RSGB BULLETIN

APRIL 1964
VOL. 40, No. 4

PORTABLE ON MOW COP

JOURNAL OF THE RADIO SOCIETY OF GREAT BRITAIN

Volume 40 No. 4

April 1964

3/- Monthly

R.S.G.B. BULLETIN

CONTENTS

Front Cover: The portable station shown on the front cover this month is G3LLG, working from Mow Cop, in Cheshire. Mow Cop is approximately 8 miles north of Trentham Gardens, and is 1,000 ft. high, with a clear take-off in all directions.

EDITOR:
John A. Rouse, G2AHL

EDITORIAL ASSISTANTS:
R. E. Molland, G3CNC
T. R. Preece, A2921

EDITORIAL OFFICE:
RSGB Headquarters, 28 Little Russell Street, London, W.C.1
Telephones: HOLborn 7373
HOLborn 2444

ADVERTISEMENT MANAGER:
Mrs. P. D. Harvey, Sawell & Sons Ltd., Ludgate Circus, London, E.C.4
Telephone: FLEet Street 4353

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.

The closing date for copy for the next issue is April 10.

NC 77X—an inexpensive communications receiver ideal for the beginner. Four-Band receiver. 115 V.A.C. transformer operation—eliminates the hum and polarity problems, shock hazards and grounding difficulties. Continuous coverage from 540KC to 31MC. Built-in 5" speaker and front panel headphone jack. Price ***£28.3.4d.***

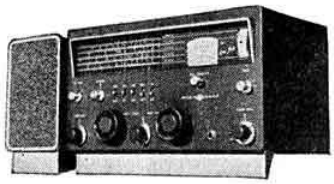
NC-140—National's new double conversion receiver with exclusive All-Band Dial Selector. Incorporating features normally associated with much higher priced equipment. Vacuum tube Q-Multiplier operation AM and CW/SSB, 6BZ6 RF Stage. 5 main tuning bands. Accessories: NT-3B matching speaker XCU-27. 1 MC crystal calibrator. Price ***£74.3.2d.***, matching Speaker NTS-3B ***£7.8.1d.***

National RANGE

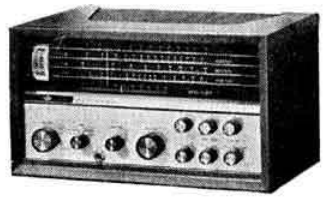
NCX 3—Tri-Band SSB transceiver. Complete coverage of the 80, 40 and 20 metre phone and CW bands. Only ***£148.8.4d.***, matching AC speaker console, ***£46.7.1d.***

The National Radio Company, America's most esteemed manufacturers of superior amateur and short wave equipment.
There is a National equipment for practically every application. The models vary in appearance, size and weight and number of features—but they all have the same uncompromising quality and all are backed by the same One Year Guarantee.

NC 121—Designed for the more advanced enthusiast, features edge-reading signal strength meter, noise-limiter, variable BFO, audio and RF gain controls, exclusive Tuner Output for use as a short wave tuner with Hi-Fi equipment and peaking Q-multiplier for optimum selectivity. Price ***£53.6.11d.***



NC 190X—combines exceptional SSB, AM and CW amateur band performance with calibrated foreign broadcast bandspread. This model incorporates every desirable feature necessary to conquer crowded amateur band conditions. Fitted for 230V 50 cycles operation.
Price ***£89.18.2d.***, Matching speaker NTS-3B ***£7.8.1d.***



NC 121—General coverage receiver with continuous coverage from 550KC to 30 MC in four bands. Model shown above is in hand-rubbed oiled walnut case—perfect for your living room.

Price ***£61.13.7d.***

Now available from stock in the U.K. from leading distributors of amateur products!

Ad. Auriema Limited.
125 Gunnersbury Lane, Acton, London, W.1.
Telephone: ACOrn 8765

GREEN & DAVIS
500W. SSB LINEAR

operates on 80-40-25-15 and 10m. With high efficiency on ALL Bands. Completely self-contained including P.S.U.
R.C.A. 7094 Beam Tetrode. Light in weight —only 38 lbs. Absolutely reliable—12 months guarantee. Internal Ant. Change-over relay matches into ALL SSB TX or transceivers.

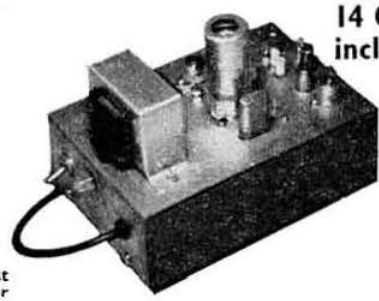
← The PGLAI £87 10.0d. (Ex Stock)

The New G & D 18w, 144 Mc/s CW Transmitter— The CTX2

- QQVO3—10 P.A. + ECF82 and 12AT7
- 18 Watts input
- Easily Modulated
- Easily Drives 150w. P.A. or 70 centimetre Tripler-amp
- CLAMPER TUBE PROTECTS P.A.

Price:- ONLY £10 (Ex Stock)
(including valves and XTAL)

PRICE 14 GNS incl. P.S.U.



The Finest Converter Yet Built

The GREEN & DAVIS 144 Mc/s. Conv. Mk. IV

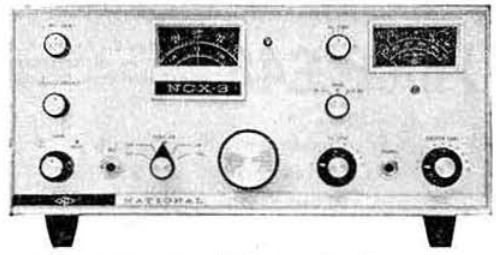
3 of 6CW4 NUVISTORS, 6060 MINIATURE XTAL I.F.s: 1.8-3.8 Mc/s. 4-6 Mc/s. 14-16 Mc/s. 24-26 Mc/s. 28-30 Mc/s. or to order.

Complete SSB/AM/CW station with full coverage of the 80, 40 and 20 metre bands.
200 watts P.E.P on SSB, 200 watts cw, 100 watts AM
High Frequency crystal filter giving 40dB sideband suppression.
VOX or Push-to-talk on phone, break-in keying on CW.

Available from stock

NCX-3 Tranceiver £148 8s. 4d.
NCX-A Mains power supply and speaker console £46 7s. 1d.
NCX-D 12v. DC Mobile power supply, £50 8s. 11d.

Easy terms, deposit NCX3, plus NCX-A power supply £24 15s. 5d.
Full details on request from Green & Davis, Main London Agents of the National Range.



THE NATIONAL RADIO NCX-3 TRI-BAND SSB TRANSCEIVER

IN STOCK

60 watt Transistorized DC-DC INVERTOR—12v DC I/P 300v 200mA o/p	**Price £7 19s. 6d.**
45 watt Transistorized DC-DC INVERTOR—12v DC I/p 300v 150mA o/p	**Price £6 19s. 6d.**
Partridge Electronics Products R.F.40. All Band Field Strength Meter, 1 to 250 Mc/s, including rod ant. and earpiece	**Price £3 9s. 6d.**
All Eagle Products available as previously advertised	
All Band RF Chokes—1 KW rating. For PA's, Pinear's, etc.	**£1 0s. 0d.**

TRADE ENQUIRIES WELCOMED:

(OFFICE)
5 WEIR HALL GDS, LONDON, N.18

GREEN & DAVIS
LONDON
Phone : NORth 6871

(WORKS)
104 HORNSEY ROAD, LONDON, N.7

Radio Society of Great Britain

(Incorporated 1926)

PATRON

H.R.H. THE PRINCE PHILIP, DUKE OF EDINBURGH, K.G.

COUNCIL 1964

President

G. M. C. STONE, A.M.I.E.E., A.M.I.E.R.E., G3FZL

Immediate Past President and Honorary Treasurer

N. CAWS, F.C.A., G3BVG

Penultimate Past President

E. G. INGRAM, GM6IZ

Executive Vice-President

E. W. YEOMANSON, G3IIR

Ordinary Elected Members

J. C. FOSTER, G2JF — R. C. HILLS, B.Sc.(Eng.)., A.M.I.E.E., A.M.I.E.R.E., G3HRH — A. O. MILNE, G2MI

L. E. NEWNHAM, B.Sc., G6NZ — R. F. STEVENS, G2BVN — J. W. SWINNERTON, T.D., B.Sc.(Econ.)(Hons.), A.I.L., G2YS

LOUIS VARNEY, A.M.I.E.E., A.I.L., G5RV

Zonal Representatives

H. A. BARTLETT, G5QA — L. N. GOLDSBROUGH, B.Sc., M.A. (Oxon), G3ERB — J. C. GRAHAM, G3TR

R. H. JAMES, A.M.I.E.E., A.M.I.E.R.E., GW3BFH — A. D. PATTERSON, B.A.Sc., GI3KYP — F. K. PARKER, G3FUR

General Manager and Secretary

JOHN A. ROUSE, G2AHL

REGIONAL REPRESENTATIVES

Region 1.—North Western. B. O'Brien, G2AMV, 1 Waterpark Road, Prenton, Birkenhead, Cheshire.

Region 2.—North Eastern. J. R. Petty, G4JW, 580 Redmires Road, Sheffield 10, Yorkshire.

Region 3.—West Midlands. W. A. Higgins, G8GF, 33 Cedars Avenue, Kingswinford, Brierley Hill, Staffs.

Region 4.—East Midlands. F. C. Ward, G2CVV, 5 Uplands Avenue, Littleover, Derby.

Region 5.—Eastern. S. J. Granfield, G5BQ, St. Luke's, 47 Warren Road, Cambridge.

Region 6.—South Central. L. W. Lewis, G8ML, 34 Cleevelands Avenue, Cheltenham, Gloucestershire.

Region 7.—London. P. A. Thorogood, G4KD, 35 Gibbs Green, Edgware, Middlesex.

Region 8.—South Eastern. Norman D. Mattock, G2DFG, "Brackstones," 185 Cheriton Road, Folkestone.

Region 9.—South Western. R. E. Griffin, G5UH, 13 Alexandra Road, Uplands, Bristol 3.

Region 10.—South Wales. C. H. Parsons, GW8NP, 90 Maesycoed Road, Heath, Cardiff, Glam.

Region 11.—North Wales. J. E. Thornton Lawrence, GW3JGA, "Perranporth," East Avenue, Bryn Newydd, Prestatyn, Flints.

Region 12.—North-East Scotland. G. B. Woffinden, GM3COV, 9 Hakon Road, Thurso, Caithness.

Region 13.—South-East Scotland. G. P. Millar, GM3UM, 8 Plewlands Gardens, Edinburgh 10.

Region 14.—West Scotland. D. W. R. Macadie, GM6MD, 154 Kingsacre Road, Glasgow, S.4.

Region 15.—Northern Ireland. J. William Douglas, GI3IWD, 21 Wellington Gardens, Bangor, Co. Down.

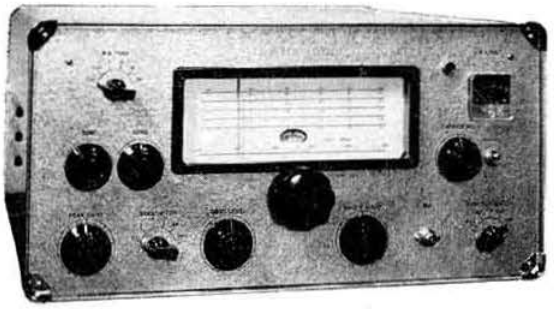
Region 16.—East Anglia. P. J. Naish, G3EIX, 6 Mildmays, Danbury, Chelmsford, Essex.

Region 17.—Southern. L. H. F. Southwell, G3JLS, 15 Hollybank Road, Hythe, Southampton, Hants.

The annual subscription rates to the RSGB are as follows: Corporate Members, Home and Overseas—35/- ($5 U.S. or Canadian:). Associate Members under 21 years of age—15/-. Application forms may be obtained from Headquarters on request.

Mosley Commando II

○ AM, SSB, CW TRANSMITTER ○



with "DXability"

- 180 WATTS P.E.P.
- AM - SSB - CW MODES.
- LATTICE FILTER EXCITER.
- PI TANK OUTPUT CIRCUIT.
- VOX AND MANUAL OPERATION.
- 10 – 80 METRE BANDSWITCHING.
- FULL VISION EDDYSTONE DIAL.
- IDEAL FOR RTTY BY TONE INJECTION.
- THREE CHANGE - OVER CONTACTS FOR EXTERNAL SWITCHING FUNCTIONS.
- ADAQUATE OUTPUT TO DRIVE THE BEEFIEST QRO LINEAR.

The features incorporated in the Mosley Commando II **makes it** The Outstanding Transmitter Buy Today! **Only reliable "air-tested" circuitry is used. Power Supply is the latest cool-running Silicon Rectifier, fuse protected and conservatively rated. Power Amplifier employs two 6146 Tetrodes operating at 750 Volts Class AB_1 Linear Amplifier Service to give maximum I.C.A.S. rating at 180 watts P.E.P. The Pi Tank circuit bandswitching 10 thru 80 metres gives efficient loading into low impedance coaxial lines. Sideband generation at 435 kcs. with half-lattice crystal filter for 45 db. sideband/carrier rejection. Sideband switch in "normal" position is correct for band in use, but, an "inversion" switch gives choice of alternative sideband.**

Hams, throughout the world, know that a real commanding signal depends on a unity match of the Transmitter and Aerial. Mosley Aerials are designed to meet the highest standards of the most discriminating hams. When completing your dream station • • • Insist on the best • • • Rely On Mosley.

Mosley Electronics Ltd.

Write/Cable — ATT. O. S. CHILVERS G3JOC — Asst. Mgr.
40 Valley Road, New Costessey—Norwich, Norfolk, England

A Low Noise Converter for 70 Mc/s

By PAUL HARRIS, G3GFN*

ONE of the factors affecting reception on the 70 Mc/s band is the relatively high atmospheric noise in this part of the v.h.f. spectrum, but, as the level of this noise varies with propagation conditions, it can be argued—as indeed for any band—that, ideally, a receiver intended for serious work should have an inherent noise level well below the *minimum* value of external noise likely to be collected by the aerial system.

While the 70 Mc/s band will provide reliable communication within a relatively local area, and in such applications receiver noise is relatively unimportant, this is not its only use. The effects of tropospheric bending are now fairly well known on this frequency, and, depending on the altitude and extent of the inversion, signal paths of several hundred miles are possible. In addition there is strong evidence to suggest that both sporadic *E* skip and *F2* layer reflection modes apply to signals on frequencies as high as 70 Mc/s. To take full advantage of such openings a low noise receiver is essential.

The converter to be described—which is in fact the front-end of a receiver specifically designed for the 70 Mc/s band—has an inherent noise level far below that likely to be encountered in even the "quietest" location, and, when correctly adjusted, excellent small signal performance.

General Design Notes

Basically the converter comprises a 6CW4 Nuvistor triode as a neutralized r.f. amplifier, followed by another 6CW4 as a triode mixer. Injection to the mixer is from a crystal controlled harmonic oscillator/multiplier sequence according to standard v.h.f. practice. As the i.f. output from the mixer is low, a high gain head amplifier employing an EF91/Z77 is included in the converter chassis. Broadband transformers are used in this amplifier, and to ensure adequate bandwidth to cover the 70 Mc/s allocation, they are slightly stagger tuned.

Due to the atmospheric noise in the 70 Mc/s region, there is an amount of r.f. amplification above which it is pointless to go. A single r.f. stage will normally provide all the small signal amplification that can be comfortably used, and a neutralized 6CW4 performs this function admirably.

One of the problems posed by the 70 Mc/s band arises from its proximity to certain Band 1 television channels, not only in respect of transmitters, but also in regard to stray radiation from the oscillator/multiplier sequence of converters. The frequencies employed in this converter, namely, 27 Mc/s (9 Mc/s × 3) and 81 Mc/s (27 Mc/s × 3) are such that they will not cause interference to any TV service operating in Channels 1-5, nor are they related to television intermediate frequencies.

For those who like having fun with figures, a little time with pencil and paper, plus a list of Band 1 frequency allocations† will show that the combination used in this converter is one of the few which will avoid the possibility of TVI due to stray radiation irrespective of the local channel in use. When working out frequency combinations, account must also be taken of the second and third harmonics of those which it is intended to employ.

With certain combinations of i.f. and injection frequencies, f.m. or TV transmissions can appear as troublesome images. While images can be reduced to a low level by a simple wavetrap, or the more sophisticated tuned *T* filter, these methods introduce losses which are, in the writer's opinion, unacceptable. Better they should not be there at all. This is yet a further reason for choosing the i.f. and injection frequencies with considerable care. In this converter the image frequency is clear of any known transmission likely to cause interference.

The circuit of the converter is shown in Fig. 1.

* 94 Aldwick Road, Bognor Regis, Sussex.

† *Radio Data Reference Book*, page 80.

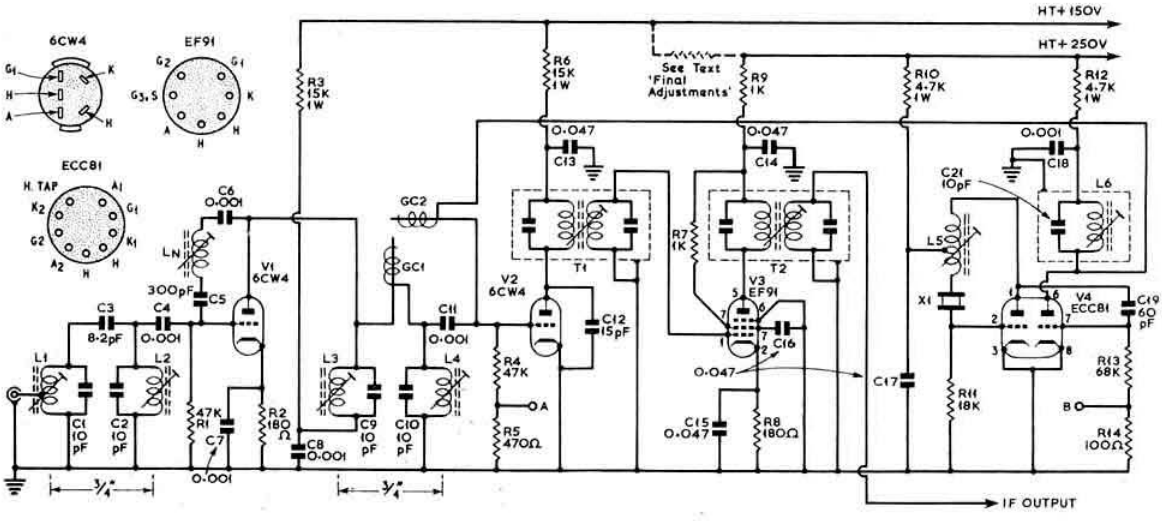


Fig. 1. Circuit of the converter. C1,2,3,9,10,21 are silver mica ± 1 pF tolerance; C19 is ± 10 per cent tolerance; C4,6,7,8,11,18 are disc ceramic; C13,14,15,16,17 are polystyrene; C5 is tubular polystyrene. GC1, two lengths of plastic covered wire tightly twisted for 1¼ in; GC2, as GC1, but ½ in. long (see text). T1, T2, 10·8 Mc/s nominal, Maxi-Q type I.F.T.11. X1, 9·041 Mc/s quartz crystal. For details of L1,2,3,4,5, and 6, see Fig. 8.

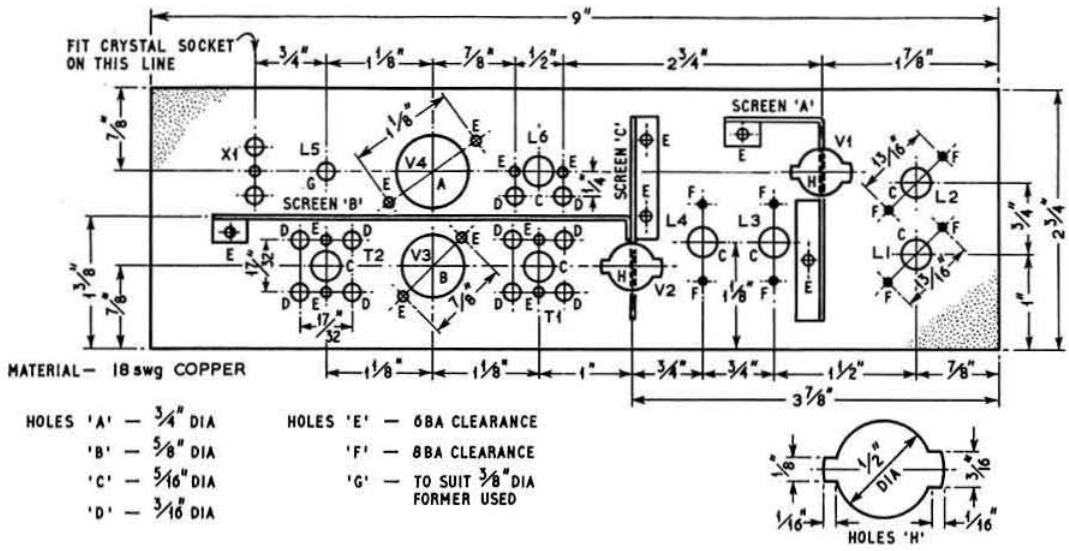


Fig. 2. Dimensions of the chassis plate. This should be cut from 18 s.w.g. copper sheet.

R.F. Amplifier

Signals are fed into a tap on L1 which approximates to 75-80 ohms to meet the requirements of most v.h.f. aerial feed lines. L1 and L2 form a mutually coupled bandpass circuit with a fairly high level of top capacity coupling. This bandpass circuit serves three main purposes and these are: (a) to ensure adequate rejection of signals on the i.f. or strong out-of-band local transmissions, (b) maintain adequate broadband characteristics with high *Q* circuits and (c) ensure that the neutralizing of V1 works into a constant impedance and so remains stable.

The triode r.f. amplifier V1 is neutralized by the inductance LN connected between anode and grid, C6 being a d.c. blocking capacitor, and C5 the coupling. With the values given the setting of the inductance to neutralize V1 is quite straightforward and not critical.

Mixer

The output of the r.f. amplifier is fed to L3, which, in association with L4, forms a second mutually coupled bandpass circuit. A small amount of top capacity coupling is provided by GC1 which is made by tightly twisting two short lengths of plastic covered 22 s.w.g. wire.

Oscillator injection is to the grid of the mixer via another " gimmick " capacitor GC2. In order to adjust the amount of oscillator injection to the optimum value, the size of GC2 is varied and this is described in the section dealing with " Adjustments." The mixer grid leak consists of two resistors in series, R4 and R5, the latter being a shunt for metering purposes. Measuring from the junction of R4/R5 to earth will indicate the approximate grid current of the mixer and this will be proportional to the amount of oscillator injection.

Many triode mixers tend to oscillate at or near the signal frequency when used at v.h.f. or u.h.f. This is usually due to lead inductance in the mixer anode circuit and can be overcome by connecting a small capacitance directly between anode and cathode pins on the valve base. This is the purpose of C12.

I.F. Amplifier

The i.f. amplifier follows standard practice. The i.f. transformers are normal commercial products nominally intended for 10·7 Mc/s, but aligned to 11·069 Mc/s approximately.

Oscillator/Multiplier

The oscillator/multiplier sequence is performed by a single valve type ECC81/12AT7, V4. One half of V4 operates as a Squier overtone oscillator on 27 Mc/s using a 9 Mc/s crystal. The output is capacity coupled to the second half of the valve which functions as a frequency tripler to 81 Mc/s and this is fed to the mixer via GC2. The constants are such that the crystal operates without excessive drive and there is no tendency for self-oscillation without the crystal in place. In addition, the efficiency of the tripler section is relatively high. L6, in its screening can, tunes, by adjustment of its core, over the range 75 Mc/s-95 Mc/s.

Construction—Mechanical

Where r.f. is involved, not only in transmitters but especially in receivers where the levels are very low, construction and layout become equally as important as circuitry as the frequency increases. Those experienced in v.h.f. and u.h.f. techniques will endorse this comment. For the foregoing reason the construction and layout of this converter is treated in some detail as are the winding of the coils.

Before dealing with actual construction, a word on components is in order. In designing this converter, and arranging its layout, only components easily available from regular supply sources have been used. Nevertheless, it is suggested that prudence dictates that those which have to be fitted to the chassis are obtained *before* construction is commenced so that their dimensions can be checked against those given, and any minor adjustments made.

The actual converter chassis is in the form of a flat plate (see Fig. 2) and this is mounted on a 3 in. × 10 in. × 2½ in. aluminium box chassis. The main surface of the box chassis is provided with a cut-out 2¼ in. × 8¼ in. to allow the converter plate to be fitted. This arrangement allows easy

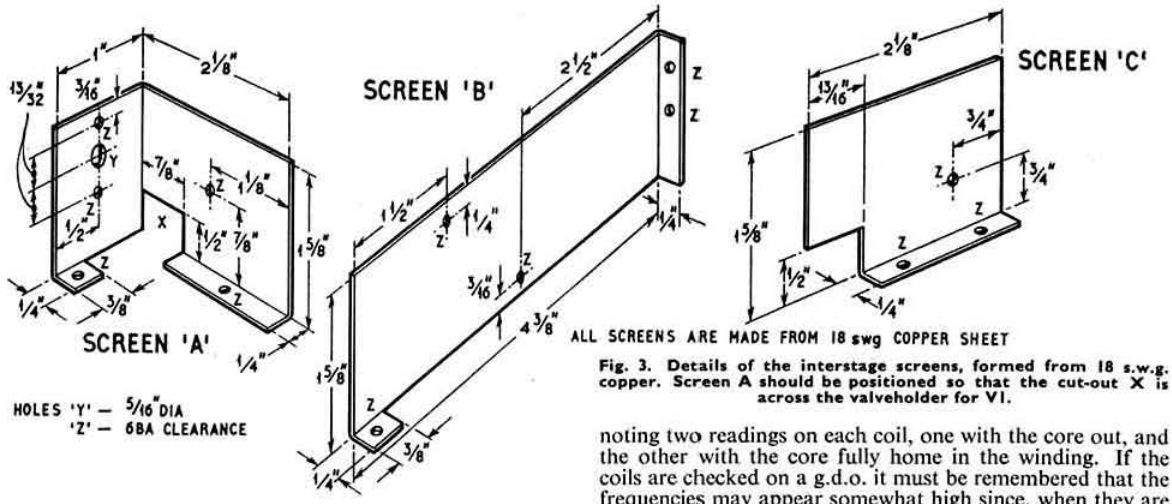


Fig. 3. Details of the interstage screens, formed from 18 s.w.g. copper. Screen A should be positioned so that the cut-out X is across the valveholder for V1.

access to the converter for wiring and testing, but when the two are secured together by PK screws, forms a solid structure.

A tip worth bearing in mind is that an ordinary fretsaw fitted with a standard middle cut blade will, with gentle persuasion, cut awkward shaped or large holes in aluminium up to 10 s.w.g. Heavy handedness will prove expensive in blades, but once the knack has been gained it is quite easy. Gentle cutting strokes are the key.

Fig. 2 gives the drilling details of the chassis plate which is made from 18 s.w.g. copper—obtainable from most builders' merchants—and shows the position of the interstage screens. This diagram also shows the dimensions of the holes required to accommodate the Nuvistor bases. When fitted, the shaped tags of these sockets are bent down on to the chassis plate and soldered to it. A heavy iron is needed for this operation, and the copper must be well cleaned beforehand.

Fig. 3 provides details of the interstage screens which are also made from 18 s.w.g. copper.

Wiring

Prior to commencing wiring, the coils should be wound according to the information given in Fig. 8. If possible, their frequencies should be checked against a reliable g.d.o. noting two readings on each coil, one with the core out, and the other with the core fully home in the winding. If the coils are checked on a g.d.o. it must be remembered that the frequencies may appear somewhat high since, when they are wired into circuit, stray and proximity capacities will tend to lower their working frequencies. Particularly is this true of L6 which is contained in a screening can. When the coils are completed the windings should be coated with polystyrene cement.

The precise layout used by the writer is shown in Figs. 4, 5, 6 and 7, and if this is followed no difficulties should be encountered when setting up and adjusting the converter.

Before starting to wire, screen *B* with all the valveholders,

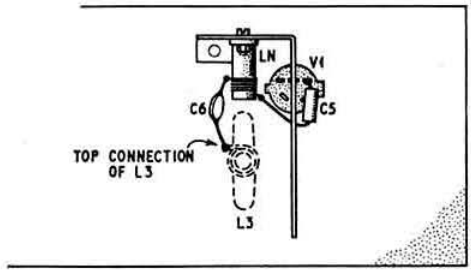


Fig. 5. Position of the neutralizing coil LN on screen A, together with the disposition of the neutralizing components.

should be fitted. The plate will then lie flat. Starting at the aerial input, wiring should be undertaken in the order of the numbering of the valves, that of the oscillator/multiplier being last. When wiring components and leads to the bases of V1 and V2, screens *A* and *C* should occasionally be offered up to ensure that no fouling takes place. Before screen *A* is attached to the main chassis plate the neutralizing coil LN should be fitted to screen *A*. Broadly speaking, the wiring sequence is that of the diagrams in Figs. 4, 5, 6 and 7.

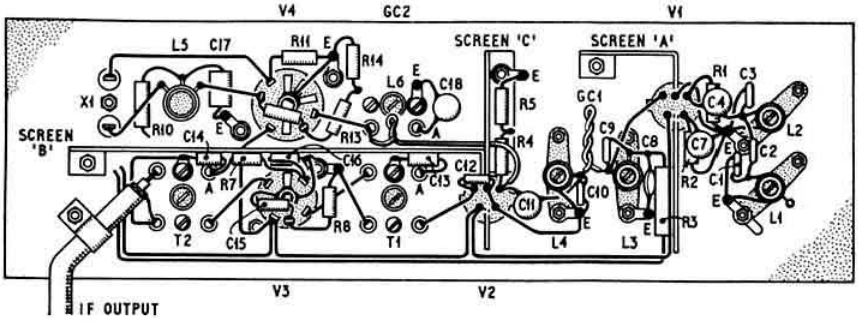


Fig. 4. Layout of the components on the chassis plate.

Preliminary Adjustments

After the wiring has been completed, and checked, and before power is applied, the cores of the various coils should

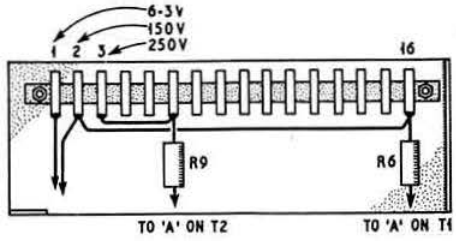


Fig. 6. Screen B with the tag strip wiring and power input connection, as seen from the i.f. amplifier side.

be set as follows: L1 $\frac{1}{8}$ in. down, L2 $\frac{3}{8}$ in. down, L3, L4 and LN $\frac{1}{16}$ in. down. For these adjustments the chassis is viewed from its underside. The word " down " indicates the distance between the edge of the coil former concerned and the *top* of the core (i.e., the core going down towards the chassis plate).

Unless there are any serious discrepancies in the winding of the coils, or their position with regard to adjacent objects, they should now be fairly near their optimum settings.

Final Adjustments

Power may now be applied to the converter. It should be noted that two h.t. lines are called for, one of 150V and the other of 250V. The maximum h.t. which may be applied to the Nuvistors is quite low, and, in the writer's case, the 150V feed was taken from a convenient stabilized line. However, a common power supply of 250V may be used, and in this case the 150V line shown on the circuit diagram should be connected to the 250V supply line through a 15 K ohms 1 watt resistor. The total consumption at 250V is about 30 mA.

With the crystal out of its socket, no reading should be obtained when a test meter—set to 1 mA—is connected between test point " B " and chassis. Insert the crystal and adjust the core of L5 until a current of about 0·2 mA is indicated between test point " B " and chassis. When the core is screwed one way the current at " B " will rise gently to a peak and then suddenly drop. The core should be positioned approximately one half turn from the peak position.

If a sensitive current meter is available, connect it between test point " A " and chassis. Adjust the core of L6 for maximum current which will be about 10 μA. If no such meter is available, set the core of L6 to its mid-travel position.

The converter is now ready to receive signals.

Connect the output of the converter to a receiver tuning between the range 11·169 Mc/s-10·969 Mc/s, this being the approximate i.f. output frequency. The actual frequency depends on the overtone generated in the Squier oscillator, but it will be near to the figures given.

Connect an aerial with an 80-ohm feed line to the converter. Tuning the receiver over the range given should produce a slight rushing noise. Find the peak of this noise and tune the cores of i.f.t.2 and i.f.t.1, in that order, for maximum. If L6 has not been adjusted with a meter as described, rotate its core to a position which gives maximum noise.

It is now probable that a pretty ghastly din will be issuing from the loudspeaker. This will be due to the r.f. stage self-oscillating, and it must now be neutralized. Slowly adjust the core of LN, ignoring all the " beats " and " gurgles," until a point is found where the core can be moved through two or three turns without producing any weird noises. Set the core to the middle of this range. The stage is now neutralized and, if the correct position has been found, tuning the main receiver through the i.f. will produce no peculiar noises whether the aerial is connected or not.

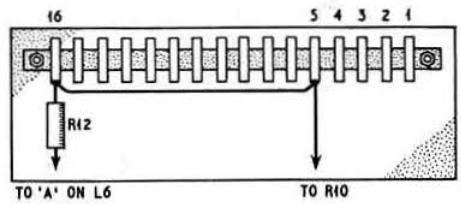


Fig. 7. Screen B viewed from the oscillator side. Tag 5 should be connected to tag 3 on the reverse side, through the hole drilled for this purpose.

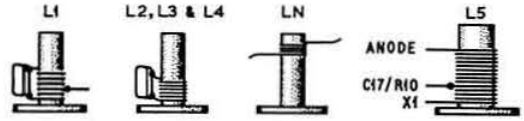


Fig. 8. Details of coils L1—6, and LN. All coils, except where indicated, are wound on $\frac{1}{4}$ in. diam. formers fitted with dust cores.
L1 — 6 turns, tapped at 1$\frac{1}{2}$ turns, 22 s.w.g., $\frac{5}{16}$ in. long.
L2,3,4 — 6 turns, 22 s.w.g., $\frac{1}{4}$ in. long.
L5 — 18 turns, tapped at 4 turns, 26 s.w.g. enam. close wound, on $\frac{3}{8}$ in. diam. former with dust core.
L6 — 4$\frac{1}{2}$ turns, 18 s.w.g. enam. close wound, with screening can.
LN — 32 s.w.g. enam. close wound, $\frac{1}{4}$ in. long.

Ideally, a *well screened* signal generator is required for correct alignment. However, actual signals from fixed stations can be used, and with care, acceptable results will be obtained. Very strong local signals should be avoided except perhaps for initial adjustments. Normally a signal of about S5 should be chosen, and if the main receiver is fitted with an S-meter this can be used visually to assess the progress of the alignment.

Tune in a centre band signal of the type suggested. Adjust the cores of i.f.t.2, i.f.t.1, L4, L3, L2 and L1 *in that order* for maximum output or S-meter reading.

Prior to any further alignment, the amount of oscillator injection to the mixer now has to be set to the optimum level. This adjustment has a large bearing on the ultimate performance of the converter, and the time spent will be very worthwhile.

Remove GC2 provisionally fitted, and replace it by one of the same size as GC1. Switch on and select a suitable station and note the reading. Remove the power; trim down the length of GC2 by about $\frac{1}{8}$ in.; restore power and note the new reading. Keep on repeating this operation until the optimum length of GC2 is determined. The object is to find the length for GC2—and, in fact, the correct coupling capacity—which will give maximum output with minimum noise for a fixed value of input signal. Two points require special note. First, the input signal to the converter during this adjustment should be the lowest usable value so that the injection is determined in direct relation to small signal levels. Second, the actual length of GC2 is not frustratingly critical as fair changes in length cause only small changes in capacity, and there is a small range of injection voltage over which performance remains optimum.

Warning. It is absolutely essential to remove the power

(Continued on page 231)

TECHNICAL TOPICS By PAT HAWKER, G3VA

" State-of-the-Art " · Transistor Transmitters · Transistor Oscillators
Transitron V.F.O. · Heavy-duty Batteries · Inverted Audio D.S.B. · Tailoring Audio
Voltage Regulated Supplies · Transistor Phase-splitter · Coil Tip · Mast-head Amplifiers
G-Line feeders

AMID all the clash and clamour at present going on in the American journals over the ARRL " incentive licensing " proposal (and for sheer invective we have seen nothing like it since the long defunct *R9 Magazine* used to lambast the ARRL back in the 1930s) there are a number of important points being made.

For example, W6SAI, editor of *Radio Handbook*, invaded the columns of *73* last November with some cutting remarks about the condition of Amateur Radio. While we would not go along with many of his arguments—believing that it is pointless to deny or decry the " hobby aspects " of Amateur Radio, we were certainly struck by his strong appeal for " an honest effort to raise our technical standards, technique and knowledge to meet state-of-the-art specifications." For there are a few signs that, perhaps for the first time since Amateur Radio began, we may be falling behind, rather than leading, the development of low-power h.f./v.h.f./u.h.f. communications.

It is a rather chastening thought, for instance, to realise that many TV viewers are now equipped for reception up to about 850 Mc/s—considerably higher in frequency than most of us.

Transistorization of equipment has tended to make greater progress in the commercial and military fields than in most of our stations. This is partly because of the relatively high price of some transistors, but also, if we are honest, because of unfamiliarity with the different circuit techniques.

Keeping abreast of the state-of-the-art does not mean that we should junk all existing equipment and take up the developing field of opto-electronic communications but rather that we should try to be fully aware of what is going on in the particular fields in which our interests fall.

Perhaps the most reassuring aspect of the present situation is how often one finds an amateur call-sign behind up-to-the-minute developments in the professional field. Examples which spring to mind include G5IJ's work on constant luminance for colour TV, G3CCA's experiments on low-cost parametric amplifiers, and G5IB's development of sensitive pocket v.h.f. equipment for the police (see *Electronics Weekly*, February 5).

As long as Amateur Radio keeps its appeal to those working both outside and inside the electronics field, there is little danger of any permanent diminution in its value to the advancement of the " state-of-the-art " of radio communication.

Transistor Transmitters

Certainly, at one time the amateur tended to be ahead of low power military and commercial equipment, and even recently the s.s.b. transceiver has blazed the way for others in the communications business. But now, in the swing to transistors, the professionals are setting the pace.

Last year we reported some personal experiences with the Hughes 15 watt s.s.b. packset (now to be built in the UK by Redifon). More recently, we had an opportunity of examining a new British-built h.f. packset for a.m./n.b.f.m. with an r.f. output exceeding 20 watts from the single 2N1901 transistor in the p.a.

