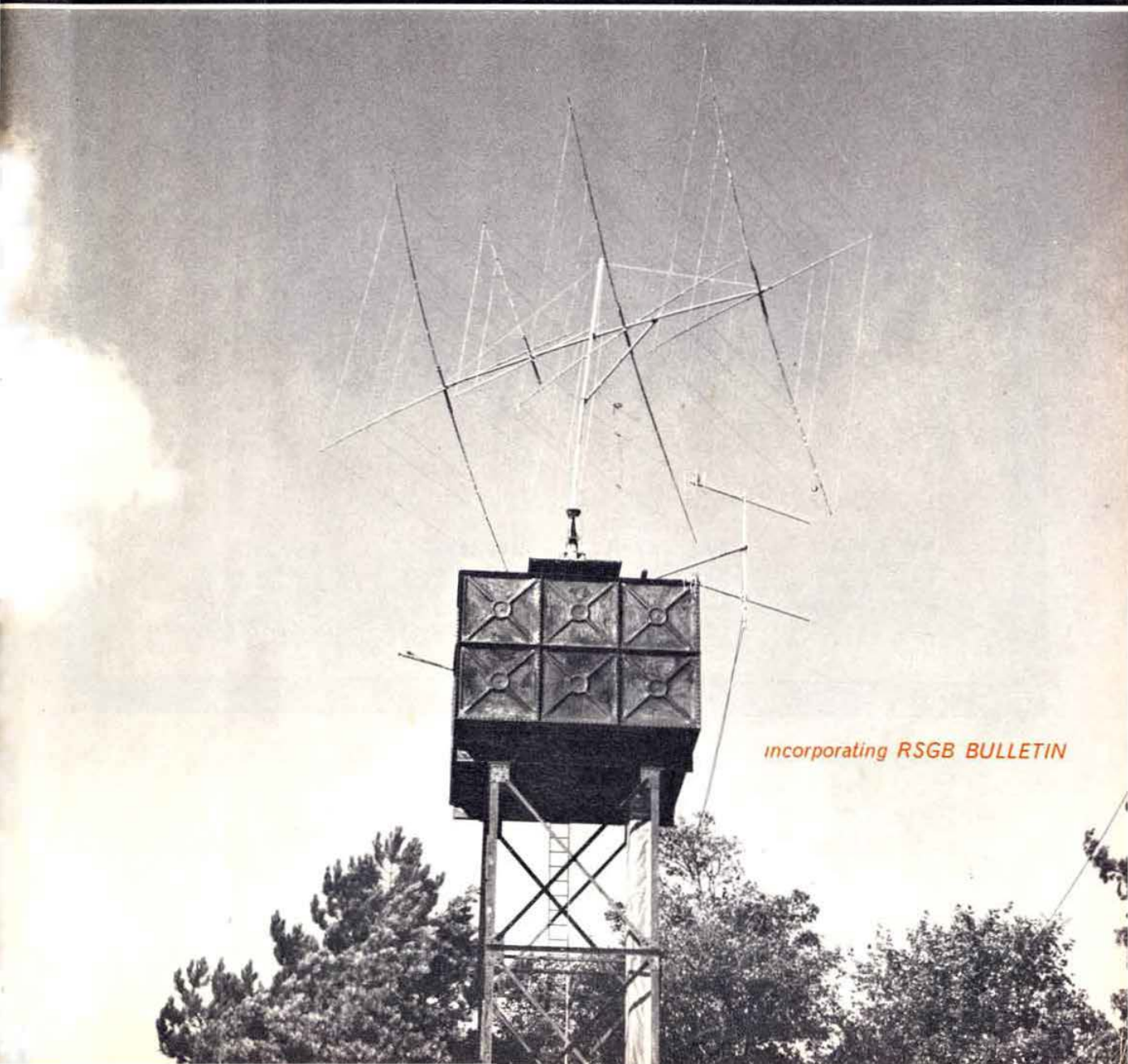
NOVEMBER 1968

# Radio Communication

JOURNAL OF THE RADIO SOCIETY OF GREAT BRITAIN



incorporating RSGB BULLETIN

# RADIO COMMUNICATION



**FRONT COVER:** A two metre link between the RSGB Exhibition at the Horticultural Hall and Crawley was used to remote control the GB3RS I.t. station. Seen here are the Quad aerials atop a water tower in Crawley (see page 733).


**NOVEMBER 1968**
**VOLUME 44 No. 11**





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**CLOSING DATES**
*(except where otherwise stated)*

**DECEMBER**
**8 NOVEMBER**

**JANUARY**
**5 DECEMBER**

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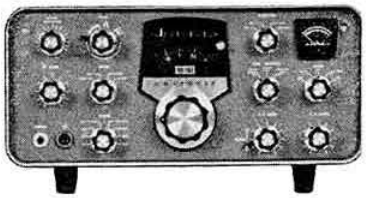
# HEATHKIT Amateur Radio Equipment

## DEFERRED CREDIT TERMS BY ARRANGEMENT (OVER £10 U.K. ONLY)

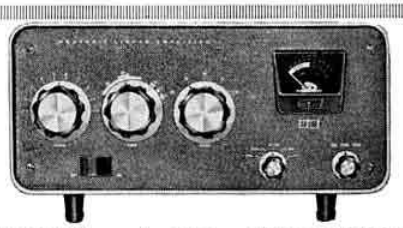


**SB-101 80 Through 10 Metre SSB Transceiver . . .** 180 watts PEP SSB, 170 watts CW (the practical power level for fixed/mobile operation). Features USB/LSB on all bands, PTT & VOX. CW sidetone and more. Unmatched engineering and design.
**Kit K/SB-101,** 23 lbs., **£185 . 12 . 0.** P.P. 9/-.
Ready to use **A/SB-101, £225 . 12 . 0.** P.P. 9/-.

**HW-100 5 Band SSB-CW Transceiver** . . . Solid-State FET VFO covers 80-10 metre bands. Switch selector USB LSB or CW. 180 watts input PEP SSB, 170 watts input C.W. Crystal filter.
**Kit HW/100** 18lbs **£125** P. & P. 9/- Ready-to-use **£165** P. & P. 9/-

**SB-610E Signal Monitor Scope** . . operates with transmitters on 160 through 6 metres at power levels from 15 watts through 1 kw. Shows transmitted envelope. Operates with receiver IF's up to 6 Mc/s, showing received signal waveforms. Spots over-modulation, etc.
**Kit K/SB-610E,** 14 lbs. **£41 . 14 . 0.** P.P. 10/6.
Ready to use **A/SB-610E, £51 . 14 . 0.** P.P. 10/6.

**SB-620 "SCANALYZER"** Radio Spectrum Monitor and Analyzer. New narrow sweep widths with crystal filter for single channel analysis. 10 Kc/s., 50 Kc/s. Variable width to 500 Kc/s. Styled as SB series.
**Kit K/SB-620, £64 . 14 . 0.** P.P. 10/6.
Ready to use **A/SB-620, £77 . 4 . 0.** P.P. 10/6.



**SB-200 KW SSB linear Amplifier . . .** 1200 watts PEP input SSB, 1000 watts CW on 80 through 10 metres. Built-in antenna relay, SWR meter, and power supply. Can be driven by most popular SSB transmitters (100 watts nominal output).
**Kit K/SB-200,** 41 lbs., **£120 . 18 . 0.** P.P. 10/6.
Ready to use **A/SB-200, £145 . 18 . 0.** P.P. 10/6.

**SB-640 External LMO for SB-101 . . .** Provides Linear Master Oscillator frequency control or either of two crystal controlled frequencies for a total of five frequency control options. Power supplied from SB-101 Trans.
**Kit K/SB-640,** 9 lbs., **£51 . 6 . 0.** P.P. 10/6. Ready to use **£56 . 6 . 0.** P.P. 10/6.

**HP-13 Mobile and HP-23 Fixed Power Supplies . . .** For the "Single Banders" and SB-101. Provides all necessary operating voltages with excellent dynamic regulation.
**Kit K/HP-13,** 7 lbs., **£37 . 2 . 0.** P.P. 6/-.
Ready to use **A/HP-13E, £44 . 2 . 0.** P.P. 6/-.
**Kit K/HP-23E,** 19 lbs., **£30 . 18 . 0.** P.P. 9/-.
Ready to use **A/HP-23E, £36 . 8 . 0.** P.P. 9/-.

**GR-64E Short Wave Receiver . . .** Covers 1 Mc to 30 Mc/s., plus 550 Kc/s. to 1620 Kc/s. AM band. Many special features for such a modest price. For 115, 230v, 50/60 c/s. A.C. mains operation.
**Kit K/GR-64E, £22 . 9 . 0.** P P. 9/-. Ready to use **£29 . 9 . 0.** P.P. 9/-.

**GR-54 Short Wave Receiver** covers 2 MHz- 30 MHz plus 550 kHz-1550 kHz AM band. 180 kHz-420 kHz band. 6" × 4" PM speakers. Mains Op.
**Kit K/GR-54, £50.** P.P. 9/-.
Ready to use **A/GR-54, £63 . 6 . 0.** P.P. 9/-.

***SEE HEATHKIT MODELS AT GLOUCESTER*-Bristol Rd. Tel: 29451. *LONDON*-233 Tottenham Ct. Rd., Tel: 01-636 7349**

# HEATHKIT Amateur Radio Equipment

## LOWEST POSSIBLE INTEREST RATES TO ASSIST OWNERSHIP OF HEATHKIT MODELS

**SB-301E Amateur Band Receiver** . . . SSB, AM, CW and RTTY reception on 80 through 10 metres + 15 MHz WWV reception. Tunes 2 metres with SBA-300-4 plug-in converter.
**Kit K/SB-301E,** 23 lbs., (less speaker) **£140 . 12 . 0.** P.P. 9/-.
Ready to use **A/SB-301E, £170 . 12 . 0.** P.P. 9/-.

**SB-401E Amateur Band SSB Transmitter** . . . 180 watts PEP SSB, 170 watts CW on 80 through 10 metres. Operates "Transceive" with SB-301—requires SBA-404-1 crystal pack for independent operation.
**Kit K/SB-401E,** 34 lbs., **£157 . 10 . 0.** P.P. 10/6.
Ready to use **£192 . 10 . 0.** P.P. 10/6.
**SBA-401-1** crystal pack, 1 lb., **£17 . 3 . 0.**

**MODELS**
**HW-12A**
**(80m.)**

**HW-32A**
**(20m.)**

**HW-12A and HW-32A Filter-Type SSB Transceivers** . . . 100 watts PEP input TX. 1μV sensitivity RX. PC Board. Pre-aligned circuits. Power required: 800v. D.C. at 250 mA., 250v D.C. at 100 mA. —125v. D.C. at 5 mA., 12v A.C. or D.C. at 3·75A.
**Kit,** either model, **£60 . 3 . 0.** P.P. 10/6.
Ready to use **£74 . 13 . 0.** P.P. 10/6.
GH-12 Push Talk Microphone Ready to use **£4 . 3 . 0.**

**HW-17 2M Transceiver.** Range 143·2-148·2 MHz.
**Kit K/HW-17** (less crystals) 1716. **£69 . 2 . 0.** P.P. 10/6.
**Kit K/HW-17-1** DC supply 516. **£13 . 19 . 0.** P.P. 4/6.

**RA-1 Amateur Bands Receiver** . . . Covers 10-160m. Half-lattice crystal filter at 1·6 Mc/s. Switched USB and LSB for SSB. Provision for fixed, portable or mobile users.
**Kit K/RA-1 £39 . 16 . 0.** P.P. 9/-.
Ready to use **A/RA-1, £53 . 0 . 0** P.P. 9/-.
**GC-1U "Mohican" General Coverage Receiver** . . . 10 transistors, 5 diode circuit. Tunes 580-1550 Kc/s. and 1·69-30 Mc/s. in 5 bands. 6" × 4" speaker.
**Kit K/GC-1U. £38.8.0.** P.P. 10/6. Ready to use **A/GC-1U £46.8.0.**

**SB-310 10 Band Professional SW Receiver.** Covers six SW broadcast bands (49, 41, 31, 25, 19 and 16 Metres. 80, 40 and 20 metre amateur bands . . . 11 metre CB. 5 kHz xtal filter incl. for AM, S.S.B. and C.W. listening. Many special features.
**Kit K/SB-310** (less skr) **£138 . 12 . 0.** P.P. 9/–.
Ready to use **£168 . 12 . 0.** P.P. 9/-.
Optional c.w. and s.s.b. filter available as extras.

A complete line of test instruments for the Amateur Radio Station. The V-7A VFM and RF probe. The MM-1U Multimeter. The OS-2 Portable Oscilloscope and many more instruments are fully described in the latest Heathkit catalogue.

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# MEMBERS' ADS

*CLOSING DATE FOR DECEMBER—13 NOVEMBER* *FORM ON PAGE 783*

Rounded cabinet with sliding section U chassis, 22 × 16 × 13 in. Solid state p.s.u. l.f. o/p stages, 100 Hz xtal. filt. i.f.ts, £8 to clear. Front panel, gd. rx. basis or would part ex. for 4CX250F, 6146. C. Stagg, G3KPW, 62 Prospect Place, Grays, Essex. Tel. Grays Thurrock 3073.

Rack, 6 ft., 19 in. fully enclosed with casters and door £1. Byr. cllcts. J. Heck, G3WGM, 5 Hartsbourne Ave., Bushey Heath, Herts. 01-950 1885.

Eddystone 740 £22. BC248M p.s.u. etc. £17. Partly constructed 50 W c.w. tx, 160–10m. with Geloso 4/101 v.f.o., no p.s.u. £8. Valient p.s.u. £5 (suit above tx). Delivered. S.a.e. for details. F. J. Sweeney, 58 Grosvenor Rd., Epsom Downs, Surrey. Tel. Ashtead 2689.

Trio TS500 transceiver with matching p.s.u., new in maker's packing £180. Carriage by passenger train 10s. 6d. Save £23. 1N2379 Silicon rects. 100 mA at 4000 V p.i.v. 6s. ea. (list £4 10s.), 4 for £1. G. Elliott, G3FMO, Oatlands, Southend Rd., Sandon, Chelmsford, Essex.

Heathkit GR54 rx complete manual, as new, ideal SWL, £25 o.n.o. M. Pavely, G3GWD, 11 Gwydor Rd., Elmers End, Beckenham, Kent. Tel. 01-650 3163.

Transistors ACY17, ACY20, OC76 from unused equipment, with short leads (½ in.), 9d. ea. or 5s. per doz. (quotes for large quantities). A. Bano, G3PCR, 28a North Audley St., Grosvenor Sq., London W1.

Complete 144 MHz a.m./c.w. station, one unit, six channels, QQV03-20A p.a., modulator, 6CW4, converter, mains p.s.u., all changeovers £30. BC221-T with charts £16, negotiate carriage. Eddystone wavemeter/modulation monitor 160–10m £3, carriage paid. R. C. Hills, G3HRH, 73 Warren Way, Digswell, Welwyn, Herts. Tel. Welwyn 4769.

KW2000A with a.l.c. and a.c. p.s.u. as new, dynamic mike inc. £180. J. F. Clingan, G3TNI, Alfresco, Bradley Green Lane, Bradley Green, Nr. Redditch, Worcs. Tel. Hanbury 457.

Cheap rx, export chassis covering m.w., 160–10m in 5 bands, r.f. stage, 465 kHz i.f., tone and gram. facilities. Requires octal valves and mains transformer, new cond. not bulky £2. M. Darkin, G3KTH, 4 Ash Drive, Catshill, Bromsgrove, Worcs. Tel. Bromsgrove 5554.

Heathkit sectional tower. CDR rotator, model TR44, 220V, also indicator. TR33 jr. aerial about 3 yrs. old, can be seen wkg., do not want to split, £60. K. Eastell, G3SDU, 9 Prod Lane, Baildon, Yorks. Tel. Shipley 53545.

G.d.o. type TE15 as new, £9 10s. Collins directional Wattmeter £20. Pye PT2202 mobile rx and 12V vibrator p.s.u., wkg. £3 10s. Akai X300 recorder £125. Wanted Pye Ranger for 2m or similar. K. Kanalz, G5AGX, 6 Marzena Court, Whitton Dene, Hounslow, Middx. Tel. 01-894 6880.

Lafayette KT340 prof. wired, gd. cond. £20. Ranger (4m) tunable rx complete with one tx xtal., switch and holders for 5 more., net facility £15. D. Taylor, G3USU, 9 Doveleat, Chinnor, Oxfordshire. Tel. Kingston Blount 689.

KW Vespa Mk 2 tx and a.c. p.s.u. Purchased March 68 and still in new cond. £110. A. A. Wickham, G3XHK, 9 Wensleydale Gdns., Hampton, Middx. Tel. 01-979 8779.

Linear Amp. 800 W max. i/p, 4 × 6HF5, AB1 in KW cabinet with p.s.u. £35. Vibroplex bug mint £10 o.n.o. Both will swap for EC10 or w.h.y. A. Baker, G3NXQ, 13 Eskdale Close, Worcester, Worcs.

Pye Ranger modified for 2m £8 plus carriage. R. Pilkington, G3IAG, Hamrest, 28 Ely Rd., Littleport, Cambs. Tel. Littleport 487.

Marconi HP51 tx/rx with valves, some parts missing 25s. Valves 6V6, 6BJ6, 6BH6, 1s. 6d. ea., QQV02-6 2s. 6d. each, plus postage. Wanted B2 p.s.u. plus valves 7R7, 7Q7. B. Burge, GI3OTU, 6 Ashley Park, Bangor, Co. Down, N. Ireland.

Z match, cond. lousy, postage 15s. Brand new J.B. capacitor type C 12, 366 pF, 2 kV wkg., cost £5. Offers, E. Kelly, GM3POK, c/o Hewlett-Packard, South Queensferry, West Lothian, Scotland.

Class D wavemeter (A1 cond.), mains operated in case, but less phones, £3 10s. Wanted xtals 3300 kHz, 8925 kHz, 8325 kHz, 2300 kHz. A. Humphrys, GW3WVT, Tower Lodge, Nercwys, Mold, Flintshire. CH7 4ED. Tel. Mold 3409.

National p.s.u. for HRO, 6·3 V htrs, £2. HRO gearbox £1. Type F portable telephones £3 pair, all p. & p. extra. CR display type MRO-A, VCR97, no time base, 19 in. rack mounting £2, buyer collects. S. Cook, G5XB, Little Orchard, Gallows Tree Common, Reading, Berks. Tel. Kidmore End 2195.

No. 52 set, very gd. cond. £7 10s. A. L. Mynett, G3HBW, 10 Prior Grove, Chesham, Bucks.

KW77 rx gd. cond. £70 also G2DAF Mk 2 tx, 160 W p.e.p. all bands 160-10m, two min. 807s in p.a., very well made £40, or £110 for the two. B. Little, G3TLS, 28 Fitzgerald Rd., St Johns Lane, Bristol 3.

HA350 £50 o.n.o. Marconi v.h.f. sig. gen., 16–150 MHz £10. BSR Audio osc. 10 Hz to 30 kHz £8 10s. carriage extra. W. Sparks, G3DGJ, 30 Withycombe Road, Penketh, Warrington, Lancs. Tel. Penketh 2044.

Eddystone S640 £15. Class D wavemeter 6 V a.c. i/p £5. KW160 £18. Mobile base springs £2. Sinclair Z12 £3. Wanted Amplivox (as Trolite) headset, r.f. ammeters, dummy loads, G3EKX "Cannonball." All prices include delivery. M. Evans, GW3UCJ, 4 Gower Crescent, Baglan, Port Talbot, Glamorgan.

Labgear Topbander, AR88 rx, xtal, mike, Morse key, £55. G. Fisher, G3KNF, 458 Alum Rock Rd., Birmingham. Tel. 021-327 0398.

CR100 £15. Minimitter conv. £8. LG300 £18. 19 in. rack cabinet 3 ft. high, hinged door containing 100 W mod. 1200 V supply, 850 V supply, 300 V supply £10. Class D wavemeter £2. Byr. must cllct. J. Baker, G2SB, 13 Castle Drive, Heswall. Tel. 051-342 1364.

Large 4 gang ceramic bandswitch, suit p.a. turret or aerial tuner. Vry gd. xtal. mike. Rectifiers GU50. Wanted xtal. 6·5 MHz, ovrtone, wkg. also small mains transformer, sec. 100-0-100 V. A. Parker, G3KH, 133 Station Rd. Cropston, Leicester. LE7 7HH.

R107T, superior to R107 £12 10s., manual 15s., high Z headphones 15s. A. Barron, 5 Unwin Close, The Reddings, Cheltenham, Glos. Eddystone 898 dial, unused £4. S. Dawson, G3JPS, 107 Franklin Ave., Tadley, Basingstoke, Hants.

Surplus valves, chokes, transformers, electrical fittings and components at give away prices. Some v.h.f. gear and ex-govt. spares, s.a.e. for lists. E. Trowell, G2HKU, Hamlyn, Saxon Ave., Minster, Sheppy, Kent. Tel. Minster (Sheppy) 3100.

HRO rx and home-brew multi-band Geloso tx, both with p.s.u. and wkg., only £20 the lot. Capt. P. Burns, Officers Mess, 7 Signal Regt., BFPO 15.

Ferroxcube coil type 36 5s. Transistors V60/6P 5s. Transistor p.s.u. 12 V i/p, 275 V at 150 mA o/p £3 10s. Valves 2C39A 15s. Round flush meters 3½ in., 0–150mA 10s. Acos 43/3 mike inserts 1¾ in. 6s. G. Jeapes, G2XV, 165 Cambridge Rd., Gt. Shelford, Cambridge. CB2 5JN.

Heathkit DX100 and SB10 £65, gd. cond., inspection or arrange sked. (evenings), will deliver reasonable distance. H. Gadsden, G3JZW, 4 Beechwood Court, Dunstable, Beds. Tel. Dunstable 64086.

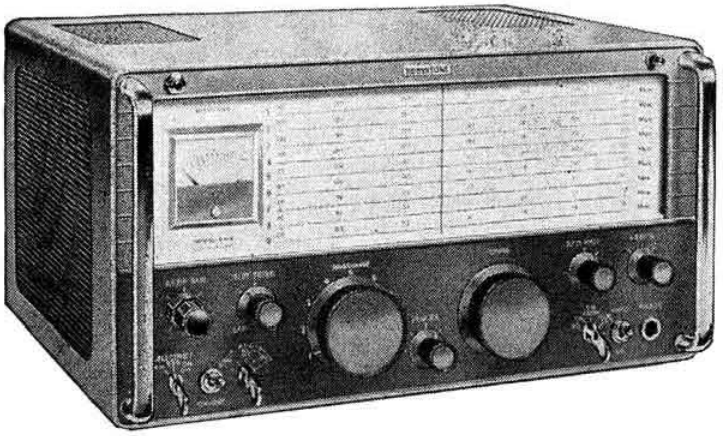
Ekco car radio £4. Brand new boxed RG1 240A (2) £1 ea. Cadenza Ribbon mike £7. Rx 1155 perfect inside £2, postage extra. Wanted 4CX250B bases, QQV03-10, QQV06-40, QQV07-40. Exchanges w.h.y. in transistor circuit line. F. J. Crisp, Carnmenellis House, Carnmenellis, Redruth, Cornwall. Tel. Stithians 501.

# Eddystone

BRITISH MADE

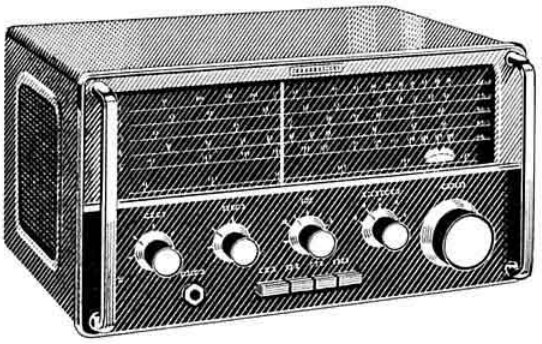
## Amateur communications receivers

### EA12



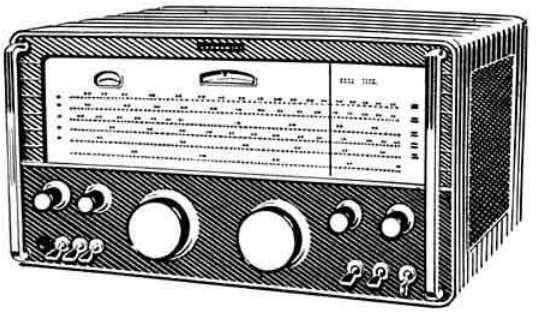
An amateur bands double-conversion superheterodyne receiver, for a.m, c.w, and s.s.b reception. For all amateur channels between 1.8 MHz and 30 MHz in nine 600 kHz bands with 28 MHz to 30 MHz in four bands.

**Primary features.** Crystal-controlled 1st oscillator, 2nd oscillator with continuously variable selectivity to 50 Hz, muting switched or by external relay, twin noise limiters, for a.m/c.w, and s.s.b, short-term drift better than 20 Hz and less than 100 Hz in any one hour, 'S' meter calibrated in nine levels of 6 dB and dB levels beyond 'S9', two a.g.c time constants, deep slot filter, independent r.f, i.f, and audio gain controls with outputs for f.s.k and panoramic adaptor.



### EC10 communications receiver

The fully transistorized EC10 communications receiver, supreme in its class, covers both medium-wave broadcasting and all shortwave service to 30 MHz. Incorporating the famous Eddystone tuning drive, with logging scale and auxiliary vernier, shortwave reception is particularly simple. Battery-operated or from optional a.c mains unit.



### 940 H.F communications receiver

An outstanding 13-valve receiver with two r.f and two i.f stages, silicon diode noise limiter circuit and high quality push-pull output. Built to a professional specification, facilities include provision for c.w, a.m, and s.s.b reception over the range of 480 kHz to 30 MHz in five bands. Suitable for 110/125 V and 200/250 V. 40-60 Hz a.c mains.

**Comprehensive information from your Eddystone distributor or: Eddystone Radio Limited, Eddystone Works, Alvechurch Road, Birmingham 31. Telephone: 021-475 2231. Telex: 33708**

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# MEMBERS' ADS members' ads MEMBERS' ADS members' ads MEMBERS' ADS

The first 35s. gets my old RSGB Handbook and 1968 Callbook post free. Cpl. W. Wynn, G8BEI, E. I. Section, 70 A/C Wksps, School of Army Anv., Middle Wallop, Hants.

Lafayette KT320 g.c. rx with b.s. amateur bands, S-meter, Q-mult., in exlt. mech. and elec. order £25. Also R103 rx 1·6–7 MHz, needs p.s.u. £5 10s. Collaro 3 speed turntable with studio arm less head £3. J. E. Lowgurst, G3VLH, 31 St Mary's Rd., Reigate, Surrey. Tel. Reigate 46641.

144 MHz converter 35s. BF180 preamp. 25s. 70 cms. G6JP converter £7 10s. Tripler-amp. £15. Modulator £5 15s, silicon rect. p.s.u. £15. G2DD converter £6. Variable 100 pF 3 gang 10s. Soldering iron 35W 18s. 8 uF paper 750 V d.c., four at 6s. ea. Many spares £1 per box. G. Parris, G3XFW, 2 Ashford Grove, Yeovil, Somerset.

Vanguard Mk 2 160–10m £35. Lafayette HE80 rx, 5 bands covering 550 kHz to 30 MHz and 142–148 MHz £30. LM14 with manual and cal. charts, but no p.s.u. £10 or £65 the lot. T. Jameson, G3VJY, Sgts. mess, RAF Tangmere, Chichester, Sussex. Tel. Halnaker 333 (evenings only).

Twin coax rly. Type 78A 15s. Cowl Gill motor £3. BC453 (Q-Fiver) £3. UM2 mod-trans 15s. R.f. meters 2½ in. sq. 0·5A 7s. 6d. Various other meters, valves and power transformers, s.a.e. all carriage extra. E. Handcocks, G5HN, 1 Conisboro Way, Caversham, Reading, Berks. Tel. Reading 73650.

Rack mounted HRO in gd. cond. with p.s.u., coil container and g.c. coils for all s.w. amateur bands and lower part of m.w. £20. Byr. arranges transport. R. Turton, G3VKE, 2 Greystones Crescent, Sheffield, S11 7JN, Yorkshire. Tel. Sheffield 66145.

Minimitter rx MR44/2 £28. Hamgear preselector powered £5. Aircraft transistor rx, 9 transistors, 4 diodes, 108-130 MHz and m.w. £9. T. A. Wilson, Orchard House, Sutton Green, Guildford, Surrey. Tel. Guildford 5783.

TA33jr, 20 ft. mast. 50 ft. coax £30. AR88D rewired p.v.c., manual, perfect cond. £40. Codar AT5 tx, T28 rx, 12 MS p.s.u., 12 RC control, FIF whip 160m coil as new £45. J. A. Greenwood, 7 Heath Crescent, Bradley, Nr. Keighley, Yorks.

Electroniques amateurband (valved) Coilpack i.f. double rx. Home-brew 20 ft, tripod mast. 2m beam, bits and pieces, byr. collects, no reasonable offer refused. R. E. Smith, 255 Purbrook Way, Leigh Park, Havant, Hants. Tel. Havant 3384.

Swop 38 set with accessories for set of FT243 or 10X xtals from 7·005–7·05 MHz or will pay cash. Please write with details. M. Smith, GM3WHT, Schoolhouse, Urafirth, Heylor, Shetland Islands. Tel. Hillswick 232.

EDC rotary converter, overhauled, 240V d.c. i/p, 230V a.c. o/p at 1·9A £3 5s. Transformer 500-0-500 V at 500 mA, CH-10H 50 W p.p. o/p transformers 3300-600 ohms, speech 600 to 7·5 ohms £2 pair. Byr. cllcts. A. Solomons, G3ICT, 70 Fairholt Rd., London N16.

14AVQ, 3 months use, unsuitable at this QTH. Could deliver 50 mls. £10 o.n.o. Jap. 2m xtal converter, 4·3 MHz i.f., also pre-amp, both units transistorized for 6–9 V, new unopened modules, the pair £6 5s. post paid. P. Pitt, G3ICH, 12 Summerlands Rd., Eastleigh, Hants. SO5 7AT. Tel. Fairoak 1272.

Isolating safety transformer (500 W), steps up or down, mint £7 10s. 4X150A 15s. CNY tx 160, 80, 40m, built-in mod. a.c. p.s.u., 24/12 V d.c. p.s.u. £9 10s. 6d. Pye car radio 5W o/p, b.s., l.w./m.w., 3 s.w., matching spkr. £9 19s 6d o.n.o. D. Byrne, G3KPO, Jersey House, Hodney Rd., Eye, Peterborough. Tel. Eye 351.

Lafayette KT320 com rx., 550kHz to 30 MHz, acc. to s.s.b. refinements realigned, gd. wkg. order, new cond. £20 o.n.o., byr, cllcts, manual inc. W. Dyer, 60 Gilbourne Rd., Plumstead Common, London, SE18.

Bandswitched exciter for h.f. bands, a.m. tx £8. Studio xtal mike £2. Heavy duty smoothing chokes. Valves 6V6 and GU50. Wanted small mains transformer 100–0–100 V sec. also 6·5 MHz, overtone xtal. A. Parker, G3KH 133 Station Rd., Cropston, Leicester. LE7 7HH.

Four brand new unused 813 £1 ea. One unused 813 10s. One unused CV128 e.h.t. rect. £1. All postage extra. C. Galloway, G3RNV, 105 Dumbarton Rd., S. Reddish, Stockport, Cheshire. SK5 7EX.

Heathkit RF1U sig. gen. Mohican rx. IO12U scope and SB301E rx. Offers. D. Pollock, 13 Priory Gdns., Easton, Gardano, Bristol.

BC221 with p.s.u., charts, booklet £15. Eddystone 740 with booklet, spare valves, spkr. RS600 r.f. sig. gen. £3. J. Macfarlane, 67 High St., Whitchurch, Aylesbury, Bucks. Tel. Whitchurch 357.

Triplett (USA) multimeter 1183, Volts, Ohms, milliamps, capacity and live circuit test, complete with instructions and accessories £3. ZC1 Mk 2 unmodified except provision for external h.t. £3. Carriage extra unless cllctd. W. Hayes, G2WK, 44 Beechwood Ave., Earlsdon, Coventry. Tel. Coventry 73415.

Heathkit RA1 rx gd. cond. £25. P. Curzen, 65 Fordington Rd., London N6. Tel. 01-833 0084.

CR100/2 rx gd. cond., spares kit, spkr., £15. Class D wavemeter mint cond. with spares etc. mod. mains, £5. Eddystone dial 598, new unused £1. Valve tester Type 4 £4. Byr. cllcts. T. Yates, 51 Lyndhurst Rd., Southport, Lancs. Tel. Southport 68792.

Spitfire 1 KW linear (6 × 12JB6 tubes) brand new £35. Unused Codar AT5 and mains p.s.u. plus unused mobile p.s.u. and control unit £28. Labes 2m converter (AF 239). Brand new £11 10s., W. Clayton, G8ARG, 7 The Bancroft, Etwall, Derbyshire.

Philips Model 338T car/portable type complete with mounting container, spkr., etc., boxes as new £17. G. Badger, G3OHC, Four Oaks, Sutton Coldfield, Warks.

Five ft. 19 in. rack £1. 20 Bullers frequelex pillar insulators 13925, 3 in. high two in. sq. base 1s. 6d. ea. Carriage/postage extra. P. Knight, G3HGR, 7 Meddowlands, Seal, Sevenoaks, Kent. Tel. Sevenoaks 62227.

Modified British 19 set Mk 3 (all top band) 2 r.f., mixer, 2 i.f., 2 a.f., b.f.o., m.n.l., S-meter, b.s. built in, mains p.s.u., resprayed case, gd. cond. £8 o.n.o. R. Foulger, 31 Woodsley Ave., Cleethorpes, Lincs.

Chinese copy of the LG300 r.f. unit in exlt. cond. complete with 1000V transformer and circuit etc., any reasonable offer secures, but regret byr. to collect. J. Crux, 16 Wiltshire Close, Bedworth, Nuneaton, Warwickshire.

Wireless Worlds 1950–65 complete, all clean copies, any offers, byr. to cllct. W. Banks, G2ARX, 110 Bramhall Lane, Stockport, Cheshire, SK2 6UD. Tel. 061-483 5187.

C.w./a.m. 160-10m homebrew tx, immaculate £25. HRO 5T, 9 coils and home brew p.s.u. £18. Joystick and tuner, de luxe £5. K. Manktelow, G3SKZ, 94 Ravenscroft Avenue, Preston Rd., Wembley, Middx.

Eddystone 840C v.g.c. £35. Prefer byr. collects, but would deliver 30 mls. Type 3A tuner as new £1 10s. Slot, 8/8 for 70cm £2. H. Hadley, G8BEO, 120 Higham Lane, Nuneaton, Warks. Tel. Nuneaton 66976.

CR100 gd. cond., S-meter, n.l. mods £16 o.n.o. M. Brenig-Jones, 113 King George 5 Drive, Cardiff. Tel. Cardiff 754437.

Bulletins 1960–67, SWM 1954–57 and 1962–67, 6s. per year, which is 6d. per copy. Or £5 the lot, carriage extra. C. Wakeman, G4FN, Broadwater House, Clifton Terrace, Southend-on-Sea, Essex.

Heathkit GD1U g.d.o., factory built, with full set of coils 1·7 to 230 MHz £8, carriage paid. C. Beynon, GW3WSC, 20 Victoria Sq., Penarth, Wales. Tel. Penarth 709171.

Rx type 109, 6V d.c., 2-12 MHz £5. Tx/rx ZC1 Mk 2, 12V, 2-8 MHz £6, both as new. W. Maddock, G2AJS, Caterham School, Harestone Valley Rd., Caterham, Surrey. Tel. Caterham 43028.

Eddystone 680X rx. in gd. cond. £65 o.n.o. Transport arranged up to 50 mls. Set of QCC xtals. for G2DAF rx filter £6. J. Holland, G3GHS, 164 Hook Rise North, Tolworth, Surrey.

KW77 Amateur band rx, 160-10m, as new, must sell £45. Byr. cllcts or post extra. L. Vogel, G3UYT, 52 Pont Street, London SW1. Tel. 01-584 0187.

National 200 W s.s.b., a.m., c.w., tx/rx, cost £220. will take £80 or £60 plus a reliable a.m./c.w. tx suitable for a beginner. F. Rayer, Reddings, Longdon Heath, Upton-on-Severn, Worcs.

SCR522 2m tx 35s. V.h.f. tx 127 10s. Choke 10 H, 250 mA, new 20s. QQV03-20, CV2799 new 25s. Rx 220 p.s.u. chassis 20s. Rx 220 i.f. strip 5s. Carriage extra. G. Steele, GM3SIY, 28 Erskine Hill, Polmont, Stirlingshire. Tel. Polmont 2025.

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IC-700R—This is an all transistor Rx for Amateur Bands and makes wide use of F.E.T.'s in the r.f. and oscillator stages to ensure maximum sensitivity and low cross-modulation. It uses a top quality 9 Mc/s xtal filter for excellent image rejection and a single conversion chain for minimum noise.

**MODES: AM, SSB, CW (L.S.B. on 80 and 40, U.S.B. on 20, 15 and 10).**

**COVERAGE: 3.5–4.0 Mc/s: 7.0–7.5; 14.0–14.5; 21–21.5; 28–28.5; 28.5–29; 29–29.5; 10–10.5 Mc/s.**

**SELECTIVITY: 2.4 kc/s at −6db; 4.5 kc/s at −60db (1.8 shape factor). 500 cycle audio filter for CW.**

**SENSITIVITY: Better than 1 microvolt for 10db.**

**SPURIOUS SIGNALS: Below noise level.**

**IMAGE REJECTION: Better than 60db.**

**STABILITY: 100 cycles.**

**POWER SUPPLY: 240V a.c. or 12V d.c. built-in.**

**DIMENSIONS: 11in wide × 6½in high × 9½in deep.**

**WEIGHT: 12 lbs.**

The design of this Rx has obviously been very well thought out. The v.f.o. is followed by no less than 3 buffer amplifiers—the r.f. tuning capacitor is ganged to the r.f. coil slugs for optimum L/C ratio over the full tuning range (I don't know of any other Rx that goes to this degree to squeeze the last drop out of the antenna!). Product detector for SSB/CW, separate detector for AM. Dual power supply built-in either 240V a.c. or 12V d.c. Built-in relay for Rx muting on transmit if used with another Tx. Provision for xtal control. Where you would get better Rx value than this I just don't know.....£85.0.0.

IC-700T—The companion Tx to match the above Rx is the same midget size. Again it is all transistor except driver, PA's and v.f.o. mixer. It uses the Rx v.f.o. and of course covers the same frequency range, with again, provision for xtal control if desired. The two 6146B's in the final are very conservatively operated with only 500V on the plates for 120W p.e.p. This ensures excellent linearity, freedom from distortion products and long life. To those plagued with TVI this may be the answer. There's a lot to be said for operating the final well within its rating rather than pushing it to the limit—and certainly this little beauty sounds very nice indeed.....£80.0.0.

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R209 Mk 2, Handbook 15s. BC454 minus 12K8 30s. Tx unit type 81 ex TR1987 has QVO4-7, TT15, ideal 2m 50s. R1147 incl acorn valves, circuit 30s. Rx 78 2·9–13 MHz 10s. M. Darkin, G3KTH, 4 Ash Drive, Catshill, Bromsgrove, Worcs. Tel. Bromsgrove 5554.

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Heathkit Mohican, factory built in June 68, mint. cond., manual £28. R. Williams, 204 Dysart Rd., Grantham, Lincs.

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Heathkit GR54 rx mint £40 o.n.o. DL6EQ t.u. part built, offers. Mosley Commando s.s.b. tx 80–10m, 2 × 6146 p.a. £90. J. Worthington, G3COI, Foxhills, Orton Lane, Penn, Wolverhampton. Tel. Wombourn 2288.

Heathkit 012U scope. less c.r.t. £22 o.n.o. also SX24 rx, requires alignment etc. £10. Byr. must cllct. J. Hudson, G3RFL, 68 Glebe St., Gt. Harwood, Nr. Blackburn, Lancs. Tel. Gt. Harwood 3395.

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KW top band Mk 2 tx as new, little used, best offer or exchange rx/4m gear or w.h.y. E. Taylor, G3FK, 4 Brownsea Ave., Corfe Mullen, Dorset. Tel. Broadstone 2631.

Radiovision Commander rx, gd. cond. product detector, manual £16. R. McInnes, GM3LNE, 37 Craiglockhart Cres., Edinburgh 11. Tel. 031-443 5097.

Eddystone 640 with manual £15. R209 £7. Electroniques GC166 QP166 Mk 6 Qoilpax, data sheets £8. Transistor converter 23cm., 28–30 MHz i.f. £14 (used in 1967 listeners championship) all postage extra. T. M. Cooper, BRS28005, Highridge, Water Lane, Storrington, Sussex. Tel. Storrington 2301.

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Codar CR45 r.x., 2000–10m, 3½ W a.f. o/p, mains operation, fully wkg., £5 10s. M. Needham, 50 The Mall, Faversham, Kent. Tel. Faversham 2162.

TW converters; 2m, 14–16 MHz i.f. £5. 70cm, 12–14 MHz, £5. Command r.x.s mod. for 12 V, l.w. £6, Top Band £4. Parabeam 18 ele, 70cm £5. Yagi 6 ele 2m £2. Slot 6/6, 2m £4. Deluxe Joystick and 4RF tuner plus carriage, lists £9. R. Barnes, 5 Prospect Drive, Hale Barns, Cheshire.

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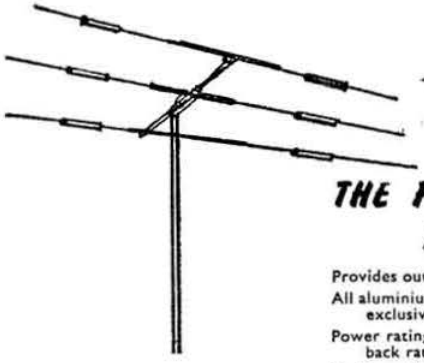

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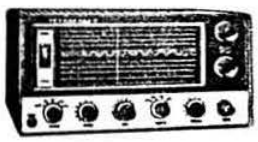

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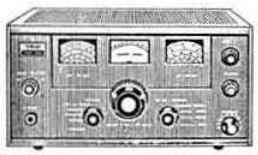

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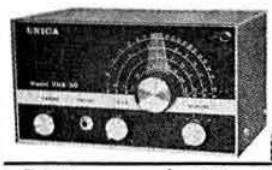

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*Continued on page 780*

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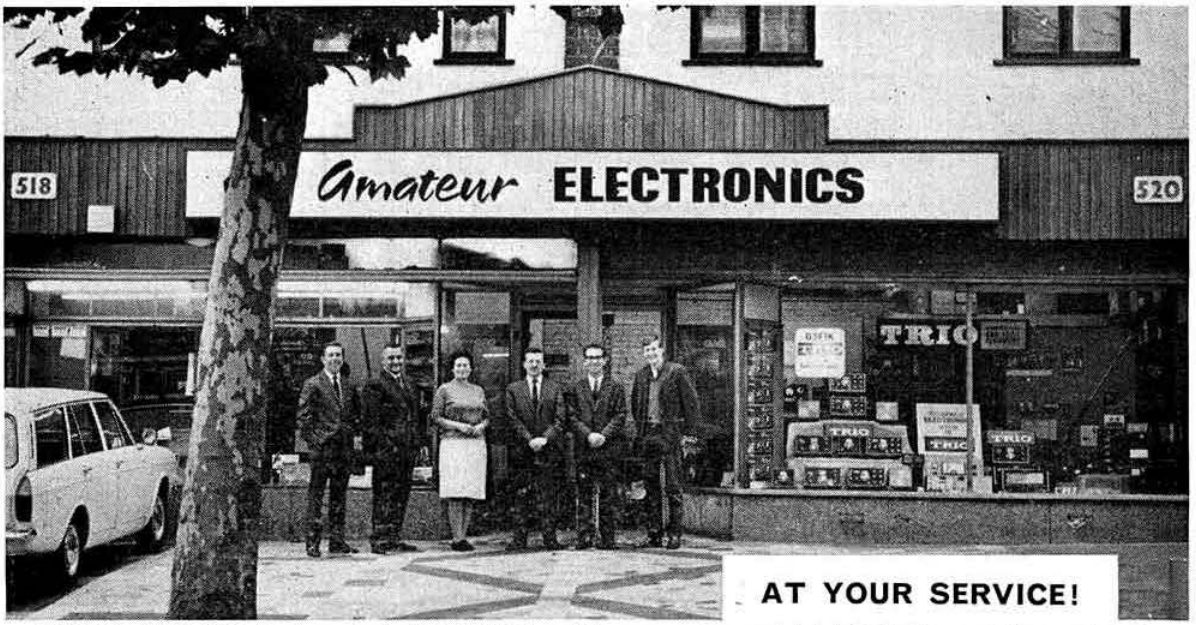


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# CURRENT COMMENT

*DISCUSSING TOPICS OF THE DAY*

## Headquarters

In recent months editorial comment has been notable by its absence. The view is held that unless there is something worthwhile to say the space should be better employed. This month, however, there are several matters which are of direct concern to the majority of our Members.

First, the new Headquarters at 35 Doughty Street. Renovation work was completed in the middle of October, the floor coverings were laid, and barring any last minute snags the move from New Ruskin House should now be complete. There has been talk of a ceremonial opening by the Society's Patron but unfortunately the existing engagements of Prince Philip do not permit him to attend such a function in the forseeable future. The decision has therefore been made that an open weekend will be arranged during which Members will be welcome to visit and inspect the new Headquarters. Probably a station will be set up to be in operation during this period. When the dust of Doughty Street has settled, firm arrangements will be announced.

## Radio Communication

This issue of *Radio Communication* will be the last to be produced under the guidance of Trevor Preece, G3TRP. After nearly six years on the editorial staff of the Society Trevor has decided that a commercial organization offers him greater opportunity and increased reward. Whilst it is a matter of regret that he should leave when the Society is embarking on a period of expansion we wish Trevor every success in his new post. Praise for *Radio Communication* has come from all parts of the world (it is sent to more than one hundred countries) and there will be no lessening of the existing high standard. Whilst we have a number of first rate technical articles scheduled for publication in the months ahead our stock must be constantly replenished and if you would like to prepare an article for publication we will be happy to hear from you. Production of our Journal will henceforth be in the hands of John Adey and as an interim measure he will be assisted by an Editorial panel consisting of Pat Hawker, G3VA, George Jessop, G6JP and Roy Stevens, G2BVN.

Still on the subject of *Radio Communication* it must be recorded that the recently introduced two tier post system has made the monthly delivery a complete chaos. Members living in the same house have received their copies spaced five days apart whilst the journey from Letchworth to Birmingham must be vastly greater than we ever imagined. The net result of this system to the Society is that we now pay an extra £50 per month in postal charges and the number of Members who do not receive *Radio Communication* within a reasonable time has increased very considerably. Complaints should go to your local Postmaster (or the PMG) but not to Headquarters . . . please.

## RSGB Publications

Many visitors to the Exhibition will have obtained a copy of the *Radio Communication Handbook*. Following a tremendous effort on the part of the Co-Editors and our Printers there were just enough copies available to satisfy counter sales. Although further stocks became available soon after the Exhibition the position was complicated by the lack of postal delivery cases. The factory making these was affected by the recent flooding and vital machinery had to be fitted with replacement motors. All is now under control and if you had to wait a few days for your Handbook it is hoped that your annoyance will have evaporated in the presence of what will undoubtedly be a best seller in the communications world.

The Society is, of course, continuously engaged in publishing new books and new editions of its established titles, designed to provide information needed by both newcomers and long-licensed amateurs. In recent months, a considerable number of new editions involving extensive revision and up-dating have appeared including new editions of *A Guide to Amateur Radio, Amateur Radio Circuits Book, Amateur Radio Call Book,* and *Radio Data Reference Book.*

A new title is *Amateur Radio Techniques* by Pat Hawker, G3VA, which replaces *Technical Topics for the Radio Amateur.* Although the new book—largely but not entirely compiled from ten years of the regular feature *Technical Topics*—contains more than 60 pages of additional material, the price has been increased by only a modest 2s. 6d., and its 160 pages include more than 350 diagrams.

The Society is acutely aware of the demand for sound and up-to-date information at prices within the reach of all members—and there can be little doubt that its current list of publications represents unbeatable value for money.

