
Sutton Coldfield (SCRS).—11 May (Afternoon Exhibition at local School), 13 May (V.H.F. by T. P. Douglas, G3BA), 20 May (Visit to BBC TV station Sutton Coldfield), 27 May (Natter Nite), Sutton FC Clubhouse, Coles Lane.
University of Keele (UoKRS).—4 May (Open Day), with almost all departments of the University open to the public, including for the first time the department of Communication. Talk in stations G3COY, G3USF, G3RPG, G3PAE and Club call G3UOK will be operating on 160m and 2m.
Wolverhampton (WARS).—Mondays, 6 May (Home Built Competition), 8 p.m., 13 May (Natter Nite), 7.15 p.m., 20 May (Annual Dinner), 27 May (Committee Meeting) 8.15 p.m., 3 June (Whitsuntide—Natter Nite), Neachells Cottage, Stockwell Road, Tettenhall, Wolverhampton. Morse classes, precede weekly meetings at 7.15 p.m.

REGION 4
Burton-on-Trent (B-o-T ARS).—1 May (DF Practice—Start from Clubroom G3NFC/P), 12 May (DF Practice 3 p.m.-5 p.m. G3NFC/P—Clubroom start), 22 May (DF Practice 7.30 p.m.-9.0 p.m.—start from Derby Airport Road—SK 289300). Club Rooms, Stapenhill Institute, Burton on Trent.
Derby (D & DARS).—1 May (Surplus Sale), 8 May ("Moan-In"—come and air your grievances), 15 May (Visit to Gypsum Mine), 19 May (Two Metre Contest—Harboro Rocks), 22 May (DF Practice—start at SK 289300 Derby Airport Road, 7.30 p.m.), 25 May (Exhibition at Sturgess School, Queensway), 29 May (Topics of the Moment), 7.30 p.m., Room 4, 119 Green Lane, Derby. The local general contest has created considerable activity over recent week-ends and arrangements are in hand for a further contest of a similar nature during the winter period. A recent exhibition/demonstration at Bemrose School Open Day aroused much interest and so further engagements of this nature are in hand, culminating in an event at Chatsworth Park on 15 June on the occasion of the 50th Anniversary of the Women's Institutes. This may take the form of a "Mini-Rally" *G2CVV.*
Grimsby (GARS).—2 May (DF Hunt). 16 May (What can you do with a meter?—G3NJF), 30 May (NFD arrangements), 8 p.m. Club Rooms, Model Engineering Society, Fletchers Yard, Wellowgate.
Hunstanton.—Bucket and Spade Party organized by G3JEC, G3SAW and G3ANM will be held on 16 June at Brookes Park Refreshment Rooms, Car Park near the Pier. Talk-in Station G3ANM/P will operate on 160m.
Leicester (LRS).—Mondays, 7.30 p.m., Sundays 10.30 a.m., Club Rooms, Gilroes Estate Cottage, Groby Road, Leicester. Arrangements are in hand for the Society to participate in an event at Granby Halls from 5 June to 8 June. "Leisure 68" will feature a typical Radio Amateur's "Shack". The Society is also running an RAE Course on Monday evenings from 8 p.m.-9.30 p.m., the tutor being Dan Johnson, G3UQX. *G3LRS.*
Mansfield (MARS).—First Friday in the month, 7.45 p.m., New Inn, Westgate, Mansfield.
Melton Mowbray (MMARS).—16 May (TV Fault Finding—Talk and Practical Demonstration by Bert Reeves in his workshop).
Newark (NSWC).—Mondays, Thursdays, 7.30 p.m., Guildhall, Guildhall Street, Newark.
Nottingham (ARCN).—Tuesdays, Thursdays, 7.30 p.m., Room 3, Sherwood Community Centre, Woodthorpe House, Mansfield Road, Nottingham.
Worksop (NNARS).—Tuesday (RAE Class), Thursday (Lecture), 7.30 p.m., Club Room, 13 Gateford Road, Worksop.

REGION 5
Cambridge (C & DARC).—Fridays, 3 May (Informal), 10 May (Partridge Electronics—Demonstration of "Joystick"—subject to conformation), 17 May (Grand Junk Sale), 24 May (Two Metre Mobiles on "Safari"), 31 May (Four Metre Mobiles take a turn), 7.30 p.m., Club Headquarters, Corporation Yard, Victoria Road, Cambridge.
Luton (DRC).—On the initiative of Roger Bryant, G3WBC, an exploratory meeting was held recently to consider the possibility of forming a club in the Dunstable area. The meeting was very encouraging, with an attendance of some 40 Radio Amateurs and SWLs and a committee was elected to guide further developments.

Anyone requiring further details should contact the Down Radio Club, 9 Chalton Heights, Chalton, Luton, Beds. Tel: Fancott 487.
Shefford (S & DARS).—Thursdays, 2 May (NFD Preparations), 9 May (Use of Oscilloscopes—G3EUS), 16 May (" The Cornishman," S.S.B. Transmitter," by G3TKJ), 23 May (DF Hunt organized by G2AUA), 30 May (Morse and operating for NFD). Morse classes 7.45 p.m., Meetings 8 p.m., Church Hall, High Street, Shefford, Bedfordshire.
Stevenage (S & DARS).—Thursdays, 16 May (Visit to BBC Station at Brookmans Park—it is regretted that numbers for this visit are strictly limited—no general invitation this time), 6 June (Final arrangements for NFD). The demonstration on 21 March of equipment by Messrs Electroniques of Harlow, which included the SR400 transceiver, was very enjoyable, and the club is particularly grateful to F. E. Mann for an instructive evening. Meetings 8 p.m., at Hawker Siddeley Dynamics Ltd., Gunnels Wood Road, Stevenage, Hertfordshire.

REGION 6
Cheltenham RSGB Group.—Meetings take place regularly on the first Thursday of the month at the Great Western Hotel, Clarence Street at 8 p.m. The May meeting will be on the 2nd when it is hoped there will be a Quiz with the Gloucester Club. The attendance at the meetings is improving. There were nearly 50 at the April meeting.
Gloucester (GRC).—Second and fourth Thursdays in the month (Morse practice included each evening) 7.30 p.m., Lamb Inn, Market Parade, Gloucester.