This compact rig has full v.f.o. facilities between 2·5 and 10 Mc/s plus some 18 crystal-controlled channels and uses a mixer technique (basically similar in principle to that in *TT*, June, 1962 but with a phase-locked oscillator) to track the transmitter automatically with the receiver. The whole station, including aerial tuner and four rechargeable nickel cadmium batteries, weighs only 32 lb. and can easily be carried by one man. Since the equipment takes only 40 mA on receive, 1·2 amps on c.w./n.b.f.m. and 2·2 amps maximum on a.m., the operating life per charge runs to about eight hours or more.

The cost of a single 2N1901 is currently about £48 in the UK so that this type of approach cannot be undertaken lightly!

An alternative approach which avoids the cost of the high power h.f. transistor but which imposes heavier loads on the battery is used in a recent military two-man packset which was shown at the IEE H.F. Convention last year. This comprises a 2 watt transistor transceiver which can be used to drive a separate 20 watt linear r.f. amplifier using one of the quick-heating tetrodes (QZ06-20) to reduce heater drain on receive.

Equipments such as these show the great improvements which are possible in portable operation with transistors—though it would be misleading to suggest that there are now no problems with transistor transmitters.

One of these, for example, is the difficulty of fully modulating a transistor p.a. In the 20 watt rig the 2N1901 is modulated simultaneously in both collector and base circuits.

A detailed description of inexpensive modulation systems for low power 27 Mc/s Citizens Band units up to 5 watts appears in *Electronics World* (February, 1964) including linearized base-modulation, double modulation and controlled-carrier circuits without modulation transformers. Base modulation is akin to grid modulation of valves and normally introduces considerable envelope distortion, but by partial rectification of the audio signal in the base-emitter junction of the p.a., it is claimed good bias control is achieved.

A simple experimental two stage 7 Mc/s 2 watt c.w. crystal-controlled transmitter using two silicon *n-p-n* transistors (currently available in the US for about $2 a piece) is described by W2RHD in *73* (February, 1964).

For the time being, there is little real likelihood of completely transistorized transmitters for normal domestic operation from mains supplies. But this does not mean that hybrid equipment, using transistors in the exciter and speech circuits should not be encouraged. Commercial equipment is certainly swinging this way.

As an example, K5OZV describes (*CQ*, February, 1964) a

100 watt modulator using transistors which it is claimed can be built as cheaply as the corresponding valve equipment.

Transistor Oscillators

In *TT* (December, 1963, February, 1964) we mentioned some of the advantages and snags of transistor v.f.o.'s. A further useful letter on this subject comes from G3COJ.

He writes: " About two years ago, I needed a 1·5 Mc/s v.f.o. to heterodyne 450 kc/s s.s.b. on to 1·8 Mc/s and used an OC170 in a Colpitts circuit with about 500 pF tuning capacitance (400 pF fixed plus 100 pF tuning) but the note was poor and wobbly.

" Checking with the *US Navy Handbook of Semiconductor Circuits*, I realized that the tank circuit impedance was wrong. On increasing the tuning capacitance to 10,000 pF (see Fig. 1), the trouble was cured.

" This meant that variable inductance was more convenient. However, the same result could be obtained by tapping the transistor down the coil instead of reducing the LC ratio, or by tapping capacitively, as in the W3JHR circuit (*TT*, December, 1963).

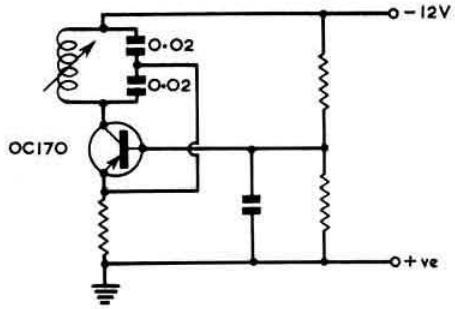


Fig. 1. Basic circuit of G3COJ's transistor oscillator illustrating need for low impedance or tapped tank circuit.

" Decoupling the supply line, as mentioned by H. Robertson in February, still leaves the frequency very sensitive to long term supply voltage variation and careful voltage stabilization will be needed.

" I believe the trouble is due to random variation of transistor output capacitance rather than variation of phase shift, as is sometimes stated. Use of a transistor with as high a cut-off frequency as possible, to minimize phase shift, is not necessary. Indeed, I found when designing the BBC transistorized radio microphone, which has an oscillator at about 20 Mc/s, that a transistor with a cut-off of several hundred megacycles could give poorer stability than, say, an OC170."

In the military packset already referred to, the v.f.o. uses two BSY26 *n-p-n* silicon transistors connected as a super-alpha pair (Darlington compound) to raise input impedance; even so the transistor base is tapped well down the tuned circuit. The supply is stabilized with a Zener diode.

There is little doubt that transistor v.f.o.'s—with few heat problems—have a big future provided that care is taken on circuit design.

Transitron V.F.O.

For those who stick to valves, the transitron oscillator has been making quite a comeback in the form of the high stability v.h.f. VXO circuit (BULLETIN, March, 1963 and *TT*, December, 1963). But very few designs using this type of oscillator for a v.f.o. or local oscillator have appeared.

One of the exceptions was a design by F8DG in *Radio-REF*

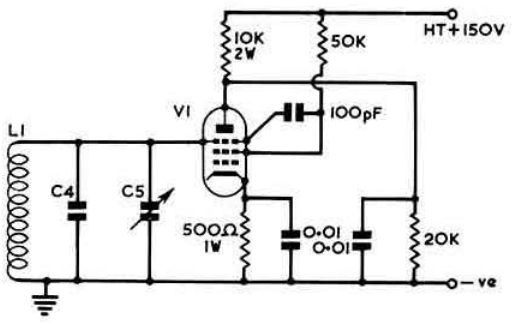


Fig. 2. Transitron oscillator by F8DG. V1, 6AC7/1851.

	1·75 Mc/s			3·5 Mc/s
L1	9 μH	or	4·5 μH	2·2 μH
C4	1000 pF	or	2000 pF	1000 pF
C5	50 pF	or	100 pF	50 pF

in July, 1951 and now reprinted in the data section of the February, 1964 issue of that journal: see Fig. 2.

It is claimed that the stability of this type of oscillator is less dependent upon the construction of the coil than, for example, the Clapp. As output is low it should be followed by a class A pentode buffer/isolator.

Modern Batteries

Last year (*TT*, June, August) we referred to some recent developments in batteries which are in increasing demand for transistor and other portable equipment.

Since then a further category of battery has been marketed which can prove an economical supply for fairly heavy-duty operation (calling for currents of the order of several hundred milliamperes) where the situation does not need the more expensive alkaline manganese or mercury cells.

This is the heavy duty Leclanche cell which shows very marked improvement over the conventional cell due to constructional improvements and to a change in the chemical formula. It has a paper separator which is much thinner than the electrolyte wall in the usual paste type, and a high grade manganese dioxide with improved depolarizing properties.

For example, whereas a standard U2 will supply a continuous 500 mA current for only about 18 minutes (with an end-point voltage of 1 volt) the heavy duty Ever Ready HP2 will provide this current for about 3¼ hours. On the other hand, for smaller loads the improvement would be much less marked.

An article in *Wireless and Electrical Trader* (January 11) gives an interesting comparative price table for the main types of cells of equivalent size to the U2 now available:

Standard U2, Leclanche	8d.
Leakproof LPU2, Leclanche	10d.
Heavy duty HP2, Leclanche	2s. 0d.
Mn1300, Alkaline manganese ..	6s. 6d.
Zm42, Mercury	14s. 6d.

Inverted Audio D.S.B.

The recognized " half-way house " between a.m. and s.s.b. is the double-sideband suppressed carrier system usually called d.s.b. (though some engineers use this abbreviation for normal double sideband a.m.). Although this mode occupies twice as much of the frequency spectrum as s.s.b. the elimination of the carrier (accounting for some 80 per cent of radiated power during typical speech transmission on a.m.) marks quite a big improvement in overall efficiency and in reduction of heterodyne interference. An attractive feature of d.s.b. is that the normal class C p.a.

stage of an a.m./c.w. transmitter can be converted quite easily to a balanced modulator.

One of the big snags with d.s.b. is that it calls for good skirt selectivity in the receiver in order to reject the unwanted sideband and so convert it into s.s.b. Unless a synchronous detector is used one sideband must be completely removed to make the signal intelligible.

Now in *CQ* (February, 1964) W4PGI has come up with a most ingenious idea for overcoming this problem; he also points out that the technique may prove to have some useful applications to s.s.b. transmission.

His idea is to invert the 200-3000 c/s audio signal by means of a 3200 c/s local oscillator and a balanced audio modulator (he uses a 7360 beam deflection tube), passing the output through a low pass filter to remove the higher frequency audio sidebands. The d.s.b. transmitter is then modulated with the inverted a.f. in which, for example, a 250 c/s original signal would become 2950 c/s; 1000 c/s as 2200 c/s, etc. In other words, the 200-3000 c/s becomes 3000-200 c/s, rather like it does in the simplest type of speech "scramblers."

At the receiving end, the inverted audio is automatically re-converted simply by tuning the injection oscillator (b.f.o.) to the upper side of the upper sideband, or the lower side of the lower sideband. Then phase cancellation between the two sets of sidebands cannot take place and W4PGI claims that d.s.b. can be received well on receivers of even moderate selectivity.

Talking About Audio

Simply inverting audio would seem quite tame to many modern telephone engineers who have developed a whole range of techniques for transmitting speech over cables. This was brought home to us very forcibly during the recent five-day IEE conference on "TACN" (transmission aspects of communications networks). Speech signals are compressed and expanded, translated to other frequencies, chopped up into pulses, or even entirely reconstructed as coded pulses (pulse code modulation).

Many of these systems have little or no application to Amateur Radio, but there were some ideas which made us wonder.

For instance, long-distance telephone networks often use "compandors" (compression at the sending end, expansion at the receiver). This has the great advantage that "background noise" disappears between each syllable—and some tape recordings showed clearly how much this improves intelligibility.

Full adaptation of this technique to radio channels is complicated by fading, and appears to need complex constant-volume compandors (now being used experimentally on at least one French h.f. circuit and soon to be tried by the GPO). But it would be interesting to know whether at least some of the benefits could not be obtained in receivers by means of a very fast acting electronic squelch or VOX to switch off output between each syllable.

There was also an interesting paper on the basic speech signal and the extent to which its bandwidth and dynamic range can be restricted without impairing intelligibility.

The standard European specification is 300-3400 c/s (slightly less on some of the ocean cables which have a complete channel every 3 kc/s), although it was mentioned that the Americans have found that reducing the lower limit below 300 c/s considerably improves "naturalness."

On peak clipping, it was stated that 6db of clipping is extremely difficult to detect; 12db has little effect on quality; and one has to go above 18db before harshness sets in. This is the same as saying that it is only the bottom 10 per cent of the signal amplitude that matters for intelligibility.

What, in fact, matters in speech is not the vowel sounds that contain a lot of power, but the consonants which although they contain little power are the key to intelligible speech. A demonstration showed clearly that if you try to clip out the centre portion of the speech waveform, even 1 per cent clipping can result in errors in consonants.

A survey of level clippers and limiters appears in *Electronics World*, February, 1964. A compressor suitable for s.s.b. or a.m. is given in Fig. 3.

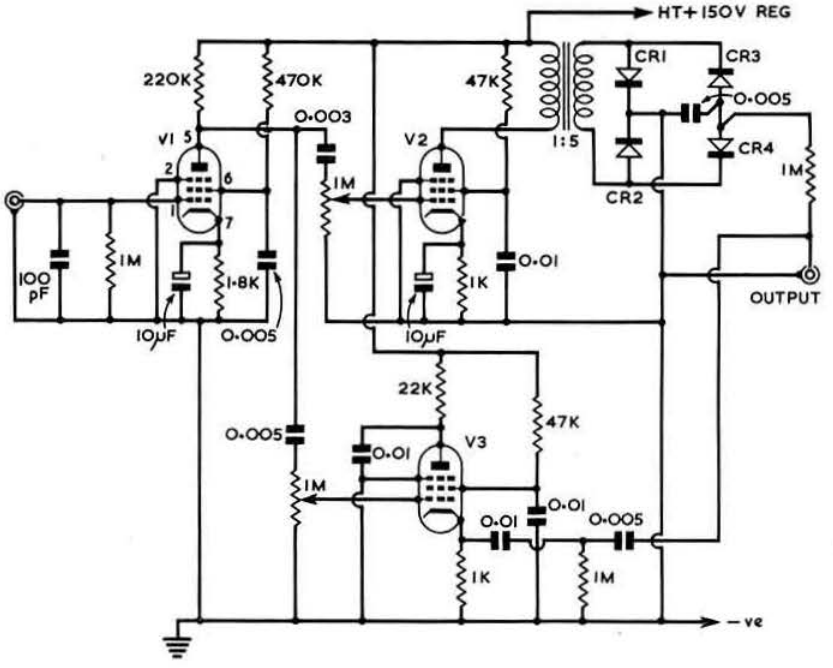


Fig. 3. A speech compressor circuit used by W9CZZ between his microphone and an SB-10 transmitter. V1,2,3, 6AU6 (EF94), CR1,2,3,4, 1N34A. (QST, February, 1964).

Voltage Regulated Supply

In *TT* (October, 1963) we gave the circuit of a small stabilized power supply for a wide range output at up to 15 mA. Since then we have noted a large number of basically similar circuits for this type of unit. One way of reducing cost, used in several designs, is to replace the voltage regulator tube (OC2) with a small neon (usually NE-2 in American circuits).

For rather huskier units, suitable for up to 40 mA or so, the ECL82 can be used in place

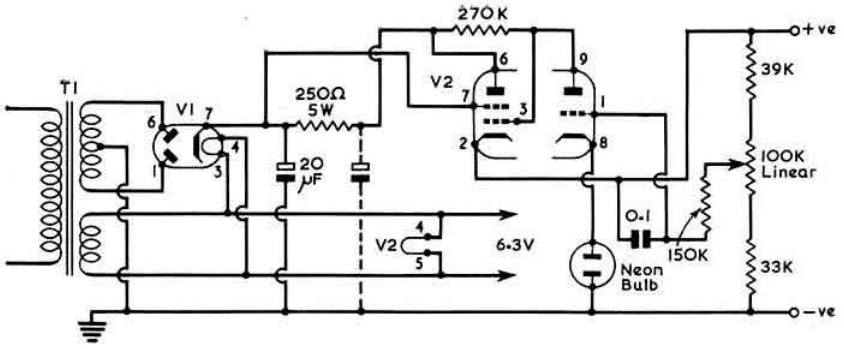


Fig. 4. Compact regulated power supply providing 110-250 volts at 0-40 mA; T1, 240-0-240 V 60 mA secondary; neon, NE-2 or similar type; V1, 6X4 (EZ90, U78); V2, ECL82.

of the 6U8. Fig. 4 shows a design from *Electronics World* (February, 1964).

Fig. 5 (also from *Electronics World*, February, 1964) shows how two 400 mW Zener diodes can be used to obtain a choice of four regulated voltages (approximately 3, 6, 9 and 15 volts) commonly used in transistor work. The diodes hold the voltage reasonably constant for loads up to about 20-25 mA. The whole unit can be made in a small box with output sockets, and ganged switch. Note that the 2·9 volt supply has a separate negative socket.

Transistor Phase Splitter

With complementary pairs of *p-n-p* and *n-p-n* audio transistors now readily available in the UK, a phase-splitter circuit that provides a gain of around 150, described in *Electronic Design* (February 3, 1964) could prove useful.

Fig. 6 shows the circuit which consists basically of a two-stage direct-coupled amplifier connected as a complementary pair with feedback, providing both phase-splitting and appreciable gain with a small number of components.

Coil Tip

Another idea which is at least new to us comes from *Electronic Design* (January 6, 1964). Mr. J. Leeb suggests that an air core inductance can be adjusted, and its *Q* improved by winding one or more layers of ordinary magnetic recording tape over the coil —the exact number of turns or layers being determined by trial and error and the end of the tape then secured by a dab of cement.

An alternative idea is to wind the magnetic tape into a core to fit inside the inductor.

We do not know how far the inductance of a coil can be shifted in this way, but it might be well worth trying, for example, if one wanted to alter the tuning range of a receiver without changing coils.

V.H.F./U.H.F. Roundup

A technique which has been used occasionally for over a decade but which seems to be taking on a new lease of life recently is the use of mast-head pre-amplifiers for TV reception. Labgear, for instance, now make a Band IV one for the new u.h.f. TV service. By putting a low noise amplifier right at the aerial the incoming signal can be amplified before the attenuation of the feeder has taken its irreversible toll of the signal-to-noise ratio. Such units are d.c. powered along the normal feeder line.

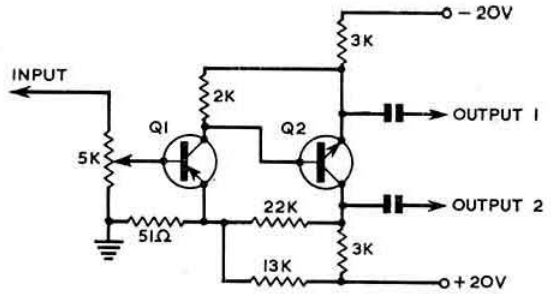


Fig. 6. Transistor phase splitter circuit providing appreciable gain and using complementary pair of *n-p-n* and *p-n-p* transistors.

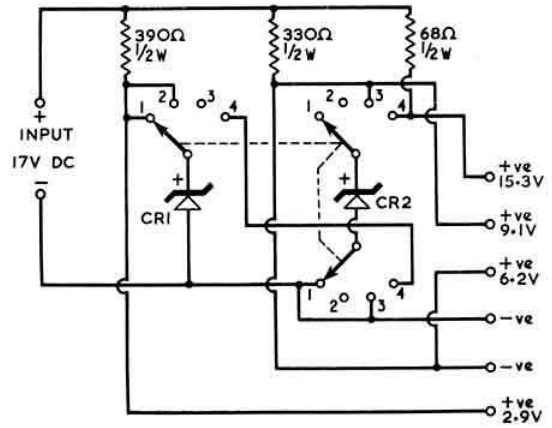


Fig. 5. Four stabilized supplies can be obtained by switching two Zener diodes. In the original circuit, the Zener diodes are 400 mW types: CR1, 1N753 (International Rectifier Co. 6·2 volts); CR2, 1N757 (IRC, 9·1 volts).

The snag for two-way amateur operation is the problem of feeding r.f. power to the aerial around the amplifier, but this could presumably be got round with some form of T/R switch.

This type of mast-head amplifier is greatly simplified by the development of low noise u.h.f. transistors, and some useful circuits for 70cm pre-amplifiers (though not specifically intended for mast-head work) and for an associated self-oscillating mixer to convert 70cm signals to 29 Mc/s appear in the latest *RCA Ham Tips* (Fall, 1963). Both units make use of the 2N2857 *n-p-n* silicon transistor and the pre-amp circuits include both neutralized and un-neutralized versions, with a noise figure at 450 Mc/s of about 4·5 db.

Quite a few years ago, we recall seeing G5CD give a spectacular demonstration at an RSGB meeting at the IEE of the " G-line " feeder with 70cm r.f. sent along a single-wire transmission line with the aid of launchers.

Not much seems to have been published on this system recently (the " G " comes from its inventor Dr. Goubau) until by coincidence articles appeared in the February issues of both *QST* and *Radio-Electronics*. In *QST*, W1HDQ reported on some tests he has been making of G-line systems;

(Continued on page 231)

A Lightweight Aerial and Collapsible Mast for 144 Mc/s Field Days

By S. F. BROWN, AMIEE, G4LU*

THERE must be many operators who are deterred from entering 144 Mc/s Field Day contests as individuals because they feel that their equipment will not match up to that which multiple-operator and club stations are able to provide. This applies not so much to transmitters and receivers as to aerials, for no solo operator would be physically capable of erecting some of the aerials which are used during contests. The individual is therefore left with the alternative of either trying to muster enthusiasm for Field Days amongst his near neighbours, or of entering with what he knows to be inferior gear.

So that the individual operator will be capable of entering a station equal to the best in the field, this article describes a high gain, lightweight aerial and an associated collapsible mast which can be easily erected by one person.

The equipment originally consisted of a 3-over-3 Yagi array mounted at 23 ft. centre height above ground and was used in this form during the first Field Day of 1962 when 100 stations were worked. In addition, the equipment was given a thorough testing during the successful tour of Wales undertaken with G3BA in August, 1962. The aerial has since been modified to a 5-over-5 Yagi array and comparison reports against the 6-over-6 slot-fed array normally used at the home station show the gain to be at least equal to that of the latter aerial. The weight of the modified aerial is 3 lb., and that of the mast 8 lb.

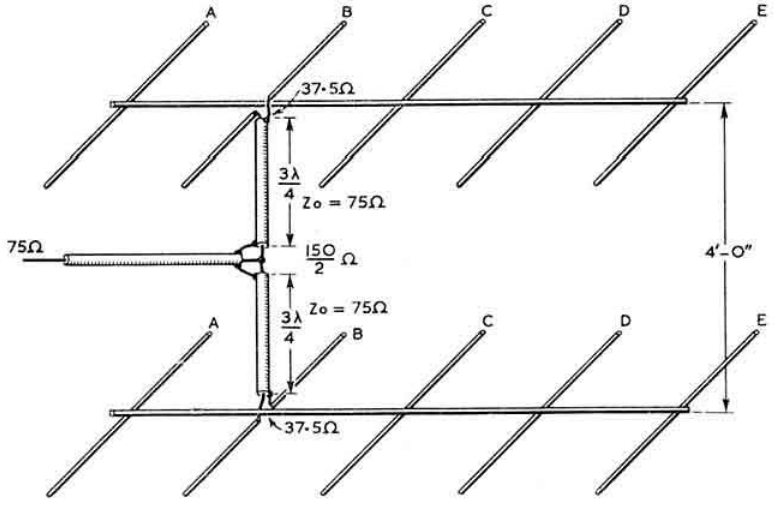


Fig. 1. Schematic diagram of 5-over-5 Yagi and matching arrangements.

A schematic diagram of the aerial and its matching arrangement is shown in Fig. 1. The lengths of the elements and their relative spacings are given in Table 1. The basic design comprises a driven element, a close-spaced reflector, and a wider-spaced director. The feed impedance of each Yagi is nominally 37·5 ohms, so that at the end of a quarter wavelength of 75 ohm cable the impedance will appear as 150 ohms. The two matching sections, when connected in parallel, will thus present an impedance of 75 ohms to the main feeder. However, the physical lengths of two quarter wavelengths of solid dielectric cable will be less than the distance separating the two aerials, but by taking advantage of the repetitive nature of standing waves on mismatched cables, two three-quarter wavelengths of cable were used instead.

The rather low driving impedance of the split dipole Yagi design presents a problem to the amateur which is never easy to solve because of the difficulty of insulating the halves of the element from the boom. The problem is particularly acute when a lightweight aerial is required with minimum wind resistance. The first solution thought of was to try to obtain commercial or surplus dipole elements with a moulded-on insulator but nothing suitable was located. The answer to this problem was to mould the insulator oneself. Difficult as this appeared to be, in practice it turned out to be delightfully simple to achieve quite a professional looking job, using the methods detailed in later paragraphs. It was also found possible to mould a Belling-Lee polythene insulated co-axial socket on to the dipole insulator which greatly simplified the assembly of the aerial on site.

The booms for the 3-over-3 aerial were made from ½ in. × ⅛ in. 20 s.w.g. square aluminium tubes which started their life in an aircraft fuselage. Discarded airframes do not figure frequently in the average amateur's junk box, and so far the writer has not found another source of supply. There seems to be no reason, electrically, why ½ in. diameter

TABLE I

Lengths of Aerial Elements

	3 element Yagi	5 element Yagi	Spacing
Reflector	40⅛ in.	40⅛ in.	15 in.
Dipole	19¼ + 19¼ in.	19¼ + 19¼ in.	20 in.
First Director	36½ in.	36½ in.	20 in.
Second Director	—	36 in.	20 in.
Third Director	—	36 in.	

* Sunbrae, Pant, Oswestry, Shropshire.

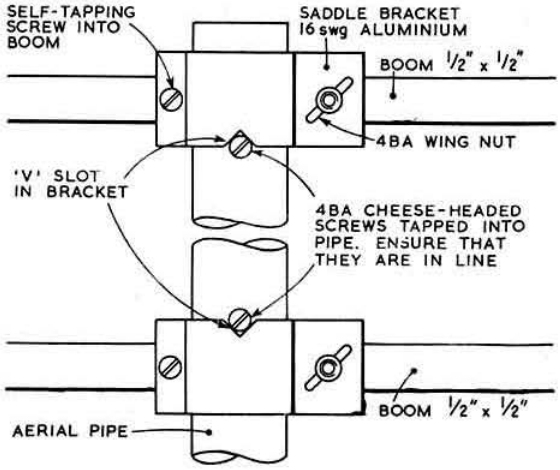


Fig. 2. Method of securing the booms.

tube should not function equally well although some difficulty might be experienced in making convenient mounts for the aerial elements. As an alternative, the method described later for fabricating the extension booms for the 5-over-5 conversion could be used if square tube cannot be obtained. The booms are fastened 4 ft. apart on a length of $\frac{7}{8}$ in. outside diameter, 17 s.w.g. wall, aluminium tube which clips into the top of the mast by a similar type of fitting as described in the mast section. " U " shape saddle clips fix

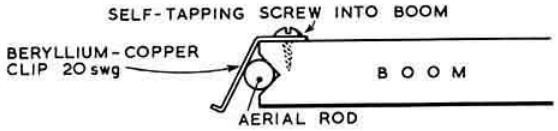


Fig. 3. Method of securing directors and reflectors to ends of booms.

the booms to the mast and to facilitate assembly, wing-nut fastenings are employed. In order to ensure that the booms are always assembled in the same vertical plane, " V " slots are cut in the sides of the " U " clamps. These slots are located by cheese-headed screws tapped into the walls of the pipe (Fig. 2).

The aerial elements are made from $\frac{1}{8}$ in. diameter aluminium welding rod which has an adequate strength-to-windage ratio, although aluminium alloy rods might perhaps be stiffer and not so subject to accidental bending during transport and assembly. The director and reflector rods are

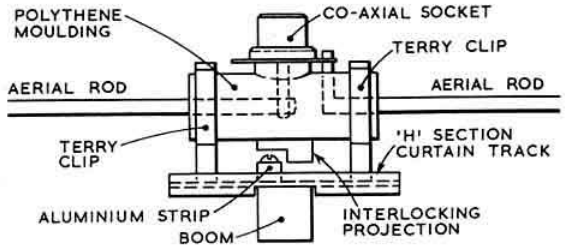


Fig. 4. Driven element centre details.

clipped into place in " V " slots cut in the ends of the booms where they are held by clips made from heat-treated beryllium copper strip or other similar material. This detail is shown in Fig. 3.

The driven elements are held by their insulators in two Terry tool clips which are mounted on a short piece of " H " section aluminium curtain rail fastened at right angles to the boom. A small piece of aluminium strip is fastened across the web of the curtain rail so as to fit in a cut-away portion of a projection on the underside of the insulator. The strips are fastened in the same relative positions on the two booms and the cut-outs in the dipole insulator projections are made in the same positions relative to the connections of the dipole units' co-axial sockets. This ensures that the dipoles are always clipped into position the right way round and that the two aerials are energized in phase. Fig. 4 shows the arrangement.

One note is perhaps pertinent on welding rods. These are usually obtainable only in 3 ft. lengths which is too short for some of the elements. Unless other suitable material can be obtained, some of the rods will require lengthening by welding on extension pieces. A good garage or a contact in the local technical college is a means of getting this job done.

The phasing lines from each aerial unit are made from ordinary solid dielectric co-axial cable, of 75 ohms impedance, and are connected in parallel by means of the " T "

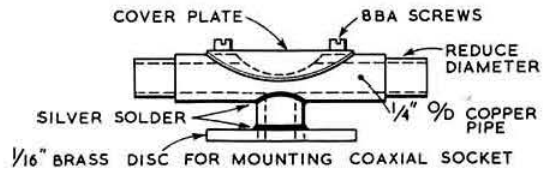


Fig. 5. Phasing line connector.

adaptor shown in Fig. 5. This is fabricated from $\frac{1}{4}$ in. outside diameter copper pipe, and the ends of the " T " are reduced in diameter to facilitate the soldering of the sheaths of the phasing lines. It is a good plan to insert a small cardboard tube between the sheath and the insulant to avoid a short circuit between inner and outer conductors of the cable. It should not be necessary to add that an iron of adequate size and quick application of heat is required for a satisfactory job.

A circular plate of $\frac{1}{16}$ in. brass is fastened to the stem of the " T " on which is mounted a co-axial socket for connection to the feeder. A curved cover plate, held in place by two short 8BA screws allows entry for connection of the inner conductors of the cables to the inner terminal of the socket.

Moulding the Dipole Insulators

Polythene is the material used for the dipole insulators and the secret of doing a successful job is to hold all the metal parts firmly until the polythene cools and sets. The salient dimensions of the mould (Fig. 6) used by the writer are given but they are not critical. Moulds made by others will probably depend on what the junk box provides.

The body of the mould is made from two pieces of $\frac{1}{2} \times \frac{3}{4}$ in. brass bar $1\frac{3}{4}$ in. long. One of these pieces is fitted with small dowel pins of piano wire in the four corners of its broad face to correspond with holes drilled in the same face of the other piece. The two pieces are then clamped together and a $\frac{1}{2}$ in. diameter hole is drilled lengthwise along the join of the composite block. Another $\frac{1}{2}$ in. diameter hole is then drilled at right angles to the first hole, also passing through the join of the composite block. If a good drill is used, the inside faces of the mould will be completely free from burrs

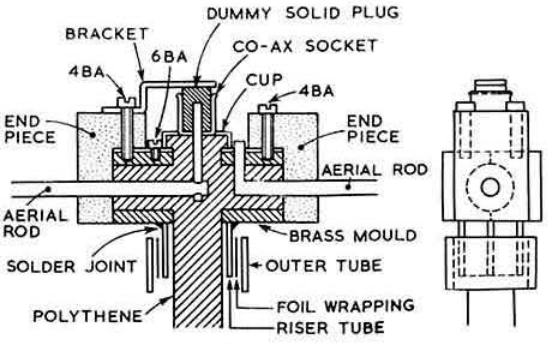


Fig. 6. Mould for making the dipole centre insulators.

and scratches but, if not, any blemishes must be polished out with fine emery paper. A riser tube comprising a short length of ½ in. bore tube, split lengthwise, is then soldered to one side of the mould so that the split of the tube corresponds with the separation between the two halves of the mould (Fig. 6).

On the opposite side of the block two holes are drilled to correspond with the mountings of the Belling-Lee co-axial socket. One of these holes is made a clearance size to take the bent end of the aerial rod which is soldered to the earthy side of the socket. The other hole is tapped 6BA along the seam between the two halves of the mould. This screw holds down the outer frame of the co-axial socket and also a small inverted cup which is used to constrain the polythene on the outside of the socket. A small lug is soldered to the edge of this cup for fixing purposes. The junk box provided a suitably shaped cup, but in any case this should not be difficult to fabricate from thin material.

Two end pieces are made from 1 in. lengths of ⅜ in. brass angle, and these serve to close the ends of the mould. A hole is drilled in each end piece along the centre line of the mould to hold the aerial rods in position. Each angle piece is held in position by two 4BA bolts which pass through clearance holes in its top face and screw into each half of the mould. These bolts hold the two halves of the mould together. One of these bolts also holds, by means of a bent strip, a brass plug which is inserted into the co-axial socket to hold its component parts in position during the moulding process.

When the mould is used, the first operation is to solder the aerial rods to the inner and outer connections of the co-axial socket. No difficulty was experienced in doing this, provided the rods were first tinned with Enthoven aluminium solder. This solder has been displayed and demonstrated at a number of RSGB Exhibitions and can be recommended. The rods should be made slightly longer than shown in the table to allow for subsequent adjustment. The mould is then smeared with silicone oil or grease to act as a release agent. After fitting a piece of polythene roughly shaped to the final dimensions around the rods, they are inserted into the mould. The end pieces are then secured to the mould and the plug and cup are fastened down on the co-axial socket. The seams in the riser tube are sealed with a wrapping of thin foil held in place by a tube of suitable bore (Fig. 6).

The next step is to raise the temperature of the mould to the melting point of polythene (slightly above 100° C) which can be done in a blowlamp flame or on a hot-plate. The former method is preferred because the mould can be held in a vice during the operation. When the correct temperature is reached, a ½ in. diameter polythene rod is pushed smartly into the riser tube until molten polythene oozes from the cracks in the mould. The whole assembly is then cooled with a damp cloth, and the mould dismantled. Trimming of the scrim along the seams of the mould can be done with a sharp penknife or razor blade. Success will be indicated by the polythene around the aerial rods having merged with the polythene of the co-axial socket, and the resulting job will be quite rigid. The larger sizes of co-axial cable (e.g. PT29M) are a suitable source of polythene rod. Finally, the rod which was pushed into the riser tube is cut off about a quarter of an inch from the body of the insulator, and the remaining projection shaped to correspond with the strip fixed on the boom mounting.

Adjustment of the Driven Elements and Phasing Lines

The driven elements can be conveniently adjusted for length with the help of a grid-dip oscillator. The co-axial socket is first short circuited with the plug made for the mould, and then the rod is adjusted to resonate at 145 Mc/s by holding the oscillator near the centre of the rod. Adjustment is made by cutting off small pieces of the rod, ⅛ in. at a time, and keeping each half of the elements equal in length during the operation. It is always a wise precaution when using a grid-dip oscillator, to monitor its frequency on a receiver while carrying out adjustments. During this operation the aerial rod can be supported on a pair of wooden steps well away from any metalwork.

The phasing lines will need to be cut to length, and for this some knowledge of the velocity factor of the cable will be needed. For solid polythene cable the figure is 0·66, but this can be quickly checked using the grid-dip oscillator. A piece of the cable to be used, slightly longer than one-eighth wavelength physically, is fitted with a co-axial plug and connected to one of the adjusted aerial rods. Short pieces of the cable are then cut off, ¼ in. at a time (making sure after each cut that the cable is open-circuit at the cut end), until the rod is restored to resonance at 145 Mc/s. This cable will then be a quarter wavelength long electrically. Two lengths of cable slightly longer than three times this length are cut off and fitted with co-axial plugs. The cut-and-try operation is then repeated until the first resonance at 145 Mc/s is reached. These cables will then be accurately cut to three-quarters of a wavelength electrically. If no results are achieved before one is knee-deep in short lengths of cable, the sensitivity of the grid-dip meter should be checked.

Conversion to 5-over-5 Aerial

The 3-over-3 aerial described has performed quite satisfactorily, but it appeared to have a horizontal beam width which was perhaps a little too wide for contest purposes. The conversion to a 5-over-5 array has been carried out to improve this feature and has also resulted in increased gain. As no more ½ × ½ in. tubing was available, boom extensions were fabricated from " H " aluminium curtain rail so that a double-H girder section resulted. Joining of the two pieces was achieved by self-tapping screws through the webs of the two pieces and blobs of aluminium solder across the seams on the side faces. The webs are slotted at one end and are opened out to fasten on each side of the box section boom by means of a 4BA bolt and wing-nut. The additional directors are held in place by " V " slots on the top face of each boom extension by small spring clips fastened down to the top webs with self-tapping screws.

The additional time taken in assembling the aerial, and the extra weight are virtually negligible. The boom mountings have been moved forward on to the boom extensions so that the assembled aerial is mechanically balanced on the mast. No change in the s.w.r. of the beam, other than a slight improvement, has been noticed because this is determined primarily by the distance between the reflectors and driven elements.

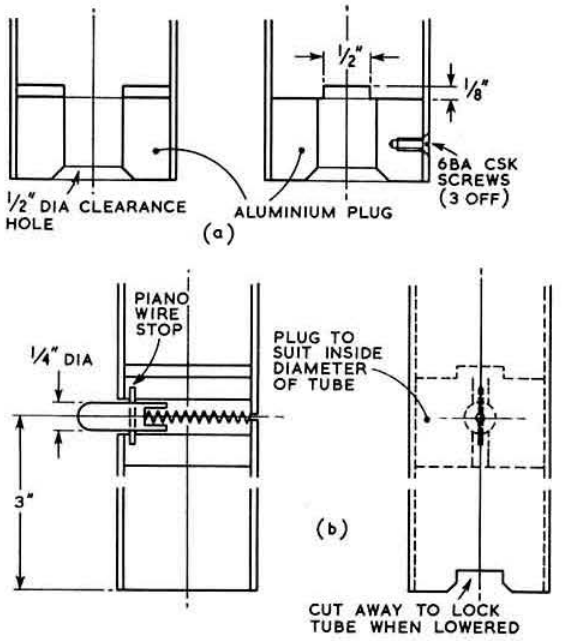


Fig. 7. Details of mast sections.

To speed up assembly of the aerial, the parasitic elements and booms may be colour coded at their mounting positions.

The Collapsible Mast

The strength of the collapsible mast is more than adequate to support both the 3-over-3 and 5-over-5 aerials already described. It has also been used at various times to support a commercial 5-element Yagi, and also a 7-element array. No distress was shown in either case. The extended height is 21 ft., and the collapsed length is 4 ft. 6 in. It is constructed from consecutive sizes of aluminium or aluminium alloy tubes of 17 s.w.g. wall thickness (i.e. almost $\frac{1}{16}$ in. thick), the largest tube being $1\frac{3}{4}$ in. outside diameter, and the smallest section 1 in. outside diameter. The lengths are given in Table 2.

Construction of Mast

The largest tube is fitted with a plug of suitable diameter at its base and is held in position by means of three 6BA countersunk screws disposed equally around the circumference of the tube. The plug is drilled to allow the mast to sit on a $\frac{1}{2}$ in. diameter metal spike driven into the ground. The spike is fitted with a 4 in. diameter metal plate to prevent the mast and spike sinking into soft earth, and to form the bottom bearing of the mast. The remaining tubes are fitted with aluminium plugs 3 in. from their lower ends and are each secured with three 6BA countersunk screws. These plugs each contain a spring loaded, $\frac{1}{4}$ in. diameter, mild steel plunger to act as the fastening to the next larger tube. The plunger protrudes through a hole in the wall of the tube and fits in a locating hole drilled 3 in. from the top of the adjacent tube. Thus a 6 in. overlap is obtained at each joint. The screws fastening the plugs are filed flush with the surface of the tube to present a smooth surface. The plunger is prevented from being pushed out of the tube by means of a small stop made of piano wire, brazed across its diameter, which rides in a saw cut in the plug. In the smaller sizes of tube the rear end of the plunger is drilled to accommodate a sufficient length of spring. The springs can be cigarette lighter springs or similar types.