# QTC

## FILM LIBRARY
## REGION 1 ORM
## CRISTOFORO COLOMBO PRIZE 1968

### Film Library

As you read this, the Society's new film *Radio News of 1968* will be in the final editing stage. Scenes shot include sequences dealing with NFD, GB2LO, Amateur Radio Astronomy, E-M-E, and What's New at the Exhibition. The October schedule promises further items of special interest. *Radio News of 1968* will run for about 20 minutes, and 16mm sound prints will be available through the film library from mid-December. Reservations can now be accepted. First-day hire will be 20s. including outward postage; additional days at half-rate. Members will appreciate that the Society's initial allocation of funds to the Film Library, while covering the cost of the first prints, will not meet the cost of production, which will therefore have to be recovered out of hire charges.

The other film, mentioned last month, is a documentary on " Moonbounce," based on the activities of G3LTF, and this is scheduled for release through the Film Library in February 1969. Part has already been filmed, and a brief sequence has been prepared for inclusion in *Radio News of 1968*.

The Film Librarian, G3NDF, is seeking to make up a list of members in UK and abroad who have 16mm camera equipment (silent and/or sound), who have some experience of filming news and documentary sequences, and who would be willing to co-operate, in their own areas, in filming for *Radio News* as and when opportunities arise. He would also be glad if Members, upon starting or hearing of any activities which are of special or historic Amateur Radio interest, would let him know (in advance please!) so that arrangements can be made to have the item covered if at all possible. The address is Mr R. A. Cathles, G3NDF, 4 Daunay Drive, Great Bookham, Leatherhead, Surrey.

### Core Colours for Flexible Electric Cable

The 19 European countries of the CEE (Imperial Commission on Rules for the Approval of Electrical Equipment) after much hard bargaining, compromise and co-operation, have accepted a new colour coding; brown for line (which is not so very different from the existing red); light blue, for neutral, which cannot be confused with the line, even in bad light; yellow and green for the earth wire—the only one with two colours, and therefore entirely different from the other wires.

These changes had to be made to overcome the existing confusion of colour coding in Europe; for example, red had been used in Germany and some other countries for many years as the earth wire. While many people may regret the change in colours, particularly the disappearance of the colour red for line or live wire—so appropriate as a danger signal—nevertheless this disadvantage is outweighed by the benefits of acceptance of a common system which will make for greater safety in the increasing international trade in electrical equipment in the future.

The new British Standard is to be issued shortly, as soon as the dates of the implementation of the new Regulations have been decided by the Home Office.

### Region 1 ORM

On Sunday, 29 September, about 100 Region 1 Members, some with their wives and families arrived in Southport to attend the ORM at the Floral Hall. The weather started by being disappointing but improved in the afternoon. This factor produced the only snag in the proceedings because two-thirds of the Headquarters' party were travelling by air from Belfast. Owing to the weather their plane was diverted from Woodvale (Southport) to Speke (Liverpool). Good fortune, however, smiled on the organizers, who were able to contact the reception party (G2DQX) standing by at Woodvale. He was asked to rush to Speke, where he arrived in time to meet Messrs Patterson and McNally when they landed.

From about 11 a.m. the talk-in Stations on 2, 4 and 160m were busy as all routes converged on the Floral Hall. The early arrivals occupied their time by inspecting the ORM stations and also the trade stands of Jim Fish, N.W. Electrics and Stephens-James.

After lunch the Business Meeting was attended by 92 members, who listened to brief remarks from each of the Council Members and from the RR. The remainder of the time was given over to questions " from the floor." These, as usual, covered a wide field with N.F.D. and licensing matters prominent. The Regional Representative wound up the meeting by thanking Jack Petty (G4JW), Barney Patterson (GI3KYP) and Eddie McNally (GI3SXG) for travelling long distances to attend on behalf of Council. Special thanks were also offered to Norman Horrocks (G2CUZ) and Gerry Illingworth (G8QG) and many local helpers for their most successful efforts in organizing the event.

After tea and having done justice to the good spread laid on by the Floral Hall, Ron Ratcliffe (G3XIM) gave an impressive lecture and demonstration of Video tape recording equipment.

The raffle, which included many prizes donated by local members proved, as always, a considerable attraction.

During the Business Meeting the Region 1 trophies were

## *RSGB Lecture Meeting*

## SINGLE SIDEBAND AT V.H.F.

*Modern Transmitter and Receiver Techniques*

By R. T. Greenwood, G3LBA. F. A. Griffiths, G3MED, R. G. Pett, G3SHK and G. M. C. Stone, G3FZL.

**Friday, 15 November, 1968**

INSTITUTION OF ELECTRICAL ENGINEERS, SAVOY PLACE, LONDON, WC2.

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

Tickets may be obtained from Society Headquarters.

presented. More details of the results of the relative contests will be published in next month's *Radio Communication*.

### RSGB Publications Department

To coincide with the move to the new Headquarters at 35 Doughty Street, certain changes have been made in the Publications Department, which should result in a speedier processing of orders. To assist in this, members are asked in future to always use the Publications Order Form when ordering Publications from the RSGB. The Publications Order Form will be printed in *Radio Communication* each month; it appears on page 776 in this issue.

### Postal Delivery of the Handbook

It is hoped that by the time that this is being read the deliveries of the *Handbook* will be well under way. The initial delay was partly due to a shut-down in the factory producing the cardboard containers caused by flooding affecting electrical machinery. Members will appreciate that to send through the post a book, weighing nearly six pounds, without proper packing would be asking for trouble. To those who have been waiting our apologies are extended and it is hoped that the pleasure derived from the *Handbook* will more than outweigh the temporary inconvenience.

### Radio Communication Handbook

The Fourth Edition of the *Handbook*, which was available for the first time at the Exhibition last month, contains an entirely new Chapter dealing with RTTY. This Chapter was contributed by Mr N. H. Sedgwick, G8WV. The Author's name does not, however, appear in the list of contributors and our apologies are offered for this regrettable omission.

### Can You Help?

● Eion Liverpool, of Buxton Village, East Coast, Demerara, Guyana, who is anxious to correspond with an amateur or SWL in Great Britain, aged between 16 and 24 years.

### G2BSA Memorial Fund

A group of amateurs have formed a committee to administer a Fund which will be used to purchase a suitable Memorial of practical utility which will be placed in a Cheshire Home. The form which the Memorial will take will be chosen in consultation with Group Capt. Cheshire and Mrs Clague.

The Members of the Committee are G2YM, G3WDQ, G3WJO, G3WOB, and G3XCS, with G3VUC as Secretary/Treasurer. Cheques and Postal Orders should be made payable to the "G2BSA Memorial Fund," crossed, and sent to W. M. Clarke, G3VUC, 66 Fillace Park, Horrabridge, Yelverton, Devon.

### Cristoforo Colombo Prize 1968

Charlie Newton, G2FKZ, has been awarded the Cristoforo Colombo Prize for Radio Amateurs in the Technical Sector. The actual citation is as follows:

"For the careful work carried out during the International Geophysical Year for the study on the phenomenon of radio electrical propagation in the presence of aurora borealis and for the scientific works presented to high level congresses which are a clear mark that the radio amateur's work has already reached high scientific importance."

The Award was made during the closing session of the 16th International Congress on communications by the President of the Italian Ministers' Council. Unfortunately Mr Newton was unable to attend in person but he expressed his appreciation by letter of the high honour accorded to him. This Award is the first formal recognition by an international professional body in recent times of the work of a UK radio amateur.

### Silent Keys

We record with sorrow the passing of:

F. S. Adams, G2YN, of Parkstone, Poole, Dorset.
A. F. Padfield, G3ACP, of Chessington, Surrey.
R. W. Blincoe, G3INP, of Redcar, Yorks.
C. E. Gregg, G5CG, of Bulwell, Nottingham.
W. H. Darnell, BRS29828, of Halstead, Essex.
E. R. Thomas, W2MM, of Englewood, NJ, USA, 07631.

## Four Metres and Down Certificates

**By reducing the number of stages in the processing of Four Metres and Down Certificates, we hope to speed up their issue. Therefore, whenever you wish to claim a certificate, please send the completed form and cards direct to F. E. A. Green, G3GMY, 48 Borough Way, Potters Bar, Herts.**

# A Semiconductor, V.H.F. Power Amplifier Using a Pi-tank Circuit

By CLIFF SHARPE, G2HIF*

*G2HIF discusses the design of a V.H.F. P.A. using "overlay" transistors. Observations are made on several causes of unstable operation which can arise in a practical circuit, culminating in design details of a pi-tank circuit offering flexibility in load matching, and good harmonic rejection.*

THE target specification of a new solid state, 144 MHz transmitter for G2HIF/P called for a full 25 watt capability on c.w., and a maximum p.e.p. on s.s.b. consistent with easily available transistors, linearity of operation and depth of pocket.

An examination of manufacturer's literature on v.h.f. power transistors showed that the RCA overlay device, 2N3632 (also by Motorola and Ferranti, or the XB402 by Texas Instruments) was rated at 13½ watts output up to 175 MHz. Two such units would easily provide a 25 watt unmodulated carrier on 2m and their specification also suggested that operation in the linear mode would be possible up to 10 watts mean (20 watts p.e.p.).

With the *RSGB Handbook* and a slide rule at the ready, a tentative circuit using a pi-tank network was postulated. The first calculations showed very forcibly that this was the wrong approach. The accepted formula yielded component values which could not be realized in practice.

As most published circuits on the data sheets favour one of the several variations of the T-network, this was a configuration which was obviously feasible. Construction of an experimental p.a. was begun. Sufficient data was readily available to enable the p.a. to be built around a single 2N3632 without knowledge of the derivation of the design parameters, and it was hoped that the workings of the finished model would help to supply some of the answers.

This preliminary venture into high power with v.h.f. semiconductors confirmed all the forebodings of other experimenters. Not only was the amplifier very non-linear, but it was also exceedingly temperamental. The thought of what might happen when two 2N3632s were connected in parallel did not bear contemplation, let alone actual construction, until more was understood of the theoretical design procedure.

A closer search was made through published articles and application reports for additional information without finding precise answers to a number of questions. In the majority of reports either the inadequacies of the approach were veiled in the ultimate setting of large variable capacitors, or else so many assumptions were made in a complex mathematical treatise that "the wood could not be seen for the trees."

The first gleam of light came when Motorola published the large signal characteristics of several power devices in graphical form. The parallel input and output impedances were shown to be functions of both power and frequency, and their values did not necessarily bear any relation to the d.c. or small signal characteristics normally quoted on data sheets.

In the accompanying report [1] a design procedure for T-network was explained which yielded realizable component values. The final step in the calculations, however, required some mathematical manipulation before the vital design formulae could be elucidated. Most amateurs at this point would resort to "guesstimation" to derive the working capacitor values, so it was left to Malcolm Bibby, G3NJY, to thrash out the algebra and to quote working design formulae [2].

## Difficulties Arising in a Practical Design

Experience on the Mark One was not entirely wasted effort. The idiosyncrasies of this type of p.a. were now more readily appreciated by a knowledge of the theory, and another single 2N3632 was offered for sacrifice.

The instabilities of the original design were attributed to three important factors. These were:

(*a*) The presentation of an incorrect load to the collector of the transistor by the matching network.

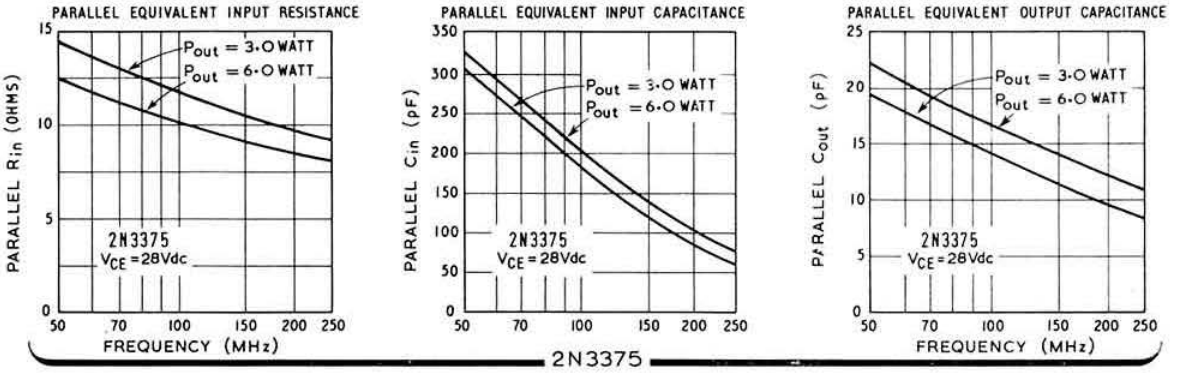
(*b*) A lack of understanding concerning the vital necessity of ensuring a minimal impedance between emitter and earth/chassis.

(*c*) A failure to take into account the possible ill effects of coupling in the supply rail through a large, high $Q$ r.f. choke.

Although most careful designers would automatically ensure the condition required by (*b*) was satisfied, few amateurs really appreciate the magnitude of the loss in power gain which can be produced by the inductance of only ½ in. of wire between emitter and chassis.

Inadequate decoupling in the emitter circuit can introduce more serious effects than merely a reduction of output power and in the worst cases can lead to actual instability and parasitic oscillations. The ingenuity of the designer may be severely taxed where it becomes necessary to run the stage

* 20 Harcourt Road, Wantage, Berks.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PARALLEL Rin (OHMS)
Pout = 3·0 WATT
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VCE = 28Vdc
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PARALLEL Cin (pF)
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VCE = 28Vdc
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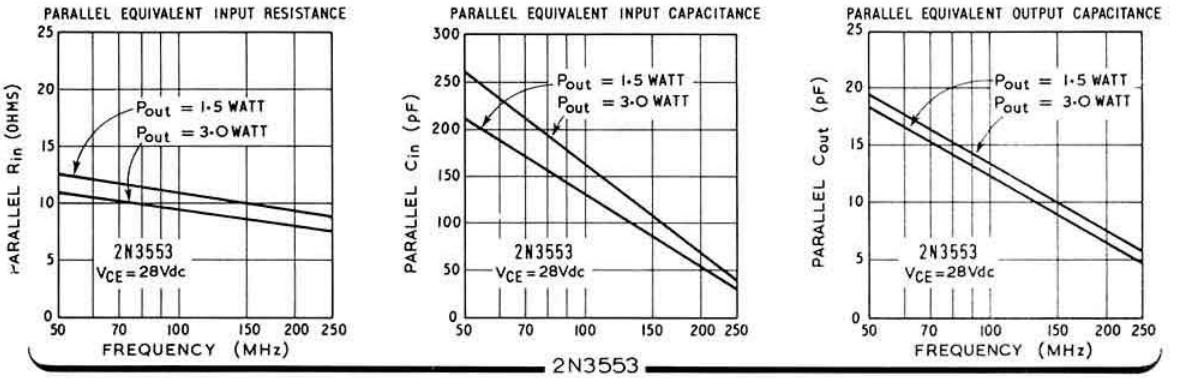
VCE = 28Vdc
FREQUENCY (MHz)
2N3375


PARALLEL EQUIVALENT INPUT RESISTANCE
PARALLEL Rin (OHMS)
Pout = 1·5 WATT
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VCE = 28Vdc
FREQUENCY (MHz)
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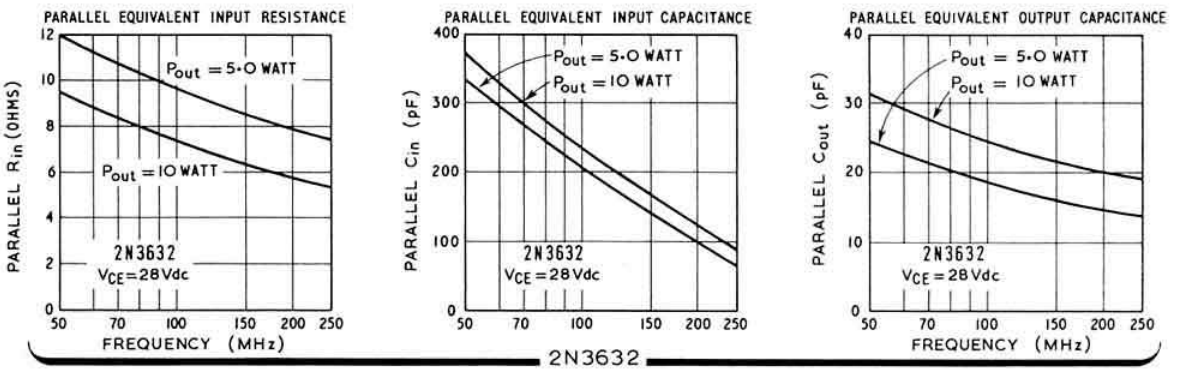
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Pout = 5·0 WATT
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VCE = 28Vdc
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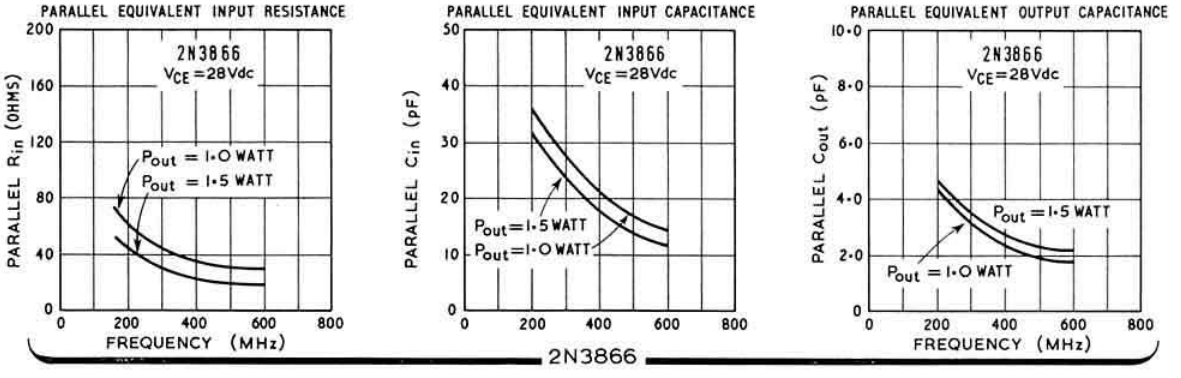
VCE = 28Vdc
FREQUENCY (MHz)
2N3632


PARALLEL EQUIVALENT INPUT RESISTANCE
PARALLEL Rin (OHMS)
2N3866
VCE = 28Vdc
Pout = 1·0 WATT
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FREQUENCY (MHz)
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PARALLEL Cin (pF)
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VCE = 28Vdc
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PARALLEL EQUIVALENT OUTPUT CAPACITANCE
PARALLEL Cout (pF)
2N3866
VCE = 28Vdc
Pout = 1·5 WATT
Pout = 1·0 WATT
FREQUENCY (MHz)
2N3866

from a positive earth supply. Many problems can be avoided —perhaps a transistor saved from self-destruction—by strapping the emitter to chassis with the shortest possible length of 1 in. wide copper foil (not braid).

The basic methods of obtaining the maximum transference of r.f. power from a semiconductor to a small resistive load are essentially the same as those used in valve circuits. The special problems which the transistor creates arise from the very much lower equivalent parallel input and output impedances of the device.

There is still a tendency for many amateurs who are more at home with valve techniques to think in terms of voltages and not currents when applying themselves to semiconductors. The familiar component values of a valve tank network are a direct function of the high impedances involved. It is hardly surprizing, therefore, to find that a similar network, which has been designed for a semiconductor circuit with impedances one hundredth of those found in valve circuits, require vastly different component values.

Unfortunately, these component values are often physically unattainable, especially at very high frequencies, and other networks have to be used which can make the impedance transformation with practical components. Some of the conditions in (*a*) arise simply through the use of wrong value components in otherwise suitable networks, but even when the designer has analyzed the problem, and derived a correct matching network, he is not out of the wood.

It is inevitable that sometime during its service, the transistor will be subject to off-tune or excess load conditions, and although these may occur only during alignment, the designer cannot afford to ignore them. In high impedance circuits, there are few ill effects resulting from a badly designed tank circuit other than a lowering of the p.a. efficiency, or an increase in the valve anode dissipation. In general, detuning or excess loading will merely cause the load line to steepen, but it will continue to cut the $I_a$ $V_a$ characteristics over their linear region.

This will not be so with the semiconductor p.a. Off-tune and higher load conditions present to the transistor a greater equivalent series impedance than does the correctly tuned and loaded network. The load line will therefore cut the $I_c$ $V_c$ curves below the " knee." In this region linear operation is impossible and the conditions favour parasitics and other instabilities. The desirability of choosing a tank network which minimizes these adverse effects of misalignment is therefore obvious.

It is not unusual to run into difficulties in valve p.a's when the h.t. supply is shunt fed through an r.f. choke, but semiconductor circuits are even more prone to the ill effects a choke can produce. The need to present a high impedance to r.f. currents circulating in the tank network of a valve p.a. had educated the designer into using high $Q$ chokes as a matter of course. The chances are, therefore that when the need to use an r.f.c. in a solid state circuit arises he automatically specifies one which is often too good for the job.

Whereas the reactance of the choke appears in shunt with a valve tank circuit, and in consequence, tunes with the inductance of the network without shifting the resonant frequency appreciably, it appears in series with the network inductance in many semiconductor circuits.

The ill effects referred to in (*c*) are a direct consequence of this. If the tank is neither correctly loaded, nor tuned to resonance, the collector does not see a low impedance in shunt with the choke. The RFC thus becomes tightly coupled to the tank inductance, and will create unwanted resonances with the capacitative reactances of the tank circuit. These resonances can occur at or near the operating frequency during the alignment of the amplifier. The load which they present is usually high with the result that the collector " bottoms " and instabilities become rife.

The impedance required effectively to isolate the collector from the supply rail needs to be no greater than ten times the load presented to it by a correctly matched network. Since this load is unlikely to be more than 50 ohms, a low $Q$ choke, or a self resonant one shunted by a 470 ohm resistance, will be adequate for the application. The unwanted resonances are thus heavily damped and are far less likely to excitation.

## Test Results on an Intermediate Design

The above precautions were scrupulously observed in the Mark Two design. More screening was introduced between the input and output circuits, and the p.a. tested into a resistive dummy load. The parameters of the T-network were aligned to deliver the rated power to the load. It was noted that the settings were in close agreement with the values calculated for the formulae derived by G3NJY. Meter indication of the collector current gave insufficient information regarding the correct tuning, but once the settings had been established, they could be repeated by observation of the load current. Good linearity was maintained to power levels approaching 70 per cent of those obtained with an unmodulated carrier.

On the air tests proved encouraging. A modulated envelope from a QRP valve transmitter provided the modest drive requirements to the 2N3632, and several QSOs were held at a mean power level of 4½ to 5 watts output. Speech quality reports confirmed the amplifier to be linear. More exhaustive tests with Colin Desborough, G3NNG, however, revealed the third harmonic content to be above that which could be tolerated. Strength S3 to S4 over a nine mile path, and impossible for common site working on V.H.F. NFD.

## The Final Pi-Circuit

The quest for a more efficient tank network which would filter off a greater proportion of the 432 MHz harmonic brought the considerations of the design back to square one. The pi-tank has not achieved almost universal popularity in valve p.a's without good reason. The question was; could any circuit configuration using a 2N3632 be made to work which would exploit the flexibility and performance capabilities of the network?

The figures were re-examined. Impedance transformation from a few k ohms to a typical cable $Z_o$ are well within the efficient range of a pi-network, and a few minutes with a slide rule will confirm that these numbers result in realistic component values on 144 MHz. It follows then, that the transformation from 50 ohms to a few k ohms is equally possible. Since two networks may be connected in tandem provided the output impedance of the first equals the input impedance of the second, here was a possible solution to the problem of gaining better harmonic rejection with a more flexible network.

Although the collector of a 10 or 20 watt p.a. is more likely to see a load of considerably less than 50 ohms, the prospect still seemed a good proposition when the possible variations of the network $Q$ were taken into account.

Two pi-networks in tandem; a minimum of three variable capacitors. The tuning procedure for correct alignment was formidable. However, if an *L* network could be designed to replace the first pi, the design of the new network was home and dry. It remained only to work out the component values in the practical case.

## Results

The final p.a. design and pi-tank network proved very simple to get working, and on the air tests confirmed that the harmonic radiation on 432 MHz was reduced to the limits which would be imposed by common site working on V.H.F. NFD.

The tuning procedure followed closely that of a normal pi-tank, but the adjustments should always be made for a maximum r.f. current in the load rather than by observation of collector current. A check on this current, however, is valuable in providing an indication of the collector dissipation and input drive requirements.

Two circuits, one using a single 2N3632 running at 13½ watts c.w., and one which connected two similar devices in parallel to give 20 watts p.e.p. were constructed, and neither showed any signs of instability during alignment or operation. The linearity of the latter amplifier was judged to be more than adequate for s.s.b. through its ability to handle a 100 per cent amplitude modulated carrier without distortion.

The drive requirements of each of the 2N3632s when wired in parallel were well matched in the samples tested, but it is recommended that a method of equalizing the drive to each in order to balance the outputs be incorporated in the design. Care should always be exercised to ensure the amplifier is not over-driven, especially when optimum linearity is required.

## Constructional Note

Both models were constructed on a copper earth plain mounted in the lid of a 4½ in. by 3½ in. die-cast box. No additional heat sink was necessary.

The two inductances in the tank network were not mutually coupled, and if mounted at right angles interact insufficiently to disturb the correct operation.

Whilst careful layout could obviate the necessity to fit screening between the base and collector circuits, a screen across the collector terminals proved advantageous in maintaining absolute stability during alignment.

Details of the input networks to the transistor bases are not discussed in this report as further experimental work on optimizing the design of this section of the amplifier is still being carried out.

## References

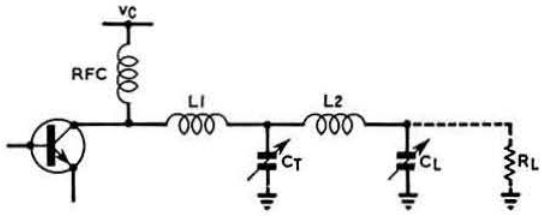

[1] Systemizing R.F. Power Amplifier Design. Motorola Application Report No. 282.

[2] The design of T Networks for Series Tuned, Semiconductor Power Amplifiers; Malcolm Bibby, G3NJY. *QAV* Tech. Supplement, AERE Radio Club Newsletter, May/June, 1967. Also *Radio Communication*, February 1968, page 96.

[3] *Technical Topics*, RSGB BULLETIN, May 1967.


# APPENDIX

## The Network




$C_T$ Main tuning capacitor
$C_L$ Loading capacitor
$L_1$ *L* network inductance
$L_2$ Pi-network inductance
$R_L$ Transmitter load resistance
$V_c$ Supply voltage

## The Design Method

The first part of the design procedure determines the *L* section of the network in Fig. 1. It follows closely the method set out by Malcolm Bibby, G3NJY, for *T* networks in series tuned semiconductor power amplifiers.

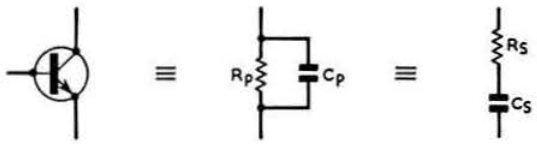



Fig. 1

The two parameters which must be determined initially are the large signal output capacitance of the transistor, and its equivalent parallel resistance.

The output capacitance, $C_p$, is obtained from the manufacturer's data sheet of the transistor, and will be quoted in the form of a capacitance/frequency graphs at various power levels. The output resistance, $R_p$, will not be included in the data sheet because it can be computed with sufficient accuracy by assuming a peak-to-peak r.f. voltage swing of twice the supply voltage, $V_c$.

If *P* is the mean power output, the equivalent parallel resistance of the transistor,

$$R_p = \frac{V_c^2}{2P}$$

The parallel resistance and capacitance must now be converted mathematically to the equivalent series circuit; Fig. 2. The equivalent series resistance,

$$R_s = \frac{R_p . X_p}{R_p^2 + X_p^2} . X_p$$

and the equivalent series capacitive reactance,

$$X_s = \frac{R_p . X_p}{R_p^2 + X_p^2} . R_p$$

where $X_p = \frac{1}{\omega C_p}$ and $X_s = \frac{1}{\omega C_s}$

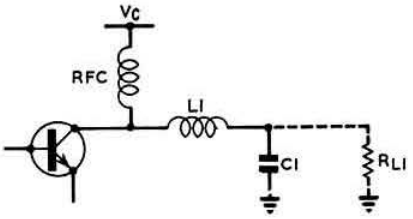



Fig. 2

The series impedance of the device, $Z_s$, is therefore equal to $R_s - jX_s$. For the maximum power transfer to a load, the load impedance must be the conjugate of the source impedance, or $R_s + jX_s$; Fig. 3. It is desirable that the network should provide harmonic rejection and ease of tuning, therefore a working $Q$ of between 8 and 20 should be chosen as being satisfactory at v.h.f.

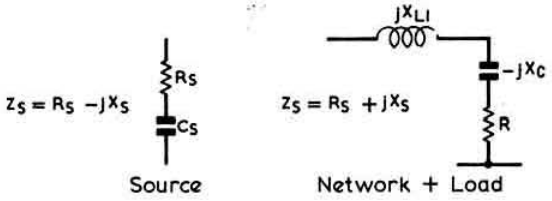



Fig. 3

Since $X_{L_1}$ and $X_{C_1}$ (Fig. 3) may have a range of values, the desired loaded $Q$ of the network may be obtained by a choice of the inductance, $L_1$. The formula relating the inductive reactance, $X_L$, the series resistance, $r$, and $Q$ is

$$Q = \frac{X_L}{r}$$

so that here $X_{L_1} = Q\,R_s$.

The impedance of the source plus the inductive reactance, $X_{L_1}$, is $R_s + j(X_{L_1} - X_s)$, thus the impedance of $R - jX_d$ must be the conjugate to establish the match. From this, by equating the real and imaginary parts,

$$R = R_s$$

and

$$X_c = (X_{L_1} - X_s)$$

The values of $C_1$ and $R_{L_1}$ in the $L$ network (Fig. 1) may now be calculated by making the series to parallel conversion.

Thus

$$R_{L_1} = \frac{X_c^2 + R_s^2}{R_s}$$

and

$$X_{c_1} = \frac{X_c^2 + R_s^2}{X_c} \qquad C_1 = \frac{1}{\omega X_{c_1}}$$

It remains only to apply the Pi-network formula (see *RSGB Handbook*) to complete the design of the tank circuit; Fig. 4. This formula states,

$$X_{c_2} = \frac{R_1}{Q}\left(1 + \sqrt{\frac{R_2}{R_1}}\right)$$

$$X_{c_3} = X_{c_2}\sqrt{\frac{R_2}{R_1}}$$

$$X_{L_2} = \frac{R_1}{Q}\left(1 + \sqrt{\frac{R_2}{R_1}}\right)^2$$

$$C_2 = \frac{1}{\omega X_{c_2}}$$

$$C_3 = \frac{1}{\omega X_{c_3}}$$

$$L_2 = \frac{X_2}{\omega}$$

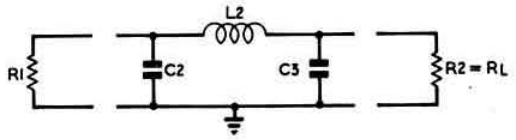



Fig. 4

Thus the values of the capacitive reactances, $X_{c_2}$ and $X_{c_3}$, and the inductive reactance, $X_{L_2}$, may be obtained by making $R_1 = R_{L_1}$, and $R_2 =$ the transmitter load, $R_L$.

The two sections of the tank are connected together by lumping $C_1$ and $C_2$ in parallel to form the tuning capacitor, $C_T$. $C_3$ is the loading capacitor, $C_L$.

The $Q$ chosen for the Pi section need not be the same value as that chosen for the $L$ section. Improved harmonic rejection will be obtained with the higher values of $Q$.

## Worked Examples

Network design for a single 2N3632 transistor operating at 13½ watts c.w. output into a 72 ohm resistive load. Frequency = 144 MHz. Supply voltage = 28 volts.

From data sheet, parallel equivalent output capacity, $C_p$, at stated power and frequency.

$C_p = 22$ pF.

Parallel equivalent output resistance, $R_p$, at stated power,

$$R_p = \frac{V_c^2}{2P}$$

$$= \frac{28^2}{2 \times 13\frac{1}{2}}$$

$$= 29 \text{ ohms}$$

$$\text{Reactance of } C_p = \frac{1}{2\pi f C_p} \qquad f = 144 \text{ MHz}, \quad 2\pi f = 9{\cdot}1\ 10^8$$

$$\text{Thus} \quad X_p = \frac{10^{12}}{9{\cdot}1 \times 10^8 \times 22}$$

$$= 50 \text{ ohms}$$

By the parallel to series conversion,

$$R_s = \frac{29 \times 50}{29^2 + 50^2} \times 50$$

$$= 0{\cdot}436 \times 50$$

$$= 22 \text{ ohms}$$

and similarly

$$X_s = \frac{29 \times 50}{29^2 + 50^2} \times 29$$
$$= 0{\cdot}436 \times 29$$
$$= 12{\cdot}7 \text{ ohms}$$

For a $Q$ of 10, reactance of $L1$

$$X_{L1} = Q\,R_s$$
$$= 10 \times 22$$
$$= 220 \text{ ohms}$$

and $L_1 = 0{\cdot}24\,\mu H$

From $X_c = (X_{L1} - X_s)$
$X_c = (220 - 12{\cdot}7)$
$= 207{\cdot}3$ ohms

To obtain the values of $C_1$ and $R_{L_1}$ of Fig. 1, the series combination of $X_c$ and $R_s$ must be converted to the parallel equivalent.

Thus from the formulae,

$$X_{c1} = \frac{2{\cdot}07^2 \times 10^4 + 2{\cdot}2^2 \times 10^2}{2{\cdot}07 \times 10^2}$$
$$= 208 \text{ ohms}$$

From which

$$C1 = \frac{10^{12}}{9{\cdot}1\,10^8 \times 208}$$
$$= 5{\cdot}3\,pF.$$

and similarly

$$R_{L_1} = \frac{2{\cdot}07^2 \times 10^4 + 2{\cdot}2^2 \times 10^2}{2{\cdot}2 \times 10}$$
$$= 1{\cdot}97 \text{ k ohms}$$

So the $L$ section has been determined. Substituting in the pi-network formula, $R1 = 1{\cdot}97\ 10^3$ and $R2 = 72$ for a selected $Q$ of 15

$$X_{c2} = \frac{1{\cdot}97 \times 10^3}{15}\left(1 + \sqrt{\frac{72}{1{\cdot}97 \times 10^3}}\right)$$
$$= 156 \text{ ohms}$$

Therefore $C2 = \dfrac{10^{12}}{9{\cdot}1 \times 10^8 \times 156}$
$= 7{\cdot}1\,pF$

$$X_{c3} = 156\sqrt{\frac{72}{1{\cdot}97 \times 10^3}}$$
$$= 29{\cdot}7 \text{ ohms}$$

So $C_3 = 37{\cdot}0\,pF$

## Semiconductor

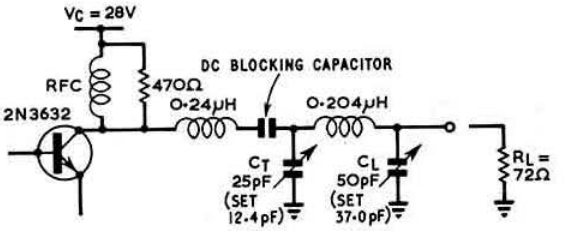
$$X_{L_2} = \frac{1{\cdot}97 \times 10^3}{15}\left(1 + \sqrt{\frac{72}{1{\cdot}97 \times 10^3}}\right)^2$$
$$= 186 \text{ ohms}$$

and $L2 = 0{\cdot}204\,\mu H$

Finally combining $C1$ and $C2$

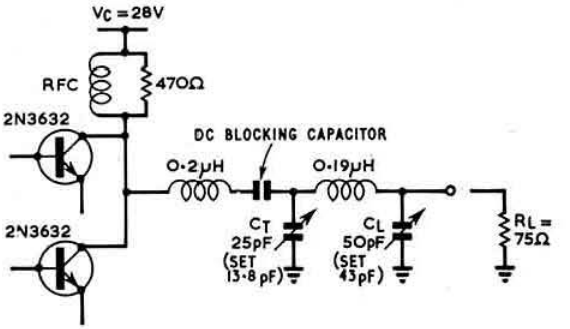
$C_T = C1 + C2$
$= 5.3 + 7.1$
$= 12{\cdot}4\,pF$

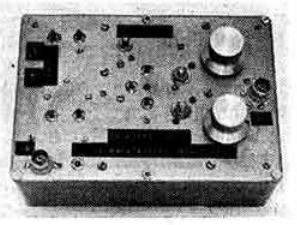
Thus the completed tank circuit becomes




Similarly for two 2N3632s in parallel, opertaing 20 watts on 144 MHz, the following values may be calculated:
$C_p$ (for pair) = 44 pF. $R_p = 19{\cdot}6$ ohms.
$X_s = 9{\cdot}5$ ohms and $R_s = 12{\cdot}1$ ohms.
$X_{L1} = 182$ ohms and $L_1 = 0{\cdot}2\,\mu$H for $Q = 15$
$X_c = 172{\cdot}5$ ohms
$X_{c1} = 174$ ohms and $C1 = 6{\cdot}35$ pF; $R_{L_1} = 2{\cdot}51$ k ohms
For a $Q = 20$ in the pi section
$C_2 = 7{\cdot}5$ pF; $C_3 = 43$ pF and $L2 = 0{\cdot}19\,\mu$H

Thus the completed Tank Network becomes



*To be published shortly*

*a practical design based on this article.*

**A DESIGN FOR A V.H.F. SOLID STATE LINEAR AMPLIFIER**

BY CLIFF SHARPE, G2HIF

REGULAR FEATURE

# TECHNICAL TOPICS

By PAT HAWKER, G3VA

PERHAPS too rashly, *TT* recently drew attention to the relative scarcity of h.f. operation by British stations (at least as noted in the London area)—and queried whether this could be due as much to TV-viewing or loss of interest as to TVI.

Now one of the hazards of writing in RADIO COMMUNICATION is that one must expect to come face-to-face or in over-the-air contact with dissenting readers. Several subsequent encounters have made it vehemently explicit that a lot of British amateurs *are* off h.f. in the evenings largely because of the risk (or the reality) of TVI—despite having taken most of the usual transmitter precautions. Where this is not due to the known risk of causing TVI, it may be just a desire to avoid possible unpleasantness with neighbours.

Thus, it is all very well for someone within sight of the Crystal Palace transmitter (G3VA pleads guilty), where TV signals are extremely strong—but different indeed where TV signals are weak.

For instance, the problem of high pick-up of the fundamental amateur signals on the TV receiver aerial (often on the outer braiding of the coax feeder) resulting in swamping or producing cross-modulation (particularly on sound) is about as bad as ever—indeed with the current trend towards integrated v.h.f./u.h.f. tuners which may have two separate aerials going to the same tuner, the position may be deteriorating. Surprisingly, one gathers that the use in TV tuners of transistors rather than valves does not seem to have had a really significant effect.

Then again, the British amateur is almost alone in having to cope with the 41·5 to 45 MHz Channel 1 television allocation (used in few other countries), still perhaps the most susceptible of any channel to interference of all types.

The recognized combination of efficient screening and low-pass filters at the transmitter and high-pass filters in the receiver aerial lead is pretty effective—but few amateurs in urban areas could afford to fit an h.p.f. to every receiver in the immediate neighbourhood. Often, the problem is as much a matter of economics as of the basic technology and leaving aside any question of who should pay.

So any technique that can lower the cost of filters is to be welcomed, and it was interesting to see the new " lossy " ferrite filter at the Post Office stand at last month's exhibition. This consists of just a few turns of coax feeder wound on a ferrite toridal core—using ferrite normally intended only for applications below about 2 MHz, so that it forms a lossy " balun." A particular attraction seemed to me that there is no need for adjustment of any type—and like anything else that can reduce the signal on the outer braid of the coax feeder getting into the TV receiver, this form of filter looks promising.

It is clear that the Post Office have a growing range of filters and perhaps even more important is their possibly unrivalled knowledge of the many mechanisms which can give rise to TVI.

One would certainly like to see more articles by these engineers, passing on their knowledge. It was interesting, for instance, to hear that often enough where a transmitter is interfering with say half-a-dozen different receivers, it may be due to a different mechanism in almost each case; calling for up to the equivalent number of different approaches to effect cures. Another point, new to me, was that weather can have a considerable influence; for example, rain water getting into the TV feeder coax in wet weather radically changing the situation. Even individual chassis of the same basic TV production model can, apparently, vary enormously in their susceptibility to interference. And many older TV aerial installations have often deteriorated to the point where they are virtually useless in picking-up TV signals but still very effective in taking down h.f. into the receiver.

Perhaps the approaching duplication of ITA and BBC1 networks on 625-line u.h.f. with colour will eventually bring about a major change in the UK position, though one has a sneaking suspicion that many viewers are still going to be looking at v.h.f. television for some time to come. A useful " anti-TVI " technique might even be to try to convince all the neighbours of the attraction of colour TV, and so tempt them up to Bands IV and V. At least the European colour sub-carrier is, unlike the American one, located outside an amateur band (i.e. 4·43361875 MHz not 3·5795455 MHz).

One thing is certain—TVI continues to be a question looming large in every h.f. amateur's thinking, and this is at least one of the main reasons why the bands are so often clear of local signals. This poses another question, how do the East European amateurs get away with it?

## Wide-range Gate-dipper

In *TT*, November, 1967 it was pointed out that gate-dippers (g.d.o.'s using FET devices) have gained the reputation of being considerably better than bipolar transistor g.d.o., while retaining the convenience of battery power. A further wide-range gate-dipper by I. Queen (*Radio-Electronics*, August, 1968) is shown in Fig. 1. This is intended to cover from about 4 to 80 MHz using four plug-in coils

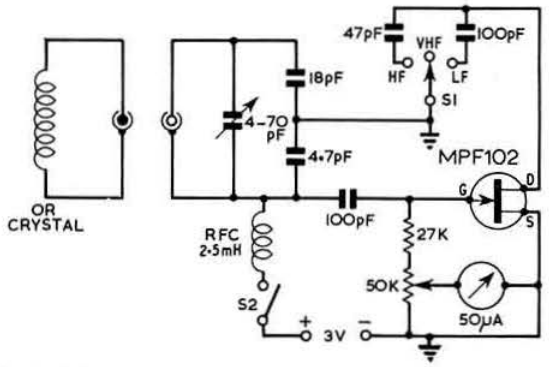



**Fig. 1. Versatile gate-dipper/crystal oscillator covering 4-80 MHz in four bands. Coils A (4-8 MHz) 61 turns; B (8-16) 20 turns; C (16-32) 9 turns; D (40-80) 4 turns wound on a ½ in. polystyrene tubing with no. 26 enam.**

wound on ½ in. polystyrene tubing. The unit also forms a useful signal source and crystal tester simply by plugging in a crystal in the coil socket; the article suggests that crystals between 1·6 and 8·3 MHz can be used. The circuit incorporates switched positions of feedback capacitance and a potentiometer allowing the 50 μA meter to be set to full-scale, and is claimed to be capable of providing good dipping sensitivity even though only a 3-volt battery is used.

## W6PIZ's " Lazy Quad "

A suggestion by W6PIZ (*QST*, September, 1968) is for a novel 28 MHz " Lazy Quad " which combines Lazy H and Quad techniques: Fig. 2. The idea is novel to me, but W6PIZ modestly admits that he adapted the arrangement from 21 MHz users. He considers that the array provides extreme simplicity and the feasibility of putting it up on a single 32 ft. unguyed pole, with particularly modest horizontal space requirements. The aerial, he reports, has given

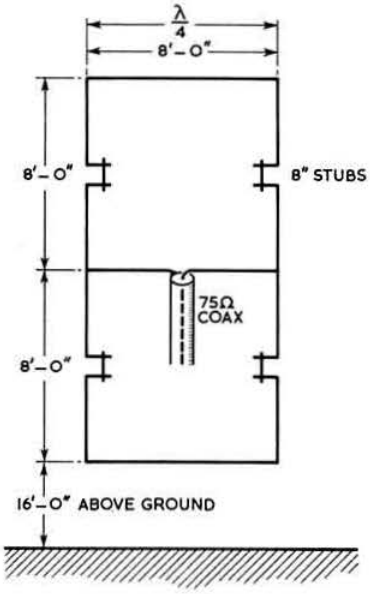



**Fig. 2. W6PIZ's arrangement for a 28 MHz " Lazy Quad " aerial which can be suspended from a single pole.**

results " consistently better than with vertical or horizontal dipoles at the same location."

He uses loops made of No. 14 wire, with the horizontal sections mounted on 8 ft. lengths of 1 × 2 in. timber, and adjustable self-supporting stubs made of the same wire. Such construction is able to withstand high winds, and the system picks up less QRN than vertically polarized systems. The stubs are 8-in. and for peaking at 28,050 kHz for c.w. operation, he finds the setting is about 6 in.

W6PIZ makes the further suggestion that such an array could be backed by a reflector employing a similar configuration, though this has not been tried.

## Urban Noise on V.h.f.

One of the main differences between h.f. and v.h.f. reception is the much higher theoretically usable sensitivity of v.h.f. converters due to the lower external noise levels. Many textbooks illustrate this by a chart showing fast descending noise temperatures—falling from very many thousands of degrees Kelvin at h.f. to around 1000° at 100 MHz to a few tens of degrees at u.h.f. and above. This is the basic reasoning behind the constant struggle to lower the noise figures of v.h.f. converters—sometimes at appreciable cost to the cross-modulation performance.

The danger of advocating any " universal " answers to such questions has always been evident, and certainly some references indicate the differences between quiet and noisy locations. But the practical importance of these very real differences, even those occurring over quite limited geographical areas, is underlined in a recent technical report by RAE, Farnborough and brought to our attention by G3JKV.

This report (TR67213 of August, 1967) is concerned with v.h.f. noise levels over large towns in England as measured at 118 MHz in a jet aircraft flying at 15,000 ft. and 26,000 ft. The figures for London are typical of other urban areas and, says G3JKV, show that over its centre the noise is no less than 12dB greater than over open country or sea. That is to say that whereas noise over open areas corresponded to an aerial temperature of 2–3000°K, that measured over London was roughly 30,000°K, with the measurements at the higher altitudes showing only a small difference from that at 15,000 ft.

The measurements were made on a receiver which, though not specifically of low-noise type, was typical of modern practice and was not the usual type of aircraft receiver. On the other hand, the aerial was the usual quarter-wave stub, mounted under the fuselage.

G3JKV admits that it is a debatable matter whether or not these results are directly applicable to amateur radio practice—but notes that, if they are representative, then there is little point in amateurs living in the middle of large cities striving to build ultra-low-noise converters, except perhaps for satellite work where the aerial beam would be pointed upwards away from the main noise-producing sources.

## Schottky-barrier Diode Front-end

The information reported by G3JKV above could well be held as further support to the view that the urban v.h.f. man should pay as much, or even more, attention to dynamic range, cross-modulation and inter-modulation performance of his front-end as to extreme low noise. And this brings us conveniently to an interesting American v.h.f./f.m. tuner technique sent along by Kjell Ström, SM6CPI, who men-

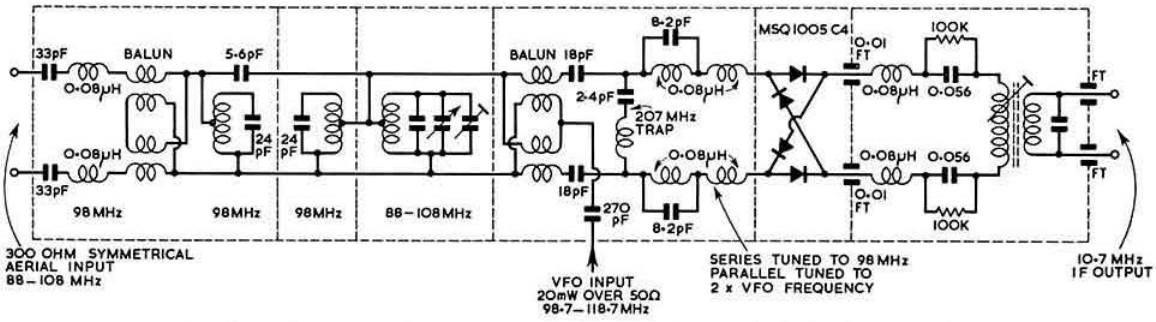



**Fig. 3. Front end of an American v.h.f./f.m. tuner using four Schottky-barrier diodes.**

tions that he found the circuit (Fig. 3) in a survey of v.h.f. tuners in the Swedish periodical *Radio & Television*.