REGION 7
Acton, Brentford and Chiswick (ABCRC).—21 May (" The Heathkit SB301 and SB401 " by G5ACX), 7.30 p.m., Chiswick Trades and Social Club, 66 High Road, Chiswick.
Addiscombe (AARC).—14 May, 7.30 p.m., The Cole 'Ole, 158 Lower Addiscombe Road, E. Croydon.
Ashford (Middlesex) (Echelford ARS).—Thursday, 30 May (Amateur Television talk and demonstration), 7.30 p.m., The Hall, St Martin's Court, Kingston Crescent, Woodthorpe Road, Ashford, Middlesex. In its March Newsletter EARS publish a reminder that subscriptions are now due. For those members who have forgotten the advantages of being fully paid up members, here are a few. (*a*) At least one meeting per month, featuring talks covering all aspects of the hobby, (*b*) a monthly Newsletter complete with Technical articles, (*c*) Free collection and delivery of outgoing QSL cards, (*d*) an opportunity to take part in contest working and, (*e*) unlimited technical advice from the Technical sub-committee. There are, of course, many more, but space just doesn't permit! *G3HZL*
Bexleyheath (NKRS).—9 May (AGM), 23 May (NFD Arrangements), 7.30 p.m. Church Hall, Chapel Road, Bexleyheath.
Chingford RSGB Group.—Alternate Fridays. Telephone 01-524 0308.
Chingford (SRC).—Friday Hill House, Simmons Lane, Chingford, E4.
Croydon (SRCC).—21 May 7.30 p.m., Blue Anchor, South End.
Dorking (D & DRS).—14 May, Wheatsheaf, Dorking, 28 May, 8 p.m., Star & Garter, Dorking.
Ealing (E & DARS).—Tuesdays, 7.30 p.m., Northfields Community Centre, Northcroft Road, Ealing, W13. *G3SGT.*
East London.—19 May 2.30 p.m., Wanstead House, The Green, Wanstead, London, E11.
Edgware & Hendon (EADRS).—Alternate Mondays, 6, 20 May, 8 p.m., St. George's Hall, 51 Flower Lane, Mill Hill, London, NW7.
Gravesend (GRS).—15 May, 8 p.m., RAFTA Club, Overcliff Road.
Guildford (G & DRS).—10 May (Sausage & Mash Nite), venue to be arranged, 24 May (NFD Discussion), Sunday 26 May (NFD Rehearsal), Guildford Engineering Society, Stoke Park.
Hampton Court (TVARTS).—1 May (" Setting up Linear Amplifiers," by D. White, G3JKA), 7.30 p.m., Cardinal Wolsey, Hampton Court.
Harlow (DRS).—Tuesdays and Thursdays, 7.30 p.m. Mark Hall Barn, First Avenue.
Harrow (RSH).—Fridays (" S.S.B. Transmitters," by G2TA), 10 May (Practical), 17 May (Junk Sale), 24 May (Practical), 31 May (Constructional Contest), 7 June (Pre-NFD arrangements), 7.30 p.m., Roxeth Manor School, Eastcote Lane.
Havering (H & DARC).—8, 22 May, Rucklers Lane Hall, Kings Langley, Romford.
Holloway (GRS).—Mondays (RAE), 7 p.m., Wednesdays (Morse), 7.30 p.m., Fridays (Club), 7.30 p.m., Monten School, Hornsey Road.
Kingston (K & DARS).—Second Wednesday, 8 p.m., YMCA, Eden Street.
Leyton & Walthamstow.—Tuesdays, 7.30 p.m., Leyton Senior Institute, Essex Road, London, E10.
London U.H.F. Group.—2 May, 7.30 p.m., White Hall Hotel, Bloomsbury Square, Holborn, WC1.
Loughton.—3, 17 May, 7.30 p.m., Loughton Hall (Nr. Debden Station).
Maidenhead (M & DARC).—21 May, 7.30 p.m., Victoria Hall, Cox Green, Maidenhead.
New Cross.—Wednesdays and Fridays, 8 p.m., 225 New Cross Road, London, SE14.
Norwood & South London (CP & DRS).—18 May (" Aerials for NFD and Heathkit SB101," by G3OOU & G3FZL), *QTH not known*, please telephone G. M. C. Stone, G3FZL, FOR 6940.
Paddington (P & DARS).—Thursdays, 7.30 p.m., Beauchamp Lodge, 2a Warwick Crescent, W2.
Purley (P & DRC).—First and Third Friday in the month. 8 p.m. Railwaymen's Hall, Side Entrance, 58 Whytecliffe Road, Purley.
Reigate (RATS).—First Wednesday of the month, 7.30 p.m., George and Dragon, Cromwell Road, Redhill. *NB* Secretary's *new address*, D. Thom, " Bankside," 58 Garlands Road, Redhill, Surrey.
Roding Boy's Society (RBS).—Tuesdays, 7 p.m., Markhouse Youth Centre, Markhouse Road, Walthamstow, E17. There is now an ardent membership drive on and all boys between 12-18 years will be more than welcome. Lecturers willing to talk on Radio and allied subjects are also very welcome. Further details may be obtained from R. Marchant, G3TAJ.
Romford (R & DRS).—RATA House, 18 Carlton Road.
Scouts (ARS).—Thursday, 16 May (Radio Control Boats demonstration by Mr Holley of Wally Kilminster Ltd.), Baden Powell House, Queensgate South Kensington, SW7.
Sidcup (CVRS).—2 May (" Metalwork on the Kitchen Table," by C. Spreyer, G3OCC), 16 May (Natter Nite), 6 June (" Commercial Oscilloscopes," by I. Lever), 8 p.m., All Saints Church Hall, Bereta Road, New Eltham.
Slough (SDR Group).—United Services Club, Wellington Street.
Southgate & District.—9 May, 7.30 p.m., Parkwood Girls School (behind Wood Green Town Hall).
St Albans (Verulam ARC).—1 May (" Simple receiver for D/F," by G2HAR), 15 May (NFD Briefing), 7.30 p.m., Cavalier Hall, Watford Road, St Albans.
Sutton & Cheam (SCRS).—21 May, 8 p.m., The Harrow Inn, High Street, Cheam.
Welwyn (Mid Herts ARS).—9 May (" DX for Beginners," by G3AAZ), Welwyn Civic Centre. 25 May (Contact 68 Convention), 10 a.m.-6 p.m., The Campus, Welwyn Garden City.
Wimbledon (W & DRS).—Second and last Friday of the month, 10 May (" Transistors in S.S.B. Equipment," by G3RNL), 31 May (Ragchew), 8 p.m., St John's Ambulance Hall, 124 Kingston Road, South Wimbledon, SW19.
Westminster (CSRS).—7 May (" Railway Telecommunications," by R. A. Peat), 21 May (Informal), 6 p.m., Room 66, Civil Service Recreation Centre, Monck Street, SW1.
Wembley (GECARS).—Thursdays, 8 p.m., Sports Club, St Augustin Avenue, North Wembley. This Club is now open to non-GEC Employees by invitation. Please telephone ARNold 1262 first.

REGION 8
Crawley (CARC).—Alternate Wednesdays, 8 May (Informal), 22 May, 8 p.m., Trinity Congregational Church Hall, Ifield. *G3FRV.*
Burgess Hill (M-SARS).—2 May (Constructional Contest and " S.S.B. Transmitters," by Alan Jones, G3SGA), 7.45 p.m., Marle Place, Further Education Centre, Leylands Road, Burgess Hill. 15 May (Informal), at QTH of Mike Sutcliffe, G3VAK. Details from G3RXJ.

REGION 9
Cornwall (CRAC).—First Thursday in the month, 7.30 p.m., South Western Electricity Board Social Centre, Poole, Camborne, Cornwall.
Saltash (S & DARC).—3 May (Visit to Decca Transmitting Station, Kingsbridge, Devon), 7.30 p.m., Burraton Toc H Hall, Warraton Road, Saltash. 28 July, Saltash Mobile Rally. *G3SN.*

REGION 10
Blackwood (BARC).—Fridays, 7.30 p.m., High Street, Blackwood. Practical and RAE courses are included in the Club facilities. *G6BK.*
Barry College of Further Education (ARS).—Thursdays, 7 p.m., College of Further Education Colcot Road, Barry, Glam. Club call GW3VKL.

Continued on page 339

CLUB NEWS— PHOTO REVIEW

Frank Irvine, GI3TLT, SWL David Boal and Eric Sandys, GI2FHN, seen at a recent meeting of the Bangor and District ARS. (N. Ireland).

Bob Palmer, G5PP, presenting his Mobile lecture to the March meeting of the East Worcestershire RC.
Photo by L. Hickingbotham, G3HZG

Lower right
Operating the B station at Birmingham Boat Show, Roy Warrender, G8ASW, with Roy Yates, G8ACR, looking on.
Photo by N. Gutteridge, G8BHE

Below
Two Corporate members, Ted Walker, BRS27872 and Audrey Shepherdson, BRS29838 were married at All Saints Church, Hessle, on 17 February. Mr Walker is a member of the South Yorkshire Amateur Radio Society, Doncaster.
Photo by H. Dudley

Rather belated congratulations to Robin Greenwood, G3LBA, and his wife Margaret, who were married recently.
Photo by John Coffey, G3PSH

MEMBERS' ADS

These advertisements are published free of charge for the benefit of members. The number of words is limited to 32, not including the address and telephone number. We must receive the advertisement at RSGB Headquarters by the first of the month for the following month's issue, typed or printed on a standard postcard or the form at the back of the issue. It must be accompanied by the current postal wrapper, the address, of course, agreeing with that in the advertisement. No advertisement obviously pertaining to a business can be accepted here, but these can be submitted in the usual way for classified advertisements.

The RSGB cannot accept responsibility for errors, or for the quality of equipment offered for sale in Members' Ads. We advise members to enclose a stamped, addressed envelope when replying to advertisements.

Cossor 1049 Mk II 'scope, good condition, £18. C. J. Lambert, G3MOT, 42 Austenwood Close, Chalfont St Peter, Bucks. Gerrard Cross 85882.

Nombrex r.f. generator model 31, unused £9, was £12 10s. Jap multimeter £2 10s., Taylor multimeter model 127A, £5. KW l.p.f. Ch 1 u.h.f. connectors £2 10s. LED two tone oscillator, £3. All new. J. L. Barry, G3UFU, 15 Fairlawn Court, London, W4.

BC348 RX mint condition, £12 10s., another with a.c. p.s.u., rough £5. G2DAF Mk. II RX in Philpotts cabinet, Electroniques coils, £25, or exchange 70cm equipment. P. Lyon, 42 Rochester Way, Bexley, Kent.

BC342 less p.s.u., 1·5–18 MHz, £11 o.n.o. G. E. Livingston, G3LAI, 23 Cranwell Road, Greasby, Upton, Wirral.

RSGB Bulletins, complete vols, mint cond. July '52 to December 1967, 15 vols. what offers? J. K. Harvey, 22 Elm Grove, Bromsgrove, Worcs.

Electroniques Ham bands transistor Quoilpax £12. Ifa/455/ssb and IRA/1·6/ssb i.f. transistor modules, £7 each. THSO 2·1 MHz, Oscillator module, 15s. L. H. Bower, 57 Broughton Crescent, Wyke Regis, Weymouth, Dorset.

Heathkit RG1 g.c. RX just built, needs slight alignment any inspection £35. KW Vanguard II, 160–10m in v.g.c. and appearance £35, or both for £60. C. T. Haley, 81 New Road, Chilworth, Guildford, Surrey. Guildford 67613.

Marconi Test Set 6004C with p.s.u. incorporates 'scope, cavity tuned sig. gen 54–997 MHz digital readout. 36 valves, as new inside and out. Believed unused, cost over £2000 new—offers. J. G. Owen, GW8BFT, "Llwyn-Fryn," Penmynydd Road, Llangefni, Anglesey, North Wales.

Heathkit Mohican, factory built, case poor, £12 10s., HRO MX, nine coils, no p.s.u. £17 10s. KW l.p.f. 50 and 75 ohm, BBC ch 2, £3 pp each. Pfer buyer collects RX. P. Buckingham, 4 Flexbury Park Road, Bude, Cornwall. Tele 2635.

Bendix TA12C TX, 50W am../c.w., 80, 40, 20m, home brew mod. and p.s.u. £6. Offers for six vols, *RSGB Bulletin* '60-66 and *SWM* '60-66. H. White, G3NKW, 23 Edale Grove, Sale, Cheshire.