A small hole is drilled through the wall of the tube behind the plunger to serve as a lubricating hole and to allow a nail or similar probe to push out the plunger in the event of it sticking. This is a safety feature which has not yet been needed in practice. All the plugs are machined or sawn across their top faces so that a ridge of metal about $\frac{1}{2}$ in. wide and $\frac{1}{8}$ in. deep remains, and which locks into place in slots in the wall of the associated tube. This allows the mast to be shortened in very high winds, although this feature was used only on one occasion during the Welsh tour. Details of the plugs and plungers are shown in Figs. 7(a) and 7(b).

TABLE 2

Lengths of Mast Sections

Outside Diameter	Length
1 in.	2 ft. 9 in.
$1\frac{1}{8}$ in.	3 ft. 0 in.
$1\frac{1}{4}$ in.	3 ft. 3 in.
$1\frac{3}{8}$ in.	3 ft. 6 in.
$1\frac{1}{2}$ in.	3 ft. 9 in.
$1\frac{5}{8}$ in.	4 ft. 0 in.
$1\frac{3}{4}$ in.	4 ft. 0 in.

Bearings

Two rotatable bearings are provided on the mast, one at the top of the third tube and one at the top of the sixth tube. The bearing details are shown in Fig. 8. Each bearing rides on a $\frac{1}{4}$ in. wide collar of aluminium, fastened to the appropriate tube by means of six 6BA screws tapped into the wall of the tube. The screws are filed flush against the inside walls of the tube. The fixed portion of the bearing is made from $\frac{1}{16}$ in. mild steel sheet, and three lugs for attachment of the guy rope shackles are provided at 120° intervals around the circumference of the plate. The bearing surface

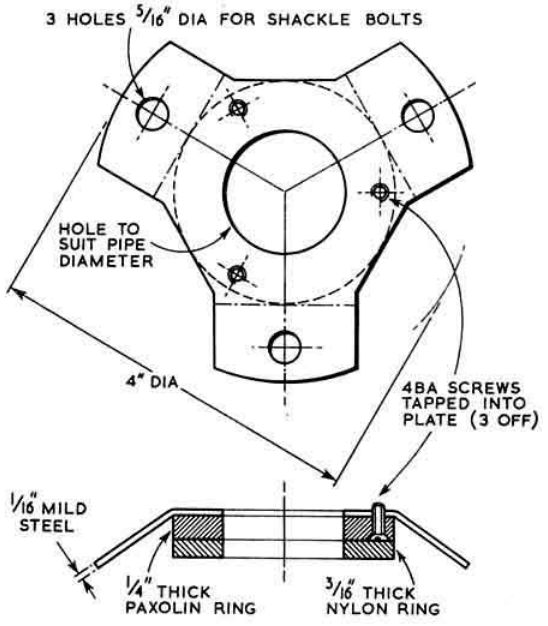


Fig. 8. Construction of mast bearings.

was originally provided by a paxolin ring fastened to the mild steel plate by three deeply countersunk 4BA screws, but a later modification was the provision of a $\frac{3}{16}$ in. thick nylon ring fixed on top of the paxolin one with an epoxy resin adhesive.

Guy Ropes

The guys are made from $\frac{1}{4}$ in. diameter nylon rope. Terylene might be a better material, but is less resilient and more costly. The top shackles are made off permanently and two of the longer guys are made off to length, for a flat site, although surplus is left to accommodate site variations. A touch with a hot soldering iron on the cut ends of the ropes, or burning them with a match flame, prevents fraying at these points.

Pickets

The mast pickets are made from three 2 ft. lengths of 2 × 2 × $\frac{1}{4}$ in. mild steel "T" section sharpened at one end and having two $\frac{3}{8}$ in. diameter holes drilled in the web to take the bottom shackles of the guys. Details are shown in Fig. 9(b).

Assembly and Erection

The first stage in assembly and erection of the mast and aerial is to position the central spike bottom bearing of the mast, preferably on an area of flat ground. Two 16 ft. surveying lines are run out from the spike and a third surveying line, 27 ft. 10 in. long, is set out to complete the triangle to determine the positions of two of the pickets. Swinging round one radial line and the base line (27 ft. 10 in.) determines the position of the third picket. The surveying lines are permanently made off to length on small wooden pegs which are painted for easy identification in long grass. The radial lines are terminated with metal rings at the other end so that they ride easily on the centre spike.

The mast is then extended and the aerial built up. This latter operation is greatly facilitated if the mast is placed on a tripod made for the purpose from sawn down broom handles. A suitable arrangement is shown in Fig. 9(a). The guys are fixed to the bearing plates and the feeder connected to the aerial. The two permanently made off top guys are then fastened to their associated pickets, and the bottom of the mast is then walked out to the centre spike keeping these two guys taut while doing so. When the mast is vertical and positioned on the centre spike the third top guy is kept taut and walked out to its picket, where it is secured to the shackle. Finally, the three bottom guys are shackled to the pickets. If the lengths of the two top guys have been calculated correctly the mast should be vertical, but if not, the position of the spike can be adjusted before the bottom guys are secured to the pickets.

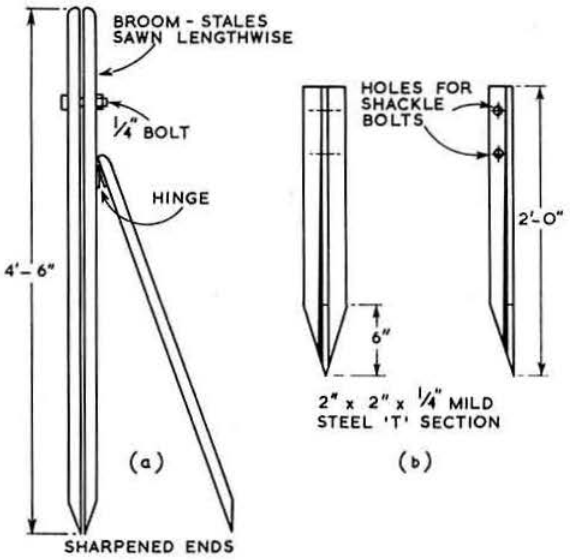


Fig. 9. (a) Folding tripod to keep aerial elements off the ground during assembly. (b) Details of guy rope pickets.

The total time for erection on site, after unloading the equipment from the vehicle, never takes more than 15 minutes, and this is a conservative estimate. Dismantling is even quicker: just press in the plungers as each section of the mast comes down under its own weight, dismantle the aerial, disconnect the guys, and pack up.

If the contestant using this equipment does not come near the top of the list, at least it is likely that he will be one of the first to be on his way home after the contest, or at the local to drown his sorrows.

Low Noise Converter for 70 Mc/s

(Continued from page 222)

when clipping back GC2 as otherwise the short circuit which occurs at the moment of cutting will apply full h.t. to the grid of V2 and burn out the valve.

After setting the oscillator injection, check the settings of L4, L3, L2 and L1 on a centre band signal. On a small signal of approximately 70·25 Mc/s adjust the *top* cores of i.f.t.1 and i.f.t.2, and on a signal of about 70·35 Mc/s adjust the *bottom* cores of i.f.t.1 and i.f.t.2. Tune for maximum output in each case.

Any further adjustments would require the use of a noise generator.

Results

Quoting results can often be misleading unless exact environmental conditions are known. However, prior to using this converter in the special 70 Mc/s receiver, it was used in conjunction with a CR100 receiver and a simple dipole at about 40 ft. Although virtually at sea level—depending on the state of the tide—and heavily screened to the North and London by the South Downs, stations in Surrey, London and the Midlands were all received with signal strengths ranging from just above the noise to well over S9.

Technical Topics

(Continued from page 226)

with no bends he achieved a 2·7db/100 ft. loss at 432 Mc/s, though the attenuation increased considerably with curved systems. Although this attenuation is a good deal more than in the original claims, it would be attractive for applications requiring a long feeder. An example of this was given in the *Radio-Electronics* article which showed how an American TV viewer is using the technique to bring incoming signals some 3400 ft. down from his aerial on top of a hill. The home-built launchers were made from aluminium tubing and two 12 in. square plates of aluminium. It is claimed the system has been working satisfactorily for six years, with low losses.

VE3BWY to Visit London

On May 6, 7 and 8, H. A. M. Whyte, VE3BWY (ex-G6WY) together with his wife, will be in London on a working holiday. As he wishes to meet some of his old friends, a luncheon has been arranged at the Kingsley Hotel on Friday, May 8, at 12.15 p.m. Those who wish to attend are invited to write to G. A. Leicester, G3IKC, 153 Park Road, Chiswick, London, W.4.

THE MONTH ON THE AIR

A CHRONICLE OF EVENTS ON THE HF AMATEUR BANDS

BY R. F. STEVENS, G2BVN*

WHAT has undoubtedly been the greatest dxpedition of all time ended early last month when Gus Browning, W4BPD, arrived in Birmingham, Alabama, after almost two years of continuous travelling. Gus left New York on March 28, 1962, headed for Monaco from where he operated as 3A2BW; 55 calls and 23 months later he brought down the curtain with a grand slam finish as XW8AW/BY. Just how W4BPD managed to obtain permission to operate from so many places, previously considered inaccessible and impossible, we shall no doubt learn in due time, but wherever he has visited Gus has been a tremendously powerful ambassador for all that is good in Amateur Radio. As the world grows smaller in this era of modern communications it seems unlikely that any future dxpedition will be able to compare with that of W4BPD. Thank you for all your efforts, Gus, and we look forward to seeing you in London later in the year.

QSL Cards

One often hears on the bands the lament that certain DX stations have failed to QSL. Whilst no doubt there have been deficiences in the methods of some of our overseas friends, might not the senders of the outgoing cards be also to blame? Having recently assisted with the QSL chores of an active DX station the writer wonders just how so many operators manage to ring the permutations on the facts necessary to find a QSO in the log. A card arrived recently from a UK station for a QSO that was actually heard to take place, but the date, year and time were all incorrect on the incoming QSL! This sad state of affairs is confirmed by BRS24733 who now handles the QSLs for 9L1TL, and comments on the inaccuracy of the times and dates on incoming cards. In the words of a current parody, all we need in order to issue the QSLs are the *facts*.

News from Overseas

Following sterling work by 5N2JKO the **Nigerian Amateur Radio Society** is now in being and to all concerned heartiest congratulations are offered. Elections for the various posts are to be held in the near future and the Society has a permanent address at PO Box 2873, Lagos. Applications for membership are not confined to those amateurs resident in Nigeria and the Secretary would be pleased to hear from any UK amateurs desirous of joining. A newsletter is to be issued at fortnightly intervals and the first number has already been received.

9M2SR is the club station of the **17 Gurkha Signal Regiment** in Seremban, Malaya. The club is using a much modified ET4336, which spent the last ten years in a garden shed in Kuala Lumpur, and the v.f.o. was provided by G2HQ. The whole transmitter was rebuilt by club members and now puts out a reasonable signal on all bands. A cubical quad, some 50 ft. in the air, is used on 14 and 21 Mc/s. The Regiment also has a club station in Nepal operating under the call of **9N1BG,** which operates mainly on 14 Mc/s c.w. and a.m. A third station in Kuching, Sarawak, is operating under the call **VS4CS.** Lt. Col. Clinch of the Gurkha Signals is now operating from Seremban under the call **9M2ER**, having formerly held the calls VS2ER and DL2ER. The correct addresses of the three club stations will be found in *QTH Corner*.

From LA5HE, Traffic Manager of the Norwegian Radio Relay League comes information on a **Norwegian Arctic Expedition,** which under the sponsorship of Bjorn Staib, the National Geographic Society and several newspapers, will cross the Arctic Sea and the North Pole on skis. The expedition commenced on March 7 and in order to maintain contact with the world, operation will take place on amateur bands using the call **LI2C.** The following frequencies will be used: 7015, 7045, 14,000, 14,115, 14,120 and 14,340 kc/s. The equipment consists of a five watt s.s.b. transceiver, a 10 watt c.w. transmitter and an auxiliary transistorized receiver. Stations are asked not to cause interference when the frequencies are being used for contact with the expedition;

Peter Avidon, ZS6BBB, at the operating position of ZS8Z during his recent dxpedition with ZS6YQ.

* Please send all items to RSGB Headquarters to arrive not later than **April 10** for the **May** issue and **May 8** for the **June** issue.

in certain propagation conditions assistance may be required to put the expedition station in touch with the Norwegian operators.

If there is any operator who worked the late Floyd McCoy, **VR6AC**, and has not received a personal QSL card, as opposed to a card from a QSL manager, he may obtain one by sending full details to **G2APN** who will make the necessary arrangements with Vi McCoy. It is emphasised that those who apply for one of these cards should be prepared to exercise a certain amount of patience.

G3IJU, formerly located at RAF Netheravon, is now at El Adem for a two year tour, and will be active as soon as the equipment arrives by surface transport. It was hoped that the Viceroy and 680X receiver would be in operation by late March.

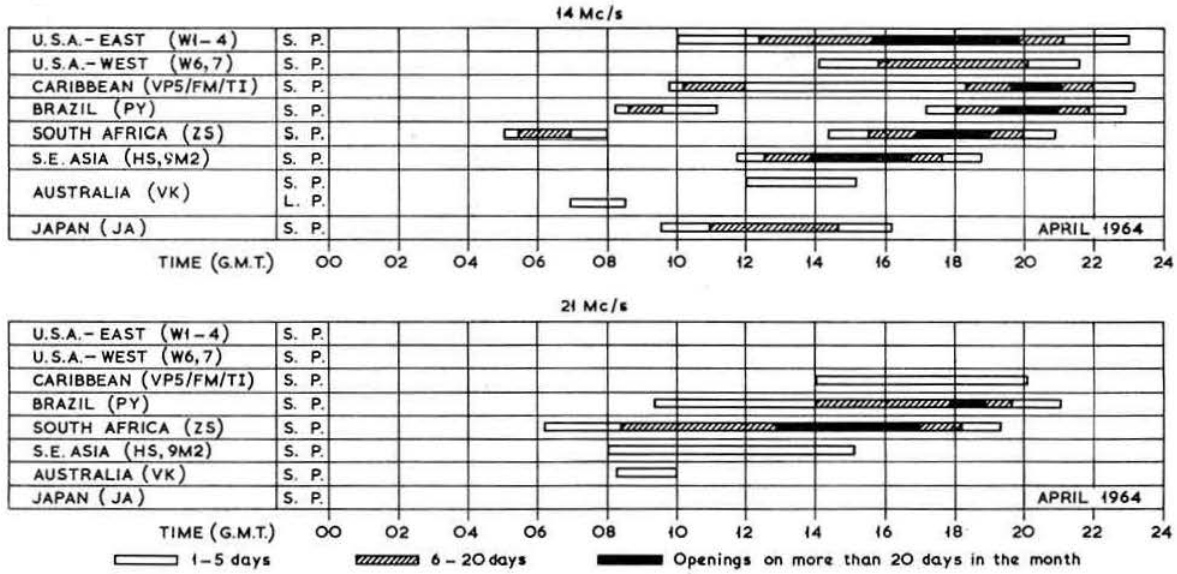
SV0WL, who has been active from Salonika since autumn 1957 is now suffering from the operations of a pirate using his call. The unlicensed operator uses the name of " Jimmy " and appears to concentrate on c.w. and a.m. on 14 Mc/s, whereas the rightful owner of the call, uses s.s.b. only on this band. SV0WL now has a stack of cards over two inches high for the illicit operator, and, as he points out, there are going to be a number of disappointed amateurs who will not get reply cards. What pleasure these owners of twisted mentalities get from piratical operation cannot be understood, but their activities cause considerable embarrassment to the rightful owner of the pirated call.

GM3OXA is now en route for **VQ8** and hopes to be operational from that dxotic spot around the end of July on c.w., a.m. and s.s.b., with the accent on c.w. GM3OXA will be particularly on the look out for UK stations.

The **Seventh Jamboree-on-the-Air** will take place between 00.01 on Saturday October 17 and 23.59 on Sunday October 18. As most operators will now be aware this is not a contest but a means of exchanging reports with Scout stations throughout the world. Special activity stations will be in operation from London, Ottawa, USA and Mexico, and in many other countries.

W9WNV, probably better known as HL9KH, is now active on the l.f. bands from **W6VSS** and looking for European contacts on 3·5 and 7 Mc/s. The 7 Mc/s beam is a full size five element array having a boom of 100 ft. and being

PROPAGATION PREDICTIONS



In comparison with the autumn period of last year solar activity has decreased considerably recently (the monthly mean values of R lie between 10 and 15), causing a further deterioration in DX conditions on the h.f. bands (28 and 21 Mc/s). 28 Mc/s will therefore, be of no practical use for DX, though during May, together with 21 Mc/s, it may produce contacts over distances of about 450 to 1100 miles, during sporadic E short skip conditions. On 21 Mc/s North America and Japan will probably not be heard, and the periods for good contacts with Africa and South America will be relatively short. On days with strong geomagnetic disturbances there will be occasions on 21 Mc/s, as well as on 28 Mc/s, for European contacts via reflection from the n orthern auroral zone. The lengthening days in April will give more time in the evenings for operation on 14 Mc/s, and during this month and especially in the summer months, contacts on this band with Australia during the afternoon will not be as easy as during the winter, and there will be no marked improvement here until about September/October. Generally during the months of June and July the best time for contacts on 14 Mc/s with Australia is during the early hours of the morning and during the summer the best time for contacts with Japan will move more and more from the morning to the afternoon. In midsummer there will be an additional period for contacts with Japan in the early hours of the morning. On days with above average F2 m.u.f.'s, contacts will be possible with KH6 between 05.30-07.00 GMT by the long path and between 16.30-21.00 GMT by the short path. In general during April, there will be few opportunities on 14 Mc/s for contacts by the long path, but in the midsummer months, however, these will increase noticeably. The shortening nights and the associated increase in the night-time F2 m.u.f. will cause a marked improvement on 7 Mc/s in the latter half of the night, for contacts with North America, but the band will close occasionally in the first half of the night. Similarly, traffic with South America and South Africa will show an improvement over the winter months. At the moment the daytime F2 m.u.f.'s lie mostly well below 7 Mc/s, so that local traffic beyond the ground wave will be frequently interrupted during the day by the dead zone. During May, and for the duration of the summer, sporadic E short skip conditions may bring about a certain improvement.

On 3.5 Mc/s, DX conditions are basically possible when the whole transmission path lies in darkness and this condition is more important here than on 7 Mc/s. The shorter nights and the increase in the atmospheric noise level mean that this band will open far less frequently for DX than in the winter.

The provisional sunspot number for February, 1964 was 16·3 with the period of greatest activity between the 20th and 29th of that month. The predicted figures for June, July and August are 13, 12 and 11 respectively. The Zurich Solar Observatory have published the definitive sunspot number for 1963, and the yearly mean was 27·9, with the month of May providing the greatest amount of sunspot activity with a number of 43.

A Single Sideband Convention was held in Moscow in October, 1963. Sitting, left to right: UR2AR, UA3CG, UA4IF, UB5WF, UA2AW. Standing, first row: UW3DE, UI8AE, UA2AO, UB5UN, UW9AF, UR2AO, UA1FA, UW3UF, SWL, UA3DR. Standing, back row: SWL, UR2KAE, UA3FE, UA4DF, UA3CR, UP2CG, UT5AA, UA0BP, SWL.

125 ft. in the air! Don Miller obtained a permit to operate from Cambodia but this allowed him to contact only about 50 countries and a fraction of the world's amateur population, and he decided not to operate under these restrictive conditions. W9WNV has plans to visit XF4 and YJ in the months ahead.

Ron Skelton, **VS4RS,** is now i/c communications in Sarawak, and has moved to Kuching. He should be back on the air shortly, but his planned trip to ZC5 will probably not now take place. His new QTH is: A.C.T., Telecommunications H.Q., Kuching, Sarawak. **VS4XK** expects to be on the air from Kuching in the near future using s.s.b. (W6YY.)

Dxpeditions

The trip by **VK2AGH** to **Lord Howe Island** will take place as previously planned, commencing April 15. Propagation forecasts are not particularly encouraging, but VK2AGH believes the long path on 14 Mc/s between 08.00 and 10.00, and the short path between 09.00 and 14.00, may be productive, whilst 7 Mc/s may be open between 07.00 and 08.00. A transceiver with separate v.f.o.'s will be used to assist in dodging the QRM.

YA4A is the call of K4UTE who will be in Afghanistan for about ten months on Peace Corps work. S.s.b. gear is being shipped by surface transport, and in the meantime YA4A will be operating on c.w. and a.m. All QSLs should go to **K4KMX** and it is important that no attempt should be made to send direct requests for cards. (WGDXC).

QSLs for the **South Sandwich** operation of **VP8HF** should go to the Hammarlund PO Box 7388 address. W2GHK made s.s.b. and c.w. equipment available to VP8HF, which was picked up at Montevideo, and without which operation would have been restricted to 7 Mc/s. Hammarlund report that mailing of QSLs for **ZD6PBD, HZ2AMS, MP4MAP/HZ, MP4TAX** and **MP4MAP** are all in hand and current, whilst it is anticipated that cards for the Aəland Is. operation should be posted at the end of March.

After delays due to poor weather and the non-arrival of equipment, **VQ9HB** and second operator/photographer Ken Hill were all set for the first leg of their Indian Ocean journey to Chagos.

The second HB9TL s.s.b. rig was sent from FR7ZD to **FB8ZZ,** and it is hoped that it will go from there to FB8XX. The crystal frequencies of the transmitter are 14,108, '113 and '120 kc/s.

At a recent meeting of the North and South California DX Clubs, the following countries were voted as heading the " wanted " list: 9K3, ZA; JY; AC3; TA; YI; VK0 Heard Is.; YK; VQ8R; VP8 S. Sandwich; FR7 Glorieuses; EA9 Rio de Oro; 3W8; VQ8 St. Brandon; FM7 and TZ.

Reporting on his recent trip to ZS8/9, **ZS6BBB** found poor band conditions which were rather disappointing. The majority of the operating was confined to 19.00 to 24.00 local time, 14 Mc/s being virtually closed during the remainder of the time. The QSO total from **ZS8** was 750 from 60 odd countries, whilst **ZS9** accounted for 925 QSOs from 64 countries. Fortunately the facilities available at the dxpedition QTH were far superior to those experienced during the last trip and off watch hours were pleasantly occupied.

The equipment loaned by the **LIDXA** to the **RAFARS,** and now in the care of **G3HCL,** is at present en route to Malaysia, where operator and gear should rendezvous at the beginning of April. G3HCL intends to provide a constant level of 9M2 activity and will in due course no doubt fall into regular operating hours and frequencies. It is intended that QSLs will be distributed through the Bureau system and all contacts will be confirmed. As the opportunity occurs dxpeditions will be undertaken to dxotic spots in the area, but it is too early to provide any indications of just where and when.

Seven members of the **Radio Society of Sierra Leone** visited the Banana Islands lying off the coast some 30 miles from Freetown during the weekend of March 14/15. QSLs for this " Field Day " trip should go via the RSGB Bureau or to N. Henwood, 9L1NH at the Technical Institute, Freetown, Sierra Leone.

IQSY News

In addition to the beacon stations already operating in the 28 and 144 Mc/s bands, information has come from 5B4WR of the CARS on the beacon station now transmitting on 29,008 kc/s. This station, operating under the call **5B4WR,** has been active since September, 1963, and is keyed to

produce long dashes for signal level measurement together with identification on c.w. The power input is 25 watts to a vertical aerial and the usual operating times are weekdays 15.00 to 19.30 and weekends 07.00 to 19.30. With the co-operation of stations in Southern Rhodesia considerable information has been accumulated regarding propagation by transequatorial circuits on the 28 Mc/s band.

The frequency of **GB3LER** will be 29,005 kc/s, while the German beacon station, **DL0AR**, is operating on 29,000 kc/s. Co-operation from h.f. band operators to undertake work on 28 Mc/s during periods of auroral activity is urgently required and full information and copies of the *IQSY News Letters* can be obtained from Society Headquarters. It is hoped that warnings of impending auroral activity can be passed to interested operators, as it is anticipated that occurrence of this phenomena will be relatively infrequent.

Contests

BERU again attracted considerable activity mainly from the " regulars " who rightly regard this contest as something out of the usual run. Certainly the operating manners are well above average. At the time of writing rumoured and claimed high scores include: **5N2JKO**, 3300 points from 428 QSOs; **ZB1BX**, 3935-363; **5B4IP**, 2960 points; **G3FXB**, 2760; **VS9AAA**, 2655 from 315 QSOs; **G4CP**, 2605; **VQ2WR**, 2560; **5Z4AQ**, 2500. **VS9AAA** comments that his second day was ruined by a USSR contest and obviously he was being well received in that part of the world! Compared with 1963 analysis of the contacts made showed little divergence between the two years.

Cpl. Tikaram Gurung (Tika) operating the club station, 9M2SR, of the 17 Gurkha Signal Regiment at Seremban, Malaya.

The results of the **SP DX Contest 1963** show **G3EYN** (1500 pts) and **G3PEU** (1452 pts) as well ahead of other entrants in the c.w. section. The 1963 Contest rules invited the participation of short wave listeners, but the 1964 rules have nothing to say on this point, and the position is therefore not clear. However it is quite certain that SWL entries for the **CHC/HTH QSO Party** on May 29 to June 1 will be welcomed.

The following are high *claimed* scores in the **Affiliated Societies' Contest 1964:** G2FJA 2580; G3GRS 2505; G3REI 2225; G8TA/A 2130; G3JEQ 2130; G3RSR 2050; G5BK 2035; G3SDR 1925; G3RCM 1885; G3AYC 1870.

The **Goose Bay Amateur Radio Club** will be holding their annual QSO Party between 00.01 April 1 to 23.59 April 15, using all modes and all bands. Stations outside North America working three GBARC stations will receive a WAG Certificate. QSL cards may accompany the application for the certificate and the GBARC members must have received the applicant's card in order to qualify for a certificate. Lists should go to GBARC, PO Box 232, Goose Airport, Labrador, Canada. Active stations are: VO2s AH, BA, DP, GA, MA, RS, UA and VE1MW/VO2, K5YDR/VO2; W1DBM/VO2 and WA4JXY/VO2.

The thirteenth **OZ-CCA Contest** sponsored by the Danish national society, the EDR, will take place as follows:

c.w. 12.00 May 2 to 24.00 May 3

phone 12.00 May 16 to 24.00 May 17.

Rules are as previous years and all bands between 3·5 and 28 Mc/s may be used. No cross mode nor cross band contacts will count for points, and all contacts with OX, OY and OZ will count for double points, i.e. 6. Stations may be worked more than once if the contacts are on different bands. Every country worked counts as a multiplier with licensing areas in the following countries being counted separately: W/K-VE-PY-LU-VK and ZL. The final score is arrived at by multiplying the total contact points by the sum of the multipliers. Logs must be postmarked not later than June 15, 1964, and should be sent to EDR Contest Committee, P.O. Box 335, Aalborg, Denmark, from whom fuller details may be obtained.

The **CQ World Wide SSB Contest** will take place between 12.00 Saturday April 11 and 24.00 Sunday April 12. Details were given in *MOTA* for February and copies of the Contest rules may be obtained by sending a s.a.s.e. to **G2BVN** (foolscap size please). The Headquarters station of the RAFARS will again be in operation from Locking under the call **GB3RAF**, endeavouring to improve the position attained last year. The RAFARS point out that this will be a multi-operator station which is a separate classification for contest entries. The writer will be pleased to receive a note of claimed scores from operators participating in this contest.

Awards

Chapter 8 of the **Certificate Hunters' Club** offer two certificates, the first being the **Worked Chapter 8 Award** for confirmed contacts with eight different members, including six different prefixes, two of which must be other than G. The Chapter now includes upwards of 30 active members and overseas CHCers include ST2AR, 5N2JKO, 5B4TC, with the several calls held by G3NMQ. A GCR list with 5/- should be sent to the Awards Manager, 124 Mitcham Road, Croydon, Surrey, from whom fuller details may be obtained. The second certificate obtainable is the **Worked Surrey Towns**, which is available for working 5-10-20 large towns in Surrey county after WWII. A certified list is acceptable, and cost and other details are as for the first award.

The Malmo Short Wave Club offers a new award (WECC) for **Worked European Capital Cities**. This award has three classes: Class A for 30 European capital cities, Class B for 20

Humberto Perez, TI2HP (centre) of San Jose, Costa Rica, accepts a silver plaque from Sidney Sasso, TI2SS, presented by the s.s.b. group in Costa Rica. Oscar F. Rohmoser, TI20FR (right), president of the Radio Club de Costa Rica, leads the applause. On the table is the gold K6MLS trophy awarded to TI2HP for being the first amateur in the world to submit confirmations of two-way sideband contacts with 300 countries. The awards were made during a meeting of the Radio Club de Costa Rica.

and Class C for 15. A GCR list and 10 IRC should accompany the application which should be sent to SM7DQK, Ingemar Svensson, Box 74, Skurup, Sweden, from whom fuller details may be obtained.

The **Singapore Rag Chewers Club** offer a certificate the qualification for which is that the applicant should contact one VS1 charter member and chew the rag for at least a period of one half hour. Charter members are VS1s CM, JG, KA, GQ, DD, DK, JW, LG, LJ, LU, LV and MC. The conversation should be reported to VS1JG, c/o PO Box 777, Singapore, giving full details.

The Hammarlund Manufacturing Company will shortly make available the **DXpedition of the Month All Continent Award,** a scroll confirming contact with Hammarlund dxpedition stations on all continents. More details will be available soon and interested operators are invited to place their name on the mailing list to receive details of this certificate. The address for such requests is PO Box 7388, GPO, New York, NY 10001, USA. In connection with a forthcoming Dxpedition of the Month, W2GHK recently visited Venezuela to make arrangements for activity using the YV8 prefix, which has hitherto received little attention.

Around the Bands†

The BERU contest certainly produced some additional activity on the bands this month. However, conditions were not as good as one would have liked and accumulating points was not easy, particularly after passing the 500 mark. A Russian contest started on Saturday evening which did not exactly help!

On **1·8 Mc/s** activity has been good but conditions only average. The ARRL contest produced most activity and coincided with the best openings. **BRS20317** (Bromley) reports a fine collection of W/VEs with the VE2s very strong. DX was available in HK6EB at S6 between 05.40 to 06.40 GMT. (1803·5 kc/s). 6YACZ was also on and received well. The best signals came from VE1ZZ, W1BB/2, W1BU rated S7, VE2TZ and VE2YU—a newcomer to the band. At the high end of the band K9WTS and W0GDH were heard around 07.30. VP2VL, VK3BM and VS1LP were all reported on the band but BRS20317 could not find them. He feels that the band is not as good as the experts say it should be. Barry Curnow, **A2340,** (Plymouth) also heard 6YACZ (06.05) and W1BB/1 (all times after dark and peaked 589 at 23.59). Many Ws were logged including W4BVV, K8EVG (04.54), W0AIH (07.01) and K0OEH (04.21). Finally OE1KU was heard and provided a new country at 22.40.

6YACZ (Kingston) operated on Top Band during the five Sunday mornings between February 2 and March 1. European stations were worked on each occasion between 04.00 and 07.00, including G3PQA, G3OLI, G3RFS, G3GRL, G3PU, GI6TK, DL1FF, HB9CM, with in addition HK4EB, XE1OK, VP2VL, YV5AGD and HP1IE. The total for January and February was 16 countries in three continents, with 90 W/K stations in all districts and 26 states, also VE1/2/3. 6YACZ reports G3GRL as the strongest UK signal and remarks on the absence of G6BQ. CO7RM was heard once at 04.35, and HP1IE was active around 05.20, with YV5AGD heard later at 07.30 and making many contacts in the ARRL Contest. Our correspondent confirms the rumour that the Jamaican prefix will be 6Y5 w.e.f. April 1—an auspicious day which will no doubt bring many strange calls on the air.

A crop of DX has been reported on **3·8 Mc/s** and the good conditions of last month seem to have held up well. **A2753** (Guildford) reports hearing c.w. from VP9BO (03.06), ZD3A (01.39) and 5N2JKO (03.04). **A1798** (Winchester) reports s.s.b. from all W/K areas from 1 through to 0. ZL4OD was on at 07.50, ZL4LM (07.35), YV5BFD (07.52), VO1AE (22.18), ZL2BU (08.05), OH0NC (21.49), IT1TAI (21.49). **A2340** (Plymouth) had a good month on this band and logged s.s.b. from HZ1AT (21.50), 5N2JKO (22.50), 9Q5RK (22.50), TG9SC (08.08), TG9FA (08.10), VK3BW (20.19), 5N2CKH (22.20), ZL1AIX (07.15), ZL4OD (07.17), and ZL4LM (07.25), whilst c.w. yielded 6W8DD (22.40), KV4CI (22.50), 9Q5AB (00.17), ZD3A (04.41), 5N2JKO (05.36), VP9BO (03.06), 5B4KG (03.10) and ZD3A (04.41), 5N2JKO (05.36), VP9BO (03.06), 5B4KG (03.10) and ZB1BX (03.44).

BRS20317 (Bromley) also found very good conditions on 80m and heard many c.w. stations. His continental round-up is as follows.

Europe: TF5TP (19.30), UF6LA (21.30) UG6KAB (21.00) rated as rare. A contest made the Russians turn out in force especially from **Asia** with 6 UA/UA9's (18.30-00.30); often at S8 were UA9CM, KAC, KEA, KTE, KWA, UW9WB, and in demand to most l.f. DXers were UH8AA (00.30-S7) and UI8KNA (20.50-21.00 on 3·531 kc/s at S8). During BERU the regular attendance of MP4BBE and VS9AAA with excellent incoming signals provided interest but not many QSOs. In fact MP4BBE was not heard in QSO at all on 80m in BERU. VS9AAA even was rather difficult to confirm, although reception was excellent. BERU usually ends with VS1LP and this was the case peaking S6. **Africa** provided a much looked for boost in the DX score with new ZD3A 00.45-06.00 S7-8, and to end BERU, new VQ2WR received fairly well 23.40-00.10 around 3·507 (frequency near VS1LP). Lastly 5N2JKO, the possible winner, S5-6 from 02.50-05.30 and 23.30, put in quite a lot of work on the band. **Oceania:** ZLs were received (07.00-08.00) quite well, i.e., ZL3FZ, GC, QX, 4BO, IE. From the **Americas** DX was quite healthy, with new HI3PC (08.00-08.30) S6-7 attracting lots of unsuccessful callers; the W screen must be pretty solid in the Contest there. The strongest DX was KV4CI (06.45) S9, others exciting equal interest were HK3RQ (07.00), HK4DP (05.00-05.30—S6), KP4AXM (06.00), KZ5CU (07.05—S6), PY1BTX (00.30 at S6), BERU from VP9BO and 6YAXG S6-7, 6YAMJ (00.50), YV5AGD (05.45 at S8). The USA and Canada were well represented; particularly well received were the

†Compiled by J. G. Cottrell, G3PSY.

Southerly and Mid-West States and the West Coast. W9 (00.00) S7-8, was again good at 07.30, (06.00-08.00) W5CKY, KC, BRR, K5RFJ (S7), K6BPR (08.00), W6GRX (07.20), W6RW S6 (05.50-06.30/07.00), W6ULS (06.00).

The **7 Mc/s** band has been somewhat unpredictable but BERU produced plenty of interest. Your compiler **G3PSY** (Thorpe Bay) made c.w. contact with a number of countries for the first time on this band including VS9AAA (00.20). 5N2JKO (01.27), VP9BO (02.07), MP4BBE (02.21) and 6YAXG (22.58). **A2753** (Guildford) reports signals from KV4CI (21.52), MP4BEE (21.55), OA4PF (08.17), SV0WM (20.16), VS1LP (19.26), VS1LU (19.44), VU2PF (18.41), ZD3A (02.41), ZD6OL (00.13), 6W8DD (20.52), 6YAXG (22.11) and several VKs. A2340 (Plymouth) reports a handsome collection including c.w. VP2AV (24.00), PZ1BH (23.30), CM2QN (23.27), FB8XX (18.56), KC4USK—once again very active on all times after 23.00. FY7YK (01.30), VP4GD (21.40), VE1AX (00.35), KG4AM (00.55), 7X2NJ (20.50), 9Q5TJ (17.55), SU7IM (20.32), HK3RQ (00.40), JA3FIP (21.14), 6W8DD (22.40), 6O6BW (22.45), VP6PJ (23.14), OD5AX (22.05), MP4QBF (21.20), VP8GQ (21.15) (Falkland signals are *weaker* than S. Orkney), 5Z4AQ (20.40), F2CC/FC (23.10), HK7ZT (22.35), CE1AD (22.46), VQ2BC (19.50), W6ASH (08.15), EA8EE (21.25), KZ5FP (21.41), VP6BW (22.35), XW8AW/BY (17.55), VK2PA (20.30), VK3DC (22.30), VK5NO (22.43) and TI2HP (23.31). **G3JAG** (Rochdale) has made some good contacts with ZD6OL (00.30), 5Z4IV (00.45), VP8GQ (01.00)—a new one for this band, 5H3HD (01.25), 5N2JKO (02.10), and between 07.00 and 08.30 ZL2, 3 and 4, VK 3, 4 and 5 areas. Also LU3DMD (08.30), HS1AA and MP4QBF (17.20) and XW8AW/BY (17.45). VK7SM was worked although his signals were only 349. G3JAG says that other VKs even with much stronger signals do not seem to look for Europeans. He has also heard FK8AT, VR2DK and VR2EK in the early mornings but is still chasing them.

BRS20317 (Bromley) provides a continental round-up and has found DX bright with fair conditions, an improvement to Oceania as expected, with Africa well represented especially in BERU. To begin the summary with **Africa:** the expected appearance of 9L1TL matured around 02.00; he was getting G very well indeed. Putting in an equally good signal was ZD3A (04.30/19.00—S8); on the rarity list for 40m came ZD6OL (00.30—S6), 5H3HD and HZ S6-7 (21.30), as well as the usual contingents of VQ2W, WR, FC, BC, 5N2JKO (no 5N2 competition this year) 5Z4AQ and IV with 9Q5TJ, ZS2/6 all received very well. KC6USK as usual 22.00 fair. **Asia:** Not quite so much from this continent due to the northerly route, but the two most outstanding strengths were S8 from UJ8KAA (20.40), and VS1LP (17.15). The path to Singapore has been very good from 15.30–20.00, VS1LU adding strength to it. Bahrein and Qatar were well received, especially MP4QBF, VU2PF (18.45) weak, VU2GG missed. Japan not received at all well, 16.45/19.30/22.20, from JA3FFD, 5ACD, 6AK. **Oceania:** the path has improved a great deal, especially in the morning 07.00-09.00, with the first VK1RD (08.50/09.10—S6), VK3NR (09.30) unusual, rarer VK7SM 08.00 and VK4SS at 18.45. From ZL quite a good bag including ZL4s GA, BO, S6 at 19.00. **South America:** most unusual was YV1AB (10.10–10.30) and a rare show from Zone 12 in CE1AD S7 (22.45-23.10) working a G. VP8GQ was heard in BERU but not like his previous South Orkney operations. All the usual HK, KZ5, KV4, VP9 and HP1IE (06.40) were heard. KP4BCL was heard as late at 09.50 6YAMJ and XG were also well received. XE1TZ (03.00 S3-4). **North America:** with W's received from 19.30–10.00, the path has declined in favour of the more Southerly States, although the W9s have been very good at midnight. On a few occasions the W6s have been available as late as 16.15; W6GRX S4-5 seems about the only one to stay late. Some are on in the mornings but are not regular. The path seems to have been very poor during the BERU, with the VEs being only available for a short hour or so.