This Marantz Model 18 tuner dispenses completely with the customary r.f. stage(s) and puts the signal into a low-noise mixer. Claimed sensitivity is better than 2 $\mu$V when followed by a low-noise i.f. amplifier, and the dynamic range is equal to or better than a tuner having a.g.c. applied to the r.f. amplifier. The noise factor of the mixer, using four matched MSQ1005 C4 Schottky barrier diodes made by Solitron Devices Inc., is put at 4dB.

It would certainly seem that this front-end, with its various traps and baluns, is a useful example of applying techniques originally developed for radar applications to consumer products. SM6CPI mentions that with rather more elaborate circuits the suppression of intermodulation products with this type of approach can be better than 100dB.

## I.f.-derived " Hang " A.g.c.

Hang-a.g.c. techniques have become popular in recent years for s.s.b. and c.w. reception, and a fair number of different circuits have been published. In a letter to *QST* (September, 1968) F. Cherubini (I1ZV) notes that the W5OMX receiver described in the January *QST* uses an a.f.-derived hang system. I1ZV however much prefers the use of an i.f. derived system and describes one that he has been using for some time in a much modified HRO (how many others at the exhibition felt a pang to see the inclusion of that mechanically fine receiver in the " historic " display of the Diplomatic Wireless Service?). Fig. 4 shows the I1ZV arrangement which could be incorporated in many existing receivers, since by using multiple valves, the realization can be a good deal simpler than might appear at first glance at the circuit.

I1ZV claims that this system offers the advantages that (1) no changes are required for a.m./s.s.b. modes; (2) fewer components than a.f. systems; (3) no audio transformer; (4) provides true hang operation.

Diode V1 fed from the 3rd i.f. transformer provides a.m. output as well as the basic a.g.c. voltage; the latter being passed to the a.g.c. line via diode V2, in the charging direction only. It should be noted that to achieve fast attack, the a.g.c. line decoupling capacitors should not be greater than 0·01$\mu$F. Discharge of the a.g.c. line can occur only via triode V5. Audio output from the receiver's product detector is amplified by V4 and rectified by diode V3, and then fed to the grid of triode V5. When the b.f.o. is turned off, the output from the product detector is zero and V5 is conducting, so that the system functions on a.m. stations as classic a.g.c.

However, with the b.f.o. on, the a.f. signal will block V5 and a.g.c. holds up. If this a.f. signal ceases or decreases, the negative voltage on the grid of V5 slowly decreases until conduction begins, when the a.g.c. voltage will decay suddenly to zero, or to a new level. A possible objection is that V1 increases the loading on the i.f. transformer in both modes, but I1ZV points out that this is of no practical consequence since selectivity of the receiver will almost certainly have been achieved in an earlier stage by a crystal or mechanical filter.

The high value (typically 10 Megohm) resistor in the grid return of V5 may require adjustment to achieve the best " hold " time.

I1ZV also notes that an S-meter can be inserted in a bridge circuit between the cathode of an a.g.c. controlled stage and the cathode of the final a.f. amplifier; with this arrangement the triode often used as an S-meter amplifier can be omitted. The resulting S-meter should provide good scale linearity.

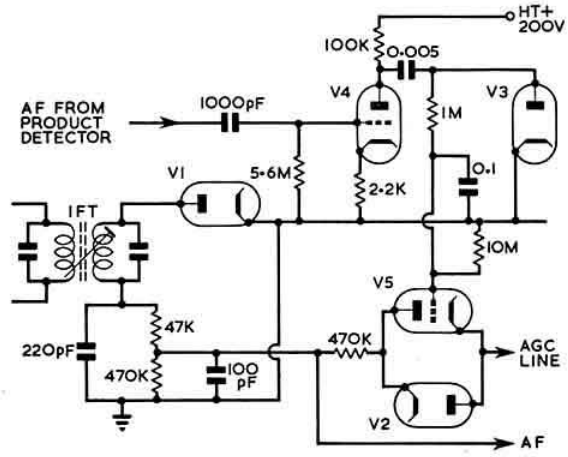



**Fig. 4. I1ZV's i.f. derived hang a.g.c. technique. Typically V1, V2 and V3 could be the three diodes of a 6T8 (EABC80, 6AK8, DH719) and V4, V5 a 12AU7.**

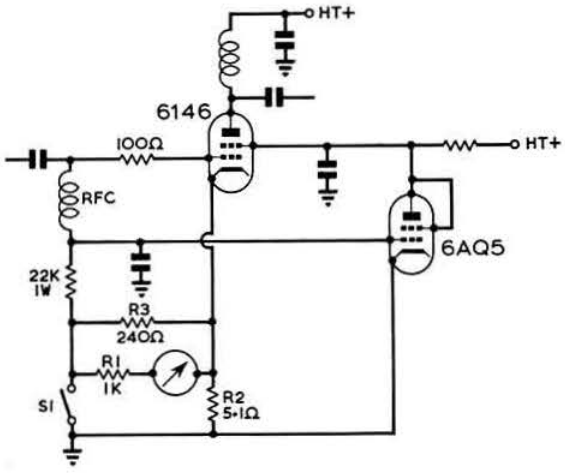



**Fig. 5. Meter switching arrangement to permit 1 mA meter to measure cathode and grid currents with simple " on-off " switch.**

## Simple Meter Switching

Many transmitter designs use a single milliammeter to measure various parameters, and sometimes fairly complex switching is involved in achieving this. W7ZOI in *QST* (July, 1968) reports on a particularly simple arrangement he uses to measure grid and cathode current in a 6146 p.a., requiring the use of only an " on-off " (s.p.s.t.) switch: Fig. 5.

With S1 closed the meter plus R1 forms a voltmeter across the R2 resistor in the cathode circuit, thus indicating the cathode current of the stage. With S1 open the meter plus R1 indicates the voltage developed by the grid drive across R3. With the values given for R1, R2, and R3 the 1 mA f.s.d. meter reads 200 mA anode current, 5 mA grid current, but clearly other values could give any required combination.

## Low-cost APT Stations

The pioneering efforts of John Tuke (GM3BST) and others in copying the APT (automatic picture transmission) photographs of cloud-cover pictures from the various weather satellites seem to have aroused interest in this work. Basically, APT is a special form of slow-scan TV, with each of the 800-line pictures taking 200 seconds to receive. Frequencies are the usual 136 MHz satellite telemetry band.

For those who are interested in building equipment for APT reception—and at least one UK enthusiast has found an ingenious way of adapting an old TV receiver for this work, by taking a long exposure photograph of the very slow read out on its screen—it is now possible to indicate a most useful source of practical information. This is a fairly recent NASA report—NASA SP-5079 *Constructing Inexpensive Automatic Picture Transmission Ground Stations*—available from " The Clearinghouse for Federal, Scientific and Technical Information, Springfield, Virginia, 22151, USA " at the extremely reasonable price of 50 cents.

This is a 60-page booklet describing in detail how the APT system works; circuits and constructional details of a complete station including crossed-Yagi type aerials, two low-noise FET preamplifiers (almost certainly readily adaptable also for 144 MHz), valve main receiver, facsimile unit using transistors and SICs; operation of the overall system; preparations for picture taking; and procedures during picture taking. The equipment as described is costed at " under $500 " and would represent quite a project, however it seems likely that many v.h.f. people would be able to put together a station for less than this by drawing on equipment and the junk box. Certainly for anybody interested in APT work—this is clearly *the* essential book of words.

## Slow Scan TV

The more " conventional " forms of slow-scan TV—with read outs from about 3 to 8 seconds—were made to sound most interesting by C. Grant Dixon at the recent British Amateur TV Club convention. He obtains good results using 5FP7 long-persistence radar tubes, with the bright blue trace filtered out, leaving the yellow afterglow to provide the picture. After a long debate, the American FCC has recently authorized SSTV using tone on s.s.b. on the h.f. bands for holders of extra and advanced class licences. American SSTV is transmitted by modulating a subcarrier between frequency limits of 1500 Hz (black) and 2300 Hz (white). Vertical and horizontal sync is maintained by transmitting short bursts of 1200 Hz, *CQ-TV* No. 66 reports. Live scenes are transmitted as a series of stills, with each scene or photograph scanned in 8 seconds. The incoming signal can be recorded on a normal audio tape recorder. A recent exchange of SSTV pictures between VE3EGO and SM0BUO acr*ss the Atlantic is believed to be a " first," although pictures from WA2BCW were copied in the UK as long ago as 1959. WA2BCW described the construction of SSTV camera and monitor designs in *QST* (March, 1964, June, July and August, 1965).

The only point about SSTV that worries me is that it forms one more of the increasing number of special modes now permissible in the amateur bands, that cannot always readily be identified immediately as amateur transmissions. This can be overcome by frequent voice announcements—but I cannot be the only non-RTTY-equipped amateur who often wonders just how many of the radioteleprinter signals on 14 MHz are really coming from amateur stations.

At least, few amateurs are likely to attempt to build one of the DWS Piccolo systems as seen at the Exhibition last month (and which have been mentioned several times over the past years in *TT*)—though there can be no doubt that this would be a really super system for amateur RTTY, if only it could be implemented more simply.

## U.h.f. and V.h.f. Propagation

A good deal of information (though some of it pretty esoteric) on the behaviour of v.h.f. and u.h.f. signals can be gleaned from papers given at the recent conference on " Tropospheric wave propagation " (*IEE Conference Publication* No. 48). The conference incidentally was opened by Dr J. A. Saxton the director of the Radio Space Research Station—often to be seen at RSGB functions.

For instance, a paper by C. P. Bell (BBC) summarizes the long series of measurements made over various paths (over-sea, over-land and mixed) on u.h.f. transmissions from 500

to 775 MHz including some with a power of 1 kW e.r.p. These tests, extending over a number of years, were carried out in conjunction with the planning of u.h.f. television networks (in which long-distance reception is a disadvantage!) and would seem to highlight some useful points. It is noticeable that the over-sea paths often produce higher signal strengths over longer periods than the over-land paths—and tend to this *more* as frequency increases (suggesting that for such paths 23cm could be better than 70cm). Maximum probability of high signals on the over-sea paths occurs in summer (peaking in June), but on the over-land paths in autumn (November seems a good month).

Long over-land paths during anticyclonic weather show very clear indication of diurnal variations with signals high at the start (08.00 hours local time), falling quickly to low values by mid-morning but subsequently rising again very sharply in the evenings, and still apparently rising at the 23.00 hours ending of the measurements. On the over-sea paths a roughly comparable pattern of diurnal variation emerges in summer months, but a January graph indicates conditions staying open during the entire daytime.

Another paper (by Rajendra Virkamsingh of ITT) indicates how in mountainous country use can be made on v.h.f. of " terrain scattering " which is one way of saying that with luck it is possible to bounce v.h.f. signals off hill surfaces into places which could not easily be reached on a direct path. The paper records that a 75 MHz link with 25-watts output was established across the main Himalayan range by using a prominent 5000 ft. mountain peak, well off the direct path. It is noted that for this type of operation vertical aerials generally produce stronger terrain scattered signals, particularly with terminals located in deep gorges. The effects of signals bouncing off hills are known to many TV viewers (often in the form of unwanted " ghosts ") but are often overlooked as a possible means of making contact between amateurs.

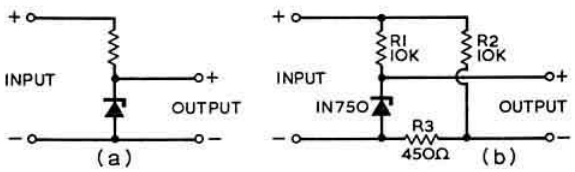



**Fig. 6. Zener diode regulation: (a) conventional circuit; (b) bridge arrangement to reduce effect of dynamic resistance of the diode. 3·5 V output from 8-20 V input.**

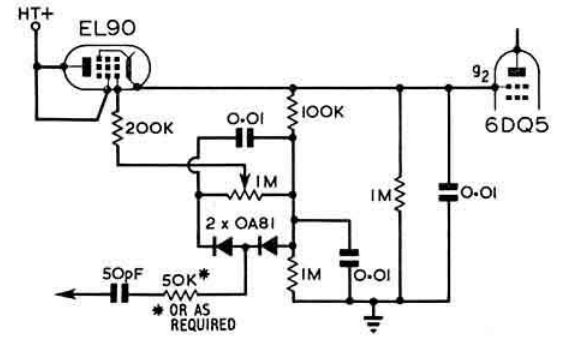



**Fig. 7. Arrangement used by DJ3WB to provide adjustable regulated screen voltage for 6DQ5 amplifier The 50pF capacitor goes to the anode of the driver valve.**

## Two Voltage Stabilization Tips

An idea from *Electronic Design* (23 May, 1968) indicates how a bridge circuit can be used to improve the performance of a zener regulator diode over a wider range of current output. This is achieved by balancing out the effect of the dynamic diode resistance: Fig. 6. The technique, however, can only be used where it is not required to have a common input/output power line. The values indicated are for the 1N750 zener but a general formula is: dynamic resistance of diode should equal (R1 × R3)/R2.

The other idea comes from an item by DJ3WB in *DL-QTC* (June, 1968) for regulating over a wide, adjustable value the screen-grid potential of a 6DQ5 power amplifier: Fig. 7. The reference voltage for an EL90 series regulator valve is derived by rectifying a little of the r.f. potential at the anode of the driver stage. My German dictionary cannot cope with DJ3WB's text, but the diagram makes the principle fairly clear. If I have grasped the idea correctly, the screen voltage would automatically be dropped in the absence of drive; a useful feature.

## Here and There

Did you know that photo-transistors can be made by grinding off the top of a silicon transistor and so allowing light to get to the base region? Clip off or leave the base lead unused; choose a silicon unit with high current gain and largest possible $f_T$, preferably planar passivated construction. Carefully open the top of the transistor container either by grinding or by cutting with a small pipe cutter, avoiding any metal fragments falling on the chip.

This trick was well known with the OC71 but it is only recently that I have noted references to the technique with silicon transistors.

The MPF157 MOS FET suggested for the 144 MHz super-regen detector last month has apparently been discontinued. The rather more expensive MFE3004 could be used, or alternatively the popular RCA 3N128.

A new 2–28 MHz wide-band " up-conversion " all-semiconductor receiver using a form of partial synthesis and many advanced ideas was shown in prototype form on the *Practical Electronics* stand, and is apparently soon to be described in a series of constructional articles in that journal. These should be worth keeping an eye open for. Another advanced receiver design deserving very careful attention is the valve/semiconductor G3PDM receiver with phase-locked frequency synthesiser, 7360 mixer and product detector and wideband noise silencer described in the S.S.B. Chapter of the new *RSGB Radio Communication Handbook*.

G3KPO recently put in a plea for a list of US-British semiconductor equivalents—unfortunately with the thousands upon thousands of type numbers (and the wide spread of semiconductor tolerances) the value of a short list is questionable. Many American types are in fact marketed in the UK—and with semiconductors it is usually only the general classification that is important with small signal types.

# 1968 International Radio Engineering and Communications Exhibition

THE RSGB can be proud of a good run of personalities to open the exhibition, and this year we had two VIPs in the running. The original plan was to have the Postmaster General on the platform to conduct the ceremony, and a certain amount of publicity appeared with this programme in mind. Owing to some clerical errors within the appropriate Post Office Department, however, he was not officially booked and we were left high and dry. But fortunately, the RSGB was rescued in style, for at least an equally eminent personality Mr W. J. Sharpe, CBE, who is Director of Communications for the Diplomatic Wireless Service, Foreign Office, was agreeable to helping us out at the last minute. Mr Sharpe has been in charge of Communications with DWS since the Department's inauguration in 1947, and he was in fact instrumental in organizing it.

The first words were spoken by Mr P. Thorogood, G4KD, who introduced the Society's President for 1968, John Graham, G3TR. After discussing the exhibition, explaining the apparent change of plans regarding the opening ceremony and fitting in a pertinent crack at the Post Office over mail delivery, John Graham handed over to Mr Sharpe, who briskly declared the show open. When G3TR resumed his position in front of the microphone, he mentioned the various awards that would be made at the exhibition, and proceeded to announce the holder of the Founder's Trophy, awarded by Council to the person who in their opinion has rendered greatest service to Amateur Radio during the year. The look of surprise of Phil Thorogood's face must have brought true satisfaction to all those present who voted that G4KD should receive it.

## Exhibition Station

Undoubtedly the highlight of the Exhibition Station this year was the extremely successful V.H.F. link with the Crawley Amateur Radio Club Station (G3WSC) near Crawley, enabling operation on the 10/15/20m bands. At Crawley, members of the Crawley and Reigate Clubs had co-operated in providing the remote station and operators, resulting in a potent signal being radiated from G3LHZ's 3 element quad on 20m, and 4 element quad for both 15 and 10m. We should like to thank the GPO for their co-operation in giving special permission to operate this link.

It had originally been intended to operate a duplex link in the 70cm band, but unhappily this plan had to be abandoned due to the poor 70cm path between Crawley and the Exhibition. As a result, we had to use 2m, and for this reason it was not possible to make many contacts on the 2m and 4m bands. In any case the usual S8 noise level on 2m prevented reception of anything but the strongest of signals, and hear we must apologize to the many stations who, no doubt, called us without result.

**Ceri Stone, G3SGN operating Exhibition Station GB3RS.**

**GB3RS** operated directly from the Hall on eighty metres s.s.b. using 120w p.e.p. input to a G8KW trap dipole, from G2DAF type equipment. **GB2VHF** used a 10 element long Yagi and 120 watts input on 2m, and 20 watts to a 4 element Yagi on 4m. **GB3RS** as operated from Crawley on 10/15 and 20m, used a KW2000 transceiver and a Heathkit HA14 linear. The quad was mounted 70ft. above ground on a site over 500 ft. a.s.l.

Well over eight hundred contacts in thirty-five countries were made during the Exhibition period; including CX4, CR6, HV3, KP4, LU, KV4, MP4, OD5, TJ1, VE2, VE3, VE5, all W call areas, VK, VS9, ZD8, ZE, ZC4, ZS1, ZS2, ZS6, 4X4, 5Z4,and 9J2.

The Exhibition Station organizer at the show was Ron Vaughan (G3FRV), and the operators were G2DP, G3LFM, G3NKS, G3PHG, G3SGN and G3TNO. The Crawley operators included G3HCU, G3PYC, G3RIM, G3TIR, G3XNS and G8AMU; G3LHZ was "I/C link." Acknowledgements are also made to the large number of Crawley and Reigate Club members who assisted in many ways. Thanks are also due to Frank Bennister (G3COX) and the "South London Gang" for their help in aerial erection, at the Hall, and to the "Crawley Quad Riggers."

The **Diplomatic Wireless Service** took considerable priority at the show. The opening was performed by Mr Sharpe, Director of Communications with DWS, and the stand at the back of the stage provided demonstrations of the relatively new Piccolo DWS teleprinter communications system. This has been mentioned several times in "Technical Topics," but a brief summary of the principle of operation should not be out of place. The advantage of Piccolo over conventional frequency shift keying is that the bandwidth can be conveniently much lower, and it has the ability to maintain intelligible copy at far lower signal-to-noise ratios. The transmitter produces tones within a 330 Hz spectrum, each teleprinter character possessing its own frequency. Thus a rather musical signal is transmitted (s.s.b.) to a distant receiver which converts the discrete tones into standard sequential printer code. This system made its first public appearance at the exhibition, and will be rapidly superseding conventional Morse and teleprinter equipment at British Embassies in other countries. Alongside the Piccolo equipment was an example of a very early communications set-up, together with a modern Morse station and some sophisticated re-broadcasting equipment for relaying and recording BBC overseas broadcasts.

The other stage stand was occupied by **Nova-Tech.** Inc., who were demonstrating some attractive, though fairly expensive marine, broadcast and aircraft receiving and D/F equipment. The Aviator II is a three band D/F plus aircraft v.h.f. receiver, covering 200-400 kHz, 550-1600 kHz, 1·5-4·5 MHz and 108-136 MHz. The price from the British Distributor is £53 10s. The Nova-Pal is similar, but misses out the v.h.f. band, and the price is reduced to £28 10s. Both models have null/tuning meters. All service on these sets is carried out in the UK.

Just below the stage was the **Heathkit** stand, adorned with several new units, although the majority of the "new faces" came from the audio stable. Joining the price battle against Japanese competition, however, were a couple of general coverage receivers bearing the designations GR-64 and GR-54, one of which was mentioned briefly last year. The GR-64 is the simpler of the two, containing four valves, an S-meter, a b.f.o., and costing £22 8s. The more complex receiver, the GR-54, is a six-valve set, and boasts a product detector plus a single section crystal half-lattice filter. The price of this set is £50. Licence holders tended to take a little more interest in the newish HW-100 s.s.b. transceiver, a 180 watt p.e.p. input device. It is fully valved, with the exception of the v.f.o. which


**The G4KD plaque went this year to B. C. Seedle, G3UIT for his 4m c.w./a.m./s.s.b. transceiver.**

contains an MPF-105 FET, and has a full range of facilities such as VOX, a.l.c., crystal calibration and selectivity provided at a high frequency of 3·395 MHz. The kit costs £125. The SB101 (reviewed last month) was there, together with the 2m a.m. transceiver, the HW-17. This gives 8 to 10 watts power output and uses a crystal oscillator, although there is provision for using the HG-10B v.f.o. The price is £69 2s.

Literally, mounds of equipment were seen sprouting from **Radio Shack/Peter Seymour's** joint stand. On Radio Shack's side was an attractive pile of Drake equipment, including the TR4 transceiver, L4-B linear, R-4B receiver, T-4B transmitter, MN4 matching network and W-4 watt meter. Setting off a considerable range of other transmitting equipment, both new and second-hand, was a new 24 hour digital clock complete with date. Last month we reviewed an aerial noise bridge, which has now acquired a more sophisticated companion, the TE702 bridge, covering 1 to 300 MHz. This naturally means a higher price, £18 10s. in fact. Peter Seymour concentrated on selling the Japanese FTDX500 transmitter for £145 and the FR500DX receiver for £130. There was even an RA17 to be seen at the back, priced at £235.

**Peak Sound (Harrow) Ltd.** are producing kits for a loudspeaker cabinet design published in *Wireless World*, and on the stand were a couple of completed units giving very clean reproduction of organ music. The firm's principal line, however, was the now established Cir-kit tape—self-adhesive copper strip which can be laid on a paxolin board, drilled in the appropriate places and soldered as with a normal printed circuit. This system can also be applied to pin-board, avoiding the necessity of inserting pins and wrapping wires round them. Price is comparable, for standard pins cost 1d. each. The copper strip is pre-lacquered and so the metal will not tarnish.

Several visitors were guided to a new exhibitor by a desirable array of h.f. and v.h.f. aerials for car and boat mounting. **Bantex Ltd.**, produce three v.h.f. mobile whips, all of which can be cut to the desired resonant length according to a chart supplied with each aerial. All are manufactured from glass-fibre, the differences between models lying in the type of mounting provided. Type BM possesses a conventional bolt fixing, while the alternative type BT has a special clamp which does not require access below the car roof when mounting it, cable being fed above the roof lining through the hole cut in the roof. The third type is yet simpler, for it is mounted on a cone-shaped plastic covered magnet, which securely locks the whole assembly to a car roof. The two bolt fixing types cost 45s. each, and the magnetic based aerial costs £7. The h.f. aerial is an 8 ft 6 in. glass-fibre cased helical whip, $\frac{3}{8}$ in.diam. tapering to $\frac{1}{4}$ in. diam., and can be obtained in 15 models to cover the range 3-15 MHz, although ferrite cores can be employed to extend the lower frequency limit. The price is £12 15s., and it must be used in conjunction with a spring loaded base of which there are two types. The model S is a standard type costing £6, and there is also a model L of sturdier construction costing £7. The firm is prepared to supply one-off quantities, but naturally it is preferable to order several on behalf of friends if possible.

**J. B. Lowe's** new exhibit was a transceiver designated the FE-600. The specification unfortunately did not synchronize with the arrival of the device, but we were able to gather that it delivers 200 watts p.e.p. from a pair of 6146Bs, after the signal has been tailored by a 9 MHz crystal filter. It squeezes in valves, bi-polar transistors and FETs, using them in their most advantageous positions. With a built-in power supply, it costs £180, and for a nominal extra charge comes a d.c. power supply with speaker. Amongst a proliferation of other equipments sat the IC-700T transmitter and IC-700R receiver; a rather expensive looking pair costing only £180 together, or £85 for the receiver alone.

**Electroniques (Prop STC Ltd.)** displayed quite a comprehensive selection of components and equipment which forms part of their immense mail order catalogue. Principal lines were Hallicrafters, and the attractive range of American Knight-Kits.

**Adcola Products Ltd.** were new exhibitors, who had on the stand a famous line of soldering irons, at prices ranging from 33s. 6d to 39s. 6d. They carry a very wide range of accessories, including a desoldering iron at 104s. 4d.

The **Post Office** asked for trouble by reserving part of its stand for helping amateurs with TVI problems, and duly received a continuous barrage of questions. Demonstrations of conventional filters were given, and the stand staff were particularly enthusiastic about a new type of trap to prevent r.f. from travelling along the TV coax outer braiding. Coax is wound round a pair of FX1588 ferrite toroids, the number of turns varying with the case in question (a starting point would be 15 turns).

**J-Beam Engineering** are basically continuing with the established range of Amateur Radio aerials, their expansion being in other commercial communications fields. A fairly new sizeable addition for 2m however, is a 14-element Parabeam, measuring 19 ft. 6 in. long! It is supposed to have a gain of 15dB, with quite a broad bandwidth, and costs £11 11s. The expansion referred to encompasses small omni-directional ground planes, verticals and slots, with several multi-element arrays, but unfortunately none were seen on the stand.

Locktronics is the trade name acquired by **A. M. Lock & Co. Ltd.**, for an electrical teaching kit comprising individual components, all mounted on identical plug-in panels, which can then

be assembled into any circuit configuration on a special board. With the majority of components such as transistors, resistors and capacitors becoming smaller and smaller, this clearly has immense teaching advantages in showing at a glance how a design is constructed, and modified, without a confusing bird's nest of wires.

This year the **BARTG** set out early to produce an exhibit which would give the public a factual insight into the problems and pleasures of RTTY working. Equipment consisted of a Creed model 75 teleprinter with keyboard, one without a keyboard, an older 7B less keyboard, a 54, a TR3 reperforator, a Lorenz LO-15 printer, two Creed 6S autotransmitters, a master control unit and terminal unit, and a 2m. transmitter and receiver mounted in the RAEN caravan, simply to operate them from the RSGB's live stations. To supplement the live RTTY, tapes were cut for running on the auto's, the text of which consisted of extracts from the ITU regulations concerning RTTY operations, a few picture tapes, hard copy of which was in the usual demand, and a brief description of amateur RTTY by G8LT. Full auto-start was used for the v.h.f. live RTTY, both ways, and performed perfectly, every time. On Saturday, the Royal Signals Amateur Radio Station at Blandford was contacted on h.f. and this resulted in about three yards of paper, of good quality copy.

The week finished with the AGM, details of which will be published in the group's newsletter, due out early in the New Year.

Last year, **KW Electronics** introduced two new transceivers to the Amateur Radio market. At that stage both were in prototype form, unfortunately owing to lack of interest, the 144 MHz transceiver never went into production despite an expensive development programme. The second, and a unit which is expected to be a " winner " overseas was the h.f. band Atlanta. Now in full production this instrument will be available from early December with a potential world wide market. The Atlanta, although using valves in most transmitter and receiver stages has adopted the now popular use of transistors in the v.f.o. thus giving rapid warm up stabilization. The p.a. handles 500 watts p.e.p. input on all bands. The receiver selectivity is drawn from a 2·7 kHz crystal filter, to the c.w. operator this would seem one slight drawback as no other provision is made for a narrower bandwidth.

Retail price is £250 including matching p.s.u. with a d.c. p.s.u. available at £42 extra. As usual other KW products were on show, from a marine distress beacon transmitter to the KW2000A transceiver.

Offering a unique service to radio amateurs are **Amateur Electronics** of Birmingham who occupied the B. H. Morris stand. Without obligation G3WQR arranges home demonstrations of equipment enabling side by side comparisons to be made. But be warned, to date this method has resulted with 100 per cent sales successes! Pride of the stand was the Trio TS-500 transceiver at £203 including p.s.u. The only extras are a 500 kHz crystal for the built-in transistor calibrator and a solid state external v.f.o. priced 30s. and £28 respectively. Although it is hoped to review this equipment shortly, here are one or two extracts from the manufacturer's spec. Power input, 180 watts p.e.p. on 80m reducing to 120 W on 10m. Receiver selectivity 2·7 kHz 6dB down widening to 5 kHz 55dB down. Standard built-in features include VOX, CAL, and RIT. In all, 17 valves and three transistors are employed in this compact transceiver which weighs no more than 17·6 lb.

Compared with last year the **British Amateur Television Club** stand was not so colourful this year. Namely the lack of vast pieces of electrical *and* mechanical engineering displaying red, green and blue! However a close study of the stand revealed three vidicon cameras, two of which were operating displays. Also in use was a 405 line sync pulse generator using uni-junction transistors. This device permitted direct switching of two camera inputs and a test pattern output. Of more interest to the layman, was no doubt the exhibit of photographs showing the world wide development of Amateur Television.


**KW Electronics new 500 W s.s.b. transceiver, the Atlanta.**


**The RAEN Committee was emphatic that the Manchester Group's caravan would appear at the exhibition, even though it meant negotiating a flight of steps!**

Specializing in the sale of semiconductor devices are **LST Components** of Brentwood, Essex. Since the show last year additional stock has been added including the Nand-Nor Miniscope —and indeed it is. Bandwidths of the two models available extend from 10 Hz to 100 kHz, and power consumption is a mere 0·5 A at 12 volts and 1 A at 6 V. Cost of the commercial model is £25 10s. and for the Educational version with a projected c.r.t. is £27 10s. LST publish a comprehensive 40 page catalogue listing all components stocked, price 2s.

*Practical Wireless*, *Practical Electronics* and *Practical Television* had settled under one banner in a sizeable stand. Around the periphery the staff had displayed several of the devices described within the pages of the three magazines, from projects such as building and designing around integrated circuits to complete transmitters and test equipment. The *Practical Electronics* Analogue Computer and s.s.b. receiver received much attention, together wih an electronic " thinking " model tractor.

*Wireless World* also had a computer, a fairly elaborate digital machine described a few months back. Several other projects were displayed, including a wide range signal generator, cross-hatch and dot generator, and a low cost high quality loudspeaker.

**AWARDS—Home Constructed Equipment**

**Exhibition Organizer's Award (G4KD Plaque)**
for the best piece of equipment; Mr B. C. Seedle, G3UIT, G6ACJ/T,
for a 4m a.m./c.w. transmitter and 28 MHz s.s.b. transverter.

**Horace Freeman Trophy**
for the most original piece of equipment: Mr S. F. Weber, G8ACC, for a solid state 432 MHz transmitter.

**Merit Prizes**
for the best transistorized equipment: Mr C. Sharpe, G3HIF, for a 144 MHz linear amplifier.

for the best valved equipment: Mr G. R. Jessop, G6JP, for an h.f transmitter.

for the best ancillary equipment: Mr C. F. Dorey, BRS16468, for filter response curve display unit.

**Special Merit Prize for the amateur Amateur**
Mr R. C. Arnold, BRS29738, for an all-band communications receiver.

# G8ACC Mk III 70 cm F.M. Solid State Transmitter

*Part 2*

CONTINUED FROM RADIO COMMUNICATION OCTOBER 1968.

By S. F. WEBER, B.Mus., A.R.A.M., G8ACC*

## Further General Points

AS a 12 volt negative supply was available, it was decided to take advantage of this for the a.f. amplifier. Unfortunately, I can't take much credit for the a.f. side: the basic design is from the UHER Report-L tape recorder with some values altered to suit different voltages and feedback considerations. The amplifier is a low noise, low distortion unit with two d.c. coupled pairs, with the gain control altering negative feedback as well as through-put. It can cope with a range from about 0·1 mV to 40 mV for full output across a 200 ohm source resistance with a lower noise figure than I can measure and a quoted 55dB dynamic range from 50 Hz to 22 kHz $\pm$ 1dB.

This performance is obviously not necessary for amateur communications but, as far as I can call it my design policy, I prefer to start with the best signal quality available and "play about" with it afterwards. Starting with a distorted signal and hoping it doesn't get worse later on in the circuitry seems to me to be wasting opportunities. (An error crept in on Fig. 22 of last month's issue: C14 should be 0·01 $\mu$F.)

As was mentioned in the first part of this article, the power requirements of this transmitter are +28 volts at 400 to 450 mA and −12 volts at 15 mA, both stabilized, so that the total efficiency of the transmitter is about 25 per cent. That is, total d.c. input to r.f. aerial power which is of importance when the unit is run off batteries.

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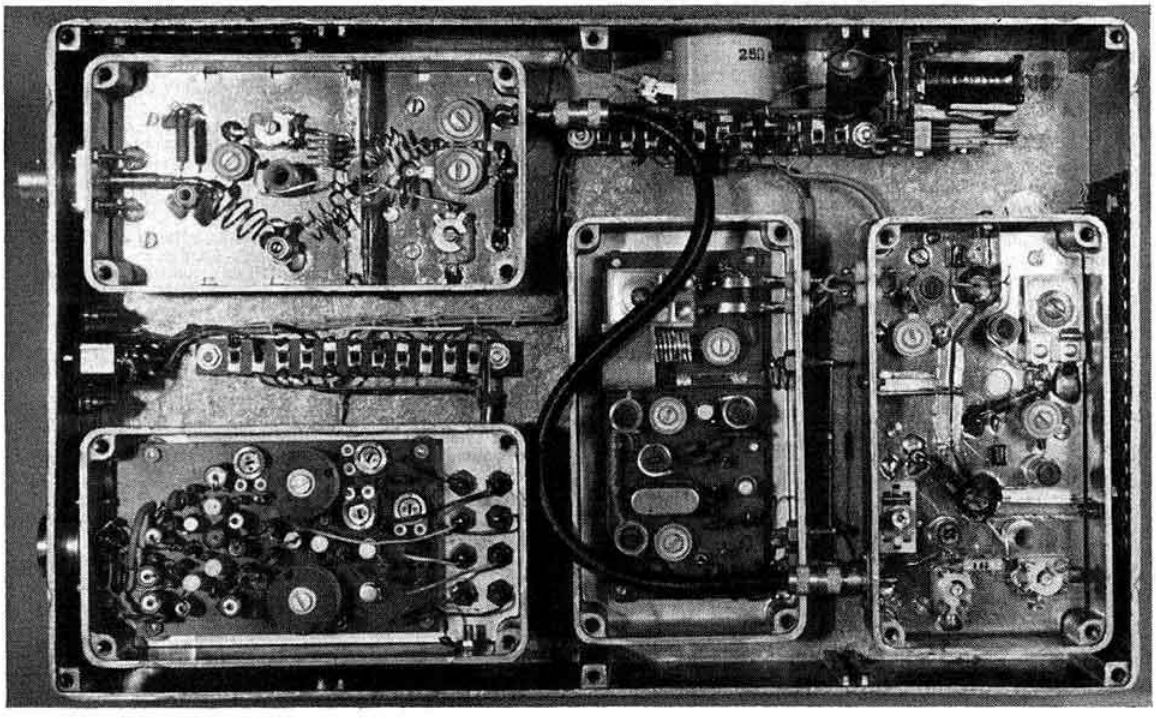

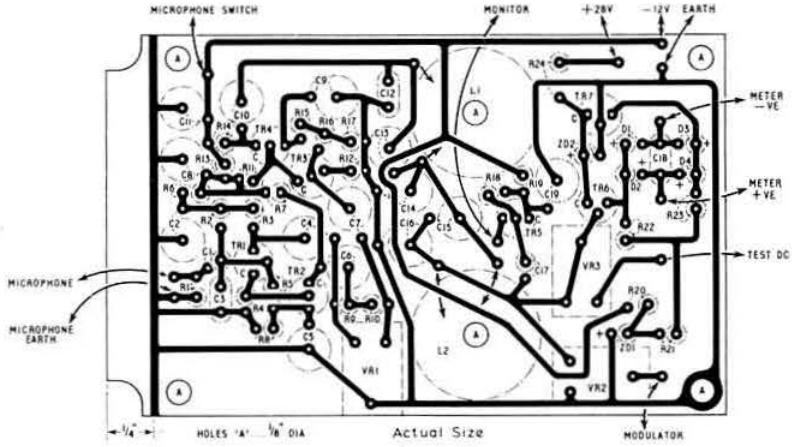


Fig. 26. Etching plan for A.F. amplifier board.

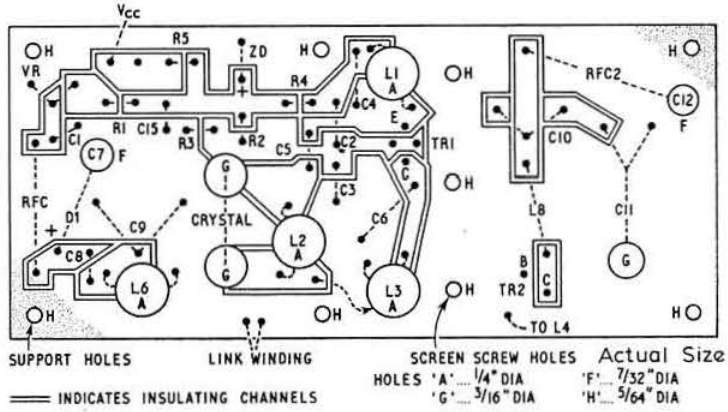


Fig. 27. Etching plan for drive box board.

## Constructional Details

There is no absolute need for unit construction in this transmitter. If things were well screened and shielded there is no reason why it shouldn't work just as well. But, of course, r.f. of this frequency gets everywhere and could make life rather difficult when alignment was undertaken, quite apart from minor instabilities like transistors bursting into oscillation and blocking the a.f. side: the r.f. field around the power stage is quite considerable, and the BC109 input transistor in the a.f. amplifier would still respond to this kind of frequency, let alone the other r.f. transistors!

All the units in this design are made in small Eddystone diecast boxes. The screw holes in these boxes are drilled through with a No. 32 drill to the other side, countersunk and tapped 4BA for the support pillars. All power and l.f. leads are decoupled to r.f. on leaving these boxes. The a.f. amplifier and the drive box use standard printed circuit boards with the circuit etched on them. High frequencies don't mind circuit boards if the h.f. is at a low value of impedance and the conductors are made as broad as possible to minimize inductance. What little loss there is, is hardly worth worrying about. So when etching the boards, leave as much copper on the board as possible, particularly on the earth leads. The extra capacitance which is the result is not going to harm anybody even if the power factor (heaven help us) is greater than 1!

## A.F. Amplifier

The etching plan is given in Fig. 26. The board is held off the bottom of the box by four insulated washers and only one earth connection is made from the board to the box. A locking 5 pin DIN microphone socket is used to complete the screening up to the microphone. Any small signal germanium alloy a.f. transistor could be used instead of the GT-43B, provided it had a reasonable current gain, say of over 100.

The inductors are wound with 38 s.w.g. enamelled copper wire in SEI Gecolite ferrite pot cores (type MM 106) and screwed together with a 6BA nut and bolt. The capacitors in the network need only be $\pm$ 10 per cent.

The two BC108's in the meter circuit were not bought as a matched pair: transistors of this type have a sufficiently close spread of values to make it unnecessary to match them except for accurate work, and the same applies to the four CG 85 gold bonded diodes. The meter is a 130 $\mu$A Japanese

level meter (the last 30 $\mu$A are considered to be an overload) with a diode shaping network to give a diminishing scale at the top end like a rough log scale.

The microphone this amplifier was designed for has a switch which can be used for a send-receive relay.

## Drive Box

This includes the crystal oscillator, frequency modulator and isolation amplifier. The printed circuit is given in Fig. 27 and the board is held off the bottom of the box enough to clear the feed-through condensers *C*7 and *C*12. This will mean that a hole has to be cut in the top of the box to clear the crystal if it is an HC-6/U type. If a wire ended HC-18/U or else a style K crystal is used, this will not be necessary.

The coils are wound on $\frac{1}{4}$ in. polystyrene formers with 18 s.w.g. silver plated wire and are let in to the circuit board and cemented. This applies to all the other r.f. coils in the transmitter that are mounted vertically.

The variable resistor feeding the varactor diode frequency modulator (VR in Fig. 23) from h.t. isn't really necessary. My original idea in putting it in was to adjust for best linearity, but the control makes very little difference on this score. However it does affect sensitivity and it is set at 3V in the prototype which seems to be the best as regards linearity and sensitivity.

The drive link to the 2N3553 isolation amplifier is located above the phase modulator link on the oscillator collector winding coil former, and goes through a small hole in the brass screen to the 2N3553's emitter and earth. This screen forms an umbrella over the transistor to avoid any gross de-tuning effects when the lid of the box is replaced. The transistor itself has as short legs as can be managed—about $\frac{1}{8}$ in.—above the circuit board. The output is taken via 2 brass strips to a pair of p.t.f.e. feed-through insulators. This unit, as was stated earlier, is in continuous operation.

## Doubler and Buffer Box

The drive box is connected to the doubler and buffer box by a twisted pair of leads and the physical input to this box is effected again by a pair of p.t.f.e. feed-through insulators.

The circuit board is upside down, copper side up, which

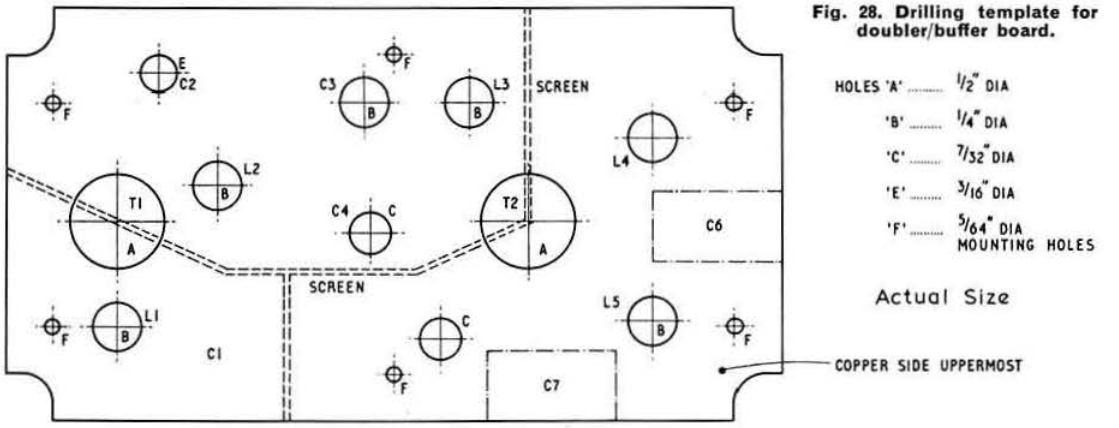


**Fig. 28. Drilling template for doubler/buffer board.**

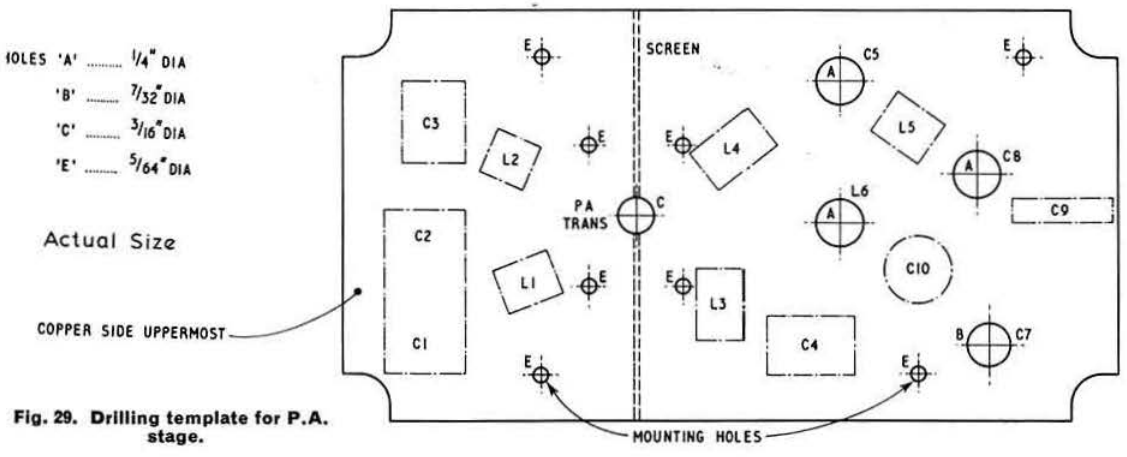


**Fig. 29. Drilling template for P.A. stage.**

makes a better ground plane than the box for r.f. (and it can be soldered!). The drilling plan is shown in Fig. 28. The holes for the transistors, feed-through capacitors, the main trimmer capacitor $C_2$ (on the doubler) and the screw holes will have to be drilled out from the box as well as the board. A brass screen, 1 in. high, should be soldered across each transistor hole and along the length of the board; a side-screen is used to separate input from output in the box, separating the box into three compartments.

The output is taken from a miniature Belling-Lee coaxial socket (type L1465) which has a piece of brass strip soldered to it and the circuit board to minimize stray inductance. $C_5$ and $C_9$ and their associated resistances are outside the box.

The transistors need black anodised aluminium vaned heat sinks which are bolted down to the box with a little bit of silicone heat sink compound for good thermal contact. The same applies to the transistors when they are inserted into their heat sinks. The emitter leads of these transistors are soldered to the screen with as short a lead length as possible, but do not apply heat for too long: in the specifications for these transistors, it is stated that the transistors will stand 230 deg. C for 10 seconds $\frac{1}{32}$ in. away from the seal. But don't tempt providence: 2 or 3 seconds should do quite well.

In Fig. 24, C3 is a ceramic trimmer fitted on to the top of an Electroniques Qoilmax former, with the former chopped to $\frac{1}{8}$ in. length and cemented into the board.

The 216 MHz output is connected by about 8 in. (the actual length is unimportant) of $\frac{7}{32}$ in. 50 ohm coaxial cable to the final stage.

## Final Amplifier—Doubler Stage

The drilling (and component) plan is given in Fig. 29. The input socket is again a miniature B/L coax socket and, as with the output socket of this unit, has brass strips soldered to it and to the board to provide a low impedance earth line.

In making connection to the power transistor, miniature spring clips should be used in preference to soldering on to the transistor's own leads, and from these the input and output inductors can be supported. A brass screen is needed to separate input and output circuits of this transistor and the emitter clip is soldered on to this to give the shortest length of lead to the grounded electrode. The transistor, when it is bolted in, needs silicone heat sink grease for good thermal contact.

The output coupling capacitor is made from a 1000 pF lead through capacitor: unsolder the outer metal casing carefully and clip off the unsoldered end of the through-lead. Half an inch of $\frac{5}{32}$ in. brass pipe is drilled out to half way down with $\frac{1}{8}$ in. The modified capacitor is then fitted in to the brass tube and soldered. After checking that all is well, this is soldered on to the centre conductor of the BNC output plug.

All the unit boxes were assembled into a larger box so as to make the transmitter completely portable. The layout of the boxes is completely at the constructor's choice considering only the flow of cooling air, and therefore drilling details have not been given for the large box.

## Alignment of the Transmitter

If there are no d.c. short-circuits in any unit, start with the drive box (the h.t. connections should not be made to any box until it is ready to be aligned). Remove the twisted pair from the output of the box and attach a 47 ohm $\frac{1}{2}$ watt resistance with the shortest possible leads to the output terminals. Remove, again temporarily, the link coils for the frequency modulator and isolation amplifier from the crystal oscillator collector coil and screw the half-core into L3 so that the bottom of the core is at the same level as the top of the winding. Apply h.t. and adjust C6 (*not* L3) until the oscillator starts on the right frequency (an oscillator using a fifth overtone crystal can easily provide output at the second harmonic of the third overtone). This output should be adjusted to maximum consistent with easy starting. Adjust the cores in *L*1 and *L*2 for maximum output: use an absorption wavemeter and a receiver for this. Replace the link winding for the phase modulator to about $\frac{1}{8}$ in. above the collector winding and the isolation amplifier link winding above the modulator link. Adjust the amplifier link so that the 2N3553 passes about 4 to 6 mA. Tune *C*10 and *C*11 for maximum output from the amplifier and detune by 10 per cent on the shallow side.

Adjust the modulator bias to 3 volts and alter C9 until there is a sudden change in frequency, which should be around 20 kHz. Tune C9 very carefully now until the crystal oscillator is highest in frequency. Retune L3 for maximum output and then re-adjust C9, C10 and C11 and again C9, all the time making sure that the output is on frequency and that it is controlled by the crystal. Most likely the drive current through the 2N3553 will dip at some setting of C10 or C11, but not at the same tuning position for maximum output, so this should be disregarded. The output voltage across the output terminals should now be about 1·5 volt r.m.s. across 47 ohms at 108 MHz, measured with a low-C diode probe and v.v.m.