Mullard 5-10 control less amp with highest quality Partridge xfmr, £10. Mullard two valve pre amplifier, £3. Mullard tape pre amp, £6. All units professionaly made, fully to Mullard specifications. D. M. Pratt, G3KEP, 30 Lyndale Road, Eldwick, Bingley, Yorks. OWR66 3699.

KW Vanguard 160–10m, £33. HRO p.s.u. and l.s., nine g.c. coil and 40m b.s. including Codar pre selector, £20. P. A. Swanson, 61 Hillary Road, Eastham, Wirral, Cheshire.

Two 5 in. Mullard DB13-2 'scope tubes. One new with screen and base, £3 or exchange for BC453. J. E. Henshaw, 15 Grasmere Road, Ellesmere Port, Cheshire.

Rebuilt 52 TX, 100W 80/40/20m. a.m./c.w., v.f.o. Requires 813 and p.s.u. nauseating appearance £5. 26BT blower 30s. Cathodeon FT243's, 5·2 MHz, 8·017 MHz, £1 each. EF95's 4s. A. J. Green, G3UZF, 178 Long Chaulden, Hemel Hempstead, Herts.

Minimitter 150W TX £30. R308 RX 20–145 MHz. a.m./f.m. £20. G8BIH, Ridgeway, Limecroft Road, Knaphill, Woking, Surrey. Brookwood 2523.

Creed 7TR Reperforator, V.G.C., 230V a.c., with partly stripped unit for spares, £8 10s., b.c. Heathkit Cotswold speaker system, £15 o.n.o. ATM CRM1, £8. T. R. Preece, G3TRP, 28 Stoneyfield Road, Old Coulsdon, Surrey. CR3 2HG. 71 52138.

Eddystone EC10 with a.c. p.s.u. £35. Wanted TW 2m Communicator. L. Arnold, 24 Albert Road, Stechford, Birmingham 33. Warks.

Mullard band 2, FM tuner with six valves £5. Japanese three transistor walkie-talkie with 27 MHz XTALs, £4 the pair. D. M. Pratt, G3KEP, 30 Lyndale Road, Eldwick, Bingley. Yorks. OWR66 3699.

Two Panoramic adaptors for 450–470 kHz. i.f. both supplied with copies of h/b. PCA 2 type T200. £22. Hallicrafters HR22 £17. P. A. Whitford, 37 Chestnut Drive, Polegate, Sussex. Polegate 4659.

Grundig TK819 tape recorder, dual heads, m.c. mic., H/B, service manual, accessories, serviced and all in v.g.c. £18. F. J. Palmer, 1 Harland Avenue, Croydon.

AVO Valve voltmeter £10 o.n.o. or exchange for AVO 8, Mk III preferred, cash adjustment, Pareko xfmr, 300-0-300V, 125 mA, 6·3V c.t. 4A, 6·3V, 1A weight 6 lb., new £3 o.n.o. H. H. Seymour, 25 Ryde Buildings, Webb Street, London, SE1.

Give away sale. 6d. to 10s. Free clubs and schools. Chassis, boxes, panels, cases, mains xfmr's, 813 and many other valves, m.c. meters-relays e.t.c. browse on 5 May 9 a.m. to 6 p.m. or write G. P. Jones, G3UZZ, 53 Lebanon Park, Twickenham, Middx.

Rectifiers, 1N2379, 4000 p.i.v., 100 mA, new 6s., four for 20s. List £4 14s. Miniature i.f.t's transistor, double tuned, tapped, 455-470 kHz, $\frac{1}{2}$ in. × $\frac{1}{2}$ in. × $\frac{1}{2}$ in. new 2s. 6d. four for 8s. G. Elliott, G3FMO, "Oatlands," Southend, Road Chelmsford, Essex.

Mullard valve tester, £25 o.n.o. Pye base station fully working on 4m, £12. Pye Reporter fully working, mobile on 4m £5. Codar 160/80m TX with a.c. and 12V d.c. p.s.u. Offers. A. J. Hickin, G3PZL, 4 New Road, Apperknowle, Nr Sheffield.

Ward Leonard 230V a.c. relay, DPDT, for open wire feeders 25s. Rikenohm NV200 rotary attentuator pad, 0-3000 ohm 25s. Cathodeon XTAL oven for HC/6-U XTALs, 6/12V 15s. G. A. Jeapes, 165 Cambridge Road, Great Shelford, Cambridge.

Eddystone S640 and matching l.s. Also spare set of valves in v.g.c. £20 o.n.o. K. T.Whithorn, G3BDS, 279 Oldbury Road, Worcester.

Case and front panel for TW Twomobile RX. Offers? M. Trundle, G3TCG, 16 Stephens Crescent, Horndon on the Hill, Essex.

CR100 no mods, n.l. circuit diagram, £13. R109 RX 1·8–8·5 MHz, a.c. only from built in p.s.u. Buyer collects. G. C. Rolfe, G3WWJ, 89 Beaumont Road, Cambridge. Cambridge 46066.

UM3 and DT1 new, £5. Valves QQV06-40, 35s., QQV03-20, 37s. 6d., 829, £1, 832, 12s. 6d., TT15, 10s. QQV04-7, 7s. 6d., 4X250, base, chimney, £5. 4X150, £1. All plus postage. R. Shadlock, G3US, Cleveland View, Ackworth. Pontefract, Yorks.

Double superhet, 15 valves, electroniques components and front end, Eddystone dial, Philpotts case. Nombrex sig gen, 3 in. 'scope—Jason design, DL6EQ T/U not finished, valves components to clear £45 o.v.n.o. M. G. Hodges, c/o 37 Thunder Lane, Thorpe, Norwich Norfolk. NOR 84s.

Electroniques transistorized front end GC166T, works checked, £12. or exchange for HB166T. Hammerlund HQ120, £10. F. J. P. Connor, G3WMR, 66 Coleraine Road, London, SE3.

Delay line 0-25-100 μS potted 10s, three for £1. Muirhead 0-180, 4½ in. sm dials, brand new, £1, three for 50s. Carpenter relays £1, three for 50s. All post free. M. Mann, G8ABR, Flat 71, Queens Road, Tewkesbury, Glos.

Taylor Universal meter type 81A, £2. Mosley transistorized 160m converter as new 30s. post extra. K. N. Smith, G3RB, 15 Malcolm Court, West Monkseaton, Whitley Bay, Northumberland.

Valves from 1s. each. Surplus equipment cheap, mains plugs sockets, adaptors, etc. s.a.e. for bargain lists. Wanted digital clock recent KW match, Codar AT5 plus p.s.u. E. H. Trowell, G2HKU, "Hamlyn" Saxon Avenue,Minster, Sheppey, Kent. Minster 3100.

Eddystone EC10 transistorized RX with remote TX/RX changeover, mod. £35 o.n.o. J. N. Eveson, G8AQE, 24 Warwick Mansions, Cromwell Crescent, London, SW5.

Marconi 52 RX in case, as new, with a.c./d.c. p.s.u., spare valves and service H/B—also covers TX—£10. G3AIO, 115 Church Mill Road, East Barnet.

DX100U TX. Any offers? P, Painter, Tizaid Hall, Princes Gardens London, SW7. 01-589 9018.

Control knobs 1 in. dia. ¼ in. spindle fitting, black 3s. doz. including postage. J. H. Fish, 28 Banks Avenue, Golcar, Huddersfield.

SB-10 adaptor and well built metered linear with p.s.u. and interlocking cables, £30 o.n.o. will split. LM frequency meter v.f.o. and multiplier for 20 and 15m, £5. Flt.-Lt. C. L. K. Ledger, G3UBL, 1 Conholt Road, Andover, Hants. Andover 2766.

R1155B and R1155L RX, l.s. to match, need slight attention. Offers? M. Pelham, Tresco House, Ogbourne St Andrew, Marlborough, Wilts.

Sig. Gen. Type 52A, 5–50 MHz in transit case, £8. BC453 no mods £3, manual SCR-399A/SCR-499A, 6s. *73* Magazine May 1966 to April 1967, 25s. Carriage paid. Wanted 813. E. S. G. Fish, GM2HCZ, Gravel Pit, Moniaive Thornhill, Dumfriesshire. Moniaive 345.

Clearing EZ40, DK91, PL82, UCH81, DL96, 35Z4, 3s. 6d. each. A number of 5U4G, GZ34, EL34, 5s. each. 5Y3GT 3s. 6J4, 6AK5, 1s. 3d. each. M. Bonner, 90 Aveling Park Road, London, E17.

R1155A in excellent working cond., top band conversion, semi rewired, output stage, resprayed cabinet, unwired S meter extracted, D/F equipment, superb matching p.s.u., many extras, manuals. £10 o.n.o. prefer buyer collects. B. Court, 3 Eden Road, High Halstow, Nr Rochester, Kent.

Eddystone S640, matching l.s. and H/B, class D wavemeter 230 a.c., Ex TU5B slow motion drives, XTALs, variable capacitors, Ronette XTAL mic., various meters all good cond. £25. J. H. Woodward, G3GYR, 77 Sandbach Road, Rode Heath, Stoke on Trent, Staffs.

Elliott d.c. to d.c. inverter, 12V input—50V 500mA output, ideal for transistor mobile equipment, £17 10s. Wanted 2·5 MHz XTAL also 455 kHz. Kokusai filter 3·1 kHz bandwidth and all XTALs for G2DAF TX. R. Shuck, Tregarron, Lowe Lane, Wolverley, Kidderminster.