G3AAE (Loughton) logged contacts with CR7IZ (20.30), KZ5MF (00.25), VS9AAA (01.00), VU2PF (19.55), XW8AW (19.45) and ZD3A (21.20). **G3HCL** (Northwood) used c.w. to QSO FS7AA (23.26), CR6AI (22.00), MP4QBF (18.25), OY2H (15.55), ST2AR (19.10), VS1LP (19.24), VU2PF (17.24), XW8AW (19.40), VP8GQ (22.58) and ZD3A (19.06).

The **14 Mc/s** band still provides the DX but conditions vary from day to day. The month has been most notable for the band remained open up to 22.00 GMT. Paths to South Africa, South America and the west coast of North America appear most evenings, often giving excellent signal strengths. Examples from the log of **G3PSY** (Thorpe Bay) are VE8CO (16.44), VE5PM (16.57), VE4MF (17.16), VE7BFN (17.32), VE8RN (12.18), VE6IT (16.42), KH6EPW (18.36), W6EPZ, 1BD, VSS, ERV (17.00-17.30), W7WVE (18.38), HP1IE (20.31), 6O6BW (20.14), VP8GQ (18.33), PZ1BH (21.42), ZS1XR (19.02), ZS1OU (18.49) and 9L1KW (10.27). Other DX worked included VS9AAA (07.58), 5N2JKO (07.45), VS9ART (08.52), 5H3HZ (08.57), ZD3A (09.07), ZL1AV (09.25—long path), ZL3VI (13.04), VK2PV (13.23) VS1LP (14.33), MP4BEE (14.44), MP4QBF (14.51)—all on c.w.

A3699 (Renfrewshire) has heard some interesting s.s.b. DX stations including HK7YB (13.20), HC2JT (11.36), CE0ZI (09.34), TI2LO (13.15), VE8AG (18.27), VP2KJ (10.56), YS1EM (13.08), VE7BU (19.08), KL7ECV (15.08) and YV5AXT (21.25). From Africa came 9Q5HS (15.08), CR7GF (17.50), ET3MEN (08.43), ZE7JZ (18.21) whilst Oceania yielded ZL1AIQ (08.05) and VK2FA (13.45).

A2753 (Guildford) reports hearing BY1PK and BY9SX

QTH CORNER

CP8AB	PO Box 9, River Alta, Bolivia
CR7IZ	via K3HQJ, 1213 Drey St., Arnold, Pa., U.S.A.
EL2AC / EL2AD	via K5SGJ, 115 Rose Avenue, Metaire, Louisiana. U.S.A.
FG7XV	J. Dumoulin, BP 248, Basse-Terre, Guadeloupe.
G2HX	L. O. Rogers, Ad-Astra, Seabrook Rd., Green St., Brockworth, Gloucester.
HZ1BF	via DJ4CJ
K4JLD/6O1	via WA4QNY
KC4USK	via W2CTN
KV4DE	via K4SWN
LX3AX	ON5AX, c/o Antwerp CW DX Club, PO Box 331, Antwerp, Belgium.
TI9FG	via VE4CP
VP8HO	PO Box 142, Port Stanley, Falkland Is.
VQ9HJB	via G8KS (to await return of operator to UK)
VS4CS	248 Gurkha Signal Sqdn., BFPO 628, c/o GPO, Kuching, Sarawak.
VS9MG	via VS1LX
XE5A	via XE1CN, PO Box 329, Merida, Yucatan, Mexico
XW8AU	
XW8AW	via W4ECI.
4W1B	via HB9YZ
5B4BG / 5B4GY	Sgt. B. Grainger, 33 Field Sqdn., RE, BFPO 53.
5R8CX	C. M. Daubier, BP 93, Antsirabe, Malagasy Republic.
5U7AC	via W9RKP, 6285 S. Baas Drive, New Berlin, Wiconsin, USA.
6W8CS	G. Segondy, Agence Centrale, BP 3106, Dakar, Senegal.
7G1G	via K3TVU
7X3VW	R. Perrier, rue du Transformation 7, Colomb Bechar, Algeria.
9M2SR	17 Gurkha Signal Regiment, c/o GPO, Seremban, Malaysia.
9N1BG	HQ British Gurkha L. of C, Dharan Cantonment, Nepal.

RSGB QSL Bureau: G2MI, Bromley, Kent.

in QSO passing code at 12.13 GMT on 14,010 kc/s. Also heard on c.w. were TF5TP (14.25), TI2LA (19.24), VP7NT (QRP) (20.19), VU2CYZ (16.33), ZL3AB on Chatham Island (17.06), ZS5CZ (17.50), 4W1B (08.23), 5R8AJ (18.52). VP5RH on Grand Turk Island was heard on a.m. at 19.53 and EP2AB (13.48), KX6BU (10.23), MP4QBF (13.17), VE3FKU/SU (14.14), VP2KJ (11.30), VQ9HJB (17.27), 9G1DY (16.51) and 9X5MX (13.56) all on s.s.b. **A1798** in Winchester also heard many of the above on s.s.b. as well as TI2HP (19.30), TI2SS (19.00), KZ5AX (19.25), YS1RD (19.39), ZD6PBD (16.39), TG9SC (21.36), EL2V (07.54), VK6MK (14.52), ZE1AC (16.58), VE6ABP (17.01), VE7PV (17.00), VE7MT (17.00), OA4CV (12.30), PZ1BJ (19.25) and KL7BJC (19.17).

A2340 in Plymouth has also been active on **14 Mc/s** and found some stations not reported by others, including s.s.b. from 5N2RSB/TY2 (09.00), VQ1GDW (18.15), CX8BM (21.20), VQ9HJB (17.10), YS1RDD (20.20). KG4AA (20.30) and c.w. from HZ1AB (12.05), FB8WW (17.10), 9K2AN (14.45), VP8HJ (21.27), VQ9HB (17.20), W5HJ/KJ6 (06.40). **BRS25901** in Worcester reports a good month for DX listening and amongst many, logged a.m. from KP4AX (16.30) and UO5KAA (14.42). **A2111** in Ilford, Essex, heard s.s.b. from VP9BV (16.09), VK2ADC (11.02), VP2KJ on St. Kitts (12.33), TT8AM (15.02), ZE6JF (15.33), XE1AE (15.37).

G3AAE recorded RST from FG7XS (22.00), FR7ZD (15.25), HZ1BF (15.15), KC4USK (23.00), KV4DE (20.50), VP8HJ (20.00), VS9MG (16.00), ZD3A (20.15), ZS2MI (18.20), 5R8AM (17.55) and 9L1TL (21.40). **G8JM** (Chingford) registered with s.s.b. from KR6MU (09.50), OH0RJ (09.28), TG9GZ (16.50), VP9FH (16.35), VS4RS (13.57), ZD6PBD (16.50), 7X3VW (09.35), 5N2RSB/TY2 (15.44), 7X3VW (09.35) and 9K2AN (15.45), whilst c.w. accounted for EL2S (17.14), KG4AM (13.17), TN8AF (16.45), VU2MD (16.58), VP8HD (20.58), 4S7EC (16.15) and 5R8AI (17.22).

The **21 Mc/s** band potential is still unrealised through lack of activity although BERU helped to populate it for one weekend at least. **G3PSY** (Thorpe Bay) worked VS9AAA (08.17), VQ2WR (09.31), 5N2JKO (10.30), 5Z4AQ (10.49), 5H3HZ (12.17), MP4QBF (11.26), 5H3HD (11.28), ZD3A (12.15) all at good strengths. **A2340** (Plymouth) heard TT8AM (10.49), TU2AW (17.30), UI8AL (08.15), EP2AS (08.17), XW8AW/BY (10.00) and KV4CI (13.00). **A2753** (Guildford) heard c.w. from 9L1TL at 11.34 whilst **A1798** in Winchester logged a.m. from ZE7JR (10.24), ZS1BV (10.30), ZS1AB (10.10) and CR7JA (10.50). In Worcester **BRS25901** heard many stations including 5N2FXL (11.47), 5A3TV (12.56), 9Q5HF (13.09), KZ5JK (15.40).

G3AAE worked FB8XX (12.05), VK2GW (09.20), VK6JK (10.40), VS1LV (10.05), ZD3A (11.55), XW8AW/BY (11.40), 5R8AB (13.00) and 9L1TL, all on c.w. **G3PZO** (Southampton) used a.m. to contact ZE1AS, ZE2JA, ZS1BV, 9Q5EI and K1/2/3/4.

On **28 Mc/s** all remains quiet although **A2753** (Guildford) did find c.w. from ZE1AS (12.21).

DX Briefs

9L1TL now has the services as QSL Manager of M. Harrison, BRS24733, 367 Parrs Wood Rd., Manchester 20. The time lag in receiving the logs is now three to four weeks, and all incoming QSLs and worthwhile SWL reports are answered by return. Please ensure that the correct date/time in GMT is indicated on QSLs.

TU2AU apparently has a large batch of outstanding QSLs awaiting replies, but he has every intention of dealing with them as soon as time permits. 5N2JKO reports that TU2AU will definitely be visiting XT2, TZ and other adjacent spots before leaving the Ivory Coast in 18 months' time. **TU2AW** is now active using a KWM-1.

VP8HR and **VP8GX** are now active from Port Stanley on a.m. on 14 and 21 Mc/s, and QSLs should go to S. R. Stringer, BRS24483, 57 Eltham Park Gardens, London, S.E.9.

UW3BV has forwarded a list of outstanding QSLs due to him from UK stations to whom he has already sent his own card. Out of 324 contacts he has received confirmations from only 121, not a proportion for which UK operators can be particularly proud. Looking through the list received from UW3BV, which incidentally provides all relevant QSO details, one notices calls well known on the h.f. bands, and to whom, quite frankly, one would have thought that an outgoing QSL would have been a courtesy readily dispensed. UW3BV also asks if there is a UK amateur who would like to send him copies of the BULLETIN in exchange for copies of the Russian journal *Radio*. The QTH of UW3BV is Post Box 3060, Moscow E.123, USSR; if *you* have not replied to a card from UW3BV now is the hour!

It is with pleasure that we record the appearance of two calls new to the DXCC Honour Roll in **G3YF** and **G8KS.** Unfortunately G3YF is now off the air temporarily whilst undergoing a major operation. It is certain that Frank's many friends will join with the writer in wishing him a speedy recovery and a quick return to DX'ing.

W3KVQ/2 (2308 Branch Pike, Riverton, New Jersey) handles cards for the following stations, some of whom are now inactive: CT3AV, FF4AL, TF2WFF, TT8AG, TU2AK, VP2AR, VU2RM, VS9AAC, ZD1CM, ZD1AW, 9L1CM, 9N1MM and 4S7WP. All QSL requests should include s.a.e. and IRC.

The *Florida DX Report*, one of the well-known US DX journals has recently changed editorship and the new occupant of the chair is W. E. Ethier, **W4HKJ**, 990 SW 63rd Avenue, Miami 44, Florida. *The Dx'er*, journal of the North California DX Club, is now under the care of Doug Murray, **W6HVN**, 708 Stoneyford Dr., Colma, California, following a successful period of editorship under WA6TGY. It is appropriate to record here appreciation of the co-operation from the former editors and extend best wishes to the incoming scribes.

It is believed that the present prefix for **Jamaica,** 6YA will be shortly changed to 6Y5.

For those interested in the propagation information broadcast by **WWV** on 5, 10 and 15 Mc/s etc., it is noted that the reports are now broadcast on the hour and every five minutes thereafter. It is pointed out that the information from WWV refers to the North Atlantic path.

G3WW (March, Cambs.) is looking for contacts on 3·5 and 7 Mc/s with London Postal Districts in an endeavour to qualify for the Worked All London Town Award which requires contacts with 65 of the 118 postal districts.

* * *

The co-operation of correspondents is much appreciated and acknowledgement is made to the West Gulf DX Club *Bulletin* (W5IGJ), the LIDXA *Bulletin* (W2MES), *Dx'press* (PA0FX), the *DX'er* (W6HVN), the *Florida DX Report* (W4HKJ) and *DX* (W4KVX) Please send all items to RSGB Headquarters to arrive not later than **April 10** for the **May** issue and **May 8** for the **June** issue.

Closing date for the May issue
April 10

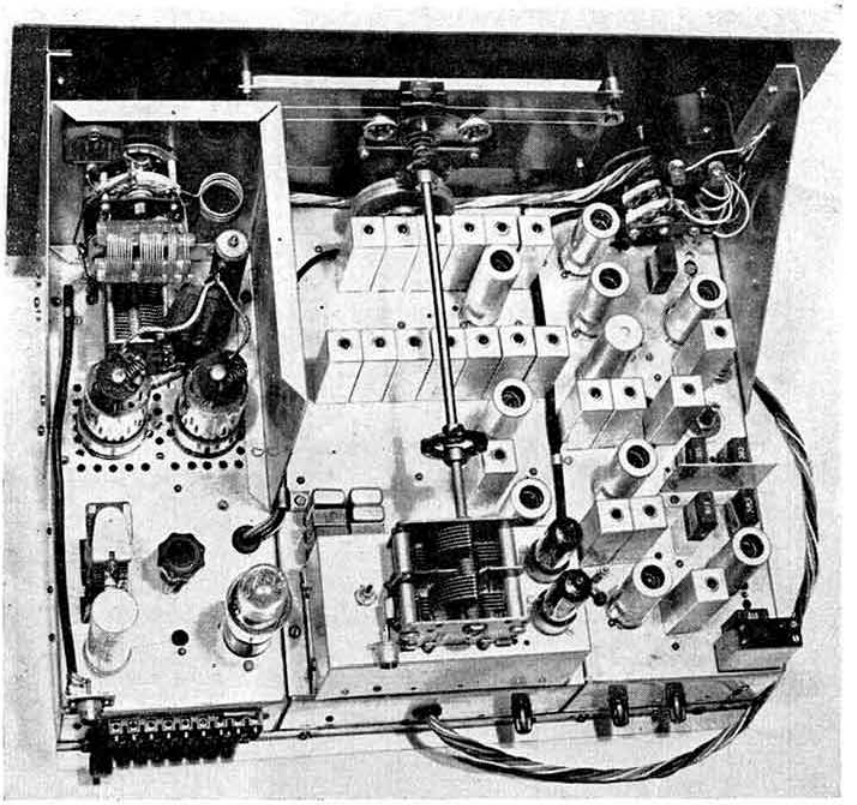
Closing date for the June issue
May 8

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

Part 2

The G2DAF S.S.B. Transmitter Mark 2

By
G. R. B. THORNLEY
G2DAF *



THE design of the Mark 2 transmitter was considered in the March issue of the BULLETIN. This month the construction will be described in detail after briefly describing the circuit finally adopted.

The complete circuit of the transmitter, with h.f. filter in use, is shown in Fig. 5.

The audio stages, V1 (EF86) and the first half of V2 (12AU7), have cathode resistors without bypass capacitors giving negative current feedback to each amplifying stage. The second half of V2 is connected as a cathode follower to present the correct impedance to the OA79 balanced diode modulator.

Output from the carrier oscillator V3a is fed via a step-down winding on T1 to the two OA79 diodes and the carrier balancing potentiometer VR2. Cathode follower V3b feeds an r.f output signal into VR3, CARRIER INSERTION control, and this enables an r.f. signal at the carrier frequency to be fed round the sideband filter and be used for carrier insertion or netting purposes.

The double sideband suppressed carrier output from the balanced modulator is fed into the two section crystal band-pass filter. The low level single sideband output is then amplified by V4a (the pentode section of an ECF82) operating in class A, and fed into an r.f. transformer T3 feeding the grids of the balanced converter V6 (12AU7) in push-pull; this valve also receives the parallel heterodyning input from the sideband switching oscillator V5 (the triode section of the ECF82).

If a different carrier frequency to the one specified is used it will be appreciated that the sideband switching crystals will have to be selected accordingly, with a spacing between them of approximately twice the carrier frequency. The two pre-set capacitors in the oscillator grid circuit are adjusted to pull the crystal frequencies the final amount necessary to maintain zero beat when switching sidebands. If the filter gives upper sideband output, the low frequency sideband switching crystal will give the required final sideband output in each band; if the filter gives lower sideband output, the high frequency sideband switching crystal will give the correct final output in each band. On the other hand, the switching can be eliminated and one crystal only used. The transmitter automatically gives the correct sideband—lower for 160, 80 and 40m, and upper for 20, 15 and 10m. Switching is included only as an operating convenience.

After the first conversion process the output at the first intermediate frequency of approximately 2·0 Mc/s is coupled via T4 and T5 and then combined with the input from the v.f.o. and cathode follower, V8 (EF80) and V9 (EF80 triode connected) tunable over the range 3·0 to 3·5 Mc/s in the balanced converter V7 (12AU7) to give an output into the 500 kc/s wideband coupler L2 and L3, at the second intermediate frequency of 5·0 to 5·5 Mc/s.

This tunable sideband output feeds into the balanced converter V11 (12AT7) which receives the heterodyning input from V10 (EF80), a fundamental or second harmonic crystal oscillator. The anode load is an inductance, L5, and this is resonated to the required heterodyning frequency for each of the amateur bands by switching various values of shunt capacity by means of S1—part of the main band change switch assembly.

After frequency conversion, the switch banks S3 and S4

* 5 Janice Drive, Fulwood, Preston, Lancashire.

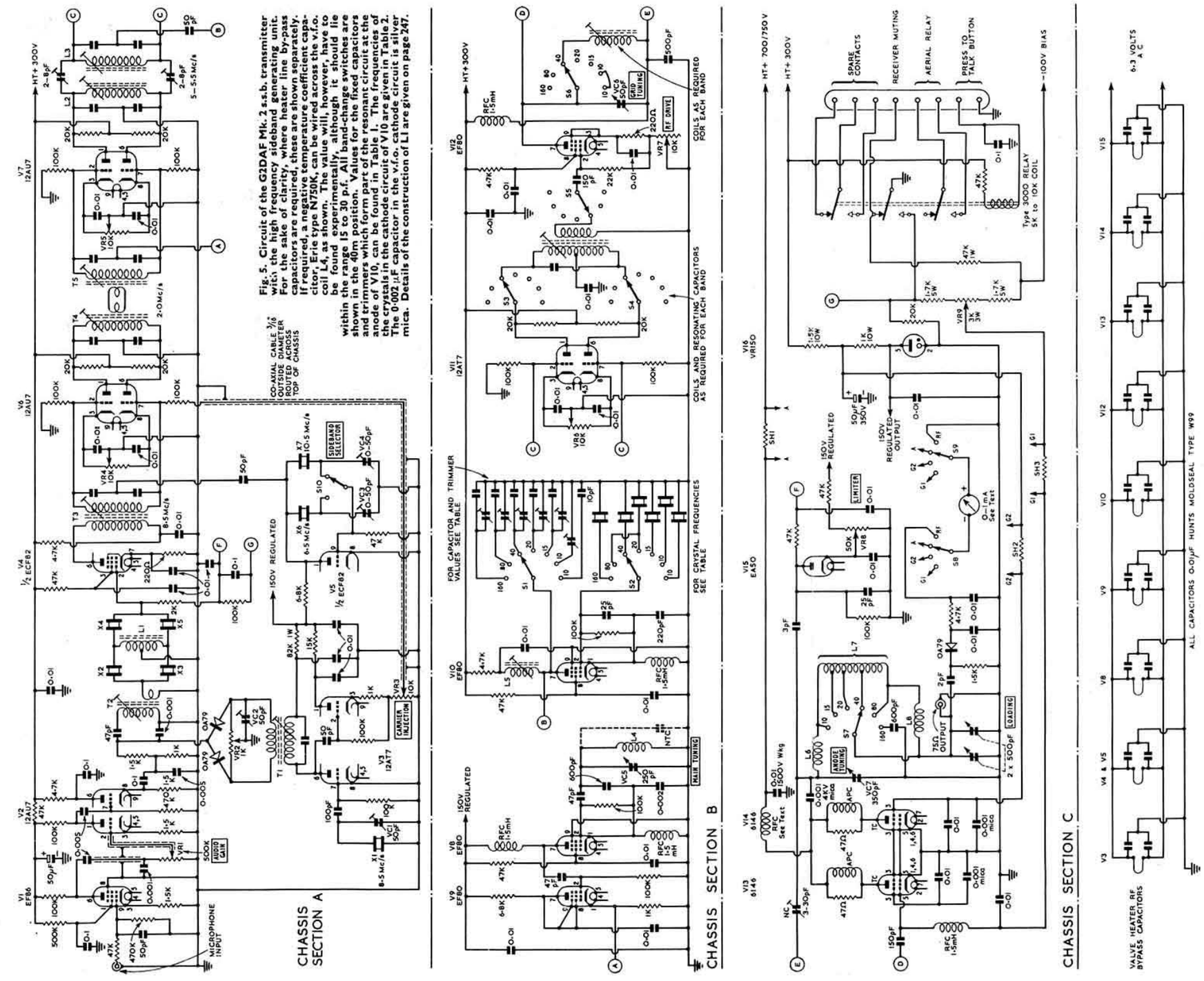


Fig. 5. Circuit of the G2DAF Mk. 2 s.s.b. transmitter with the high frequency sideband generating unit. For the sake of clarity, where heater line by-pass capacitors are required, these are shown separately. If required, a negative temperature coefficient capacitor, Erie type N750K, can be wired across the v.f.o. coil L4, as shown. The value will, however, have to be found experimentally, although it should lie within the range 15 to 30 p.f. All band-change switches are shown in the 40m position. Values for the fixed capacitors and trimmers which form part of the resonant circuit at the anode of V10, can be found in Table I. The frequencies of the crystals in the cathode circuit of V10 are given in Table 2. The 0·002 μF capacitor in the v.f.o. cathode circuit is silver mica. Details of the construction of L1 are given on page 247.

connect the anodes to the pre-tuned primary of the required r.f. transformer for each band, while S5 selects the secondary winding. The sideband voltage developed is amplified by V12 (EF80), a class A linear amplifier the gain of which is controlled by r.f. negative current feedback across VR7, the R.F. DRIVE control. The anode coil for V12 is selected by S6 and drive fed into the grids of the parallel 6146 class AB1 linear amplifier valves; the circuit is tuned by its associated variable capacitor brought out to the panel control GRID TUNING.

The p.a. valves are correctly loaded and matched to the 75 ohm output by a conventional pi-tank circuit controlled by S7 and the ANODE TUNING and LOADING variable capacitors. A pre-determined proportion of the r.f. voltage at the anodes of the 6146 valves is taken off via the 3 pF and 25 pF capacity potential divider, rectified by the diode valve V15 (EA50) and fed as controlling bias to the grid return circuit of the filter amplifier V4. Adjustment of the potentiometer, LIMITER control, VR8 alters the delay bias on V15 and this is set to allow the diode to conduct and provide a negative bias voltage that will reduce the gain of V4 and prevent the p.a. valves being inadvertently over-driven on speech peaks.

Voltage regulator V16 (VR150), together with the 1·5K ohm and 1K ohm bleeder resistors, provides 200 volts stabilized for the screens of the 6146 valves and 150 volts stabilized for the v.f.o. and cathode follower, carrier oscillator, and sideband switching oscillator.

All operating functions are effected by press-button control of the three-pole two-way Type 3000 relay whose high resistance coil is energized by current bled from the main 300 volt h.t. rail. The relay is shown in the non-energized "receiving" position, the negative muting voltage to the receiver being short circuited and the full 100 volt bias being fed to the grid return of V4 and, via the bias setting potentiometer VR9, to the grids of the two 6146s; these three valves are therefore held at cut-off and there is no output from the transmitter. When the "press to talk" button is depressed the relay contacts close allowing the 100 volt muting bias to cut off the receiver, and at the same moment of time to short circuit the bias rail "G" to earth, allowing V4 to conduct. The bias on the p.a. valves is now a proportion of the negative 100 volt supply, determined by the setting of the 3K ohm potentiometer VR9 which is now the centre part of a potential divider between the 100 volt bias rail and chassis earth. VR9 is adjusted until the two 6146 valves are taking a total of 50mA standing anode current.

The panel meter (a basic 1 or 2mA movement) is re-scaled to read 0-3mA, 0-30mA and 0-300mA and is connected via the two bank, single pole four-way switch, S8 and S9, to read grid, screen and anode current of the p.a. valves. In the fourth position it is used to monitor the transmitter r.f. output voltage.

The L.F. Filter Sideband Generator

Many constructors will prefer to avoid the crystal etching necessary when building a high frequency sideband filter. The Kokusai mechanical filter is now readily obtainable* and at the present price is an attractive alternative that will give an adequate unwanted sideband suppression. These filters are available on a nominal centre passband frequency of 455 kc/s with either 2·0 kc/s or 3·0 kc/s bandwidth at the 6db points. Either filter would be entirely satisfactory for an s.s.b. transmitter; however the wider 3·0 kc/s filter will give more natural audio quality, make the positioning of the carrier frequency less critical, and be more accommodating in regard to the operator's voice characteristics.

The circuit diagram of the complete low frequency sideband generating unit is shown in Fig. 6. It will be seen that

* From K.W. Electronics Ltd., 1 Heath Street, Dartford, Kent.

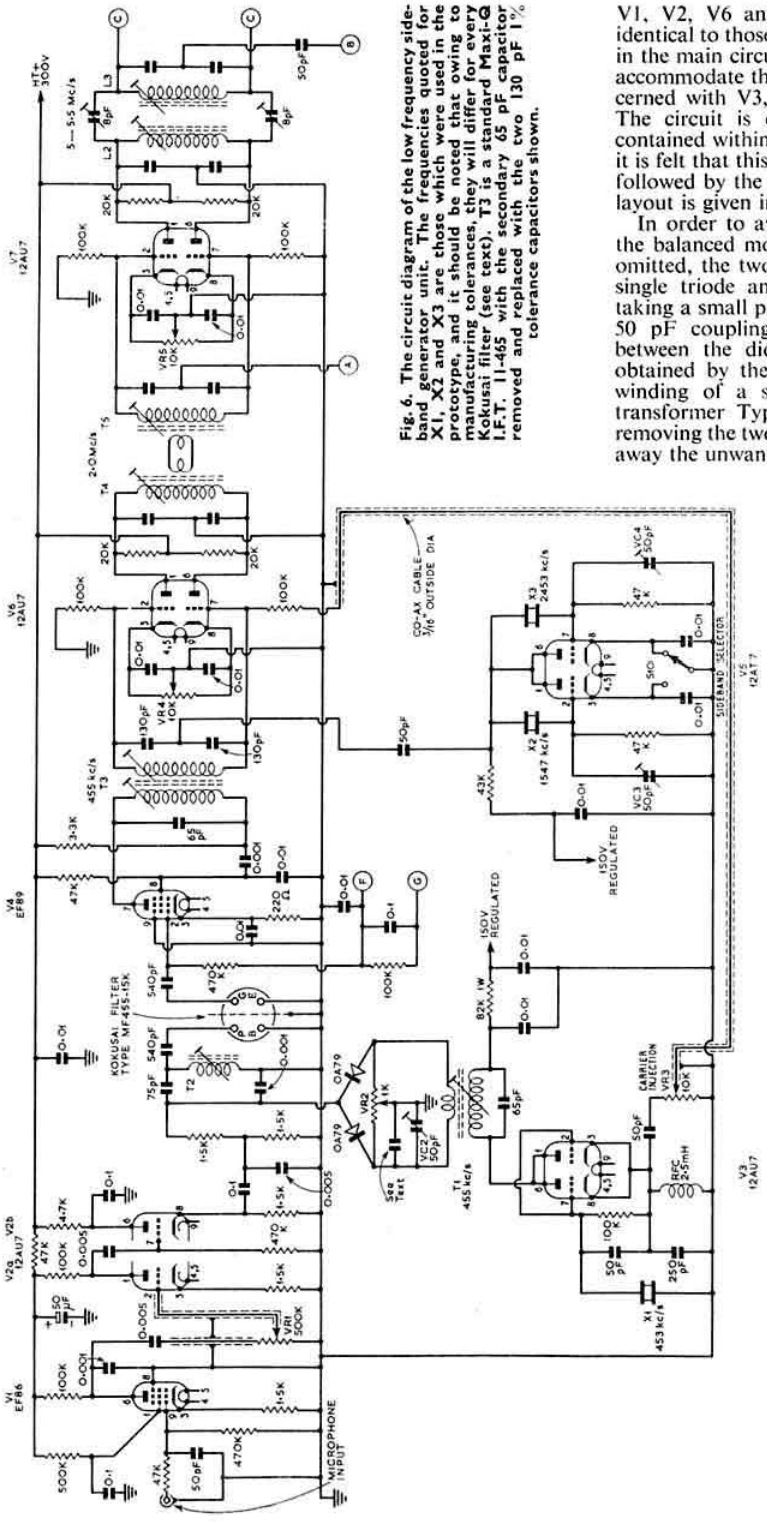


Fig. 6. The circuit diagram of the low frequency sideband generator unit. The frequencies quoted for X1, X2 and X3 are those which were used in the prototype, and it should be noted that owing to manufacturing tolerances, they will differ for every Kokusai filter (see text). T3 is a standard Maxi-Q I.F.T. 11-465 with the secondary 65 pF capacitor removed and replaced with the two 130 pF 1% tolerance capacitors shown.

V1, V2, V6 and V7 and the associated components are identical to those in the h.f. filter sideband generating section in the main circuit diagram in Fig. 5. Changes necessary to accommodate the low frequency mechanical filter are concerned with V3, V4, V5 and their associated components. The circuit is drawn in full to show exactly what is contained within the complete chassis section " A " because it is felt that this is a clearer method that will be more easily followed by the constructor. As a further guide the chassis layout is given in Fig. 7(b).

In order to avoid any possibility of carrier leakage past the balanced modulator the customary cathode follower is omitted, the two sections of V3 are strapped together as a single triode and carrier insertion is controlled by VR3 taking a small proportion of the r.f. cathode voltage via the 50 pF coupling capacitor. Correct impedance matching between the diode modulator and the Kokusai filter is obtained by the series resonated circuit T2. (This is one winding of a standard Maxi-Q* intermediate frequency transformer Type IFT.11-465 that has been modified by removing the two existing 65 pF shunt capacitors and cutting away the unwanted pie winding.)

The low level output from the mechanical filter is amplified by the class A low-mu pentode V4 (EF89). In order to ensure the highest possible stability this stage is bridge neutralized by the 0·001 and 0·01 μF capacitor bridge in the anode and screen return circuits.

It will be appreciated that if the heterodyning input to the converter V6 (12AU7) is made switchable with one crystal 2000 kc/s less 453 kc/s and the second crystal 2000 kc/s plus 453 kc/s, switching crystals will change the sideband output without changing the (suppressed carrier) output frequency. The required crystal frequencies are X2 1547 kc/s and X3 2453 kc/s and these are arranged as two separate Pierce oscillators using a double triode valve V5 (12AT7). To compensate for manufacturing tolerances and the effect of stray circuit capacity the crystals are finally " pulled " exactly on frequency by the pre-set 50 pF capacitors across each grid circuit to maintain zero beat when switching sidebands. The advantage of the double Pierce oscillator is that either oscillator can be selected by switching the cathodes at d.c. and this in turn enables the switch S10 to be mounted directly on the panel.

The frequencies shown for X1, X2 and X3 are those actually used in the prototype unit. However, it is important to appreciate that the Kokusai filter has a centre passband frequency of 455 kc/s plus or minus 800 c/s to allow for manufacturing tolerances. For this reason the correct carrier crystal frequencies for each filter are individually obtained from the characteristics.† As the G2DAF transmitter incorporates sideband switching it does not matter whether the filter passes the upper side-

* Manufactured by Denco (Clacton) Ltd., 357-9 Old Road, Clacton-on-Sea, Essex.

† See " Single Sideband," RSGB BULLETIN, February, 1964. (Out of print.)

band or the lower sideband and either one of the two specified carrier crystals can be used. Obviously the frequencies of the sideband switching crystals are directly determined by the frequency of the carrier crystal actually used. For any carrier frequency of value Y, the crystal X2 = 2000 kc/s minus Y, and the crystal X3 = 2000 kc/s plus Y.

T1 in the anode circuit of the crystal oscillator is required to have an impedance step down to the diode modulator. The upper pie winding of a standard Maxi-Q Type IFT.11-465 transformer is removed by cutting through with a sharp knife and replacing with 75 turns of 32 s.w.g. enamelled wire tightly coupled by scramble winding against the lower pie coil. The new winding is connected to the original lead-out wires but the original fixed tuning capacitor is removed.

In addition to the current balance obtained by the potentiometer VR2, the modulator must be reactively balanced; the amount of capacity necessary is affected by a number of variables such as out of balance in the transformer T1, stray circuit capacity and the tuning of the anode circuit. It is not therefore possible to give specific values and the fixed capacitor in parallel with VC2 may be in the range 25 to 100 pF and will have to be found experimentally. Should adjustment to VC2 fail to improve the carrier attenuation the connections from the secondary of T1 should be reversed.

TABLE I—RESONANT CIRCUIT DETAILS

Function	Freq. or Band	Winding	Resonating Capacity
Carrier oscillator T1	8·5 Mc/s	Primary 32 turns 32 s.w.g. enam. Secondary 22 turns 32 s.w.g. enam. against cold end of primary.	50 pF s.m.
Filter input T2	8·5 Mc/s	Primary 32 turns 32 s.w.g. enam. Secondary 8 turns 32 s.w.g. enam. against cold end of primary.	See Figs 5 and 6
Filter amplifier T3	8·5 Mc/s	Secondary 45 turns 32 s.w.g. enam. Primary 25 turns 36 s.w.g. enam. over centre of secondary with one layer of paper insulation.	47 pF—47 pF 1% tolerance s.m.
V6 Converter anode T4	2·0 Mc/s	Primary 90 turns 36 s.w.g. enam. Secondary 5 turns 36 s.w.g. enam. over centre of primary with one layer of paper insulation.	450 pF—450 pF 1% tolerance s.m.
V7 Converter grid T5	2·0 Mc/s	Secondary 90 turns 36 s.w.g. enam. Primary 5 turns 36 s.w.g. enam. over centre of secondary with one layer of paper insulation.	450 pF—450 pF 1% tolerance s.m.
V7 Converter anode L2	5·0 to 5·5 Mc/s	75 turns 36 s.w.g. enam.	65 pF—65 pF 1% tolerance s.m.
V11 Converter grid L3	5·0 to 5·5 Mc/s	75 turns 36 s.w.g. enam.	65 pF—65 pF 1%tolerance s.m.
V.F.O. L4	3·0 to 3·5 Mc/s	18 turns 19 s.w.g. enam. on ¼ in. diam. former with dust core. Cambion 1538-2-2 ceramic with 20063-K slug is recommended.	VC5 tuning of 250 pF maximum capacity.
V10 Oscillator anode L5	10m (28·5-29 Mc/s)	13 turns 24 s.w.g. enam.	10 pF s.m.
	10m (28-28·5 Mc/s)		30 pF Philips trimmer.
	15m		30 pF Phil. trim. + 50 pF s.m.
	20m		30 pF Phil. trim. + 220 pF s.m.
	40m		30 pF Phil. trim. + 100 pF s.m.
	80m		75 pF variable + 200 pF s.m.
	160m		75 pF variable + 350 pF s.m.
V11 Converter anode	10m (28·5-29 Mc/s)	Primary 7 double turns 24 s.w.g. enam. Secondary 7 turns 24 s.w.g. enam. over centre of primary.	None
V11 Converter anode	10m (28-28·5 Mc/s)	Primary 8 double turns 24 s.w.g. enam. Secondary 8 turns 24 s.w.g. enam. over centre of primary.	None
	15m	Primary 10 double turns 24 s.w.g. enam. Secondary 10 turns 24 s.w.g. enam. over centre of primary.	None
	20m	Primary 12 double turns 28 s.w.g. enam. Secondary 12 turns 28 s.w.g. enam. over centre of primary.	15 pF s.m.
	40m	Primary 25 double turns 32 s.w.g. enam. Secondary 25 turns 32 s.w.g. enam. over centre of primary.	30 pF s.m.
	80m	Primary 40 double turns 36 s.w.g. enam. Secondary 20 turns 36 s.w.g. enam. over centre of primary.	27 pF s.m.
	160m	Primary 70 double turns 38 s.w.g. enam. Secondary 35 turns 38 s.w.g. enam. over centre of primary.	60 pF s.m.
In all cases the primary is bifilar wound with the wire laid on double (i.e. 7 double turns = total primary of 14 turns). The secondary is insulated from primary with one layer of typewriter copy paper. (Three thou. thickness.)			
V12 Class A Amplifier anode	10m	9 turns 20 s.w.g. enam. spaced to ¼ in. long.	VC6 tuning
	15m	11 turns 24 s.w.g. enam.	VC6 tuning
	20m	18 turns 24 s.w.g. enam.	VC6 tuning
	40m	55 turns 32 s.w.g. enam.	VC6 tuning
	80m	90 turns 36 s.w.g. enam.	VC6 tuning
	160m	150 turns 38 s.w.g. enam.	VC6 tuning plus 80 pF s.m. across coil.
All coils are close wound unless otherwise stated. After winding all coils are doped with "Denfix" polystyrene cement. With the exception of L4 all coils are wound on 0·3 in. diam. formers with dust cores and 2¼ in. x 1⅜ in. x 1⅜ in. aluminium cans (Neosid or Aladdin). In all cases resonating capacitors are wired across coil and transformer connecting tags underneath the chassis. (s.m. = silver mica).			

COMPONENT CONSIDERATIONS

All amateurs with past constructional experience will appreciate that the efficiency and satisfactory operation of any sideband transmitter is directly dependent on the "good-

ness " of the various resonant circuits. The design and the performance of the prototype may be everything that could be desired; however, this is scant compensation to the builder if, after many weeks of painstaking work, his " new baby " fails to measure up to the expected standards. When this happens, and the usual checks do not show any obvious fault, the failure is usually in the tuned circuits. Possibly the constructor has been unable to obtain the surplus i.f. transformers and coil formers used by the designer and although the windings are exactly as specified the coils do not tune correctly because of variation in former diameter and magnetic property of the associated dust core.