## Doubler and Buffer

Remove the 47 ohm load resistor from the output terminals of the drive box and reconnect the twisted pair to the doubler box. A 1 watt 47 ohm load is necessary for alignment of this box. This load can be made by enclosing a composition resistor inside a standard B/L (brass) coax socket (3) and connecting it via a short length of 50 ohm coax to the output. Apply h.t. and adjust L1, C1 and the position of L1a so that the doubler passes a current of between 25 to 30 mA with L1 detuned 10 per cent on the shallow side. The coupling between L1a and L1 is very loose: about $\frac{3}{8}$ in. gap between the two windings should be all that is necessary. Don't start with the windings too close: the doubler could easily be driven up to 75 mA or more.

Adjust C2 and L2 for 216 MHz with a wavemeter and receiver and adjust C3 and L3 for maximum drive current through the 2N3553 buffer (75 to 100 mA). Repeat these steps and realign L1 for stable operation (i.e. not affected by hysteresis). Reduce or increase the coupling between L1a and L1 so that the maximum *buffer* current is no more than 75 mA.

C7's capacity should now be set to maximum and then C6 and C7 aligned for maximum 216 MHz output using the wavemeter. This stage can give an output of 324 MHz by mixing the 216 MHz input and the residual 108 MHz drive, so be careful about the output frequency: the double-pi tunes very sharply on both frequencies.

Realign the doubler and buffer stages completely until, with the buffer current set at 75 mA, no further increase in output power can be obtained. The drive box should *not* be read-

justed. The output voltage should be approximately 7 volt r.m.s. at 216 MHz.

## Power Amplifier—Doubler

The important issue with this stage is to make certain that amplification takes place on the drive frequency, 216 MHz, hence the back to front heading of this section. Connect the previous stage to the p.a. with the length of 50 ohm coax. A 68 ohm, 3 watt composition resistor in a coaxial mounting as a dummy load is necessary for alignment of this stage. It should be connected to the p.a. through a reflectometer with 70 ohm coax. Turn C3 (Fig. 25) to maximum and apply h.t. in series with a meter reading 0–500 mA. Adjust C2 and then C1 several times in succession for drive (which should not be more than 250 mA), and then C4 is aligned for maximum output with a wavemeter (when the stage has been adjusted, C4 can be peaked on maximum transistor current). *Make certain* that this drive frequency is on 216 MHz. Next C10 should be adjusted for maximum absorption on 108 MHz with the wavemeter (and possibly also minimum deflection on the reflectometer which should be set to forward wave). Then repeat all these adjustments. Tune C3 now until there is a sudden sharp increase in transistor current (though maximum output does not occur at maximum current) and tune C5 and C8 to resonance on 432 MHz with the absorption wavemeter. Readjust C3 and then C5 and C8 to give maximum output. The tuning of C3 and C5 will be found to be very sharp. At this stage, the reflectometer should show a deflection indicating power being absorbed by the load. Naturally the reflectometer does not indicate what frequency this power is on.

Going back to the doubler/buffer box, adjust L1a so that the 2N4012 p.a. stage does not pass more than 300 mA. Repeat the adjustments to C2 and C1 in the final (C2 should be near minimum capacitance) for maximum output, C10 for minimum sub-harmonic, C3 for maximum output and the same with C5 and C8. When C3, C5 and C8 are tuned accurately to give full output into the 70 ohm load, hysteresis should not prove troublesome. The alignment of this stage is very critical to get the best on-frequency output and the best unwanted (spurious) frequency rejection, but it can and must be done.

Non-linear multipliers can cause havoc if they are connected to an aerial before being properly tuned up. So it is essential to align properly, even if it takes some time, and not only to preclude a visit from an irate GPO official!

With all these adjustments it is imperative that the frequency be known and that it is *a* frequency, not a band full of noise that is being produced by the transistor. When aligning the prototype, no trouble of this sort appeared, but that does *not* mean that trouble never happens. It does. As I know to my cost with previous designs. A properly aligned transmitter is a pleasure to operate and transistor transmitters when they are correctly aligned, stay that way, if the load is stable.

## The A.F. Amplifier

Apply −12 volt and + 28 volt h.t. and monitor through headphones. Apply an a.f. tone signal of 1 mV across 600 ohms and between 100 Hz and 1 KHz to the input from a calibrated signal generator. Adjust RV1 for maximum reading on the meter. If there is no distortion present, and one's ears are a far better judge of this than any oscilloscope, do a frequency run from 50 Hz to 20 kHz and the results

| Trx | Function | $V_c$ | $V_b$ | $V_e$ | $I_c$ |
|---|---|---|---|---|---|
| BC109 | A.F. input (T1) | −1·8 | −2·2 | −3·2 | |
| GT-43B | A.F. input (T2) | −3·8 | −1·8 | −1·7 | |
| GT-43B | A.F. amp (T3) | −1·5 | −0·35 | −0·25 | |
| GT-43B | A.F. output (T4) | −7 | −1·5 | −1·3 | |
| GT-43B | Monitor (T5) | −5·8 | | −2 | |
| BC108 | P.L.M. (T6) | +3·3 | | −0·6 | |
| BC108 | P.L.M. (T7) | +3·3 | | −0·6 | |
| GM290 | Xtal Osc | | +7·8 | +8 | |
| 2N3553 | Isol. amp | +28 | | | 3·5 mA |
| 2N3553 | Doubler | +25·5 | | | 25 mA |
| 2N3553 | Buffer | +21·5 | | | 65 mA |
| 2N4012 | P.A./Doubler | +20·5 | | | 300 mA |

Voltages measured with v.v.m., input resistance 11 Mohm. Allow 10 per cent.

should tally with Fig. 20. If there is distortion present, check the components, particularly collector resistors.

Next, the meter must be made to coincide with deviation in the phase modulator. Apply 1·5 volt (positive or negative) to the d.c. test terminal and adjust RV3 for maximum reading on the meter. Now adjust RV2 so that the frequency of the transmitter has been deviated by 2·5 kHz one way or the other at 432 MHz. It is sufficient to use the drive box for this, and it can be checked by the receiver BFO and comparison with a calibrated A.F. signal generator.

Connect a microphone (100 to 300 ohm impedance) and, after adjusting for level with RV1, check the modulation. Further very careful adjustment of C9 in the drive box and RV2 should make the modulation more or less linear.

## Other Points

U.h.f. power transistors are not cheap. However, as a result of the superficial simplicity of the r.f. circuits, the overall cost is roughly comparable with a valve transmitter, power for power, in the low to low-medium output power class. It only starts getting expensive if transistors are burnt out. So make certain that they can't by having current limiting resistors and a P.S.U. with a very fast cut-out. The price of the complete prototype transmitter as described here came to about £45 for components, which is not too far from a valve transmitter of the same specification. Now there is obviously still room for many improvements—and not only in the modulator section!—but with the non-specialist test gear I have, the design has proved itself in the basically simple aligning procedure and in the more than occasional use I make of it on the air.

I wish to thank G3HBW for much valuable advice in the preliminary stages of building this transmitter and GW3MZY for help freely given during alignment and for checking the manuscript.

## References

[1] RSGB Bulletin July 1967: "Tunnel Diode Protected P.S.U."
[2] *Amateur Radio Circuits Book* (RSGB): p. 85: V.H.F. Reflectometer.
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[4] The *Amateur Radio Handbook*, 3rd Edition (RSGB): p. 187; Pi networks.
[5] *Radio Communication* Feb. 1968: "Design of T-Networks."
[6] Mullard *TP900* and *901* May 1967.
RCA: *SMA-40*: "Frequency Multiplication using Overlay Transistors."
RCA: *Ham Tips* Vol. 26 no. 4, 1966.

REGULAR FEATURE

# THE MONTH ON THE AIR

By JOHN ALLAWAY, G3FKM*

JUDGING by the response to your scribe's remarks concerning TVI in August *MOTA* a very large number of readers are in fact not too active because of their existing interference troubles, or because of the fear that they may stir up cases of interference if they transmit during television hours. Many share the writer's feeling that a national scheme for dealing with difficult cases and a uniform approach by different GPO area officials would be a boon.

Bill Metcalf, G3TIF, will be moving to Edmonton, Alberta, in the New Year, and is giving up the post of Hon. Secretary to the Royal Naval Amateur Radio Society. The new secretary is Radio Sup. R. Malcolmson, who may be reached at H.M.S. *Mercury*, Leydene, Hants.

A very useful publication called the *QSL Manager's Directory* (published by W6GSV) is now available in this country. This 60-page book lists the QSL managers of some 2,500 DX stations and gives their full addresses and those of all the world bureaux. A bulk purchase by Geoff Watts (62 Belmore Rd, Norwich, NOR. 72.T) has enabled him to offer these at a specially reduced price of £1, post free. Another publication of great value to those interested in DX is the *DX News Sheet*, published weekly and available from the same address.

Jack Lambert, G3TA/VP7TA, wishes to apologize for the delay in answering all correspondence during the last few months. This has been due to the death of his wife. Your scribe feels certain that all readers would wish to join him in extending sincere sympathy to Jack.

Readers will be sorry to learn that one of the world's top DX'ers, and better known characters on the bands, Walter Wendelken, W3RIS, became a silent key on 2 October.

## Top Band News

Further information concerning VP2GBR is that he will be looking for UK and USA contacts on 1822·5 and 1981 kHz (and on 7032 kHz) between 01.00 and 04.00 as from October. His aerial will be a Joystick VFA system mounted at 50 ft. Dave is with the Voluntary Service Overseas organization and was given his aerial by the makers. He will be in Grenada for two years and will be active during the Transatlantic tests.

G3SQX, GW3NJW, and GW3OAY, reporting on their recent trip to Inverness, Angus, and Kinross, say that they had difficulty in finding camp sites, and that they found the best technique was to approach farmers for permission to use their land in spite of the fact that they were quite obviously considered to be mad! An alarming fall off in the amount of Top Band activity was noticed, particularly on c.w.

Another successful sortie was that carried out by G3's UBI and UGF as GB2NI. The excellent weather enabled their 200 ft. high hydrogen filled balloon to be used to the full, and the twelve day operation produced 700 QSO's—the best DX being OK8AAA (G2LQB). Thanks are extended to all—manufacturers, G's and GI's—who helped, and apologies to all those who did not get a QSO owing to the QRM.

F/O Ron Lanchbury, G3RFB, hopes to come on the air from the VK8 area in late November. He will be accompanied by G3MDR and they are currently awaiting their licence. They hope to be on for ten days, starting the last weekend in the month, and they will operate on transceive as their equipment will consist of a KW2000. Procedure will consist of a 20 second call followed by one minute of listening throughout the period 19.00 to 20.00 and between 1821 and 1824 kHz. They will answer any callers on their own frequencies and will revert to the calling cycle when a QSO is finished. The aerial will probably be an inverted vee, and QRN will most likely be at a high level but every effort will be made to make contacts.

Your scribe would appreciate receiving a list of the ten most wanted UK counties on 160m from all those interested. The results should be of use to those planning expeditions next summer, and will be published in a future issue.

## News from Overseas

Apologies for an error in September *MOTA* when G3NMH was quoted as being QSL manager for VP8HJ. This should have been W2CTN of course, although Dave has no gear at present and is therefore not having any contacts! VP8CW recently married a YL from S. Georgia in Lydney, Glos, and VP8JD had a mid-September wedding in Surrey.

G3SWH writes to say that the GPO have at last issued him with an Amateur (Maritime) Licence, and that he has been operational since 30 August. His frequencies are crystal controlled (as required by the licence) and he operates mainly 29 kHz up from the lower band edges on c.w. and either 300 or 320 kHz up on s.s.b. Bands in use are 40, 20, 15, and 10 metres and he is particularly on the lookout for UK stations. His 40m s.s.b. frequencies are 7069 and 7095 kHz. Hours of operation depend on Phil's free time, but he tries to get on 15m at around 18.00 for a couple of hours. All QSO's will be QSL'd by special card which may have a picture of the S.S. *Ottawa* on it if the shipping company co-operates. All cards will go via the bureau unless urgently required when they may be sent to G3SWH's home address marked " please forward." Future movements of the 93,000

*10 Knightlow Road, Birmingham 17. Closing date for the December issue is 13 November, for the January issue 4 December, and for the February issue, 15 January.

ton tanker should involve departure from Milford Haven on 1 November for the Arabian Gulf, via Capetown.

Latest news from W3HNK is that he has added three new call-signs to the list of stations for whom he acts as QSL manager. He is now able to confirm QSO's with CR6KT (since 20 May, 1968), and EP2KB and JA1IVV (both since 1 September 1968). The other stations whose QSL cards are handled by Joe are: ex-5A5TR (December 1964 to June 1965), ex-5A3TX (October 1964 to July 1966), SM5BUT, SM0BUT, PZ1CF (January 1968 on), KV4EY, CR6LF (since 16 April 1968), ZE4JS, TI2JCC, GW3DJZ, 4X4RD, 4X4UH, PA0COE, and VY5CEY.

Peter Dowdall, MP4BHA, reports that he has been on 80m s.s.b. and met with considerable success. He was on between 01.00 and 03.00, and besides European signals has heard W and VO. Apparently a pirate has been using MP4BCC's call on this band, Bob has no 80m aerial and has no intention of operating on the band at present. There seems to be an upsurge of activity in the MP4 area with about 10 active MP4B's, three MP4T's, and three MP4M's, but still no MP4Q's. MP4BGX (G3XHE) and MP4BEU are the most active l.f. band users and may possibly try some 160m operation this winter. Relating to comments in August *MOTA* concerning lack of UK activity, Peter finds that the UK stations come third (after DL and W) in numbers heard, but are usually weak and difficult to copy through the DL/UA/I QRM. Television in Bahrein is being received from Dharran, 25 miles away, and TVI is now rearing its ugly head!

More piracy is reported by TF2WKI, who says that he is never on 80m. He operates on 10, 15, and 20m s.s.b., and also on 40m c.w.

Another item of news from Bahrein comes from G3XMG, who was posted out there almost as soon as he had received his UK licence and is now MP4BHF. He was hoping to be active during the Jamboree on the Air, on behalf of the 1st Manama Bahrein Scout Group. QSL's may be sent to G3XMQ's home address, or to the address in *QTH Corner*.

## Awards

Full details of the new ARRL **5BDXCC Award** are now available. This is an entirely separate award from the old DXCC, and is being issued in addition to it. The only connection with DXCC is that anyone disqualified from holding the old award is automatically disqualified from holding the new one. A minimum of 500 confirmations representing two way communication with 100 different " countries " (as per the ARRL *Countries List*) on each of five amateur bands (after 1 January, 1969) must be submitted. Contacts may have been on any permitted mode, but cross mode or cross band QSO's may not be used for credit. Phone and c.w. sections of bands do not count separately as bands. Applications must be made on special application forms, which must be obtained from the ARRL Communications Dept., 225 Main Street, Newington, Conn., USA 06111, and for which there is a charge of $10. This charge covers the cost of returning the 500 QSL cards from the US by first class registered mail, and also the purchase and forwarding of a personalized plaque " commensurate with the difficulty and effort required to achieve the award." These forms will not be available until early in the New Year. It is believed that there will be no endorsements or " stickers " available for 5BDXCC.

The Radio Society of Rhodesia is giving the **Bulawayo 75th Anniversary Award** to applicants who have worked three stations in Bulawayo between 1 and 30 November, 1968. Contacts may be on any band, and on two way c.w. or phone. Claims for the certificate should consist of a certified log extract together with three IRC's, and should be sent to: Matabeleland Branch, Radio Society of Rhodesia, PO Box 1372, Bulawayo, Rhodesia, no later than 31 December, 1968.


**G3UBI and G3UGF recently staged a DXpedition to Northern Ireland signing GB2NI. This twelve day operation produced 700 QSO's.**

## Contests

Two **QSO Parties** are to be held by **CHC** during December. The c.w. effort will run from 00.01 7 December until 24.00 8 December, and the s.s.b. section between the same times on 14-15 December. CHC members should sign /CHC and non-members /HTH. Activity will be concentrated around the following frequencies (c.w.) 3575, 7090, 14,075, 21,090, 28,090 (s.s.b.), 3960, 3943, 7260, 7210, 14,320, 14,340, 21,360, 21,440, 28,620, and 28,690 kHz. QSO points will be three for QSO's with members of Chapter 73 in the c.w. section, three for members of Chapter 88 in the s.s.b. section, two for QSO's with other CHC members, and one for other contacts. A multiplier of the number of different ARRL countries on each band added together is to be used in working out the final score. QSO exchanges consist of report plus serial number of QSO (starting at 001). Logs should show date, time, station worked, exchange sent and received, band and points claimed, and a summary sheet should show total points per band, multiplier by band, total score on each band, and total score claimed. Entries should be posted before 15 January next to Al Kemmesies, 76 Garden Street, Ansonia, Conn., USA, 06401 for the c.w. contest and to Clifford Taylor, General Delivery, Stinnett, Ky., USA, 40868., for the s.s.b. section.

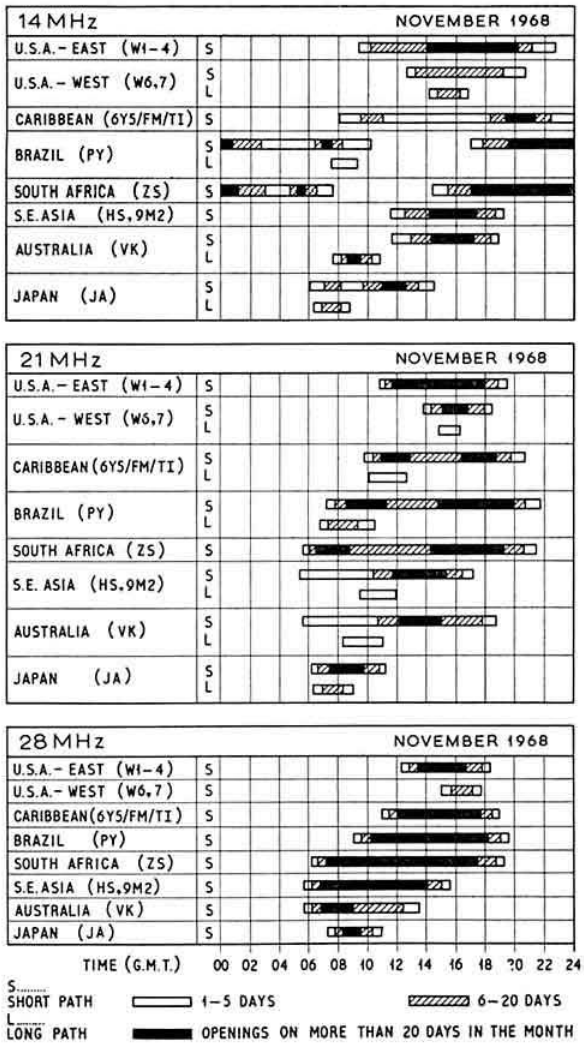
The **OK DX CW Contest** takes place from 00.00 to 24.00 on 10 November and covers all bands 1·8 to 28 MHz; single or multi-band entries may be made. Multi-operator stations must also be multi-band. Exchanges consist of RST followed by a figure representing the number of years the operator

has been licensed. QSO's with OK stations count three points, otherwise one point. The multiplier is the number of prefixes worked on each band. Separate log sheets must be used for each band and should show date, time, station worked, number sent/received, QSO points and prefix (if new), and a a separate summary sheet should also be filled in together with a declaration that all rules have been observed. Contacts with OK stations may be used for credit for the " **100 K** " and " **S6S** " awards *if application is made with the log*. Entries must be sent to: Central Radio Club, PO Box 69, Praha 1, Czechoslovakia, before 31 December.

## US Frequency Allocations

Readers may recall that the first effects of the new Incentive Licensing scheme brought in by the FCC will make themselves seen on 23 November. From that date certain band segments will be reserved for the exclusive use of holders of higher grade licences. Extra class licensees only will be permitted to use the following segments: 3500 to 3525 kHz, 3800 to 3825 kHz, 7000 to 7025 kHz, 14,000 to 14,025 kHz, 21,000 to 21,025 kHz, and 21,250 to 21,275 kHz. Both Extra and Advanced class holders will be allowed in the following sections: 3825 to 3850 kHz, 7200 to 7225 kHz, 14,200 to 14,235 and 21,275 to 21,300 kHz. These exclusive allocations will be extended further in November 1969. Holders of all other grades of licence are permitted to operate anywhere in the bands outside these specified segments, as are the Extra and Advanced licensees of course.

Two other contests being held in November are the Society's **7 MHz DX Contest** (phone) which takes place on 9-10 November (see page 404, June *MOTA*, and the c.w. section of the **CQ WW DX Contest** on 23-24 November.




# PROPAGATION PREDICTIONS

The F2 m.u.f's reach their maximum annual value at the end of October and beginning of November, which implies good conditions on the h.f. bands 21 and 28 MHz. On **28 MHz,** therefore, all continents will be workable with certainty, but Western Northern America only on favourable days (i.e. those with above average F2 m.u.f's for a few hours. In general, Southern European stations will be better placed for contacts with Western North America than those further north. Because of the winter season, **28 MHz** will close between about 18.00 and 19.00 GMT. On **21 MHz** all continents will be workable with certainty. On this band, as well as on **14 MHz**, the mid-winter months will give more opportunities for working DX via the long path during favourable conditions, in contrast to the months of March and September. Towards the end of the month 21 MHz should close around 20.00 GMT (21.00 ET). On **14 MHz** DX traffic will be heaviest from afternoon till about midnight. In the latter half of the night practically only South America and Africa will be workable. On **7** and **3·5 MHz** conditions will change little from those of the previous month. On 3·5 MHz local traffic may be interrupted by the dead zone in the early morning.

The provisional sunspot number for September 1968 from the Swiss Federal Observatory was 120·7 with the period of greatest solar activity concentrated in the last ten days of the month. The predicted smoothed sunspot numbers for January, February and March 1969 are 100, 98 and 97 respectively.

Results of the **34th (1968) ARRL DX Competition** are as follows:

**Phone Section**

| | | | |
|---|---|---|---|
| **G4JZ** | **1,107,540 points** | **GM5AIW** | **197,085 points** |
| G3IAR | 981,948 points | G5AGN/A | 101,979 points |
| G6LK | 471,546 points | G2NH | 8787 points |
| G3KMA | 336,720 points | GM3CSM | 6696 points |
| **GW3NWV** | **298,584 points** | | |

**Multi-operator**

**GB2SM (16 ops.) 1,839,786 points.**
G3WWO (G3JOC, G3MPN) 1,595,700 points
G3SME (G3SME, G3UQR) 1,285,438 points
G3VZT/A (7 ops.) 1,090,890 points

**C.W. Section**

| | | | |
|---|---|---|---|
| **GI3OQR** | **1,746,528 points** | G3ESF | 283,290 points |
| **G2RO** | **1,362,561 points** | G3APN | 190,848 points |
| G4CP | 1,235,406 points | **GM5AII** | **177,840 points** |
| G3FXB | 971,319 points | **GW3JI** | **139,680 points** |
| **GC3IEW** | **957,972 points** | GM5AIW | 124,845 points |
| G2DC | 502,560 points | **GD3AIM** | **35,802 points** |
| G3KMA | 342,015 points | G3HZL | 20,022 points |
| G3VNR | 322,326 points | G3RJB | 12,180 points |

**Multi-operator**

**G6VC (6 ops.) 1,103,436 points**
**GW3ITZ (7 ops.) 805,680 points**

Congratulations to all the winners (listed in heavy type) and especially to **GI3OQR** who was European continental champion in the c.w. section, and also reached the " Top Ten " scores from entrants outside the USA.

## DXpeditions

According to the *DXer's Magazine* Gus, W4BPD, has set 1 February, 1969 as his date of departure from the US on his new expedition. Equipment is already being assembled and tested, and a three element beam for 10, 15, and 20m together with a vertical for all bands 10 to 40m and a 135 ft. wire for 80 and 160m are ready. As on previous occasions the expedition finances and QSL cards will be dealt with by Ack, W4ECI, and contributions will be welcomed. They should be sent to: Worldwide Radio Propagation Study Association, c/o W3ECI, 3103 4th Avenue S., Birmingham, Ala., USA 35233. UK amateurs should arrange donations through their bankers. Gus promises to publish the call-signs of all amateurs who contact him more than twice per mode per band so that DX hogs will be discouraged! No possible itinerary has yet been given but it seems likely that the expedition will continue for as long as funds last out and may last for anything from a few months to five years " or until we run out of countries to visit." Gus says " Ack and I want to get the sport of DXing back to the point that it was a few years ago—a good clean sport, no blackballing, all bands (10 to 160m), both c.w. and s.s.b. will be used to meet the apparent demands for each. No one will be sued regardless of whatever happens and the DXpedition operator will not ever get his temper aroused. In other words fellows, you are in for a good happy DXpedition, one in which everyone will be happy while it's on and when it's completed." Those of us who have happy memories of previous W4BPD expeditions know that it would be foreign to Gus's nature for it to be otherwise.

KH6GLU is planning a trip to **Wallis Is.** (FW8) and **Samoa** (5W) sometime soon. He will be equipped for all bands 10 to 160 metres, and will also have RTTY gear.

WB4APC has now obtained permission to operate from **Sarawak** with the call-sign 9M8APC. He hopes to get there during November or December, but at the time his letter was received was still without equipment and hoping to borrow some from Singapore or Australia.

ET3REL and other operators from ET3USA intend to pay a visit to the **Sudan** soon, and to take some s.s.b. equipment with them. Licensing difficulties are such that operation may take place from ST2SA's QTH. A beam will be one of the items taken, and will be left behind, together with the other equipment, for further use by ST2SA.

WB4HIP and K0CER intend to be on from **Grand Cayman Is.** using the call-sign ZF1DT during the c.w. section of the CQ WW DX Contest. Operations will begin at 18.00 25 October, and will cover 10, 15 and 20m.

The very successful trip to **Macao** (CR9) which took place a few months ago is likely to be repeated in November.

It is rumoured that VK2BKM may possibly be operating /VK2 from **Lord Howe Is.** during the weekend of the CQ WW DX contest (c.w.).

The VE6/Pacific expedition seems to have got under way, but signals in the UK have so far been very weak. At the time of writing VR1P was the call-sign being used (from Br. Phoenix Is.) and bad behaviour on their frequency was making them virtually unworkable.

A repeat of the expedition to **St. Peter and Paul Rocks** seems imminent. PY7's ABU, ACJ, ACQ, AKW, and AOA, are expected to be signing PY0DX (on c.w.) and PY0SP (on s.s.b.) for 72 hours or more sometime between 10-20 November. A list of frequencies has been given as (PY0DX) 1827 kHz 03.00-04.00, 3523 kHz (listening 3518 kHz 02.00-03.00), 7001 kHz (listening 7006 kHz), 14,045 kHz (listening 14,050 kHz), and 21,045 kHz (listening 21,050 kHz). PY0SP frequencies and listening frequencies are given as 7070 kHz (7075 kHz), 14,105 kHz (14,180 kHz for Europe, above 14,200 kHz for USA), 21,245 kHz (21,250-21,255 kHz). QSL's must show times in GMT, and if direct reply is required European applicants should send s.a.e. plus six IRC's to the addresses in *QTH Corner*, otherwise cards will be sent via the bureau. The trip is estimated to be going to cost over £1000 to make, and donations would be appreciated!

A possible 4A4J operation by 4A1J from **Revilla Gigedo Is,** using a dipole and Swan 350 has been mentioned, but your scribe will believe it when he hears 4A4J.

## DX News

VR4EK was scheduled to leave the Solomon Is. on 1 October for five months stay in New Zealand. He is expected to take some s.s.b. equipment back with him on his return. The currently active station VR4EL, who has a.m. only, has been supplied with some 25 crystals by DU1FH, these are all in the range 14,100-14,200 kHz except for one on 14,210 and one on 14,300 kHz.

Frank Hattemore, ex-6Y5FH, now G3WSH, writes to say that, due to a particularly unsuitable QTH for aerials he has not been able to work his old friends in Jamaica. He hopes to remedy the situation as soon as possible.

9V1LK (R. L. Halls, 12B Robin Rd, Singapore) is very

active on 3·5 and 7 MHz between 23.00 and 24,00, and has been hearing UK stations. His usual frequencies are 3510, and 7005-7010 kHz, and he will be happy to fix skeds with anyone interested.

Other news of forthcoming increasing interest in the l.f. bands includes a report that VK3BM has a fixed three element 80 metre Quad beamed on Europe! He will be on 3697 kHz s.s.b. at 20.00. Roger Baines, MP4TBD, expects to be active from Trucial Oman again on all bands from December onwards. A potent signal from the Philippines should be provided by DU1FH, who hopes to have a 2 element Quad on 40m fed by a 2 kW linear by the time of the CQ WW DX Contest!

Stations heard using a 9L4 prefix between October 18 and 27 were Zambian licencees celebrating their country's 4th Independence anniversary.

A new station will be on the air from Kure Is. from 29 October. This will be KH6BZF, who says that he will be found on 14,225, 21,270 or 28,570 kHz from 04.00. QSL's should be sent to KH6BZF, Lee R. Wical, 45-601 Luluku Rd, Kaneohe, Hi, 96744, USA.

A number of OK stations are using an OM prefix during the period 1 October to 15 December to commemorate the 50th anniversary of the Czechoslovakian republic.

A2CAH is ex-ZS9H (Box 17 Gaberones, Botswana) and A2CAQ appears to be the new call-sign of ZS9Q (PO Box 45, Francistown.)

CR3KD, Portuguese Guinea, is being supplied with s.s.b. equipment. Donations should be sent via G3HSR, 11 The Crescent, Milton, Weston-super-Mare, Somerset. Jim also acts as QSL manager for MP4TCF.

Reciprocal licensing is now in effect between the US and Barbados, and between the US and Surinam.

Dale, W4DQS, says that he has not received any TJ1QQ logs since April, and that there will therefore be considerable delay in QSL'ing QSO's since that time. It is reported that QSL's for the PY0BLR (Trindade Is) operation last April may now be obtained from PY4BK (see *QTH Corner*).

The station at Morokuilen, Norway, presently signing LG5LG is reported to be a memorial to LA5LG, who was a former president of NRRL, It may be operated by any licensed amateur.

9V1OS, Les, will be going to Fiji in late October and hopes to be on the air on 14 and 21 MHz c.w. with a VR2 call soon afterwards. VK4EV (Willis Is.) is reported to be leaving in December, and has been heard on 14 MHz s.s.b. between 06.00 and 07.00 on Saturdays.

OA8AAA is a special station set up to commemorate the centenary of the city of Iquitos, and contacts will be confirmed by special QSL. Cards should be sent to the address in *QTH Corner*.

## Band Reports

Apologies to all correspondents whose letters failed to arrive before deadline. It would seem that our rapidly failing postal services are unable even to deliver first class mail from our capital city to the second city on time. Please allow extra time in future!

Conditions on all bands appear to have been good. An interesting phenomenon noticed during the RSGB 28 MHz phone contest was that stations in southern areas were apparently having much better DX openings than those further north. Many thanks to all the following for reports and news items: G2BOZ, G2HKU, GW3AX, GM3CSM, G3HCT, G3HDA, G3ING, G3LNS, G3NMH, G3SHM, G3URX, G3VJG, G3VPS, G3VRZ, G3XKV, GM5AHS, G8JM, G8VG, BRS6604, BRS19682, BRS25429, BRS27806, A5135, A5390, A5637, A5852, A5980 and A6081.

Stations listed in italics are c.w., other calls were s.s.b.—unless otherwise noted.

**3·5 MHz.** EA6AR (22.10), EP2GI (22.30), ET3USA (22.30), KP4AST (05.34), VU2LO (22.30), ZC4TK (21.01), ZL's 2BCG, 4AV, 4BQ, *4IE*, 4LM (06.15-06.45), 9M2DQ (22.30), 9X5SP (22.30).

**7 MHz.** AP2MR (00.00), CO2FA (06.53), *CR6AI* (21.45), DU1FH (21.00), *EA9JW* (21.00), *ET3USA* (20.50), *JA6YB* (21.10), *KL7ATV* (19.55), KP4ZC (22.32), MP4BGU/BGX (22.55), PX1RG (21.09), PZ1CF (21.00), *ST2SA* (21.05), *TA1SK* (24.00), TU2AK, (23.07), VK's (06.45), VP2KF (22.40), VP8's HZ, JB (22.45), *VU2JN* (01.10), *W6GHG* (05.25), W7ENG (06.50) YV4GYD (21.07), ZD9BE (21.57), ZL2BCG (06.40), *ZL4BO* (19.20), *ZP5GZ* (23.25), *ZS1JA* (18.52), ZS3T (21.00), 4J0AH (21.00), 4S7PB (20.30), *5U7AC* (19.35), 5X5XO (21.25) 9M2DQ (22.35), 9Y4KR (13.17).

**14 MHz.** *AP5HQ* (17.30), FO8's BO, BS, CB (07.15), HQ2GK (08.17, Special Honduras prefix), JX2BH (18.55), KX6DR (15.00), LG5LG (18.05), OA8AAA (07.00), *PJ2VD* (18.45), P *Y0APS* (06.55), PY0ARM (09.10), *TA2SC* (10.25), *TT8AF* (22.53), VK0IA (07.43), *VP2VW* (21.40), *VQ9B* (20.30), VR1P (08.30), VR2CC (06.41), VS5TJ (10.12), *XP1AA* (06.13), *XW8BP* (13.45), YN1GLB/9 (22.30), ZK1AA (07.37).

**21 MHz.** W4UDF/AP2 (E. Pakistan, 15.40), CE0AE (21.30), *EA9AQ* (16.00), FG7TH (18.55), FK8's, BG, BK (11.05), *GC5AET* (15.00), HR1KAS (18.30), HS3DR (15.00), KL7EJ (10.00), W0VXO/KP4 (17.40), KX6BR (11.30-15.00), *ST2SA* (18.36), TJ1AT (08.05, a.m.), VK9AW (Cocos Keeling Is. 11.50), VK9LR (10.19), VP8JW (17.25), *VQ8CC* (17.50), VR1L (11.43), *VS6AA* (12.09), *XE0LOW* (16.00), *XW8CAL* (17.18), *ZL1AMO* (22.10), 4J0AH (12.01), *4S7DA* (10.46), *7X0WW* (11.10), 9N1MM (11.26).

**28 MHz.** AP2MR (10.15), CE3ZW (19.57), CR4BL (11.05, PO Box 64, Praia, Cape Verde Is.), ET3REL (16.46), FG7's XL, XT (15.50), FM7WE (16.40 a.m.), FS7RT (15.55), WA6AHF/HK0 (18.08), HP1LM (13.33), HS3RS (09.57), HV3SJ (11.38), KG6AAY (13.40), KV4FC (20.25), G3SWH/MM (at Bahrain, 11.30), OA8AAA (16.52), TJ1AU (12.45), *UH8BX* (14.30), VK6, VK4 etc. (07.00-12.00), *VK8HA* (11.10), VK9XI (15.10), VP5AA (13.45), *VP8JT* (Antarctica, 15.00), VP8KE (18.55), VP8KF (19.22), VQ8CT (19.40), *VS6AA* (10.37), VS9MB (10.30), *VU2LO* (07.58), XW8BP (13.42), YA5RG (13.13), YS1GL (18.45), ZD7DI (18.25), ZD9BE (08.48, very active at week ends), 4A1OE (14.40), 4A2CJ (20.00), 7P8AR (14.45), *7Q7RM* (17.44), 9K2CC (13.13), 9J2XZ (G3SXZ, 11.00), 9M2RH (13.50).

Very many thanks once again to all correspondents, and particularly to the following for permission to reproduce items from their publications: The *DX'ers Magazine* (W4BPD), the *Florida DX Report* (W4BRB), *CQ DX* (A.R.I.), the *HKARTS Newsletter*, *DX'press* (PA0FX), *NARS News* (5N2AAF), the *L.I.DX.A. Bulletin* (W2GKZ), *Long Skip* (VE3DLC), *QUAX* (SM4DXL), the *DX'er* (K6CQF), *DX News Sheet* (Geoff Watts), and the *Ex-G Radio Club Bulletin* (W3HQO).

Please send all contributions **in time to reach G3FKM** no later than **13 November** for the **December issue, 4 December** for **January** issue, and **15 January** for **February** issue.

## QTH CORNER

**FG7TH** via F2VX, Gerard Debelle, Residence la Vallee, Bat D, Porte A, Rue des Iris, Buxerolles, France.

**FK8BG** via W5IXQ, Travis Flatt, 1212 Chama N.E., Albuquerque, N.M., USA.

**G3ODO/KL7** William Buckett, 1006 7th Avenue, Fairbanks, Alaska, 99701, (or via G2MI).

**KW6AA** via WB6YCT, Charles Ansoms, 10543, Danube, Granada Hills, Calif., USA.

**LG5LG** via LA4YF, Hans Kinck, BO 1 Telemark, Norway.

**K1DWQ/LX** Walter P. Smith, RFD, 2, South Windham, Maine, USA.

**W8IMZ/LX** Burnell Welch, RFD2, Box 259, Ada, Ohio, 45810, USA.

**MP4BHF** 592 Jnr, Tech. Eggleton P.R., Joint Transmitters, R.A.F. Muharraq, BFPO 63.

**OA8AAA** PO Box 193, Iquitos, Peru.

**PY0BLR** via PY4BK, Nelson Orsini, Rua Marquesa de Alorna, 62, Belo Horizonte, Brazil.

**PY0DX** via PY7ACQ, Plinio B, dos Santos, Rua Gov. Lopo Garro 277, Recife, Brazil.

**PY0SP** via PY7AOA, Gastao C. de Almeida, Av. Beira Mar 4100, Boa Viagem, Recife, Brazil.

**PZ1DA** PO Box 1810, Paramaribo, Surinam.

**SV0WY** via W1RPW, Raymond Sigda, 64 St. Jacques Av., Fairview, Mass, USA.

**VP2VW** L/Cpl John Irwin, Royal Sigs., 53 FD SQD R.E., BFPO 14.

**VR1P** (see VR2FR).

**VR2DI** via VE6TK, Duncan Davidson, 1108 Trafford Drive, Calgary, Alberta, Canada.

**VR2FR** via VE6AO, George Sargenia, 3211 Kenmare Cresc., Calgary, Alberta, Canada.

**VR4EL** Box C-22, Honiara, Guadalcanal, British Solomon Is.

**VS9MB** via G3KDB, P. A. Miles, 28 Scotch Orchard, Lichfield, Staffs.

**XW8BQ** via WA4ZTW, George Allen, 421 Cypress St., Milton, Fla, USA 32570.

**ZF1DT** 68 NE 87th Street, El Portal, Florida, USA 33138.

**4S7NE** via W5NOP; J. Lowell Otto, 1511 Live Oak Road, Metairie, La., USA.

**5W1AE** see VR2FR.

**8R1J** PO Box 557, Georgetown, Guyana.

**8R1X** via VE3DLC, R. J. Kreger, 30 Zenith Drive, Scarborough, Ont., Canada.

**9H1N** via 9H1R, Ron Meachen, 1 Jasmine Path, St. Lucia, Malta.

**RSGB QSL Bureau, G2MI, Bromley, Kent.**

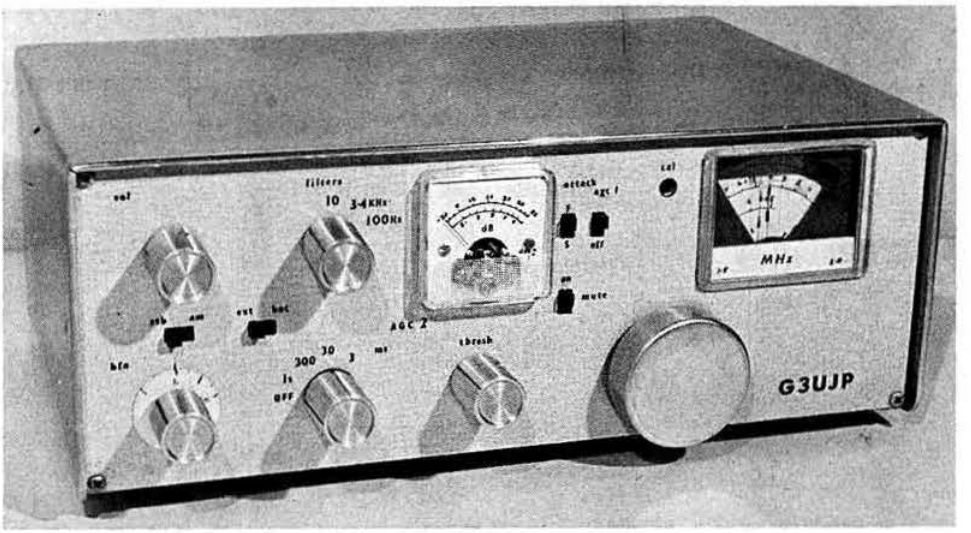
## 1968 COUNTRIES TABLE

| | 160m | 80m | 40m | 20m | 15m | 10m | Total |
|---|---|---|---|---|---|---|---|
| G8JM | — | — | 4 | 196 | 115 | 67 | 385 |
| G3IAR | 4 | 38 | 40 | 124 | 101 | 28 | 357 |
| G3OLY | — | 5 | 8 | 138 | 98 | 74 | 323 |
| 9J2BC | — | — | 17 | 106 | 54 | 64 | 241 |
| G3XBY | 4 | 30 | 40 | 75 | 90 | 54 | 293 |
| G3PQF | 10 | 7 | 32 | 58 | 5 | 25 | 137 |
| G3VPS | 13 | 23 | 18 | 61 | 12 | — | 127 |
| G8VG | 5 | 16 | 27 | 46 | 58 | 56 | 208 |
| G3TBK | 3 | 6 | 26 | 39 | 31 | 23 | 128 |
| G3XDV | 15 | 10 | 17 | 38 | 1 | 18 | 99 |
| SM2BYD | — | 14 | 6 | 49 | 16 | — | 85 |
| G3ING | 12 | 16 | 22 | 21 | 20 | 14 | 105 |
| G3VJG | — | 2 | 10 | 18 | 22 | 59 | 111 |
| BRS25429 | 3 | 57 | 80 | 176 | 141 | 114 | 568 |
| A4886 | 14 | 56 | 50 | 187 | 103 | 89 | 489 |
| A5390 | 4 | 22 | 35 | 161 | 163 | 92 | 477 |
| BRS30094 | 10 | 33 | 29 | 157 | 150 | 111 | 490 |
| BRS27806 | 4 | 27 | 17 | 168 | 136 | 78 | 473 |
| A5662 | 13 | 30 | 41 | 136 | 124 | 102 | 446 |
| A5154 | 3 | 25 | 21 | 140 | 121 | 70 | 380 |
| A5135 | 5 | 24 | 37 | 115 | 81 | 56 | 318 |
| A5466 | 5 | 21 | 23 | 106 | 38 | 28 | 216 |
| A5852 | 5 | 15 | 11 | 110 | 114 | 1 | 256 |
| A5459 | 8 | 25 | 34 | 84 | 37 | 22 | 210 |
| A5489 | — | 10 | 6 | 110 | 95 | 51 | 272 |
| BRS28198 | 2 | 32 | 46 | 66 | 32 | 92 | 270 |
| A5126 | 2 | 31 | 31 | 81 | 53 | 44 | 242 |
| A6015 | 6 | 16 | 30 | 65 | 53 | 43 | 213 |
| A3942 | 14 | 38 | 36 | 58 | 60 | 50 | 256 |
| A5950 | 7 | 23 | 20 | 66 | 73 | 68 | 257 |
| A5943 | 10 | 42 | 30 | 53 | 65 | 33 | 233 |
| A6081 | — | 9 | 12 | 47 | 44 | — | 112 |
| A5610 | 10 | 71 | 17 | 35 | 25 | 31 | 191 |
| A5805 | — | — | 42 | — | — | — | 42 |
| A5457 | 3 | 24 | 3 | 19 | 18 | 6 | 73 |

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

# Miniature High Performance Tunable I.F.

P. J. SKIRROW, B.Sc. (Electron.Eng.) G3UJP*




*Part 2*

Continued from page 660 of last month.

## SECTION 3

### The B.F.O./Detector Unit

For optimum reception of s.s.b. signals a product detector of some type is essential, and although good a.m. can be resolved on such a detector with carrier insertion good quality cannot be obtained and separate detectors for a.m. and s.s.b. are desirable. The need for low b.f.o. pick-up in the i.f. amplifier makes a separate screened unit an essential, otherwise full use cannot be made of th a.g.c. action.

### The Circuit

Fig. 5 shows the circuit diagram of the detector unit, the popular two diode ring modulator being used for s.s.b. reception, with carrier drive obtained from the b.f.o. via a standard i.f. transformer. In order to prevent b.f.o. leakage a buffer is used, TR301, in the form of a low gain common emitter stage. The whole unit is of course built into a single die-cast box, and provided the supply leads are carefully decoupled no b.f.o. signal should be detectable on the "S" meter. TR301 gives around unity gain in order to maintain a low level of signal into the product detector for low distortion. D301 is the envelope detector and to improve detector linearity some forward bias is applied via R304. Both detectors are left in circuit, interaction being slight, and output selection is by switch S301a. With the values shown the two detector outputs are quite closely matched so that switching from s.s.b. to a well modulated a.m. signal does not necessitate gain adjustment.

Two errors regrettably crept into Part 1 of this article last month. **The I.F. Strip:** TR1, TR2 and TR3 should read TR4, TR5 and TR6. **Contructional Notes:** R204 should read R203.

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### The B.F.O.

The b.f.o. circuit is very similar to that of the v.f.o., a stable oscillator being preferred to a set of crystal controlled c.i.o.'s as it is cheaper and more versatile, particularly when audio filters are to be used. TR304 provides a high level of drive to the detector and for best stability careful layout and screening is recommended, or feedback from TR304 may degrade the frequency stability. A ¼ in. bakelite former was used for L301 as slug tuning was convenient and stability proved adequate. A glass or ceramic former could of course be used with advantage, but polystyrene should definitely be avoided owing to its high thermal expansion coefficient.

### Detectors

A word about setting up is required as product detectors require balancing for good results. After ensuring that the b.f.o. is adjustable over the required range (and modifying L301 if necessary) check if posible that the output from TR304 is adequate and peak TR302 for max. drive. This is best carried out with diodes D302, 303 removed and a VTVM or 'scope across T302 secondary, when approximately 1·5V r.m.s. should be obtained. It is not sufficient to adjust R305 with the oscillator disabled as this does not simulate normal operating conditions, the recommended method is as follows: Tune in an a.m. signal and detune the b.f.o. by adjusting L301 until the beat note is inaudible. The modulation will probably remain audible but adjustment of R305 should produce a null point at least 20dB down on normal output

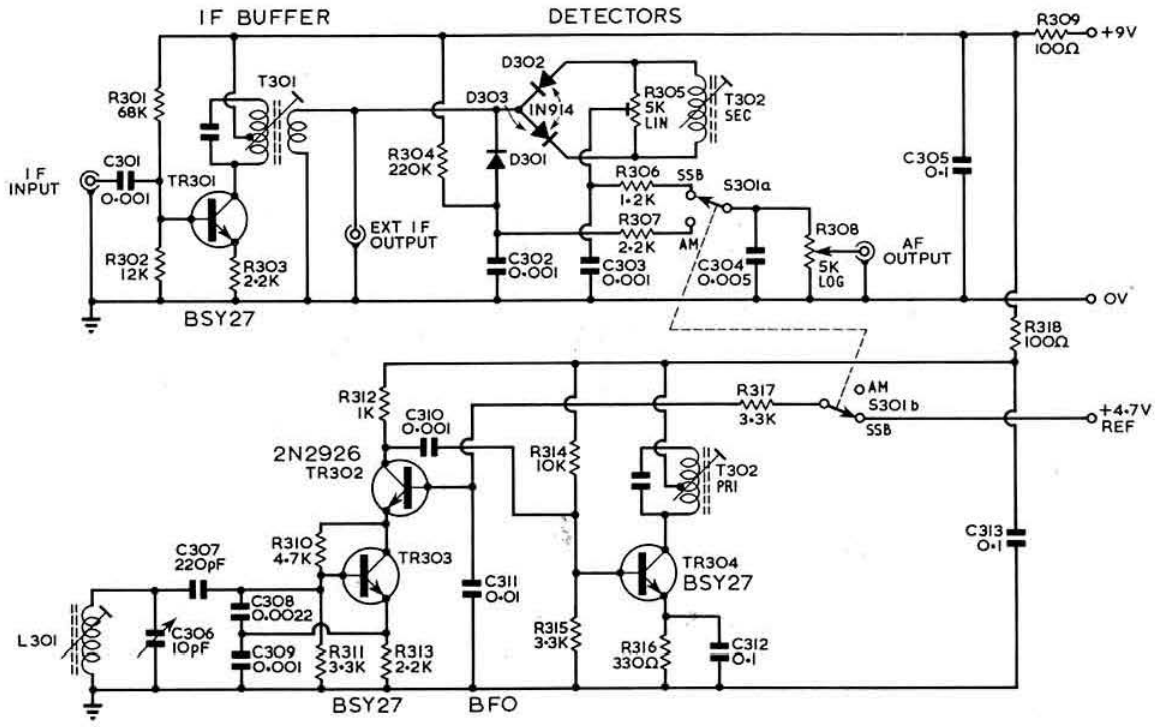



**Fig. 5. B.F.O., a.m. and s.s.b. detector stages.**

level, corresponding fairly well with the correct balance point for minimum intermodulation.