HRO-MX RX in fair cond. Mod front end 6BA6s, coil packs for all bands, bandspread. No p.s.u. Offers to E. F. Jones, G3EUE, 43 Hartley Down, Purley, Surrey.

Large quantity of good amateur equipment, S.a.e. for seven page list. G. R. B. Thornley, G2DAF, 5 Janice Drive, Fulwood, Preston. Lancs.

BCC69D 4m TX/RX untested, circuit, see *RSGB Bulletin* March 1967, £4. BCC69 p.s.u. xfmr 10s. Auto xmfr 230V—110V, 1kVa, steel case £2. 40 *SWM* 8s, 1960-63, £1, carriage extra K. M. Orchard, G3TTC, 25 Kenmore Drive, Yeovil, Somerset.

BC348 RX v.g.c. all new capacitors, fitted internal p.s.u., £10 o.n.o. CR100 H/B new, 15s. About 100 valves, assorted, OK, 30s. D. T. Wilson, G8APS, 177 Dower Road, Four Oaks, Sutton Coldfield, Warks.

Eddystone 670, AN/APR 4, 38-1000 MHz, Hallicrafter S-38. Meters AN/PSM 6, Unipivot Galvanometers, Wattmeter. Frequency meters; TS 174/U, TS 175 AU, FR-6U, 'scopes, TS 34AP, OS 8CU, h.f. sig. gen. C. Goldman, Apt. 6,36 West Heath Road, Hampstead, London, NW3. 01-435 2663.

P.s.u. for Valiant or similar TX £3. Geloso v.f.o. 4-104 new £6. Wanted p.s.u. phones and case for B2. D. V. Walters, G3MXO, 14 Wood End Road, Erdington, Birmingham 24.

HRO, l.s., p.s.u., nine coils £18. AR77E, £15. R.f. sig. gen. £4. 'scope £12. Valve tester £5. A.f. power meter 50s. U.h.f. tuner 15s. Spare HRO coils. S.a.e. P. J. Kerry, 47 Cottenham Road, London, E17.

One 52 set with p.s.u.—230V a.c. and 12V d.c.—and interconnecting cable, £10 o.n.o. J. Docwra, 1 White Hill Cottages,Wrotham, Sevenoaks, Kent.

Desperate for loan diagram or manual for New Zealand RX ZC1, U.S. TX BC625-A Bendix. U.S. RX/TX RT-72/UPN-1 Hallicrafters. Expenses generously refunded. All replies answered. M. Dawson, G3TCL, 5 Holly Avenue, Walton on Thames, Surrey.

Two American service manuals (14 spartan sets 1936 on; 17 Emerson sets 1940 on). HRO instruction manual 1942. Admiralty H/B vol. 1-2. Offers. A. Hickling, 2 North End Lane, Malvern, Worcs.

KW77, £65. Can deliver approx. 50 miles. BC453, Q5'r, front panel controls 50s. Woden UM1, 30s. R. German, G3OZT, 10 Beverley Road, Dibden Purlieu, Southampton. Hythe 3198.

Hartley 13A split beam 'scope perfect £17 including delivery up to 50 miles. 27 MHz XTAL controlled 10 channel simultaneous R/C TX. Home built on printed circuit board. All transistor, £5. G. Coffin. G3XFN, 45 Egerton Road, Streetly, Staffs. 021-353 3364.

New Mullard transistors, AF117, 4s each, 2N706, 4s. 6d. each, OC75, 6s. each. C. F. Cole, GW3GEN, 18 Parklands View, Derwen Fawr, Swansea, Glam.

Mk 1 vertical aerials (2) 32 ft. plus whip (see March *SWM*), £3 10s. carriage paid. H. Tonks, 11 St Edwards Road, Bournebrook, Birmingham 29, Warks.

QRO plate xfmr primary 0-250V, sec 2·5 kV-0-2·5 kV at 0·9 kVa continuous. Weight 73 lb. £5 prefer buyer collects. F. A. Shaw, G3NXS, 2 Church Close, Hartwell, Northampton.

Heathkit RG1 with Q5'r and plinth type l.s., manuals, as new, £35. Triplett sig gen, 100 kHz-120 MHz, manual, excellent, £15. 'scope £5. Full RAE course, £6. Books, magazines etc. N. Bailey, 241 MSQ, Middle Wallop, Andover, Hants.

Anglian 1000 cost £330, see LED ad in August 1967 *RSGB Bulletin* for full spec., also TA33, CDR rotator, nylon guys, aluminium poles. Offers. K. G. Beckton, G3TUZ, 11 Pebmarsh Close, Monkwick, Colchester, Essex.

RSGB Bulletin July '49 to Dec. '52, £1. *SWM* May '46 to Feb. '53, £2. *QST* Aug. '48 to July '50, £1. 150W auto xfmr 115-250V tapped, 10s. Ericsson HR phones, new, 30s. H. Owen, G2HLU, 223 Church Road, Earley, Reading, Berks.

TW 2m converter, i.f. 21 MHz unpowered, £6. A. A. Pretty, 237 Sidegate Lane, Ipswich, Suffolk.

Linear: three 4CX250B, bases, chimneys, p.t.f.e. PI choke, three Jap meters, two Airflow 26 BTC Blowers, 80–10m, seven 4CX250B, five 4X150A spare. Enclosed cabinet, brand new. £48 o.n.o. p.s.u. available. S. J. Taylor, Chy yn Gwel,Woodbine Lane, Illogan, Redruth, Cornwall.

Rack fitting 200W class B mod and speech amp, £12. New TX blower £1 5s. Wanted XTAL 6·5 MHz overtone working. A. H. Parker, 133 Station Road, Cropston, Leicester, LE7 7HH.

UM3 120W mod xfmr, brand new unused, also TLR Yashica E Automatic exposure F3·5, 80mm lens camera. Would consider exchange for 2m TX equipment. A. F. Smyth, ZsODN, RAF Gatow, BFPO 45.

Vibroplex original de luxe Bug key, all chrome finish, jewel bearings, as new, £8 inc. post. W. L. Nilan, 44 Watson Road, Worksop, Notts.

RA1 RX with l.s., £27 o.n.o. A. J. Oliphant, GM3SFH, 17 Rockwell Crescent, Thurso, Caithness.

Shack clear out, all equipment for sale, any reasonable offer accepted. Prefer buyer collects, any time after 5.30 p.m. on any day. P. J. Turner, 58a Stroud Green Road, Finsbury Park, London, N4.

CR100 RX valves low but works OK, £10. SR40 RX, 550 kHz–30 MHz, b.s., a.n.l., b.f.o., muting, S meter etc. almost new £10. KY102 Bug Key, practically new, £3. Carriage to be arranged. S.a.e. for details to S. A. Mickel, GM3WDF, 15 Orleans Avenue, Jordanhill, Glasgow, W4. 041 SCO 2946.

Deaf Aid, ex NHS chassis only, mic., three valves, DF64, DL64 etc. untested, cash return if dissatisfied 7s. 6d. Make pre amp. J. M. Heath, 235 Thorne Road, Wheatley Hills, Doncaster.

SR600 triple conversion 80–10m, mint offers £50? HA350 filter £5, 898 dial £3, QP166, £6. Garrard 4HF player, £7. BSR tape deck new, £5. Leak stereo pre amp £8. M. R. G. Snowden, Swainsea Lane, Pickering.

Mod xfmr, £4 10s., 100W, brand new! Primary 4500-0-4500 ohm, secondary 5000, 6700, 7500 ohm (i.e. two KT88's into 4X150), L. Wiltshire, 12 Leslie Road, Winton, Bournemouth.

TW Topmobile £15, Labgear E5034, l.p.f. £4. Heath Sig Gen £8. G. D. Clarkson, G3RHM, 1226 Greenford Road, Greenford, Middx.

Mobile RX Codar T28, hardly used £11 plus carriage. Taylor, GW8PG, 37 Pickerill Road Greasby, Upton, Wirral, Cheshire.

Eddystone 888A, matching l.s. S meter, mounting blocks, £70. KW Viceroy Mk II and p.s.u., £70. Near offers? Top cond. Buyer collect, or car delivery reasonable distance arranged. W. E. Thompson, G3MQT, 8 Coventry Road. St Leonards on Sea, Sussex. Hastings 3681.

R107 RX in fair cond., complete with spare valves, circuit and packing covers, £10. Can deliver in West Riding. J. T. Webster, G3WDW, 133 Argie Avenue, Leeds 4, Yorks.

Drake TR3, RV3, AC3 (115/230V), Heathkit HA14, HP24 (115/230V), SWR bridge, CDR AR22 rotator. Mosley TA33 junr. (USA model), D. A. Barry, G3ONU, 67 Harcourt Road, Bushey, Herts. 01-950 3091.

Heathkit 'scope OS2 factory built, unused cost £32 accept £28. KW p.e.p. meter, brand new, £14. Drake MN4 matching network, brand new £29. L. H. Lee, G5FH, 17 Knottshall Lane, Oldbury, Warley, Worcs. 021 BRO 1338.

Stereo integrated Hi Fi amps, 230V a.c. 10W per ch., 15 ohm. distortion 0·1 per cent. Selector, bass, treble, balance and level controls. Attractive cabinets with solid teak ends. All silicon, printed circuitry. £25. P. G. Martin, Oak Cottage, Witton Gilbert, Durham.