For this reason all r.f. transformers and coils in the Mk. 2 transmitter have been wound using standard easily obtainable 0·3 in. diameter formers and 0BA dust cores with 2¼ in. × $\frac{13}{16}$ in. × $\frac{13}{16}$ in. seamless aluminium cans. These items are available as new equipment manufactured by Neosid or Aladdin and obtainable from BULLETIN advertisers. This ensures that all completed resonant circuits will give exactly the same *Q* value and coupling co-efficient as those used in the original transmitter.

A good quality variable capacitor should be used to tune the v.f.o. The type selected should preferably have ceramic insulation and a two bearing rotor. The capacitor used in the original transmitter is a twin gang 125 pF type, with both sections strapped in parallel to provide a maximum capacitance of 250 pF.

Balancing potentiometers VR4, VR5 and VR6 in the converter cathodes carry d.c. only and may be the small wire wound pre-set type of 10K ohms in value and rated at ½ watt. As the 1K ohm carrier balancing potentiometer and the 10K ohm carrier insertion and r.f. drive potentiometers are carrying r.f., these should preferably be non-inductive with carbon tracks.

The germanium diodes in the balanced modulator should be purchased as a matched pair.

With the exception of the three octal bases used for V13, V14 and V16 all valveholders are B9A Noval with skirts and screening cans. The EA50 valve (V15) may conveniently be wired directly into circuit—alternatively a special three pin holder and anode clip is available as a standard item.

All fixed capacitors of less than 1000 pF in value should be silver mica of good quality, and where two of these are used across a resonant circuit to provide a centre-tap, they should be 1% tolerance types. Unless otherwise stated, all other values of 1000 pF or greater used in the prototype were Hunts Moldseal Type W99 of 400 volts rating.

Resistors used throughout are Erie Type 8, ½ watt rating, unless otherwise specified.

The anti-parasitic chokes in the anodes of the 6146 valves are made in the usual way by space winding 6 turns of 18 s.w.g. tinned copper wire over the body of a 47 ohm ½ watt resistor. In regard to the anode tuning capacitor the type used was the semi-circular rotor, brass vane capacitor of 400 pF total capacity taken from a surplus TCS12 transmitter. The 350 pF Jackson Type C604 capacitor available as new equipment is equally suitable. The aerial loading capacitor is a standard two-gang 500 pF each section broadcast type, also available as new equipment.

A standard pie wound r.f. choke is unsuitable for use with a shunt fed tank circuit and this component must be specially wound to have a low self-capacity and no self-resonant points within the required amateur bands. There is insufficient space in the p.a. screening box for the full size pi-tank choke described in the RSGB *Amateur Radio Handbook;* however the smaller version actually employed appears to give a satisfactory performance. This consists of 250 turns of 36 s.w.g. enamelled wire wound in unequal sections of 150, 50, 25, 15 and 10 turns on a ceramic former ¾ in. diameter and 4 in. long with a ⅛ in. spacing between each of the sections.

All the crystals used in the h.f. filter unit (X1-7) are FT243 types. Where necessary these were manipulated on to the

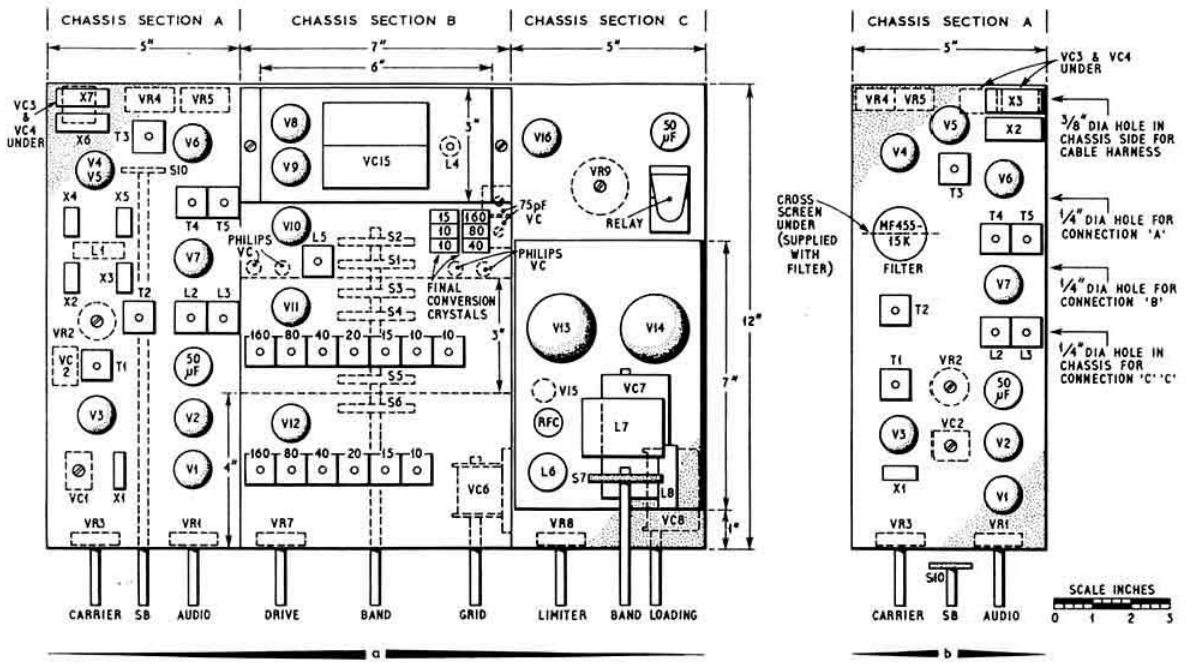


Fig. 7 (a). Chassis layout showing the principal components. (b). Chassis layout for the l.f. filter sideband generating unit (chassis section A). The sideband selection switch S10 is mounted directly on the panel, which is positioned ¼in. away from the chassis front apron.

TABLE 2
FINAL CONVERSION CRYSTAL FREQUENCIES

Band	Crystal Frequency (Mc/s)	Mode	Output Frequency (Mc/s)
160	7·0	Fund.	7·0
80	9·0	Fund.	9·0
40	6·25	2nd Har.	12·5
20	9·0	Fund.	9·0
15	8·0	2nd Har.	16·0
10	11·5	2nd Har.	23·0
10	11·75	2nd Har.	23·5

required frequency by etching with ammonium bifluoride* solution. The carrier crystal for the l.f. mechanical filter unit can be ordered either with the filter, or obtained later to the frequency specified.

Many of the final conversion crystals associated with V10 can be obtained from surplus sources, however current production crystals have much better activity and it is strongly recommended that these crystals are purchased as new items: in all cases when ordering specify that the crystal is required for operation at the quoted frequency on the parallel resonant mode with 30 pF shunt capacity. (The only exception would be the h.f. filter crystals—these are operating on the series resonance. It is most unlikely, however, that a British crystal manufacturer would accept an order for high frequency filter crystals, and any constructor unable to do his own etching would be well advised to build the l.f. sideband generator using the specified mechanical filter.)

CONSTRUCTION

The chassis is made up of three separate box sections of 16 s.w.g. aluminium to give a total size of 17 in. × 12 in. × 3 in. deep with a 19 in. × 10½ in. panel. This enables the transmitter to be constructed and wired in units, and was in fact adopted in the prototype to give flexibility during experimental work with additional crystal and mechanical filter sideband generating sections. Elaborate screening is not necessary and adequate protection against instability in the final conversion section is achieved with two simple cross-screens that also afford support to the main band-change switch assembly.

A pair of 6146 valves will give an appreciable output and as a precaution against any possibility of stray r.f. fields, the two valves and the components in the anode circuit are screened with a 16 s.w.g. aluminium "box" measuring 7 in. × 5 in. × 6½ in. high. This is in fact two separate *L*-shaped screens with ½ in. lips top and bottom, the inner screen (nearest to panel and chassis centre line) being permanently fixed to the main chassis section with PK self-tapping screws and used to support the pi-tank switch and coil and the anode tuning capacitor; the outer screen is removable for access to the p.a. valves. It is most important that there is a free flow of air throughout the p.a. compartment; accordingly a ring of $\frac{3}{16}$ in. diameter holes is drilled round each octal valveholder and the "box" top is made from expanded aluminium mesh, also held in position by PK screws.

The chassis layout showing the principal components is given in Fig. 7(a) and a panel layout with suggested positioning of the control knobs and Eddystone 898 dial in Fig. 8.

* "Crystal Erosion Made Easy," Jack Hum, RSGB BULLETIN, July, 1960

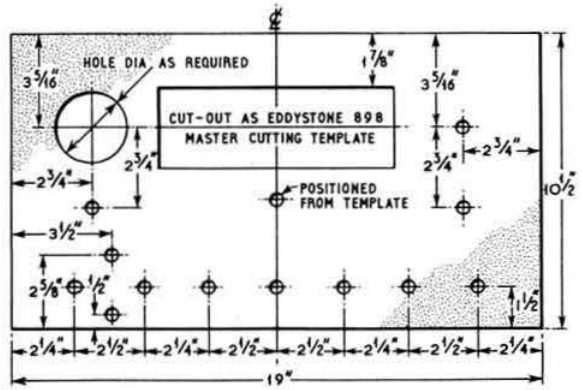


Fig. 8. The panel layout. In order to eliminate undue panel flexing, it is cut from ⅛in. thick aluminium alloy. A template is supplied with every Eddystone 898 dial to ensure that the mounting holes and the rectangular cut-out are accurately positioned.

It will be noted that the p.a. screening box is set back 1 in. behind the front chassis apron—this is necessary to clear the 898 drive mechanism.

The Yaxley two-pole changeover switch bank S10 must be mounted reasonably close to the two crystals X6 and X7 and the oscillator valve V5 (this applies only to the h.f. filter sideband generating section) and is supported by a small *L*-shaped bracket bolted to the chassis underside. A clear space should be kept down the centre of this section to clear the switch control rod and support bearing before connection to the Eddystone flexible coupler that is brought out to the front panel control knob. This detail and positioning of the ceramic single pole seven way band-change switch assembly is shown clearly in the photograph of the underside of the chassis. It will be noted that the use of individual coil cans on top of the chassis and switch banks centrally disposed underneath, gives a clean accessible layout together with very short coil connecting wires. Switch sections S1, S2, S3 and S4 are supported by the rear cross screen and S5 and S6 by the front cross screen—these can conveniently be assembled before the screens are bolted in position in the central box section.

In order to bring the drive shaft in line with the driving boss of the Eddystone 898 dial assembly, the v.f.o. tuning capacitor must be raised above chassis level. For the type of tuning gang used in the prototype this required a platform

TABLE 3
Pi-NETWORK DATA—TWO 6146 VALVES
R_L = 2000 ohms

BAND	XC1 = 200 ohms	XL = 250 ohms	XC2 = 46 ohms
80m	220 pF	11·0 μH	900 pF
40m	110 pF	5·5 μH	450 pF
20m	56 pF	2·7 μH	225 pF
15m	38 pF	1·8 μH	160 pF
10m	28 pF	1·4 μH	115 pF

TANK COIL

L6, 4 turns 16 s.w.g. tinned copper 1 in. diam. spaced to ½ in. long, self supporting.

L7, One continuous winding of 18 s.w.g. tinned copper wound 16 turns per inch, 10 turns, $\frac{7}{16}$ in. gap, 8 turns, $\frac{7}{16}$ in. gap, 3 turns, $\frac{7}{16}$ in. gap and 2 turns. Total length approximately 2 in. Diameter 1½ in. supported by 4 lengths of ¼ in. diam. polystyrene rod.

L8, 32 turns 22 s.w.g. enam. close wound on ⅜ in. diam. ceramic former.

2½ in. high. In order to obtain the utmost rigidity an aluminium box section 6 in. × 3 in. × 2½ in. was used—held to the main chassis by 3 in. × ½ in. × ½ in. *L*-section angle plates—and this provides ample room for the v.f.o. and cathode follower valves (V8 and V9). All the other associated components are mounted inside the box. This unit can be completely built and tested before being fitted into position.

A balanced bridge circuit is used for neutralization of the 6146 valves and this requires that the cold ends of the six coils and the rotor plates of the 50 pF tuning capacitor be taken to a common bus-bar which is insulated from earth and bypassed with a 500 pF capacitor. The 50 pF tuning capacitor (ex-RF27 unit or Polar Type C28-141) is mounted on a paxolin plate 2½ in. × 2½ in. × ⅛ in. thick; this in turn is bolted to the chassis side apron with the capacitor spindle extended through to the control knob with a ¼ in. diam. paxolin rod.

The pi-network values have been calculated for an R_L (anode load) of 2,000 ohms and are given for each band in Table 3. The tank inductance is made up of three separate units with the 160m coil L8 on a separate ceramic former positioned at right angles to the main winding L7 and adjacent to its " cold " end with the self-supporting 10m coil L6 positioned at the " hot " end to form the connecting link between L7 and the stator plates of the anode tuning capacitor. Because of the difficulty of obtaining a suitable diameter ceramic former, the main tank coil L7 is hand wound over four 2½ in. lengths of ¼ in. diam. polystyrene rod held in position on a mandrel made from a 4 in. length of 1½ in. diameter birch dowel rod previously prepared with four semi-circular grooves down its length. The mandrel should be supported horizontally so that it can be turned as the tinned copper wire is run into position; as it crosses each polystyrene rod the wire is " cemented " into position by local heat applied with a soldering iron. After the winding is completed, the mandrel is withdrawn, and the coil carefully inspected to ensure that there are no shorted turns—the finished appearance should be similar to Codar coils† advertised in the RSGB BULLETIN.

It is convenient to use a standard two gang capacitor of 500 pF each section for the aerial loading capacitor. As this would not have a large enough value for use on the lowest amateur band, the 160m position of the pi-tank band-change switch is used to bring into circuit a further fixed loading capacitor of 600 pF or thereabouts. The standard single pole, six way, Yaxley ceramic switch S7 is supported by the front apron of the p.a. screening " box " and the switch in turn supports the coil L7 by means of the two ends and the three tapping connections. S7 and L7 are conveniently made up as a unit before fitting into position.

On the 160m band, power is reduced to the equivalent p.e.p. of a 100 per cent modulated 10 watt d.c. input A3 transmitter by switching the anode feed to the p.a. valves from the normal 700-750 volts line to the 300 volts rail feeding the remainder of the transmitter.

As the transmitter is controlled by a " press-to-talk " button (this may be a press switch on the microphone or alternatively a circular bell push screwed to a block of wood and placed on the floor for foot operation) there is no relay clicking while the operator is actually talking. The Type 3000 relay does not require a flexible rubber shock mount and may be screwed directly to the chassis.

The meter switch, S8 and S9, is a two bank, two pole, four way Yaxley type. This may be paxolin but ceramic is prefered to eliminate any possibility of tracking. It is most important that this switch is the " break-before-make " type, otherwise h.t. would be momentarily connected to the 6146 grids and the OA79 diode as the switch poles moved over. If this type of Yaxley wafer is not available, standard " make-before-break," single pole seven-way, banks can be used with each adjacent contact left blank (i.e. the four positions of the control knob would be at 60 degrees instead of the customary 30 degrees.)

Any good quality moving coil meter of 1 or 2mA full scale deflection is suitable and is more conveniently read if the original scale is re-numbered to read 0 to 3, 0 to 30 and 0 to 300mA. The meter shunts, SH1, SH2 and SH3, may be constructed by winding Eureka resistance wire round a 100 ohm Erie (ceramic body) resistor. The value of resistance wire to shunt the meter correctly for each of the required ranges will depend on the meter internal resistance and will have to be found experimentally. (A detailed discussion on meter shunts is outside the scope of this article; however, the subject is discussed in the Measurements Chapter of the RSGB *Amateur Radio Handbook*.)

H.F. Filter Construction

The theory and operation of high frequency crystal filters is outside the scope of this article (the subject has been dealt with in detail elsewhere)* and it is the intention to give only sufficient information to enable the constructor to " have a go ": the rest is left to his own common sense and initiative.

It is well known that a quartz crystal has two resonant points very close together: these are the series resonance (the " zero " of impedance) and the parallel resonance (the " pole " of impedance) and this change of reactance or impedance is shown in Fig. 9.

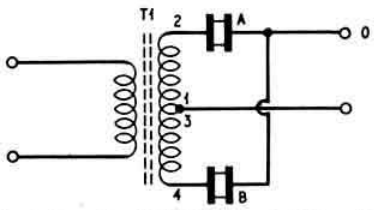


Fig. 10. Basic single section half-lattice crystal filter. For optimum results the two halves of T1 must have very tight coupling.

The circuit of a simple one-section half-lattice filter is given in Fig. 10 and it will be seen that the two crystals and the two halves of the inductance T1 form the legs of a bridge. Provided that the voltage across the coil from 1 to 2 is exactly the same as the voltage from 3 to 4, and provided also that the impedances of the two crystals *A* and *B* are equal, the voltage at their common connection (point *O*) will be equal to the voltage at the centre tap.

For the requirements of a bandpass filter, crystals *A* and *B*

† A suitable ready made complete coil and switch assembly is the Codar type DAF/180/SW.

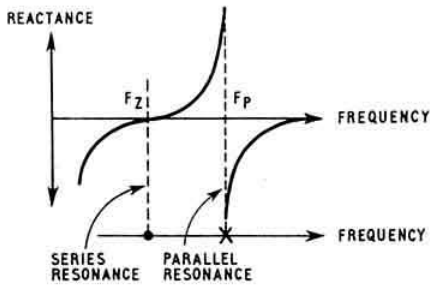


Fig. 9. Reactance characteristics of a quartz crystal. The horizontal arrows denote an increasing frequency.

* Vester, " Surplus-Crystal High-Frequency Filters," *QST*, January, 1959.
Healey, " High-Frequency Crystal Filters for S.S.B.," *QST*, October, 1960.
Bell, "An Introduction to Crystal Filters," RSGB BULLETIN, February, 1962.

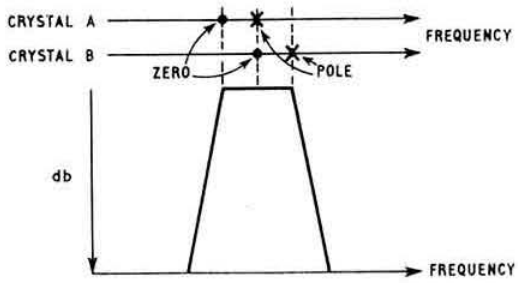


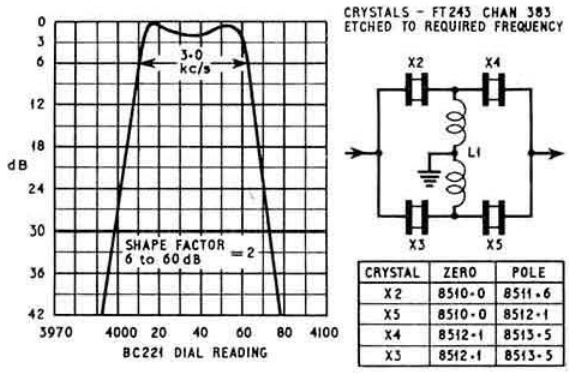
Fig. 11. Diagram showing the theoretical passband of a half-lattice crystal filter.

are chosen to be different in frequency. Assuming the input frequency is at the zero (series resonance) frequency of crystal *A* the impedance balance of *A* and *B* is spoiled and there will be an output voltage between point *O* and the centre of the coil; this will also occur if the input frequency is at the pole (parallel resonant) frequency of crystal *A*. At the appropriate input frequencies the same thing will happen for crystal *B*, only the unbalance will be in the opposite direction. From this it follows that the filter passband will be as wide as the spacing of all the poles and zeros. Further, if the series resonant frequency of crystal *B* is arranged to coincide with the parallel resonant frequency of crystal *A* this will theoretically give a perfectly flat passband of twice the pole zero spacing of each crystal; see Fig. 11.

Fortunately for the constructor the surplus range of FT243 crystals have a measured range of pole zero frequencies suitable for the requirement. Two of these crystals spaced approximately 2 kc/s apart will give a satisfactory single sideband bandwidth. A further improvement in the steepness of the passband skirts and therefore better unwanted sideband rejection is obtained by cascading two half-lattice sections in a simple back-to-back circuit.

In the writer's opinion it is an impossible undertaking to attempt to measure the series and parallel resonances of an 8·5 Mc/s crystal with the usual workshop signal generator—the tuning is far too coarse. The only satisfactory procedure is to construct a test rig so that the variable signal source is a BC221 frequency meter used on its normal l.f. ranges. A suitable test rig is shown in Fig. 12. It will be seen that the BC221 beats against a crystal controlled oscillator to produce the required frequency at the converter valve anode. The crystal for test is plugged into the holder whose input and output has a resistive padding network to avoid measurement error due to stray circuit capacity (stray circuit capacity has no effect on the series resonance but will affect the parallel resonance). At the parallel resonance the crystal is offering a high impedance and the output voltage would be too small to be measured on a workshop valve voltmeter. Accordingly a class A amplifier is used and the valve voltmeter probe is connected to the valve anode. This gives ample voltage to enable the pole and the zero frequencies to be accurately determined, and also enables the test rig to be used to plot the response of the complete filter, using the alternative connections shown.

Initially it is wise to purchase at least 8 crystals—preferably 12—all of the same channel number. Using the test rig, measure the pole and zero of each crystal and mark the frequencies in pencil on the side of the crystal base (the crystal zero frequency coincides with a sharp rise in the valve voltmeter reading, and the pole frequency with a sharp dip). Now select four crystals with the same—or most nearly the same—pole zero spacing. Take two of these crystals and match them within 10 c/s of the same series resonant frequency by etching the lower up to the higher with ammonium bifluoride. The two remaining crystals are also matched in the same way, but on a series resonant frequency that is approximately 2 kc/s higher. As 2 kc/s is a very small proportion of the crystal frequency the etching solution will work very fast and it is advisable to use one part of a normal saturated solution to one or two parts of water.



CRYSTAL	ZERO	POLE
X2	8510·0	8511·6
X5	8510·0	8512·1
X4	8512·1	8513·5
X3	8512·1	8513·5

Fig. 13. The high frequency filter passband and pole zero frequencies of the filter in use at G2DAF. It can be seen that crystal X5 is the odd one out, with a greater pole-zero spacing than the others. This causes the slight asymmetry of the curve.

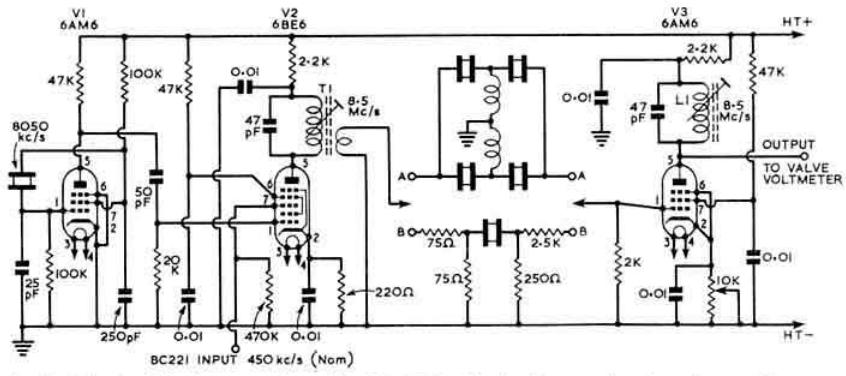
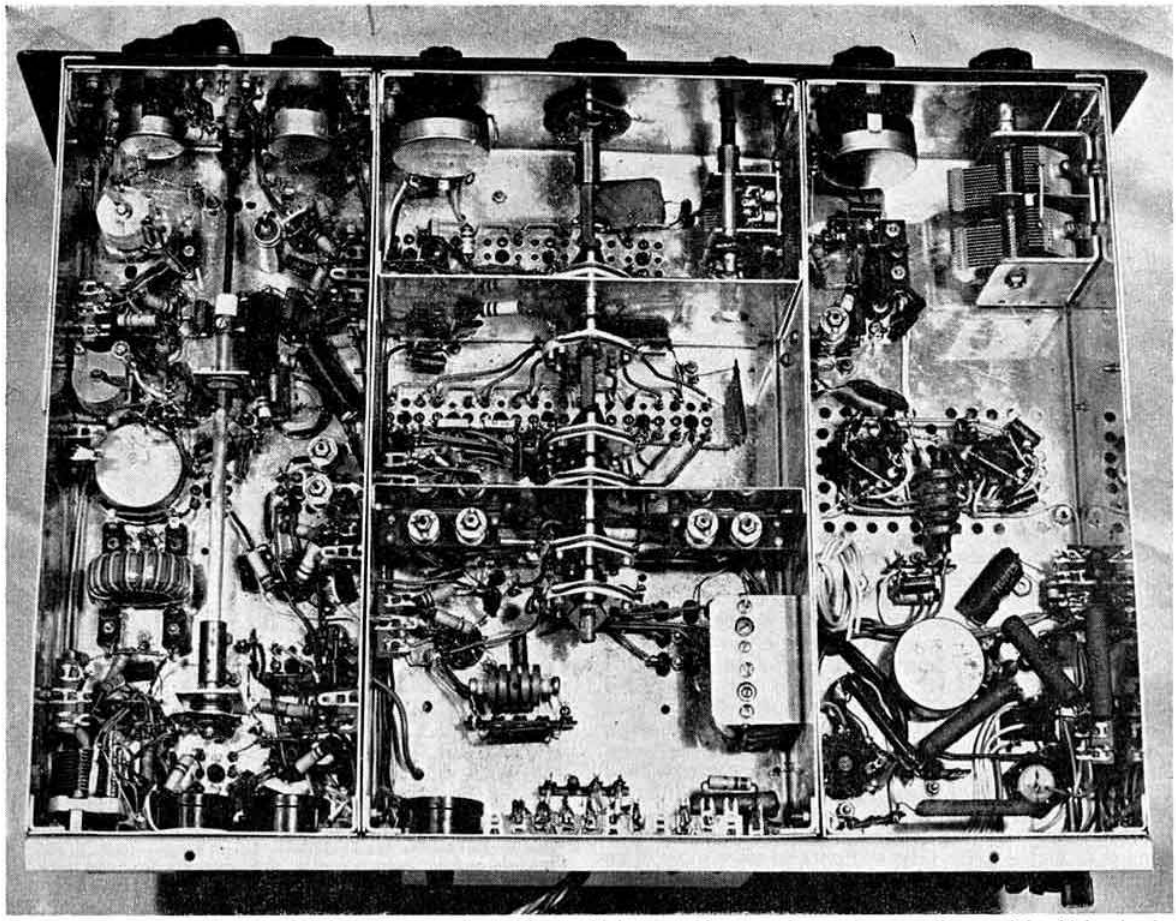


Fig. 12. This circuit is the test unit used by G2DAF for plotting filter passbands, and crystal frequency measurement. The BC221 frequency meter operates on its normal 430 to 470 kc/s range, and beats against the 8050 kc/s crystal controlled oscillator to give a precision output over the range 8480 to 8520 kc/s. For pole zero frequency measurement, the arrowed connection points are taken to the B terminals, and for filter passband plotting they are taken to terminals A. The potentiometer in the cathode circuit of V3 enables the amplifier gain to be set to give a convenient scale deflection on the valve voltmeter at the point of maximum filter response, i.e., 0 db.

Finally the coil L1 is constructed by taking a length of 22 s.w.g. p.v.c.-insulated connecting wire, doubled back on itself to form two parallel wires. This is then wound on a ferrite ring core to form nine double turns (total 18 turns) and the inner of one winding connected to the outer of the other to form a bifilar winding with the junction the centre tap. The main requirement of the inductance is very tight coupling between each half, together with a perfect



A view beneath the chassis of the G2DAF s.s.b. transmitter. The toroidal core and its mounting can be seen adjacent of the sideband switch shaft on the left-hand side in the high frequency crystal filter compartment. All wiring is point-to-point, small tag strips being placed in appropriate positions to anchor the smaller components. Reference should be made to Fig. 7 for identification of components shown in the photograph.

electrical balance. In practice the grade of ferrite material does not appear to be critical. Filters have been successfully built using the ring from a Mullard LA4 pot core assembly (35mm outside diam.) and also the ring from a mains suppressor filter choke (1⅝ in. outside diam.) obtained from surplus sources.

To give some guidance as to the characteristics that may be expected, the plot of the filter passband and the pole and zero frequencies of the filter that has been in use at G2DAF since October 1960 is given in Fig. 13.

The carrier crystal frequency is determined by plotting the filter passband and marking the 20db down points. One of the remaining FT243 crystals is etched so that its *parallel* resonant frequency is at this frequency. Finally when the transmitter is completed and tested on the air the carrier crystal can be " pulled " by means of the 50 pF trimmer capacitor across the grid circuit of V3 to obtain the best balance of voice quality.

The original filter was constructed on a nominal frequency of 8·5 Mc/s using channel 383 crystals. However it does not in practice have to be on this frequency and any crystal in the FT243 range can be used from 6500 kc/s up to 8650 kc/s—provided of course that the sideband switching crystals are altered to suit the new carrier frequency. That is, X6 = carrier frequency less 2·0 Mc/s, and X7 = carrier frequency plus 2·0 Mc/s. One of the inherent advantages of heterodyning the initial single sideband output down to the first intermediate frequency of 2·0 Mc/s is the fact that there is a considerable flexibility in the choice of filter centre passband frequency. Because of the wide choice of crystals over the range of Channel 303 to Channel 389 there should not be any difficulty due to a preferred channel " drying up " and suitable supplies should remain available for some time to come.

(To be concluded)

Royal Air Force Amateur Radio Society

The RAFARS are organizing a Hamfest during the weekend July 4-5. This will commence with an informal dinner at a hotel in Weston-super-Mare, on July 4 at 7.30 p.m. for 8 p.m. On the Sunday there will be an open day at Locking RAF station with a selection of laboratories open to visitors. A buffet type lunch will be available. This will be followed by a Mobile Rally run in conjunction with the Weston-super-Mare group of RSGB and this will conclude the Hamfest.

The RAFARS will be glad to know the numbers of members and friends attending the dinner on Saturday, July 4. Letters may be addressed to Mr. A. E. Seymour, G3GNS, at RAF, Locking.

Modifications to CDR AR22 Rotator

By H. BAILEY, G2UF*

AN essential feature of any beam rotator is that it should have an efficient braking system capable of holding the aerial steady in strong winds. At G2UF a CDR AR22 rotator was installed in conjunction with a three-band Mosley beam on a 30 ft. tower and was found to be unstable in anything like a stiff breeze. The rotator was unable to hold

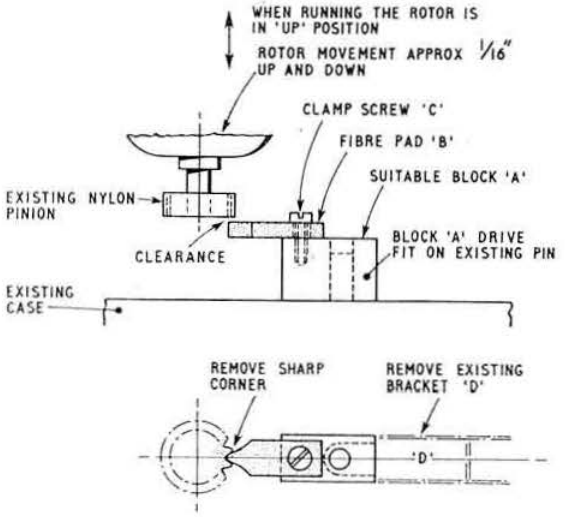


Fig 1. Brake assembly fitted to a CDR AR22 rotator. To set brake: lift rotor to "up" position and set fibre pad "B" just clear of bottom of nylon pinion; drop rotor slowly to ensure fibre tooth lines up with nylon pinion.

the aerial against the wind and would go out of synchronization, which meant having to reset it.

On dismantling the rotator, no evidence was found of any brake mechanism. It was therefore decided to modify the rotator to include an automatic brake. This is shown in Fig. 1 and is self-explanatory.

The beam has since been installed on a 50 ft. tower and the modified rotator has proved satisfactory in the strongest winds.

* Derby House, 116 Manchester Road, Denton, Lancs.

RSGB Merseyside Lecture 1964

Commercial Tape Recording

by Robert Auger, of Pye Records Ltd.

at the

Radiant House, Lecture Theatre, Bold Street, Liverpool, on Friday, April 24, at 7.45 p.m. for 8 p.m.

Admission will be by ticket only

Tickets are free, and may be obtained from the Region 1 Representative

Basil O'Brien, G2AMV, 1 Waterpark Road, Prenton, Birkenhead.

RSGB NATIONAL MOBILE RALLY

Texas Instruments Ltd., Manton Lane, Bedford

SUNDAY, APRIL 5, 1964

* Conducted tour of a modern semiconductor manufacturing plant.
* Special attractions for the ladies.
* Raffle and Lucky Dip.
* Cafeteria service available—tea and coffee provided free of charge.
* Trade exhibition.
* Mobile competition.
* GB3RS on Top Band and Two Metres from 10 a.m.

Organized by the RSGB Mobile Committee

Stratford-upon-Avon & District Radio Club

The Shakespeare Quatercentenary

St. George's Day, April 23, 1964, will mark the 400th Anniversary of William Shakespeare's birth and will be celebrated throughout the world, particularly at Stratford-upon-Avon where a festival of commemorative activities extending from April to September will be held.

The Stratford-upon-Avon & District Radio Club will be taking part in the celebrations by setting up and operating an Amateur Radio Station with the call-sign GB2WS. The station will be in Henley Street overlooking Shakespeare's birthplace. The public will not be allowed in the station itself, but they will be able to see and hear what is going on. A special QSL card has been designed.

The festivities start on April 22 with the opening of the new Shakespeare Centre, so it is hoped that GB2WS will go on the air at about 17.00 GMT on the same day. Operation will continue on April 23, 24 and 25 from 08.00 to 17.00 GMT on the 20m, 40m and 80m bands.

Replies to Enquiries

Contrary to the belief in some quarters, RSGB Headquarters replies to enquiries by post whether or not a stamp is enclosed.

NORTH MIDLANDS MOBILE RALLY

Trentham Gardens, near Stoke-on-Trent

SUNDAY, APRIL 19, 1964

The event will be opened by the Lord Mayor of Stoke-on-Trent at noon on Sunday, April 19, and will last until 5 p.m.

Talk-in stations at Trentham will be G3GBU on 1920 kc/s, and G3MAR on 145·0 Mc/s. Outstations will be active on 160, 80, 4 and 2m. The times of operation will be from 9.30 a.m. to 2 p.m.

Events and items of interest will include:

water ski-ing competitions
model aircraft competitions
closed circuit TV installations
commercial stands
a grand raffle
three bars and restaurant

Ample parking space will be available, with separate areas for l.f. and v.h.f. band equipped cars.

Organized by the Midland Amateur Radio Society.

Mobile Column

By E. ARNOLD MATTHEWS, G3FZW *

THERE have been some alterations in the arrangements for the conducted tour of Texas Instruments Ltd. factory, which forms part of the programme of the Society's rally being held there on **April 5.** It is no longer necessary to advise in advance the names of persons wishing to make this tour, but the tour of inspection is limited to men only. Consequently, the Mobile Committee is arranging a programme which will cater for YFs and YLs interests, and will include a beauty culture demonstration.

Owing to operational requirements the rally at the **USAF Station, Wethersfield** will now take place on **June 28.**

The **Thanet Radio Society** is to hold its fifth annual rally at the Viking Ship Site, Pegwell Bay, Ramsgate, on Sunday, **May 10.** Talk-in will be by G3DOE/P on 1·8 Mc/s, and G3BAC/P on 144 Mc/s.

A very comprehensive arrangement of talk-in stations is being planned for the **North Midlands Rally** at **Trentham Gardens,** near Stoke-on-Trent, on Sunday, **April 19.** There will be the usual stations at the site: G3GBU on 1920 kc/s, and another on 144 Mc/s.

An outer ring of stations sited at positions between 5 and 15 miles from the rally will also be on the same bands. At the time of writing, their call-signs are not known, but they will identify themselves on the day.

G3JGE will operate on 3·5 and 7 Mc/s, and will be looking for " DX " contacts. As many cars going to the rally will have more than one operator, it is hoped that c.w. contacts will be made, and prior arrangements for skeds will be welcomed. G3JGE will be assisted by members of 238 Sqn. ATC, the signals officer of which is F/O V. J. Reynolds, G3COY. It is understood that G3UD will be operating on 3·5 Mc/s on s.s.b.

A very full programme includes demonstrations of water ski-ing, model aeroplanes, and amateur TV using a radio link by members of BATC. There will be stands devoted to pottery, archaeology and crime prevention. Several radio societies will have stands, and trade exhibits will be made by J-Beam Aerials Ltd., C. H. Young Ltd., and others.

Operating Notes

Many mobileers will have come out of hibernation now with new gear, although many have continued through the winter to keep the damp out of the rigs. In the former category, G3NCX (Sutton Coldfield) is putting the finishing touches to a new hybrid transmitter for 144 Mc/s. This has a transistor oscillator chain driving an EL85 which drives a QV06/20. The modulator is also transistorized. Together with a Withers " Twomobile " receiver, this should form a very compact station. G2COP (Lichfield) is among the growing number of amateurs who are going s.s.b. with the KW2000. G2YV (" Des ") of Cannock, whose Ford Zephyr carries the registration number DES 3, is getting good results with a Minimitter Mobile transmitter and transistor receiver. He plans to add an r.f. stage to the receiver. G3KNB (Stafford) who has a Valiant transmitter and KW77 receiver in a Vauxhall Victor, has been working Western Europe including EA, CT and HB, and getting frequent R5S8/9 reports. He has left that band for a while pending improvements to the vehicle suppression and is working 3·5 Mc/s now. G3KNB is seeking information about helical whips, and a source of supply of suitable fibreglass rods.

* 1 Shortbutts Lane, Lichfield, Staffs.

The closing dates for this column are **April 1** for the **May** issue, and **May 1** for the **June** issue.

MOBILE RALLIES 1964

April 5	RSGB National Mobile Rally, Texas Instruments Ltd., Bedford.
April 19	North Midlands Mobile Rally, Trentham Gardens.
June 21	Longleat Mobile Rally.
June 28	RSGB National Mobile Rally, USAF, Wethersfield.
July 5	South Shields Mobile Rally.
August 9	Torbay ARS Mobile Rally at Britannia Royal Naval College, Dartmouth.
August 30	UBA International Mobile Rally, Ardennes, Belgium.
September 13	RSGB National Mobile Rally, Woburn Abbey.

A Miniature Top Band Transmitter

It is regretted that some errors occurred in the article " A Miniature Top Band Transmitter," by R. J. Toby, G2CDN, which appeared on page 168 of the March, 1964 issue of the BULLETIN.

In the wiring diagram for the valve heaters, in Fig. 1, V1, 2 and 3 should be connected as follows. V1 and V2 should remain connected in parallel as shown, but R16 must be placed between earth and the common supply rail to V1 and V2. The section of the live l.t. rail which then bridges V3 should be omitted.