## The Audio Amplifier

This is entirely conventional, a complementary output pair producing about ½ watt into an 8 ohm load. As the output from the detector is low (typically 50mV) a preamplifier was required, and by including a two stage preamp. with heavy negative feedback, the use of external filters was facilitated. Removal of the shorting link supplies a low impedance output (40 ohms) and high impedance input (230K ohms) suitable for the connection of simple filters. Excess gain is also available to allow for insertion losses.

When testing the amplifier a meter should be included in TR406 collector and R416 adjusted for approximately 5mA standing bias, this being adequate to avoid crossover distortion.

## Performance

Full details of measurements made on the prototype receiver were provided last month and these should assist the testing of any unit if suitable equipment is available.

The figure quoted for image rejection (60dB) may seem inadequate but it represents the best that could be achieved without the use of a bulky four-gang capacitor. Pot-core

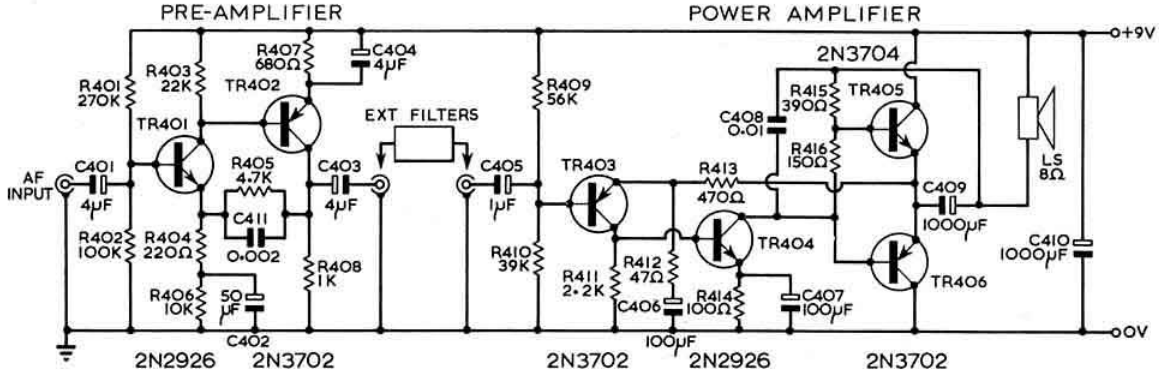
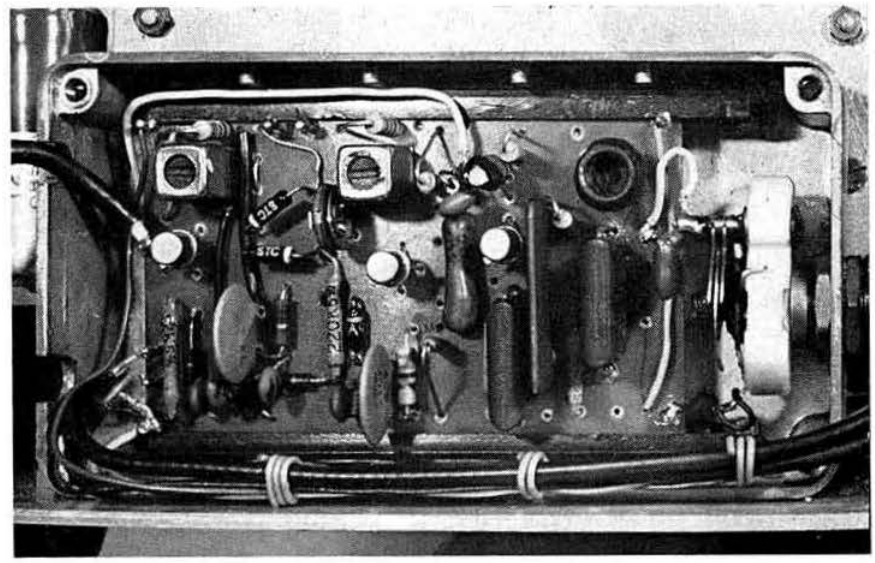



**Fig. 6. Complete circuit of audio pre-amplifier and audio power amplifier.**



**Component layout of the b.f.o.-detector unit.**

inductors could be used with some improvement but as further attenuation is usually provided by the use of a tuned aerial or converter such steps have not been found necessary.

Conversion to other bands requires only simple circuits and suitable FET converters have already been described in *Radio Communication*[4]. A single mixer stage using a 2N3819 and double tuned preselector has given good results on h.f. bands as only unity gain is needed.

## References


[1] " An Improved Method of Etching Printed Circuits." *RSGB Bulletin*, March 1967.

[2] "The Stability of Transistor V.F.O.'s." *RSGB Bulletin*, Sept. 1967.

[3] "The Ring of Two Reference." *Wireless World*, July 1967.

[4] "Technical Topics," Sept 1967, Nov. 1967, *RSGB Bulletin*.


## COMPONENTS LIST

### Detector/B.F.O. (Prefix 3)

| | |
|---|---|
| R301 | 68 k |
| R2 | 12 k |
| R3, 7, 13 | 2·2 k |
| R4 | 220 k |
| R5 | 5 k lin. preset. |
| R6, 12 | 1 k |
| R8 | 5 k log. pot. |
| R9, 18 | 100 |
| R10 | 4·7 k |
| R11, 15, 17 | 3·3 k |
| R14 | 10 k |
| R16 | 330 |
| C301, 2, 3. 10 | 0·001 ceramic |
| C4 | 0·005 " |
| C5, 12, 13 | 0·1 " |
| C6 | 10 pF air trimmer |
| C7 | 220 pF s.m. |
| C8 | 0·0022 s.m. |
| C9 | 0·001 s.m. |
| C11 | 0·01 ceramic |
| TR301, 3, 4 | BSY27 |
| TR302 | 2N2926 |
| T301 | 1st or 2nd i.f.t. (7 mm. 20 k/500) |
| T302 | 3rd " ( " 20 k/5 k) |
| L301 | 300 turns 40 s.w.g. ¼ in. Bakelite former ¼ in. long slug |
| S301 | 2P 2W min. slide switch. |
| D301 | Germanium |
| D302, 3 | Sil. 1N914, etc. |

### Audio (Prefix 4)

| | |
|---|---|
| R401 | 270 k |
| R2 | 100 k |
| R3 | 22 k |
| R4 | 220 |
| R5 | 4·7 k |
| R6 | 10 k |
| R7 | 680 |
| R8 | 1 k |
| R9 | 56 k |
| R10 | 39 k |
| R11 | 2·2 k |
| R12 | 47 |
| R13 | 470 |
| R14 | 100 |
| R15 | 390 |
| R16 | 150 Adj. on test ($I_c$ = 5 mA) |
| C401, 3, 4 | 4 μF elect. |
| C2 | 50 μF " |
| C5 | 1 μF " |
| C6, 7 | 100 μF " |
| C8 | 0·01 |
| C9, 10 | 1000 μF " |
| TR401, 4 | 2N2926 |
| TR2, 3, 6 | 2N3702 |
| TR5 | 2N3704 |

REGULAR FEATURE

# FOUR METRES AND DOWN

By JACK HUM, G5UM*

## To Those Contemplating Sideband. . . .

ANY h.f. operator who happens to read this feature must have wondered why s.s.b., which has taken over almost universally on *his* bands, comes in for a tentative approach on ours. There are various reasons why this should be so. One of them, the question " Is there any real need for s.s.b. for the high signal-level, local contacts which make up most of what goes on at v.h.f.? " is argued by G8VN lower down. Another, the transverter approach, at once excludes all Class B licensees and many Class A licensees who don't operate below 70 MHz and therefore don't possess (perhaps cannot afford) h.f. band injection sources—though of course they can always *build*. There may be as many as 2000 such operators.

And thirdly, arising from the transverter approach, there is the very real fear by responsible operators who have done the " mixer product " sums involved that a better word might be " transdirter."

" Unless the situation is controlled *now*, in five years' time the 2m band will be a mass of unintelligible burbles from end to end." When one of this country's leading v.h.f. men said this the other day he must have struck a feeling of foreboding into the hearts of many. Which was a good thing: if the UK amateur movement can be alerted now to the danger of using sideband transmitters of poor design then perhaps our v.h.f. bands will remain in the future as pleasant to operate in as they are today.

Basically, the problem is this:

Any mixer system (and sideband rigs rely on them) by its very nature generates a family of unwanted frequencies as well as the single wanted one. Unless the oscillator frequency is chosen with great care some spurious products will almost certainly fall into the band. Just how difficult it is to suppress them any v.h.f. operator who has ever worked across town (or across the county) using only a dummy load will know. Truly, v.h.f. has a highly penetrative quality. With today's high gain converters you can hear the man in the next town testing his 10 watt Pipsqueak on a dummy load.

Recognizing the urgent need to do something about " Single Sideband at V.H.F." the Society has laid on a lecture meeting under this title, to be given at the IEE next week, on Friday, 15 November, by G3LBA, G3MED, G3SHK and V.H.F. Manager G3FZL. Members who saw last month's notice on page 639 will have already applied for tickets. Those who haven't done so and want to go should send a stamped addressed envelope to Headquarters at once.

The lecture may well prove to be one of the most important ever to be given if it succeeds (as it is intended to do) in getting all of us thinking out and adopting correct technical and operational procedures where sideband on the metre waves is concerned.

Now over to G8VN. . . .

## Is Your Sideband Really Necessary ?

To those about to go on sideband on " Two," think again. This is the advice offered by Harold Turner, G8VN, of Leicester, who has misgivings about the value of the mode at v.h.f.

Technically, says Harold, there is every justification for s.s.b. on say 80 or 20 metres where there are many stations clamouring to be fitted into a small space. On v.h.f. this argument does not apply, he declares: there is plenty of room for all, using a.m. and keeping within one's local geographical frequency zone.

G8VN makes the point that as the greater part of v.h.f. communication is between stations operating at high signal levels over semi-optical ranges, the use of sideband for such contacts is nothing less than brute force.

There is also the question of proximity interference. It is difficult to attentuate strong local a.m. signals to a workable level: how much more difficult it is, then, to keep out of the receiver the even stronger sideband signals that give no warning of their presence until the operator actually speaks.

Another point made by G8VN: because v.h.f. is capable of realizing such superb audio quality it seems both retrograde as well as technically unnecessary to adopt a mode that debases the sound of the human voice!

For DX working on the spot frequency of 145·41 MHz there is justification for the use of sideband, concludes G8VN—yet a good c.w. signal will do the same job at far less complexity in the way of equipment, more cheaply, and with much less chance of emitting spurious products.

## Beaconry

If the Cornish beacon appears a degree or two above the 144·1 mark on the receiver scale, don't suspect your calibration: that's where it *should* be. Officially its frequency is now 144·13 MHz, and there was a very good practical reason for the change. Near the Camborne Technical College, where G3CZZ is the " beacon keeper," there is a very sensitive business radio receiver on 72·05 MHz which persisted in picking up a weak heterodyne from GB3CTC when the beacon was operational on 144·100 MHz. To avoid inconvenience to the business radio user the change was made to the present frequency.

Apropos beacon frequencies, those of GB3GM and GB3ANG were recently checked by GM3TFY of Edinburgh using an 8-figure frequency counter capable of a resolution at 2m of better than 10 Hz. Up to the time of this check GB3ANG near Dundee had held 145·9769 MHz plus or

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minus 100 Hz for as long as two months. From Thurso the GB3GM signal registered 145·9880 MHz on the GM3TFY counter. David Guest makes the point that many people use the beacon frequencies both for calibrating converters and for pre-setting receivers to listen for meteor pings in narrow passbands. For these purposes accurate knowledge of beacon frequencies is important.

Out of service for the time being is ZB2VHF. The beacon transmitter was shipped back to the UK for modification and servicing by the South Coast V.H.F. Group in preparation for installation early in the New Year in good time for the start of the next sporadic-*E* season.

This does not mean that v.h.f. activity on The Rock will now be quiescent. Far from it. See below.

## Transequatorial on " Six "

With the 4m beacon temporarily off the air, Gibraltar's two v.h.f. enthusiasts, ZB2BC and ZB2BO, have turned their attention, as they said they would do, to the " next band down," meaning 50 MHz.

Using adapted 70 MHz equipment, they spent their first few days on the band getting the feel of it. On 5 October came the hoped-for transequatorial breakthrough; ZB2BO worked ZS3E on 50·1 MHz. The contact was made possible by some swift work by a member of the ever helpful South Coast V.H.F. Group, G3JVL, who upon working a neighbour of ZS3E on an h.f. band reported that the Gibraltar stations would be active on " Six " if someone in South Africa could look out for them. The message was passed on to ZS3E, who did.

There was quick work by ZS3E, also. Although not immediately equipped for " Six " he got himself that way, 100 watts of it, in short order, and was rewarded by the ZB contact not just on 5 October but on the 6th and 8th as well, early evening in each case. By 10 October there had been four QSOs between ZB2BC and ZS3E, and one between ZB2BO and ZS3E. And on 12 October 'BC worked ZE7JX.

The possibility of further TE propagation is suggested by the fact that the Rhodesia beacon on 50·04 MHz is regularly heard by the Gibraltar operators. For us in Europe this is an awkward frequency to monitor during the key early evening period by reason of the television burps on or around it, a hazard which did not exist when the British (well, a few of us anyway) had permission to use the 6m band twenty-one years ago. This does not mean that it is pointless to build 50 MHz converters to attempt TE reception even though transmission is out. From what we hear several people are doing precisely that.

Any reports of the reception of ZE1AZC on 50·04 MHz will be of great interest and importance and should be addressed to the V.H.F. Committee at Headquarters.

## There's Something About " Four "

Ever since the British amateur was granted the 4m band back in the middle Fifties it has exerted an appeal such that many people use it in preference to " Two " or 70cm—indeed some to the exclusion of the other v.h.f. bands altogether.

It is not just that transmitters are easier to drive on " Four," and output easier to get: certainly these factors have something to do with it (more's the pity that in some cases these advantages are thrown away by the use of poor radiating systems). Where the fascination lies is in the capability of 4m to turn up quite unexpected results. Just when nothing more than a " local natter " with a man in the next county seems to be indicated, there's ZB2VHF climbing up through the noise or perhaps GB3GM with a ring to its note reminiscent of the old days of Californians on 23 metres! There are modes of propagation that produce DX on " Four " when the higher frequency bands remain unaffected; so it doesn't do to peek out of the window on a dark and dirty night and conclude that 4m will be dead. The chances are that it won't be.

Developing last month's suggestion that more long haul schedules on " Four " might produce surprising results, Bill Lord of Reading, G5NU, states that he would very much like to hear from any operators in GI, GM or northern England who would be prepared to participate in before-breakfast meteor scatter skeds on 4m telegraphy. Write him at Linden Mews, The Mount, Reading. After a year on the band he finds it " disappointingly empty sometimes but rewarding on others "—one reward being an Auroral contact with GM3UAG in Banff, worked by several southern stations in the " Tone A " opening of September.

More recently on the band is G3VPS of Hailsham in Sussex, who, as he puts it, " would never have got this v.h.f. bug (and *have* I been bitten!) but for a friend suggesting that as I had a mobile ticket we use his B44 and attend a local mobile evening." Hearing ZB2VHF for several successive evenings helped demonstrate that v.h.f. was a worthwhile thing, a feeling that was reinforced over the subsequent weeks when 4m equipment was installed in the G3VPS vehicle to give many contacts well into the London area from various sites in Sussex. As the vehicle is a van with a

**Last month we reported an 80-mile record QSO on 13cm made by G3IUD/P and G3NLZ/P. G3NLR, who accompanied G3IUD to the Great Orme, North Wales, took several photos of the set-up, this one showing Mike, G3IUD aligning the dishes. Everything had to be securely anchored with string and stones to counteract the effect of the usual high winds experienced on the Great Orme.**

## BEACON STATIONS

| Call-sign | Location | Nominal Frequency | Emission | Aerial Direction |
|---|---|---|---|---|
| GB3ANG | Craigowl Hill, Dundee | 145·950 MHz | A1 | S |
| GB3CTC | Redruth, Cornwall | 144·13 MHz | A1 | NE |
| GB3GI | Strabane, N.I.* | 145·990 MHz | A1 | N/SE |
| GB3GW | Swansea | 144·250 MHz | A1 | E.N.E. |
| GB3GM | Thurso | 144·995 MHz | A1 | N/S |
| GB3GM | Thurso | 70·305 MHz | A1 | N/S |
| GB3GM | Thurso | 29·005 MHz | A1 | Omni |
| GB3GEC | W. London | 434·000 MHz | F1 | N/W |
| GB3SX | Crowborough,Sussex* | 28·185 MHz | A1 | E/Omni |
| GB3VHF | Wrotham, Kent | 144·500 MHz | F1 | North-West |

* Not operational

### GB3VHF

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

| Date | Time | Error |
|---|---|---|
| 24 September | 10.00 GMT | 1069 Hz high |
| 1 October | 14.08 GMT | 320 Hz high |
| 8 October | 09.15 GMT | 292 Hz high |
| 16 October | 16·15 GMT | 390 Hz high |

fibreglass body, the quarter wave aerial has been installed on the roof with four radials immediately below it inside.

Which goes to show once again that " Four " offers special delights as a mobile band, in the opinion of many superior to " Two " because you can get more aerial cut. It is at home sites that " Two " scores, in large measure because much more elaborate and gainy aerial systems are the rule; and although this trend is developing on 70 MHz the sheer bigness of a stacked array on " Four " tends to be off-putting.

There are many sites where beams are mandatory if any sort of 4m results are to be obtained at all, and Alan Williams, GM3KSU, whose home QTH is deep in the heart of Edinburgh, is one of many Scottish stations hemmed in by topography. Since he commenced operations from his " Stroke A " location up at the observatory the expected improvement has materialized. For the Sunday morning schedule with GM3WFH the beam needs to be laid somewhat north of Paisley; an even more difficult path, to GM3LTW in Ayrshire, at 70 miles, produces signals under good conditions even with 1500 ft. hills in between. Other regulars are GM3OQI in Bonnybridge at 30 miles and GM3WFJ in Perthshire at 55 miles.

Encouraged by these results GM3KSU now seeks longer haul schedules on 4m, with say Aberdeen or Fraserburgh. Interested operators should write to him at 35 Howard Place, Edinburgh, 3.

Arising from the above, on now to—

### DX via Meteor Trails

The increasing interest in the prospect of opening up the G-to-GM path on 4m prompts some suggestions from G3JVL (well-known as a member of the South Coast V.H.F. Group which by definition means a keen opener-upper of " Four "). Mike Walters comments that DX by meteor scatter is a virtual certainty at the right time, and the thing to do in GM is to edge in as close as possible to the Thurso beacon frequency and send frequent CQ calls to the South when GB3GM beams North.

Scottish 4m operators may find it profitable to monitor the national calling frequency of 70·26 MHz in case replies are received from one or more of the several operators in the South who maintain constant listening watch on GB3GM. To be able to work break-in c.w. will be an advantage: a quick burst on the key as soon as a ping from a Southern station is heard may be instrumental in starting a QSO.

G3JVL along with G3TCT of Guildford, and others, keep a watch on the GB3GM channel on 4m every night (except Sundays) between 21·45 and 22·10 GMT.

* * *

Ron Ham of Storrington in Sussex, BRS15744, recommends all who can to keep a special watch for GB3GM and other Northerly DX on 15-18 November when the Leonid meteor shower is due. There should be a maximum on 17 November. During the Perseids shower in August pen recordings were made at Storrington of several of the broadcast stations that roar up in the 4m band and are then gone. Over an 80-minute period on 12 August, the Perseids maximum, he was charting the pings at an average of two a minute.

### " Co-Channel " or " Split "

Reading last month's comments on the merit of split frequency working on 2m as compared with co-channel, Brian Bower, of High Wycombe, G3COJ, finds the professional advocacy of split difficult to accept under amateur conditions: " The professional knows the frequency of the station he is transmitting to, the amateur does not." He goes on to point out that it is wasteful of spectrum to have perhaps a dozen replies to a CQ spread over a large slice of band when only one of them will result in a QSO.

A further and less often appreciated advantage of co-channel is the ability of a centrally situated station, say in the Midlands, to connect a weak southern station with a GI or north of England station, adds G3COJ, who goes on to remind us that " G3BA has many times carried out this manoeuvre, which would not be practical if the stations were spread over the band."

### Video-Scene

Whenever the BATC organizes an Amateur Television Convention one of the special pleasures is to see so much practical equipment in actual operation. There was plenty of it at this year's event at the ITA Conference Suite in Kensington, including demonstrations of r.f. and vision equipment, and an alluring transmitter bandswitchable to 2m, 70cm or 23cm.

Practicalities were also emphasized in the three technical talks that drew large crowds during the afternoon session: " Slow scan techniques " by C. Grant Dixon, some points to watch in assembling vidicon deflector coils, offered by G6NDT/T, and an amateur video tape recording talk by G6LEE/T.

During the day a videotape recording from a former member now in Canada —yes, Mike Barlow, of course, one-time G3CVO—was played to visitors after having been standards-converted.

The BATC's new president is none other than G5IJ, whose work on advanced television systems with EMI is widely known and respected in the industry. He was present at the Convention dinner after the tech-sessions, as was another

of television's leading research engineers, Dr Boris Townsend, a former president of the Club.

From F3DD, who attended the dinner, came the news that French amateurs are planning an International Amateur Television Convention to be held in Armentieres next year on 19-20 April.

## Contest News

Here are a couple of items of contest news which will give pleasure in a number of quarters.

First of all, the 70cm Cumulatives are to return, probably at the end of January, with the rules to appear in the January number of *Radio Communication*. In spite of the small number of logs it simply wasn't true that the previous Cumulatives were not wanted, and it is in recognition of this fact that the V.H.F. Contests Committee has decided to resuscitate them, not exactly as before but with changes to the rules that previous experience has dictated. Which gives the G8B—men who have not yet tried the delights of 70cm time to get their finals finished in the next couple of months.

The second bit of contest news to come our way (thanks to the V.H.F. Contests Committee) is that an analysis has been done of most of the 1968 v.h.f. contests in order to determine whether this year's new scoring system is a good one or not. Their main conclusion is that the multiplier has very little effect on the placing of a station in the final table, even though it spreads the scoring range; and so in consequence multipliers will be dropped in future. This will help scotch complaints of " unfairness " (not altogether, you may be sure, for someone somewhere will assuredly have a grouch even at the " perfect " scoring system). A more detailed explanation of the changes to the v.h.f./u.h.f. scoring system appears on page 766 in this issue.

This for the future, of course. Right now we have before us the next 2m sideband contest on Monday, 11 November (officially the Seventh 144 MHz S.S.B. Contest), about which a reminder appeared on page 686 last month. As with its predecessors, this event will almost certainly be a demonstration of keen operating with a view to securing the maximum pointage in a brief couple of hours.

December brings the annual 4m telegraphy event (the Fourth 70 MHz C.W. Contest). It will be here and gone by the time the next " Four Metres and Down " appears, so please accept this as the final notice. If by good fortune " Four " is extended down to 70·025 MHz by official *London Gazette* notification (all too long delayed) the band will get its first proper exercising under planned conditions, with telegraphy in the lowest 75 kHz shown in the diagram last month.

The trouble with " Four " is that operators in television Channels 4 and 5 areas tend to be frightened off by the bogey of TVI, whether it has been known to occur or not. They might be pleasantly surprised at its complete absence when a c.w. transmitter is operated at a medium to low power level. Certainly it would be well worth while to do a few tests in the weeks before the contest to establish just how much—or little—TVI there is under A1 conditions.

* * *

On another page is the V.H.F. Contests Committee's account of V.H.F. National Field Day 1968, assuredly the best ever to have been held (91 entries, a record) and certainly holding claim to further the progress of the art with such a healthy showing on 23cms, 13cms and even 10 Gigs!

Congratulations to the winners in each section, of course. And congratulations equally to all the lowly placed: many stood no hope of topping a table, knew it and entered all the same. Without their contributions the final lists would have been much smaller, and posterity denied a cross-section of v.h.f./u.h.f. activity in these islands as of 1968.

Above all, congratulations to the V.H.F. Contests Committee on processing a bigger intake of entries in a smaller space of time than ever before.

By now the V.H.F. Contests Committee will have polished off a much less onerous task; that of adjudicating the entries for the Second 1296 MHz Open Contest of 13 October, for the number was small by comparison with other events. But in terms of " advancing the state of the art " this is probably the most worthwhile contest there is (on *any* band). The October event produced a number of contacts well in excess of a hundred miles. Although the general pattern was " Call on 70 and change to 23 " several direct " 23 to 23 " contacts took place when participants found themselves fortunately and fortuitously in the line of fire from another's parabola.

## Parchment Department

Some friendly rivalry has been in evidence among Class B licensees to see who would be the first to secure the " Four Metres and Down " Operating Award for 2m (five countries and thirty counties). The distinction has now been won by South Londoner G8AAZ to whom Certificate No. 113 was allocated when the V.H.F. Committee met last month. There are many more G8-plus-three claims closely following him up.

Already the holder of Certificate No 6 for 70cm, he is now in a position to start all over again from scratch with his new call-sign of GC8AAZ.

The member of the V.H.F. Committee who checks incoming claims is Frank Green, G3GMY. In future he will accept the claims direct at his QTH of 48 Borough Way, Potters Bar, Herts. Hitherto they had been sent to him via Headquarters. Frank offers the following advice to claimants for " Four Metres and Down " certificates.

1. If possible, use the claim form which can be had from HQ free of charge on receipt of an s.a.e.

2. If the claim is made on plain paper list the QSLs submitted in their *county* order. This greatly simplifies checking.

3. Before sending off the packet of QSLs for checking, make sure that the accompanying claim form bears your name, full QTH, call-sign, date, and the class of award for which the claim is being made, e.g. 4m Ordinary, or 2m Senior or whatever.

4. Dispatch only the QSL cards relating to the claim, plus one or two extra (but no more) to cover any possible discrepancy.

One more detail we would add to the G3GMY list is: Don't send him cards for any other awards but " Four Metres and Down."

Every claim is scrutinized by Frank Green and if in order the Award is issued. Awards are then endorsed at the next meeting of the V.H.F. Committee.

## Xtal Xchange

GM3DXJ offers the following: 7825, 7840, 8075, 12054 kHz and a further set of crystals between 6 and 8·5 MHz which he says should be suitable for converters. He requires

the following: 12,150 to 12,166 kHz if possible, but 8100 to 8111 kHz suitable if activity good. Letters to T. Holbert, 19 Thomson Drive, Currie, Midlothian.

G8AOS has for disposal a third overtone HC6U for 48·3 MHz " dated April 1957 and useful for Zone 5 of the 2m band." He would like to exchange it for a similar type of crystal to work between 48·08 and 48·17 MHz for operation in Zone 3. John Greenwood, 43 Coxlea Close, Evesham, Worcestershire.

G8CCV, M. O'Donnell, Box 8, EES, REU, Henlow, Beds., wants to *buy* crystals for 144·1-144·25 MHz (must be in 8 MHz range).

## Tech Corner

**From G6SN** (E. Shackleton of Harrogate):

A query received by phone from a reader makes me realize that some people do not seem to understand that the whole principle of s.s.b. is a *mixing* process and that *nothing* (except the actual crystal oscillator chain) must be *driven*. My inquirer asked how hard to drive the mixer.

Referring to the diagram in August, page 534, of the G3AAV transverter as used at G6SN, careful choice of the crystal frequency is vital (in general the higher the crystal frequency the better, but this is not always). It is advisable to screen the various frequency multiplying stages to prevent as far as possible the fundamental and harmonics from appearing at the end of the crystal chain and hence in the mixer.

Now for the mixer. The grid circuit is first tuned with a grid dip oscillator to 117 MHz and the anode circuit to 145·4 MHz. Now connect a 0-50 mA meter across the meter shunt and couple the plate coil of the E180F (L3) close to L4 with their axes parallel. Switch on the crystal oscillator and the mixer supplies and note the maximum mixer anode current at dip (the second or Class A amplifier QQV03-10 should be taken out of its socket). The maximum anode current in the mixer circuit should be between 40 and 50 mA. Now reduce the coupling between L3 and L4 until the mixer anode current is half the maximum, which should be around 23 mA.

In the writer's transverter L3 and L4 are now spaced about an inch apart but this should only be taken as a guide. The mixer is now ready to accept the 28-30 MHz s.s.b. input, which should not exceed about 1 watt. As the s.s.b. source is likely to be a standard commercial transmitter or transceiver with an output of 90-200 watts or more a dummy load must be employed to waste 99 per cent or so, as described in " Tech Corner " last month. On no account must the output of the transmitter or transceiver be reduced by turning down the audio gain: a dummy load must be used.

Having managed some form of dummy load take a screened lead to the input on the transverter and set the 100 pF variable capacitor at minimum. Adjust the s.s.b. input by this capacitor until the 50 mA meter in the plate circuit of the mixer moves upward by about 1 mA on speech. The mixer is now ready to be coupled to the second Class A linear QQV03-10, the input circuit of which comprises a two turn centre tapped coil L7 about ¼ in. diameter. Note that this circuit is not tuned, otherwise the stage will become unstable. A 6·3 volt bulb connected to the output link L9 should now light up brilliantly on speech.

The original article makes reference to a " High Q Break " between the Class A stage and the linear amplifier. This is nothing more than a low " C " tuned circuit with a single turn input link and a single turn output link close together at the cold end of the tuned circuit. Its purpose is to remove all the spurious frequencies that have penetrated so far, and to permit only 145·4 MHz signals to reach the linear amplifier grid.

It will be noted that 10 ohm wire wound resistors are shown in the anode circuits of the E180F and the two QQV03-10's instead of r.f. chokes. In effect these are damped r.f. chokes to stop any tendency towards self-oscillation. In the G6SN transverter these damped chokes were made by winding 17 in. of No 44 s.w.g. resistance wire on 47K ½ watt resistors and doping with polystyrene cement.

It should be noted that the anode supply via the r.f. choke to the series tuned coil L3 must be made to the electrical centre of the coil which will not be the same as the mechanical centre. To find the electrical centre couple the grid dip meter to the coil with the E180F valve in its socket and tune the circuit to resonance. Now touch each turn of the coil with a lead pencil and note which turn has the minimum effect on the GDO. This is the electrical centre.

Instead of using Zener diodes in the cathode circuits of the two QQV03-10's these could be replaced by 1K 1 watt resistors.

## Here and There

" During the Auroral opening which occurred on V.H.F./NFD a number of Auroral carriers were heard for a while. These no doubt would be some of the many contest stations who do not seem to have heard of c.w.! "—GM3TFY.

* * *

"Those of us operating at G3MAX/P deplored the zone-hopping of NFD contest stations. It was impossible to hear the GMs when stations came out of zone to the top end to attract attention. We are all for in-zone working during contests. Give it a trial for one year, with band observers to hold a watching brief "—G3AOS.

* * *

" Could you squeeze in a few words of thanks from the Cornish Group to all who turned their beams our way during V.H.F./NFD, especially to the ten stations we worked on 70cms. We could have worked more but it seems they (1) do not realize there is activity during contests here, (2) have duff receivers, (3) are not interested "—G3LPB (second operator at G2BHW/P).

"P.S.—We now have 12 months to keep the 1296 MHz r.f. in the box. After many hours of toil, sweat and tears it was everywhere! "—G3LPB.

* * *

" There is room for about 100,000 mobiles in the UK but it will not be long before the band in the London area becomes congested. J. R. Brinkley (introducing STC's new range of Star mobile radios) urged that its lower limit should be extended from 450 to 420 MHz "—from a report in *The Engineer* for 11 October.

Don't mind us, of course.

* * *

" Would there be any support for a Cumulative Activity Contest, say on Sunday mornings, for the 4m band? "—G5NU.

# SOCIETY AFFAIRS AND NEWS SUPPLEMENT


**Eric Dowdeswell, G4AR (General Manager, RSGB), meets Noel Eaton, VE3CJ (right) on 17 October in the Editorial Office at Little Russell Street. VE3CJ is the ARRL Canadian Division Director and IARU Region 2 Treasurer and a member of the Region 2 Executive Committee. Noel Eaton is also licensed as G3SDA, 6Y5BP, XW1WWM and ZF1BP.**

## A brief report of the RSGB Council Meeting held on 16 September, 1968, in the Kingsley Hotel, London

*Present: The President, J. C. Graham (in the Chair), Messrs B. Armstrong, N. Caws, J. Etherington, R. J. Hughes, A. Hunter, E. J. Ingram, H. E. McNally, A. D. Patterson, J. Petty, R. J. Stevens, G. M. C. Stone, J. W. Swinnerton, E. W. Yeomanson, (Members of Council), C. D. Pope (Secretary), A. E. Dowdeswell (General Manager) and T. R. Preece (Assistant Edtior).*

*Apologies for absence were received from Messrs L. E. Newnham, D. W. Thomas and G. Twist.*

### Membership and Affiliation

It was resolved to elect 155 Corporate and 49 Associate Members.

In accordance with Article 23 Council resolved to waive the subscriptions of seven members. The following applications for affiliation were accepted by Council.

Fulford and District Amateur Radio Society, G3XLH, Sec. G. B. Widnall, G3XJT; North Lindsey Technical College Radio Club, Sec. Lee J. Hotson (Student); Terendak Amateur Radio Club, Malaysia, Sec. Major R. H. A. Salisbury; Canterbury City Ranger Guides, Guider in Charge, Mrs G. H. Arnold.

### Application for Overseas Membership

This item was fully discussed and Council decided that as soon as the application was received, an air letter acknowledgement would be sent.

When the application was passed by Council another air letter would be sent stating that the applicant's membership had been accepted and that the Membership Certificate, etc. was being sent by surface mail.

### New Headquarters

Structural work was now completed and the building ready for the installation of floor covering and fixtures, etc. It was hoped to make the removal early in November.

A list of suggested names for the new HQ was fully discussed, but the Council felt that no action should be taken at that time.

### Publications

Mr Stevens reported that the new Handbook would be ready for the Exhibition together with a plentiful supply of all other publications.

### Society Trophies

After discussing the various nominations, Council awarded the following Trophies:

Calcutta Key—Mr C. R. Emary, G5GH
Rotab Trophy—Mr A. T. Martin, G2LB
Founders Trophy—Mr P. A. Thorogood, G4KD

### Recommendations of Committees

The following recommendations of Committees were accepted by Council.

### V.H.F. Contests Committee

A. That Council approve the awards for the V.H.F. Contests as recommended (these awards are published in *Radio Communication*).

B. The Committee recommendation that an award be made for the main 70cm (open) contest was referred to the Finance and Staff Committee.

### Education Committee

Council accepted the recommendation that the sum of £15 be allocated for the preparation of material for the Christmas lecture to be held at the Science Museum on 4 January, 1969.

Full details of the lecture would be published in *Radio Communication*.

### Other Business

Council's approval was given to the acceptance of an invitation to the President to attend the GI-EI Convention at Dundalk and the Dutch Amateur Day at Utrecht.

Mr McNally said he was most disturbed at the wording used by certain advertisers in *Radio Communication*. After discussion it was decided that the General Manager would deal with this matter.

Council heartily endorsed the congratulations of Mr Ingram to Mr Stevens of obtaining on behalf of the Society a large order for RSGB Publications from Communications Technology of the USA.

It was reported that the list of Affiliated Societies was out of date. Council approved the preparation and printing of a new one.

**The meeting ended, Council having been in session for 4 hours 20 mins.**

## Representation 1969-1971

A complete list of Corporate Members who have been nominated without opposition to serve as Regional or Area Representatives will appear in the December issue of *Radio Communication*.

In one area, however, a ballot is necessary for the office of Area Representative.

## Brentwood, Essex

The nominees for the office of Area Representative are:
Mr M. E. Allard, G3WFC.
Mr R. A. E. Fronius, G3MCW.

## Voting

Corporate Members resident in the above Regions are invited to record their vote in favour of *one* of the above candidates in the appropriate Region on a *postcard* and to send the postcard to the General Manager, Radio Society of Great Britain, 35 Doughty Street London, W.C.1, to **arrive not later than 11 November, 1968.**

*Form of Voting Card*

**Election of Regional Representatives, 1969-1971**

I, ..... being a fully paid up Corporate Member of RSGB wish to record my vote in favour of

Mr. ..... as Representive for Region.....

Signed .....

Call-sign or BRS number.....

Address .....

.....

# Obituaries

### George Hale, G2HS

It is with sorrow that we report the death, on 5 July, after a very brief illness, of our old friend George Hale, G2HS, at the age of 71.

George, who was the eldest member of Wimbledon and District Radio Society, first entered the field of Amateur Radio in 1912 as a lad of 15. He maintained his interest throughout his life, two of his sons following in his footsteps, John, G3FTH and Peter, G3JPI.

Married for fifty years, George leaves a widow and three sons, to whom we extend our deepest sympathies in their sad loss.

K.A.

### Bill Jardine, G2AQB

Bill Jardine died suddenly and unexpectedly on 23 August, aged 58 years, while at the wheel of his car. He had, however, a very serious illness several years ago but had made a good recovery and to his friends he appeared to be in excellent health.

Bill was well-known at his place of work, as a member of the Aquila Radio Society, and in his home locality as a member of the Cray Valley Radio Society. He had wide interests outside Amateur Radio and was a very keen operatic singer and lover of music. His manner and infectious humour made him a sought after companion and he will be sorely missed.

Sympathies are extended to his widow Olive, to his son Findlay, his daughter Katrina and to his relatives.

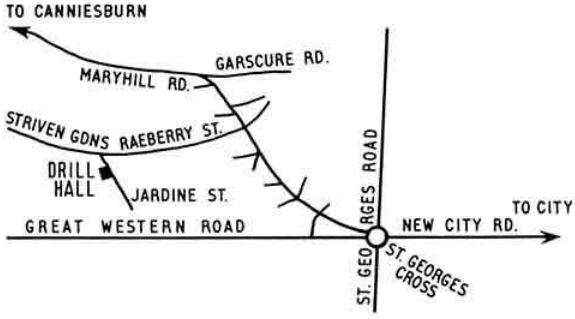
G.M.C.S.

## Scottish V.H.F. Convention 16 November, 1968

**Royal Signals (TA) Drill Hall, 21 Jardine Street, Glasgow, NW.**

**2.30–5.45 p.m.**

High tea will be served in the Methodists Hall, Maryhill Road, Glasgow, NW, from 6.30 p.m. There will be lectures and displays of equipment, together with a bring and buy sale. All items for sale should be clearly marked with name, call-sign and price. 10 per cent will be deducted by the organizers.




**Talk-in stations will be GM3WFH on 4m, and GM3VIO on 2m.**

*The charge for the convention will be 21s., tickets being available from GM3RXU, GM3VAP, GM3VIO, GM3VOX and GM3UWX. Tickets should be retained for the raffle.*

☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆

# Open Day at the **New** Headquarters

## 14-15 December 1968

Council Members and Staff will be present to receive members between 10 a.m. and 6 p.m.

H.F. and V.H.F. Talk-in facilities.

We look forward to meeting you at

**35 Doughty Street,**

**London, WC1**

☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆

# IARU

## Region 1 calling

'NTERNATIONAL AMATEUR RADIO UNION

By R. F. STEVENS, G2BVN

### Call Signs

In accordance with Section 749 of the *Radio Regulations* (Geneva 1959) the following call sign series has been provisionally located:

**A2A-A2Z** (Republic of Botswana)

The original call sign series appearing in the table of allocation of call signs have now all been used and it has therefore become necessary to introduce a new series, the first of which is given above.

### Indonesia

A new National Amateur Radio Organization (ORARI) has been formed. Three prefixes have been allocated to Indonesian amateurs, YB, YC and YD. Only holders of the YB series will be allowed to work overseas stations and holders of the YC series are permitted to contact other Indonesian amateurs. The call sign areas are now 0-Djakarta; 1—West Java; 2-Central Java; 3-East Java.

The Indonesian Administration has not yet rescinded the notice filed with the ITU which objects to Indonesian amateurs contacting amateurs of other countries. It is hoped that action amending the present position will soon be taken.

### Phone Patches

Following a law suit in North America it has been decided that commercial telephone companies cannot prohibit attachments to telephones unless they can prove such attachments cause interference to other telephone services. This decision, which is subject to appeal, legalises only the telephone attachments and not the " on-the-air " part of phone patches.

### Reciprocal Licensing—Finland

The Finnish Posts and Telegraphs grants temporary licences to foreign visitors on the basis of reciprocity for a period of 1-3 months. The licence can be renewed by written application but mobile operation is not yet permitted.

The Finnish National Society deals with all amateur radio licence applications and the relevant forms may be obtained on request from SRAL, PO Box 10306, Helsinki, 10, Finland. The total amount payable is Fmk.47.20, comprising registration and membership fee for SRAL and the licence fee. The call sign used is the visitor's home call sign to which the OH district from where the operration takes place is added, i.e. G2BVN/OH0.

### Reciprocal Licensing—Italy

A restricted form of reciprocal licensing is in force whereby an overseas visitor may operate a licensed Italian station as second operator. Enquiries concerning this licence should be made to the Assistant General Manager of ARI, IIRCD, Cleto Realini, Via Rimini 13, 20142 Milano, Italy.

**The Presidents of three IARU Societies at the Overseas Visitors Reception on October 4 at the RSGB Exhibition. Left to right: Bob Denniston, W0DX (also President of IARU); John Graham, G3TR and Louis v.d. Nadort, PA0LOU.**

### Amateur Licenses

The numbers of licences issued by the GPO as at 31 August 1968, were

| | |
|---|---|
| Amateur (Sound A) | 12,903 |
| Amateur (Sound B) | 1058 |
| Amateur (Sound Mobile A) | 2567 |
| Amateur (Sound Mobile B) | 103 |
| Amateur (Television) | 186 |
| Model Control | 14,661 |

### Slow Scan TV

The FCC in Docket No. 17736, RM-265, now permits the transmission of pictures using narrow band modulation techniques by amateur stations in the telephony sections of the amateur bands. The affected portions of the 3·5 and 7 MHz bands in which picture transmission is allowed are not available in Region 1 and the portions of the 14, 21 and 28 MHz bands are as follow:

14,200-14,235 kHz
21,250-21,300 ,,
28,500-29,700 ,,

A choice of either amplitude modulation, A5, or frequency modulation, F5, for the picture transmission is allowed.

It is understood that slow scan TV transmissions have been made with considerable success from the USA to the amateur stations located in the US Antarctic bases.

### Space Conference

A World Administrative Conference to deal with the problems and allocations of space communication will be held during 1970 The last Conference of this type took place in 1963. The IARU are already taking steps to safeguard the interests of the amateur service and there will probably be representation at the actual Conference.

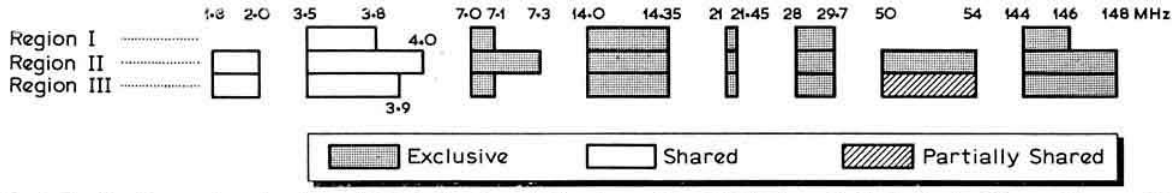



**Chart showing the amateur bands available in the three ITU regions. 1·8—2·0 MHz is available in Region 1 to certain countries only, including the UK.**

# The Council's Annual Report on the Society's Activities 1967-68

*The Council is pleased to report on the more significant happenings which took place between 1 July, 1967 and 30 June, 1968*

### Installation of President

This time-honoured annual ceremony took place on Friday, 12 January, 1968, at the Kingsley Hotel in Bloomsbury, London, when well over 100 guests gathered to see Mr J. C. Graham, G3TR, installed as President for 1968 by the retiring President, Mr A. D. Patterson, GI3KYP.

### General Manager

Mr W. Robinson, G3FMT, resigned as General Manager in November 1967 and his place was filled by Mr A. E. Dowdeswell, G4AR/ST2AR, at short notice. A profile on the new General Manager was published in the December 1967 issue of the *Bulletin*.

### Licensing Matters

As a result of negotiations between the Society and the General Post Office the terms of the Amateur (Sound) Licence B were amended to allow the use of the 2m band. In making this announcement in March 1968 the Postmaster General also spoke of the Beginner's Licence which he intended to introduce.

Council's views on this were made clear in the April 1968 issue of *Radio Communication*. Nothing further has been heard of the proposed Licence.

Extension of the 4m band down to 70·025 MHz was also negotiated. This awaited promulgation.

Following a request from the Society, the Amateur (Sound) Licence A licence condition specifying the maximum speed at which call-signs must be transmitted was amended from 12 w.p.m. to 20 w.p.m. The GPO agreed to grant facilities on application for the use of facsimile.

The Society registered a strong protest with the GPO on the increase of the various Licence fees by 50 per cent w.e.f. October, 1968. At the same time, the Society suggested the issue of a unified Licence in order to reduce administration costs.

The Society welcomed the Government announcement that restrictions were to be placed on the import and use of radio equipment in the range 27–108 MHz. Licensed radio amateurs would not be affected by these restrictions.

Reciprocal licensing arrangements were concluded between the GPO and the administrations of Denmark, France, Israel, Monaco, Sweden, and Switzerland.

The number of Amateur Licences in force at the end of June 1968 was:

| | |
|---|---|
| Amateur (Sound) A | 12,837 |
| Amateur (Sound) B | 985 |
| Amateur (Sound Mobile) A | 2,503 |
| Amateur (Sound Mobile) B | 83 |
| Amateur Television | 184 |
| The number of model control licences current is | 14,126 |

Meetings took place between members of the GPO Liaison and TVI Committee, the General Manager and officials of the GPO, at which many matters relative to amateur licences were discussed.

### New Headquarters

The Radio Society of Harrow issued a challenge to other societies and clubs to engage in a competition in order to swell the new Headquarters Building Fund. Many clubs and societies responded well with contributions and the thanks of the Society go out to them.

Debentures continued to be taken up in the Lambda Investment Company and the overall response to the letter sent to all members inviting participation in the Debenture issue has been most satisfactory.

The Report on the Lambda Investment Company is published separately.

Work was started on the re-decorating of the new Headquarters, together with the installation of the central heating system and renovation of the electrical system.

### Membership and Representation

An outline of the workings of the Society's present scheme of representation was given in the June 1968 issue of *Radio Communication* and copies circulated to all Regional Representatives.

The present period of office of Regional Representatives and Area Representatives expires at the end of 1968.

The number of Affiliated Clubs and Societies increased during the year both at home and abroad. Many copies of the Society's "Specimen Constitution" was sent out to embryo Clubs and Societies.

The membership of the Society on 30 June, 1968 was 14,045, an increase of 644 in the year under review.

### Committees

As in so many years past, hundreds of hours of voluntary work were freely given to the Society by Council and other members while serving on the various Committees. Council would like to express its sincere thanks to all concerned.

The following Committees were constituted:

| | *Chairman* | |
|---|---|---|
| Education Committee | R. J. Hughes | G3GVV |
| Exhibition | E. W. Yeomanson | G3IIR |
| Finance and Staff Committee | J. W. Swinnerton | G2YS |
| GPO Liaison and TVI Committee | R. F. Stevens | G2BVN |
| H.F. Contests Committee | J. C. Graham | G3TR |
| IARU Working Group | R. F. Stevens | G2BVN |
| Membership & Representation | H. E. McNally | GI3SXG |
| Mobile Committee | N. Miller | G3MVV |
| RAEN Committee | P. Balestrini | G3BPT |
| Scientific Studies Committee | G. M. C. Stone | G3FZL |
| Technical Committee | R. F. Stevens | G2BVN |
| V.H.F. Committee | G. M. C. Stone | G3FZL |
| V.H.F. Contests Committee | A. H. Dormer | G3DAH |

A full list of Committee Members was published in the February issue of *Radio Communication*. The *Education Committee* continued with the development of Novisets, including an 80m s.s.b. transceiver. Some of these sets were on show at the exhibition in 1967.

