JUNE 1968

Radio Communication

JOURNAL OF THE RADIO SOCIETY OF GREAT BRITAIN

incorporating RSGB BULLETIN

KW2000A

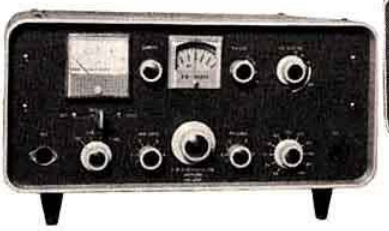
SSB TRANSCEIVER

BUY KW EQUIPMENT

IT'S BRITISH

The finest value available, with no extras to buy. 180 watt PEP operation on all amateur bands 10-160m, complete with AC psu: VOX control: crystal calibrator: Independent receiver tuning: Upper/lower sideband tuning: Top band included: Automatic linearity control on transmit: Special attention to TVI proofing.

There are alternative crystals available for full coverage of the 10 and 15 metre bands.



KW VESPA MK II

TRANSMITTER

Transmitter for all H.F. Bands, 220 watts PEP, SSB, AM CW now in full production complete with PSU.

KW 201

AMATEUR BANDS COMMUNICATIONS RECEIVER

Now with two detectors. i. product detector for SSB and CW. ii. diode detector for A.M. The KW201 has been specifically designed for optimum performance on Single Sideband. Eleven ranges give coverage in the amateur bands from 1·8 Mc/s to 30 Mc/s bands. A mechanical filter gives an IF selectivity of 3·1 kc/s at 60db, and 6 kc/s at 60db. A "Q" multiplier is available giving a variable range of 3·1 kc/s to 200 cycles selectivity.

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LINEAR AMPLIFIER

1200 watts PEP complete with built in PSU and SWR indicator.

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KW E-Z ANTENNAE MATCH UNIT
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KW MATCH SWR INDICATOR
KW LOW-PASS FILTER
KW TRAP DIPOLES
KW BALUN
KW DUMMY LOAD
KW Q MULTIPLIER

RADIO COMMUNICATION

FRONT COVER:

Going mobile with a difference—Verulum members operating G3LXP/A. At the controls of a Vampire Mk T II, Bert Browning G8TK, microphone in hand operates Derek Purchese's KW2000 on 40m sideband. In the background are G3LXP (right) and Tony Spears, G3SSQ. The photo was taken at Salisbury Hall, London Colney, Herts., where Mr R. Goldsmith has added a Vampire and a Venom to the Mosquito already on permanent static display outside his XVI century Stately Home, which is open to the public twice weekly. *(Photo by Paul Fletcher)*

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J. B. LOWE

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You've had your ration of pretty pictures for a bit—they're very nice but they cost money and you know me. Parting with money is something I don't do readily. In fact, every time I see a bill I throw myself on the floor. I writhe in agony, mumbling obscenities accompanied by the odd wail, tears streaming down my face as my legs thrash and my palms beat the floor. Quite a performance, boy, I'll tell ya. At one time I used to beat my head against the wall—but these days, well, there just aren't the decorators about. Enough of this nonsense, Lowe—start flogging. You know this Sommerkamp stuff I flog—you're probably not aware of it, but I do keep a complete range of spares—not only spares, but optional extra goodies such as 500 cycle mechanical filters, 5 kc A.M. filters (note that this is a true mechanical filter and an improvement over the 4 kc/s A.M. filter fitted as standard), 2m. converters expressly designed for the FR-500, the 2m. transverter for the FL-500 (bet you didn't even know there was one!), extra crystals and so on. Damnit, this Sommerkamp stuff must be pretty good when Bill Lowe is reduced to advertising spares. I've sold about 300 Sommerkamps and as many spares to buy a Mars bar! Anyway, if you want to join the happy band of Sommerkamp owners, I would be delighted to take your money. Not only that, but I do like to sell stuff I know I'm not going to have repair under guarantee. That's why I sell the stuff I do, because repairs under guarantee cost me money and you know how I feel about that!! Not so soft as I look, am I?

Sommerkamp prices:—FR-500—£130.0.0; FL-500—£145.0.0; FT-150—£215.0.0; FT-500—£250.0.0.

STAR LINE:

Customers come and look at it, twiddle knobs and say " Looks terrific, but what's it like, Bill? " I always say " Excellent." The keener Customers who make every penny count, look at it, twiddle, delve inside it, go carefully over the circuit diagram and then say, " Looks terrific, but forget you're a dealer and tell me what it's *really* like." I always say " Excellent." Like I say, unless I am absolutely convinced a thing is honest value for money, I just will not sell it. The tragedy of being a dealer of course, is that nobody ever believes you. Ah well, never mind. Bash on!

Star SR-700A Rx: 80 to 10, ½ microvolt sensitivity, 4 kc/s down to 500 cycle selectivity, notch filter, very stable and accurate VFO, direct readout to 1 kc/s. Beautiful to handle—**£115.0.0.**

Star ST-700 Tx: 80-10 SSB/CW/AM 200W p.e.p. VOX, MOX, PTT, break-in CW, built in CW monitor, ALC. A very, very nice rig indeed—**£135.0.0.**

Star SR-200 Rx: Top band to 10m. 1 microvolt sensitivity, single xtal filter at 1650 kc/s for good selectivity and image rejection. Product detector for CW/SSB and diode detector for AM. Amplified a.g.c., built-in xtal calibrator. A very great deal of thought has gone into the design of this and it's a beauty—**£40.0.0.**

INOUE LINE: I don't want to push these too hard as the demand exceeds the supply, but here's brief details:

IC-700R; Rx. 80-10, better than ½ microvolt sensitivity, 2.4 kc/s selectivity (a beautiful 9 mc/s xtal filter with a 1.8:1 shape factor). Audio filter for CW, all transistor with FET front end. Either 240V A.C. or 12V D.C. built in. 6½" × 11" × 8¼"—**£85.0.0.**

IC-700T; Tx. Designed to operate transceive with the 700R. 2—6146B's in the final, VOX, PTT, MOX, RIT. 6½" × 10" × 9¼"—£80.0.0. Companion p.s.u./speaker—£30.0.0. The lot, as a package deal £180.0.0. Just where would you go to beat this little beast I wouldn't know. All I can say is, get your name down for one pronto. Delivery currently 4-6 weeks but improving.

Whilst on the subject of new stuff, I also have the following in stock:

Fanon 28.5 mc/s walkie-talkies—£12.10.0. per pair; Hansen S.W.R. bridges—£3.10.0; Bug Keys—£4.10.0; Dentsu DA1 electronic keyers—£16.0.0; Alpha padded low impedance headsets—£2.2.6; Filters, loads of 'em, KVG XF9A and 9B, 9 mc/s xtal filters of the highest quality. Mechanical filters—455 kc/s, 2.1 kc/s, 500 cycles, 5 kc/s and even 24 kc/s for VHF/FM. Crystals, 100 kc/s to mil. spec. These are an extremely accurate xtal (lab. report on each and every one), newly manufactured, *not* surplus and fit HC6/U holder (HA350, Heathkit, etc. etc.) £2.0.0. AR88D manual reprints 15/- each; Hansen VT300 VTVM—£15.10.0. complete with r.f. probe. Transistor Intercoms—useful in the shack, " Charlie, your beer's getting cold! "—£3.0.0. (must be a good buy at this price!); Tavasu mobile whips—£12.10.0. Details of the above new stuff gladly sent on request. I also stock a fair range of components both new and surplus:

NEW: Tubular trimmers either ½-5pF or 3-15pF 1/- each, 10/- a doz; Feedthroughs 1000pF screw type 1/- each, 10/- a doz; Disc ceramics, .001, 3/6d a doz; .01 5/- a doz; Standard coax sockets, 1/- each; standard coax plugs, 1/4d each; Plugs (Octal, B7G, B9A) 2/6d each; Electrolytics-brand spanking new can types, complete with mounting clips, 10mF 350V, 1/8d; 20mF 350V 2/3d; 20mF 450V 2/9d; 100mF 350V 5/6d; 100-100mF 350V 6/8d; 100mF 450V 7/2d; 40-40mF 500V 7/3d; 100mF 500V 7/9d; 100-10mF 450V 13/2d. Silicon rectifiers—Current manufacture, NOT surplus, NOT seconds. You can rely on these. SE-05 1000piv 500mA 4/6d; 1S1066 1000piv 750mA 8/-.

NEW SURPLUS:

Resistors, most values from 2d each. Capacitors from 2pF to 150mF from 2d each. Mica trimmers 1000pF 1/-, 2,800pF solid dielectric variables—ideal top band loading 1/-; Oil filled 8mF at 750V dc 2/-; Pots—from 5 ohms to 1 meg 6d each. I can make up a useful bunch of 25 for 10/-. The guts of the 19 set variometer, 5/- post free.

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TCS12	£12. 0. 0	SUPER PRO	£20. 0. 0
TRIO JR500—demonstrator	£50. 0. 0	EDDYSTONE 750	£45. 0. 0
B40's—A1	£20. 0. 0	MARCONI CR150	£35. 0. 0
EDDYSTONE 770U	£100. 0. 0	RA17—Choice of 2	£180. 0. 0
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MARCONI TF390G 16-50 mc/s	£20. 0. 0
TAYLOR Sig. Generator, 100 kc/s to 45 mc/s	£10. 0. 0
AVO Sig. Gen 50 kc/s—80 mc/s, mint	£17.10. 0
HEATHKIT 1012U 'Scope, mint	£27. 0. 0
COSSOR 1045 'Scope	£25. 0. 0

I also have a bunch of tantalum capacitors at very low prices, ¼ watt sub miniature resistors (metal oxide types, very nice). Write for component lists.