250TH £5, 100TH, £2, 805 £2, 3T £1, 1625 10s., new 45 MHz EF50, i.f. strip £2. 2000-0-2000, 115V, 800mA mains xfmr with ½ kW mod xfmr. £10 pair buyer collects. S. R. Kharbanda, 39 London Road, Harston, Cambs.

Heath HO-10 monitor 'scope/two tone 'scope, mint cond £35. KW Z match, mint £9. KW SWR Bridge, mint £6. R. Storey, 145 The Knares, Castlemayne, Basildon, Essex.

10W 4m transceiver a.m./c.w. complete with mod and p.s.u., £15. 4m G4ZU birdcage 10s. CDR TR11A £5. Heathkit VF1U £4. Class D wavemeter with p.s.u. £2. Buyer inspects and collects. S. N. Gall, G3UCM, 175 Coulsdon Road, Old Coulsdon, Surrey. CR3 1EJ.

Going transceiver, for sale Tiger 200 in first class cond., any reasonable offer. G. Brownlow, 1 Widdicombe Way, Brighton, 65704.

Kokusai filter type MF/455/15/CK as new with charts, list £10, £8 o.n.o.W. Bilton, G3TYY, 7 Neap House Road, Gunness, Nr Scunthorpe, Lincs.

Senior HRO complete with p.s.u. and nine g.c. coils, 50 kHz-20 MHz, £20 o.n.o. No callers please. M. Keeping, G8AVZ, 11 Falcon Close, Langley Green, Crawley, Sussex.

Geloso V.F.O. 4/102 with dial and valves, £4 10s. Two rack mounting p.s.u. 580V 150 mA, fused and metered £4 each. Geloso tank coil (80–10m) and r.f. choke 25s. UM3 £2. Post Extra. G. C. Price, GW3MPP, The School House, Hereford Road, Abergavenny, Mon.

Advance "Voltstat" variac unit 0–260V variable and fixed stabilised a.c. output £4. Dekatron counter £7. CT53 v.h.f. sig. gen. £8. TS-45 APM3 micro wave test set, new £4. Carriage at cost. R. J. Tarr, GW3PUR, 43 Castle Park, Ruthin, Denbighshire, North Wales.

Complete station, cost £500—accept £360 see classified ads for further details. Would consider selling separately. Emigrating to a land of 110V–60 Hz! M. M. Bibby, Halla, Leckhampstead, Newbury, Berks.

19 Set TX/RX, new RX mains p.s.u., neon indicators, 6V6 output stage, phones, mic., key, £5. Also vibrator gen. control box and connectors, plus 12V Car Battery. £1. M. J. Gray, 43 The Oaks, South Green, Billericay, Essex.

Heathkit HW-32 single band 20m. s.s.b. transceiver, 200W p.e.p. Electrically similar to HW-32A. With detailed manual but less p.s.u. £30. N. Joly, G3FNJ, 28 Oakington Avenue, Harrow, Middlesex. 01 866 4680 evenings or weekend.

For sale. DX100U, SB10, a.t.u. Z match, connecting cables, manuals, the 6146's are new. £70 the lot. K. C. Brown, G3PHT, " Hillrise," Leiston Road, Aldeburgh, Suffolk. 2007.

KW Vanguard TX 160-10m mint cond., £45 o.n.o. Wanted Mohican GC1U or Eddystone EC10 RX. Would part exchange TX for RX. F. W. Boulton, G3JZB, 15 Holmcroft Road, Stafford, Staffs.

AR88LF ½ lattice XTAL filter, tuning meter, v.g.c. £30. Two new 813s plus base, £2 15s. N. T. Hodgson, G2ABK, 53 Main Road, Hundleby, Spilsby, Lincs.

Tape recorders, almost new. Grundig EN3 pocket type with accessories £25 o.n.o. Ultra four track model £18. R1155N good working cond. £4. R1155 suitable for spares 7s. 6d. S. A. Gaunt, G3PXJ. 43 Appian Close, Kings Heath, Birmingham 14.

Mint Eddystone EC10 RX hardly used, £38. Neumann stereo cartridge, £12, cost £48, new B. J. Whitty, " Fourways," Morris Lane, Halsall, Lancs.

Six foot, 19 in. rack, rear door, v.g.c. £5 10s. Minimitter mobile whip, sprung base, universal joint, top sections and coils for 160/80m, v.g.c. £7 15s. D. Byrne, G3KPO, Jersey House, Eye, Peterborough. Eye 351.

RSGB Bulletins, '62, '63 complete 15s. per set. post paid. *SWM* odd copies, Jan. '60 to Dec. '65 1s. each. J. Baldwinson, 33 Cherry Close, Tulse Hill Estate, London, SW2.

Imminent house purchase forces sale of six months old EC10 RX in perfect cond. £35 o.n.o. You pay petrol, I will deliver. A. Ryan, G3VJN, 63 Staverton Park, Bamfurlong Lane, Cheltenham.

Courier CTR 1 transceiver, a.c., p.s.u., all bands 160–10m 200W p.e.p. First class condition, £150 o.n.o. BC221 a.c. p.s.u. all data, £15 o.n.o. Two donkey relays—new £5 each. Dr S. Lazanus, G3TUA, 114 Beechwood Gardens, Ilford, Essex. 01 550 0012.

Hallicrafters SR-150 transceiver with all accessories for fixed and mobile operation. Complete with 750W 240/110V xfmr, mic and spare set of valves. Unmarked and in perfect working order. £200. A. A. Hordern, GC2AAO, St Martin, Jersey, CI. East 946.

Valves. 813 35s., 5B255 17s. 6d., 5B254 17s. 6d. 832 15s., TZ40 8s., UU8 7s. 6d., 1622 5s., 6SN7, 6N7 2s. 6d. Please add postage. K. G. Selleck, G3SNU, Coplands, Dartington, Totnes, S. Devon.

Have 2m Pye Reporter and 4m Pye PTC113 transceiver both with tunable RXs. Sell or exchange for Accordian, VHF/FM/BC RX, record player, 10m TX/RX or w.h.y. All s.a.e. answered. R. H. Lamb, 17 Queens Road, Leytonstone, London, E11.

Mullard type GM 4140/1 resistance capacity meter, magic eye indicator, a.c. p.s.u. £2 plus 5s. post. G. Jones, GW2HMO, 24 Walters Road, Llanelli. Wanted 8275, 8273 XTALS.

52 Set RX with p.s.u., XTAL cal., and spare valves. Grade 1 cond., some mods. Coverage, part of b.c., 1·75–4, 4–18 MHz. Works FB, £12 o.n.o. plus carriage. R. A. Haken, G3VRJ, 7 Gravel Hill, Addington, Croydon, Surrey. 01 656 9336.

HRO having bandspread 160-10m, miniature valves, very sensitive, low internal noise, r.f. i.f. gains, all mode detector, audio noise limiter, amplified audio fast/slow a.g.c. stabilized, l.s., circuit, £25. M. J. Darkin, G3KTH, 4 Ash Drive, Catshill, Bromsgrove, Worcs. Bromsgrove 5554.

6LQ6 valves—brand new—surplus to requirements—much better than 6HF5 with 200W per valve for 40 secs. 37s. 6d. each. Four only. R. Toby, G2CDN, 13 Wood Lane, Isleworth, Middlesex.

XTALs, 4m 8790 kHz, 4s each. post paid or six for £1 FB for h.f. filter. Seven vols of *Radio and TV Servicing*. £7. RCA 14 in. colour shadow mask tube £6. Buyer collects. Regret address mislaid: all parties please contact RSGB HQ.

R107 unmod and mint cond. £12. B44 converted for 4m RX tunable with mic and connectors, £5. Four QQVO3-10's for 25s. or 7s. 6d. each. Will deliver 20 miles. R. Lucas, G8APZ, 64 Beresford Gardens, Hounslow, Middx.

New. Three 3CX100A5, two 4-65A, two 6146, four 6AK5. AR88D manual. No reasonable offer refused. Wanted 9 MHz HC/6U XTAL. B. Burton, G8ANQ, 14 Westbourne Road, Whitby, Yorks.

M & G 3 s.s.b. transceiver plus a.c./p.s.u. 90W p.e.p. 160, 80, 20m, one year £100 new—offers. Wanted Electroniques IFA/1-6/SSB and HB166T, also Class D wavemeter, D. Carter, G3VYW, 4 The Terrace, Morile Yard, Devonport, Devon.

2m station, TX similar 'TW, cascode converter—i.f. 28–30 MHz—s.w.r bridge, £25 complete. 15W 160/80m TX similar to Codar £10. Another less beautiful £8. G2DD 70cm converter—i.f. 28–30 MHz —£2. Geloso 2m driver XTAL/v.f.o. 25s. S.a.e. for list. Collect or carriage extra. M. W. Dixon, G3PFR, 6 Wayside Avenue, Bushey Heath, Herts.

Must clear valves. Four EF80, EB91, EBF80, ECC81, ECC84, ECL80, two EL84, PY81, two PY82. 1s. each or 10s. the lot. S. Burfoot, 84 Mayhill Road, Barnet, Herts.

Mosley A320 three ele beam £7. XTAL cal No. 10, 10s. 28V d.c. Air blowers for 4X150 etc. 10s. Valves min. 807 and 6146 etc., chokes, xfmr's, capacitors. T. J. Griffiths, G3NPZ, 7 Somaford Grove, East Barnet, Herts.