The Radio Amateurs' Examinations were held at the London centre in December 1967 and May 1968.

The *Exhibition Committee* was kept busy throughout the year with the International Radio Engineering and Communications Exhibition, which was opened by Dr J. A. Saxton on 27 September, 1967, and in preparation for the 1968 Exhibition. A report of the 1967 Show appeared in the November 1967 issue of the Society's journal.

The *Finance and Staff Committee* was very active during the year dealing with the many matters that needed attention and in connection with the purchase and decoration of the new Headquarters.

The *GPO Liaison and TVI Committee* again dealt with many cases of TVI reported by members to the Committee and, in the majority of cases, an effective cure was found possible. Strenuous efforts have been continued to persuade the GPO to adopt a standard interference investigation procedure among its regional inspectors.

The case of Mr Hall, G3DRF, was widely reported in the national

newspapers and members of the Committee and helpers were able to clear up the trouble to the satisfaction of all concerned.

Both the *H.F. and V.H.F. Contests Committees* were kept busy planning and adjudicating the many contests which were organized on all bands and the number of entries continued to increase.

The *IARU Working Group* continued to work on preparations for the triennial IARU Region 1 Convention to be held in Brussels in 1969.

Assistance was given in the production of a very informative booklet on the work and nature of Amateur Radio for general distribution to National Societies and Governments seeking information on the Movement.

The *Membership and Representation Committee* scrutinized all applications for membership, reviewed the working of the News Bulletin Service, and discussed methods of attracting newcomers to the Society.

The *Mobile Committee* continued the good and necessary work of organizing and supporting rallies in various parts of the country.

The *RAEN Committee* was busy implementing and expanding and consolidating its own organization, especially in view of the " run down " of the Civil Defence system.

The *Scientific Studies Committee* dealt with beacons established for scientific purposes including GB3GM and made plans for a new beacon, GB3SX, at Crowborough, Sussex, which will be operating in the 10m band. Experiments concerning ionospheric and auroral ionizations were conducted and liaison was maintained with other interested bodies.

The *Technical Committee* gave assistance to the editorial staff in connection with articles submitted for publication in *Radio Communication*. A number of new technical publications were produced and work continued on the *Radio Communication Handbook*.

The *V.H.F. Committee* arranged a most successful V.H.F./U.H.F. Convention at Whitton, Middlesex, when an attendance of over 270 was recorded. A number of lectures were given which proved of great interest. The system of beacons was maintained and plans were made for new beacons. Other important subjects considered included band plans and the relative merits of the QRA and Georef locator systems.

### RSGB Certificates Manager

Applications for the Society's Certificates from all over the world continued to increase and have been dealt with by Mr C. R. Emary, G5GH.

### QSL Bureau

With the increasing number of licensees, additional sub-managers have been appointed. Increased postal charges have added to the cost of operating the service.

The greatly increased number of cards handled warrants high praise for the work of Mr A. Milne, G2MI, his wife and the Bureau Sub-managers.

### RSGB Tape Library

The demand for tapes and slides continued to grow and the then Curator, Mr G. S. Milne, G3UMI, commented that an even better service could be given if borrowers of the tapes and slides would return them on time!

### RSGB Film Library

In view of the age and condition of most of the films in the library, Council regretfully agreed to the suggestion by the curator, Mr R. A. Cathles, G3NDF, that no further loans of films be made until new films are added.

### RSGB Slow Morse Transmissions

During the year, the organizer, Mr McBrayne, G3KGU, completed a review of all stations operating the service, to ensure that adequate coverage was being maintained.

### RSGB Intruder Watch

Colin Thomas, GW3PSM, and the members of the Intruder Watch organization continued to render regular reports on commercial stations operating in exclusive amateur bands. Effective liaison was maintained with the GPO.

### RSGB Publications

As from the January 1968 issue, the title of the Society's journal was changed from the BULLETIN to *Radio Communication*, but Council appreciates that to many members it will still be fondly known as the " Bull."

Work continued at a rapid pace on the preparation of the new edition of the Handbook, which was expected to be published in time for the October Exhibition. The following regular contributors to *Radio Communication* continued their good work which Council recognizes with its sincere thanks:

Dr John Allaway, G3FKM, (" The Month on the Air "), Messrs B. Armstrong, G3EDD, and P. Simpson, G3GGK, (Equipment Reviews), Mr P. Hawker, G3VA, (" Technical Topics "), Mr J. Hum, G5UM, (" Four Metres and Down "), Mr S. W. Law, G3PAZ, (RAEN News), Mrs Sylvia Margolis, for her reports written in her capacity as RSGB Public Relations Officer and Mr R. F. Stevens, G2BVN, (" Region 1 IARU Calling ").

A new publication was *World at Their Fingertips* by John Clarricoats, OBE, G6CL. New printings or editions were made for *A Guide to Amateur Radio*, *Amateur Radio Circuits Book*, and *Radio Amateurs Examination Manual* and *Radio Data Reference Book*. Routine work continued for the 1969 edition of the Call Book.

### Lectures and Meetings

Official Regional Meetings were held in Region 14 at Culzean Castle, Ayrshire, and in Region 10 at Cardiff. The Region 14 ORM was successfully combined with the Scottish Mobile Rally.

Major National Mobile Rallies also took place at Woburn Abbey, and at Gilwell Park, Essex.

Representatives of the Society attended several overseas gatherings including:

Third International Radio Amateur Convention at Knokke, Belgium, in September.

UBA General Assembly at Geneva in September.

IARC Convention at Geneva in September.

Members of the Scientific Studies Committee attended the IQSY/COSPAR Assembly in London in July.

The popular series of London Lecture Meetings at the I.E.E. continued with a lecture on " Colour TV " by G. Roe, B.Sc. (Eng.), A.C.G.I., G3NGS, in November and another on " The Development of a U.H.F. TV Service " by R. C. Hills, B.Sc. (Eng.), C.Eng. M.I.E.E., M.I.E.R.E., G3HRH, in January.

The Dinner Club maintained its popularity and meetings took place at intervals during the year with average attendances of thirty-five, which included many welcome overseas visitors.

### Mr N. Caws, G3BVG, and Mr R. F. Stevens, G2BVN

Mr Caws and Mr Stevens have both undertaken much extra and valuable work during the course of the year under review and Council is very happy to have the opportunity to express its thanks to them for their devoted attention to Society matters.

* * *

In conclusion, Council records its thanks to the many members who have assisted the Society in a voluntary capacity in the year under review, and have given loyally of their time and energy, for the benefit of the membership at large.

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## Affiliated Societies

The following Clubs have recently become affiliated to RSGB:

Haverfordwest Amateur Radio Society, GW3XOT.
D. R. Roberts, GW3UBV, c/o 33 St Martins Park, Haverfordwest, Pembs.

Leuchars Radiophonic Club.
H. McGuinnes, Leuchars Radiophonic Club, Electronics Centre, RAF Leuchars, Fife.

Middleton District Scout Amateur Radio Club.
R. Taylor, 57 Mellalleu Street, Middleton, Manchester, Lancs.

Standard Radio Club, G3NIS.
W. Evans, G3ROE, Standard Radio Club, STC Rectifier Division, Edinburgh Way, Harlow, Essex.

Woolwich Polytechnic Radio Society.
R. Howgill, Woolwich Polytechnic Radio Society, Riverside House Annexe, Beresford Street, London, SE18.

### Call Book Corrections

G3PED L. A. Crane, 10 Crescent Road, Tollesbury, Maldon, Essex.

G3RPA J. D. Knowles, " Springhill," Gilpins Road, Berkhamsted, Herts.

G8APX W. H. Jarvis, Royal Masonic Senior School, The Avenue, Bushey, Herts.

G2LU See GC2LU.

# V.H.F. National Field Day, 1968

By V.H.F. CONTESTS COMMITTEE

## Overall Winner

Mid-Essex V.H.F./U.H.F. Contest Group

## Overall Runners-up

Worcester V.H.F. Group (combined with)
Loughton V.H.F. Group

## Band Winners

70 MHz—Cumberland and Westmorland V.H.F. Group
144 MHz—Worcester/Loughborough V.H.F. Groups

Propagation and weather conditions during the 1968 V.H.F. NFD were rather better than in previous years, and this probably led to the increased entry for this Contest. Although there were few extended tropospheric contacts made, and these were notably with stations in Southern France, an Aurora made a brief appearance during the closing hours and several G/GM contacts were made by this method of propagation on both 70 and 144 MHz.

The Mid-Essex V.H.F./U.H.F. Contest Group, operating from Linch Down, near Midhurst in Sussex, who were in fifth place in 1967, achieved a convincing win by a lead of nearly 16,000 points over the runner-up, the Worcester and Loughborough combined Group. The stations were G3VPK on 70 MHz, G3ORL on 144 MHz and G3LTF on 432 and 1296 MHz.

The equipment used on 70 MHz was an EF91, 5763, QQV03-20A transmitter, modulated by a pair of OC29s. The aerial was a massive 6 over 6 at 37 ft. in the centre. The entire receiving side was transistorized.

For 144 MHz the Parabeam was fed by a QQV03-20A running 25 watts. The receiving equipment again being transistorized.

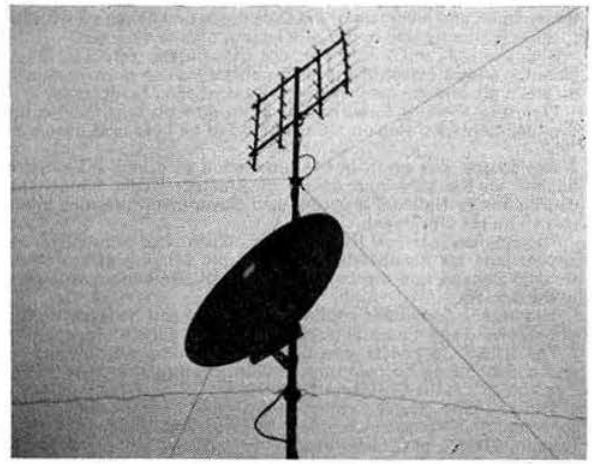
On 432 MHz the transmitter line up was; EF91, N78, 5763, QQV03-10, Varactor tripler, QQV03-20A with 25 watts output. The modulation was provided by OC 29 transistors. The i.f. strip was an EC 10, preceded by a 3dB n.f. converter using a K5001 r.f. stage into a K5001 mixer tuning 12-14 MHz. The 48 element stack at 30 feet obviously contributed greatly to the fact that this Group were also the leaders on this band.

The 1296 MHz transmitter was; EF91, N78, 5763, QQV03-10, Varactor tripler, QQV03-20A, Varactor tripler, the output from the final stage being 5 watts. F.m. was also available. The receiver consisted of a KD5001 into a K5001 followed by a transistor pre-amp. with 16dB of gain, into a 1N23E mixer. The 4 ft. diameter solid dish antenna used a dipole with disc reflector and was at a height of 20 ft.

Congratulations go to the Mid-Essex Group as overall winners and to the Worcester/Loughborough Group as runner-up and to all the other award winners.

### Scoring System

By and large, the new scoring system has met with general approval. Certainly the km radius aspect has been welcomed by both contestants and Adjudicators. Of those who criticize the system, opinions are just about equally divided between operators who claim that it is biased in favour of the remote station and those who claim that stations near large population centres have an unfair advantage. There is no prize for guessing who said what! It is intended to modify the scoring system for all V.H.F./U.H.F. Contests in 1969 in to order to simplify still further the computation of results; full details are published on page 766 in this issue of *Radio Communication*.



432 MHz—Mid-Essex V.H.F./U.H.F. Contest Group
1296 MHz—A.E.R.E. (Harwell) Amateur Radio Club
2300 MHz—G3MCS Contest Group
10 GHz—Purley and Addiscombe Group

## Country Winners

England—Mid-Essex V.H.F./U.H.F. Contest Group
Wales—Worcester/Loughborough V.H.F. Groups
Scotland—Pennine V.H.F. Expedition Group
N. Ireland—Mid-Ulster RSGB Group

### Number of Stations

The Rule permitting the use of 3 stations was obviously popular judging by the number of entrants who took advantage of it. Several competitors, inter alia, G3MCS, raise the point that a fourth station should be allowed for experimental operation on 23cm and above, in view of the time-consuming nature of this work, and that a list of such stations should be published in advance. The Mid-Herts A.R.S. suggest that the fourth station be operated on 70cm for setting-up purposes, but that contacts for this purpose should not count for points. The Committee will consider these proposals.

### Location Systems

The Rules gave the option of exchanging either QTH or QRA or both if so desired. It was surprising to note that in all but a few cases, the choice was for both. Where a single location was sent, more operators used the QRA than used the QTH. Since Contestants appear to favour the exchange of geographical and locational data, the Committee will employ Rule 9(b) of the General Rules for V.H.F./U.H.F. Contests more frequently in the future.

Inevitably, Location Systems came in for some comment, the most original being from G3RSC, ".... using NGRs would be more 'acurate'" (sic), and from GM8AGU, who discovered "...to my disgust a large section of Scotland is not covered by the U.B.A. QRA Location Map." (He made 13 GM QSOs on 2m from Sutherland all the same and also worked G3UPB at 352 Km.)

### Operating

Fewer complaints were received this year than last about poor operating, but the grounds for complaint remain the same. Overmodulation and wide signals in general are the most common complaint. Several entrants urge the V.H.F. Contest Committee to penalize stations with poor signals. This will certainly be discussed by the Committee although no obvious way of applying such a ruling is immediately apparent.

For example, a blistering comment from the Cumberland and Westmorland Group "...overmodulation on four metres and

cloth ears on 70 cms; out of Zone working on Two metres; how the blazes can we work weak South Coast stations when they are buried beneath 59 + 60dB signals from stations nearly 50 miles away?" "Modulation problems seem to have been even more abundant this year." (G3VPK). "There should be no restriction on locations as none of the suggestions put forward in the May, 1968 *Radio Communication* could be enforced." (Mid-Herts A.R.S.).

### Date of Contest

"We would prefer to have the contest one or two weeks later than the present date." (Mid-Herts A.R.S.). "We believe it would be wrong to advance the date of the contest." (Reigate A.T.S.). Many other comments were received with the Questionnaire answers on this topic. The Questionnaire results clearly indicate that no change is required from the present date.

### General Comments

"QRM from very local combine harvester." (G3TVG/P) "QRM from off-duty operators' electric shavers." (Reigate ATS). "Award points for the worst performance on each band." (G3OXD). H'm?

"I can't understand why some groups give G8 call-signs to their 23cm stations as surely one expects the most marginal QSO to be on this band. We passed up three QSOs with weak G8 a.m. stations at the 100 km distance, which would have been a walk over on c.w." (G3LTF).

"F stations were readable on 23 cms with a screwdriver in the converter antenna socket." (G3LTF and G3RIN).

"Suggest standardization on horizontal polarization and use of narrow band equipment in 2304 MHz region for 13 cm working." (G3MCS).

### Hard Luck Stories

GW3BA/P intended to have a go at an IARU Contest and ran high power. They discovered subsequently, and too late, that they were not in GW after all and that the high power excluded them from the RSGB Contest. To cap it all, they were using the wrong QRA Locator anyway.

G3WZR/P, to whom congratulations on the only 3 cms entry made only one contact and was then required by the Contest Rules to divide the score by two. His comment... "Band was very quiet."

### Results Tables

It is hoped that the results tables are self-explanatory. Many entrants used the wrong cover sheets and thus did not give all the details that were required.

### Questionnaire Results

There was an 80 per cent response to the questionnaire. One wonders if the 20 per cent that did not answer the questionnaire read any of the other rules! Comments have already been made about the date of the V.H.F. NFD for next year. In the case of Question 1, the exact tie between answers (*c*) and (*d*) (even on the second choice) is resolved by asking for both the QRA and QTH to be sent. Thus those who answered (*d*) may use the system that they prefer. This of course also applies to those who answered (*a*) or (*b*).

The results of Question 2 clearly show that despite the technical arguments in favour of high power the majority prefer to remain at the 25 Watt level.

A clear answer is also given to question 3. Your recommendations as implied by the answers to the questionnaire will be carried out by the V.H.F. Contests Committee. We thank you for your co-operation.

### Endpiece

Very many man-hours were spent in checking entries in order to get the final results published as soon as possible. The new scoring system helped us to reduce checking time and you will note that this year's results have been published much earlier than is normal.

The Committee wish to thank all entrants and those listeners that sent in check logs; ORS 27426B, BRS 18456, BRS 26234, BRS 28005, A5032, A 3942, A 5662.

### Questionnaire Results

**Q1**

| | | |
|---|---|---|
| (*a*) | QTH only | 13 per cent. |
| (*b*) | QRA only | 19 per cent. |
| (*c*) | QRA and QTH | 34 per cent. |
| (*d*) | Optional | 34 per cent. |

**Q2**

| | | |
|---|---|---|
| (*a*) | 10 watts | 4 per cent. |
| (*b*) | 25 watts | 74 per cent. |
| (*c*) | 50 watts | 7 per cent. |
| (*d*) | 75 watts | 2 per cent. |
| (*e*) | Max. licensed power | 13 per cent. |

**Q3**

| | | |
|---|---|---|
| (*a*) | Confine entrants to their own county | 8 per cent. |
| (*b*) | Limit the number of miles from clubroom to/P site | 12 per cent. |
| (*c*) | Introduce a register of sites based on past occupancy | 7 per cent. |
| (*d*) | Do none of the above (i.e. place no restrictions on entrants locations) | 73 per cent. |

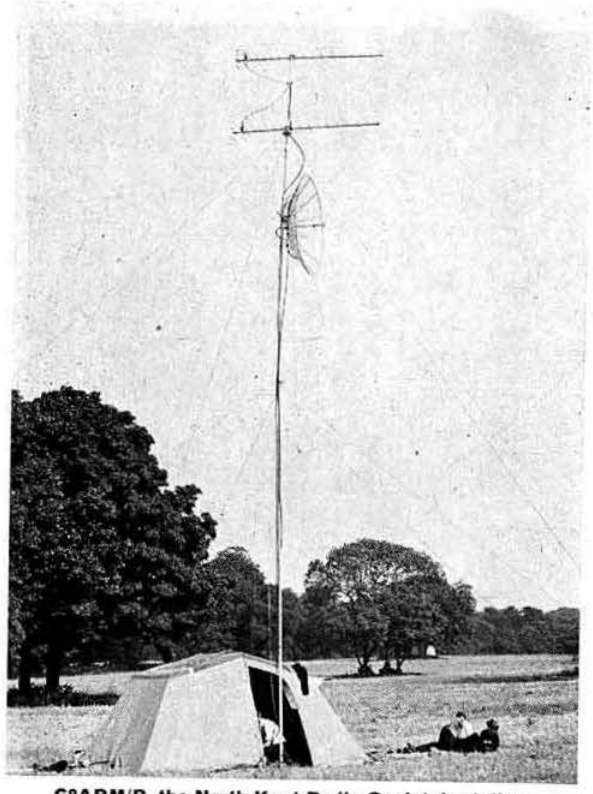
**Q4**

| | | |
|---|---|---|
| (*a*) | The present date | 87 per cent. |
| (*b*) | Two weeks earlier | 9 per cent. |
| (*c*) | Four weeks earlier | 2 per cent. |
| (*d*) | Six weeks earlier | 2 per cent. |

**Comparison of Entries**

| Band (MHz) | 1966 | 1967 | 1968 |
|---|---|---|---|
| 70 | 51 | 55 | 63 |
| 144 | 52 | 60 | 83 |
| 432 | 37 | 51 | 44 |
| 1296 | 14 | 17 | 20 |
| 2300 | Nil | 2 | 3 |
| 10 GHz | Nil | Nil | 1 |
| Overall entries | 57 | 69 | 91 |

*(continued overleaf)*



**G8ARM/P, the North Kent Radio Society's station.**

# V.H.F. National Field Day 1968

## Overall Results

| Posn. | Group | Band (MHz) 70 | 144 | 432 | 1296 | Total Score |
|---|---|---|---|---|---|---|
| 1 | Mid-Essex VHF/UHF Contest Group | G3VPK | G3ORL | G3LTF | G3LTF | 602833 |
| 2 | Worcester VHF Group combined with Loughborough VHF Group | GW3TQD | GW3NUE | GW3PXP | GW3PXP | 586985 |
| 3 | Reigate ATS | G3REI | G3PNA | G3RIN | G3RIN | 541982 |
| 4 | Surrey Radio Conact Club | G8TB | G3ODY | G2RD | G2RD | 522522 |
| 5 | Albright & Wilson ARS | GW3XHU | GW3OHC | GW3OXD | GW3OXD | 484867 |
| 6 | AERE (Harwell) ARC | G3PIA | G2HIF | G3NNG | G3NNG | 474234 |
| 7 | Mid-Herts ARS | G3AAZ | G2BLA | G3WGC | G3WGC | 356321 |
| 8 | South Coast VHF Group combined with Worthing RC | G3WOR | G3WLE | G3URC | G3URC | 323358 |
| 9 | Radio Society of Harrow | G3TUX[1] | G3EFX | G3HBW | G3HBW | 302720 |
| 10 | Bournemouth-Poole VHF Group | G3VOB | G6XM | G3OBD | G3OBD | 274946 |
| 11 | Cumberland & Westmorland V.H.F. Group | G3FDW | G3WIN | G3WIN | | 263067 |
| 12 | Crawley ARC | G3PHG | | G3FRV | G3FRV | 253468 |
| 13 | Stean Group | G3KKP | G3MFJ | G3NPO | | 240736 |
| 14 | RAF Sealand ARC | GW3ITZ | GW3NTI | GW8AAP | GW8AAP | 241288 |
| 15 | Pennine VHF Group | G3PUO | G3JIJ | G3XAC | | 228320 |
| 16 | Grimsby ARS | G3NJF | G3RSD | G4GX | | 213804 |
| 17 | Southgate RC combined with Hadleigh Contest Club | G3TDM | G3SFG | G3FD | | 208025 |
| 18 | Midland ARS | | | G3MAR | G3MAR | 202418 |
| 19 | Verulam ARC | G3UNX | G3VER | G3STA | | 188135 |
| 20 | Derby & District ARS | G2BZF | G3ERD | G2DJ | | 176546 |
| 21 | Barnsley & District ARS | G3LRP | G4JJ | G8AKQ | | 163257 |
| 22 | Dunstable Downs RC | G3WBC | G8AYB | G8ADC | G8ADC | 160322 |
| 23 | Blackpool & Fylde ARS | G3UIT | G3SEK | G8ANY | | 156123 |
| 24 | Wirral ARS | GW2AMV | GW3NWR | | | 144958 |
| 25 | Clifton ARS " B " | G3GHN | G8APV | G3GHN | | 135202 |
| 26 | Southampton RSGB Group | G3MRA | G3WDG | G3MRA | | 123261 |
| 27 | Cray Valley RS | G3TAA | G3RCV | | | 119026 |
| 28 | G3UBX-G3OAD | G3UBX | | G3OAD | G3OAD | 118866 |
| 29 | Reading ARC | G3PGM | G5HZ | | | 118580 |
| 30 | Fulford ARS (York) | G3XLH | G3UUT | | | 114086 |
| 31 | Norwood & South London RSGB Group | G3IIR | G3FZL | | | 112380 |
| 32 | Guildford & District RS | G3PGT | G3HTP | G8ACJ | | 105374 |
| 33 | Dorking & District RS | G3CZU | G3LBA* | G3HZJ | | 102752 |
| 34 | Shefford & District ARC | G3WKR | G3TVG | G8AKT | | 98449 |
| 35 | Leyton & District RS | G3VUE | G3WHY | G8ALM | | 98321 |
| 36 | Ealing & District ARS | G3UUP | G3OUF | G3TQH | G3THQ[1] | 97387 |
| 37 | North Kent RS | | G8AXA | G8ARM | G8ARM | 96979 |
| 38 | South Dorset RS | G3VPF | G3SDS | G3RZG | G3RZG | 95923 |
| 39 | GEC-AEI Electronics Coventry Group | | GW3TXR | | | 92910 |
| 40 | Stoke-on-Trent ARS | G3UD | G3GBU | | | 91572 |
| 41 | East Surrey Contest Club | G3KTA | G3OVL | | | 90865 |
| 42 | Purley & Addiscombe Group | G3UFY | G3WZR[2] | G3VKI | | 85527 |
| 43 | GW8ACB | | GW8ACB | | | 83371 |
| 44 | The Warren Group | G3TQY | G8ATK | G8APQ | | 75842 |
| 45 | Taunton & District RC | | G3CQE | | | 70010 |
| 46 | Caesoromagus VHF/UHF Contest Group | G3XCX | G3SLJ | | | 67908 |
| 47 | Northern Heights ARS | G3UGF | G2SU | G3TQA | | 66817 |
| 48 | The City University ARS | GW3VFD | GW3VAJ | GW3WKL | | 65791 |
| 49 | Norwich & District Group | | G2YU | G2YU | | 63598 |
| 50 | G3WKF | G3WKF | | | | 62062 |
| 51 | Coventry ARS | G2ASF | G3SZY | | | 61386 |
| 52 | Southdown ARS | G3SJV | G3WQK | | | 54984 |
| 53 | Hull & District Group | | G3AMW | | | 52681 |
| 54 | Cambridge & District ARC | | G3PKF | | | 51302 |
| 55 | March & District RAS | | G3PMH | | | 44464 |
| 56 | Clifton ARS " A " | GW3OYU | | | | 42018 |
| 57 | Teeside VHF Group | G3KEU | G3KEU | | | 40006 |
| 58 | Sheffield Group | G8NN | G3JRL | G3XOL | | 39519 |
| 59 | Cornish VHF Group | G3TTG | G3XC | G2BHW | G3LPB | 37212 |
| 60 | Cardiff RSGB Group | | GW3GHC | | | 35024 |
| 61 | West Kent ARS | G2UJ | G3WKS | | | 33322 |
| 62 | Stourbridge VHF/UHF Group | | G8AAL | | | 32414 |
| 63 | Ashford ARC | | G3TYB | | | 30900 |
| 64 | Wessex ARG | G3NIL | G3FVU | | | 29351 |
| 65 | Lincoln Short Wave Club | | G3TJO | | | 27780 |
| 66 | GM3WML | | GM3WML | | | 25752 |
| 67 | Burnham Beeches RC | G3WIR | G3AHB | G8AIJ | | 25701 |
| 68 | Pennine VHF Expedition Group | GM3RLE | | | | 21504 |
| 69 | Dursley & District ARS | | G3ONX | | | 19120 |
| 70 | Yeovil ARC | | G3CMH | G8AFA | | 18914 |
| 71 | Scarborough ARS VHF Group | | G3PEJ | | | 18814 |
| 72 | Sutton Coldfield RS | | G3RSC | | | 16356 |
| 73 | G3MCS | | | | G3MCS[1] | 15500 |
| 74 | East Sheffield Group | G3NEO | G3LLE | | | 14322 |
| 75 | Ariel Radio Group BBC Club | G3SAK | G3NTS | G8QAE | | 14293 |
| 76 | Monmouthshire VHF Group | | GW3RNH | GW6GW | | 14229 |
| 77 | Stratford-on-Avon RC | G3TQF | G3RPJ | | | 11207 |
| 78 | G8AJR | | G8AJR | | | 10672 |
| 79 | Mid-Cheshire ARC | G3SIQ | G8ARQ | | | 10520 |
| 80 | Fareham & District RC | G3VEF | G8AYL | | | 10428 |
| 81 | Mid-Ulster RSGB Group | GI3ILV | GI3VJS | | | 9225 |
| 82 | GW3ERB | GW3ERB | | | | 8775 |
| 83 | G3BPM | | G3BPM | | | 6419 |
| 84 | South Shields & District ARC | | G3DDI | | | 5177 |
| 85 | G2WS | G2WS | G2WS | G2WS | | 3541 |
| 86 | G3UFP | G3UFP | | | | 3510 |
| 87 | Salisbury & District Short Wave Club | | G3FKF | | | 3232 |
| 88 | G3JFY | | G3JFY | | | 2392 |
| 89 | GM8AGU | | GM8AGU | | | 616 |
| 90 | GW3MWZ | | GW3MWZ | | | 445 |
| 91 | G2DHV | | G2DHV | | | 32 |

[1] Also operated on 2300 MHz.
[2] Also oporated on 10 GHz.

# Band Results

*Glossary*
*—Excess power declared. (Rule 7)
†—Late entry, (Rule 14a)
P.B.—Parabeam.
D.—Dish.
C.R.—Corner Reflector.
D.R.—Dipole plus reflector.
S.—Stack.
C.L.—Colinear.

## 70 MHz

| Call-sign | Posn. | Score | QSOs | County Code | Best QSO Stn. | km. | Aerial | Ops. |
|---|---|---|---|---|---|---|---|---|
| G3FDW | 1 | 194726 | 119 | WD | G3UPS/P | 463 | 4 ele. | 4 |
| G3REI | 2 | 146333 | 132 | SX | EI2W | 535 | 4/4 | 3 |
| GW3XHU | 3 | 144404 | 125 | WR | GM3UAG | 620 | 4 ele. | 4 |
| G3VPK | 4 | 124992 | 134 | SX | GM3UAG | 720 | 6/6 | 2 |
| GW3TQD | 5 | 122616 | 119 | BR | — | — | 4 ele. | 3 |
| G3PUO | 6 | 119880 | 117 | YS | G3TTG/P | 570 | 4/4 | 4 |
| G3PHG | 7 | 112240 | 132 | SX | EI2W | 450 | 6 ele. | 4 |
| G8TB | 8 | 84460 | 114 | SX | G3FDW/P | 445 | 4/4 | 4 |
| G3KKP | 9 | 83240 | 95 | YS | G3TTG/P | 495 | 8 ele. | 3 |
| GW2AMV | 10 | 77200 | 123 | DB | G3UUP/P | 360 | 3 ele. | 5 |
| G3NJF | 11 | 72568 | 87 | LN | G3TTG/P | 475 | 4/4 | 4 |
| G3UIT | 12 | 71640 | 87 | LE | G3WKF/P | 425 | 4 ele. | 3 |
| G3TUX | 13 | 68168 | 114 | OX | GM3RLE/P | 440 | 4 ele. | 2 |
| G3MRA | 14 | 68440 | 95 | WE | G3FDW/P | 417 | 4 ele. | 3 |
| G3WOR | 15 | 65006 | 104 | SX | — | — | 4/4/4 | 5 |
| G3VOB | 16 | 64986 | 94 | WE | G3FDW/P | 412 | 6/6 | 3 |
| G3PIA | 17 | 62900 | 98 | BE | GM3RLE/P | 446 | 4/4 | 5 |
| G3PGM | 18 | 62834 | 96 | BE | EI2W | 406 | 4 ele. | 2 |
| G3WKF | 19 | 62062 | 67 | CL | GM3RLE/P | — | 4/4 | 1 |
| GW3ITZ | 20 | 59026 | 89 | FT | G3SJV/P | 380 | 4 ele. | 3 |
| GW3VFD | 21 | 58906 | 82 | RN | G3UUP/P | — | 4 ele. | 3 |
| G3TAA | 22 | 57094 | 111 | KT | G3FDW/P | 410 | 4/4 | 3 |
| G3PGT | 23 | 56430 | 109 | SY | EI2W | 452 | 4/4 | 6 |
| G3IIR | 24 | 47700 | 100 | SY | G3FDW/P | 412 | 4 ele. | 2 |
| G3TDM | 25 | 47144 | 96 | BD | — | — | 4 ele. | 3 |
| G3SJV | 26 | 46980 | 80 | SX | G3FDW/P | 462 | 4/4 | 3 |
| G3KTA | 27 | 44320 | 104 | SY | G3FDW/P | 415 | 4 ele | 2 |
| GW3OYU | 28 | 42018 | 71 | DB | G3SJV/P | 337 | 6/6 | 3 |
| G3BZF | 29 | 39198 | 73 | DY | G3WKF/P | 410 | 4 ele. | 5 |
| G3XCX | 30 | 35775 | 70 | SF | GM3RLE/P | 320 | 6 ele. | 1 |
| G2ASF | 31 | 35376 | 70 | L | — | — | 4 ele. | 2 |
| G3AAZ | 32 | 35136 | 90 | HF | G3FDW/P | — | 4 ele. | 7 |
| G3WKR | 33 | 34602 | 83 | BD | G3FDW/P | 327 | 3 ele. | 4 |
| G3GHN | 34 | 32976 | 93 | KT | G3FDW/P | 410 | 4 ele. | 4 |
| G3XLH | 35 | 30600 | 57 | YS | G3TND/P | 365 | 3 ele. | 2 |
| G3CZU | 36 | 27880 | 80 | SY | — | — | 4ele. | 3 |
| G3UBX | 37 | 27261 | 61 | SE | GC3OBM | 322 | 4/4 | 3 |
| G3TQY | 38 | 27219 | 70 | BE | G3FDW/P | 360 | 4 ele. | 4 |
| G3UNX | 39 | 25553 | 91 | HF | G3TTG/P | 342 | 4 ele. | 7 |
| G3TTG | 40 | 24471 | 50 | CL | — | — | 4/4 | 5 |
| G2UJ | 41 | 24360 | 70 | SX | G3FDW/P | 420 | 4 ele. | 2 |
| G3VPF | 42 | 22660 | 55 | DT | G3FDW/P | 460 | 4/4 | 2 |
| G3UD | 43 | 22140 | 69 | SD | G3SJV | 320 | 4 ele. | 1 |
| GM3RLE | 44 | 21504 | 42 | LK | G3WKF/P | 540 | 4 ele. | 3 |
| G3UGF | 45 | 21408 | 52 | YS | G3WKF/P | 415 | 3/3 | 3 |
| G3UUP | 46 | 21056 | 48 | KT | G3FDW/P | 455 | 6/6 | 2 |
| G8NN | 47 | 16275 | 51 | YS | G3REI/P | 316 | 4 ele. | 4 |
| G3KEU | 48 | 12675 | 35 | DH | G3REI/P | 405 | 3 ele. | 2 |
| G3TQF | 49 | 11205 | 45 | WK | G3WKF/P | 285 | 4 ele. | 2 |
| G3NIL | 50 | 11011 | 40 | DT | G3FDW/P | 438 | 4 ele. | 4 |
| G3UFY | 51 | 10736 | 58 | SY | G3FDW/P | 395 | 3/3 | 3 |
| GW3ERB | 52 | 8775 | 44 | FT | G3REI/P | 360 | 3 ele. | 2 |
| GI3ILV | 53 | 8633 | 38 | AR | G3WKF/P | 440 | 4/4 | 3 |
| G3VEF | 54 | 7992 | 38 | HE | GW3ITZ | 280 | 4 ele. | 6 |
| G3SAK | 55 | 7663 | 47 | BS | — | — | 4 ele. | 2 |
| G3WBC | 56 | 6762 | 44 | HF | G3UIC/P | 315 | 4 ele. | 3 |
| G3VUE | 57 | 6432 | 36 | HF | GW3TQD/P | 225 | 4 ele. | 4 |
| G3NEO | 58 | 5280 | 31 | YS | EI2W | 320 | 5 ele. | 2 |
| G3WIR | 59 | 5135 | 46 | BS | — | — | 3 ele. | 2 |
| G3UFP | 60 | 3510 | 15 | YS | G3PHG/P | 387 | 4 ele. | 3 |
| G2WS | 61 | 2447 | 20 | DT | G3MPN/P | — | 4 ele. | 1 |
| G3VEF | 62 | 1085 | 24 | CH | G3FDW/P | 175 | 3 ele. | 2 |
| G3LRP | 63 | 312 | 7 | YS | G3FDW/P | 138 | 3/3 | 1 |

## 144 MHz

| Call-sign | Posn. | Score | QSOs | County Code | Best QSO Stn. | km. | Aerial | Ops. |
|---|---|---|---|---|---|---|---|---|
| GW3NUE | 1 | 257929 | 235 | BR | F1DV | 690 | 10 ele. | 3 |
| GW3OHC | 2 | 237526 | 231 | RN | F9FT | 615 | 10 ele. | 4 |
| G3WLE | 3 | 193632 | 201 | SX | F9BP/P | 815 | 10/10 | 7 |
| G3ODY | 4 | 168822 | 179 | SX | PA0HEB | 502 | P.B. | 4 |
| G3PNA | 5 | 151146 | 161 | SX | F9BP/P | 808 | 10 ele. | 3 |
| G3ORL | 6 | 150353 | 180 | SX | DJ9DL | 541 | P.B. | 2 |
| G3EFX | 7 | 141120 | 152 | IM | DJ3ZU/P | 530 | 8/8 | 5 |
| G3LBA | * | 139548 | 192 | SY | DJ9DL | 525 | P.B. | 3 |
| GW3NTI | 8 | 107164 | 158 | FT | PA0CML | 513 | 8/8 | 3 |
| G6XM | 9 | 93662 | 156 | WE | ON4RY | 462 | 10 ele. | 2 |
| GW3TXR | 10 | 92910 | 146 | RN | PA0CML | 505 | 10 ele. | 2 |
| G8APV | 11 | 88125 | 132 | SX | F9BP/P | 822 | 8/8 | 2 |
| G4JJ | 12 | 85500 | 147 | DY | ON4KJ/A | 430 | 8 ele. | 1 |
| GW8ACB | 13 | 83371 | 139 | MG | ON4KJ/A | 810 | 6/6 | 2 |
| G3UUT | 14 | 83486 | 131 | YS | F9NJ | 443 | 6/6 | 5 |
| G2HIF | 15 | 75735 | 148 | BE | PA0MJK/P | 482 | 6/6 | 5 |
| G3VER | 16 | 72618 | 146 | BE | PA0GSM | 498 | 10 ele. | 4 |
| G3SFG | 17 | 70357 | 147 | BD | — | — | 8 ele. | 5 |
| G3CQE | 18 | 70010 | 127 | ST | PA0NAP | 505 | 8/8 | 4 |
| G3SEK | 19 | 66675 | 110 | LE | F9NJ | 556 | 10 ele. | 2 |
| GW3NWR | 20 | 65658 | 131 | DB | ON4KJ/A | 512 | 6/6 | 6 |
| G3GBU | 21 | 69432 | 155 | SD | ON4CT | 512 | 8 ele. | 2 |
| G3FZL | 22 | 64680 | 144 | SY | PA0GSM | 320 | 10/10 | 3 |
| G3WIN | 23 | 63994 | 100 | CD | — | — | 6/6 | 3 |
| G8AYB | 24 | 61125 | 141 | BD | PA0VVH/P | 490 | 10 ele. | 3 |
| G3RCV | 25 | 61122 | 148 | KT | G3WIN | 405 | 8/8 | 6 |
| G3RSD | 26 | 60767 | 114 | LN | G3XC/P | 475 | 6/6 | 5 |
| G5HZ | 27 | 55746 | 126 | HE | PA0JCS | 425 | 6/6 | 3 |
| G3AMW | 28 | 52681 | 107 | YS | — | — | 6/6 | 6 |
| G3PKF | 29 | 51302 | 125 | CE | PA0VVH/P | 395 | 8 ele. | 7 |
| G3JIJ | 30 | 50298 | 107 | YS | ON4KJ/A | 538 | 8/8 | 4 |
| G3MFJ | 31 | 46560 | 103 | YS | PA0MJK/P | 460 | 10 ele. | 3 |
| G3OVL | 32 | 46545 | 126 | SY | PA0PRY/P | 413 | 6 ele. | 3 |
| G3PMH | 33 | 44464 | 115 | HN | PA0CML | 343 | 8 ele. | 4 |
| G3OUF | 34 | 43587 | 90 | KT | DL2BQ | 483 | 10/10 | 3 |
| G2YU | 35 | 42430 | 100 | NK | — | — | 10 ele. | 6 |
| G3SDS | 36 | 41118 | 108 | DT | F9BP/P | 795 | 6/6 | 5 |
| G3TVG | 37 | 37632 | 107 | BD | PA0MJK/P | 405 | P.B. | 4 |
| G8ATK | 38 | 35295 | 109 | BE | ON4RY | 403 | 8/8 | 3 |
| GW3GHC | 39 | 35024 | 95 | GN | F9NJ | 465 | 4/4 | 4 |
| G8AAL | 40 | 32414 | 104 | SE | ON4KJ/A | 530 | 8 ele. | 4 |
| G2BLA | 41 | 32164 | 110 | HF | — | — | P.B. | 6 |
| G3SLJ | 42 | 32133 | 112 | SE | G3DAH | 280 | 8/8 | 1 |
| G3TYB | 43 | 30900 | 83 | KT | DJ9DL | 435 | 8 ele. | 2 |
| G3WHY | 44 | 28700 | 99 | HF | ON4RY | 360 | 8/8 | 7 |
| G3TJO | 45 | 27880 | 90 | LN | PA0CNL | 435 | 4 ele. | 4 |
| G2SU | 46 | 27454 | 81 | YS | PA0CML | 506 | 4/4 | 2 |
| G3KEU | 47 | 27331 | 71 | YS | ON4KJ/A | 450 | 10 ele. | 2 |
| G3SZY | 48 | 26010 | 91 | LR | F9NJ | 471 | 8 ele. | 1 |
| GM3WML | 49 | 25752 | 61 | KE | F2XN/P | 784 | 4/4 | 2 |
| G8AXA | 50 | 24727 | 90 | KT | PA0PRY/P | 362 | 10 ele. | 2 |
| G3HTP | 51 | 24160 | 100 | SY | G3SEK/P | 370 | 8/8 | 1 |
| G3WDG | 52 | 21606 | 89 | HE | PA0VD | 388 | — | 7 |
| G3ERD | 53 | 19647 | 81 | DY | PA0CML | 415 | 10 ele. | 5 |
| G3ONX | 54 | 19120 | 92 | GR | G3WIN/P | 260 | 8/8 | 3 |
| G3PEJ | 55 | 18814 | 61 | YS | PA0EZ | 420 | 4/4 | 1 |
| G3FVU | 56 | 18340 | 79 | DT | G3WIN/P | 420 | 5 ele. | 3 |
| G3RSC | 57 | 16356 | 83 | WK | ON4KJ | 380 | 10 ele. | 5 |
| G3AHB | 58 | 16206 | 99 | BS | — | — | 6/6 | 2 |
| G8AJR | 59 | 10672 | 71 | EX | — | — | 6 ele. | 1 |
| G8ARQ | 60 | 9435 | 59 | CH | F2XN/P | 403 | 5 ele. | 1 |
| G3LLE | 61 | 9042 | 50 | YS | F2XN/P | 330 | 5 ele. | 2 |
| G3WKS | 62 | 8962 | 59 | SX | G3KEU/P | 350 | 6/6 | 5 |
| G3WQK | 63 | 8004 | 53 | SX | — | — | 10 ele. | 5 |
| G3XC | 64 | 7141 | 37 | CL | — | — | 7/7 | 7 |
| G3NTS | 65 | 6630 | 51 | HF | ON4RY | 330 | 5/5 | 6 |
| G3BPM | 66 | 6419 | 30 | NK | GM5YK/A | 615 | 5 ele. | 1 |
| GW3VAJ | 67 | 5346 | 38 | RN | F2XN/P | 365 | 6/6 | 3 |
| G3DDI | 68 | 5177 | 37 | DH | F2XN/P | 490 | 8/8 | 2 |
| G2FHM | † | 4884 | 38 | LN | ON4RY | 390 | 6/6 | 3 |
| GW3RNH | 69 | 4779 | 49 | MH | G2AMW/P | 280 | 4 ele. | 1 |
| G3FKF | 70 | 3232 | 38 | WE | — | — | 6/6 | 2 |
| G3WZR | 71 | 2668 | 37 | SY | GW3NTI/P | 304 | 6/6 | 6 |
| G8AYL | 72 | 2478 | 43 | HE | G3MAX/P | 290 | 6/6 | 2 |
| G3JFY | 73 | 2392 | 28 | HE | G3WIN | 370 | 4 ele. | 1 |
| G3CMH | 74 | 1715 | 28 | ST | G3AMW/P | 357 | 8 ele. | 2 |
| G3JRL | 75 | 1320 | 23 | DY | G3ORL/P | 275 | 7 ele. | 2 |
| G2WS | 76 | 752 | 17 | DT | F6AEV | 224 | 5 ele. | 1 |
| GM8AGU | 77 | 616 | 14 | SU | G3URP | 352 | 6 ele. | 1 |
| GW3MWZ | 78 | 445 | 16 | CV | EI6AS | 170 | 4 ele. | 1 |
| GI3VJS | 79 | 379 | 13 | AR | G2SEK/P | 210 | 6/6 | 2 |
| G2DHV | 80 | 32 | 8 | SY | — | — | 7 ele. | 1 |
| G3RPJ | 81 | 2 | 1 | WK | — | — | 4/4 | 1 |

*Continued overleaf*

**432 MHz**

| Call-sign | Posn. | Score | QSOs | County Code | Best QSO Stn. | km. | Aerial | Ops. |
|---|---|---|---|---|---|---|---|---|
| G3LTF | 1 | 169050 | 82 | SX | PA0EZ | 433 | 48 el. S. | 2 |
| G3NNG | 2 | 156849 | 81 | BE | PA0EZ | 471 | 8/8/8/8/8 | 3 |
| G3WGC | 3 | 120834 | 76 | HF | ON4ZK | 360 | 14 el. | 7 |
| GW3PXP | 4 | 117190 | 68 | BR | F8MX/A | 350 | — | 1 |
| G3RIN | 5 | 115878 | 63 | SX | G3NPO/P | 368 | 2 × P.B. | 4 |
| G3NPO | 6 | 110936 | 58 | YS | F8MX/A | 460 | 2 × P.B. | 1 |
| G2RD | 7 | 108166 | 64 | SX | ON4ZK | 365 | P.B. | 3 |
| G3FD | 8 | 90524 | 73 | BD | ON4ZK | 385 | 2 × P.B. | 3 |
| G3STA | 9 | 89964 | 71 | BS | ON4ZK | 395 | 24 el. | 5 |
| G8ADC | 10 | 88935 | 69 | BD | ON4GC | 352 | 14 el. | 2 |
| G3MAR | 11 | 87668 | 68 | WR | G3RIN/P | 242 | 14/14 | 3 |
| G4GX | 12 | 80469 | 54 | LN | F8MX/A | 400 | 48 el. C.L. | 4 |
| G3HZJ | 13 | 74872 | 71 | SY | G3NPO/P | 325 | 10 el. | 3 |
| G8AKQ | 14 | 77445 | 61 | DY | F8MX/A | 412 | 8/8 | 1 |
| G3FRV | 15 | 75978 | 61 | SX | PA0EZ | 432 | 14/14 S. | 2 |
| G3OAD | 16 | 74980 | 60 | SE | G3LQR | 274 | 64 el. S. | 4 |
| G2DJ | 17 | 72576 | 58 | DY | G3RIN/P | 277 | P.B. | 1 |
| G3VKI | 18 | 71873 | 65 | SY | G3NPO/P | 310 | 8/8/8/8 | 4 |
| GW3OXD | 19 | 69937 | 50 | RN | G3LQR | 342 | 8/8 | 4 |
| G8ARM | 20 | 64690 | 54 | KT | G3NPO/P | 325 | 2 × P.B. | 4 |
| G8ALM | 21 | 63189 | 56 | HF | PA0EZ | 350 | P.B. | 2 |
| GW8AAP | 22 | 62426 | 54 | FT | G2RD/P | 325 | 8/8 | 2 |
| G3XAC | 23 | 58142 | 57 | LE | G3RIN/P | 365 | P.B. | 2 |
| G3HBW | 24 | 51744 | 48 | HE | ON4ZK | 431 | 8/8/8/8 | 6 |
| G3URC | 25 | 41720 | 47 | SX | G3NPO/P | 335 | 14/14 | 3 |
| G3OBD | 26 | 34048 | 40 | WE | G3LQR | 281 | 2 × P.B. | 2 |
| G3MRA | 27 | 33215 | 46 | HE | G3NPO/P | 322 | 14/14 | 4 |
| G8AKT | 28 | 26215 | 40 | BD | PA0COB | 315 | 2 × P.B. | 3 |
| G8ACJ | 29 | 24784 | 45 | SY | G4GX/P | 248 | 8/8 | 3 |
| G3THQ | 30 | 24619 | 38 | HF | ON5LM | 283 | 8/8/8/8 | 1 |
| G3XOL | 31 | 21924 | 34 | YS | G3RIN/P | 320 | 18 el. | 2 |
| G2YU | 32 | 21168 | 29 | NK | PA0FAJ | 310 | P.B. | 2 |
| G3TQA | 33 | 17955 | 31 | YS | G3LQR | 268 | 8/8 | 1 |
| G8ANY | 34 | 17808 | 36 | LE | G8ARM/P | 310 | P.B. | 2 |
| G8AFA | 35 | 17199 | 29 | ST | G3XAC/P | 305 | 24 el. | 3 |
| G3GHN | 36 | 14101 | 28 | KT | GW8AAP/P | 310 | C.R. | 2 |
| G8APQ | 37 | 13328 | 31 | BE | G3LQR | 195 | 14 el. | 2 |
| G3RZG | 38 | 11515 | 25 | DT | G3OAD/P | 192 | 14 el. | 4 |
| GW6GW | 39 | 9450 | 9 | MH | G3MRA/P | 138 | 5/5 | 2 |
| G2BHW | 40 | 5600 | 10 | CL | F1RJ | 385 | 8/8/8/8 | 2 |
| G3WIN | 41 | 4347 | 14 | CD | G3NNG/P | 320 | 14 el. | 1 |
| G8AIJ | 42 | 3255 | 21 | BS | G3RIN/P | 105 | 6/6 | 1 |
| GW3WKL | 43 | 1449 | 10 | RN | G5NU | 175 | P.B. | 1 |
| G2WS | 44 | 347 | 5 | DT | G8ADP/P | 110 | 8 el. | 1 |

**1296 MHz**

| Call-sign | Posn. | Score | QSOs | County Code | Best QSO Stn. | km. | Aerial | Ops. |
|---|---|---|---|---|---|---|---|---|
| G3NNG | 1 | 178750 | 23 | BE | F8MX/P | 253 | 3 ft. D. | 2 |
| G3WGC | 2 | 168187 | 21 | HF | F1NJ | 292 | 3 ft. D. | 7 |
| G2RD | 3 | 159565 | 21 | SX | F1GG/P | 264 | 3 ft D. | 2 |
| G3LTF | 4 | 158438 | 22 | SX | F1GG/P | 270 | 4 ft. D. | 2 |
| G3RIN | 5 | 128625 | 18 | SX | G8AUE | 282 | 3 ft. D. | 1 |
| G3MAR | 6 | 114750 | 18 | WR | G3RIN/P | 242 | D.R. | 3 |
| GW3PXP | 7 | 89250 | 15 | BR | G3RIN/P | 263 | — | 1 |
| G3OBD | 8 | 82250 | 15 | DT | F1RJ/P | 239 | 4 ft. D. | 1 |
| G3FRV | 9 | 56250 | 16 | SX | F1RJ/P | 174 | 6/6 | 1 |
| G2DJ | 10 | 45125 | 10 | DY | G3RIN/P | 277 | C.R. | 1 |
| G3HBW | 11 | 40688 | 12 | HE | GW3PXP/P | 202 | 4 ft. D. | 5 |
| GW3OXD | 12 | 33000 | 9 | RN | G2RD/P | 278 | 3 ft. D. | 4 |
| G3URC | 13 | 23000 | 10 | SX | F8MX/P | 175 | 4½ ft. D. | 1 |
| G3RZG | 14 | 20000 | 9 | DT | G3RIN/P | 160 | 3 ft. D. | 3 |
| G3OAD | 15 | 16625 | 9 | SE | G3WGC/P | 180 | C.R. | 3 |
| G3MCS | 16 | 10500 | 6 | BE | G2RD/P | 103 | 3 ft. D. | 3 |
| GW8AAP | 17 | 8750 | 6 | FT | G3WGC/P | 245 | 3 ft. D. | 1 |
| G3THQ | 18 | 8125 | 6 | HF | G3MAR/P | 123 | 4 ft. D. | 1 |
| G8ARM | 19 | 7562 | 6 | KT | G3LTF/P | 78 | 6 ft. D. | 3 |
| G8ADC | 20 | 3500 | 5 | BD | G3MAR/P | 114 | 4 ft. D. | 1 |

**2300 MHz**

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| G3MCS | 1 | 5000 | 2 | BE | G2RD/P | 107 | 2 ft. D. | 3 |
| G2RD | 2 | 1500 | 1 | SX | G3MCS | 107 | 3 ft. D. | 3 |
| G3TUX | 3 | 1000 | 1 | OX | G3MCS/P | 64 | 4 ft. D. | 1 |

**10 HGz**

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| G3WZR | 1 | 250 | 1 | SY | G3XMW | 2·4 | 3 ft. D. | 1 |

# /M /M /M /M /M /M /M /M

The 1968 Rally Season has come to an end and apart from reporting on the later events we look forward to expanding the Diary as organizers finalise their 1969 arrangements.