Postage: Allow lots, (it's always more than you think), I'll refund any left over.

A large s.a.e. will get you a copy of my latest lists.

73 Bandit Bill,
VE8DP/G3UBO.

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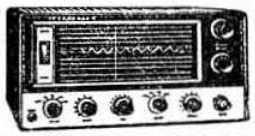
HAM Bands 80/40/20/15/10 metres. Incorporates 12 valves, product detector, mech. filter, Xtal control oscillator, Xtal calibrator, Xtal B.F.O. Dual conversion 110/240v AC. Brand new **£67.10.0.** Carriage 10/-.



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General coverage on 5 Bands. 150-400 Kc/s. 550 Kc/s-30 Mc/s. RF stage, AE trimmer, noise limiter, BFO, product detector, electrical bandspread, S meter. 220/240 volt AC. Brand new **36 gns.**, carr. 10/-.

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TE.15. Transistorized. 440 Kc/s-220 Mc/s. **£11 11 0**

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52 ohm .. **69/6** P. & P. 3/6.

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Just released by the Ministry. High quality 10 valve receiver manufactured by Murphy. 5 bands 650 Kc/s-30 Mc/s. I.F. 500 Kc/s. Incorporates 2 R.F. and 3 I.F. stages, bandpass filter, noise limiter, crystal controlled B.F.O. calibrator, I.F. output etc. Built-in speaker, output for phones. Operation 150/230 volt A.C. Size 191 in. × 15½ in. × 16 in. Weight 114 lbs. Offered in good working condition. **£22.10.0.** Carr. 30/-. With circuit diagrams. Also available B41 L.F. version of above. 15 Kc/s-700 Kc/s. **£17.10.0.** Carr. 30/-.

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500μA	.. 27/6	150mA	.. 25/-	10V DC	.. 25/-
50-0-50μA ..	35/-	200mA	.. 25/-	20V DC	.. 25/-
100-0-100μA	32/6	200mA	.. 25/-	50V DC	.. 25/-
500-0-500μA	25/-	300mA	.. 25/-	100V DC	.. 25/-
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Post extra. Larger sizes available—Send for list.

15V DC	.. 25/-
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300V AC	.. 25/-
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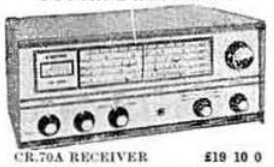

CR.70A RECEIVER **£19 10 0**

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PR.30 PRESELECTOR	£5 10 0
PR.30X (BUILT IN PSU)	£7 4 0
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General coverage on 4 bands. 550 Kc/s-30 Mc/s. RF stage, electrical bandspread, noise limiter, BFO, S meter, 115/230 volt AC. Brand new. **£37.10.0.** Carr. 12/6.

EX-AM CONTROL BOX with two Londex 7026 24v. D.C. Aerial Changeover Relays. New. **39/6.** Carr. 5/-.

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TOUGH POLYTHENE LINE, type ML1 (100lb.), 2d. per yd. or 12/6 per 100 yds. Type ML2 (220 lb.), 4d. per yd. or 25/- per 100 yds., ML4 (400 lb.), 6d. per yd. Ideal for Guys, L.W. Supports, Halyards, etc. Postage 1/6 on all line.

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ABSORPTION WAVEMETERS, 3·00 to 35·00 Mc/s in 3 Switched Bands. 3·5, 7, 14, 21 and 28 Mc/s. Ham Bands marked on scale. Complete with indicator bulb. A MUST for any Ham Shack. ONLY **25/-** EACH. P. & P. 1/6.

SHORT WAVE KIT. 1 valve only **45/-.** Phones, Ant. & Batts. 40/- extra if required. Ideal for junior Op.

VARIABLE CONDENSERS. All brass with ceramic end plates and ball race bearings. 50pF, 5/9; 100, 6/6; 160, 7/6; 240, 8/6; Extension for ganging. P. & P. 2/-.

SEALED RELAYS, 12v. 105Ω Coil. Type A. 4 Pole, C.O. 15/-. Type B.2 Pole, C.O. + 2 Pole Norm. on, 12/6. P. & P. 1/6.

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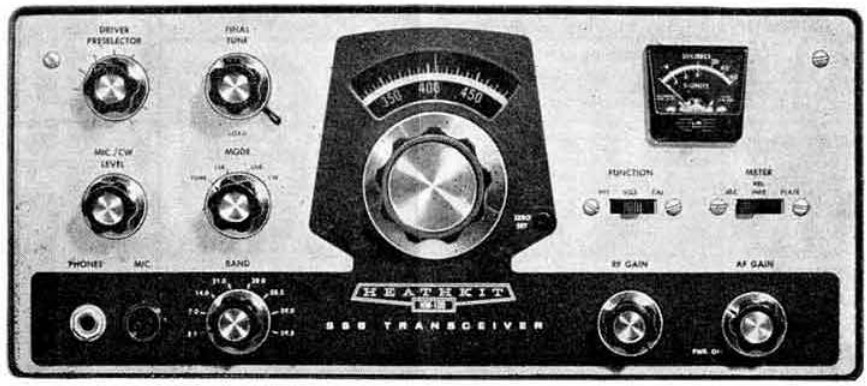
HEATHKIT

NEW HW-100 5-BAND SSB-CW TRANSCEIVER



£125 KIT pp. 10/6

EXTENDED PAYMENT PLAN
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19 monthly payments £5. 9. 0.

Total credit Price £135. 7. 0

Check the features and the specifications:

• Solid-state (FET) VFO • 80-10 metre coverage • Switch selected upper or lower sideband or CW • 180 watts input PEP SSB • 170 watts input CW • Crystal filter • Full coverage on all bands with 500 kHz per band segment • Smooth vernier control of frequency with patented Harmonic Drive™ dial mechanism • Built-in 100 KHz calibrator • Separate offset CW carrier crystal • TALC • Quiet, enclosed relays • Fixed or mobile operation with HP-23 or HP-13 power supplies • Easy assembly with circuit boards and wiring harness

Kit HW-100, 18 lbs., ... **£125 0 0 pp. 10/6**
Kit HP-13, DC power supply, 7 lbs. ..... **£37 2 0 pp. 6/-**
Kit HP-23, AC power supply, 19 lbs. ..... **£30 18 0 pp. 10/6**
Kit SB-600, 8 ohm speaker, 6 lbs. ..... **£10 2 0 pp. 4/6**

HW-100 SPECIFICATIONS—RECEIVER. Sensitivity: Less than .5 microvolt for 10 dB signal-plus-noise to noise ratio for SSB operation. **Selectivity:** 2.1 KHz minimum of 6 dB down, 7 KHz maximum at 60 dB down (3.396 MHz filter). **Input:** Low impedance for unbalanced coaxial input. **Output impedance:** 8 Ω speaker and high impedance headphone. **Power output:** 2 watts with less than 10% distortion. **Spurious response:** Image and IF rejection better than 50 dB. Internal spurious signals below equivalent antenna input of 1 microvolt.

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

NEW from HEATH
2M TRANSCEIVER, HW-17
10 watts AM output, valve T/X D/Superhet Receiver, Fully Transistorised.
KIT £69 2 0 pp. extra
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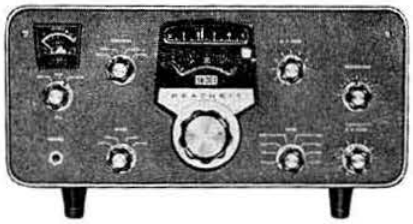

SB-301E Amateur Band Receiver . . . SSB, AM, CW and RTTY reception on 80 through 10 metres + 15 MHz WWV reception. Tunes 2 metres with SBA-300-4 plug-in converter.
Kit SB-301E, 23 lbs. (less speaker) **£140.12.0** Ready to use **£170.12.0** P. & P. 9/-

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.
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SBA-401-1 crystal pack, 1 lb., **£17.3.0** NC

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.
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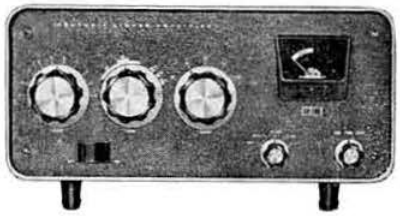

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NEW POPULAR
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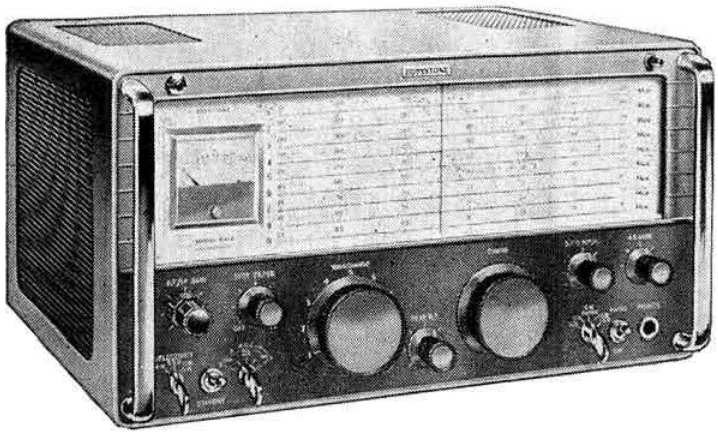
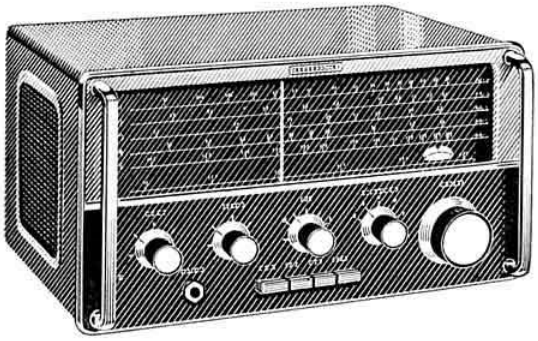
EA12



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.