Pins 2, 4 and 7 of N1 should be earthed, and the anode supply for V1 taken from pins 1 and 5 of the stabilizer.

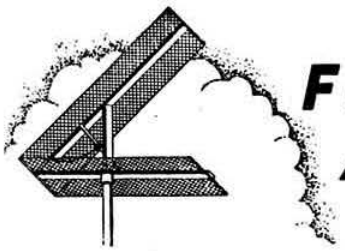
The stabilizer N2 should be inverted. CR1 should also be reversed.

RAEN Rally, October 6, 1963

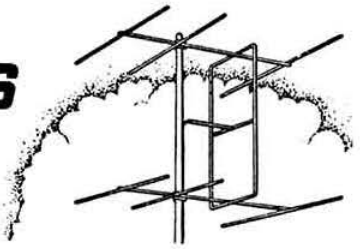
In general, test phrases, of which 100 were issued, caused little difficulty and technical terms were copied better than little used but non-technical words. Unfortunately, many contestants did not return logs. Thanks are due to G3HPR for his check log.

Position	Call Sign	Points
Section A	**(Outstations)**	
1	G3OHX/M	64
2	G3ISV/P	61
3	G2AVC/M	6
Section B	**(Fixed Stations)**	
1	G3HRK	49
2	G3RDI, G3RKR, G2TG	40
5	G3NHU	37
6	G3CKC, G3OFU	35
8	G3NTV	34
9	G3SMP	33
10	G6ZG	29
11	G3SEM	28
12	G4KO	26
13	G3SEH, GM3PFY	25
15	G3NOD	24
16	G3GOX	22
17	G3NSI	20
*	G3NOJ	19
18	G3DTD	12
19	G3OOA	11
20	G3KQJ	9
Section C	**(Receiving Stations)**	
1	Stephen Black	63
2	BRS20185	53

* Declaration not signed.



FOUR METRES AND DOWN



By F. G. LAMBETH, G2AIW *

NEWS from Scotland has recently been very scarce, and it is pleasing to receive news, through the President of the RSGB, G3FZL, that a regular correspondent for Scotland is being sought. The pioneering spirit which was so ably represented by the late Jock Kyle, GM6WL, is, we know, even more virile now, but hitherto we have heard little about it.

A 2m station has been set up in Thurso with GM3NQB's equipment. In addition, the following stations are known to be active in Northern Scotland on 2m: GM2FFH (Aberdeen), GM3GNR (Fort William), GM3GUI (Friockheim, Angus), GM3JFG (Invergordon, Ross-shire), GM3ODP (Conon Bridge, Ross-shire), GM3PIB (Forres, Morayshire) and a station in Nairn, the call-sign of which is not known.

GM3DYS (Invergordon) has equipment for 2m, but is not active at present. **GM3SLW** only has a simple 2m converter, but something more elaborate is being considered.

GM3JFG (Invergordon) and **GM3GUI** (Friockheim) run a 2m sked nightly across 90 miles of the Grampians. GM3JFG runs 80 watts to a quadruple stack 32 element array.

G3FZL, during a visit to Scotland on February 21-23 gleaned some further news of considerable activity, especially in the Glasgow area.

GM3HLQ is a comparative newcomer to the band and will shortly be putting up an 8-over-8 slot beam outside. His QTH is 800 ft. above sea level at Strathaven, Lanarks., but although the site is screened to the south, it has a good take off to the south west. He is on the air at present, but only using a dipole. A group is becoming active in Stranraer: GM3OTF is on both portable and mobile; GM3RZM and GM3RSZ are becoming interested; and GM2UU is already active. Other regularly active stations in the Glasgow area include GM3NG, GM6KH, GM6ZV, GM5VG and his son GM3PMB who is the organizer of the Scottish V.H.F. Convention which is being held on April 18.

GB3LER has encountered some teething troubles, but it is hoped that these will have been overcome, and that the station will be operating by the time this appears. The station should be firing alternately north and south in 10 second periods, the call-sign being inserted once every five minutes.

G3KEF and a number of other Coventry amateurs think that the V.H.F. Field Day rules should be modified, as it is felt that 24 hours on four bands is too much, and results in poor activity on 70cm and 23cm. They suggest that the event be split into two sections, i.e., 4m and 2m on one weekend, and 70cm and 23cm on another, but not the following weekend.

The Contest Committee wishes to draw readers' attention to the first 144 Mc/s Portable Contest on May 2-3, which coincides with the second IARU Sub-Regional event.

DJ2BC (Lindau) writes to advise us of the forthcoming publication of "Radio Communication in the Arctic Regions," to be published by the Pergamon Press, Oxford during the coming summer. This book will be available in most bookshops.

F9ND has asked us to note that the "Coupe du REF" (Third part, 144 Mc/s, 432 Mc/s and 1296 Mc/s) will take place on May 2-3.

There are a number of French V.H.F. Certificates available called DDFM, i.e., Metropolitan French Department Awards.

DDFM-V.H.F.-1 For twenty contacts established with twenty French departments.

DDFM-V.H.F.-2 For thirty contacts with thirty departments. Applicants having DDFM-V.H.F.-1 must submit only QSLs for ten new departments.

DDFM-V.H.F.-3 For forty contacts with forty French departments, applicants having the first must submit twenty QSLs for twenty new departments. Those having the second must submit for ten new departments.

As France has ninety departments, an honour roll has been established for operators who can show proof of contact with 40 or more departments. Reports must be better than RST 338 or RS 45, and all contacts after June, 1957 are valid.

We learn from *Radio REF* that French amateurs are now permitted to use RTTY.

Two Metre News and Views

GW2HQ (Aberdovey) will be pleased to offer a 2m QSO with a rare county (Merionethshire) to anyone who calls him. Located in the middle of Cardigan Bay, he puts out test calls eastward and southward from 20.30 onwards on approximately 145·420 Mc/s. As far as is known, GW2HQ is the only 2m station operating from Merioneth.

An interesting QSO took place at midnight on March 2, between **G3RMB** (Coventry) and **G3KUJ** (Bristol 9), who

SCOTTISH V.H.F. CONVENTION

The Mill Hotel, Rutherglen, Glasgow

SATURDAY, APRIL 18, 1964

The programme will include lectures during the afternoon and a dinner in the evening.

The Council of RSGB will be represented by the Society's V.H.F. Manager, R. C. Hills, G3HRH, and by Council Member J. C. Foster, G2JF. Further information may be obtained from W. B. Miller, GM3PMB, 14 Clamps Wood, East Kilbride, Glasgow.

Organized by West of Scotland V.H.F. Group

* 21 Bridge Way, Whitton, Twickenham, Middlesex. Please send all reports for the **May** issue to arrive by **April 10**, and for the **June** issue by **May 8**.

LONDON U.H.F. GROUP

will meet at the

Bull and Mouth Tavern

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

at 7.30 p.m. on Thursday, April 2, and May 7, 1964

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

reports that band conditions were exceptional at that time, and accordingly G3RMB agreed to listen for signals from G3KUJ's transistor transmitter. With 50 mW input to the p.a., approximately 10 mW was delivered to the 6-over-6 slot at 20 ft., and the transmission was received in Coventry at RST 539 with slight QSB. After this encouraging report, phone was tried and the report was RS 43. The direction is usually a very poor path for G3KUJ. Other local stations worked during the February to March period included G6GN, G6HN, G3CHW, G3ORL and G3SJI. These stations lie between 2 and 8 miles from G3KUJ and reports were, on c.w., R5-S8/9-T9, and on phone, R5-S8/9.

G3CCA (Oadby) had a personal QSO with G3RND, and many operators were surprised to hear his voice on a new channel. The QQV03-20A in G3CCA's transmitter has recently been replaced by a QQV03-25, which has raised the power from 50 to 70 watts without any other alteration to the equipment. G3CCA wrote that this valve seems to be unheard of in amateur circles, but is well worth an extra £1. G3CCA now only needs three QSL cards to claim the Four Metres and Down award.

G3OCB (Nr. Truro) says that the local net continues at 21.00 hours most evenings. Apart from this, the only bright spots have been slight openings to the Bristol Channel area and Hampshire, when G6XM, GW3CBY and G3OBD were worked in February. After that, only locals were worked until March 6, when G2DQ was heard, though very weak, in QSO with a station in the Home Counties. G3IEA (Torquay) was also worked. The strength of these signals was not good however. The double 4X150A linear amplifier is now functioning properly, and is being run at about 600 watts p.e.p. (1350 V at 450 mA) and a considerable increase in signal strength is being reported locally. Although there will shortly be some limitations of operation for personal reasons, skeds on a tentative basis for tropo-scatter s.s.b. can still be arranged if desired.

G3MTG (nr. Bridgwater) has only had local contacts recently. An exception, however, was on February 6, when EI2W was worked at RS59 and also EI4Q for a first contact. EI2A was coming in well that evening.

G2BJY (Walsall) found conditions poor, and activity apparently low recently, except for a G opening on March 2 when Southern and Home Counties stations were very strong. The good conditions also covered Somerset and two outstanding stations worked were G3MTG (Bridgwater) and G3ICO (Yeovil). During the 144 Mc/s Open Contest, conditions were very poor for the first three hours on Saturday, with G2JF only S6 with bad fading, and curiously the best results were obtained from the south west. G3MTG was worked S8 both ways and other stations heard from the same area were G6GN (Bristol) S7, well down on his usual strength, and G3MA (Gloucester) was also good. On Sunday, scarcely anything could be heard from the south, south east, east or north. The best QSO southwards was with G3GHI (Kenley), but no London station was heard. G3LAS (Berkhamsted) was S7. From the south west came the following QSOs: G3MTG (Somerset), G3MA (Glos.), G3CHW (nr. Bristol), G6GN, GW3RUF/P (Brecon), and G3BDS/M (Hereford). Several stations had scored to over the 100 mark by Sunday at 18.00, notably G3GHI, and G6GN. G3BA told G2BJY that he worked three GMs early on Sunday morning.

G3JGJ (nr. Newton Abbot) went to a portable site 10 miles south west of Exeter for the contest. This is over 1000 ft. a.s.l. on a small open moor with views towards Exmoor. CQ was called many times but only three stations were worked up to 16.03, when operation was discontinued. The temperature was below freezing all day. The stations worked were GW3RUF/P (59+) who gave 579 on c.w. G3JGJ was running 4 watts to a 6J6 p.a. G3MU (Exeter) and GW3MFY (Bridgend) were also worked. GW3MFY was also 59+ on phone and gave G3JGJ 579. Others heard and called, but not worked, were G3MDH/P, GW3LEX/P, G6GN, GW3RLX/P, GW2HIN/P and G3EIW. Some of these were S9+ but could not be raised.

New European Beacon Stations

SM6PU reports that a beacon is now operating in Norway with the call-sign LA1VHF on 145·15 Mc/s. The location is 125 km west of Oslo on Mount Yausta.

DL3FM reports in *DL QTC* that an IQSY beacon call-sign OE7IB/P on 144·15 Mc/s is operating from a location 2248m above sea level on the Patscherkofel mountain. The transmission is A2 for 24 hours a day sending "CQ OE7IB/P." QSLs should be sent to OVSV, Box 999, Vienna I/9. The Patscherkofel mountain is near Innsbruck.

The "London Convention" Comes Round Again

The V.H.F. Committee of the Society, together with the London U.H.F. Group, are already hard at work on the arrangements for the Tenth International V.H.F./U.H.F. Convention to be held at the same venue as in previous years, the Kingsley Hotel, London, on Saturday, May 16, 1964. Following the successful pattern of last year's event, there will be an afternoon lecture programme mixing an element of scientific experimentation with some down-to-earth technical advice. It is hoped to have the usual run of trade exhibits, and the BATC have promised a demonstration of amateur Band IV television. The traditional dinner in the evening will set the stage for the presentation of the 1962 V.H.F. Committee Cup, to be awarded to the winner of the competition for home constructed V.H.F. or U.H.F. equipment exhibited during the afternoon. At the time of writing the Committee hopes to welcome Harry Wilson, EI2W, as principal guest at this event, together with representatives of the Post Office and the Press. The full details of the programme together with information for obtaining tickets are set out in the block on page 264 of this issue, and will be circulated to all who attended last year's event. It is hoped

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

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

RSGB V.H.F. BEACON STATION GB3VHF

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

Date	Time	Error
January 28	... 16.40 GMT	2800 c/s high
February 4	... 16.00 GMT	2240 c/s high
February 11	... 16.57 GMT	2200 c/s high
February 18	... 18.28 GMT	2400 c/s high
February 25	... 12.12 GMT	2080 c/s high
March 3	... 12.08 GMT	2330 c/s high
March 10	... 14.15 GMT	2330 c/s high
March 17	... 11.28 GMT	2338 c/s high

to see a large gathering at the Kingsley on May 16 for the major V.H.F. get-together of the year. Bring a piece of equipment with you and take the 1962 V.H.F. Committee Cup home, as well as an armful of raffle prizes.

Auroral Report from SM6PU

G3FZL received a report from Olof Karlsson, SM6PU, as part of the IQSY programme regarding auroral activity during January and February, 1964. QSOs by aurora on 144 Mc/s were effected on January 16, February 8, 13 and 25. On the first occasion, OH3YH and SM3CFG were worked with the following heard: OH3VHF, SM4UKV, LA5EF, SM3AKW, SM5BIU, OH2RK, SM3AH, LA9VF and SM5BKI (between 15.25 and 17.33 GMT). On February 8, SM4UKV, SM3AH, LA6CG, and OH3VHF were heard. On February 13, SM4UKV, SM6DYK, OH3YH, SM4HNK were heard and LA5EF and LA4YG worked (between 17.17 and 18.17 GMT). On February 25, SM4UKV, OH3TH, SM4AMM and SM4CDO were heard and OH3TE worked.

Four Metres

G3FZL informs us that there is considerable interest and activity on this band by members of the Radio Club of Scotland (Glasgow area). They have a Sunday morning net, and are using surplus business radio equipment recently procured.

G5ZT (Plymouth) worked GC3OBM on February 27, G5ZT being RS 59 to 55 and GC3OBM 579 to 559. This, it is thought, is a first on 4m.

G3EKP (Belthorn, Lancs.) is now active on 70·211 Mc/s, the p.a. being a QV06/20 running 30 watts. The transmitter is generally the same as that described in the *RSGB Handbook*, and there was no trouble in getting it working. The aerial is a 2 element indoor system and over 20 stations were contacted during the first week of operation.

G5ZT (Plymouth) would like someone to turn his beam towards Plymouth at about 23.00 on most evenings. The G5ZT frequency is 70·2 Mc/s, and the equipment is a 4-element beam and Nuvistor converter.

A3603 writes from Malvern to say that from his home QTH (West Wickham, Kent) he heard 16 stations within the first hour of switching on the receiver for the first time. However, switching on from Malvern College recently the only station heard was G2AIH (Epsom, 120 miles) at 58. The receiver is an R220, which was very simple to modify, and performs very well with a simple dipole. A3603 points out that G3SGR (Horam, Sussex) is also active on 70·26 Mc/s.

Seventy Centimetres

The following description of G3KEF/P's equipment may be of interest. The 2m transmitter and receiver units fit on the gear box housing, with the transistor power supply under the front seat. The 2m transmitter is used to drive a tripler and p.a. (both QQV03/20As), which is on the floor, on front passenger side. An extra transistor power supply, together with the coaxial relay, fits in the parcel shelf above the tripler/p.a., and supplies h.t. to it on TRANSMIT. The receiver, carried on the passenger side of the front bench seat, is essentially a 26/30 Mc/s i.f. strip, G3BKQ converter, and A2521 preamplifier. This method of distributing the gear enables it to be interconnected prior to installation. The aerial, a 6-over-6 slot is carried on the roof rack, and all the gear is home constructed. Home activity from G3KEF is hampered by a poor QTH, but local activity is good. The best DX so far is with G5QA (Exeter); RS 59 each way. The best DX heard has been ON and F. G3KEF and friends would like to see a 70cm contest of 9 hours duration, similar to the 2m Field Day.

G5ZT (Plymouth) will again be transmitting Amateur TV soon, and would like to contact anyone living within 40 miles of his QTH for schedules. He will be also going portable this summer with the TV apparatus to the excellent 2m site near Okehampton, which is 1750 ft. a.s.l. He has hopes of some TV QSOs. If anyone is interested, G5ZT would like to hear from them.

G3EKP (Belthorn, Lancs.) is still carrying out scheduled tests with G3LJO/T on Wednesday and Saturday evenings at times between 21.30 and 22.30 approximately. A new station now active in Blackburn is G3SXC/T, who is heartily welcomed.

G3NBQ (Coventry) reports that local activity has been very good, in spite of the " Winter Doldrums." Six to 10 stations can often be heard, and the band then sounds like 2m.

Twenty-three Centimetres

G3FZL understands that both GM5VG (Glasgow) and GM3FYB (Dunfermline) are almost ready to make a two way QSO. GM3FYB is using a converter employing three trough lines as described in *QST*, with an NC303 as the i.f. amplifier tuning from 30 to 35 Mc/s. The transmitter is a DET24 tripler driven by the 434 Mc/s transmitter, whilst the aerial is a truncated corner reflector having 3 ft. sides. He also possesses an 8-over-8 slot. He is now working on a 2C39 amplifier stage. GM5VG is using an A2521 converter as described in the RSGB BULLETIN.

Twenty-three centimetres in Coventry is proceeding apace with the formation of the Coventry V.H.F./U.H.F. Group, consisting of G3KEF, G3LHA, G3NBQ (founders), and G3NAP, G3OVQ and G3RYB/T. On Sunday, February 16, receiving equipment supplied by G3NBQ was set up at Meriden, 6 miles N.W. Coventry and 600 ft. a.s.l. Contact was established by 70cm link between G3KEF and G2CIW. Unfortunately, G2CIW's 23cm aerial was down for modification, but contact was soon established on 2m with G3NAP and G3KPT. Shortly afterwards, G3KPT was received at RST 598 on 23cm. Transmission from Meriden on 23cm was achieved by driving G3RYB/T's tripler, using a 2C39A, with G3KEF's 70cm rig. Reports exchanged on c.w. were 589 out and 559 in. Both systems were modulated. The lessons learned from this QSO included the necessity for a form of r.f. monitor to assist in tuning up on 23cm. More attempts are to be made in March.

G3NBQ reports that G3RYB/T has now built a 2C39 tripler, and on February 13, G3NBQ received G3RYB/T at 59 on phone over a distance of half a mile. G3NBQ also reports the Meriden outing, and points out that the weather was atrocious, and three inches of snow lay on the ground.

On March 2, both G3KPT and G2CIW worked G3FP. Signals were peaking S6 on phone with deep QSB. On the same evening, G3NBQ completed his 2C39A tripler and had his first QSO working G2CIW (19 miles), with S7 phone both ways. The 2C39A was used as an h.t.-less tripler, probably giving about 1 watt output. G2CIW was running 50 watts input. G3RYB/T and G3OVQ are both building 23cm converters.

V.H.F. Operating Certificates

Members who are compiling claims for the various categories of the Four Metres and Down Certificates are asked to make use of the duplicated check list which is available from Headquarters on request. This list is designed to simplify the process of making a claim, helps to avoid errors and duplication of claimed counties, and makes the task of checking claims much easier and faster, which speeds up the issue of the appropriate Certificate. *Please help the V.H.F. Committee to help you, by using the official check list.*

Testing

It is opportune to remind all licensed readers that the practice of relaying broadcast programmes, or playing gramophone records, for the purposes of on-the-air testing of transmitters, or for any other purpose, falls outside the terms of the Amateur (Sound) and Amateur (Television) Licences, and is strongly to be deprecated.

RTTY

By ARTHUR C. GEE, G2UK*

WHILST it is a good exercise for the newcomer to RTTY to build at least one terminal unit, in order to gain experience in the principles of f.s.k. reception, the more experienced worker will soon want something a little better than the simple type of converter such as that, for instance, described by the writer in this column in the April, 1963 issue of the BULLETIN. A considerable number of more sophisticated designs which can be home-brewed have been described in American amateur radio literature, and there are some who consider that a far more satisfactory terminal unit for amateur radio use can be acquired in this way, rather than by seeking to obtain one of the surplus commercial units which appear from time to time on the market. However, some of these are excellent terminal units, which fulfil the requirements of amateur RTTY, and at the price they are usually offered are a very good buy.

Surplus Equipment

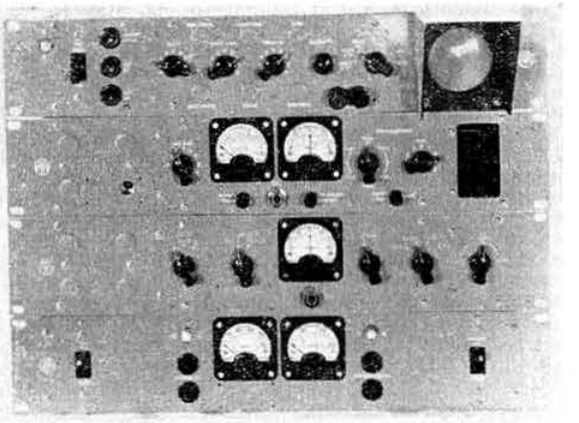
One of the best is that known as the Frequency Shift Converter Unit Model FSY1.1, or the AP66862 Adaptor Receiver Frequency Shift. The AP100386 is a slightly modified and improved version of the latter unit. Both these have appeared on the surplus market at a few pounds a piece. This unit is part of a complete f.s.k. receiving station, which is shown in the photograph. In addition to the f.s.k. unit, an automatic frequency control and b.f.o. unit, a cathode ray monitor unit and a power supply are provided, together with a second f.s.k. unit occasionally, if dual diversity reception is required. The a.f.c., b.f.o., and cathode ray monitor units have not so far appeared on the surplus market, but the power supply has, and is designated the AP66863. The units match, being constructed for 19 in. rack mounting. The f.s.k. unit is of the audio tone type, being fed from the receiver in the same way as the terminal unit described in April, 1963. It will work with any frequency shift from 200 c/s up to 1000 c/s. A polarized relay is incorporated, which in turn works the teleprinter in the conventional manner.

There is no point in giving a fuller description of this equipment now, but this should draw the attention of those interested in RTTY to these units. They are definitely items to watch for during surplus-hunting expeditions. If you are lucky enough to come across one and need further information on it, this can be provided via the BARTG information service.

The next piece of similar equipment which is of value to the RTTY enthusiast and which has also appeared on the surplus market recently is an ex-Army unit, known as the Receiver Adaptor Field, C.F.S. ZA39384. This terminal unit is of the intermediate-frequency type, that is, it takes its input from the i.f. stage of the receiver, and not from the audio output stage as in the case of the unit described above. This unit is far more complicated than the AP66862, and has a heavy power supply requirement. There is a matching power supply unit for it, designated Supply Unit DC/AC No. 3, ZA39385 but these are not so readily available as the unit itself. Again they are for 19 in. rack mounting.

We are indebted to BARTG member David Wadsworth for the following information on the C.F.S. ZA39384 unit. The unit is designed to be fed from the last i.f. stage of a receiver having an i.f. of between 445 kc/s and 500 kc/s. The specification states that it is designed for frequencies between 445 and 475 kc/s, but it was found that it could be tuned to 500 kc/s without difficulty. They are designed to operate with

* "East Keal," Romany Road, Oulton Broad, Lowestoft, Suffolk.



The f.s.k. receiving equipment referred to in the text. From top to bottom, the individual units are: (1) the cathode ray monitor; (2) AP66862 f.s.k. unit; (3) automatic frequency control and b.f.o. unit; (4) the power supply. As this unit was intended as an export version, the calibrations are in German.

any shift between 400 c/s and 1 kc/s, and will still copy when the signal has drifted plus or minus 2·75 kc/s from the nominal centre frequency. The unit also contains circuitry and switching to enable connections to be made between a local and/or remote teleprinter and the converter output and/or the transmitter. It should be stressed that before these units are tried out, they should be correctly aligned to the receiver with which they are to be used. The power supply needed is fairly elaborate, being 315 to 336V d.c. at 50 mA stabilized; 220V d.c. at 60 mA unsmoothed, 73-0-73V a.c. at 100 mA; 19V a.c. at 1·2A; 6·3V a.c. at 0·6A isolated.

Regarding the performance of these units, they are of course i.f. type converters and are not designed to contribute any additional selectivity. Thus in severe QRM, they will not compete with an audio type converter with audio filters, unless you are fortunate enough to have a mechanical filter in the i.f. strip! This is one of the penalties of catering for a 5·5 kc/s tolerance receiver drift. There are two Carpenter relays in the unit, which are extremely well suppressed, incorporating chokes mounted directly on the contacts and thus no interference is detectable from these. The valves used are 12 CV138s (6AM6); 2 CV140s (6AL5) and 5 CV286s (stabilizers).

Well, there are details of two surplus units which can be put to good use by the RTTY enthusiast. But don't forget, build yourself a terminal unit first; the exercise is a most useful instructional one.

Creed Model 6S

In the July, 1963 article in this series, the Creed Model 6S auto-transmitting head was briefly described. A number of these have come on to the surplus market and most need some attention, particularly regarding adjustment of the transmitting contacts, etc. We have been asked for instructions for this, so they are given herewith. Thanks are due to Frank Dickenson, G3HVB, for this information.

Slacken off the M and S contacts by means of their respective locking screws and unscrewing the contacts. Turn the drive shaft of the head in the operating direction until one pecker has risen to its full height and continue turning until it has dropped about halfway back—by this time an adjacent pecker will have started to rise. Stop turning the shaft when both peckers are the same height. This operation will place the horseshoe operating lever in the middle of its travel. Now turn the M and S contacts so they lightly hold the tongue in the middle of the operating lever. Clamp one contact. Now withdraw the other contact until there is a gap of three

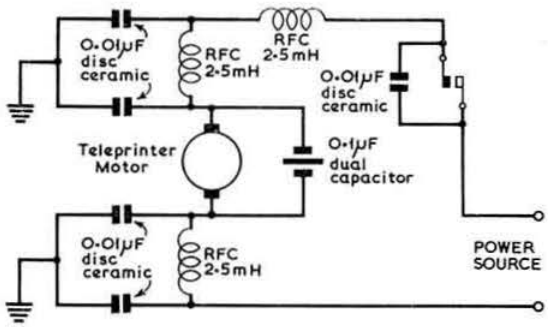


Fig. 1. Suppressing a teleprinter motor for use when operating on 15m and 20m.

thousandths of an inch, and clamp lightly. Now hold the tongue on this contact and withdraw the other until a six thou' feeler will just pass between the contact and the tongue. Clamp this contact.

The next job is to ensure that equal pressures are required to operate the tongue in either direction. This is achieved by slackening off a small screw adjacent to the bias lever, and adjusting the bias lever until equal pressures are required on the tip of the tongue to shift from M and S and vice versa. Care is needed when tightening the bias locking screw as it tends to upset the position of the bias already set. A small drop of light grease on the roller and oiling the felt pad underneath the camshaft is all the lubrication it needs, apart from a drop or so through the top holes.

Tensions: With a pecker raised, the pressure needed to start it moving downwards against the pecker spring is, for the Mark I model, 150 to 180 grammes, and, for the Mark II 160-185 grammes. The pressure needed to just shift the tongue from mark to space, with the gramme gauge operating just below the knife edge of the tongue, is 27 to 30 grammes for the Mark I, and 90 to 100 grammes for the Mark II. The maximum difference must not exceed 5 grammes; otherwise bias will result.

We are also grateful to G3HVB for passing on some advice on suppressing teleprinters for use on 15 and 20m. This is a problem which many encounter. Hash suppression is comparatively easy on 80 and 2m but often proves very difficult on the former two bands. The circuit is shown in Fig. 1, and in G3HVB's case almost completely suppressed motor hash on the h.f. bands, except with the r.f. gain fully up. G3HVB continues:

Another point to watch is that the aerial feed into the shack should be co-ax rather than long wire feed if possible, and also the Z match or other tuning unit should be completely screened. This of course goes without saying in these TVI-ridden days, but this was found out the hard way as far as G3HVB was concerned!

Activity

As has been indicated before, most RTTY activity in the British Isles is now on 2m. Of more general interest is the activity on 80m, which is now to be found mainly between 3550 and 3575 kc/s. The RTTY Test Transmissions are radiated regularly on Sunday mornings at about 11.00 BST in this channel by G6CW, G2HIO and G8DD in rotation. They are useful signals for the newcomer to RTTY to copy in order to gain some experience of receiving amateur RTTY, which is by no means as easy as printing high power commercial signals. PA0AA is still transmitting the News Bulletin at 20.30 GMT on 3·6 Mc/s on Friday evenings, but the signals have been difficult to copy recently due to poor band conditions and severe QRM.

On 20m, there have been many Amateur RTTY signals which are not too difficult to print. Alan Walmsley, G2HIO, submitted the following list: K3GIF is always present and is also listening on 80m at 24.00, and early mornings at 06.00 if DX conditions are suitable. The others are W0ZUU, WA4GTA (US Navy, and a good signal), 5A5TR, W4AIS, DL3IR, DL9EX, DL4IA, W8DFA, DL1VR, W2UGM, K8MYF, W2JJC, WA2LFO, DJ4BF, DF2ZJ, DL1LK, DJ4KW, I1DBK, VO1BB, FB7XT, W8BZB/HC2, ZS1KP, K0CUT, WB2FFW, W7VKO, W1AOH, ON4HW, W4ZME, and OZ8US. It definitely seems as though it is worthwhile getting that teleprinter properly suppressed for 20m!

Project Oscar

KC4USK reports, via G3DYY, that the Project Net meets on Fridays on 7015 kc/s at 06.30 GMT.

Echo 2 Satellite

Amateurs are asked to send full details to the ARRL of signals believed to have been reflected from the Echo 2 satellite, giving particular attention to variations of signal strength or tone. Reports should state whether circular polarization was used and details of tracking systems used should be given. Recordings should not be sent unless specifically requested.

CONTESTS DIARY

April 5	– Low Power Contest, (see page 190, March, 1964.)
April 11-12	– CQ WW DX SSB Contest.
April 11-12	– International SP DX Contest.
April 12	– D/F Qualifying Event (Rugby). (see page 190, March, 1964.)
April 18-19	– Helvetia 22 Contest.
April 25-26	– PACC (C.w. and 'phone).
April 26	– D/F Qualifying Event (Newbury). (see page 258.)
*May 2-3	– First 144 Mc/s Portable Contest. (see page 190, March, 1964.)
May 2-3	– OZ CCA (C.w.).
May 9-10	– USSR DX Contest (C.w.).
May 10	– D/F Qualifying Event (Manchester). (see page 258.)
May 16-17	– OZ CCA (Phone).
May 30-31	– CHC/HTH Party.
*May 30-31	– First 420 Mc/s Contest. (see page 258.)

June 6-7	— National Field Day.
June 14	— D/F Qualifying Event (High Wycombe).
June 20-21	— 70 Mc/s Contest.
June 28	— D/F Qualifying Event (Derby).
June 27-28	— RSGB 1250 Mc/s Tests.
*July 4-5	— Second 144 Mc/s Portable Contest.
July 12	— D/F Qualifying Event.
July 19	— D/F Qualifying Event (Wirral).
July 26	— D/F Qualifying Event.
*September 5-6	— V.H.F. National Field Day.
September 13	— D/F National Final.
September 20	— Low Power Field Day.
October 3-4	— RAEN Rally.
October 17-18	— Second 420 Mc/s Contest.
October 31-November 1	— RSGB 7 Mc/s DX Contest (Phone).
November 21-22	— RSGB 7 Mc/s Contest DX (C.W.).
November 28-29	— Second 1·8 Mc/s Contest.
December 5-6	— RSGB 21/28 Mc/s Telephony/Receiving Contests.
December 13	— 70 Mc/s C.W. Contest

** To coincide with Region 1 IARU Contests.*

Society Affairs

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

THE January meeting of the Council was held at Society Headquarters on January 16, 1964, and was attended by Messrs. G. M. C. Stone (President), N. Caws, J. C. Graham, R. C. Hills, E. G. Ingram, R. H. James, A. O. Milne, L. E. Newnham, F. K. Parker, R. F. Stevens, J. W. Swinnerton, R. L. Varney, E. W. Yeomanson (Members of Council), John A. Rouse (General Manager) and A. J. Reynolds (Secretary-Accountant).

Apologies for Absence were submitted on behalf of Mr. H. A. Bartlett, who was in hospital, and Mr. A. D. Patterson.

Welcome to New Council Members

The President opened the proceedings by welcoming Mr. R. H. James and Mr. Louis Varney, newly elected Ordinary Members of Council, and Mr. J. C. Graham, newly elected Zone C Representative.

BBC Broadcast

The Council resolved to place on record its congratulations to Mr. G. M. C. Stone and Mr. John Clarricoats for their excellent broadcast on the History and Future of the Society on the BBC Third Network on December 22, 1963.

Membership

The Council approved 116 applications for membership (68 Corporate and 38 Associate). Approval was also given to 15 applications from Associates for transfer to Corporate grade.

It was agreed to waive for one year the subscription of two members who suffer from blindness.

The Council granted affiliation to Amateur Radio Society (RAF Carlisle), Bagshot and District Amateur Radio Club, Medway Radio Contest Group, and Wimbledon and District Radio Society.

Council Meetings

It was decided to hold meetings of the Council on February 17, March 16, April 13, May 11, June 15, July 13, August 17, September 14, October 12, November 16 and December 17.

Due to pressure on Headquarters accommodation, it was agreed to hold Council meetings at the Kingsley Hotel for three months as an experiment.

Annual General Meeting

After considerable discussion, it was agreed to hold the next Annual General Meeting on Friday, December 18, 1964. Mr. Swinnerton asked to be recorded as voting against the decision to hold the meeting on a Friday, as in his opinion it might limit the attendance of provincial members.

Resignation of Mr. J. Douglas Kay

The Council accepted with regret the resignation of Mr. J. Douglas Kay from the Society's Governing Body, with effect from December 31, 1963, and placed on record the Council's appreciation of his services to the Society.

It was resolved to invite Mr. J. C. Foster to fill the vacancy caused by Mr. Kay's resignation (Mr. Foster has since accepted the invitation).

Zone A Representative

The Council considered the procedure to be adopted to fill the casual vacancy for the office of Zone A Representative and decided that it should be advertised in the February issue of the RSGB BULLETIN. A ballot would be conducted if more than one member were nominated.

Committees

The Committees of the Council were constituted for 1964. (A list of Committee members was published on page 184 of the March issue of the BULLETIN.)

City and Guilds of London RAE Committees

It was agreed to nominate Mr. L. E. Newnham, Mr. W. A. Scarr and Mr. J. W. Swinnerton to represent the Society on the Advisory and Moderating Committees of the City and Guilds of London Institute for the Radio Amateurs' Examination.

Honorary Managers 1964

Mr. A. O. Milne was re-appointed QSL Manager, Mr. R. C. Hills, V.H.F. Manager, and Mr. K. A. V. Hurrell, Certificates Manager for 1964. Mr. M. A. C. McBrayne was re-appointed Honorary Organizer of Slow Morse Transmissions.

Miss A. M. Gadsden

Arising out of a discussion on Miss Gadsden's resignation from the Society's Headquarters Staff with effect from December 31, 1963, it was agreed to open a presentation fund and invite members wishing to contribute to send donations to the President, Mr. G. M. C. Stone.

National Field Day 1964

On behalf of Mr. Patterson, Zonal Representative for Northern Ireland and Scotland, Mr. Caws raised the question of alterations in the scoring system for 1·8 and 3·5 Mc/s contacts in the 1964 NFD event.

It was agreed to ask the Contests Committee to supply for publication extracts of correspondence received in connection with the scoring system after the 1963 event.

Dundalk Convention

It was agreed that the Society should be associated with the Irish Radio Transmitters Society in the organization of the Dundalk Convention to be held at the Ballymascanlan Hotel on April 18, 1964. Mr. Patterson, Zone F Representative, is the organizer of the Convention on behalf of the Belfast RSGB Group and IRTS.

Chairmen of Official Regional Meetings

The Council resolved that the Regional Representative should take the chair at an Official Regional Meeting.

Family Subscriptions

The Council considered a suggestion from a member that "family" (reduced) subscriptions should be available for those cases where a number of persons in the same family resident at the same address wished to be members of the Society, but only require one copy of the BULLETIN. It is considered, however, that considerable difficulties would arise in operating such a scheme.

Resignation of Mr. A. J. Reynolds

The Council agreed to accept Mr. A. J. Reynolds' resignation from the Headquarters Staff with effect from February 14, 1964.

"The Morse Code for Radio Amateurs"

A further reprint of *The Morse Code for Radio Amateurs* was authorized.

Visit of Mr. V. Jovanovic

It was reported that Mr. V. Jovanovic, YU1AO, editor of *Radioamater*, Belgrade, was visiting Britain as a guest of the Central Office of Information. Arrangements were made for Mr. E. W. Yeomanson, Executive Vice-President, Mr. J. C. Graham, Zonal Representative, and the General Manager to meet Mr. Jovanovic.

Reports of Committees

The Mobile Committee met on November 27, 1963, to plan the Society's Mobile Rally programme for 1964.

At its meeting on December 2, 1963, the V.H.F. Committee dealt with v.h.f. contest log sheets, visits of the V.H.F. Manager to V.H.F. Conventions, V.H.F. Operating Awards, beacon stations and certain matters relating to V.H.F. National Field Day, 1964.

The Technical Committee met the following day, December 3, 1963, and discussed BULLETIN articles, new products advertised in the RSGB BULLETIN, and a suggestion that the Society should consider holding weekend courses in specialized Amateur Radio subjects.

On December 9, 1963, the Scientific Studies Committee considered articles for the BULLETIN, the Society's IQSY programme,

(*Continued on page 257*)

Society News

Zone A Representative

Mr. L. N. Goldsbrough, B.Sc., M.A.(Oxon), G3ERB, has been elected unopposed to fill the vacancy in the office of Zone A Representative for 1964.

London Lecture Meeting

Mr. Frank Hyde gave a most interesting lecture on Radio Astronomy at a meeting of the Society held at the Institution of Electrical Engineers on March 13. The talk was illustrated with films and slides, amongst them pictures of the East Grinstead " flying saucer " and a " Venusian." Following the talk, Mr. Hyde answered many questions from the audience.

The chair was taken by the President, Mr. G. M. C. Stone, G3FZL, who had the support of the Executive Vice-President, Mr. E. W. Yeomanson, G3IIR, the Immediate Past President and Honorary Treasurer, Mr. Norman Caws, G3BVG, and Mr. J. W. Swinnerton, G2YS.

A vote of thanks to the lecturer was proposed by Mr. C. E. Newton, G2FKZ.

Resignation of Miss Gadsden

Presentation Fund closes April 11, 1964.

Miss A. M. Gadsden resigned from the Headquarters Staff on December 31, 1963, after more than 34 years' service to the Society.