## The Eleventh Derby Mobile Radio Event, Rykneld Schools, Derby

As usual, this event was blessed with glorious weather; the first fine day in Derby for more than a week. The crowds started to roll in from 11 a.m. onwards and the Trade Stands were overwhelmed with customers. Our members who were acting as Car Park attendants were getting desperate for more room by 12.30 a.m. and still the cars came rolling in. The final tally was the grand total of 853 vehicles including one Trolley Bus from the Transport Museum.

About 300 Amateurs signed in, six of whom were from overseas. These were from New Zealand, Canada, Malawi, Tripoli, Trucial Oman and Czechoslovakia. G2YS and G4JW represented the Council of the RSGB. Quite a few keen Mobiles attended both the Derby Rally and the National Event at Woburn. The total attendance was over 4000 and everything was sold out.

The Derby Junk Sale was as popular as ever and the Prize Draw came up to all expectations, over 40 prizes being distributed. The Derby County and Borough Police gave a "Live" Road Safety Display but it was most unfortunate that the Radio Controlled Model Aircraft display had to be cancelled owing to strong winds at about 50 ft.

## Northern Radio Societies' Association, Belle Vue Convention, Manchester

Though not a Mobile Rally in the strict sense of the word, but nevertheless an event to which many Mobiles make their way, the Belle Vue Convention will be held in Manchester on 27 April 1969 Further details will be published when received.

## Harlow and District Mobile Rally

For the locals, and indeed the not-so-locals, in the Harlow district this Rally is an eagerly awaited "happening." This year the day was Sunday, 29 September and apart from the odd cloudburst or two during the afternoon the weather played reasonably fair.

There are no trade stands at the Harlow Rally. There isn't room. There is, of course a junk sale but of modest proportions. There is a very good Raffle. But the main attraction surely is the fine friendly spirit which pervades the whole affair.

We are sure the organizers will not take offence if we say that during the peak hours of the afternoon breathing space was severely limited in the Magdalen Laver Village Hall. They like it that way.

## The "Pangbourne" Rally

Forgive the inverted commas but this is a new one about which it is a pleasure to report. With, we hope, the forgiveness of the organizers we will quote from a letter addressed to the General Manager by Council Member Jack Etherington.

"Last Sunday 28 July, 1968, a small private Mobile Rally organized by G2CDN and myself was held at the Beale Childe Trust, Pangbourne. Some 40 of our friends and about 15 mobiles were present. Amongst the several activities laid on was a small raffle with prizes donated by Rex (G2CDN), Trudy and myself, the entire proceeds of this, amounting to £4 13s for which my cheque is enclosed we should like to be added to the building fund . . . etc."

The donation has, of course, been formally acknowledged but we have pleasure in publicly thanking Jack and Rex for this very fine effort.

# RADIO AMATEUR EMERGENCY NETWORK

By S. W. LAW, G3PAZ*

IT is no cliché on this occasion when we say that much water has flowed under the bridge since we last wrote this page. Far too much water has taken too many bridges with it in the wide-spread floods which have devastated many areas this year. Your scribe writes with feeling in this connection, having experienced a very hectic few days on a cruiser in the midst of the floods in the Medway Valley. The most astonishing thing, in these days of mass communication, is the attitude of those people who were far removed from the devastated areas. One remark stands out for us above all others —" It's only water." " You only had to tie your boat to a tree and wait for it to go down!" Comment seems superfluous. We have to admit, with shame, that we only had a 4m rig aboard our craft and with the hazardous conditions and the static combined with the poor site we failed to make any contact radio-wise. There is undoubtedly a lesson to be learned here—and the hard way is the best! However, others also have been learning by doing, and so good comes out of evil.

## The Vital Not Dramatic

One of the aspects of wide-spread flooding which is often not fully appreciated is the hazard to health which remains long after the flood-waters recede. Many hours of unremitting work are called for, not only in the obvious fields of cleaning up and drying out but the less apparent jobs of restoring pure water supplies and repairing broken sewers, to say nothing of other services which we normally take very much for granted. Such a herculean task had to be undertaken by the local authorities in the Molesey and Esher areas adjacent to the river Thames during the later part of September. Needless to say, the Army and Air Force were assisting, but oddly enough with only the minimum of radio communications, and the St. John Ambulance Brigade were bearing the brunt with their own radio equipment. An unfortunate situation arose when this was urgently needed elsewhere.

## Late Call-out

Sad to relate, it had not occurred to the User Services in the Surrey area to call upon RAEN for assistance up to this point. When it was finally suggested, however, the Surrey Group (who had been standing by for a call-out) stepped smartly into the breach and put in a 5-day stint, working from 9 a.m. until 8 p.m. daily in the affected area. Equipment, even in some cases aerials and masts, was speedily transferred from existing User Services sites in other parts of Surrey and a supply chain of batteries set up from areas with charging facilities.

## Professional Communications

The base station and six walkie-talkies of the St. John Ambulance Brigade had been loaned to the Local Authority until needed elsewhere, and these had proved invaluable on the 86 MHz band. One unforeseen use was to direct the petrol tanker supplying fuel for the 112 drying machines manned by some 200 RAF personnel who were not equipped with radio. A RAEN mobile covered this angle to our base station which then passed the requirements to the 86 MHz base, and an 86 MHz walkie-talkie loaned to the driver of the fuel tanker cleared up the supply problem. A nice job of liaison, indeed.

## Amazing Statistics

The figures connected with this type of disaster will always astonish the uninitiated. Molesey Public Library was open as an information centre and distributed free cleaning materials, buckets, etc. to assist the 25,000 people flooded out in this area alone. Priority was naturally given to the aged and infirm, and with only one telephone in operation at the Library the task could have proved almost insurmountable but for the 4m base station quickly installed at this site.

## Flexibility

The base stations installed at Molesey and at Esher on 4m were soon supplemented by a further link on 145·15 MHz, a 4m ground plane and a 5-element Yagi for 2m serving at Esher. Equipment from RAEN fixed User Services sites at Croydon and Wimbledon was added to that already in use and things began to hum. With the aid of G3GOX/G2AVC at Hounslow as Mobile Control, up to four or even five messages were passing at peak period *per minute*! Some of this was due to slick *intercutting* between stations using the same channel—a great example of the saving of *air time* when using the *break-in* technique. Altogether some 200 messages were accounted for in written form, but this takes no regard of the many verbal instructions which were not recorded. (This last is not strictly true, as we shall see later.)

## Ready and Willing

As is always the case, those taking part displayed a tireless enthusiasm for the job. One SWL member, Martin Crayton, even slept on the site. The Group Controller G3VK was on holiday at the commencement of the call-out, but he had been keeping in contact with the Group from that well-known /P site, the Devil's Dyke. He cut short his holiday and returned to take part in the operation. Some very slick working was observed on the part of G2NH working into G3VIR at Esher, and a very pleasing aspect was the good work put in by some of the newer members of the Surrey Group. Out of a total membership of 37, twenty took an active part in the operation.

## Further Information

Those members who would like to read more about the Molesey/Esher flooding may be able to obtain copies of the appropriate issue of the " Surrey Comet " through the usual channels. In order, however, that Group Controllers may benefit from the lessons learnt during this call-out, the Surrey Group intend to prepare an information sheet for distribution in due course. It is also intended to make available copies of 7 in. double-track tape recordings of typical message-passing during the period. These are due to an ingenious automatic monitoring device originated some years ago by G3MFB which can be set to record unattended over a period of many hours. The tapes will be available to registered Group Controllers at the basic cost of the tape plus postage.

## Manchester Caravan

Those members who attended the Radio Communications Exhibition last month will undoubtedly wish to join us in thanking G3MBQ and his team for the excellent work they put in with their well-known caravan at the show. It was no mean task to transport this unit on a 400-mile round trip, let alone the work involved in the *get-in* and *get-out*. When one adds to this the arduous task of manning the exhibit throughout the period, our gratitude to this hard-working Group is unbounded. It must have needed unremitting vigilance to keep prying fingers from being truncated in that hypnotic teleprinter!

* 11 Chisholm Road, Croydon, Surrey, CRO 6UQ.

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

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

# CONTEST NEWS

## Contest Scoring Systems for V.H.F./U.H.F.

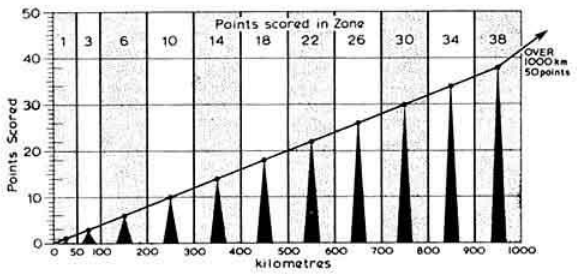
During 1968 a new v.h.f. contest scoring system was introduced. The idea behind the system (which is currently in use) was mainly to reduce the time spent in arriving at a final score for a v.h.f. contest and to try to offset regional advantages. Having used this scoring system for six months, the V.H.F. Contests Committee decided to ask v.h.f. contest operators for their opinions of this new system. On page 544 in the August issue of *Radio Communication* your opinion of the new scoring system was requested. At the same time the V.H.F. Contests Committee decided to analyse the contest results already obtained with the new scoring system and compare them with the results that would have been obtained using a points per km system. Many hours of work have been done and comparison results for several contests obtained. The results of comparing a points per km system with the new radial system (with station multiplier) can be summarized as follows:

(*a*) A greater range of scores is achieved with the radial system plus station multiplier.
(*b*) Your position in the results table using the new scoring system is virtually unchanged if compared with a points per km system, although the scoring range is greater.
(*c*) The station multiplier has very little effect on your position in the final results table.

From the above findings, two conclusions have been drawn.

(*a*) The station multiplier is *not* unfair, because your position in the results table is virtually the same when you compare the radial system (with multiplier) with a points per km system.
(*b*) There is no point in having the station multiplier if it has no effect on the final placings.

Thus the following action will be taken by the V.H.F. Contests Committee in order to change the present scoring system to omit the station multiplier. The points scored in each zone have been changed (see below). There is no station multiplier. You will note




that the new distance points scale is linear, if you consider the average distance scored in each zone. The system is progressive; i.e. you score more the longer the contact. A careful examination of this scale will show that it is similar to the old points per km system in as much as, if you work double the distance you score double the points. There is in fact a slight advantage in making longer contacts over and above the fact that they score more points. The Committee could have used a linear scale that did not observe this rule. Several of this year's contests have been rescored using this new scoring scale and the results obtained have been considered to be most satisfactory. This new scoring system will be used for all v.h.f./u.h.f. contests during 1969.

## Fourth 70 MHz (Open C.W.) Contest 1968

1. **Date and Time.** 1 December from 09.00 to 21.00 GMT.
2. All entries **must** be sent to the adjudicator at: V.H.F. Contests Committee, "Summerleigh", Beltinge Road, Herne Bay, Kent.

The following **General Rules** also apply; 3a, 4, 5a, 6a, 7a, 8b, 9b, 10a, 12-28 (rule 22 does not apply)

## Summer Top Band Contest

The Summer Top Band Contest held on 6 and 7 July did not produce as many entries as before, the total being 39 which included eight multi-purpose entries.

The winner this year is G3FXA, G.W. Spray of Cheltenham, with a total of 481 points from 95 contacts. There seems to have been little activity outside the British Isles and G3FXA has only two Europeans, OL1AKG/P and ZB2AY in his log. Second place goes to G3IGW, Mike Whitaker of Halifax, who made 102 contacts and whose only European was OK1ALG/P mentioned above.

Conditions seem to have been only fair with reports of very bad static from the more southerly stations (" worst that I can remember in a Top Band Contest"—G6BQ), although this was not confined to the south as G3OKA in Cheshire reports equally bad conditions.

Equipment in use was conventional and it seems that a half-wave aerial is a must if one aspires to the top part of the table. G3IGW reports his aerial as 275 ft. semi-vertical, and G3VMW used an inverted V, with the apex at 70 ft., tuned against an earth mat about a quarter of a square mile in area. G3BDQ used a similar system although he only describes his earth mat as extensive.

There were no complaints about the scoring system, the only complaint from entrants being the elastic time-keeping systems in use and the high speed sending of certain stations. This latter fault probably accounts for the large number of logging errors that were made and which resulted in loss of points particularly from stations near the top of the table.

The contest seems to have been enjoyed by all, even though the static made operating somewhat tedious at times.

| Position | Call-sign | Score | County Code |
|---|---|---|---|
| 1 | G3FXA/A | 481 | GR |
| 2 | G3IGW | 476 | YS |
| 3 | G3VMW* | 467 | YS |
| 4 | G3RPB | 466 | LD |
| 5 | G3OLB | 455 | GR |
| 5 | G6BQ | 455 | KT |
| 7 | G3BDQ | 439 | SX |
| 8 | G3PDL | 433 | LN |
| 9 | G3WWV/A | 416 | LD |
| 10 | G3OKA | 404 | CH |
| 11 | G3JTW | 401 | EX |
| 12 | G3SYS | 375 | SX |
| 13 | G3LHJ | 369 | DN |
| 14 | G2DC | 365 | HE |
| 15 | G3SRA* | 364 | LD |
| 16 | G4AR | 356 | SY |
| 17 | GW3XEJ/A* | 352 | MH |
| 18 | G3MFJ | 343 | YS |
| 19 | G3UNT | 340 | KT |
| 20 | G3WIM/P | 338 | SX |
| 21 | G3VTY | 330 | YS |
| 22 | GW3CDH * | 322 | MH |
| 23 | G3XDV | 317 | KT |
| 24 | G3VIP/A* | 314 | LN |
| 25 | G3VFD | 273 | KT |
| 26 | G3ORY | 272 | WK |
| 27 | G3CCP * | 249 | YS |
| 28 | G3XAP | 209 | SF |
| 29 | G3XOQ * | 206 | SY |
| 30 | G3UFW | 203 | WE |
| 31 | G3RPJ | 194 | WK |
| 32 | G3VXM | 184 | HE |
| 33 | G3XFT | 144 | LD |
| 34 | G3VLX* | 132 | KT |
| 35 | G5DZ | 126 | HE |
| 36 | G8QZ | 115 | DY |
| 37 | G3WZR | 104 | SY |
| 38 | G6OO | 54 | LN |
| 39 | G3JSK | 49 | WE |

* Multi-operator

## Contest Rules—Correction

In the rules for the Second 1·8 MHz Contest, 1968, published on page 686 last month, the first part of rule 5 should have read " Six points for each of the first six contacts with any one *county* . . ."

# Sixth 144 MHz (Open) Contest 1968

This contest was held on 3-4 August, and despite the Summer Contest held only a month previously, a good entry was received, although only three appeared in Section B. The general opinion was that the conditions were only average, although there is some evidence of a slight " lift " on the Saturday evening.

The highest score was made, as usual, by GW3NUE/P operated by G3NUE, G3TQZ and G3UKV from "That site in Brecknock". An interesting point is that their score is within one per cent of their score in the Summer Contest; their total number worked is only six less and their best DX is 10km farther. This consistency is apparent in a number of other logs. Runner-up in Section C was G3BNL/P operating from near Cheltenham. It is not often that there is a winner in Lincolnshire but G3REH has succeeded in Section A, helped by a 112 ft. tower and a 10 element Yagi! Another creditable performance is that of runner-up in Section A—G8BBB, whose QTH is only 23 ft. a.s.l. in the fen country of North Cambridgeshire. The winners of Section B are regularly at the top of the table—G3OXD/A (Albright and Wilson ARS) and were far ahead of the runner-up G8AHM. Since a low entry was received in Section B an award will only be made to the winner in this section (Rule 3a).

Among the notable entries received was that from GM5PI/P, being the only GM entry. Although over half-way down the results table they worked the best DX of the contest—G2JF at 540km. A good effort and some compensation for the 800 miles of driving put in by G3EDD and G3GGK over the contest weekend. Another notable entry was that from G8APZ/P who was one position below GM5PI/P; 82 contacts were made although the transmitter power input was only 800 mW. An entry that hardly needed checking was that submitted on computer print-out paper by G3NAQ/P. He had programmed a computer to convert QRA Locators into latitude and longitude, which then uses spherical trigonometry to calculate the distance in km and miles between any two locations. It took Geoff. 15 minutes to punch the data on to cards and the computer took 25 seconds to produce the result. For anyone with access to a computer G3NAQ can supply on request the programme in Fortran or K-code.

Comments received included " The early start and finish were most welcome and would be a good idea for all 24-hour contests (G3NJN/P)." One G8+3 station using high power s.s.b. in the middle of the c.w. section had this to say, " I prefer to use the c.w. section as people tune there with their b.f.o.s on." (G2WS). "We gave EI5BH his first GM QSO, and we didn't work any GMs!" (GM5PI/P). " Our operations were severely curtailed by deliberate local interference." (G3WZR/P).

In general, log-keeping was excellent although too many people are still using old-style cover sheets. It is odd how many rulers shrink when contacts are on borders and a few stations lost quite a lot of points through extremely optimistic scoring. Finally, please read the instructions on where to send the entries. Too many went to either RSGB Headquarters or to the adjudicator of the previous contest.

R.J.B.

**SECTION A** Single operator, fixed stations

| Call-sign | Posn. | Points | QSOs | Best QSO Call-sign | Km | QTH (county) | Power (Watts) | Aerial |
|---|---|---|---|---|---|---|---|---|
| G3REH | 1 | 44,892 | 125 | ON4UM | 339 | LN | 50 | 10 el. |
| G8BBB | 2 | 24,298·5 | 95 | G3WIN/P | 304 | CE | 120 | 10 el. |
| G3NEO | 3 | 18,400·5 | 79 | G3GZJ | 435 | YS | 150 | 5/5 slot and 10 el. |
| G5UM | 4 | 12,700 | 70 | GM5PI/P | 302 | LR | 40 | 10 el. |
| G2WS | 5 | 12,247·5 | 70 | G3WIN/P | 324 | ST | 70 | 4/4 slot |
| G8AWW | 6 | 11,745 | 80 | G3WIN/P | 222 | LR | 25 | 5 el. |
| G8ARC | 7 | 10,639·5 | 80 | GW8BBR/P | 275 | LD | 40 | 8 el. |
| G3NOH | 8 | 10,288·5 | 90 | G3NJN/P | 330 | HF | 30 | 12 el. collinear |
| G3PTM | 9 | 9,548·5 | 65 | GM5PI/P | 360 | WK | 40 | 6/6 slot |
| G3WHK | 10 | 8,893·5 | 94 | GW3LEW | 231 | SY | 12 | 8 el. |
| G2AIQ | 11 | 8,880 | 65 | ON4UM | 350 | CE | 100 | 4/4 slot |
| G3VXK | 12 | 8,774 | 64 | G3NJN/P | 380 | HE | 100 | 10 el. |
| G8BJZ | 13 | 7,608 | 58 | ON4UM | 339 | CE | 50 | 6/6 slot |
| G3PKV | 14 | 4,654 | 56 | GW8BBR/P | 240 | HF | 25 | 6/6 slot |
| G8ATM | 15 | 3,589 | 41 | G2JF | 240 | NM | 18 | 9 el. |
| G2BHN | 16 | 3,484 | 40 | G3NEO | 290 | ST | 45 | 4/4 slot |
| G8BIJ | 17 | 2,464 | 35 | GW3NUE/P | 215 | MX | 10 | 8/8 slot |
| G8BCD | 18 | 1,305 | 30 | G2JF | 290 | ST | 30 | 4 el. |
| GW8BOQ | 19 | 1,025 | 27 | F9NJ/P | 345 | MH | 28 | 6/6 slot |
| G3XFW | 20 | 726 | 20 | G3SLJ/P | 170 | ST | 38 | Indoor 3 el. |
| G3UIK | 21 | 704 | 23 | GW8BBR/P | 260 | LD | 15 | 6/6 slot |
| G8AVG | 22 | 493 | 17 | G3REH | 180 | WE | 15 | 14 el. |
| G8BKR | 23 | 364 | 19 | GW3TXR/P | 107 | ST | 5 | 8 el. |
| G8BCE | 24 | 210 | 12 | GW3NUE/P | 110 | ST | 35 | 8/8 slot |
| G8AZK | 25 | 91 | 9 | GW3NUE/P | 160 | WE | 14 | 6/6 slot |

**SECTION B** Club, /A and multi-operator fixed stations

| Call-sign | Posn. | Points | QSOs | Rest QSO Call-sign | Km | QTH (county) | Power (watts) | Aerial |
|---|---|---|---|---|---|---|---|---|
| G3OXD/A | 1 | 111,218 | 203 | PA0JWV | 460 | WR | 20 | 10 el. |
| G8AHM | 2 | 18,170 | 76 | PA0NAP | 320 | HE | 150 | 8 el. |
| G3PKF | 3 | 10,148 | 68 | ON4UM | 256 | CE | 120 | 8/8 slot |

**SECTION C** Portable stations

| Call-sign | Posn. | Points | QSOs | Best QSO Call-sign | Km | QTH (county) | Power (watts) | Aerial |
|---|---|---|---|---|---|---|---|---|
| GW3NUE/P | 1 | 210,356 | 229 | ON4UM | 520 | BR | 50 | 10 el. |
| G3BNL/P | 2 | 116,700 | 203 | F9NJ/P | 242 | GR | 14 | 2×5 el. |
| GW8BBR/P | 3 | 73,948 | 151 | G2JF | 350 | DB | 25 | 8/8 slot |
| G5HZ/P | 4 | 48,106 | 138 | ON4UM | 380 | HE | 15 | 6/6 slot |
| G3NJN/P | 5 | 45,435 | 102 | G3OIV | 432 | LE | 25 | 10 el. |
| G3GHN/P | 6 | 44,472 | 108 | F1RM | 450 | SX | 30 | 8 el. |
| G3NAQ/P | 7 | 44,149 | 136 | PA0NAP | 396 | SD | 10 | 6/6 slot |
| GW3TXR/P | 8 | 36,543·5 | 102 | G8AJC/P | 327 | RN | 30 | 8/8 slot |
| G3SLJ/P | 9 | 36,079 | 121 | G8AJC/P | 290 | SE | 30 | 8/8 slot |
| G3XAC/P | 10 | 23,688 | 95 | G2JF | 350 | LE | 20 | 4/4 slot |
| G3WCB/P | 11 | 18,094 | 110 | F9NJ/P | 305 | SY | 15 | 6/6 slot |
| GM5PI/P | 12 | 11,745 | 45 | G2JF | 540 | WG | 25 | 6 el. |
| G8APZ/P | 13 | 10,965 | 82 | G3NJN/P | 368 | HE | 800 mW | 8 el. |
| GW8BHH/P | 14 | 7,800 | 56 | G8AUN | 293 | MG | 5 | 8/8 slot |
| G8ASX/P | 15 | 7,280 | 60 | G3XAC/P | 315 | DT | 10 | 4 el. |
| G8AJC/P | 16 | 4,912·5 | 45 | GW3TXR/P | 320 | KT | 12 | 6 el. |
| G8AVE/P | 17 | 4,680 | 46 | G3WIN/P | 415 | DT | 15 | 6/6 slot |
| G3WZR/P | 18 | 3,255 | 51 | GW3NUE/P | 210 | SY | 20 | 6/6 slot |
| G3OTK/P | 19 | 966 | 28 | GC2FZC | 190 | ST | 4 | 4 el. |
| G8AFN/P | 20 | 667 | 12 | GW3NUE/P | 270 | ND | 12 | 8 el. |

Check logs gratefully received from:
G3NJF/P, G3EHR, G3MWF, G3GJY, A5180.

# High Power H.F. Field Day

The first High Power H.F. Field Day contest held on 13-14 July last attracted 17 entries, though a study of the logs showed there were over 30 portable stations active and some of those who did not submit logs had serial numbers of over 100. Considering that this was an experimental contest held at short notice the Contests Committee was satisfied with the turn-out.

The Anglo Welsh Contest Consortium, with the call-sign G3POI/P, were the winners with 1299 points from 380 contacts and, at the discretion of Council, will receive a Certificate of Merit. The runners-up were Cannock Chase ARS (G3VCC/P) who scored 1129 points from 329 contacts while Durham City ARS (G3TAK/P) were third with 988 points and 298 contacts.

The Famagusta Group of the Cyprus ARS (ZC4SS/P) was the only overseas group to submit an entry. They made 280 contacts for 923 points and finished in fifth place and will receive a Certificate of Merit.

As could be expected nearly all entrants used transceivers; in fact, only three did not use Swan or KW equipment. All stations bar one had either Diesel or PE generators, the odd man out having a gas driven generator. Aerials provided more variety. G3POI/P used a TH2 Mk2 for 15m and 20m and inverted V's for 40m and 80m, while G3VCC/P had a quad for the two higher and dipoles for the two lower bands. G3TAK/P had a broadside array, a ground plane and an inverted-V while ZC4SS/P used a multiband trap vertical. The remainder of the contestants had variations on the above plus extended Zepps, long wires, a Rhombic, a three-wire system 120° apart with triangular feeder, three Lazy H in a triangle and a three-band Colinear array.

The logs were very well prepared and the Contests Committee thank all those responsible. There were one or two minor irregularities on the cover sheets and one would think that using a PE generator as a receiver would produce rather a high noise level!

The few comments received, on the whole, welcomed the contest and the suggestions and criticisms were greatly appreciated.

Check logs were received, with thanks, from G3CGD/P, G3VCP/P, W1WMH, YU1SF and A4798/G3IOR.

| Posn. | Group | Call-sign | QSOs | Score |
|---|---|---|---|---|
| 1 | Anglo-Welsh Contest Consortium | G3POI/P | 380 | 1299 |
| 2 | Cannock Chase ARS | G3VCC/P | 329 | 1129 |
| 3 | Durham City ARS | G3TAK/P | 298 | 988 |
| 4 | Guildford & District RS | G3TLM/P | 271 | 951 |
| 5 | Cyprus ARS (Famagusta) | ZC4SS/P | 280 | 923 |
| 6 | Woking Group | G3OXI/P | 250 | 889 |
| 7 | AERE (Harwell) RC | G3PIA/P | 241 | 847 |
| 8 | Oxford & District ARS | G3JLE/P | 232 | 796 |
| 9 | Gravesend Group | G6BQ/P | 214 | 780 |
| 10 | Crystal Palace & District RC | G2LW/P | 201 | 745 |
| 11 | Midland Amateur RS | G3MAR/P | 200 | 714 |
| 12 | Royal Signals ARS | G4RS/P | 203 | 711 |
| 13 | Bedford & District ARS | G3WTP/P | 196 | 702 |
| 14 | Southgate RC | G3BWQ/P | 188 | 672 |
| 15 | Maidstone YMCA ARS | G3TRF/P | 187 | 639 |
| 16 | Belfast & District Group | GI5SJ/P | 123 | 432 |
| 17 | Dundee Group | GM3NHQ/P | 84 | 339 |

# D/F National Final

The National D/F Final was held on 22 September in Gloucestershire in a neutral area which had not been used in any previous Test. After the torrential rain of the previous week, the weather smiled upon the 14 competitors who assembled at the start near Cirencester on a sunny but windy afternoon.

At 13.20 hours very good signals were received from Station A (G3OUV) and Station B (G8VZ). The signal strength of each Station had been carefully adjusted to conceal the fact that Station A was over 15 miles away whereas Station B was hidden near the bed of a flooded disused canal in a deep valley, a relatively short distance from the start.

The majority of competitors attempted to locate Station B first, only to find themselves delayed by the thick undergrowth and flooded valley, not to mention the difficulty of crossing the canal, to achieve which several competitors emulated Tarzan and took to the overhanging trees. This transmitter was so well concealed that E. Mollart passed within a few feet of the operators some 20 minutes before finding them. Station A was a long way away hidden in a dense wood, and was best approached by a long climb up a path transformed into a morass by the heavy rains.

Detailed results are appended below, and it should be noted that M. P. Hawkins, the winner, first located the distant Station B and then had to return nearly 15 miles to locate Station A, still taking an overall time of only just over two hours.

A party of over 50 sat down to tea at the Golden Farm Hotel, Cirencester, where the National Trophy and other prizes were presented by Miss Findlay. After the first three successful competitors had given graphic descriptions of their adventures during the afternoon, Mr W. Findlay, representing the Contest Committee, thanked Mr G. T. Peck and his colleagues for an interesting, arduous, and very well organized event, which had been thoroughly enjoyed by all. Thanks were also expressed to the Station Operators (G8VZ—J. Redrup, G3OUV—P. Perkins) and to others who had risen very early in the morning to make the necessary preparations a long way from their home territory.

| Position | Name | Club | Time of Arrival A Station | Time of Arrival B Station |
|---|---|---|---|---|
| 1 | M. P. Hawkins | Oxford | 15.37 | 14.46 |
| 2 | W. J. North | High Wycombe | 15.03 | 16.04 |
| 3 | R. Curnow | Oxford | 14.45 | 16.15 |
| 4 | E. L. Mollart | Oxford | 14.48 | 16.16 |
| 5 | E. W. Bristow | Oxford | 16.18 | 15.05 |
| 5 | M. Gee | Oxford | 15.06 | 16.18 |
| 7 | B. Mahoney | Rugby | 15.05 | 16.20 |
| 8 | R. Boby | Oxford | 15.02 | 16.29 |
| 9 | I. Butson | Oxford | 15.04 | 16.30 |
| 10 | A. Simmons | Oxford | 15.19 | |
| 11 | D. Newman | Rugby | 15.24 | |
| 12 | P. Tyler | Oxford | 15.26 | |
| 13 | J. Vickers | Stratford on Avon | 15.48 | |
| 14 | T. Gage | Oxford | | 15.49 |

# Oxford D/F Qualifying Event

Sixteen teams assembled at Lower Heyford, near Banbury, on 11 August for the last qualifying event of the season. Transmitter A was situated in thick undergrowth 10 miles from the start and was approached along a rather boggy track half a mile from the road. Transmitter B was only 4½ miles from the start hidden in undergrowth near a junction of the Oxford canal and Cherwell river. It was so arranged that the bearing from the start intersected the winding canal and river many times. Competitors were required to map-read very carefully and to obtain accurate bearings in order to find the best approach to the transmitter. The organizers were taken by surprise when several teams headed by Robin Boby G3JLE approached from a quite unexpected direction. They had crossed the canal by railway bridge and reduced their journey on foot considerably. However, the organizers were rewarded when Brian Mahoney, hotly pursued by Bob Vickers tore past the transmitter and disappeared along the towpath covering at least ¾ mile before the next transmission made them realize their error. They returned rather more slowly, cursing an organizer who was filming the whole episode with a cine camera. Brian Mahoney caused more laughter when after having finally reached the transmitter, he took off his Wellingtons and emptied a gallon of water out of each one. Bill North, whose call-sign appropriately enough is G3TRY, found the river Cherwell between him and the transmitter. Undeterred, he waded across in 2 ft. 6 in. of water until, quite suddenly he disappeared from sight in 9 ft. of water. Not being much of a swimmer and with visions of appearing in " Silent Keys," he decided that discretion was the better part of valour and let go of the receiver. After tea a salvage operation was organized by competitors, but all to no avail. However, 2 weeks later, Bill rescued the set with the help of two frogmen and within a couple of days it worked perfectly.

Tea was served at Stanton St. John Village Hall by Mrs Mollart and her young ladies to 50 participants including Mr B. Shaal from Israel who was intrigued by the " combination of the best of the British countryside and Amateur Radio." He hopes to compete next year.

| Position | Name | Club | Time of Arrival A Station | Time of Arrival B Station |
|---|---|---|---|---|
| 1 | E. W. Bristow | Oxford | 15.35 | 14.40 |
| * 2 | R. Boby | Oxford | 15.37 | 14.31 |
| 3 | A. Simmons | Oxford | 14.35 | 15.42 |
| * 4 | D. Newman | Rugby | 15.49 | 14.49 |
| 5 | I. Butson | Oxford | 15.51 | 14.42 |
| 6 | B. Mahoney | Rugby | 14.24 | 15.52 |
| * 7 | R. Vickers | Stratford | 14.42 | 15.55 |
| 8 | A. Newman | Salisbury | 15.57 | 15.00 |
| 9 | M. Gee | Oxford | 16.04 | 15.16 |
| 10 | P. Tyler | Oxford | 16.04½ | 15.01 |
| 11 | G. Peck | HighWycombe | 16.30 | 15.30 |
| 12 | T. Gage | Oxford | — | 14.44 |
| 13 | W. North | Chiltern | 14.53 | — |
| 14 | R. Smith | South Manchester | — | 15.31 |
| 15 | M. Webb | Stratford | 15.58 | — |
| 16 | P. Woollet | Edenbridge | 16.19 | — |

* Qualified for National Final.

# Affiliated Societies' Contest, 1969

**1. The General Rules** for RSGB H.F. Contests to be published in the January, 1969, *Radio Communication* will apply.

**2. When:** 18.00 to 22.00 GMT on 11 January, 1969.
and 18.00 to 22.00 GMT on 12 January, 1969.

**3. Eligible Entrants:** all fully paid-up Affiliated Societies.

(*a*) As the contest is to encourage club activity, it is not in the spirit of the contest that a competing station should be operated by only one operator for all, or nearly all, of the time and entries which indicate this method of operation may be disallowed. For the purposes of this contest, all entries are classed as multi-operator.

(*b*) Entries will only be accepted from stations operating within a 10 mile radius of the normal meeting place or HQ of the Affiliated Society.

(*c*) Call-signs which have been issued to Affiliated Societies must be used.

(*d*) More than one entry will be accepted from an Affiliated Society providing that where a club call-sign has been issued, that call-sign is used for the A station.

**4. Contacts:** C.w. (A1) only in the 1·8–2·0 MHz band.
Competing stations only (as defined in Rule 3) must send AFS, to identify themselves, after the report-serial number group, e.g. 579001 AFS. Repeat contacts may be made during the second session.

**5. Scoring:** Fifteen points for each contact with a competing station, and one point for other stations.

**6. Logs:** Column (5) must be headed " Enter AFS if Received." Entries must be addressed to "H.F. Contests Committee," c/o Tralee, 5 Filbert Crescent, Gossops Green, Crawley, Sussex.

**7. Trophy:** The Edgware Trophy will be awarded to the Affiliated Society submitting the highest checked score.

# LOOKING AHEAD

**15 November**—RSGB London Lecture Meeting: " Single Sideband at V.H.F." G3LBA, G3MED, G3SHK, and G3FZL. Institution of Electrical Engineers, Savoy Place, London, WC2. Buffet tea 6 p.m. Lecture 6.30 p.m. Tickets from RSGB HQ.

**16 November**—Scottish V.H.F. Convention, Royal Signals (TA) Drill Hall, 21 Jardine Street, Glasgow, NW, from 14.30 to 17.45. High tea will be served in the Methodists Hall, Marhill Road, Glasgow, NW, from 18.30. There will be lectures and displays of equipment, with a bring and buy sale. Talk-in stations will be operating on 4 and 2m. The charge for the convention will be 21s., and tickets are available from GM3RXU, GM3VAP, GM3VIO, GM3VOX and GM3UWX.

**23-24 November**—DXpedition to Curacao. PJ0CC. QSLs via W2ADE.

**3 December**—Winter Radio Amateurs' Examination. RSGB Centre at the College of Preceptors, Bloomsbury Square, London, WC1. Members 35s., Non-members 45s. Closing date 31 October.

**6 December**—RSGB Annual General Meeting. Royal Society of Arts, John Adam Street (off Strand), London, WC2.

**14-15 December**—Open Day at New RSGB H/Q, 35 Doughty Street, W.C.1.

**7 March**—RSGB London Lecture Meeting.

**27 April**—Bellevue Convention, Manchester.

# CONTESTS

**6–7 November**—YLRL Anniversary Party Contest (Phone). 18.00 Wed.-18.00 Thu.
**9–10 November**—7 MHz DX Contest (Phone) (see page 404 June).
**9–10 November**—OK Contest (C.W.).
**9–11 November**—ARRL SS Contest (Phone).
**11 November**—Seventh 144 MHz (S.S.B.) Contest.
**16–17 November**—Second 1·8 MHz Contest.
**16–18 November**—ARRL SS Contest (C.W.).
**23–24 November**—CQ WW DX Contest (C.W.).
**1 December**—Fourth 70 MHz (C.W.) Contest.
**7–9 December**—Town of Porto Amelia Contest.
**13 January**—First 144 MHz (S.S.B.) Contest. †
**11–12 January**—Affiliated Societies' Contest.
**26 January**—Second 144 MHz (C.W.) Contest.
**15–16 February**—First 1·8 MHz Contest.
**16 February**—First 70 MHz (Open) Contest.
**22–23 February**—YL-OM Contest (Phone). 18.00 Sat.-18.00 Sun.
**1–2 March**—Third 144 MHz (Open) Contest *
**8–9 March**—BERU Contest (see page 605, Sept.).
**8–9 March**—YL-OM Contest (C.W.). 18.00 Sat.–18.00 Sun.
**30 March**—Low Power 3·5 MHz Contest.
**12–13 April**—Second 70 MHz (Open) Contest.

† This is an amended date.

**3–4 May**—Fourth 144 MHz (Portable) Contest *
**24–25 May**—First 432 MHz (Open) Contest *
**24–25 May**—First 1296 MHz Contest. *
**7–8 June**—National Field Day.
**22 June**—Second 432 MHz (Portable) Contest.
**5–6 July**—Summer 1·8 MHz Contest.
**5–6 July**—Fifth 144 MHz (Open) Contest*.
**12–13 July**—High Power Field Day.
**27 July**—Third 70 MHz (Portable) Contest.
**4 August**—Sixth 144 MHz (S.S.B.) Contest.
**10 August**—Third 432 MHz (Open) Contest.
**17 August**—Fourth 70 MHz (C.W.) Contest.
**6–7 September**—V.H.F. National Field Day*.
**14 September**—3·5 MHz Field Day.
**21 September**—Seventh 144 MHz (C.W.) Contest.
**5 October**—Second 1296 MHz (Open) Contest.
**11–12 October**—28 MHz Telephony Contest.
**25–26 October**—7 MHz Contest (C.W.).
**3 November**—Eighth 144 MHz (S.S.B.) Contest.
**8–9 November**—7 MHz Contest (Phone).
**15–16 November**—Second 1·8 MHz Contest.
**7 December**—Fifth 70 MHz (C.W.) Contest.

* To coincide with a Regional IARU Contest.

# MOBILE RALLIES

**20 April 1969**—North Midlands Mobile Rally, Drayton Manor Park, Near Tamworth, Staffs.
**29 June**—Longleat Mobile Rally, Longleat Park, near Warminster, Wilts.
**6 July**—South Shields Mobile Rally.
**10 August**—RSGB National Mobile Rally, Woburn Abbey.
**17 August**—Derby and District Mobile Rally.

# YOUR OPINION

### Hansen S.W.R. Bridges

*From: G. K. Laycock, G3XFZ, Shooters Hill, London SE18.*

After reading the review some time ago in " The Bulletin " by G2BVN on the Hansen Bridges, I was prompted to buy one. On asking for a 75 ohm version at a London stockists, I was informed that the only version then available was the 50 ohm one, and that the only modificaton required to convert the 50 ohm bridge to the 75 ohm bridge was to change the two 150 ohm resistors to 270 ohm. This was done, but incorrect SWR readings were obtained.

I was then told by another operator that he had one of the original 75 ohm versions. Unfortunately, on investigation, he found that he had the instruction leaflet for the 50 ohm bridge. However, this bridge contained two 220 ohm resistors. This value was then tried, but poor readings were still obtained, an 80 ohm dummy load being used.

At the recent exhibition, a word with a well-known northern stockist revealed that he recommended using 100 ohm resistors. This being done, an SWR of 1 : 1 was obtained. It would therefore appear that the value of 100 ohms gives the correct reading.

I would be very interested to hear from anyone having one of the original 75 ohm bridges, in order to find the resistor values specified in the circuit diagram.

* Hansen, S.W.R. Bridge, Page 571 September 1967.

### Thanks!

*From: W. J. Robinson, Warwick.*

Some months ago I advertised in your " Wanted " columns for an AR88D " S " meter.

By the same post that I received my copy of *Radio Communication* I also received a small parcel containing a meter together with a typed note giving instructions for installing it.

But there was no indication as to who had sent it and although I have waited some time and questioned all my friends, I still have no idea as to who my unknown friend is.

May I therefore through your columns, thank him and ask him to write me so that, at least, I can thank him personally.

I have known for a long time that Radio Amateurs are a jolly good crowd but this is carrying kindness a bit too far.

### Our Ten Commandments

*From: J. Creedy, A6012, Ramsey, Huntingdon.*

I should like to propose ten new commandments for the attention of amateur's everywhere regardless of race or creed.

1. Thou shalt not cause TVI.
2. Thou shalt pay for the damaged S meter of the SWL across the road.
3. Thou shalt transmit thine call-sign every 15 minutes.
4. Thou shalt keep clear of 3600 kHz on Sunday mornings.
5. Thou shalt not splatter.
6. Thou shalt check thine QRG in Hertz.
7. Thine carrier shalt not drift.
8. Thou shalt not wind coils on the XYL's rolling pin.
9. Thou shalt be kind to SWLs.
10. Thou shalt not covet thine neighbour's 100 ft. steel tower, nor his KW2000A, nor anything that is his.

Repent ye sinners before next year's NFD!

### Hospitality

*From: D. R. Kelly, W7NXJ ex GM5AFF*

I would like to take this opportunity to thank the many members of the RSGB who have given so freely of their time and experience to make my stay such a pleasant one. I have indeed felt at home here and find it very difficult to leave such pleasant surroundings.

I am particularly indebted to Messrs L. Hardie, GM2FHH, C. F. Sherrit, GM3EOJ and W. M. Beattie, GM8AT, and to Messrs A. S. Thomas, GW3AX and T. Hall, CN8AW whose interest and courtesy permitted me to take part in many pleasant evenings of chasing the elusive DX on 80 and 40m, and last but certainly not least, to the CHC Chapter 8 members for many memorable Sundays on 40m.

My retirement from the service will permit me to be quite active. I shall look forward to hearing you all from W7-land. I hope to remain a member of the RSGB indefinitely.

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## MODERN ENGLISH MISUSAGE

*With apologies to that eminent authority H. W. Fowler.*

*Long wire.* 68 ft. on Top-Band, equivalent to 8½ ft. on 20m. Verb. sap?

*10 watts.* Zero means nothing, so what the hell if I put one or two more on? I can then proudly (?) display my " W " QSL on 160.

*About QRU.* I have said all the useless things, so there is no longer any point in saying something useful.

*HI! I* think it amusing, but I don't trust your receiver to reproduce a chuckle (I haven't indigestion).

*Sinusoidal Tone.* As a repetitive waveform can be analysed into harmonically related sine-waves, I can construct as I speak with files, saws and hammers, and still observe licence regulations.

*Break-Break.* I stutter, and its a good excuse for giving my call every hour or so.

*Net.* More than two stations in contact. Others join in geometric progression, and I diary my next turn for Tuesday next.

*—and now searching for a possible call.* That'll shake you when the impossible reply comes back!

*QRX 1.* Chinese equivalent of " Stand-by." Euphemism for " must or bust." Usually means QRX 10, whatever that is.

*Blower.* No connection with the land-line. Just thawing out a frozen mike. A whistle almost as effective.

*599.* Beautiful signal, but please repeat. Your sand-paper note makes difficult copy.

*Final.* I am in a hurry, so don't make *your* final longer than 30 minutes. If that's too short, you can always make a final-final-final.

*V.H.F. Opening.* Cheers! All zones have disappeared, and we can all migrate to the l.f. end, and fight our way through the jungle.

*RSGB*.* No more bricks needed. Enough received for building several new HQ's.

* The writer has compiled this list, not entirely with " tongue in cheek," so what about a few bouquets for the hard-working staff, and those who give unstinting voluntary help? (Your scribe is not scratching his own back, and is only an ordinary member.)

# CLUB NEWS

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

## REGION 1

**Merseyside Members**—Several members have suggested the formation of a Liverpool Luncheon Club. After a long search, a venue has been found where a private room would be available, where local members could meet once a month for lunch. Prices quoted are very reasonable. Would anyone interested, please write to the Region 1 Representative, G2AMV, 1 Waterpark Road, Prenton, Birkenhead.