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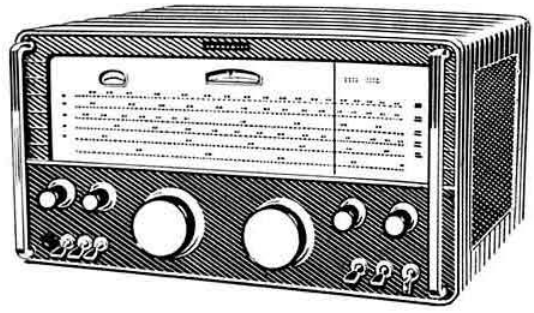

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QTC

LICENCE FEES UP
GM3BST GIVEN STATES TRIP

Licence Dues

It looks as if it will cost more to renew licences. The Post Office has announced that as from 1 October this year, the following increases will take effect. This, as we are sure you will already have assumed, is to cover administration costs which have risen significantly since the current fees were introduced some 20 years ago.

Amateur (Sound) A from £2 to £3.
Amateur (Sound) B from £2 to £3.
Amateur (Television) from £2 to £3.
Amateur (Sound Mobile) from £1 to £1 10s.

The fee for issue and renewal of Model Control Licences will also be effected, with a rise of £1 to £1 10s. for a period of five years.

The RSGB has, however, registered a protest with the GPO, at the same time outlining a method of avoiding the need for any increase by combining the various types of licence. This would have the effect of reducing administration work connected with the issue of licences.

Trip to USA for GM3BST

John Tuke, GM3BST and his wife, of Stanraer, received an invitation to witness the launching of the weather satellite Nimbus 3 in the USA as guests of the General Electric Co. An article in *CQ Magazine* describing John Tuke's home constructed installation for receiving and recording cloud-cover photographs transmitted from the Nimbus and Essa satellites was noticed by GE, who manufacture the Nimbus satellites, and a representative was sent to interview him and collect some photographs for inclusion on a book being compiled by the Company. Shortly afterwards, John Tuke received a cable offering an expenses paid fortnight in the States.

On 8 May, television viewers in this country were given an opportunity to see GM3BST's experiments with the reception of satellite weather maps during an interesting short documentary film on BBC-1's " Tomorrow's World " programme.

RSGB Film Library

As the existing films in the library are now only of historic interest and do not reflect a picture of Amateur Radio in UK as it is today, the Council has decided to withdraw them from general availability. The negatives are to be preserved and the remaining serviceable prints will be released for special occasions.

Northern Radio Societies' Convention

The convention organized by the Northern Radio Societies Association was held at Belle Vue, Manchester, on Sunday, 19 May, 1968. It was opened by Mr R. S. Barratt, Assistant Chief Constable of the Manchester and Salford Police, and aroused great interest, not only amongst licensed amateurs who attended in force, but also with members of the public. Fuller details and photographs of the convention will appear in the next issue.

Airman Posed as Friend for Morse Test

The *North Devon Journal Herald* carried a story on 2 May describing how a man posed as a comrade at RAF Chivenor and passed the Morse Test in his place. He was fined £25 at Ilfracombe Court on 26 April.

Senior Aircraftman Robert Symons and Ian Richard Body admitted fraudulently obtaining an amateur radio certificate by falsely pretending that Symons was Body. Body was also fined £25.

The court was told that Body was discharged from the RAF partly because of this offence. Symons, now stationed at Tenby, was stated to have an exemplary service record.

Mr Peter Carder, prosecuting, said that Body did not have the ability to pass the Morse test. So, said Mr Carder, Body asked Symons to impersonate him in a test, and Symons passed.

But in the form which Symons filled in he said he was Ian Robert Body instead of Ian Richard, and this led to inquiries.

Sideband Cupid

The weekly women's magazine, *Woman*, wants to do a feature on a woman radio amateur who met her husband through Amateur Radio, preferably through an actual QSO.

There is no question that the story would be developed along sensational or distasteful lines, as the feature will be compiled with the fullest co-operation of the Society's Public Relations Programme.

Please contact the Public Relations Officer, Sylvia Margolis.

Rt. Hon. Ness Edwards

We note, with sorrow, the passing of the Rt. Hon. Ness Edwards, MP, the first PMG to take any real interest in Amateur Radio, the first to attend an ORM and an RSGB Exhibition.

It was to this enlightened and forthright Minister that we owe our facilities for Amateur Television. When the experts said that it would interfere with Radio Altimeters, it was he who asked if any steps had been taken to see if this was so. At his bidding and with the co-operation of the Air Ministry, there took place the famous series of tests between TV Amateurs and a Hastings aircraft on 1 July, 1951 to the complete vindication of the amateurs.

His attitude was always; Let us find out, is there any good reason why not? He never took the easy course of just saying No. We have lost a good friend who has left his mark on our hobby and we salute him. R.I.P. A. O. M.

ITA Museum of Radio

We have been approached by a firm of designers, James Gardner, 13 Duke Street, Manchester Square, London, W1, to assist in locating radio receiving, transmitting and broadcasting equipment of pre-1920 vintage to place in a permanent museum of broadcasting at ITA Headquarters in Old Brompton Road, London, SW1. Anyone who is willing to offer any suitable apparatus may contact James Gardner direct to negotiate a sale.

GB2LO in Daily Mirror Building

The RSGB will be operating a special station, with the call GB2LO during the 1968 City of London Festival, 8-20 July. It will be located in the *Daily Mirror* Building, Holborn, London, EC1.

This location, within the 1·03 square miles of the City of London, is about 200 yards from the premises at 107 Hatton Garden, where some of the earliest meetings of the Radio Society of Great Britain, when it was still called the London Wireless Club, were held in the late Summer of 1913. " GB2LO " will be on view to the public and it is anticipated that several distinguished guests will visit the installation during the period of the City of London Festival.

Contacts have been arranged with London, Ontario, Canada, where an Exhibition Station, call-sign VE3LON, is being operated during the London (Ontario) " Fortnight Festival," whose theme is " The British are coming! "

Sincere thanks are expressed to the proprietors of the *Daily Mirror* for their generosity and co-operation in this venture.

Belfast Students

Thanks to the many members who sent press cuttings to the Society's Public Relations Officer regarding the Belfast students who allege that they had been transmitting on the medium waves in order to draw attention to the public demand for Citizens' Band!

This matter is being handled through the appropriate channels.

The cuttings were too numerous to be acknowledged individually, but the P.R.O. requests that lack of personal acknowledgement should not prevent members from sending information of this kind to her as quickly as possible.

Reward for Stolen Equipment

On Sunday, 28 April, 1968, a Swan 500 with an a.c. p.s.u. was purchased from George Francis, of Newark, by false pretences. The person paid by cheque, which turned out to be useless, and he gave a false name and address. He is well-spoken, well-dressed and smokes an expensive pipe. He is about 5 ft. 10 in., aged 30-35, of weight about 13 stone, 40 in. chest, 36 in. waist. His hair is well cropped and a light brown colour. When last seen he was wearing light checked sports coat, fawn cavalry twill trousers, light fawn suede shoes, and a green Paisley handkerchief in his top pocket. His wife is Scottish, about 5 ft. 8 in. high, with black hair and was wearing a turquoise maternity dress with a double strand of pearls around the neck. They gave an address in London and said they were planning to emigrate to Australia or Papua. He says that VK5DL is his brother-in-law.

The equipment is a Swan 500 Transceiver, Serial No. H 289019, and an a.c. p.s.u., Serial No. Q 182709. George Francis is offering £20 reward to the person or persons who can give information leading to the recovery of the equipment. Telephone Newark 4733 or Newark 2578, and reverse the charges, or telephone Newark CID, Newark 3244 or 3242.

Bill Lowe of Matlock 'lost a Sommerkamp FT 150 Transceiver to the same couple on Sunday, 21 April, 1968. He will also give a reward of £20 to the person or persons who can give information to the recovery of his equipment. The telephone number is Matlock 2817 or Matlock 2430.

The Daily Mirror Building in London. See " GB2LO."

G6XJ Retires from Eddystone

Mr A. C. Edwards, one of the men who pioneered the production of radio equipment for the amateur enthusiast has had to retire from his post as Commercial Director of Eddystone Radio Ltd. for health reasons. G6XJ held joint executive responsibility for the firm and had 40 years association with the trade name Eddystone.

Arthur Edwards was born in Birmingham in 1906, and educated at Aston Secondary School in Birmingham. After working for the Exide Battery Company for a number of years, he joined Stratton and Company, the original name of Eddystone Radio Ltd., in 1927, as Assistant to the General Manager, Mr G. S. Laughton. Mr Laughton spent much of his time running the Laughton business in Australia, and Arthur rapidly became responsible for much of the sales and general management of the company. After his return from service in the Fleet Air Arm during the Second World War, he was appointed Commercial Director, a position which he has held until his retirement.