It is believed that many members would like to contribute towards a presentation to her. This is of course over and above arrangements made by the Council in connection with Miss Gadsden's pension.

Members who wish to contribute are asked to send donations to the President, Mr. G. M. C. Stone, G3FZL, who has agreed to act as treasurer for this presentation, at 10 Liphook Crescent, Forest Hill, London, S.E.23. Cheques should be made payable to G. M. C. Stone, No. 2 A/c.

Silent Keys

We record with sorrow the passing of the following amateurs:

R. Boyd, BRS21661, of Ilford, Essex.

C. J. L. Brown, G3HLT, of York.

George Crossley, G2CGR, of Dewsbury, Yorks.

Dr. Anthony A. Dunlevy, BRS13151, of West Didsbury, Manchester 20.

Gilbert Harris, BRS7466, of Rugby, Warks.

Syd Lee, ex-ZS5MR, of Jersey.

Philip Wade, BRS20520, of Slough, Bucks.

LONDON LECTURE MEETING

Friday, May 1, 1964

" AERIALS "

By H. V. Sims

(Head of Engineering Maintenance Section of the Engineering Training Dept., BBC)

at the

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

Buffet tea 6 p.m. **Lecture 6.30 p.m.**

Another Pirate Fined

On January 21, 1964, at the Court of Old Fletton, Huntingdonshire, Mr. T. M. Proverbs of 144 Broadway, Yaxley, Peterborough pleaded guilty to a charge of using wireless telegraphy apparatus without the necessary licence. He was found guilty, was fined £2 and ordered to pay £3 3s. costs.

Society Affairs (Continued from page 256)

auroral and solar warnings, Project Lerwick and the recording of information concerning auroral propagation.

The Contests Committee on December 12, 1963, dealt with the results of and the report on V.H.F. National Field Day, correspondence from members and arragements for checking the entries received for the RSGB 7 Mc/s DX Contest.

At its meeting on December 13, 1963, the Exhibition Committee dealt with matters relating to the RSGB Radio Communications Exhibition and plans for 1964.

On December 18, 1963, the Finance and Staff Committee discussed the sale of the Society's publications abroad, a proposed History of the Society, problems related to the Staff Pension Scheme, BULLETIN printing charges and budgets for 1964.

The TVI/BCI Committee dealt with a number of members' TVI cases on January 6 and discussed in detail problems in Peterborough arising from a wired television service. In addition, consideration was given to a number of members' aerial mast planning permission cases.

Obituary

H. H. Lassman, G2PX

It is with deep regret that we record the death of Harry Lassman, G2PX, on November 9, 1963.

One of the early pioneers of radio, Harry carried out experiments with Marconi, and in May, 1922, he conducted telephony tests on 360 metres with the Marconi Company, which led to the commencement of broadcasting by the British Broadcasting Company six months later.

For many years he ran a shop in East Ham which was a mecca for radio enthusiasts from a wide area.

In 1960 he was awarded the Society's ROTAB Trophy in recognition of his consistent DX work over a period of many years. G2PX was a founder member of the Radio Amateur Old Timers' Association.

He will long be remembered by his friends in the East London RSGB Group and by his many thousands of contacts over the air.

To his widow and son we offer our deepest sympathy.

G3AAJ

CONTEST NEWS

— RESULTS — REPORTS — RULES —

RSGB 1250 Mc/s Tests 1964

The Council and the Contests Committee hope that the ninth series of RSGB 1250 Mc/s Tests will again attract the support of u.h.f. workers. The Contests Committee would very much like to receive information on routine local contacts during 1963 and 1964 as well as reports on special contacts during the Tests.

The event will have few fixed rules, other than the duration which will be from 17.00 GMT on Saturday, June 27, to 22.00 GMT on Sunday, June 28, 1964, and the provision that all entries must be from fully paid-up Corporate Members of the RSGB and accompanied by the declaration set out below. Entries will be accepted on behalf of individual stations or groups of stations and no limitation is placed on the number of operators or assistants. Entries from receiving stations will be welcome and will be eligible for the award.

The entries will be required to include details of stations heard or worked (with distances) and general observations on the band. A full description of all equipment used should be included and this information and any other evidence submitted of work carried out on the band will be taken into consideration when judging the event. The Contests Committee reserves the right to abstract information for the purpose of preparing a report on the Tests. The entrant submitting the best entry in the opinion of the judges may be recommended to the Council for the award of the *Arthur Watts Trophy*.

Entries must be addressed to the Contests Committee, Radio Society of Great Britain, 28 Little Russell Street, London, W.C.1., and be postmarked not later than July 27, 1964. Entries must contain the following declaration.

I declare that my station was operated strictly in accordance with the rules and spirit of the Tests and I agree that the decision of the Council of the Radio Society of Great Britain shall be final in all cases of dispute.

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

D/F Qualifying Events

Details of the South Manchester Qualifying Event are as follows:

Sunday, May 10, 1964

Organizer: J. A. Elliot, G3KIQ, 2 Pennine Close, Higher Blackley, Manchester 9.

Frequencies and Call-Signs: 1825 kc/s and 1835 kc/s. G3FVA/P, and one other to be announced at the start.

Map: Ordnance Survey, New Popular Edition, Sheet No. 101.

Assembly Point: Werneth Low, Joel Lane, Gee Cross, Hyde, Cheshire (NGR 955924).

Assembly Time: 13.00 BST.

Entries and Tea: Intending competitors should notify the organizer by May 4, stating the number in their party requiring tea. Tea rendezvous will be supplied at the start.

Details of the Newbury Qualifying Event are as follows:

Sunday, April 26, 1964

Organizers: M. P. Hawkins and E. L. Mollart, 17 Spinfield Mount, Marlow, Bucks.

Frequencies and Call-signs: to be announced at the start.

Map: Ordnance Survey, New Popular Edition, Sheet No 158.

Assembly Point: West End of Shotover Lane, NGR 565062.

Assembly Time: 13.00 BST.

Entries and Tea: Intending competitors should notify the organizers by April 20, stating the number in their party requiring tea.

DUNDALK CONVENTION

Ballymascanlan Hotel, Dundalk

SATURDAY, APRIL 18, 1964

The programme will commence at 2 p.m. and will include a talk on "Transmitting Aerials" by H. V. Sims, (Head of Engineering Maintenance Section, BBC) and a number of lecturettes on topics of interest. A separate ladies' programme is being arranged.

The Council of RSGB will be represented by the Executive Vice-President, E. W. Yeomanson, G3IIR.

The Convention Dinner will be at 7.30 p.m. Tickets, price 30/- each, and further information may be obtained from A. F. McNamara, EI8A, 11 Shanowen Drive, Whitehall, Dublin, 9, or from S. H. H. Foster, GI3GAL, 31 Belmont Park, Belfast.

Organized by Belfast RSGB Group in conjunction with the Irish Radio Transmitters' Society.

First 420 Mc/s Open Contest 1964

Members taking part in this contest are recommended to operate between 432-434 Mc/s in accordance with the British Isles 70cm Band Plan. As stations in this contest can work from more than one location they have the advantage of claiming the score for the best contact with any particular station. This applies equally to static stations who may work them at more than one site.

This contest coincides with the IARU Region I U.H.F. Contest.

1. When: 18.00 GMT on Saturday, May 30 to 18.00 GMT on Sunday, May 31, 1964.

2. Station Locations: Stations may be operated from more than one site but the National Grid Full Six Figure reference must be recorded in the log for each location in the case of entries from G, GD, GM and GW. in all other cases, entrants must show latitude and longitude.

3. The General Rules relating to RSGB Contests, as published in the January, 1964 issue of the RSGB Bulletin, will apply except as superseded by the rules of the Contest.

4. Eligible Entrants: All fully paid-up members of the RSGB resident in Europe. Multiple-operator entries will be accepted provided only one call-sign is used.

5. Contacts: May be made on either A1, A3, A3a or F3.

6. Scoring: One point per mile.

7. Contact Exchanges: RST (RS) reports followed by the contact number and location (e.g. RST559001 SNE Wigan). This location must be identifiable on the 10 mile to the inch Ordnance Survey Map.

8. Logs: (a) Must be tabulated in columns headed (in this order) " Date/Time (GMT)," " Call-sign of station contacted," " My report on his signals and serial number sent," " His report on my signals and serial number received," " Location of station contacted as received," " Points claimed."

Logs must show clearly when station locations are changed.

(b) The cover sheet must be made out in accordance with RSGB Contests Rule 5 and the declaration signed. The NGR and locations of the station as transmitted must be given on the cover sheet.

(c) Entries must be postmarked not later than Monday, June 15, 1964.

9. Awards: At the discretion of the Council, a **miniature cup** will be awarded to the winner and **certificates of merit** to the runner-up, the leading portable station and to the non-transmitting member submitting the best check log in the opinion of the Contests Committee.

NATIONAL FIELD DAY 1964

FINAL DATE FOR ENTRY—APRIL 29

Members responsible for stations participating in this year's NFD, to be held on June 6-7, are reminded that details of call-signs and frequencies to be used, together with the name of the group, club or affiliated society concerned, must reach the Contests Committee at RSGB Headquarters not later than Wednesday, April 29, 1964. The information should be set out as shown in Rule 6. on page 381 of the December 1963 issue of the RSGB BULLETIN.

RSGB 21/28 Mc/s Telephony Contest 1963

The eighth RSGB 21/28 Mc/s Telephony Contest once again was mainly a contest on 21 Mc/s. In spite of the very few 28 Mc/s contacts reported, scoring was about 25 per cent greater than last year. However, the number of entries fell sharply from G stations, 24 against 55 while overseas entries increased from 30 to 40. There were contacts with more than 300 Gs reported in the overseas logs and the Contests Committee was rather disappointed with the UK entry as after all said and done the Contest was arranged mainly for their benefit.

The Whitworth Trophy was won by Lt. Col. N. I. Bower, G5HZ, with a score of 2615 points while the leading overseas entrant, for the second year running, was D. S. Roden, ZB1BX, 230 points behind. G5HZ was third last year and fourth in 1961. A. E. White, G3HCU, was runner-up in the UK placings as he was in 1961 and 1962, but this year he was followed by J. Readings, G3KFT, who held fourth place last year.

The overseas runner-up was Yura Chernomoretz, UB5FG, followed by M. Dransfield, 5N2JKO, with scores of 2097 and 1756 points respectively.

In the receiving section there was a very close contest for the Metcalfe Trophy between three competitors, as happened last year. This year the result was even closer, D. Gray, A2498, with a score of 1923 points winning first place from D. S. Kendall, BRS24643, and A. Withers, BRS14252, who both scored 1908 points.

Once again, the multi-operator section was very poorly supported. Royal Signals Amateur Radio Society, Catterick, G3CIO, were the leaders with 1601 points while UB5KCA was the overseas leader with 1055 points.

There were very few comments made this year and those that were made were generally to the effect that it was a very enjoyable contest. There was not a single comment on the rules so the Contests Committee hopes that everybody is happy with them.

The standard of logs was very good, particularly in the Receiving Section. The thanks of the Contests Committee go to all the contestants for the care taken, and good handwriting used in preparing their entries. A neatly written log is so much easier to check.

However, the Contests Committee do ask any intending entrants to future Receiving Contests to please read the rules carefully and to add up their scores correctly. Several entrants will find their recorded scores higher than they claimed owing to bad casting and/or not claiming enough bonuses. Likewise several have been reduced for claiming too many bonus points and/or casting errors. Also please remember one can claim points only for overseas stations working UK stations in the contest.

Check logs from G2DP, G3MTB and BRS24825 are gratefully acknowledged.

RESULTS

Call-sign	Points	Posn. Home	Posn. Overseas
G5HZ	2615	1	
ZB1BX*	2385		1
G3HCU*	2343	2	
G3KFT	2127	3	
UB5FG*	2097		2
G2QT	1865	4	
5N2JKO*	1756		3
ZB1CR	1745		4
G3HS	1455	5	
G3LHJ	1425	6	
OH5SM*	1400		5
4X4MJ*	1358		6
G2DC	1340	7	
5H3IW*	1293		7
G2JB	1245	8	
G3BXS / G3PZO	1190	9	
GM3NPR*	1130	11	
YO4WU*	1110		8
VQ4AA*	1060		9
G3CAZ	1020	12	
5N2RSB	990		10
G3VW	965	13	
OH8YL	965		11
G3PRP	918	14	
VE2AFC*	870		12
5B4RA*	855		13
UA3KWB*	852		14
VK6QL*	747		15
VP7NX*	630		16
G2AJB	620	15	
I1RIZ*	605		17
G3NLY	600	16	
VP9BY*	600		18
GW2HFR*	585	17	
G3FLS / GM3MOR	550	18	
OH5UX	520		19
G3BHF	510	20	
G3RUV	505	21	
W3HQO*	505		20
G2BLA	460	22	
VE1TG*	460		21
K2UTC*	455		22
VE2BV	450		23
G3MWZ	420	23	
G2DXK	395	24	

Call-sign	Points	Posn. Home	Posn. Overseas
W4EEO*	383		24
K1RQE*	357		25
VE3BMB*	353		26
WA2QMC	328		27
CO8RA*	317		28
VE3CBY / VK3QV*	310		29
5B4JF	255		31
VK6RE	240		32
UA3RB	235		33
VE1YB	228		34
W1FDL	205		35
ZD7BW*	170		36
UD6DU* / W2MNW	133		37
VK2AKV*	70		39
UA3QBU	55		40

Multi-Operator Section

G3CIO*	1601	1	
G3LHZ	1495	2	
UB5KCA*	1055		1
LZ1KSP*	435		2

* Certificates.

Receiving Section

Posn.		Points	Posn.		Points
1	A2498	1923	20	A2886	1000
2	BRS14252*	1908	21	A2966	970
2	BRS24643*	1908	22	BRS23115	955
4	BRS24733	1867	23	A2949	935
5	A. Hewett	1760	24	SM4-3415*	905
6	BRS21008	1745	25	BRS18461	810
7	A2122	1635	26	A2861	765
8	BRS24957	1632	27	A2821	755
9	BRS22844	1620	28	A3297	610
10	A2461	1540	29	A3304	537
11	BRS22445	1533	30	A3409	445
12	A1798	1515	31	BRS25387	340
13	BRS21624	1340	32	NL455*	335
14	BRS20249	1230	33	M. Caracas*	330
15	A2111	1210	34	R. N. Biggs	325
16	BRS15822	1180	35	BRS25204	275
17	BRS19682	1150	36	DEA.21083-D08*	115
18	A3812	1060	37	WIA-L6021*	85
19	BRS24962	1045			

* Certificates.

CLUBROOM

A Monthly Survey of Group and Club Activities

News from the Newsletters

Constructional details for an economical /P transmitter for 430 Mc/s are given in the *QAV Technical Supplement*. The *Cornish Link* prints information on a 2m converter. The Cray Valley *Newsletter* reports progress with the Sea Cadets: an AR88 has been acquired. The First Class Operators' Club *Circular Letter No. 191* prints a useful table of component values for pi-networks based on a *Q* of 12 and an output load of 72 ohms. The Reigate *Feedback* quotes a report in the *Surrey Mirror* which referred to " Reigate's 23 Radio Stations." The South London Mobile Club's *Newsletter* gives information on modifying the RF26 Unit for 10m and also a mobile modulator using transistors. Enfield's *Newsletter* reports a c.w. station signing GR0AN and working under a special licence on the island of Rockall.

Club Reports

Aeriel Radio Group. At the AGM of the London Sections of the Group the following officers were elected: President, R. C. Patrick, G2BBX; Chairman, B. A. Toms, G3BBU; Vice-Chairman (TV), A. Wright, G3IWR; (BH) P. B. K. Pierson, G3MVM; (Bush) W. F. Williams, G3RFJ; Treasurer, A. H. B. Bower, G3COJ; Honorary Secretary, H. M. Tainton, G2BCI, c/o 14a Cavendish Place, London, W.1. R. C. Hills, G3HRH, continues as Liaison Officer with the regional members and clubs which now include G3SUT (Sutton Coldfield) and G3SWB (Caversham).

Blackpool & Fylde ARS. At the AGM the following were elected: President, F. W. Pontin; Chairman, D. Taylor, G3OPT; Secretary, J. Boulter, G3OCX, whose address is 175 West Drive, Cleveleys, Blackpool, Lancs.; Treasurer, B. Yates; Committee Members: J. Newland, G5ND; A. Floyd, G3PNQ; P. Sinclair.

Cambridge & District ARC. At a recent meeting a representative of Cathodeon Crystals gave a most interesting illustrated lecture on the processing and mounting of crystals. A " Transparencies Evening " resulted in the showing of members' slides from the Far East, USA, and most countries in Europe. On the only informal evening during the month, the attendance was almost an all-time record and included a number of new members.

Chester and District ARS. The Committee met on March 2 when the following programme was planned: April 7, " Net Night " on 160m and 2m; April 14, talk on the HRO by G3JAZ; April 21, judging of Construction Contest by G3CSG; April 28, " Getting going on Two " by G3EWZ. The Press Secretary is P. J. Holland, A3784, Field House, 19 Kingsley Road, Gt. Boughton, Chester.

Civil Service RS. A very enjoyable and informative lecture, illustrated by slides, on the " Construction and Manufacture of Radio Valves " attracted a good attendance. The lecturer was G. C. Playford, Development Engineer-in-Charge of A.E.I.-Thorn Ltd. Also included was an excellent film on simple transistor theory and practical applications. The AGM will be held on April 6. There will be an informal meeting on April 20 at which G3BTM will speak on Transmitter Design and TVI. Members have been operating GB2SM in the recent ARRL DX Phone Contest and it is hoped to mount a full-scale effort in the forthcoming *CQ* WW S.S.B. DX Contest in April. Visitors are welcome to all meetings. Honorary Secretary: G. Lloyd-Dalton, 2 Honister Heights, Purley, Surrey.

Conway Valley RC. Members attended the Post Office lecture by Mr. Ray on " Satellite Communication " which was held at Chester on February 10. On February 13 the club visited the telephone exchange at Llandudno. Arrangements are well in hand for NFD. Monthly meetings continue to be held on the second Thursday of each month at the Albert Hotel, Llandudno. Honorary Secretary: B. Clark, GW3HGL, Meadfoot, Tan-y-Bryn Road, Colwyn Bay.

Dorking and District RS. The society will meet at the " Wheatsheaf," Dorking, on April 14 for a discussion on " Operating Technique," and on April 28 for NFD planning. Visitors will be welcomed to the former, and spies thrown out of the latter! Further information may be obtained from the Public Relations Officer, R. Cathles, G3NDF, 4 Dawnay Road, Gt. Bookham, Leatherhead, Surrey.

Crawley ARC. The fourth Annual Dinner was held at Tilgate on March 6 when there was an attendance of 53. Recent activities included a lecture by G6CL on " International Amateur Radio," and a visit to the Thames South Control Room of the CEGB. The next meeting will be on April 29 when there will be a hi-fi stereo demonstration by G3FZL and G3IIR. Visitors are always welcome to meetings, details of which may be obtained from the Honorary Secretary, R. G. B. Vaughan, G3FRV, 9 Hawkins Road, Tilgate, Crawley, Sussex.

Derby & District ARS. The AGM was held on February 5. A very successful Annual Dinner and Dance was held on February 15 and was attended by over 150 members and friends. Weekly meetings are held, details of which may be obtained from the Honorary Secretary, F. C. Ward, G2CVV, 5 Uplands Avenue, Littleover, Derby.

East Kent RS. The club took part in the RSGB AFS Contest, and members were generally satisfied with the results obtained. Two members who took the last RAE were both successful. A lecture planned for the future is one on the " Deltahet " by G3MDO. Meetings are held every Tuesday at 7.30 p.m. at the Technical College, Longport Street, Canterbury, and new members and visitors are always welcome. Details of the future programme may be obtained from the Honorary Secretary, D. N. T. Williams, Seletar, New House Lane, Canterbury, Kent.

East London Group. Arthur Milne, G2MI, recently gave a most informative talk entitled " Geneva, its relationship with Amateur Radio." It presented to many their first insight into the workings of international conferences and emphasised that retention of the amateur frequency allocations had to be fought for. Details of meetings from M. McBrayne, G3KGU, 25 Purlieu Way, Theydon Bois, Essex.

Flintshire RS. There was a record attendance at the meeting held on February 25 when Dr. H. J. Roberts of UCNW, Bangor, gave a talk on " Noise in Receivers." This included a demonstration of noise measurement on a 2m converter. On April 28 there will be a monochrome and colour Amateur TV demonstration. Weekly slow Morse classes are now being held and details of these and of meetings which are held on the last Tuesday of each month may be obtained from the Honorary Secretary, A. Antley, Fairholme, Fairfield Avenue, Rhyl, Flintshire.

The first Dinner of the South Shields Amateur Radio Club was held on February 11. Back row (left to right): G3PVD, G3NOQ, XYL of G3PRE, G3KZZ, G3PRE, ZL3HD. Front row (left to right): G2BCY, XYL of G2BCY, Miss Pauline Summers, BRS20185, XYL of G3SFL, and G3SFL.

(Photo by courtesy of the Shields Gazette)

Lothians RS. There have been lectures on the uses of silicon planar transistors and the merits of s.s.b. A number of members paid a visit to the Falkirk Radio Club on February 28 and enjoyed a pleasant evening. Honorary Secretary: L. R. Richardson, GM3AKM, 39 Silverknowes Grove, Edinburgh, 4.

Manchester & District RS. The second heat for the selection of the Club Quiz Team was held and G3JIJ and G3IOA now go on to the finals. On February 26 a most entertaining lecture was given by G3OAG on electronic musical effects. Honorary Secretary: D. H. Poole, BRS25698, 215 Greengate, Middleton Junction, Manchester.

Northern Heights ARS. The AGM will be held on April 15. On April 29 there will be a talk on medium wave DX by D. Howell. A junk sale has been arranged for May 13, and on May 27 there will be a talk on transistors by G3UI. Members were recently guests of the Bradford RS for a demonstration of colour TV. Honorary Secretary, A. Robinson, G3MDW, Candy Cabin, Ogden, Halifax, Yorks.

Peterborough. There was a film show at the February meeting. Meetings are held on the first Friday in each month in Room 13, Electronics Block, Peterborough Technical College. Honorary Secretary: D. Byrne, G3KPO, Jersey House, Eye, Peterborough.

Preston ARS. On Tuesday, February 25, members welcomed J. Hallatt, G3DBY, who gave a very interesting talk on the subject of radio interference suppression and aerial filters. Meetings are held on the second and fourth Tuesdays of each month and all are welcome to attend. Details may be obtained from the Honorary Secretary, W. K. Beazley, G3RTX, 9 Thorngate, Penwortham, Preston, Lancs.

Reading ARC. The meeting to be held on April 25 will be devoted entirely to the SWL. A surplus equipment sale will take place on May 30. The first Mobile Picnic of the year will be held in conjunction with the Mortimer Motor Cycle Club's Scramble on July 12 at Raghill Farm, Padworth Common, near Aldermaston. Meetings are held at the Palmer Hall, West Street, Reading, at 7.30 p.m. on the last Saturday of each month. Honorary Secretary: R. G. Nash, G3EJA, Peacehaven, 9 Holybrook Road, Reading, Berks.

Reigate Amateur Transmitting Society. 49 members and friends, including seven from Crawley ARC, attended the Annual Dinner and Dance at the Warwick Hotel, Redhill, on February 15. The guest of honour was W. H. Matthews, G2CD, Chairman of the Contests Committee, who was accompanied by Mrs. Matthews. The first meeting at the new clubroom at the " George and Dragon," Cromwell Road, Redhill, will be at 7.30 p.m. on April 18, when there will be a selection of films from the library of the Electrical Development Association. Prospective members, and visitors from other clubs, will be warmly welcomed. Honorary Secretary: F. D. Thom, G3NKT, 12 Willow Road, Redhill, Surrey.

Royal Naval ARS. It is planned to operate GB3RN from HM Dockyard, Portsmouth, during the August Navy Days. Anyone prepared to help with this, or wishing to join the RNARS, should contact the Secretary, RNARS, HMS *Mercury*, Petersfield, Hants.

Scarborough ARS. Meetings are held every Thursday at 8 p.m. at the club's premises in Chapman's Yard, North Street. These premises will have to be vacated in the near future owing to redevelopment, and the search continues for suitable alternative accommodation. The month's programme is as follows: April 2, surplus gear sale; April 9, talk on the HRO by G3PEJ; April 16, talk on " Light " by G5VO; April 23, planning for NFD; April 30, visits to local amateur stations. Press Officer: F. Postlethwaite, G5KA, 11 Alma Square, Scarborough, Yorks.

South Dorset RS. At the March meeting, members' own 8mm films were screened as a break from normal procedure. A social evening held on February 28 was well supported by members and YLs and XYLs. A visit to Dorchester Brewery has been arranged for the evening of April 28. Honorary Secretary: C. E. Biggs, G2TZ, 54 Prince of Wales Road, Dorchester, Dorset.

Southgate, Finchley & District Group. At a recent meeting, C. Jardine, G5DJ, gave a talk on cables and showed examples of some really large co-axial types. On February 20 the first of a new venture called the " Second Evening " was held and was attended by about 12 SWLs and amateurs. Slow Morse practice was held, and there was a demonstration of operating a 2m station. On April 9 there will be a talk by a representative of Acos Ltd. The next " Second Meeting " takes place on April 23. Meetings are held at 7.30 p.m. for 8 p.m. at Atlasta Lodge, Tottenhall Road, Palmers Green, London, N.13. Publicity Officer: R. D. Mason, BRS25695, 28 Shrubbery Gardens, Winchmore Hill, London, N.21.

South Shields & District ARC. Meetings are held every Friday at 7.30 p.m. at Trinity House, Laygate, South Shields. The club station, G3DDI, is in operation and several DX contacts have been made. The club news bulletin, *Spectrum*, is issued to members each month and a library of technical books and magazines for the use of members has been installed in the clubroom. Recent activities have included a transmitting and receiving contest on 160m and 80m, the First Annual Dinner, a radio quiz, a junk sale, and a film show by G3OOR, ex-VP4DR, on his stay in the West Indies. A full programme has been arranged for the summer months. Visitors and new members will always be welcomed at all meetings. Honorary Secretary: D. I. Forster, G3KZZ, 41 Marlborough Street, South Shields, Co. Durham.

South Yorkshire ARS. The Annual Dinner was held on February 1 and was attended by 30 members and their wives. The draw for the prizes kindly donated by manufacturers took place after dinner. Meetings are held at the Lord Nelson Hotel, Cleveland Street, Doncaster, and details may be obtained from the new Honorary Secretary, J. M. Heath, BRS20337, 235 Thorne Road, Wheatley Hills, Doncaster, Yorks.

University College of North Wales ARS. A most enjoyable meeting took place on February 18 when D. G. Whitehead, GW3FDZ, gave a talk on " Life on the Dew Line." A colour film, with stereo sound, taken by him in the Arctic, was greatly appreciated by the record attendance of over 60. On February 19 a party of 35 members visited the Post Office Anglesey Radio Station. Meetings are held in the Department of Electronic Engineering, Dean Street, Bangor, and all local amateurs and SWLs are welcome. Details of future meetings may be obtained from the Honorary Secretary, M. J. English, c/o Dept. of Electronic Engineering, UCNW, Dean Street, Bangor.

Uxbridge RS. Plans are being made for NFD and assistance will be very welcome. On April 20 there will be a lecture on Aeronautical Communications and Control Tower Procedures. Meetings are held at St. Andrews Church Scout Hut, Uxbridge Road. Further details may be obtained from the Honorary Secretary, A. Duell, Treetops, Bakers Wood, Denham, Bucks.

Welwyn Garden City. At the February meeting a crowded gathering heard G. Watts, of the Murphy Electronics Laboratory talk on " Microminiaturization." Semiconductor modules were shown, so small that the multitude of components and transistors on them could be seen only through a microscope. The March meeting was the annual constructors' competition. The group now has two trophies available from S. Harrison, G3EPK, a Junior Cup for members under 21 and a Senior Cup for those over 21.

Wimbledon & District RS. Meetings are held on the second Friday of each month at 8 p.m. at the Community Centre, 28 St. George's Road, Wimbledon, London, S.W.19. This club was started last August with six members and now numbers 42.

Wolverton & District RC. V. Hartop, of J-Beam Aerials Ltd., gave an interesting lecture at a meeting held on February 7. The talk lasted two hours and ranged from log aperiodic to 10-element Yagis. At the AGM held on February 21, G3NOC was re-elected Chairman, and G3LCS was re-elected Honorary Secretary/Treasurer.

Worthing & District ARC. Meetings are held on the second Monday of each month (except August) at 8 p.m. at the Adult Education Centre, Union Place, Worthing. The February meeting took the form of a lecture by J. Packer on Ascension Island and was illustrated by film slides and tape recordings. Details of future meetings may be obtained from the Publicity Officer, R. J. Avis, 62 Normandy Road, Worthing, Sussex.

Yeovil ARC. During February, two lectures from the RSGB Tape Library were heard, and C. Atkins gave a lecture on " The Working and Uses of Oscilloscopes." The club hopes to be " on the air " a little more often and reports and QSOs are always welcome. Press Officer: R. K. Parkhurst, 56 Cromwell Road, Pen Mill, Yeovil, Somerset.

Club of the Month

CAMBRIDGE AND DISTRICT AMATEUR RADIO CLUB

Cambridge has been a very lively centre of amateur activity for very many years, and the call-signs of some of its old-timers were certainly among the best known on the h.f. bands since long before the war. From a very active RSGB group the

present club was formed around 1950. Until some two years ago, the club meetings were held at " The Jolly Waterman," but as the membership increased and came to include several younger members, the possibility of securing permanent club premises, offering more scope for practical work, became a first priority.

The City Corporation was approached, and was quite sympathetic, but before the formalities for the leasing of a property could be completed, the offer had to be withdrawn, and the search started all over again. At last a war-time decontamination centre was rented, and for many weeks the Radio Club became a " Do it Yourself " Club. A new floor was laid and tiled, brick-laying, plastering, carpentry, and wiring were tackled with enthusiasm. Then on January 27, 1961, the Official Opening was performed by Mr. L. E. Newnham, B.SC., G6NZ, a Member of Council.

The Club is open on Friday evenings, and the club station holds the call-sign G3PKF.

The Cambridge Committee for Education has been most generous in loaning a most comprehensive kit of tools, folding tables, blackboard and easel, and sundry other items. There has always been a close liaison with the Cambridge University Wireless Society, whose meetings are open to club members.

Although the Pye Telecommunications Amateur Radio Group has now been formed, the Cambridge and District Amateur Radio Club continues to flourish, with a steady but encouraging growth in numbers, and the scope of its activities.

An inter-club picnic at Houghton Mill, Huntingdonshire, attended by members of the Cambridge & District, March, Shefford and Peterborough Clubs. G3IIT/M is sitting by the mast, while G2CDX (Chairman) and G5BQ (President) of the Cambridge Club are chair-borne. Others in the group are G3PEI (Secretary), G3IAG and G8QM.

(Photo by G3RGX/T)

Silver Plating. Green and Davis, 5 Weir Hall Gardens, London, N.18, offer a service to amateurs for the silver plating of metalwork. Interested constructors should write to Green and Davis for fuller details.

Heathkit Oscilloscope Kit, IO-12U. Daystrom Ltd., Gloucester, are producing a new kit for a 5 in. flat face general purpose oscilloscope kit. Consistency of results is achieved through the use of printed circuits and pre-formed cable harnesses. It has a vertical channel response of ± 3db from 3 c/s to 4·5 Mc/s, falling to −5db at 5 Mc/s, the rise time being 0·08 microseconds or less. The sensitivity is 10 mV r.m.s./cm. Time base frequencies between 10 c/s and 500 kc/s are covered in five steps, and a sync. input can select either positive or negative pulses. A switched attenuator, phasing control, stabilized power supply, and an output for a wobbulator are also incorporated. The price of the kit is £32 12s. 6d., or, pre-constructed, £41 10s.

Ten Pin Double-Pentode PFL200. A new double-pentode primarily intended for use in TV receivers is being manufactured by Mullard Ltd., Mullard House, Torrington Place, London, W.1. The ten pin B10B (decal) base allows two completely separate pentodes to be incorporated in one envelope. One section is a high gain frame-grid type, designed as a video output stage providing a high signal voltage across a low value anode resistor. The gm is 21mA/V at 30mA. The other pentode is a medium-slope voltage amplifier capable of passing an adequate current at a low anode voltage.

Metal Film Resistors. The Dubilier Condenser Co. Ltd., Ducon Works, Victoria Road, North Acton, London, W.3., has introduced a range of metal film resistors in five wattage ratings, with values between 30 ohms and 10 Megohms, subject to range limitations per wattage size. The available tolerances are ± 1 per cent (standard), 0·5 and 0·1 per cent. The noise level is low at 0·1 μV/V, and they are non-inductive up to 100 Mc/s, except for the low value high wattage types.

Cambion Components. Cambion Electronic Products Ltd., well known in North America for their range of high quality electronic components, have recently opened a works near Sheffield to cover the UK market. The range of items manufactured by Cambion includes terminals, coil forms, coils, chokes, capacitors, connectors, clips, hardware and tools. Retail enquiries concerning Cambion products may be addressed to Green and Davis, 5 Weir Hall Gardens, London, N.18.

Taylor Multimeter Model 101. Taylor Electrical Instruments Ltd., Montrose Avenue, Slough, have announced the production of a new high-sensitivity multimeter type 101. The self-contained ranges extend from (f.s.d.) 10 μA to 10 A, 0·5 to 1000 volts d.c. at 100,000 ohms per volt, 10 to 1000 volts a.c., and 2K ohms to 200 Megohms resistance. The basic movement is 7 μA f.s.d., and is temperature compensated. A mirror arc is included on the 5 in. scale, which is calibrated in three colours.

GB2RS SCHEDULE

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

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

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

Can You Help?

- E. A. Bovey, BRS19530, 1 Chapel Lane, Dartmouth, Devon, who would like to buy or borrow a copy of the manual for the Test Set No. 253?
- A. E. Harvey, G3IUG, 39 Curlieu Road, Oakdale, Poole, Dorset, and R. W. P. Wilson, 14 Edgecumbe Park Drive, Crowthorne, Berks., who require the manual and/or circuit diagram for the B44 Mk. II transmitter-receiver?
- A. Walker, G3DAR, " Lyndhurst," 463 Idle Road, Bradford 2, who requires circuit details of the Indicator Unit Type 248 (part of Monitor 56)?

Forthcoming Events

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

LOOKING AHEAD

April 18.—Dundalk Convention at Ballymascanlan Hotel, Dundalk, Eire.
May 1.—London Lecture Meeting at IEE.
June 14.—Hunstanton "Bucket and Spade Party."
August 30.—G6UT's Ham Party.
September 20.—Surrey Radio Contact Club 2m D/F Hunt.
October 28-31.—RSGB Radio Communications Exhibition.
December 18.—RSGB Annual General Meeting.

REGION 1

Ainsdale (ARS).—April 15 (S.S.B. Night), April 29 (Tape Lecture on Operating), 8 p.m., 77 Clifton Road, Southport.
Blackburn.—Fridays, 8 p.m., West View Hotel, Revidge Road.
Blackpool (B & FARS).—Mondays, 8 p.m., Pontins Holiday Camp, Squires Gate.
Bury (BRS).—April 14 ("The Other Man's Station"), 8 p.m., Knowsley Hotel, Kay Gardens.
Chester.—Tuesdays, 8 p.m., YMCA.
Eccles (E & DAC).—Tuesdays, 8 p.m., The Congregational Mission Church, King Street.
Liverpool (L & DARS).—Tuesdays, 8 p.m., Gladstone Mission Hall, Queens Drive, Stoneycroft.
Macclesfield.—April 14, 28, 42 Jordongate.
Manchester (M & DARS).—Wednesdays, 7.30 p.m., 203 Droylsden Road, Newton Heath, Manchester 10.
Manchester (SMRC).—Fridays, 7.45 p.m., Rackhouse Community Centre, Rackhouse, Daine Avenue, Northenden.
Morecambe.—April 1, May 6, 125 Regent Road.
Preston.—April 14, 28 (All meetings start with a Morse practice at 7.30 p.m.), St. Paul's School, Pole Street.
Southport (SRS).—Wednesdays, 8.30 p.m., Sea Cadets' Camp, The Esplanade.
Stockport.—April 8, 22, May 6, The Blossoms Hotel, Buxton Road, Stockport.
Wirral.—April 1, 15, May 6, 7.45 p.m., Harding House, Park Road West, Claughton.

REGION 2

Barnsley.—April 10 (Tape Lecture on "S.S.B." by R. Bray, G3KEL), 7.30 p.m., King George Hotel, Peel Street.
Bradford.—April 7 ("Simple Transmitters," by D. M. Pratt, G3KEP), 66 Little Horton Lane, April 28 (Visit to ITA Emley Moor Television Station).
Catterick.—Tuesdays and Thursdays, 7.30 p.m., Clubroom, Vimy Road.
Halifax.—April 28 ("Around my Shack," by J. Platt, G2VO), Beehive and Cross Keys Hotel, King Cross Lane.
Northern Heights.—April 15 (AGM), April 29 ("Medium Wave DXing," by D. Howell), 7.30 p.m., Sportsman Inn, Ogden.
Scarborough.—Thursdays, 7.30 p.m., Chapman's Yard, North Street.
Spen Valley.—April 9 (Visit to Leeds and Bradford Airport), April 15 (Visit to Leeds Radio Club), April 16 ("Telstar," by H. Tomlinson), April 25 (Annual Dinner at Batley Park Cafe), April 30 ("Amateur Radio Gear," by T. H. Withers), Heckmondwike Grammar School.
York.—Thursdays, 8 p.m., British Legion Club, Micklegate.

REGION 3

Birmingham (MARS).—April 21 ("Hints for Amateur Workshop Practice," by E. Shackleton and G. V. Farrance), 7.30 p.m., Midland Institute, Paradise Street, Birmingham. **(MRCC).**—April 3, May 1, 7.30 p.m., Windmill House, Weatheroak, Wythall, Birmingham. **(Slade).**—April 10, 7.45 p.m., The Church House, High Street, Erdington. **South.**—April 16 (Lecture and Demonstration by G3JAO), Friends' Institute, Balsall Heath. Acting Honorary Secretary is A. E. Bishop, 40 Cecil Road, Birmingham 29.
Cannock (CCARS).—April 2, 8 p.m., The Tavern, Bridgtown.
Coventry (CARS).—Mondays, 8 p.m., Westfield House, Radford Road, Coventry.
East Worcestershire Group.—April 9, 8 p.m., Old People's Centre, Redditch.
Lichfield (ARS).—April 21, 7.30 p.m., Swann Inn, Lichfield.
Mid-Warwickshire (ARS).—April 6 ("Coils," by J. Boyce, G3PZA), April 20 ("Short Wave Listening," by C. R. S. Smith, BRS18612), 7.30 p.m., Civil Defence Training School, Harrington House, Newbold Terrace, Leamington Spa.
Salop (ARS).—April 13, 7.30 p.m., The Tennis Club, Harlescott Crescent, Harlescott Lane, Harlescott, Shrewsbury.
Stourbridge (STARS).—April 14, 7.45 p.m., Foley College, Stourbridge.
Stratford-upon-Avon (ARS).—Fridays, 7.30 p.m., Flat 1, Bird's Commercial Motors, Stratford-upon-Avon.
Sutton Coldfield (ARS).—April 10, 7.30 p.m., The Parade, Sutton Coldfield.
Wolverhampton (ARS).—Mondays, 8 p.m., Neachells Cottage, Stockwell End, Tettenhall.