CR100 RX complete with manual, £15 o.n.o. E. J. Andrews, G3JAP, 56 Windsor Road, Swindon. 21402.

Labgear LG50 a.m./c.w. TX. Performance to original specification on all bands, all valves checked and appearance virtually as new. £25 o.n.o. M. Savage, G6SV, Thrae, Compton, Valance, Dorchester, Dorset.

Complete 22 Set, less p.s.u. 500V a.c. p.s.u. plus low voltage taps. 12V Vibrator p.s.u. 300V at 100mA. Other low voltage and a.f. xfmr's. 1W transistor amp, offers, s.a.e. M. L. Kinnersly-Taylor, G3WTA, Seaton Ryde, Tranwell Woods, Nr Morpeth, Northumberland.

R107 in perfect external and internal cond., all plugs, not " got at," Delivery possible, £8. Wanted 'scope tube 5BKPI. C. Pell, G3WLH, 6 Leopold Avenue, Farnborough, Hants.

Arrow relays, 240V 10A two pole changeover contacts, auxiliary contacts, 240V 50 Hz coil, £1 each or four for £3. Hand mic, 40 ohm with PTT switch. 8s. All post free. M. Mann, G8ABR, Flat 71, Queens Road, Tewkesbury, Glos.

Codar T28 RX 160/80m mint original packing, £11 15s. new 6J6 plus bases/screens 5s. Pair 6L6 metal 10s. All post paid. S. G. C. Howson 28 Middletons Lane, Norwich. NOR 33M.

KW Vanguard, 10–160 m, £33. HRO with p.s.u. and l.s. plus nine g.c. coil sets, 40m b.s. Codar pre-selector, £20. P. A. Swanson, 61 Hillary Road, Eastham, Wirral, Cheshire.

Owing to house moving the following must be disposed of (Junk free!). R208, Bush TV24, *PW* '60–'64 approx. Buyers must collect from Penarth, Glam. Replies to D. J. L. Gibbs, Oakworth Cottage, Little Baddow, Chelmsford, Essex.

LG300 r.f. plus twin mod/p.s.u. 150W 80–10m, perfect, £50. As new Trio JR60 double conversion RX 550 kHz-30 MHz plus 142–148 MHz, £40. P. Parker, G3UAP, 23 St Michael's Close, Rough Common, Canterbury, Kent.

P.s.u. for HW32A, silicon rect., home built, 800V, 250V, 150V, £15. 60W a.m./c.w. TX 80/40/20m p.s.u. and mod £12. 160m a.m./c.w. TX with p.s.u. £5. L. Pollack, G3SZX, 41a Pickwick, Corsham. Wilts.

KW Viceroy Mk II perfect, recently overhauled and fitted extra ½ lattice filter. All silicon p.s.u. internal aerial relay, D104 p.t.t. £75. Wanted good EC10 with a.c. p.s.u. Consider part exchange with cash adjustment. Olley, 157 Wanstead Park Road, Ilford, Essex.

Stellaphone tape recorder ST458, four track, two speed, m.c. mic., 110/250V. Two 7 in., one 5¾ in. tapes. Spare spools, H/B, cost £46 unmodified mint, 12 hours use only, £35. G. A. Massey GW6YQ, 14 West Avenue, Bryn Newydd, Prestatyn, Flintshire.

KW2000A, nine months old, but little used current specification Shure 201 mic, as new £180. A saving of £45 on new price. 1000 Hz XTAL BT base glass, cost £24, sell £3. C. V. Taft, G3PDT, 239 Hagley Road, Edgbaston, Birmingham 16, Warks. Edgbaston 1825.

WANTED

Viceroy, must be good performer nothing faulty considered. State model. A. H. Parker, 133 Station Road, Cropston, Leicester. LE7 7HH

Woden Mod xfmr UM1. A. J. Stock, G3VEE, 7 Dunkirk Road, Hillside, Southport, Lancs.

DX 40U TX must be in full working order. G. K. Laycock, G3XFZ, 90a Shrewsbury Lane, Plumstead, London, SE18.

Mains p.s.u./l.s. unit for TW Communicator. Good price paid. J. D. Siddall, G4BM, 12 Shaw Crescent, Formby, Lancs. For 6795.

Second hand RX. 118–134 MHz. Details to T. A. Wilson, Orchard House, Sutton Green, Guildford, Surrey. Guildford 5783.

RSGB Bulletins prior to March '64. R. Chappell, 2 Vale Close, Dronfield, Nr Sheffield, Yorks.

RX. Guaranteed good working order, 160–10m in four bands or more, with good stable b.f.o. and 240V a.c. operation. Price please. P. J. Pinder, The Poplars, Wyke Road, Trowbridge, Wilts.

80–10m s.s.b. transceiver, Z match, trap vertical. L. Austin, G3CYH, 12 Whittle Close, Bawnmore Road, Bilton, Rugby, Warks. Rugby 6229.

Xfmr's giving 600-0-600V at 1A and 1250-0-1250V 300mA or near, B. Robertson, G3TTV, 12 Hazel Close, Thetford Road, Mildenhall. Suffolk.

G4ZU type minibeam for 10-15m in any cond. Loan of circuit or H/B for Marconi Electra RX. R. Price, 20 Manor Road, Wrea Green, Nr Preston, Lancs.

Circuit, alignment details or H/B for communications RX CR150, 2-60 MHz octal valve version. D. H. Forgan, 27 Mount Crescent, Brentwood, Essex.

Two i.f. xfmr from CR100—i.f.t. 3, 4, or 5—or scrap CR100 with i.f.t.s. intact. R. D. Muir, 7 Orchard Road, Hampton. Middx.

Service manual or circuit diagram, purchase or loan, for Ace radio model 600, nine band valve RX. 154 Alderwood Road, Eltham, London, SE9.

Mobile transceiver for 12V car, any waveband, £15-20 offered. R. Campbell Pine, 29 Sunnydale Gardens, Mill Hill, London, NW7.

Information for loan or purchase on kites suitable for flying aerials. Consider purchase of kite and equipment in good cond. I. H. Mochrie, G3VCM, 46 Rowan Avenue, Ulverston, Lancs.

RSGB Bulletin, December 1966. A. E. Cooling, VK5ZE, 20 Blencowe Street, Elizabeth Grove, South Australia, 5112.

The overseas QTH of J. Frings, G3FFH and also any information on the USA valve tester model 314, buy or loan. John Tye, " Inter-Nos," Swanton, Morley, Dereham, Norfolk.

Circuit diagram or H/B of B2 TX/RX for loan or purchase. These circuits were published in the *RSGB Bulletin* around 1948-50. Has anyone a copy? M. E. Lambeth, G3LIM, 11 Ellerman Avenue, Twickenham, Middlesex.

Exchange R109A RX for small test meter or sig gen up to 60 MHz plus. D. Bowers, 95 Grenfell Avenue, Saltash Cornwall.

Early valve RX and horn l.s. Original pair if possible. Also Eddystone glass panel s.w. RX. Good price paid or will exchange communication RX or transmitting and receiving valves. D. F. Neale, 11 Pine Drive, Wokingham, Berks.

AR88D and HRO RX with b.s. coils. Any spare parts, any cond. B2 TX or p.s.u. Also XTALs 3505, 3510, 3515, 3520, 7005, 7014, 7025, 7035 kHz or near. R. Field, 1 Haines Street, Battersea, London, SW8.

RSGB Amateur Radio Handbook, third edition. Also 1 MHz XTAL. D. W. Hill, 3 The Orchard, Kings Langley, Herts. Kings Langley 5434.

Amateur Bands RX wanted, must be in working cond., price around £14. Describe and state price. B. Newton, 45 Highcliffe Drive, Sheffield 11, S11 7LT.

Mod details for fitting an S meter to the PCR 3 RX. Circuits can be copied and returned. C. R. Adams, 46 Clarendon Road West, Chorlton-cum-Hardy, Manchester 21.

500pF variable capacitors, suitable for Z match, 75 and 52 ohm 100W carbon resistors, 75 ohm co-ax relay, rotary guy rings for scaffold pole. Price and details to F. J. Crisp, Carnmenellis House, Carnmenellis, Redruth, Cornwall.

HRO coil, 0·9-2·05 MHz or any freq. covering Top-Band. K. G. Selleck G3SNU, Coplands Farm, Dartington, Totnes, Devon. Totnes 3040.

Command RX 3-6 MHz or 6-9 MHz. Write stating cond. and price. For Sale. *Modern Practical Radio and TV*, four vols, mint. cond. £3. D. Watson, Magnus Grammar School RS, c/o R. V. Gelsthorpe, Earp Avenue, Newark, Notts.

Exchange Gledhill Brooks (pendulum) time recorder 45 in. × 15 in. × 12 in. time card stamping clock for Pilot Pal, BEME or similar portable/mobile D/F radio. B. R. Makowski, 66 Manor Avenue, London, SE4.

Circuit or manual for test set type 219 for loan or would purchase. W. G. Phillips, 130 Hillbury Road, Warlingham, Surrey.

HW32 or 32A by Heathkit, price and cond. to D. J. G. Legge, G3MP, 61 Sunnydale Road, Bakersfields, Nottingham.