G6XJ now plans a long sailing and walking holiday in Devon, followed by a round-the-world trip in a freighter. We are particularly glad to learn that he also looks forward to much more Amateur Radio activity than he has been able to pursue in present years owing to pressure of work.

Silent Keys

We record with sorrow the passing of:

J. C. Gill, G2CLO, of Scarborough, Yorks.

L. E. Tucker, G4IQ, of Harrow, Middlesex.

F. McAinsh, GM8MN, of Crieff, Perthshire.

Dr Hugh Neely, WB2BPK, of Douglaston Manor, NewYork USA.

T. Edmunds, MRCS, ZS5JW, of Durban, South Africa.

A 2m S.S.B. Phasing Exciter using F.E.T.s

By G. E. GOODWIN, G3MNQ*

THE main problem with transistors when applied to this sort of project is their low input impedance and in particular this makes the design of the audio phase shift network almost impossible. Recently, however, the price of FETs has dropped remarkably and experiments have shown that they can be used in much the same way as a valve, only with low voltage, low power supplies. The equipment which I shall be describing makes free use of these devices, and needs just 12 volts at 30mA, compared with a valve unit which consumed 6·3V at 2·7 amps and 250V, at 110mA, yet giving much the same output with equal sideband and carrier suppression.

General Considerations

In these days of v.f.o.'s on v.h.f. as well as the h.f. bands, it was felt that the exciter must be capable of giving satisfactory signals over a range of input frequencies. This dictated that the r.f. phase shift network must be relatively insensitive to changes in frequency and so ruled out any form of tuned circuit to perform phase shifting. Some form of low *Q* network was wanted, either L and R, C and R or L, C and R, there appearing to be little to choose between them on a performance basis, but those using L need to have specially wound components whereas those using C can use off-the-shelf parts.

From this it follows that such a network cannot be fed into a low impedance device such as a diode balanced modulator as considerable damping would occur. Some circuit offering high impedance has to be used and a FET modulator similar to the valve was envisaged. Obviously there will be some loss of sideband suppression and change in output amplitude as the frequency is altered since there are tuned circuits involved in the system, but the sacrifices were found to be small.

High input impedance is required in three places in the exciter: (*a*) Audio input when using crystal microphones; (*b*) amplifiers following the audio phase shift network when the amplifier input impedance must not alter the characteristics of the network; (*c*) balanced modulators following the r.f. p.s.n. where input capacitance must not excessively shunt the r.f. network.

A.F. Amplifier

The frequency pass-band of the audio stages has to be shaped so that it matches the phase shift network which for simplicity is designed to operate over a restricted range; in this case 300 Hz to 3 kHz. This means that the phase shift produced by the network is within 2 per cent of 90° only over this range and that any frequency outside will produce

* Peatling Hall Farm Cottage, Peatling Pava, Rugby, Warks.

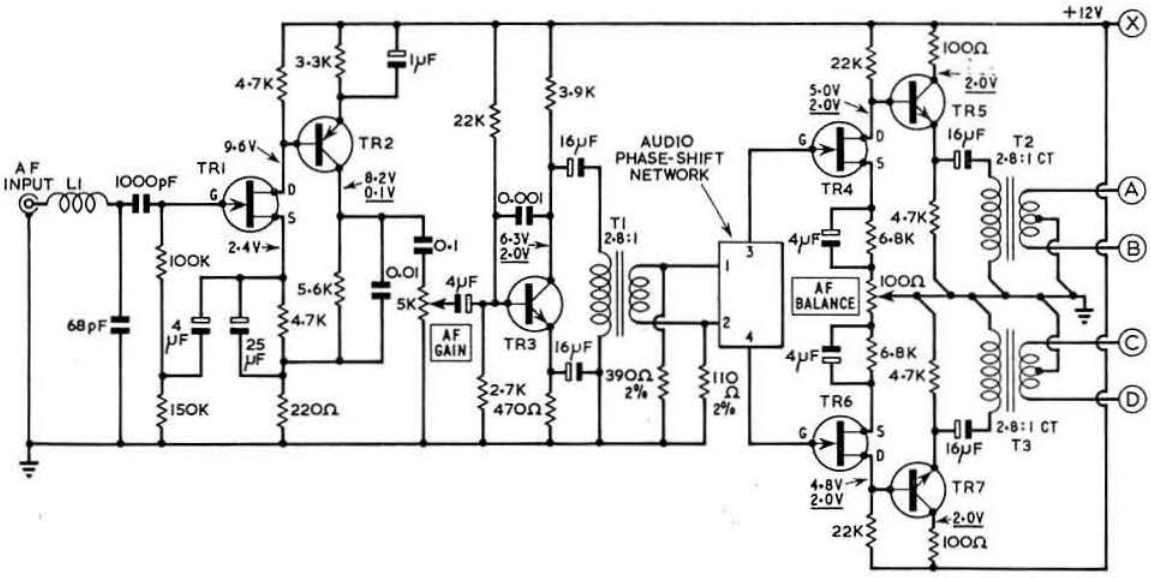
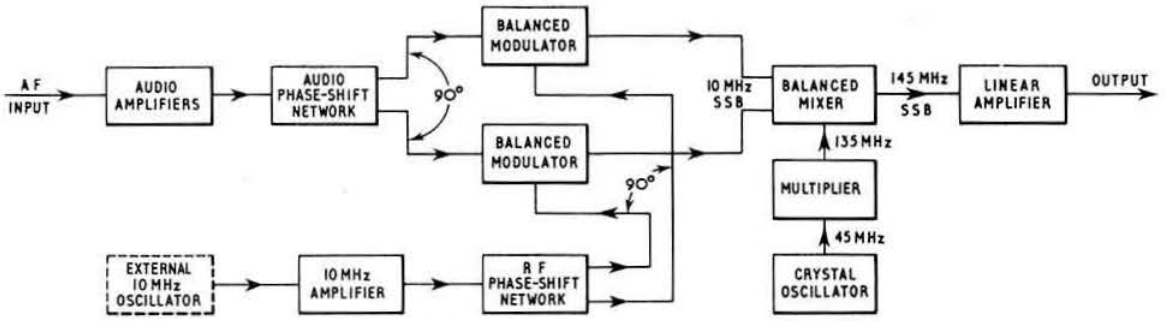


Fig. 1. The audio stages of the phasing exciter. L1 consists of 50 turns of 38 s.w.g. enamelled wire close wound on a ¼in. diam. former. T1, 2 and 3 can be Radiospares type TT6 or any 3:1 interstage transformers. Signal voltages are underlined.



G3MNQ's 2m phasing exciter block diagram.

a phase shift greater than the above limits; this results in the sideband suppression suffering. Therefore frequencies below 300 Hz and above 3 kHz are attenuated by suitable choice of components, but it is important that this is done before the phase shift network, and that the circuitry after that has a reasonably flat response. This is because circuits which change the amplitude of signals relative to their frequency nearly always change the phase of the signals as well, and after taking reasonable care to make the p.s.n. accurate it is not desirable deliberately to impare this by introducing further phase changes.

In Fig. 1 are shown the a.f. stages of the exciter. TR1 and TR2 are a d.c. coupled pair in a bootstrap circuit designed to produce a high input impedance and a low output impedance. The circuit is based on one published in *Electronics*, 12 April, 1963, by E. G. Fleenor, and components have been chosen to give the following parameters:

Input impedance: 3·4 M ohms.
Output impedance: 280 ohms.
3dB L.F. point: 370 Hz.
3dB H.F. point: 2·85 kHz.
Gain: 26.

TR1, a low noise audio FET naturally offers a high input impedance, but this often has to be degraded by relatively low value resistors in the gate circuit when considering problems such as biasing and leakage. By using the bootstrap method, however, these resistors can be effectively increased by several orders and as can be seen the 100 k ohm resistor in the gate of TR1 would in an ordinary circuit be the input impedance, but here it becomes 3·4 M ohm. Similarly, the output impedance would normally be several k ohm and this is reduced to some 280 ohms by bootstrap action so that the output can be shunted by the 5 k ohm a.f. control without fear of loading the circuit.

The 100 k ohm resistor in TR1 gate can be changed if desired and the input impedance will be changed by the same ratio without affecting any other parameter.

The output from TR2 is coupled to the a.f. gain control via a relatively small coupling capacitor which provides attenuation of signals below 500 Hz in order to meet the above requirements. TR3 is a straight amplifier, the high frequency response of which is attenuated by the 0·001 μF capacitor between collector and base.

The audio p.s.n. requires an assymetrical low source impedance with an amplitude difference of 2 : 7; this is provided by a 3 : 1 step-down transformer T1, the output of which is loaded by a 390 and 110 ohm resistors in order to produce the amplitude difference. The p.s.n. itself is taken from the RSGB *Handbook* and is exactly as specified for valve use, (see Fig. 6). It must be terminated in a very high impedance and this is provided by the FETs TR4 and TR5. These are self biased by source resistors and the 100 ohm "A.F. Balance," potentiometer provides the means of making the output signals equal during setting up. TR6 and TR7 are d.c. coupled to the FETs and are there for two reasons: (*a*) to provide a low impedance drive for the transformers T2 and T3 to ensure low distortion at the lower frequencies; (*b*) to provide a high impedance load for the FETs so that the gain can be as high as possible.