REGION 4

Burton-on-Trent (ARS).—Wednesdays, 7.30 p.m., Club Rooms, Stapenhill Institute, Burton-on-Trent.
Chesterfield (C & DARS).—April 8, May 6, 7.30 p.m., Newbold Observatory, Newbold Road, Chesterfield.
Derby (D & DARS).—April 1 (Surplus Sale), April 8 (Film Show), April 15 (D/F Practice Run), April 22 ("The RSGB," by F. C. Ward, and "The ISWL," by B. J. C. Brown), April 29 ("N.B.F.M. and V.H.F.," by J. Anthony), May 6 (Surplus Sale), 7.30 p.m., Room No. 4, 119 Green Lane, Derby. **(DSW Exp. S).**—Fridays, 7.30 p.m., Sundays, 10.30 a.m., Club Rooms, Nunsfield House, Boulton Lane, Alvaston, Derby.
Grantham (G & DARS).—Mondays, 7.30 p.m., Club Room rear of Manners Arms Hotel, London Road, Grantham.
Grimsby (ARS).—April 9 (TVI and BCI Lecture), April 23 (Film Show), 8 p.m., Grimsby Model Engineers' Club Rooms, Fletcher's Yard, Wellowgate, Grimsby.
Heanor (H & DARS).—Tuesdays, 7.30 p.m., Room No. 5, Heanor Technical College, Ilkeston Road, Heanor.
Leicester (LRS).—Mondays, 7.30 p.m., Club Room, Old Hall Farm, Braunstone Lane, Leicester.
Lincoln (LSWC).—First Wednesday in each month, 7.30 p.m., Lincoln Technical College, Cathedral Street, Lincoln.
Loughborough (RCL).—Fridays, 7.30 p.m., Corporation Hotel, Wharncliffe Road, Loughborough.
Mansfield (MRC).—Fridays, 7.30 p.m., Hope and Anchor Hotel, Union Street, Mansfield.
Melton Mowbray (ARS).—April 23 (A Visit to G4MK's Shack), 7.30 p.m., 20 Iris Avenue, Birstall.
Nottingham (ARCN).—Tuesdays, Thursdays, Room No. 3, Sherwood Community Centre, Woodthorpe House, Mansfield Road, Sherwood.
Northampton (NSWC).—Thursdays, 7 p.m., Allen's Pram Works, 8 Duke Street, Northampton.
Peterborough (P & DARS).—April 10, 7 p.m., Room No. 13, Electronics Block, Peterborough Technical College, Eastfield Road.
Worksop (NNARS).—Tuesdays (Beginners), Thursdays (Informal), 7.30 p.m., Club Room Victoria Institute, Eastgate, Worksop, Notts.

REGION 5

Cambridge (C & DARC).—April 3 (Annual Dinner), West House Hotel, West Road, 7.30 p.m., for 8 p.m. Guest of Honour will be G6UT. Meetings on Fridays, 7.30 p.m., Club Headquarters, Corporation Yard, Victoria Road.
Cambridge University (CUWS).—Meetings are now suspended until the October Term.
Luton (L & DARS).—Tuesdays, 8 p.m., ATC Headquarters, Crescent Road.
March (M & DRAS).—Tuesdays, 7.30 p.m., rear of Police Headquarters, High Street, March, Cambs.
Royston (R & DARC).—April 8 (Film Show), 8 p.m., Royston Secondary School, Garden Walk. Visitors and non-members welcome. Meetings on Wednesdays, 8 p.m., Manor House Social Club, Melbourn Street, Royston, Herts.
Shefford (S & DARC).—April 2 ("Transistors," by P. Wicks, G3ROL), April 9 (Portable Demonstration by W. Bigley, G2AUA), April 16 ("Any Questions? "), April 23 (NFD Meeting and Junk Sale), April 30 (Film Show), 7.45 p.m., Digswell House, Hitchin Road.

REGION 6

Cheltenham RSGB Group.—First Thursday in each month, 8 p.m., Great Western Hotel, Clarence Street.
Wolverton.—April 3 ("Transistor Applications for the Amateur," by G3NOC and G3PBV). No details of venue supplied.

REGION 7

Acton, Brentford & Chiswick (ABCRC).—April 14 ("Comparison Tests on Receivers,' 7.30 p.m., AEU Club, 66 High Road, Chiswick.
Bexley Heath (NKRS).—April 9, 23, 7.30 p.m., Congregational Hall, Chapel Road, Bexleyheath.
Barnet (BRC).—April 28, 8 p.m., Red Lion Hotel, Barnet.
Chingford (Group).—April 3, 17. For details, contact the Hon. Secretary at Loughton 2397. **(SRC).**—Fridays (except first in month), 8 p.m., Friday Hill Community Centre, Simmons Lane.
Croydon (SRCC).—April 14, 7.30 p.m., Blacksmiths Arms, South End, Croydon.
Dorking (D & DRS).—April 14 (Discussion on "Operating Technique,") 8 p.m., "Wheatsheaf," Dorking. April 28 ("N.F.D. Plans"), 8 p.m., Star & Garter, Dorking.
East Ham.—April 7, 21, Tuesdays fortnightly, 7.30 p.m., 12 Leigh Road, East Ham.
East London District.—April 29 ("V.H.F. Aerials," by V. Hartopp, of J-Beam Aerials Ltd.), 2.30 p.m., Ilford Town Hall, High Road, Ilford.
East Molesey (TVARTS).—April 1, May 6, Carnarvan Castle Hotel, Hampton Court.
Edgware & Hendon (EARDS).—April 13, 27, 8 p.m., John Keble Hall, Church Close. Deans Lane, Edgware. Interested new members contact G3VW, 10 Holmstal Avenue, Edgware.
Enfield.—April 16, 7.30 p.m., George Spicer School, Southbury Road, Enfield.
Gravesend (GRS).—April 15, 7.30 p.m., RAFA Club, 17 Overcliffe, Gravesend.
Guildford (G & DRS).—Second and Fourth Fridays in each month, 8 p.m., City Cafe, Onslow Street, Guildford.
Harlow.—Tuesdays, 7.30 p.m., rear of G3ERN (G. E. Read), High Street, Harlow. **(SRC).**—Wednesdays, 7 p.m., Edinburgh Way, Harlow.
Harrow (RSH).—Fridays, 8 p.m., Roxeth Manor County School, Eastcote Lane, Harrow.
Holloway (GRS).—Mondays and Wednesdays (RAE and Morse), 7 p.m., Fridays (Club), 7.30 p.m., Montem School, Hornsey, N.7.
Hounslow (HADRS).—Fortnightly, April 13, 27, 7.30 p.m., The Canteen, Mogden Main Drain-

age Dept., Mogden Works, Isleworth.
Ilford.—Thursdays, 8 p.m., 579 High Road, Ilford (nr. Seven Kings Station).
Kingston.—April 9, 8 p.m., YMCA, Eden Street, Kingston. Morse Classes weekly on Fridays, at 2 Sunray Avenue, Tolworth.
Leyton & Walthamstow.—April 28, 7.30 p.m., Leyton Senior Institute, Essex Road, E.10. Interested new members contact A. Rix, 17 Forest Drive East, E.11.

LONDON MEMBERS' LUNCHEON CLUB

will meet at the Bedford Corner Hotel, Bayley Street, Tottenham Court Road,

at 12.30 p.m. on Fridays, April 17, and May 15, 1964

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

Loughton.—April 10 (" Operating in El-Land," by G3MVV), 7.30 p.m., April 24 (SWL Night), 7.30 p.m., Loughton Hall, nr. Debden Station.
Mitcham (M & DRS).—April 10, 7.0 p.m., " The Canons," Madeira Road, Mitcham.
New Cross (CARS).—Wednesdays and Fridays, 8 p.m., 225 New Cross Road, London, S.E.14.
Norwood & South London (CP & DRS).—April 3 (Round 2, Club Quiz, Clifton v Crystal Palace), CD Training Centre, Bromley Crescent, W.2.
Paddington (P & DARS).—Wednesdays, 7.30 p.m., Beauchamp Lodge, 2 Warwick Crescent, W.2.
Purley (P & DRC).—April 3, 17, 8 p.m., Railwaymen's Hall, (side entrance), Whytecliffe Road, Purley.
Reigate (RATS).—April 18 (Film Show), 7.30 p.m., George & Dragon, Cromwell Road, Redhill.
Romford (R & DRS).—Tuesdays, 8.15 p.m., RAFTA House, 18 Carlton Road, Romford.
Science Museum (CSRS).—April 6 (AGM), 6.30 p.m., Science Museum, South Kensington.
Sidcup (CVRS).—April 2, May 7 (AGM), Congregational Church Hall, Court Road, Eltham.
Slough (SARS).—First Wednesday in each month, 8 p.m., United Services Club, Wellington Street, Slough.
Southgate & District.—April 9 (Talk by Acos Ltd.), April 23 (SWL Discussion and Demonstration), 7.30 p.m., Atlasta Lodge, Tettenhall Road, N.13.
St. Albans (Verulam ARC).—April 15 (" NFD " and Junk Sale), 8 p.m., Hedley Road, St. Albans.
Sutton & Cheam (SCRS).—April 21, 7.30 p.m., The Harrow, High Street, Cheam
Uxbridge.—April 20 (Lecture on " Aeronautical Communications and Control Tower Procedures "), May 4 (Lecture on " Field Day Technique "), 8 p.m., St. Andrews Church Scout Hut, Uxbridge Road.
Welwyn Garden City.—April 9 (" Aerials for Mobile and D/F," by Derek Purchese, G3LXP), 8 p.m., Conference Room, Murphy Radio, Bessemer Road, Welwyn Garden City.
Wimbledon (W & DRS).—April 10, 8 p.m., Community Centre, St. George's Road, Wimbledon, S.W.19.

REGION 8

Crawley (CARS).—April 8 (Informal), for details contact G3FRV. April 29 (Stereo Demonstration by G3FZL and G3IIR), Trinity Methodist Church, Ifield.
Worthing (W & DARC).—April 13 (Meeting and Quiz), 8 p.m., Adult Education Centre, Union Place, Worthing.

REGION 9

Bath.—April 8, 7.30 p.m., Assembly Room, Technical College, Lower Borough Walls, Bath.
Bristol.—April 3 (" Two Metre Equipment," by T. Withers), April 24 (" Aerials," by G. A. Bird, G4ZU), 7.15 p.m., Small Physics Theatre, Royal Fort, Bristol University, Woodland Road, Bristol, 8.
Burnham-on-Sea (B-o-SARS).—Second Tuesday in each month, 8 p.m., Crown Hotel, Oxford Street, Burnham-on-Sea.
Camborne (CR & TC).—First Thursday in each month, Staff Recreation Hall, SWEB Headquarters, Pool, nr. Camborne.
Exeter.—First Tuesday in each month, 7.30 p.m., George and Dragon Inn, Blackboy Road, Exeter.
Plymouth (PRC).—Tuesdays, April 7 (G5ZT Trophy Competition), 7.30 p.m., Virginia House, Bretonside, Plymouth.
South Dorset (SDRS).—First Friday in each month, 7.30 p.m., Labour Rooms, West Walks, Dorchester.
Torquay (TARS).—First Saturday in each month, Club HQ, Belgrave Road, Torquay.
Weston-super-Mare.—First Tuesday in each month, 7.15 p.m., Technical College, Lower Church Road.
Yeovil (YARC).—Wednesdays, 7.30 p.m., Park Lodge, The Park, Yeovil.

REGION 10

Cardiff.—April 6 (Surplus Sale and Quiz), 7.30 p.m., TA Centre, Park Street, Cardiff.
Port Talbot.—April 7 (Social and Get-together), May 5 (Discussion on " NFD "), 7.30 p.m., Workmen's Institute, 8-10 Jersey Street, Port Talbot.

REGION 11

Bangor (UCNWARS).—Thursdays fortnightly, 5.30 p.m., Dept. of Electrical Engineering, Dean Street, Bangor. Details from M. J. English, c/o above address.
Llandudno (CVARC).—April 9 (" Fundamentals of Radio," by J. Quick, Asst. Eng. POED), 7.30 p.m., Albert Hotel, Llandudno.
Prestatyn (FRS).—April 14 (Slow Morse, and a discussion on " Standardisation in Amateur Radio "), April 28 (Amateur TV Demonstration of Monochrome and Colour Transmission, by GW3JGA/T and GW3PCZ/T), 7.30 p.m., The Railway Hotel, Prestatyn.

REGION 13

Edinburgh (LRS).—April 9 (" Going Mobile? " by J. E. Priddy, GM3CIG), April 23 (Junk Sale), 7.30 p.m., YMCA, South St. Andrew Street, Edinburgh.

REGION 14

Glasgow.—April 3, 17, 7.30 p.m., The Christian Institute, Bothwell Street, Glasgow.

REGION 16

Basildon (BDARS).—Details of meetings from G3RQT, 59 Waldegrave, Basildon.
Chelmsford (CARS).—First Tuesday in each month, 7.30 p.m., Marconi College, Arbour Lane, Chelmsford.
Great Yarmouth (GYRC).—Fridays, 7.30 p.m., in the Manager's Office, The Old Power Station, South Quay, Swanstons Road, Great Yarmouth. Details from G3HPR.
Norwich (Norfolk ARC).—Regular meetings at The Branford Stores, Branford Road, Norwich Details from G3NJQ.
Southend (SDARS).—April 3 (" S.S.B. Techniques," by G3PAG), April 17 (Amateur TV Demonstrations by G3KXQ), Fridays fortnightly, the Executives' Canteen, E. K. Co'e Ltd., Priory Crescent, Southend-on-Sea.

REGION 17

Southampton.—April 11 (" Air Traffic Control," by G3TR), second Saturday in each month, Engineering Lecture Theatre, Lanchester Building, Southampton University.

TENTH INTERNATIONAL V.H.F.-U.H.F. CONVENTION

Saturday, May 16, 1964

Kingsley Hotel, Bloomsbury Way, London, W.C.1.

Programme:

Morning—Exhibition of commercial and amateur equipment

Afternoon—A programme of lectures

Evening—Dinner, and presentation of prizes

Tickets may be obtained from F. E. A. Green, G3GMY, 48 Borough Way, Potters Bar, Middlesex, at the following prices:

Convention only 3/6

Convention and Dinner 27/6

Underground Stations: Holborn (Kingsway) and Tottenham Court Road

Buses: 23, 25, 32, 73

Organized jointly by the RSGB V.H.F. Committee and the London U.H.F. Group

Publications for the Radio Amateur and Shortwave Listener

RSGB PUBLICATIONS

AMATEUR RADIO HANDBOOK. Covers the whole field of Amateur Radio transmission and reception from fundamentals to station operation. Profusely illustrated with nearly 700 line diagrams and more than 100 half-tones. 544 pages bound in maroon buckram linson. **Price 36s. 6d. post paid in carton.**

RADIO DATA REFERENCE BOOK. Data for the radio designer, engineer and amateur presented in the form of curves, tables and charts. 136 pages bound in blue buckram linson. **Price 14s. post paid in carton.**

RADIO AMATEURS' EXAMINATION MANUAL. Covers the syllabus of the City and Guilds of London Institute examination. Chapters on licence requirements and conditions, interference, receivers, circuits, calculations, semiconductors, aerials and propagation. Essential reading for those wishing to obtain the Amateur (Sound) Licence. More than 50 line diagrams. 60 pages. **Price 5s. 6d. post paid.**

RSGB AMATEUR RADIO CALL BOOK. The most accurate and comprehensive list of amateur fixed and mobile stations in the United Kingdom and the Republic of Ireland. 88 pages. **New 1964 Edition. Price 5s. post paid.**

A GUIDE TO AMATEUR RADIO. Provides the newcomer to Amateur Radio with basic information on receivers, transmitters, and aerials. Explains how to obtain an amateur transmitting licence. Well illustrated, 80 pages. New Tenth Edition. **Price 4s. post paid.**

THE MORSE CODE FOR RADIO AMATEURS. A carefully graded selection of exercises designed to make learning the Morse code as simple as possible. 24 pages. **Price 1s. 9d. post paid.**

COMMUNICATION RECEIVERS. A reprint in booklet form of the series of articles by G. R. B. Thornley originally published in the RSGB BULLETIN. The G2DAF high performance communication receiver is described in detail. 32 pages. **Price 3s. post paid.**

SERVICE VALVE EQUIVALENTS. Lists the commercial equivalents of all CV numbered valves, cathode ray tubes and semiconductors useful to the radio amateur and home constructor. Equivalents of British Army, Royal Navy, Royal Air Force and US Signal Corps valves are also given. Pocket size. 48 pages. **Price 3s. 6d. post paid.**

BRITISH ISLES TWO METRE BAND PLAN MAP. A reprint on stiff card of the map published in the February, 1963, issue of the RSGB BULLETIN. Details are also given of the 70cm Zones. **Price 6d. post paid.**

OTHER BRITISH PUBLICATIONS

RADIO AMATEUR OPERATOR'S HANDBOOK. Contains a list of Amateur Prefixes with provision for heard/worked record, W.A.S. chart, Zones record, Counties Heard or Worked record, Call Areas, Directional bearings, Standard Frequency transmissions, etc. Published by Data Publications Ltd. 48 pages. **Price 5s. post paid.**

WEBB'S RADIO LOG BOOK. Inexpensive paper-backed log book conforming with GPO requirements. **Price 6s. post paid.**

MANUAL OF TRANSISTOR CIRCUITS. Intended to help those interested in radio and electronics to realize the possibilities of the transistor. In addition, it is an excellent reference source of semiconductor circuits. Published by Mullard Ltd. 308 pages. **Price 13s. 6d. post paid.**

TRANSISTOR RADIOS, CIRCUITRY AND SERVICING. Deals with the principles of transistors, printed wiring, receiver circuits and the servicing of transistor radios, with a brief review of the test equipment necessary. Published by Mullard Ltd. 72 pages. **Price 5s. 9d. post paid.**

RADIO VALVE DATA. Characteristics of 4,800 valves, transistors, rectifiers and cathode ray tubes. Base connections are included. Seventh edition compiled by the staff of *Wireless World*. 156 pages. **Price 7s. post paid.**

SHORT WAVE RECEIVERS FOR THE BEGINNER. Describes 1 and 2 valve battery receivers, 2 and 3 valve mains operated short wave receivers, with notes on soldering and an introduction to the short waves. Published by Data Publications Ltd. 72 pages. **Price 6s. 6d. post paid.**

AMERICAN PUBLICATIONS

ARRL RADIO AMATEUR'S HANDBOOK, 1964. One of the best-known textbooks for the amateur written from the American point of view. Now in its 41st edition. 592 pages plus 34 pages of valve tables, 14 page index and 10 page advertising section. **Price 37s. 6d. post paid.** Cloth bound edition, **Price 46s.**

UNDERSTANDING AMATEUR RADIO. A new ARRL publication containing down-to-earth information on circuit design, construction of receivers, transmitters, aerials and accessories, testing and adjustment. Sixteen easily understood chapters. 313 pages plus six page index. **Price 18s. post paid.**

RTTY HANDBOOK. A new edition of the well-known *CQ* publication by Byron Kretzman, W2JTP. A valuable textbook for both the beginning and experienced RTTY'er. 191 pages. **Price 30s. post paid.**

CQ NEW SIDEBAND HANDBOOK. The fundamentals of single and double sideband suppressed carrier transmission with many practical designs. Details of a number of commercial equipments are given. 232 pages. **Price 25s. 6d. post paid.**

SINGLE SIDEBAND FOR THE RADIO AMATEUR. Outstanding articles from *QST* on all aspects of s.s.b. transmission and reception. 224 pages. **Price 18s. 6d. post paid.**

MOBILE MANUAL FOR RADIO AMATEURS. A selection of articles from *QST* on mobile operation—transmission, reception, aerials, noise suppression, power supplies. 282 pages. **Price 25s. post paid.**

CQ MOBILE HANDBOOK. By Bill Orr, W6SAI. Chapters devoted to car ignition systems, power supplies, receivers, transmitters, aerials, s.s.b. equipment, noise problems and test equipment. 240 pages. **Price 24s. 6d. post paid.**

ARRL ANTENNA BOOK. Probably the best-known textbook on aerial systems for the amateur station. 320 pages. **Price 18s. 6d. post paid.**

CQ ANTHOLOGY 1952-1959. More than 75 articles published in *CQ* during the years 1952-1959. 256 pages. **Price 23s. post paid.** A few copies of *CQ Anthology 1945-1952* are still available, **price 16s. 6d. post paid.**

HINTS AND KINKS, Volume 6. A further selection of helpful ideas from *QST's* long-running feature. 128 pages. **Price 10s. 6d. post paid.**

SURPLUS SCHEMATICS. Circuit diagrams for more than 90 popular American surplus equipments. A useful addition to any club library. A *CQ* publication. 111 pages. **Price 19s. 6d. post paid.**

TELEVISION INTERFERENCE—Its Causes and Cures. By Phil Rand, W1DBM. The second edition of this well-known American guide to the cure of interference. Well illustrated with diagrams, photos, charts and tables. 56 pages. **Price 14s. 6d. post paid.**

A COURSE IN RADIO FUNDAMENTALS. A step-by-step course in the principles required for a basic understanding of amateur radio. Intended to be used in conjunction with the *ARRL Radio Amateur's Handbook*. 103 pages. **Price 10s. 6d. post paid.**

HOW TO BECOME A RADIO AMATEUR. Information on learning Morse, getting on the air, the fundamentals of radio, a two valve receiver and a simple one valve transmitter. An ARRL publication. 148 pages. **Price 5s. post paid.**

LEARNING THE RADIOTELEGRAPH CODE. Designed to help the beginner overcome the usual stumbling blocks encountered in learning the Morse code. One chapter is devoted to selected exercises. An ARRL publication. 48 pages. **Price 5s. post paid.**

AMERICAN MAGAZINE SUBSCRIPTIONS

QST. Journal of the American Radio Relay League. Devoted entirely to Amateur Radio. Monthly, direct from USA. **Price 43s. 6d. p.a.**

CQ, the Radio Amateur's Journal. Covers the whole field of Amateur Radio. Incorporates the monthly *V.H.F. Amateur* as a bound-in supplement. Monthly, direct from USA. **Price 44s. p.a.**

73 Magazine. Almost exclusively technical and constructional articles. Monthly, direct from USA. **Price 28s. 6d. p.a.**

RSGB PUBLICATIONS (Dept. B), 28 LITTLE RUSSELL STREET, LONDON, W.C.1

CLASSIFIED ADVERTISEMENTS

ADVERTISEMENT RATES. Members' Private Advertisements 3d. per word, minimum charge **5s. Trade Advertisements 9d. per word.** minimum charge **12s.** All capitals **1s.** per word, minimum charge **18s.** Write clearly. No responsibility accepted for errors. Use of Box number **1s. 6d.** extra. Send copy to **Sawell & Sons Ltd., 4 Ludgate Circus, London, E.C.4.**

OFFICIAL APPOINTMENTS

MINISTRY OF AVIATION
RADIO TECHNICIANS

Vacancies for RADIO TECHNICIANS aged 19 or over at airports and radio stations throughout the United Kingdom, maintaining radio communications and electronic navigational aids.

A good basic knowledge of the theory and practise of radio and/or electronics is required. The possession of recognized technical qualifications would be an advantage. Training given on equipment in use. National rates of pay, age 19 £701 rising to £1,036 (max.). Starting pay at age 25 and over £902. Paid sick leave. Facilities to study for higher qualifications. Good prospects of permanent pensionable posts and promotion to Telecommunications Technical Officer. For further details apply to:

Ministry of Aviation,
Est. 5(a)1, Room 754, The Adelphi,
John Adam Street, London, W.C.2.

ASSISTANT ENGINEERS (TELECOMMUNICATIONS)

Required by KENYA GOVERNMENT, Police Department, on contract for two tours each of 24/27 months in the first instance. Salary according to age and experience in scale (including Overseas Addition), £1,521 rising to £1,956 a year. Gratuity at the rate of 25% of total salary drawn. Children's education allowances. Free passages. Liberal leave on full salary.

Candidates, 25 to 45 years of age, should be at least third year City and Guilds standard and must have had eight years' experience of maintenance and installation of H.F. and V.H.F. communications (including Multiplex carrier systems) and single side-band equipment.

Duties involve extensive travelling in Kenya.

Apply to CROWN AGENTS, 4, Millbank, London, S.W.1, for further particulars, stating age, name, brief details of qualifications and experience and quoting reference M2/52037/RC.

SITUATIONS VACANT

ELECTRONIC ENGINEERS

to join small team engaged in the design and development of audio amplifiers. Sound knowledge of transistors and printed circuit technique. Must be capable of working with minimum supervision. Excellent prospects.—Write or telephone for appointment to Selmer Electronics Ltd., 40 Theobalds Road, W.C.1. CHA. 6141.

LABGEAR LIMITED have a few vacancies for ELECTRONIC TECHNICIANS in their Laboratory and Test Departments. Skilled PROTOTYPE WIREMEN also required. Apply giving full details of previous experience to The Personnel Director, LABGEAR LIMITED, CROMWELL ROAD, CAMBRIDGE.

SITUATIONS VACANT—contd.

ALIGNMENT TECHNICIAN for the alignment of radio frequency amplifiers. Knowledge of this work essential, but final specialised training will be given.—Applications in writing to The Personnel Manager, Belling & Lee Ltd., Great Cambridge Road, Enfield, Middlesex.

AN ELECTRONIC TECHNICIAN required for construction of Test Equipment. Apply giving full details of previous experience to The Personnel Manager, CAMBRIDGE WORKS LIMITED, Haig Road, Cambridge.

ELECTRONIC TECHNICIAN for varied Assembly Work and Testing of one off and small batch equipment; apply—Electronic and Mechanical Engineering Co. Ltd., Forge Lane, Halesowen.

PERSONAL

QSL CARDS. G.P.O. approved log books, cheapest, best, prompt delivery. Samples.—Atkinson Bros., Printers, Looe, Cornwall.

EXCHANGE

EXCHANGE four-metre crystal controlled double conversion superhet (R220) for R107, CR100 or W.H.U. **WANTED,** must be cheap but going condition, R109, R1392, R208, R1155.—Bennett, 66 Clewer Hill Road, Windsor. Phone: 65415.

SERVICES OFFERED

GO ONE BETTER. Have your cabinets, panels, etc., stove-enamelled and lettered to your own or original specification. —For by-return quotations, contact: The Universal Productions (Enamellers) Ltd., 22 Aston Road North, Birmingham 6. Tel.: Aston Cross 2987.

CASES, chassis, panels. ANYTHING in metal: send your drawings, for quote. Stove enamelled, hammertone, or plain, in any colour.—Moss Watson, 40 Mount Pleasant Street, Oldham, Lancs. (Main 9400).

WANTED

SCANDINAVIAN AMATEURS are constantly requiring the following receivers (working or not): AR88D, CR.100 (especially CR.100/8 mod.), HRO-5T, BC-342, BC-348, BRT400, PCR3; second-hand Eddystone, Hammarlund and Collins receivers, etc. Cash payment and collection from your shack within 200 miles London.—Brian J. Ayres, 21 Grange Road, Chessington, Surrey (Lower Hook 2000).

COLLECTING FOR PRIVATE MUSEUM.—Early Marconi tuners, detectors, spark coils, high voltage transformers, Leyden jar and plate condensers, keys, spark gaps, oscillation transformers. Commercial gear and commercially made amateur gear before 1920 especially tubes, magazines, catalogues and *QSTs*. RSGB BULLETINS before 1937. Old Post Office manual morse telegraph equipment including needle systems. All letters answered.—E. W. Freeman, KØMOA, Box 57, Yankton, South Dakota, U.S.A.

WANTED.—All types of communications receivers, test equipment, tape recorders, amplifiers, etc. Prompt cash payment.—Details to R. T. & I. Electronics Ltd., Ashville Old Hall, Ashville Road, London E.11. (LEYton 4986).

WANTED. 1930-1939 radio components, Telsen, Lissen, Wearite and Igranic. Coils, meters, condensers, valve bases, dials, & knobs, etc. British General radio tuner unit. Eddystone HF and V.H.F. components, bright emitter valves of any date. Magazine: Television & Short Wave World 1930-1940, bound or unbound, RSGB BULLETINS 1930-40, bound or unbound. Write to: A. Sullivan, G2DGF, 12 Glebe Road, Letchworth, Herts.

B2 TRANSMITTER, receiver and power pack.—G3CXQ, Wynyard, Leys Road, Oxshott, Surrey. Tel. XSO 2565 evenings.

R208 or similar Rx. Full details to—M. P. Johns, The Cottage, Bridge Lane, Forant, Salisbury.

FOR SALE

EDDYSTONE 740. BC453s. TR1986s. Power Packs, much other gear cheap. SAE for lists. Callers welcome.—G3ERB 56 Kings Lane, Bebington, Cheshire.

ALL TYPES of modern and obsolete valves at low prices. S.a.e. lists/enquiries. Radio/Television books. Service sheets. —Hamilton Radio (B), Western Road, St. Leonards, Sussex.

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

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

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

R1116A, double conversion superhet, 142 kc/s-16 Mc/s, plus power supply £8; R.F.24, 15/-; Carriage extra. G3OOW, 116 Yarningale Road, Birmingham 14.

TWO PROP PITCH MOTORS complete and fitted with selsyns, £12 each. One cowl gill motor, £4. One C.D.R. motor with indicator £8. Yates, G3LB, 134 Whitcliffe Lane, Ripon, Yorkshire.

COLLINS PTO 1·0/1·5 Mc/s, £10. TCS12 Transmitter, £7 10s. Set HRO Bandspread Coils, £10. Electro Voice Ribbon Mike, £5. MB150 Tank Unit, £5. RK715B, 10/-. Avo CR Bridge, 30/-. Box No. X.7117, c/o RSGB BULLETIN, 4 Ludgate Circus, London, E.C.4.

JOHNSON VIKING MOBILE TX, with Johnson VFO, manuals, etc., £45: Hallicrafters SX24, £15: G4ZU 10/15 Minibeam, £6. **WANTED**—Western Electric Converter covering 95-220 Mc/s.—80 Endsor Street, Moss Side, Manchester 16.

FOR SALE—contd.

TRANSISTORISING? Use "EYELET-BOARD." S.A.E. sample. G3IDD 17 Queens Road Leytonstone, London, E.11.

EDDYSTONE ACCESSORIES. Variable Condensers, 584 Butterfly 34X34 Pf, 588-27 Pf, 589-54 Pf, 583-Split Stater 25X25 Pf all at 3/- each. ERIE COMPONENTS 560 Pf Nut Fixing Feed Thro Condensers, 1000 Pf Miniature Tubular Ceramics, and 3000 Pf Tubular Ceramics all at 5/- doz. Bulgin 3000 Pf Trimmers, Ceramic 30 Pf Airspaced Trimmers and 5 Pf Airspaced Trimmers all at 9d. each. Resistors 10 ohm to 10 meg. in 2, 1½ watt, and miniature at 2/- doz. All items brand new and post paid. J. Birkett, Radio Component Suppliers, 9 Steep Hill, Lincoln. Phone 20767.

TCS. TX. RX. cables, remote control unit, rotary convertor. 100-156 Mc/s signal generator and field strength meter. Offers?—G8DT, 18 Newcourt Park, Charlton Kings, Cheltenham.

FOR DISCERNING ENTHUSIASTS. Prompt service. High quality components. Mullard miniature electrolytics for transistor circuits. Mullard high grade industrial transistors, e.g. BY100, 11s. 6d.; GET880, 10s. 6d.; OC83, 6s.; OC170, 8s. 6d.; OC171, 9s.; VHF Power AUY10 4·5w fl=120 Mc/s, 53s. RCA & Texas transistors, available to order, some ex-stock. Tunnel diodes, silicon planar, etc. S.T. & C. thermistors, R53, 21s. Please send S.A.E. for list. C.W.O. Postage free over 10s., otherwise 6d. please. J. Williams & Co., 208 Hagley Road, Birmingham 16.

C.V. 323 Klystrons Micro Tuning 8,400 to 10,400 Megacycles. Brand New. Individual performance charts. 20/- plus postage. Limited supply. Brand New 4X150s, Offers? Box No. X.7118, c/o RSGB BULLETIN, 4 Ludgate Circus, London, E.C.4.

TWO METRE CONVERTER, Crystal controlled, cascode circuit, complete with crystal, valves, and built-in power unit, I.F. output 23·8 Mc/s to 25·8 Mc/s, £6 10s. Another, similar but I.F. output 14·7 Mc/s to 16·7 Mc/s, £6 10s. Another, suit beginner, not crystal controlled, 24-26 Mc/s, £5. G. A. Jeapes, 165 Cambridge Road, Gt. Shelford, Cambridge.

K.W. VANGUARD 10-80m, under a year old, excellent condition, £40.—G3OBP, Zodiac House, Porthcurno, Nr. Penzance, Cornwall.

PYE V.H.F. RADIOS—P.T.C. 703, £20; P.T.C. 116 "Reporters," £8 each; all less crystals and carriage extra—as previously advertised. One Hudson AM.108 c/w extension control unit—as new condition, £75, plus carriage. G.E.C. F.M. V.H.F. Equipment—two mobiles, fixed station, battery chargers, etc., £20 the lot, callers only.—Pendry & Kennedy, 6 Coed Celyn Road, Derwen Fawr, Swansea.

OLYMPIC T100 transmitter 10m-160m, unused, £50. CR150 Receiver 2-60 Mc/s, £28. B44 TxRx (70 Mc/s), £2.10.0. Valiant Tx PSU 50 watt 10-160m, £25. CW Tx Geloso and PA stage, £6. S.A.E. details. (Wilts.) Box No. X.7119, c/o RSGB BULLETIN, 4 Ludgate Circus, London, E.C.4.

EDDYSTONE 750. Set valves. Manual. Z-match ATU, £35. MR44/11, speaker, manual. Money back guarantee, £40. Mosley V4-6 new, never assembled, £10.—Box No. X.7120, RSGB BULLETIN, 4 Ludgate Circus, London, E.C.4.

COMPLETE SSB STATION. Mk. III K.W. Viceroy with co-ax aerial c/o relay, KW.77 Rx with matching speaker, xtal mike. All in as new condition, approximately 25 hours use only. Cost over £275. Reluctant to sell but new QTH unsuitable. £215 o.n.o.—Stallworthy, 33 Edinburgh Gardens, Windsor. Tel. 65623.

BRT 400, Gonset G66B, MCR1; Minimitter Mobile Transmitter, Control Box, Power Supply; ZC1, AN/PPN2, S450B, FM Tuner, R209 Tuner. New transformers, valves, crystals, etc. Large S.A.E. for lists—G3ERB QTHR.

FOR SALE—contd.

EDDYSTONE 770R V.H.F. receiver 19-165 Mc/s/AM/FM/CW, excellent condition, £110, or offer. Free delivery Midlands, S. England. Also new service manual Collins 75A4 Rx., 35/-.—D. Walch, 9 Pembroke Street, Oxford.

DX4OU and VF, U combination. Professionally built, clean and full working order. Delivered within 25 miles of Watford, £25.—Box No. X7121, c/o RSGB BULLETIN, 4 Ludgate Circus, London, E.C.4.

JOHNSON VIKING COURIER 500-watt Linear (811A's in Class B or Class C) 3·5 to 30 Mc/s, matches any antenna, £60.—Stanley Ingram (G6ZY), 2 Shepherd Street, London, W.1. Hyde Park 9041.

MULTIBAND ANTENNA TRAPS 80 thro 10m high efficiency and superbly finished, only 45/- pair. Silicon Diodes 1000 PIV at 500mA, 9/-. OC.45, 44, 81, 81D, 3/6. OC.170, 4/-. OC.171, 4/6. BM.3 xtal mic., 37/-. HE.30 and HE.40 Communication Rx. All plus P. & P.—Wakeley, 70 Arnold Road, Binstead, I.W. Ryde 3231.

HALSON 3FIF MOBILE ANTENNA

Complete with coil of your choice 160m, 80m, 40m, or 20m £6.10.0. Extra coils £3.10.0. each.

From: **Halson Radio Services Ltd., Dover Road Works, Blackpool. Tel 62740.**

SALE: CR-100, £16. R.107, £11. Both nice condition, buyer collects.—Miles, The Dene, Ford, Nr. Chippenham, Wilts.

SERVICE SHEETS. Radio and Television, 3/6 post paid. S.A.E. with enquiries.—VEST AND EMERY, 17 Hallgarth Street, Durham.

VICEROY SSB MKIII Transmitter with coax aerial relay, hardly used, untouched interior. Offers over £120. Multi-Elmac miniature receiver ideal for mobile work, £45. Or complete station including operating desk and test equipment, offers over £140. Telephone Redpost 4870 (between 9 and 10 p.m. only) G3ACC.

CR100, good condition, £12. Buyer collects, but will deliver 40 miles.—Wiltshire, 2 Gainsborough Gardens, Weston, Bath.

EDDYSTONE S640. Excellent condition, matching speaker, manual, unmodified, £20 o.n.o., would exchange for Heathkit Mohican. Cash adjustment.—G3JZB, 15 Holmcroft Road, Stafford.

SALE: R3A/ARR-2X VHF receiver. Ten B7G valves, circuit, control box, rack, as new, 35/-. Circuit, component values and operating instructions for TBS receivers, 5/-.

WANTED: Control box, ancillary equipment and information on the APA 17 radar.—Wright, 13 Worts Causeway, Cambridge.

PRIVATE ADVERTISEMENT ORDER FORM

3d. per word (minimum 5/-), Box Nos. 1/6 (including forwarding replies)

Please insert above advertisement in RSGB BULLETIN

NAME .....
(in block capitals)

Address .....

.....

.....

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

INDEX TO ADVERTISERS

Printed in Great Britain for the RADIO SOCIETY OF GREAT BRITAIN, New Ruskin House, Little Russell Street, London, W.C.1
by Loxley Brothers Limited, Letchworth, Hertfordshire

IF UNDELIVERED Return to:— RSGB, NEW RUSKIN HOUSE, LITTLE RUSSELL STREET, W.C.1