**Ainsdale (ARC)**—6, 20 November, 4 December, 8 p.m., "Morris Dancers," Scarisbrick.

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

**Ashton under Lyme (AUL & DARS)**—Fridays, 7.30 p.m., Stamford Street, Stalybridge.

**Blackburn (ELARC)**—7 November, 5 December, 7.30 p.m. YMCA, Limbrick, Blackburn.

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

**Bury (B & RRS)**—The next meeting of the club takes place on 12 November at 8 p.m. at the George Hotel, Bury, and will be a constructional competition and quiz. The East Lancs Radio Society will be our guests for the evening to judge the event, so let's see plenty of entries from the Bury lads including our young SWL's for whom a special prize is usually set aside. As usual we are expecting a rush of people wanting to take part in the quiz but we are afraid that once again it will have to be limited to the four most intelligent lads in the club!

**Cheshire (Mid-Cheshire ARC)**—Wednesdays, 7.30 p.m., Oak House Farm, Beeston Drive, Over, Winsford. 7.30-8 p.m. Slow Morse tuition.

**Chester (C & DARS)**—Tuesdays, 8 p.m., YMCA.

**Crewe & District**—No meetings will be held for the time being as no accommodation is available. However, the Area Representative, Mr. R. Owen, 10 Circle Avenue, Willaston, Nantwich, will welcome visitors at his home.

**Eccles (E & DRC)**—Tuesdays, 8 p.m., Patricroft Congregational School, Shakespeare Crescent, Patricroft. Thursdays, 8.30 p.m., Club Top Band net

**Leyland Hundred Amateur Group**—Thursdays, weekly net, 19.15 GMT (1·915 MHz).

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

**(NLRC)**—8, 22 November, 6 December, 8 p.m. Landsbury House, 13 Crosby Road South, Liverpool 22. Please note address of new Secretary, who is: R. Simmons, *G3PNS*, 62 Daneville Road, Liverpool, L4 9RG.

**Macclesfield (M & DRS)**—5, 19 November, 3 December, 8 p.m., The George Hotel, Jordangate.

**Manchester (M & DARS)**—Wednesdays, 7.30 p.m., 203 Droylsden Road, Newton Heath, Manchester 10. Hon. Secretary, G. Tillson, *G3TJX*, 95 Kelverlow Street, Oldham, Lancs.

**(SMRC)**—Fridays, 8 p.m., Conservative Association Divisional Office, 449 Palatine Road, Northenden, Manchester 22.

**North West V.H.F. Group**—12 November (A.G.M.), 50 Great Ancoats Street, Manchester. Although still without a permanent Headquarters it is possible that by the above date the Group will have news of a more permanent location. Also more details will be available about the caravan acquired for use in contests and for expeditions. Secretary *G3FNM*, Tel: 061-973 1472.

**Preston (PARS)**—14, 28 November, 12 December, 7.30pm., (Private Room), "Windsor Castle," St. Paul's Square.

**St. Helens (SES)**—12, 26 November, 10 December, 7.30 p.m., IVS Centre, 55 College Street, St. Helens.

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

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

**(SRS)**—13, 27 November, 11 December, 8 p.m., Royal Oak Hotel, Castle Street, Edgeley; new Members are always welcome.

**Warrington-Culcheth (CARC)**—Fridays, 7.30 p.m., Chat Moss Hotel, Glazebury. All visitors will be welcome. Secretary—K. Bulgess, 32 Hendon Street, Leigh.

**Westmorland**—15 November, 6 December 7 p.m., The Allen Technical College, Sandes Avenue, Kendal.

**Wirral (WARS)**—First and third Wednesday of each month, 8 p.m. Former Civil Defence Headquarters, Upton Road, Bidston, Birkenhead. The entrance to the new Headquarters is marked by an electricity sub-station between Thermopylae Pass Footpath and Noctorum Lane. Please note Saturday, 30 November, 1968, the Annual Dinner at The Eagle and Crown Hotel, Upton.

## REGION 2

**Barnsley (B & DARC)**—8, 22 November (Lectures to be announced). Meetings second and fourth Fridays, 7.30 p.m., King George Hotel, Peel Street, Barnsley. New members made welcome.

**Hull (H & DARS)**—8 November (Tape Lecture), 15 November ("Linear Amplifiers" by G3OHT), 22 November (Rx Comparison, Part III), 29 November ("Natural Gas Exploration," by G3FCY), 7.45 p.m., 592 Hessle Road, Hull.

**Northern Heights**—20 November ("Sound Recording," by Mr. Thislethwaite), 4 December ("Osciloscopes," by L. M. Dougherty), 11 December (Annual Dinner), Mr. and Mrs. J. Petty, G4JW will be guests of honour, 18 December ("Economics of the Shack Layout," by G. Theasby G8BMI), 1 January 1969 ("Radio Navigational Aids for Civil Aviation," by Mike Fisher, G3UBI), 7.45 p.m., Sportsman Inn, Ogden, Nr. Halifax. Visitors are very welcome.

**Otley (ORS)**—Meetings held every Tuesday at Club premises in Otley. The Society has its own call-sign (G3XNO) which is on 160m every Tuesday and sometimes at weekends.

Four members recently passed the RAE and are now learning Morse while another nine members are running an RAE course for next May's examination.

On the 10 September an open meeting was held welcoming wives and friends of members, forty people in all being present. Members had been making Radio and Electronic equipment for several months to enter the Constructional Competition which was judged by three visitors during the evening.

Further details about the Society are available from the Publicity Officer, M. T. Scorge-Powell, G3NNO, 82 Forest Avenue, Starbeck, Harrogate.

**Scarborough (SARS)**—7.30 p.m., Thursdays, c/o RAF Association, Fulbeck House, 3 Westover Road, Scarborough.

**Spen Valley (SPARS)**—7 November (Sale of Surplus Equipment

and trade demonstration by G4MH), 14 November (" RTTY " by D. M. Pratt, G3KEP), 28 November (" Modern Receivers " by I. Lamb, G6LD, President of the Society), 7.30 p.m., The Grammar School, High Street, Heckmondwike. A visit is arranged for 21 November to the newly opened " Radio Leeds," where alas only a limited number will be allowed.

**York (YARS)**—8 November (visit to BSC). Sugar Factory, Poppleton), 27 November (Christmas Dinner at The Ainsty Hotel, 8 p.m.), Meetings Thursdays 7.30 p.m., British Legion, 61 Micklegate, York.

## REGION 3

**Birmingham (MARS)**—Third Tuesday in the month 7.45 p.m., 19 November (" Colour Slide show USA "), Midland Institute, Margaret Street, Birmingham 3.

**(Solihull ARS)**—Third Thursday in each Month 7.30 p.m. Mason's Arms High Street, Solihull.

**(South)**—6 November (G5PP on "Mobile Working") The Scout Hut, Pershore Road, (Opposite Bob's Cafe) Selly Park, Birmingham 29.

**Bromsgrove (B & DARC)**—8 November (Talk on Mobile Equipment), 29 November Club Xmas Dinner. Co-op Hall 8 p.m.

**Coventry (CARS)**—1 November (Night on the Air), 8 November (Tape Lecture G2YS " World at their Finger-Tips "), 15 November (Night on the Air), 22 November (" Criss Cross Quiz " by G2FTK), 29 November (Night on the Air), Scout Hq, 121 St. Nicholas Road, Radford, Coventry.

**Dudley (DARC)**—5 November, 19 November, 8 p.m., Central Library, St. James Road.

**Hereford (HARS)**—1 November 7.30 p.m. Continuation of Club Project Trinity Hall, Whitecross Road, Hereford.

**Lichfield (LARS)**—4 November (Film), 19 November, 7.30 p.m. Swan Hotel, Lichfield.

**Mid-Warwickshire (MWARS)**—11 November (Film Show), 18 November (Visit Printed Circuit Board Manufacture), 25 November (Sale of Surplus Equipment), 8 p.m., 28 Hamilton Terrace, Leamington Spa.

**Rugby (RADARAEC)**—Tuesdays and Thursdays each week. (RAE and Morse practice) Wednesday, (RAEN Group) last Tuesday of each month. Full details G3IKL, 103 Clifton Road, Club QTH 10 Drury Lane.

**Salop. (SARS)**—7 November (" Contest Working " by Tom Cashmore, G3BMY) Old Post Office Hotel, Milk St. Shrewsbury.

**Stourbridge (STARS)**—3 November, The Library, Longlands School, Stourbridge.

**Sutton Coldfield (SCARS)**—11 November, 25 November (Natter and Project evening), HQ SCTFC Clubhouse, Coles Lane, Sutton Coldfield.

**Wolverhampton (WARS)**—4 November (" Listening with a General coverage Rx " by G3NOW), 11 November (Natternite), 18 November (Anti-Direction Finding, G6GR), 25 November (Committee Meeting), 2 December ("Transistors in Transmission," N. Lockley), Neachells Cottage, Stockwell Road, Tettenhall.

**Worcester (W & CARC)**—9 November (A history of Radio), 16 November (Amateur Radio as my Window), 27 November (World Wide Telecommunications), 6 December (Annual Dinner), 7.30 p.m., 25 Perdiswell Park, Droitwich Road, Worcester.

## REGION 4

**Burton on Trent (BoT ARS)**—Details from *G3ACR*.

**Chesterfield (C & DARS)**—Annual Dinner and Social Evening, 11 December. Details from *G3VDI*.

**Derby (D & DARS)**—6 November (Surplus Sale), 13 November (Club Inventory in Sub-Basement), 20 November (Open Forum), 27 November (The Year in retrospect, Members Slides and Films), 7.30 p.m. Room No .4, 119 Green Lane, Derby. The Society's fully paid membership is now 206 with 104 holding transmitting Licences. Activity at present is centred on the general contest which commenced 26 October and will continue each weekend, Saturdays 20.00 to 22.00 and Sundays 14.30 to 16.30 clock time until 1 December, the object being to contact all Club Members. *G2CVV*.

**Grimsby (GARS)**—Thursday 8 p.m., North Lincs Photographic Society's Room, back of 50 Welholme Road, Grimsby. *G3RSD*.

**Heanor (TSEDRS)**—5 November (Closed), 12 November (Demonstration of Electronic Organ by G3KTP), 19 November (Films), 26 November (" Circuit Board Technique " by E. E. West), 7.30 p.m., Club Room, South East Derbyshire College of Further Education Ilkeston Road, Heanor, Derbys. *G2LGK*.

**Leicester (LRS)**—Mondays 7.30 p.m., Sundays 10.30 a.m., The Club Rooms, Gilroes Estate Cottage, Groby Road, Leicester. *G3UQX*.

**Lincoln (LSWC)**—Tuesdays 7.30 p.m., No. 2 Guardroom, Sobraon Barracks, Breedon Drive, Loncoln. *G8BSS*.

**Mansfield (MARS)**—First Friday in each month 7.45 p.m., New Inn, Westgate, Mansfield. *G8HX*.

**Melton Mowbray (MMARS)**—21 November, 7.30 p.m., St. Johns Ambulance Hall, Asfordby Hill, Melton Mowbray. *G3FDF*.

**Newark (NSWC)**—Mondays, Thursdays, 7.30 p.m., Guildhall, Guildhall Street, Newark. *G3TWV*.

**Nottingham (ARCN)**—Tuesdays, Thursdays, 7.30 p.m., Room No. 3, Sherwood Community Centre, Woodthorpe House, Mansfield Road, Nottingham. *G3SRX*.

**Peterborough (P & DARS)**—First Friday in month, Lecture or Demonstration in the Electronics Section at Peterborough Technical College, Eastfield Road, 7.30 p.m. Other Fridays meet at the Club HQ in the Old Windmill, behind the Peacock Inn, London Road, 8 p.m. onwards. *G3KPO*.

**Worksop (NNARS)**—Tuesdays, Thursdays, 7.30 p.m., Club Room, Gateford Road, Worksop. *G8ON*.

## REGION 5

**Bedford (B & DARC)**—Particulars of meetings from Ken Whitbread, *G3ADU*, 78 Pipit Rise, Bedford. Headquarters, " The Dolphin Inn," The Broadway, Bedford.

**Bishops Stortford (BS & DARC)**—18 November (Third of three Lectures on Receivers), Monday at 8 p.m., British Legion Club, Windhill, Bishop's Stortford, Hertfordshire.

**Cambridge (C & DARC)**—1 November (Informal), 8 November (Demonstration of Hi-Fi Equipment by Mike Dighton—G3TEJ), 15 November (Informal), 22 November (Reserved for Amateur TV Demonstration), 29 November (Informal), Fridays, 7.30 p.m., Club Headquarters, Corporation Yard, Victoria Road, Cambridge.

**(CUWS)**—12 November (Talk from Transmitter Planning and Installation Department of the B.B.C.), 26 November (" Amateur 'Moonbounce' Work" by Peter Blair, G3LTF), Alternate Tuesdays, 8.15 p.m., Psychology Department Lecture Room, Downing Site.

**Dunstable Downs Radio Club**—Alternate Fridays, 7.30 p.m., The Star and Garter, High Street South, Dunstable, Bedfordshire.

**March (M & DRAS)**—Tuesdays, 7.30 p.m., Old Police Headquarters, High Street, March, Cambridgeshire.

**Shefford (S & DARS)**—7 November (" Constructing Air-Spaced Coils " by G2DPQ), 14 November (" Transistor Transmitters " by G3ROL), 21 November (Any Questions and Judging of Constructional Competition), 28 November (Film on Car Testing, G3TDW), 30 November (Annual Dinner).

## REGION 6

**Cheltenham (RSGB Group)**—First Thursday in each month, 8 p.m., Great Western Hotel, Clarence Street, Cheltenham, 7 November (Talk by G3TR, President of the RSGB). *G3TVW*.

**Chiltern (CARC)**—Last Thursday in each month, 8 p.m., British Legion, St. Mary's Street, High Wycombe, Bucks.

**Gloucester (GRC)**—Second and fourth Thursdays in each month, 7.30 p.m., Lamb Inn, Market Parade, Gloucester.

## REGION 7

**Acton, Brentford, Chiswick (ABCRC)**—19 November (Demonstration of Audio Waveforms and Stereo), 7.30 p.m., Chiswick Trades and Social Club, 66 High Road, Chiswick.

**Addiscombe (AARC)**—Second and fourth Tuesdays in each month, 7.30 p.m. 148 Lower Addiscombe Road (Toc H Hall).

**Ashford (Middx.), (Echelford ARS)**—11 November, 28 November (Slide Show of Echelford Shacks), St. Martins Court, Kingston Crescent, Ashford.

**Barking (B & DEC)**—Tuesdays and Thursdays, 7.30 p.m., Gascoigne Recreation Centre, Gascoigne School, Morley Road, Barking, Essex.

**Bexleyheath (NKRS)**—14 November (" Modern Developments in Professional Communications " by G3FRB), 28 November,7.30 p.m., Congregational Hall, Chapel Road, Bexleyheath.

**Chingford Group**—Fridays. For details of meetings telephone 01-524 0308.

**G3RVM being presented with the Grafton Top Band Contest winner's certificate by G3TR.**

**Chingford (SRC)**—Fridays, 8 p.m., except the first Friday in the month, Friday Hill House, Simmons Lane, Chingford, E4.
**Civil Service Radio Society**—Meetings are held on the first and third Tuesdays of each month. 19 November, 7 p.m., (Computers) at Charles House, Kensington High Street, London, W.8. *Membership is open to all Civil Servants and similar employments and is WORLD WIDE.* Members have undertaken to provide an article per issue for the *Newsletter*, so no more headscratching for the Editor Car parking is convenient, and free, after 6 p.m. or 6.30 p.m., dependent upon site. Meetings begin at 6.30 p.m. for 7 p.m., at The Civil Service Sports Centre, Monck Street, London, S.W.1. Details from, G3KGM, 52 Pinewood Avenue, Sidcup, Kent. Tel: 01-300 0767.
**Croydon (Surrey RCC)**—Tuesday is 4m net night on 70·5 MHz, at 9 p.m., Blue Anchor, South End, Croydon. *G3KGA.*
**Crystal Palace (CP & DRC)**—16 November (" Electronic Colour Sorting " by G3GWD), 21 December (Hi-Fi Evening), Emmanual Church Hall, Barry Road, E. Dulwich, S.E.22.
**Dorking (DR & DRS)**—12, 26 November, " Wheatsheaf," Dorking.
**Ealing (E & DARS)**—Tuesdays, 8 p.m., Northfields Community Centre, Northcroft Road, W.13.
**East London**—17 November, (" S.S.B." by G3RNL), 2.30 for 3 p.m., Wanstead House, The Green, E11. Full details may be obtained from G3AAJ.
**Edgware and Hendon (EADRS)**—11, 25 November, 8 p.m., St. Georges School, Flower Lane, Mill Hill, NW7.
**Gravesend (GRS)**—Third Wednesday of each month, 8 p.m., RAFTA Club, Overcliff Road, Gravesend.
**Guildford (G & DRS)**—8 November (Constructional Contest), 22 November (Members Films), 8 p.m., Guildford Engineering Society in Stoke Park.
**Hampton Court (TVARTS)**—First Wednesday in each month, 7.30 p.m., Cardinal Wolsey, Hampton Court.
**Harlow (H & DRS)**—Tuesday (General), Thursdays (c.w. practice), Fridays (Seniors), Mark Hall Barn, First Avenue.
**Harrow (RSH)**—8 November (Practical), 15 November (Lecture), 22 November (Practical), Roxeth Manor School, Eastcote Lane, Harrow.
**Havering (H & DARC)**—6, 20 November, 8 p.m., British Legion House, Western Road, Romford, Essex.
**Hemel Hempstead (HH & DARS)**—15 November, 8 p.m., Rucklers Lane Hall, Kings Langley.
**Holloway (GRS)**—Grafton Radio Society held their A.G.M. on Friday 27 September, at which the following officials were elected: President (G2CJN), Hon. Chairman (BRS 25779), Hon. Secretary (BRS 27678), Hon. Treasurer (BRS 11584), Committee—G3AFC, G3MFO, G3ONS, G3THQ. Mondays, 7 p.m. (RAE), Wednesdays 7.30 p.m. (Morse), Fridays, 7.30 p.m. (Club), Montem School Hornsey Road.
**Kingston (K & DARS)**—Second Wednesday in each month, 8 p.m., Penguin Lounge, 37 Brighton Road, Surbiton.
**Leyton & Walthamstow**—Tuesdays, 7.30 p.m., Leyton Senior Institute, Essex Road, E10.
**London U.H.F. Group**—First Thursday each month, White Hall Hotel, Bloomsbury Square' Holborn, WC1.
**Maidenhead (M & DARC)**—19 November, 7.30 p.m., Victoria Hall, Cox Green, Maidenhead.
**New Cross (CARS)**—8 November (Quiz, G8 v. G3), 22 November (" Frequency Synthesizers " by G3FVG), 8 p.m., 225 New Cross Road, London, SE14.
**Norwood and South London**—See Crystal Palace.
**Paddington (P & DARS)**—Thursdays, 7.30 p.m., Beauchamp Lodge, 2 Warwick Crescent, W2.
**Purley (P & DRS)**—First and third Thursdays each month, 8 p.m., Railwaymens Hall, 58 Whytecliffe Road, Purley.
**Reigate (RATS)**—First Thursday in each month, 7.45 p.m., George and Dragon, Cromwell Road, Redhill.
**Romford (R & DRS)**—Tuesdays, 8.15 p.m., RAFTA House, 18 Carlton Road, Romford.
**Scouts (Kensington)**—21 November (Junk Sale), 7.30 p.m., Baden Powell House, Queensgate, South Kensington, SW7.
**Sidcup (CVRS)**—7 November (" Recent Developments in Semiconductor P.A.s " by G3FRB), 5 December (" Moonbounce " by G3LTF), Congregational Church Hall, Court Road, Eltham, London SE9. On the 21 November (Natter Night), All Saints Church Hall, Bercta Road, New Eltham, SE9.
**Southgate (SRC)**—Parkwood Girls School (behind Wood Green Town Hall).
**St Albans (Verulam ARC)**—20 November (" V.H.F. Construction," by G8ASP).
**Stevenage (SDARS)**—First and third Thursdays, 8 p.m.
**Sutton & Cheam (SCRS)**—19 November, 8 p.m., The Harrow Inn, High Street, Cheam.
**Welwyn (Mid Herts ARS)**—Welwyn Civic Centre, Welwyn.
**Wimbledon (W & DRS)**—8 November (Film Show), 8 p.m., St John Hall, 124 Kingston Road, South Wimbledon SW19.
**Wembley (GECARS)**—Thursdays, 7.30 p.m. The Club is open to non GEC employees by invitation. Telephone ARNold 1262 first. Sports Club, St Augustin Avenue, North Wembley.

## REGION 8

**Crawley (CARC)**—The recent lecture by " Dud " Charman (G6CJ) produced a record attendance of 76, and a total of over £15 was realized for the RSGB HQ Fund. Members of the Crawley Club co-operated with Reigate Amateur Transmitting Society members in arrangements for the RSGB Exhibition Station to operate from the Crawley Club station. Signals from and to GB3RS in London were relayed by 2m/70cm duplex link to the G3WSC site at Crawley, where the 10/15/20m transmitters and receivers were located. 27 November (" History of Radar," by G. C. Woods), Trinity Congregational Church Hall, Ifield, Nr. Crawley, Sussex.
**Mid-Sussex (MSARC)**—7 November (" RTTY," by G3FRV), 21 November (Details from G3RXJ), 7.45 p.m., Marle Place Further Education Centre, Leylands Road, Burgess Hill.
**South Coast (South Coast V.H.F. Group)**—Details from *G3JHM.*
**Worthing (W & DARC)**—Rose Wilmot Youth Centre, Worthing.

## REGION 9

**Bristol Group**—18 November (" Three Band U.H.F. Transmitter," by E. Robinson, G3TWT), 7.30 p.m., Becket Hall, St Thomas Street, off Victoria Street, Bristol 1. The recent lecture by H. E. Perkins, G3NMH, of Swindon may solve a few problems for the Bristol members who proved a very attentive audience on the problems of working Dx. The Bristol-MARS Annual Contest is being revived again this year. Bristol area members are reminded that the December meeting is the AGM on 9 December when reports are presented and the Committee is elected for 1969. *G3PFD.*
**BARC**—Mondays and Thursdays, from 7.30 p.m., University Settlement, 41 Ducie Road, Barton Hill, Bristol 5. *G3WLZ.*
**Cornwall (CRAC)**—7 November (" Go fly my kite," by Edna Cooper, G3UGO, and " My African experience," continued by G3WJP), South Western Electricity Board Social Centre, Pool, Camborne.
**S.S.B. Group**—Second Thursday in each month.
**V.H.F. Group**—Third Thursday in each month, both 7.30 p.m., Barley Sheaf, Truro. *G3OCB.*
**Exeter (EARS)**—First Tuesday in each month, 7.30 p.m., George and Dragon, Blackboy Hill, Exeter. *G3HMY.*
**Plymouth (PRC)**—First and Third Tuesday in each month, 7.30 p.m., Virginia House, Bretonside, Plymouth. The Club are holding their Annual Dinner on 9 November, details available from G3SCW, venue is the Davie Hall, North Hill, Plymouth. *G3UQF.*
**Saltash (S & DRC)**—Burraton Toc H Hall, Warraton Road, Saltash. *G3UBY.*

**South Dorset (SDARS)**—First Friday in each month, 7.30 p.m., Labour Rooms, West Walk, Dorchester. At the September meeting, G3VPF gave a talk on X Band gear and demonstrated a home-built portable transceiver for this band. The Club operated four bands on V.H.F. Field days. *G3BKV*.
**Torquay (TARS)**—Every Tuesday and Friday, 7.30 p.m., Club nights, Monthly Club meeting the last Saturday in each month, 7.30 p.m., Club Headquarters, Bath Lane, rear of 94 Belgrave Road, Torquay. *G3VNG*.
**Taunton Group**—8 November, 7.30 p.m., Lecture Theatre, Taunton Technical College. *G3WNV*.
**Wells (WARS)**—Mondays from 8 p.m., EMIE Sports Club, Chamberlain Street, Wells. *G3MQQ*.
**Weston super Mare (WSM ARS)**—First Friday in each month, 7.30 p.m., Westhaven School, Ellesmere Road, Uphill, Weston super Mare. *G3GNS*.
**Yeovil (YARS)**—Wednesdays, 7.30 p.m., Park Lodge, The Park, Yeovil. The Club entered V.H.F. Field Days with a station working 2m, 70cm and 23cm. Before the site could be entered, the Club had to wait for the field of corn to be harvested hence a late start was made. A Club visit was made to the London exhibition. *G3NOF*.

### REGION 10

**Blackwood (ARC)**—Fridays, 7.30 p.m., Headquarters, off High Street, Blackwood, Mon. Further details from the Secretary, F. Mudford, 3 Albany Road, Blackwood, Mon.
**Barry College of Further Education (ARS)**—Thursdays, 7 p.m., at the College, Colcot Road, Barry, Glam.
**Cardiff (RSGB) Group**—Monday, 11 November, 7.30 p.m., Film Show, T.A. Centre, Park Street, Cardiff.
**Llanelli Boys' Grammar School (ARS)**—Meetings at the School on Fridays, 3.30 p.m.
**Pontypool (ARC)**—Tuesdays, 7 p.m., at the Educational Settlement, Rockhill Road, Pontypool, Mon.
**Pembroke (ARC)**—Friday, 29 November, Defensible Barracks, Pembroke Dock at 7.30 p.m.
**Rhondda (ARS)**—Pengelli Hotel, Treorchy. Details from the Secretary, Cyril Parry, 34 Caer Gwerlas, Tonyrefail, Glam.

### REGION 11

**Rhyl (R & DARC)**—Second Tuesday in each month. Rhyl's Silver Band Room, Windsor Street, Rhyl.

### REGION 12

**Aberdeen (AARS)**—15 November (2m Activity), 22 November (Presidential Address), 29 November (Quiz Night), 7.30 p.m., 6 Blenheim Lane, Aberdeen.
**Moray Firth (MFARS)**—Further details from GM3IAA.

### REGION 13

**Border Area**—Members in the Scottish Border Area are asked to contact George Shankie, GM3WIG, 8 Ettrick Terrace, Harwick, who has recently formed a Club to cater for amateurs in this area.
**Edinburgh (Lothians RS)**—14 November (Visit to Hewlett Packard), 28 November (Junk Sale), 7.30 p.m., YMCA, 14 South St. Andrew's Street, Edinburgh, *GM3VBB*.

### REGION 14

**Glasgow (Glasgow University RC)**—8 November, 7.30 p.m., Engineering South Building, University of Glasgow.
**Greenock (G & DARC)**—8, 22 November, 7.30 p.m., Arts Guild, Campbell Street, Greenock.
**Lowland Royal Signal Group (LRSG)**—5, 19, November 7.30 p.m., 21 Jardine Street, Glasgow.
**Mid-Lanark RSGB Group**—15 November (" Pye Equipment " by P. Harrison), 7.30 p.m., YMCA, Brandon Street, Motherwell.

### REGION 15

**Bangor (B & DARC)**—First Friday in each month, Silverstream Unionist Hall, Belfast Road, Bangor, Co. Down. Further details from GI3OLJ.

**Ulster (Mid-Ulster RSGB Group)**—Temperance Hall, West Street, Portadown. Further details from GI3ILV.

### REGION 16

**Gt. Yarmouth (GYRC)**—Fridays 7.30 p.m., 98 Southmarket Street, Gt. Yarmouth.
**Ipswich (IRC)**—27 November, (Meters) 7.30 p.m. M. Wicks, Red Cross HQ, Gippeswyk Avenue, Ipswich.
**Norwich (NARC)**—4 November (Junk Sale), 11 November (Informal Meeting), 18 November (V.H.F. Modulation Checking), 25 November (Film Show), 2 December (Exhibition of Members' Equipment), 7.30 p.m., The Clubroom, Brickmakers Arms, Sprowston Road, Norwich.

### REGION 17

**Farnborough (F & DRS)**—12 November (Junk Sale), 26 November (A.G.M.), 7.30 p.m., Railway Enthusiasts Clubrooms, 310 Farnborough Road, Farnborough, Hants.
**Swindon (S & DARC)**—6 November (Informal with lecture on " frequency measurement "), 20 November (Lecture by members of Oxford and DARS), Penhill Jun.

### LATE NEWS

**The PMG has announced changes to 4m and 70cm w.e.f. 1st November 1968. The band limits are now 70·025 to 70·7 MHz, 425–429 and 432–450 MHz.**
**Full details on GB2RS.**

# Radio Society of Great Britain

(FOUNDED 1913) (INCORPORATED 1926)

PATRON H.R.H. THE PRINCE PHILIP, DUKE OF EDINBURGH, KG

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* I hereby apply for election as a Corporate Member of the Society and enclose a remittance for £2/10/- being the amount of my first annual subscription.

* Being under 21 years of age and not holding a current Amateur Radio Transmitting Licence I hereby apply for election as a Non-Corporate (Associate) Member of the Society and enclose herewith a remittance of £1/5/- being the amount of my first annual subscription.

I, the undersigned, agree that in the event of my election to Membership of the Radio Society of Great Britain, I will be governed by the Memorandum and Articles of Association of the Society and the rules and regulations thereof as they now are or as they may hereafter be altered; and that I will advance the objects of the Society as far as may be in my power; providing that whenever I shall signify in writing to the Society addressed to the Secretary that I am desirous of withdrawing from the Society I shall at the end of one year thereafter after the payment of any arrears which may be due by me at that period to be free from my undertaking to contribute to the assets of the Society in accordance with Clause 8 of the Memorandum of Association of the Society.

**Date**..... **Signed**.....

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**PERSONAL DETAILS TO BE COMPLETED BY THE APPLICANT**

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| **Echelford BI/4** transmitter for 4 metres | 30 | 0 | 0 |
| **Echelford MI/4** transmitter (mains or mobile) | 40 | 0 | 0 |
| **Echelford CI/4** 4 metre converter | 10 | 10 | 0 |

Full range of **Drake Equipment** available to order.
Full range of **Heathkit Equipment** available to order.

**Cedar Radio Company:**

| | £ | s. | d. | | £ | s. | d. |
|---|---|---|---|---|---|---|---|
| **CR.70A** receiver | 19 | 10 | 0 | **CR.45RB** | 11 | 7 | 0 |
| **PR30** | 5 | 10 | 0 | **AR5** transmitter | 16 | 10 | 0 |
| **PR.30X** | 7 | 4 | 0 | **250 volt P.S.U.** | 8 | 0 | 0 |
| **R.Q.10** | 6 | 15 | 0 | **12/MS** P.S.U. | 11 | 5 | 0 |
| **R.Q.10X** | 8 | 8 | 0 | **12/RC** control | 2 | 7 | 6 |
| **CC.40** | 6 | 10 | 0 | **T28** receiver | 15 | 10 | 0 |
| **CR.45K** | 9 | 10 | 0 | **Mini-Clipper** | 1 | 19 | 6 |

**Pertridge Electronics:**

| | £ | s. | d. |
|---|---|---|---|
| Joystick std. | 4 | 15 | 0 |
| Joystick de-luxe | 5 | 19 | 6 |
| Type 3 tuner | 2 | 15 | 0 |
| Type 3A tuner | 3 | 12 | 6 |
| Type 4 tuner | 4 | 4 | 0 |
| Type 4RF tuner | 6 | 6 | 0 |

**Shure Microphones**

| | £ | s. | d. |
|---|---|---|---|
| Shure 201 | 4 | 10 | 0 |
| Shure 202 | 5 | 0 | 0 |
| Shure 444 | 10 | 12 | 6 |
| Shure 401A | 5 | 10 | 0 |
| Shure 275SK | 4 | 2 | 6 |

**SECOND-HAND EQUIPMENT**

Many items in stock including: LG-50, Tiger TR100, DX-100, SB10, K.W.76, K.W.77, 840C's, etc. Your enquiries please.
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**Telephone: Coventry 22714**
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## WANTED (contd.)

**I NEED THE FOLLOWING HEATHKIT** equipment in " as new " condition, complete with manuals. Power supply IP-20U. Oscilloscope IO-12U. Transistor g.d.o. XGD-1. Reflected power meter HM-11U. Evans, 4 Gower Crescent, Baglan, Port Talbot, Glam.

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**10-28 Underwood Street,**

**London N.1.**

**EXPERIENCED** Television service engineer required. Summer holiday honoured. Phone for appointment. REM Radio, Ashford (Middx.) 53336.

**ALVAR-POLARON LTD.,** require ELECTRONICS TECHNICIANS qualified to at least ONC standard having at least three years experience in the electronics industry. Applicants should be capable of working with minimum supervision on various types of transistorized equipment. Apply in writing: R. B. Reeson, Alvar-Polaron Ltd., 4 Shakespeare Road, Finchley, London, N.3.

## MEMBERS' ADS—*continued*

Antenna noise bridge transformer toroids and data 6s. or 4 for £1. Wound toroid, 3 transistors, zener diode and data for £1. 2N2369, 650 MHz 5s., 5 for £1. All post free. M. Mann, G8ABR, 71 Queens Rd., Tewkesbury, Glos. Tel. Tewkesbury 2476 (day).

Labgear Topbander E5051 £17. TE149 Wavemeter p.s.u., manual, packing case, £8. R220 4m £3. R220 2m front end £3. 6CW4 preamp. 12s. 6d. Prefer byr. cllcts. T. Butler, G3FNV, Deva Edina, Whitechurch Rd., Christleton, Chester. Tel. Chester 25357 (after 6 p.m.)

Codar Mobile AT5, T28, 12 MS p.s.u., 12 RC, 160m whip, as new £35 o.n.o. Pye Ranger, high band on 2m, offers. Wanted 2m converter. G. Wright, G3VUF, 12 The Kylins, Morpeth, Northumberland.

R1155 wkg. order, handbook, also selection of Jones plugs, but less p.s.u., any reasonable offer, byr. cllct. or carriage extra. A. Senior, G3TZI, Park View, Bilsby, Alford, Lincs. Tel. Alford 3489.

*RSGB Bulletins* 1958/60/61/62/67, *QST* 1958–66, 6d. ea. plus postage. Johnson roller coaster, 2½ in. dia. inc. h.v.c. £3. Heathkit valve voltmeter V7AU, factory wired £12. Both plus carriage. Wylie (pp late G3MEF), 17 Manor Park, Barnstable, Devon. Tel. Barnstable 2665.

Cosser 339DB scope £11. Cosser 1039M scope £6 in wkg. order. KW 160m tx, exlnt. cond. £15. All plus carriage, prefer byr. cllcts and inspects). R. Jones, G3PIX, 24 Forest Ave., Forest-Hall, Newcastle-upon-Tyne, NE12 9AH. Tel. Newcastle 665334.

Quantities of surplus valves, QQVO6–40A 12s. 6d., QQVO3–20A 10s. 4X150A 17s. 6d., 2C39A 7s. 6d., U19 3s. 6d., KT88 6s., 813 17s. 6d., 5R4GY 4s., quantities new, OC71, OC70, OC139, OA81, all 1s. ea. A. Papworth, G3WUW, 25 Station Rd., Over, Cambs. Tel. Swavesey 339.

DX100U £50. N. Smith, G3HFO, 7 The Byeways, Surbiton, Surrey. Tel. 01-399 9526.

Heathkit rx 301E and tx 401E, perfect cond., 9 months old, also HO 10E. What offers. N. Jacobs, G3OGB, 41 Queenborough Gdns., Ilford, Essex. Tel. 01-550 1697.

Converter 2m f.e.t., 2 2N3819, 3 OC171 in small diecast box, 9 V operation, i.f. 3·9–5·9 MHz £8. S. Williamson, G3WGU, 3 Beaufort Ave., Bispham, Blackpool. Tel. Blackpool 53126.

No. 38 a.f.v., 2 units 7–9 MHz £4. Wanted Creed 7B or 8B with p.s.u. and t.u. Also any cheap RTTY equipment for SWL. J. Waters, 15A Midmoor Rd., London SW12.

KW201 rx mint £75. CR100/8 gd. cond. £12. Hallicrafters SX140 gd. £20. Wanted Johnson air systems bases and chimneys. c/o G3UDA, Sunny Bank, Oak Lane, Bicton Heath, Shrewsbury. Tel. Shrewsbury 51733.

Sommerkamp FR100B/FL2000B, cost £270, 11 months old, will be sold to nearest offer to £200. Heathkit scope OS1 £10. 2m s.s.b. £15. (Equipment of the late G4MN), c/o G3PDT, 239 Hagley Rd., Edgebaston, Birmingham 16. Tel. Edgebaston 1825.

160/80m tx, p.t.t. mike £13. 1440 V 360 mA transformer £4. 3uF 3000 V paper £2. R1224 £4. R1132 int. p.s.u. £5. 22 set plus vit. p.s.u. £6. Pattern generator £5. W1649 £3. 1986 modulator £1. E180Fs 5s. ea. Carriage extra. P. Brown, G3RAS, 17 Oakdale Drive, Wrose, Shipley, Yorks.

Eddystone 358X 40 kHz to 30 MHz, 10 coils, low breakthrough as tunable i.f., p.s.u., spkr., manual, gd. condx. £15 o.n.o. P. Banbury, Linstead Hall, Imperial College, S. Kensington, London SW7.

Phillips tape recorder type EL3542, 4 track, 3 speed, with mike, slight attention needed to rewind drive, otherwise perfect cond., offers, inspect any time, M. E. Deutsch, G3VJG, 148 London Rd., Kettering, Northants. Tel. 0536-3112.

Heathkit RA1 rx and Codar PR30X preselector, both units in very gd. cond. £32 10s. D. Poulter, G3WHK, 279 Aragon Rd., Morden, Surrey.

## MEMBERS' ADS (Wanted)—*continued*

BC453 Q5er £4 (6s.). Codar RQ10 £4 10s. (3s.). Dual stereo preamp for mag. pickups type TVV46 £5 10s. (2s. 6d.). 4CX250B, base chimney (valve not tested) £3 10s. (2s. 6d.). 4–125A unused £3 10. (2s. 6d.) (postage shown in brackets). P. Godwin, G3RRF, 17 Downs Rd., Epsom, Surrey. Tel. Epsom 21224.

CR150 Marconi double superhet., 2 half lattice filts., 2–60 MHz, clarifier, aerial trim., a.v.c. short/long, gd. cond., £35, byr. cllcts. BC348R rough cond. but OK for experiments £5. A. Pegler, G3ENI 7 Queen Annes Drive, Bedhampton, Havant, Hants. Tel. 070-12 5237.

DST 100 Mk2, 50 kHz to 30 MHz, S-meter, n.l., double conv., functions but needs 88s £15 10s. R1155 cobwebd £3 10s. 18 set exlnt £3 10. Hammerland SP600 £100 o.n.o. G. Barber, G3WQT, Balvarra, 124 Bassett Ave., Bassett, Southampton, SO1 7EZ.

### WANTED

Circt. of Vanguard rx using Geloso 104 drive unit. Can be copied and returned. A. Treanor, G3FZG, 19 York Rd., Great Crobby, Liverpool 25. Tel. 051-924 2642.

Feb. '66 *Practical Wireless*, need not have blueprint. J. W. M. Beveridge, 18 Braeside, Haugh of Urr, Castle Douglas, Kirkcudbrightshire. Tel. Haugh of Urr 279.

Exchange v.h.f. equpmnt. by BCC and GEC, suit. conversion to 4m, for any 160m. or 2m. equpmnt. For sale, TA12C partly modified, not used £3. Crrg. extra. J. W. Thompson, G3WQM, White House, Tellerton, York.

Several Pye Rangers, high band, 12 V, urgently required, all offers considered. I. Richmond, Parkview, 33 Abbey Road, Gt. Malvern, Worcs.

SWL magazines,, *SW Listening*, *Radio Amateur SW News* etc. for period 1946-51. J. St. Leger, G3VDL, Warmbrook House, Long Walk, Chalfont St. Giles, Bucks.

KW77, Viceroy (latest types), el-bug, Pye Reporter or other 2m gear, *RSGB Bulletins* prior to Sept. 1964 (clean and damage free), all gear must be in f.b. cond. H. Pryse, 36 Hart Road, Byfleet, Weybridge, Surrey.

XTALS 8 and 10 MHz preferably FT243. W. Goodwin, G3VDG, 36 Meadow Road, Albridge, Staffs.

Mosley trap. vert. RV4 and RV4RK roof mounting kit, purchased separately if necessary. B. M. Stone, 39 Purrett Road, Plumstead, London SE18.

One rubber tape pressure/pinch wheel for Walter type 404 tape recorder, your price and postage paid. E. Badger, G3OZN, 20 Tennyson Drive, Worksop, Notts.

Eddystone 888 or 888a and Mosley V46, 40-10m, reasonable price and gd. cond. A. Smith, G3SQM, 5 Varnells Terrace, Hambleden, Henley-on-Thames. Tel. Hambleden 443.

Handbook or circuit dia. for Trio 9R59, borrow or buy. B. Bigley, 134 Ridgeway, Wellingborough, Northants. Wellingborough 4530.

S.s.b. tx, G2DAF or w.h.y., any cond. or partly built. A. J. White, G2FCI, 5 Glenmore Rd., St Loyes, Exeter, Devon.

TW4 Communicator or will consider other 70 MHz/M rig. Only interested in 100 per cent working and trouble free gear. D. Haylock, Bowyers, Steepmarsh, Petersfield, Hants.

Rx BC348, 640 or similar, cond. immaterial. J. Francis, G3HGY, 12 Clivesway, Hollycroft, Hinckley, Leicestershire. Tel. Hinckley 4686.

OS1 scope or similar in f.b. cond. D. Woodford, G8IB, 22 St. Swituns Rd., Kennington, Oxford.

Gd. price paid for prop pitch motor in first class cond. with selsyns if possible. A Yates, G3LB, Kancel Acre, Littlethorpe Rd., Ripon, Yorkshire. Tel. Ripon 3033.

Petrol or diesel alternator 110 or 230 V at 0·5 to 1 kW at 50 Hz (/P). K. Birch, G2FOS, 19 Lloyd Drive, Greasby, Wirral. Tel. 051-677 4542.

Supply unit ZE12 for 52 set (Canadian) for a.c./d.c. operation must be complete with line and plug and removable plug for a.c./d.c. operation. R. Bovington, 6 Roberts Lane, Horn Hill, Chalfont St. Peter, Bucks.

Heathkit RG1 or Eddystone EC10 rx, reasonable price and gd. cond. F. Parsons, G3MIX, 96 Blackamoor Lane, Maidenhead. Tel. Maidenhead 26723.

## MEMBERS' ADS (Wanted)—*continued*

Hallicrafter SX27, 45-140 MHz, cond. not important provided major components are complete and set is repairable. G. Rogers, G8ABB, 10 The Laurels, Bletchley, Bucks.

L.p.f., gd. audio amp. and spkr. D. Peach, G3VXS, 56 Basford Park Rd., Mayband, Newcastle-under-Lyme, Staffs.

Handbook or circuit dia. for ex-service rx type 62H by E. K. Cole, (not the 62 set). Will buy or accept for a few days on loan. M. Rollison, 1 Ingleden Cres., Leeds 8. Tel. Leeds 667534.

Service manual and circuit dia. for Wayne Kerr sig. gen. CT53, Ref. No. 10S/16160, offers for sale or loan. J. Brown, 10 Pum-erw Rd., Cardiff, CF4 4PF. Tel. Cardiff 62411.

Will swap 1931-36 amateur mags. for Blakes 1928 " History of Radio Telegraphy and Telephony," *RSGB Bulletin* Aug. 29, Jan. 30, July 33, " RSGB in Wartime," 1939 circular, or sell/buy. F. Herridge, G3IDG, 96 George St., Basingstoke, Hants.

Exchange or part exchange SR600 triple conversion s.s.b. amateur band rx in new cond. for linear amp. in brand new cond. W. Yeo, G2CVY, Ebberly Dairy Farm, Newport Rd., Barnstable, Devon. Tel. Barnstable 3355.

QP166 unit also mech. filts. MF455 type 2·1 kHz of 3·1 kHz complete with u.s.b. and l.s.b. xtals., postage paid. J. Tyas, G3NSG, 2 Craven St., Barnoldswick, Nr. Colne, Lancs.

P.s.u. for Canadian 52 set rx. F. Wright, 40 Wyndham Rd., Petworth, Sussex.

Compact 160m tx/rx or transceiver (valve or transistor) for mobile operation, 12 V positive earth, A3 and A1 or A3 only. Will view in London or Home Counties before purchase. G. Woolner, 35 New Rd., Wood Green, London N22. Tel. 01-888 3428.

1 MHz xtal for LM14 frequency meter also handbooks for LM13 and LM14. J. R. Tilsley, Penwartha, Hafodty Lane, Upper Colwyn Bay, N. Wales. Tel. (0492) 2485.

Alignment instructions for G2DAF s.s.b. tx Mk2 version, l.f. type, sent free for s.a.e. Wanted cabinet for G2DAF tx, front panel, 19x 10½ in., rounded corners. Chassis 12½ front to back. J. Hoban, G3EGC, 96 Ashworth Lane, Bolton, Lancs. Tel. Bolton 51502.

Will exchange Rolleiflex 4 × 4 or Retina Automatic 35mm camera for gd. rx or 2m rx/tx. Also wanted scope. F. W. Webb, G8BRI, 37 Alwyne Grove, Shipton Rd., York. Tel. 25798.

S.s.b. tx and rx or transceiver, need not be in wkg. cond. provided all special components satisfactory and no major internal disaster has occurred. A. Marr, GM3AYR, 48 Dalmahoy Crescent, Kirkaldy, Fife. Tel. Kirkcaldy 61993.

H.f. band rx, g.c. or amateur only, but must be solid state, suitable for mobile use, Mohican or similar is ideal. Xtals. 8, 9, 12·5, 11·5, 11·75, 12·0, 12·25, 16, 23, 23·5, 24 MHz. For sale, 36 in. model aircraft, Vulcan delta wing complete with 4 channel radio control rx and tx., new and unflown. Also new binoculars 7 x 50 with case.

Beam aerial, 2 or 3 el. for 14 and/or 21 and/or 28 MHz. R. Dixon, G3UXD, 1 Plantation Rd., York.

Xtal. 24·5 MHz. Panda a.t.u. P. McConnachie, GM3CRY, Craiglea, Bonfield Rd., Strathkinness, St. Andrews, Fife, Scotland. Tel. Strathkinness 219.

Student requires slotted line meter to cover 70cm amateur band or similar hetrodyne freq. meter to satisfy GPO licencing conditions. F. C. Fuller, 29 Lannock Rd., Hayes, Middx. Tel. 01-573 2041.

Rx T28 or G31U Mohican state price please. A. McKenzie, GM3WFI, 124 Burns Rd., Greenock.

Cheap HRO rx for beginner. J. Whitehead, 3 Linacre House, Heathmere Drive, Chelmsley Woods, Birmingham 37.

R1475 rx mechanically OK, preferably wkg. I White, G3SEK, 56 James Lane, Leyton, London E10. Tel. 01-980 4279 (day).

Past RAE papers, will be returned if required. R. Farleigh, 7 Cedar Chase, Heybridge, Maldon, Essex.

Any FT243, 8 MHz xtals, between 8·046 and 8·06 MHz. R. Clark, Waltham Rd., Woodford Bridge, Essex. Tel. 01-504 4984.

Freq. meter, Class D or similar in working cond. and reasonable price. S. Shaw, 164 Liverpool Rd., Penwortham, Preston, Lancs, PR1 0QE.

Rx, g.c. or amateur band, any make, unmodified model with Q-mult., xtal. cal. preferred but not essential. R. Johnston, GI3HCG, 6 Beechdene Drive, Lisburn, Co. Antrim. Tel. Lisburn 2473.

Drake DC3 p.s.u., must be in perfect wkg. order. D. Bootman, G3MWG, 18 Worcester Cres., Mill Hill, London NW7. Tel. 01-959 5156.

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# MEMBERS' ADS

*Closing date for December, 13 November*

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**J. BIRKETT, 25 The Strait, Lincoln.** **Phone 20767**

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# ECHELFORD COMMUNICATIONS

**32, FELTHAM HILL ROAD, ASHFORD, MIDDLESEX**

As Echelford Communications is proving a little hard to find for one or two of you this month will be given over to directions on how to find us.

From London: Proceed down the A30 past London Airport towards Staines. After passing the Airport (about ¾ mile) you will come to a large roundabout you will require the 2nd exit (the A30 being the 3rd exit) " Princes Ski Club " board will show you the road if in doubt. About 1 mile down this road, passed a playing field, you will come to a crossroads. Turn right. 200 yds you will come to another roundabout, 2nd exit (straight across) and about 150 yds on the right is Echelford Communications.

More routes next month.

CODAR equipment is now coming in, including AT5's and P.S.U.'s
J BEAMS for 2 metres, 4 metres and 70cms (bit dead since G8's on 144 mc/s!)
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