The transformers T2 and T3 are 2·8 : 1 with centre-tapped secondaries to produce anti-phase outputs for the balanced modulators, connected via 22 k ohm resistors. Some circuits use r.f. chokes in this position but these are not necessary here as the audio sees the balanced modulator inputs as a few pF, hence the time constant is too short to affect the audio in any way. The r.f. sees a relatively high impedance so very little is lost.

The R.F. Circuits

The 10 MHz originates in a Vackar type v.f.o. which is external to the exciter unit and is not shown here. It produces some 1·5V r.m.s. and is coupled to the exciter via a short length of coaxial cable. TR8 (Fig. 2) is an emitter follower since some isolation was found to be necessary to reduce oscillator pulling.

TR9 is an amplifier tuned to 10 MHz in its collector circuit by L2 and its low impedance coupling coil connects it to the r.f. phase shift network. This uses capacitors and resistors only, adjustment being provided by two Philips trimmers. The phase shifted r.f. is then applied to the balanced modulators which consist of four FETs TR10–TR13 and along with the audio is fed into the gates. Balancing of the modulators is carried out by means of 1 k ohm potentiometers in the source circuits of each pair. The 10 MHz s.s.b. suppressed carrier signal is taken from the drain circuits which are tuned to 10 MHz by a bifilar wound coil, L3. This must now be converted to the required operating frequency by a mixer.

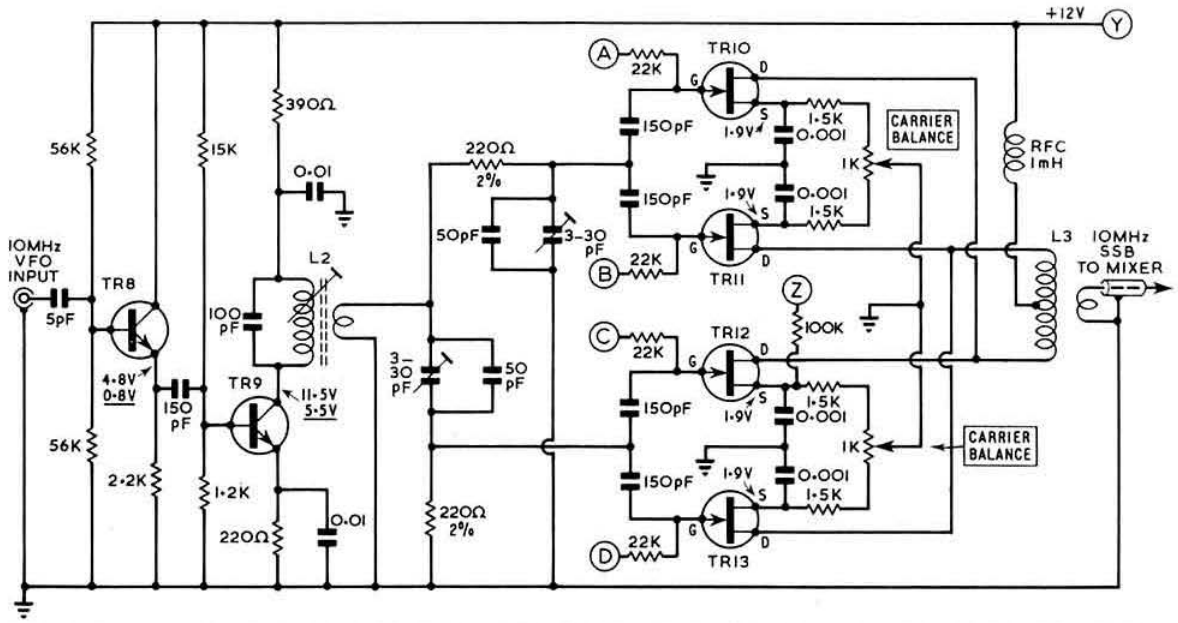


Fig. 2. The low frequency r.f. stages. The 10 MHz drive is obtained from an external Vackar v.f.o. capable of delivering 1·5 volts. L2, 18 turns, 28 s.w.g. enam., close wound on Radiospares former, plus 2 turn coupling at earthy end. L3, 20 + 20 turns, 36 s.w.g. enam., close wound on Radiospares former, plus 1 turn coupling at centre of main winding.

Mixer for 144 MHz Operation

Several mixer circuits are provided in the RSGB *Handbook* for producing s.s.b. signals on the h.f. bands, but there appears to be little information on mixers for v.h.f. use. Fig. 3 therefore shows a circuit developed for this purpose and once again it uses FETs, this time as mixers, operating in push-pull as far as the 10 MHz signal is concerned and as a push-push device for the 135 MHz heterodyning signal; hence the 135 MHz is cancelled in the output circuit.

TR14 is a crystal oscillator using an HC-6/U, 45·0 MHz crystal, the circuit being the same as given by G3HBW (RSGB BULLETIN, Nov. 1966). TR15 is a harmonic amplifier multiplying by three, the collector being series tuned to 135 MHz. This is link coupled to the common connection of a bifilar wound coil tuned to 10 MHz which matches the incoming 10 MHz signal to the gates of the FETs TR16 and TR17. These are self biased by source resistors, and the output is resonated to 144 MHz by L4, the output being link coupled to a grounded base amplifier, TR18.

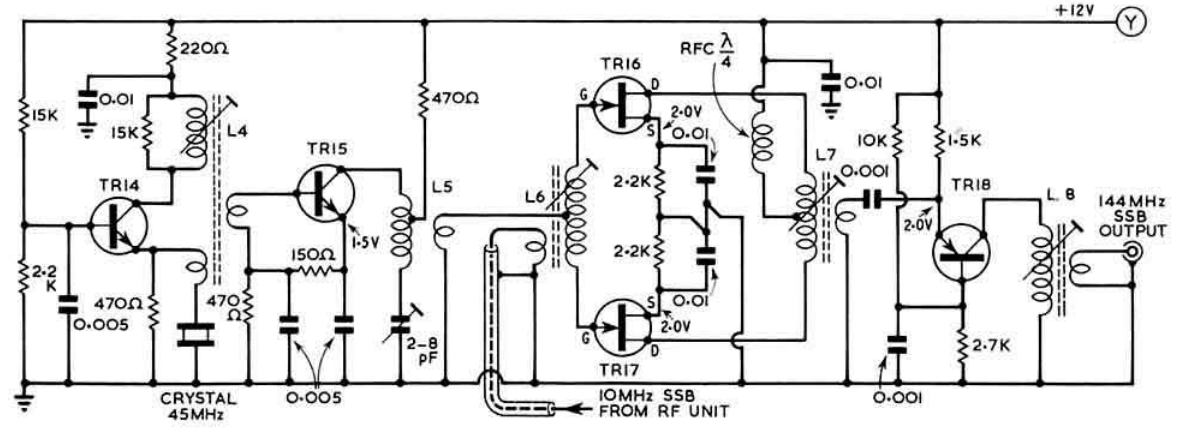


Fig. 3. The mixer section which provides the output at 144 MHz. L4, 12 turns, 28 s.w.g. enam., close wound on Radiospares former (feedback winding 1 turn, output winding 2 turns, both over earthy end of L4). L5, 8 turns, ¼ in. diam., 1 in. long, 18 s.w.g. tinned copper, plus 1 turn coupling in centre. L6, 20 + 20 turns bifilar wound on Radiospares former, with 2 turn coupling around centre. L7, 8 turns close wound, 22 s.w.g. enam., on Radiospares former, with 2 turn coupling around centre. L8, 6 turns, ¼ in. long, 22 s.w.g., on Radiospares former, with 2 turn coupling at earthy end.

Construction

No specialized form of construction is necessary but care should be taken to prevent hum pick-up in the gate circuits of TR1, TR4 and TR5. The filter components at the audio input should have short direct leads as they are intended to reduce r.f. pick-up at 144 MHz.

Care should also be taken that 10 MHz r.f. cannot leak from input to output which could impair the carrier suppression.

The prototype was constructed on three pieces of Veroboard some 8 in. long and 3 in. wide. The audio section was built on one as far as the outputs of TR2 and TR3, while the r.f. section and balanced modulators were built on the second and the mixer on the third. The three were then stacked one on top of the other with short interconnecting leads to take audio, r.f. and supply lines between them, and the whole placed in a metal box for screening.

For convenience, the A.F. GAIN, A.F. BALANCE, CARRIER BALANCE controls and the cores of L7 and L8 should be made adjustable from outside the box as they are affected by stray capacities.

Alignment—A.F. Section

After a careful check on wiring the d.c. can be supplied and a current check will show if all is well, that of the r.f. and a.f. sections being 18–20mA at 12 volts and the mixer unit being 10mA.

Transistors being what they are in the way of tolerances some check on voltages may be worthwhile and these are shown on the circuits. In particular, TR3 collector and the drains of TR4, TR5 should be about 6 volts to obtain the full a.f. swing at these points. If these are not so, then the bias on TR3 should be altered until the correct collector voltage is obtained, and the source resistors in TR4, TR5 should be changed in pairs for the correct result. The drains of TR4, TR5 should be within about ½ volt of each other if they are sufficiently well matched.

Next a signal check can be carried out by applying a 1 kHz tone to the a.f. input, a suitable circuit for producing this being shown in Fig. 4.