Would anyone like to exchange their flat/house e.t.c. for a modern Maisonette/Penthouse, GLC, overlooking the River Thames near Greenwich? Three bedrooms. A. R. Preston, 53 Marlowe House, Pepys Estate, Grove Street, London SE8.

5 MHz XTAL preferably ex Wavemeter W1649. J. Bell, " Ashlawn," Ryland Road, Welton, Nr Lincoln Lincs.

TW Twomobile RX in good cond. Also TX XTALs for 2m and 4m bands with ½ in. pin spacing, all letters answered. W. G. Harbinson, GI3VJS, 10 Deramore Park, Belfast 9, NI.

Exchange pair of Tokai Sommerkamp walkie talkies for 35mm camera, Ilford " Sportsman " or equivalent. B. C. Poole, G3MLP, 10 Roberts Street, Rushden, Northants.

CR100 RX in good condition also v.h.f. converter. Buyer will collect within 100 miles radius. R. Mannion, G3XFD, 43 Elgar Road, Sholing, Southampton, Hants.

H.F. gain control for Marconi CR150 RX. Also circuit diagram for Marconi R1475 RX for purchase or loan. A. Horsfield, 10 North Place, East Dene, Rotherham, Yorks.

Manual and a.c. p.s.u. for Eddystone EC10. G3VAJ, " Swithlands," Falkenham, Ipswich, Suffolk.

Early RSGB Union Jack—Britannia, BERU & ELS badges. RSGB rubber stamp, incorporating T & R *RSGB in Wartime* (1939 circular), Amateur Radio Exhibition Catalogues, '47, '48, '49, *Experimental Wireless*, 1925 vol. F. A. Herridge, G3IDG, 96 George Street, Basingstoke, Hants.

Urgently. RX with gapless coverage, 1·8–18 MHz, (BC348/CR100) working XTAL filter, repairable acceptable if mechanically sound and front end OK. A. Marshall, 33 Brookbridge Lane, Datchworth, Knebworth, Herts.

Case for AR88D. D. J. O'Brien, G3TGI, High Trees, Colley Way, Reigate, Surrey.

Mobile SWL needs transistor RX. Now working, faulty, no object, Mohican GC1U, EC10 etc. Would collect reasonable distance. G. Bedwell, 130 Clifton Road, Wokingham, Berks. West Forest 5348.

GOOD RX wanted by keen schoolboy, can only afford £25. Failing this circuit diagram for transistor RX. State price. R. Barrie, 15 Ladyacre Road, Lanark, Scotland.

Hustler 80m resonator, RM75, Top price offered for coil in new cond. E. B. Grist, G3GJX, Little Hoath, Green Acres, Leverstock Green, Hemel Hempstead, Herts. 0442 3329.

Lafayette KT340, Trio 9R59 or similar communication RX. R. Threlfall, 13 Victoria Road, Whalley Range, Manchester 16.

FT243 or 10XJ demountable XTALs from 9750-9955 kHz inclusive. G. Barnard, G3VSZ, Lulworth, Rushmoor Avenue, Hazlemere, High Wycombe, Bucks.

Front panel nameplate for HRO. A. R. Williams, GM3KSU, 35 Howard Place, Edinburgh 3.

Circuit and details of model MT Hallicrafters CHL 43028 Navy Transceiver. R. Adams, 6 Homefield Road, Hemel Hempstead, Herts.

HA350, 888A and G2DAF Mk II RX and TX or similar. Write details first, to M. J. Faulkner, 35 Abbey Way, Farnborough, Hants.

BC221 or Class D wavemeter with p.s.u. Z match, r.f. meter. Also Vanguard TX about £25. Seller must deliver. H. C. Pryse, G3WXT, 36 Hart Road, Byfleet, Weybridge, Surrey.

Pye Ranger, mod for 2m or not, Mobile. G. E. Spark, G3UOX, 1 Daver Court, Mount Avenue, Ealing, London, W5.

Taylor valve tester, 45C, manual wanted loan or buy. SBD Radio and Television Society, c/o GPO Saving Dept., Blyth Road, London, W14.

TW 2m transistor RX required, must be 100 per cent. T. Groombridge, 28 Sprotlands Avenue, Willesborough, Ashford, Kent.

H/B for Cossor 'scope, model 339. Purchase or loan. Good price paid. W. Middleton, 49 Gregory Way, Childwell, Liverpool 16 Lancs.

Mains power xmfr or p.s.u. for Minimitter, 150W TX. I. Anderson, 26 Knellar Drive, Glasgow W4.

Class D wavemeter and Panda tunable. I.p.f. state condition and price. G. A. Martin, GI3XCZ, 26 Camowen Cottage, Hospital Road, Omagh, Co Tyrone., NI.

G2DAF TX Mk II, parts and XTALs. E. P. Inman, G2DRA, 27 Harlow, Crescent, Harrogate, Yorks.

Large disc seal U.H.F. Triode type ACT25, TD2-300A, TD2-400A, TD2-500A or anything in this class for g.g. linear. State price and condition please. L. Williams, G8AVX, 19 Burcote Road, Birmingham 24.

Spy radio equipment and manuals as used by Resistance Forces. E.g. 3 Mk I, 3 Mk 2, A Mk I, Mk 2, Mk 3, 21/1, 51/1, 53/1, MCR1, A1, A2, BP3, BP5, BP6, MR3, AP4, AP5, OP3, AT1, AR11. A. W. MacDonald, 57 Lavgherne Road, St Johns, Worcester. A. W.

Any complete vol/years/long runs of: *Wireless Constructor/Magazine/Weekly, Amateur/Popular Wireless, Modern Wireless* (Vol. 2 on), *Practical Wireless* (1932-38), *Wireless World* (1915-22). G3IDG, 96 George Street, Basingstoke, Hants.

H/B for Panda Cub TX. J. A. Rainbow, 14 Temple Road, Bishopthorpe, York.

EC10 transistor receiver in mint condition, 10 months old, £38 o.n.o. Also practically unused AR22A motor and control unit, £15. J. D. Spencer, DL5YP, c/o R. Watkins, 9 Deakins Road, South Yardley, Birmingham 25.

Reliable D/F equip. for beginner. F. A. Barrell, 4 Great Road, Hemel Hempstead. 56196.

Hallicrafters SX42, front panel, " S " meter, bandspread dial, knobs, etc. or scrap RX for spares w.h.y. R. H. Perrin, G8ALY, 30 Franchise Street, Kidderminster, Worcs.

KW2000A with linear or complete Collins " S " line TX, RX and Linear. Full details and price to J. E. Baylis, G3UXX, Holt Farm, Fairoak Road, Bishopstoke, Hants.

Enthusiastic disabled member requires help setting up station. Requires RX and mobile equipment, will repair if necessary, Joystick. RAE Course and books. Must be cheap. Any advice welcomed. R. Pallatt, 61 Springfield Road, Hemel Hempstead, Herts. Hemel Hempstead 52453.

Heathkit Mohican, CSE 2AR RX, U/S HRO coilpack, any band. 3FIF 160m mobile aerial. M. J. P. Evans, 4 Gower Crescent, Baglan, Port Talbot, Glam.

AT5 TX and p.s.u. EC10 or Mohican. G. S. Starling, 207 Shirley Road Croydon. CRO 8SB.

HRO g.c. coils 2-4, 4-7, 14-30 MHz and b.s. 14, 30 MHz. Dial and capacitor w.h.y. or cash. J. Stobseth-Brown, G3NLU, Ivy Cottage, Argyle Street, Alnmouth, Northumberland.

XTAL cal, Het Freq meter, 100-200 MHz or w.h.y. J. M. Heath, 235 Thorne Road, Wheatley Hills, Doncaster.

XTAL Cal, Het., freq. meter, 100-200 MHz and 300-500 MHz or w.h.y. also BC645 TX/RX or other version. J. M. Heath, 235 Thorne Road, Wheatley Hills, Doncaster.

Any type of RX or TX/RX with reasonable coverage for School Radio Society. Possibly 19 Set or 52 Set. Price must be very low as funds are extremely limited. P. W. Murray, The Amateur Radio Society, Llanelli Boy's Grammar School, Llanelli, Carns.

Good g.c. RX, such as 680X, 940, HQ180A, SX122, etc. Full details please and s.a.e. M. R. G. Snowden, Swainsea Lane, Pickering.

RSGB H/B 1st edition, RES lapel badge, *How to Become a Radio Amateur* 1938 RSGB Publication. Complete vols of pre-war Wireless (Not Radio Amateur) magazines, pre-1929 QSLs, early certificates. F. A. Herridge, G3IDG, 96 George Street, Basingstoke, Hants.

Complete two ele Labgear Quad aerial, also two HC/6-U or similar small 1 MHz XTALs. C. Galloway, G3RNV, 105 Dumbarton Road, South Reddish, Stockport, Cheshire.

Manuals and circuit diagrams for suitcase type B2 (3 Mk II) and type A Mk III. Also suitcase TX/RX as used by resistance forces. A. MacDonald, G3UCO, 57 Laugherne Road, St Johns, Worcester.

Jap Bug Key 102 or similar, will exchange for Joystick v.f.a. and type 4 tuner complete with instructions and feeder. Write first. T. Blewett, GM3WPU, 41 Salmond Street, A.M.Q. RAF Kinloss, Forres, Moray, Scotland.