Turn all pots. to mid travel, and examine the waveform at TR3 collector with a 'scope and adjust the a.f. gain to give a 2 volt pk-pk signal. Check through the circuit for the correct signal voltage levels as shown underlined on the circuits.

Apply 10 MHz from a v.f.o. or signal generator to the r.f. input and ensure that there is some 0·4V r.m.s. at the output of L2 when it is tuned for maximum. The coupling capacitor on TR8 base should be changed in value to obtain this voltage.

R.F. Section and Mixer Alignment

Setting up the r.f. section is a little more difficult as either a 'scope with 10 MHz bandwidth or a mixer system as given in Fig. 3 with a narrow band receiver are necessary.

If the 'scope is available the normal procedure for aligning phasing exciters can be followed. Display the output on the 'scope with r.f. input but no a.f. Adjust the carrier balance controls for minimum deflection. Apply a.f. at the same level when the trace should be deflected at r.f. whilst showing considerable a.f. ripple. Tune L2 for max. output then the r.f. p.s.n. capacitors and the a.f. balance pot. for

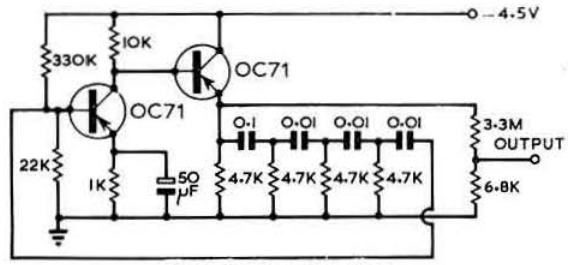


Fig. 4. 1 kHz test oscillator.

min. ripple as shown in the RSGB *Handbook*. Repeat carrier balance and r.f. p.s.n. adjustments.

However, most amateurs will not have such a 'scope available and the alternative procedure will have to be adopted.

It is not possible to monitor the output of the exciter directly on the receiver as it will pick-up a very strong signal from the 10 MHz oscillator, but the mixer enables the s.s.b. signal to be heard on the frequency on which it will be used.

At this point the mixer circuit should be checked and roughly aligned, d.c. voltages being given in Fig. 3. If TR14 is not oscillating due, perhaps, to the feedback winding being the wrong way round, the emitter voltage of TR15 will be zero.

The third overtone of the crystal can usually be monitored by tuning a 2m converter/receiver set-up to 135 MHz. L4 is tuned for max. output consistent with good starting and single frequency operation when the supply is temporarily interrupted. L5 is then tuned for max. output at 135 MHz. Output from the 10 MHz v.f.o. is then connected to the 10 MHz input socket and the resultant output from the 144 MHz s.s.b. socket is monitored by loosely coupling it to the 2m converter. Tune L6, L7 and L8 for max. output. Now adjustment of the r.f. p.s.n. can commence.

Turn all BALANCE pots. to centre of track and capacitors to half mesh. With r.f. in but no a.f. tune the receiver to resultant signal, and adjust CARRIER BALANCE pots. for min. signal. Switch in the b.f.o. and tune for zero beat. Apply 1 kHz a.f. input at the same level as before, noting that the receiver should tune in two separate sidebands at 1 kHz from the carrier, one above and one below, but one much stronger than the other. It should in fact be possible to get three separate zero beats as the receiver is tuned across the signal; one very strong, the next one weak (being the remains of the carrier) and the other, at this time, fairly strong. This last one is the one to tune to as it is desired to make it as weak as possible. The receiver should be tuned so that the beat note produced by this sideband can easily be distinguished from the others. At this point, it may be profitable to ensure that the correct (lower) sideband is being suppressed; the weakest sideband obtained from the previous procedure should be on the low frequency side of the carrier. If this is found not to be so then it can easily be changed by reversing connections A and B or C and D on T2 or T3.

Assuming that the sidebands are correct and the unwanted sideband is tuned in on the receiver adjustments can start in reducing this to the lowest possible level. Commence with the r.f. p.s.n. capacitors and adjust them for minimum output, then the same with the A.F. BALANCE pots. Remove

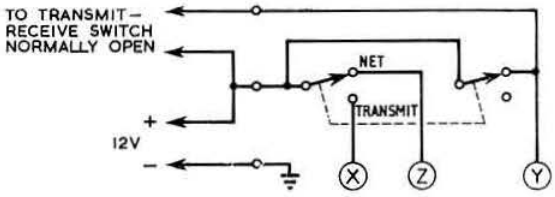


Fig. 5. The author's power supply switching.

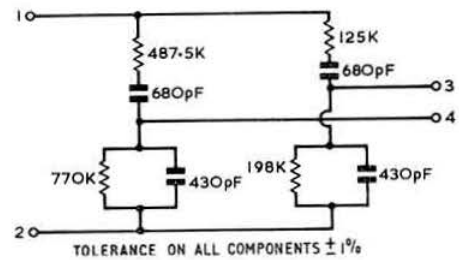


Fig. 6. The audio phase shift network circuit and component values.

a.f. input, readjust carrier balance pots. for minimum carrier and with the a.f. input replaced, repeat the sideband suppression. It will be necessary during all this to adjust the receiver output level, and as with all sideband signals it is best to have the a.f. gain well up and the output level adjusted with the r.f./i.f. gain controls. As the unwanted sideband is suppressed it will be necessary to increase the receiver gain so that it is still audible. Finally, it should be possible for the unwanted sideband to become almost lost in the heterodynes produced by the carrier and wanted sideband.

The exciter is now almost ready for use but a little work remains to be done on the mixer unit to ensure linear operation. With the 1 kHz a.f. input as before, tune L6 for maximum receiver output. Remove a.f. and move the link coupling to L5 out so that coupling is very weak, then monitor TR16 or TR17 source voltage and note reading. Replace a.f. and increase coupling to L5 until the source voltage just starts to rise and then reduce it a fraction.

All that remains to be done is to replace the a.f. oscillator with the microphone and adjust the AUDIO GAIN so that the a.f. voltage at TR3 collector is around 2V, pk-pk. A few milli-watts of s.s.b. at 144 MHz are now available and can be amplified to any desired power level using Class A single ended or Class AB push-pull stages.

Reports on the air indicate that both carrier and sideband suppression are better than 40dB, which is generally adequate for amateur communications, but this will only be obtained after careful setting-up and paying attention to linear operation in the balanced modulator and mixer.

Operation on Other Frequencies

There is no reason why the operating frequency should not be made 3·7 MHz if it is so desired. Suitable changes would have to be made to L2, L3 and the r.f. p.s.n. as follows:

L2 should be made 25 turns 32 s.w.g. plus 3 turn coupling.

L3 should be made 28 turns 36 s.w.g. bifilar wound.

P.s.n. capacitors 150pF plus 3/30pF trimmers.

The oscilloscope method of alignment is the only one practical if the exciter is followed by a p.a. stage (i.e., without a mixer) for operation directly on 3·7 MHz. At high power levels, coupling directly to the *Y* plates is possible and alignment carrier out for minimum ripple as described.

Supply Switching

To make the unit " workable " the supplies have to be switched on and off at the right times and some provision made for " netting " the v.f.o. onto the received frequency. One such system is shown in Fig. 5, but it may have to be varied to suit individual requirements.

The incoming 12 volts negative is earthed and the positive side goes to the wipers of a 2 pole 2-way switch and also to one side of a pair of contacts on the transmit/receive relay which are open on receive.

On net, the positive side of the 12 volts is routed to the r.f. and mixer section but not the audio as an acoustic feedback loop would be formed. Since the carrier has been reduced to a low level it may not be audible unless it is temporarily increased during the netting procedure. This is done by off-setting any one of the balanced modulator sources by applying a small positive potential to it via a 100 k ohm resistor, which could be made adjustable if desired but should not be made less than 10 k ohm for safety's sake. On receive, the audio section only is energized by the switch, and use can be made of this during setting-up as a jumper lead can be taken to other sections as required. The output from the exciter is now controlled by the transmit-receive switch, which puts voltage on the r.f. and mixer sections when transmit is selected. It is safe to interrupt the supply to the crystal oscillator TR14 as the power dissipated is very low and there is no oscillator drift due to thermal effects on the crystal.

Conclusions

It would appear that FETs can be used in the ways described and good results obtained without any undue " side-effects." No elaborate test equipment capable of measuring the various parameters of the signal produced has been available during the development of the unit, but on the air tests give good accounts of the sideband suppression which would be greatly impaired if the FETs TR4 and TR5 were applying any load to the audio phase shift network.

The r.f. phase shift network was easily tuned for sideband suppression and capacitor values in practice were close to the calculated ones, showing that there were no capacitive effects due to the FETs in the balanced modulators.

The sideband suppression would also suffer if the mixer was operating in a non-linear manner due, perhaps to overdriving the FETs, but provided they are operated within the given limits the results obtained should be duplicated.

TRANSISTORS

T1—Low Noise Audio—Micro Electronics MEFET etc.
T2—OC45, 2N1305, 2N3702, 2N3703 etc.
T3, T5, T7—2N3704, 2N3705, 2N1304 etc.
T4, T6, T10, T11, T12, T13, T16, T17—2N3819, MFP105 etc.
T8, T9—2N3704, 2N3705, BFY19, 2N3826 etc.
T14, T15—BFY19, 2N3826 etc.
T18—AFZ12, OC171, AF139, AF186 etc.

Reflectometers and Directional Power Meters

By M. M. BIBBY, G3NJY*

A NUMBER of articles have appeared from time to time in the RSGB BULLETIN describing s.w.r. bridges, but the authors of these articles have generally devoted their attention to the practical use of these instruments, leaving the theory of their operation largely unexplained. It is the purpose of this article to 'explain' the relevant theory.

Fig. 1 illustrates a section of coaxial cable with a small loop of wire inserted running parallel to the centre cable

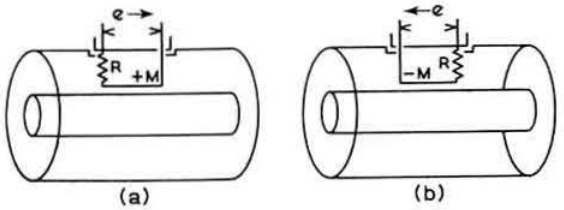


Fig. 1. The sensing circuit. At (a), mutual coupling is positive, at (b), negative.

with one end terminated in a resistance R. This set-up will be familiar to those who have used these devices. Fig. 2 shows the equivalent electrical circuit. C is the capacitance between the loop and the centre conductor, M the mutual inductance between the two and E is the voltage between the outer and inner conductors. I is the current in the centre conductor.

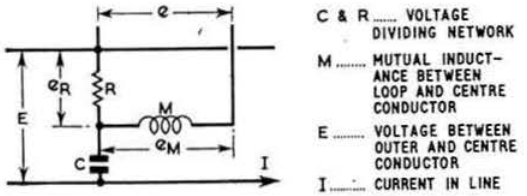


Fig. 2. Basic power sensing circuit used in a wattmeter.

Referring to Fig. 2, if
$R << X_c$, then

$$e_R = \frac{RE}{X_c} = j\omega\, RCE$$

and $e_m = I\,[j\omega\,(\pm\, M)]$.
The $\pm$ sign in front of M is the quantity which makes the device directional. The sign is varied either by turning the loop through 180° (only practicable at v.h.f.) or exchanging the positions of R and the detector. Now the measured output voltage, e, is the sum e_R and e_m, i.e.

$$e = e_R + e_M$$

i.e. $e = j\omega\,[CRE \pm MI]$

Besides selecting R very much smaller than X_c, the components of the circuit are chosen so that $CR = M/Z_o$

Now $e = j\omega \left[\frac{E.M}{Z_o} \pm MI\right]$

$$= j\omega M \left[\frac{E}{Z_o} \pm I\right]$$

At any one point on a transmission line the voltage, E, is the sum of the forward and reflected voltages, E_F and E_R respectively, and the current I is $\frac{E_F}{Z_o} - \frac{E_R}{Z_o}$

Therefore when we consider the mutual coupling in the positive sense

$$e_t = j\omega\, M \left[\frac{E_F + E_R}{Z_o} + \frac{E_F - E_R}{Z_o}\right]$$

$$= \frac{j\omega\, M}{Z_o} . 2E_F$$

And when we consider the mutual coupling in the negative sense

$$e_b = j\omega\, M \left[\frac{E_F + E_R}{Z_o} - \frac{E_F - E_R}{Z_o}\right]$$

$$= \frac{jw\, M}{Z_o} . 2E_R$$

e_t and e_b are the quantities we measure as forward and backward voltages and the standing wave ratio (s.w.r.) is calculated from

$$\text{s.w.r.} = \frac{e_t + e_b}{e_t - e_b} = \frac{E_F + E_R}{E_F - E_R}$$

Errors in R

Although it is relatively easy to ensure the condition that R must be smaller than X_c, it is much more difficult to ensure the condition that

$R = \frac{M}{C.Z_o}$ as we know neither C nor M accurately. To see what effect occurs when a wrong value for R is chosen let

$$CR = k.\ \frac{M}{Z_o}$$

then $e = j\omega M \left[k.\ \frac{E}{Z_o} \pm I\right]$

and $e_t = \frac{j\omega M}{Z_o}\left[(k + 1)\, E_F + (k - 1)\, E_R\right]$ . . . (1)

$$e_b = \frac{j\omega M}{Z_o}\left[(k - 1)\, E_F + (k + 1)\, E_R\right] \quad \ldots (2)$$

The s.w.r. we calculate is now

$$\text{s.w.r.} = \frac{e_t + e_b}{e_t - e_b} = k\,\frac{E_F + E_R}{E_F - E_R} \quad k > 1$$

When k is less than 1 the situation becomes rather complex as e_b may sometimes go negative although the detector will still give a positive indication.

* Halla, Shop Lane, Leckhampstead, Newbury, Berks.

False Zero Reflections

If equation (2) is studied it can be seen that e_b will indicate zero when

$$(k + 1)\, E_R = (1 - k)\, E_F$$

$$\text{or } \frac{E_R}{E_F} = \frac{1-k}{1+k} \qquad \ldots (3)$$

As $0 \leqslant \frac{E_R}{E_F} \leqslant 1$ then equation (3) can only be true when $k \leqslant 1$. Thus we see that when $k \leqslant 1$ we will apparently have no reflected power when in actual fact the true standing wave ratio is

$$\text{s.w.r.} = \frac{1 + \frac{E_R}{E_F}}{1 - \frac{E_R}{E_F}} = \frac{1}{k} \quad (k < 1)$$

Thus if we are using a value of R only half or what it should be zero reflected power as indicated at the detector will really mean an s.w.r. of 2 : 1!

Equation (2) also shows that if it is impossible to get zero indicated reflected power when the transmission line is known to be well matched then the value of R is too high ($k > 1$).

Directivity

The quantity

$$D = 20 \log_{10} \frac{e_f}{e_b} \text{ [when } E_R = 0\text{]}$$

is known as the directivity of the instrument. It is a measure of the capability of the device to discriminate between forward and reflected power. Using the values of e_f and e_b from equations (1) and (2), remembering $E_R = 0$,

$$D = 20 \log_{10} \frac{k + 1}{k - 1} \text{ if } k > 1$$

$$= 20 \log_{10} \frac{k + 1}{1 - k} \text{ if } k < 1$$

The BBC in their reflectometers on Bands I and II aim for a directivity of about 40dB. This means that R must be accurate within 2 per cent.

A Frequency Independent Design

From the foregoing analysis it can be seen that the sensitivity of the basic reflectometer circuit is directly proportional to the operating frequency. When measurements are made over a wide frequency range this effect is undesirable and efforts have been made by various designers to construct reflectometers whose sensitivity is largely independent of frequency. One such design has recently been discussed in the literature [Ref. 7].

The circuit for a frequency independent reflectometer is shown in Fig. 3(a) and its equivalent circuit shown in Fig. 3(b). Let us consider the instrument to be set up to indicate forward power then the output voltage V_o (e_f of the previous section) is given by

$$V_o = + \left[2j\omega \frac{M}{Z_o} \right] E_F$$

When the coupler of impedance Z_c is connected to an external load impedance, Z_L (usually a diode voltmeter) the measured voltage across the load, V_L, will be

$$V_L = \left[\frac{Z_L}{Z_L + Z_c} \right] . \; V_o = \frac{Z_L}{Z_L + Z_c} . \; j\, 2\omega \frac{M}{Z_o} . \; E_F$$

The coupler impedance Z_c consists of three components,

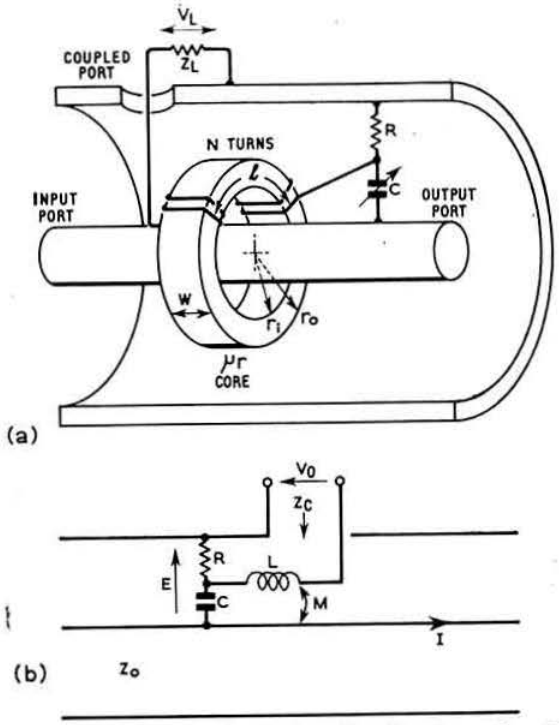


Fig. 3. (a) Physical circuit of a directional coupler. (b) Equivalent circuit of a directional coupler.