January '63 issue of *CQ Magazine* and mumetal screen for VCR 139. Offers to B. Wilbraham, G2ATU, Post Office, Abbots Leigh, Bristol 8.

KW E-Zee match and Mosley Tri Band vertical aerial. H. Froggatt, G3HQH, " Moncrieff," Hague Bar Road, New Mills, Stockport.

4m Pye Reporter, preferably tunable RX, suitable mobile working. 455 kHz sideband filter, sale or part exchange. A. V. Bryant, G3NVB, 101 Mays Lane, Stubbington, Hants. Stubbington 3220.

2m converter, Digtal clock, good quality tape recorder. Details to P. Bentley, G3VUD, 3 Eddington Road, Lytham St Annes, Lancs.

All band commercial TX, Z match, s.w.r. meter and commercial RX. For sale HRO-MX in FB cond. slight fault in S meter circuit, otherwise OK, very clean. Nine g.c. coils. £20. H. C. Pryse, G3WXT, 36 Hart Road, Byfleet, Weybridge, Surrey.

Circuit of H/B for the Hallicrafters S27 v.h.f. RX. FT241 or 243 XTALs in the range 11·685-11·781 MHz and 6·079 MHz. N. J. Dudman, 82 Chessington Hill Park, Chessington, Surrey.

XTALs between 9·874-9·96 MHz and also 11·6833-11·7833 MHz. A. C. Wadsworth, G3NPF, 130 Ashingdon Road, Rochford, Essex.

SX24 RX aerial, r.f. and oscillator coils or suitable front end. Would purchase unserviceable set or similar. All letters answered. K. B. Pearse, G3MLC, Sandford House, Sandford, Nr Ventnor, IoW.

Eddystone 898 dial. G. R. B. Wilson, G3APV, 18 Eskdale Avenue, Seascale, Cumberland.

Audio output xfmr for AR88 and addresses of suppliers for all AR88 spares. Also H/B for Hallicrafters S40 RX. R. W. L. Jones, G3PIX, 24 Forest Avenue, Foresthall, Newcastle upon Tyne. NE12 9AH.

CLUB NEWS

continued from page 332

Cardiff RSGB Group.—13 May, 7 30 p.m., TA Centre, Park Street, Cardiff. *See Looking Ahead.*

(UCARS).—Further details from the Secretary, Students Union, University College Dumfries Place, Cardiff. It is hoped shortly to have a station added to the club's facilities.

Llanelli (LBGSARS).—Fridays, 3.30 p.m., Llanelli Boys Grammar Technical School.

Pontypool (PARC).—Tuesdays, 7 p.m., Educational Settlement, Rockhill Road, Pontypool, Mon.

Pembroke (PARC).—31 May, Defensible Barracks, Pembroke Dock, Pembs. Club station operates all bands including 2m, other facilities include RAE tuition.

Rhondda (RARS).—13 May (Practical and Instructional), Pencelli Hotel, Treorchy. *GW3PHH.*

REGION 11

Rhyl (R & DARC).—Tuesday, 14 May, Rhyl Silver Band Room, Windsor Street, Rhyl. Equipment from most leading manufacturers was subjected to comparison tests to evaluate pros and cons. The debating continues!

REGION 13

Edinburgh (LRS).—9 May (Constructional Competition and NFD Briefing), 23 May (Visit to BBC TV Transmitter at Kirk o'Shotts—details from GM3PSP), 7.30 p.m., Board Room, YMCA, 14 South St Andrew Street, Edinburgh.

REGION 14

Ayrshire (AARG).—1, 15, May, 7.30 p.m., Peter Boyle, Bowling Club, Craigie Road, Ayr.

Auchenharvie (A & DARS).—7, 9, 14, 16, 21, 23, 28, 30 May, 7.30 p.m., Auchenharvie Community Centre, Stevenston.

Glasgow University (GURC).—10 May, 7.30 p.m., Engineering North Building, University of Glasgow.

Lowland Royal Signals Group (LRSG).—7, 21 May, 7.30 p.m., 21 Jardine Street, Glasgow.

Mid-Lanark RSGB Group.—17 May (NFD Preparation & Junk Sale), 7.30 p.m., YMCA, Brandon Street, Motherwell.

Greenock (G & DARC).—10, 24 May, 7.30 p.m., Arts Guild, Campbell Street, Greenock.

REGION 15

Belfast and District RSGB Group.—Third Wednesday in each month, 8 p.m., War Memorial Building, Waring Street, Belfast.

REGION 16

Norwich (NARC).—Mondays, 6 May (Business Meeting), 13 May (" New Theories of H.F. Propagation," by Pat Gowen, G3IOR), 20 May (RUA Lid?), 27 May (" The Misuse of Components," by Arnold Tomalin, G3PTB), 3 June (Bank Holiday—NO meeting), 7.30 p.m., Old Lakenham Hall, Mansfield Lane, Norwich.

REGION 17

Chippenham (C & DRAC).—Tuesdays, 28 May (" Aerial Demonstration and Lecture," by G3JMY), 7.30 p.m., The Chippenham High School for Boys, Hardenhuish Lane, Chippenham. This year's NFD event is well in hand with preparations being organized by a sub committee. *G3PQG.*

Farnborough (F & DRC).—14 May (" Early Amateur Radio," by M. Child), 28 May (Film Show), 7.30 p.m., 310 Farnborough Road, Farnborough.

Reading (RARC).—7 May (Trouble Shooting with members' 2m equipment), 21 May (Final arrangements for NFD), 4 June (Constructional Competition), 8 p.m., St Pauls Hall, Whitley Wood. The club's Annual picnic has been provisionally fixed for 13 July, but more of this later. *G3LFM.*

Government of Zambia

REQUIRES

TELECOMMUNICATIONS TECHNICIANS

for the General Post Office, on contract for one tour of 36 months in the first instance. Commencing salary according to experience in scale Kwacha 2292 rising to Kwacha 3216 a year (£Stg.1337-£Stg.1876) plus Inducement Allowance of £Stg.506 rising to £Stg.615 a year. Gratuity 25% of total salary drawn. A supplement of £Stg.175/215 a year is also payable direct to an officer's home bank account. Both gratuity and supplement are normally TAX FREE. Free passages. Quarters at low rental. Children's education allowances. Liberal leave on full salary or terminal payment in lieu. Contributory pension scheme available in certain circumstances. Special terms of service apply to serving civil servants including employees of the General Post Office whose applications *must* be submitted through their own Establishment Division/Head of Department.

Candidates should have had a sound technical education and possess City and Guilds Certificates or equivalent in telecommunications. They should preferably have ten or more years training and practical experience in one or more of the following branches Carrier Systems; HF and VHF Radio; Telegraph Machines; Mixed duties covering these branches.

Apply to CROWN AGENTS, M. Dept., 4 Millbank, London, S.W.1., for application form and further particulars, stating name, age, brief details of qualifications and experience, and quoting reference M2K/62915/RC

British Solomon Islands

REQUIRE

TELECOMMUNICATIONS ENGINEER

for the Posts and Telecommunications Department, on contract for one tour of two years in the first instance. Commencing basic salary in scale equivalent to £ Stg. 1042 rising to £ Stg. 1993 a year, liable to British Solomon Islands Income Tax. In addition an allowance ranging from £ Stg. 716 to £ Stg. 1160, normally TAX FREE, will be paid direct by the British Government to an officer's bank account in the United Kingdom. Gratuity 25% of total salary drawn. Free passages. Terminal payment in lieu of leave. Generous Education Allowances. Contributory pension scheme available in certain circumstances.

Candidates should possess the Final City and Guilds Certificate in Telecommunications and have a good knowledge of the operation and expansion of Strowger telephone exchange equipment. Membership of the Institute of Technician Engineers and broad experience of the installation and maintenance of H F Communications equipment, associated receivers and test equipment in a supervisory capacity will be an advantage.

Apply to CROWN AGENTS, M. Dept., 4, Millbank, London, S.W.1., for application form and further particulars, stating name, age, brief details of qualifications and experience, and quoting reference M2K/61637/RC

ASTROPHYSICS RESEARCH

under Science Research Council direction at

THE CULHAM LABORATORY

Senior Scientific Assistants and Scientific Assistants

There are vacancies for Senior Scientific Assistants and Scientific Assistants in the Astrophysics Research Unit which is to become part of the Science Research Council and is located at the Culham Laboratory of the United Kingdom Atomic Energy Authority.

The work of the Unit covers Space Astrophysics and currently includes:

(a) ultraviolet and soft X-ray studies of the sun;

(b) ultraviolet stellar spectroscopy;

(c) laboratory research in plasma spectroscopy related to the space programme.

Members of the Unit engaged in fields **(a)** or **(b)** may be required to spend short periods abroad at rocket launch sites in Australia, Sardinia or the U.S.A.

Duties

To assist in the development, construction, calibration and use of spectroscopic instrumentation and/or associated rocket payload equipment.

Qualifications and Experience

Minimum desirable qualifications would be a G.C.E. "O" level in four subjects including English Language and Mathematics or a Science subject, or equivalent. Experience in one or more of the following fields would be an advantage: spectroscopy, optical instruments, photography, rocket instrumentation and control systems, or other areas of advanced instrumentation. Applicants for Senior Scientific Assistant posts must be at least 27 years of age.

Salary Scales

Senior Scientific Assistant: £1,105—£1,455 p.a.
Scientific Assistant: £430 (at age 16)—£1,055 p.a.

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