Z_m the reflected line of impedance, Z_x the self-inductive reactance of the secondary pick-up coil and R the terminating resistance (remember $R << \frac{1}{\omega C}$). Normally $Z_m + Z_x << R$. However by adjusting $Z_x >> Z_m + R$ then $Z_e \simeq Z_x = j\omega L$; the load voltage now becomes

$$V_L \simeq \frac{Z_L}{Z_o} . \; \frac{2M}{L} . \; E_F \quad \left(j\omega L > 2 \left(R + Z_L \right) \right.$$

A much easier approach is that adopted by at least one US company [Ref. 3] using a capacitor as the frequency dependent component. This employs the more normal circuitry of Figs. 1 and 2 but the output voltage, e, instead of being monitored by the conventional voltmeter circuit is

(Continued on page 372)

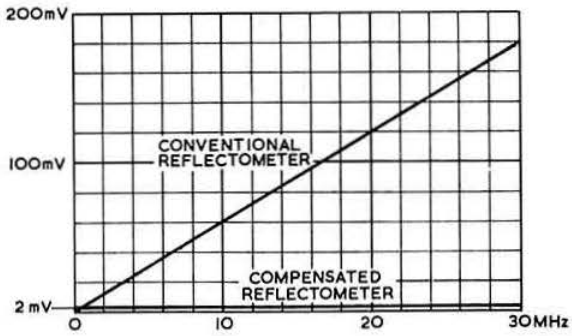
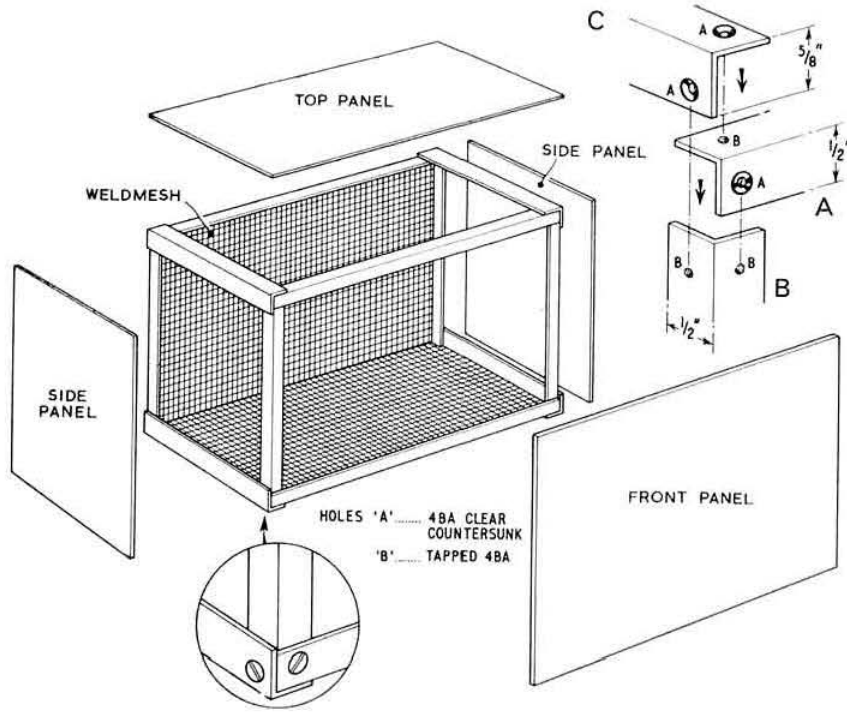


Fig. 4. A comparison of sensitivities between a conventional reflectometer and a frequency independent type.

Make Your Own Cabinets

By W. H. ALLEN, MBE, G2UJ *



THERE are a number of advantages to be gained from putting home-built equipment into some form of enclosure, rather than leaving it lying around untidily gathering dust and forming a temptation to prying fingers. In the case of valve apparatus particularly, protection against accidental contact with high voltages is a prime necessity. And yet there are many constructors who, having produced an excellent transmitter, receiver or item of test equipment, begrudge the comparatively small expenditure of time and money to provide it with a serviceable finish in the form of a case or cabinet.

Without exceptional skill in sheet metal working and access to more than ordinary home workshop facilities, there is no possibility of the amateur " kitchen table " worker being able to compete with the professionals in either design or appearance when it comes to cabinet work, and if one examines the catalogue of a commercial case maker it will be found that the goods offered are by no means over-expensive for what one gets. There is, however, one considerable snag; cases have to be ordered, and if of a non-standard size, made to order, all of which takes time. The purpose of this article is to describe how perfectly serviceable cases, although naturally not so " professional " looking as those bought from a specialist, can be produced without any complicated metal work or special tools.

The basis of the design is a frame of semi-hard aluminium angle covered on its faces with flat metal sheets or, when ventilation is required, by a metallic mesh such as *Weldmesh*. Aluminium angle may be obtained from builders' merchants or from many ironmongers in various widths, $\frac{1}{2}$ in. and $\frac{5}{8}$ in. being adequate for all but the largest cases. *Weldmesh* is obtainable from similar sources.†

To construct the framework, two rectangles, forming the front and back, are first made up from lengths of the $\frac{1}{2}$ in. angle. The horizontal members are designated (A) in the diagram and the vertical members (B). (A) is overlapped on (B) and a hole suitable for tapping 4BA is drilled through both pieces in the centre of the $\frac{1}{2}$ in. square so formed. The hole in (B) is tapped 4BA and that in (A) enlarged to 4BA clearance and countersunk. A similar operation is carried out for each of the corners and each frame assembled, using $\frac{1}{4}$ in. c.s. screws.

Next, four pieces *C* are cut from the $\frac{5}{8}$ in. stock of a length required for the depth of the case and bolted in a similar manner to that already described, to the angle formed by *A* and *B*, the end of *C* being made level with the edge of *A*. The position of the holes drilled in *C* must be chosen so that the three $\frac{1}{4}$ in. screws do not foul one another.

If all pieces were originally cut to the correct lengths, the final result will be a frame square in all directions and the next step is to secure the metal plates to its faces either by bolts or self-tapping screws. To avoid having touching edges, which are difficult to make of good appearance, each metal plate should be cut $\frac{1}{8}$ in. small in both dimensions than the face on which it is to fit, thus leaving $\frac{1}{16}$ in. of the angle exposed at each corner. If desired, the front panel, which should generally be of heavier gauge than the side and top

* 24 Arundel Road, Tunbridge Wells, Kent.

† The $\frac{1}{2}$" mesh would be suitable for this application.

plates—say 14 or 16 s.w.g. as against 20 or 22 s.w.g.—may be made an exact fit on the front face.

Reference to the diagram will show that if *A* overlapped *B* there would be a $\frac{1}{16}$ in. gap (the thickness of the angle) between panel and frame at each side and this may be accommodated either by using washers under each of the self-tapping screws or, preferably, by inserting a narrow strip of 16 s.w.g. metal to fill the space. A similar packing operation will be required in the case of the two side panels.

If ventilation is required, the bottom and back of the case should be covered with *Weldmesh* and four rubber feet fitted to raise the case above the table and so permit free circulation of air. The *Weldmesh* should be fitted *inside* the bottom and back frames and secured to the angle with c.s. bolts, washers and nuts. A somewhat neater job results from using a single piece of *Weldmesh* to cover both the back and bottom of the case.

The finished case may then be painted either by brush or by means of an aerosol paint spray. A particularly effective finish is imparted by the YUKAN hammer-tone spray as advertised in RADIO COMMUNICATION. The panel should be sprayed separately from the case, as should be the heads of the self-tapping screws which will secure the panel. These should be mounted on a piece of card for the purpose. Care should be taken to screen off, with paper and Sellotape or masking tape, those parts of the finished case which are not to be painted. The *Weldmesh* may either be left *in situ* and sprayed (a somewhat wasteful procedure!) or separately varnished by brush to prevent rusting. If aluminium sheets are used for the top and side plates, no additional finish is required on the inside surfaces unless desired, but if tinplate or other ferrous metal is employed it should be painted (preferably by brush as it is difficult to spray satisfactorily inside a small case) or varnished.

Weldmesh is easily cut with tinsnips and any apertures required for the passage of cables etc. can be made without difficulty.

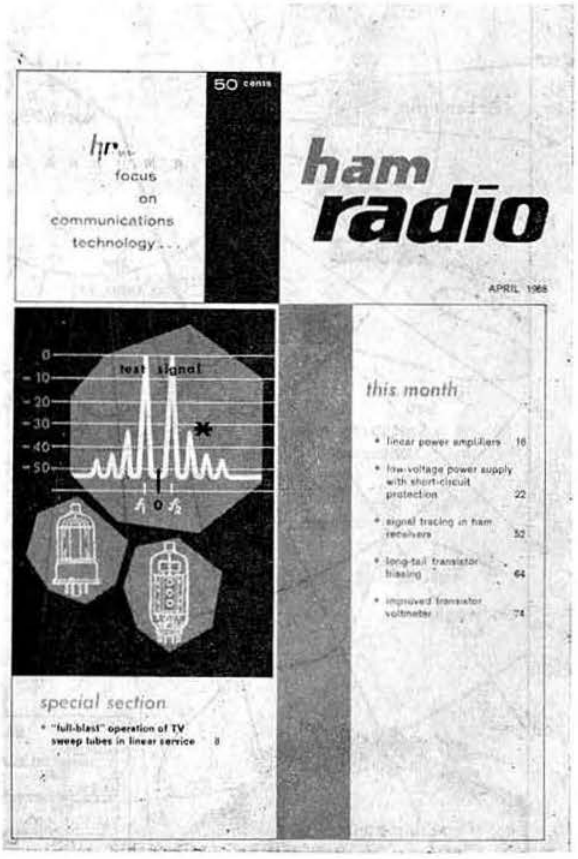
Power packs, which need protection against accidental contact with high voltages but adequate ventilation, may be simply housed by constructing an angle frame work entirely covered in *Weldmesh*. The four vertical anglepieces can then be secured to the corners of the chassis by means of self-tapping screws. A similar construction could usefully be employed for audio amplifiers or modulators with, if required, a solid metal panel to carry controls and meters.

A New American Monthly

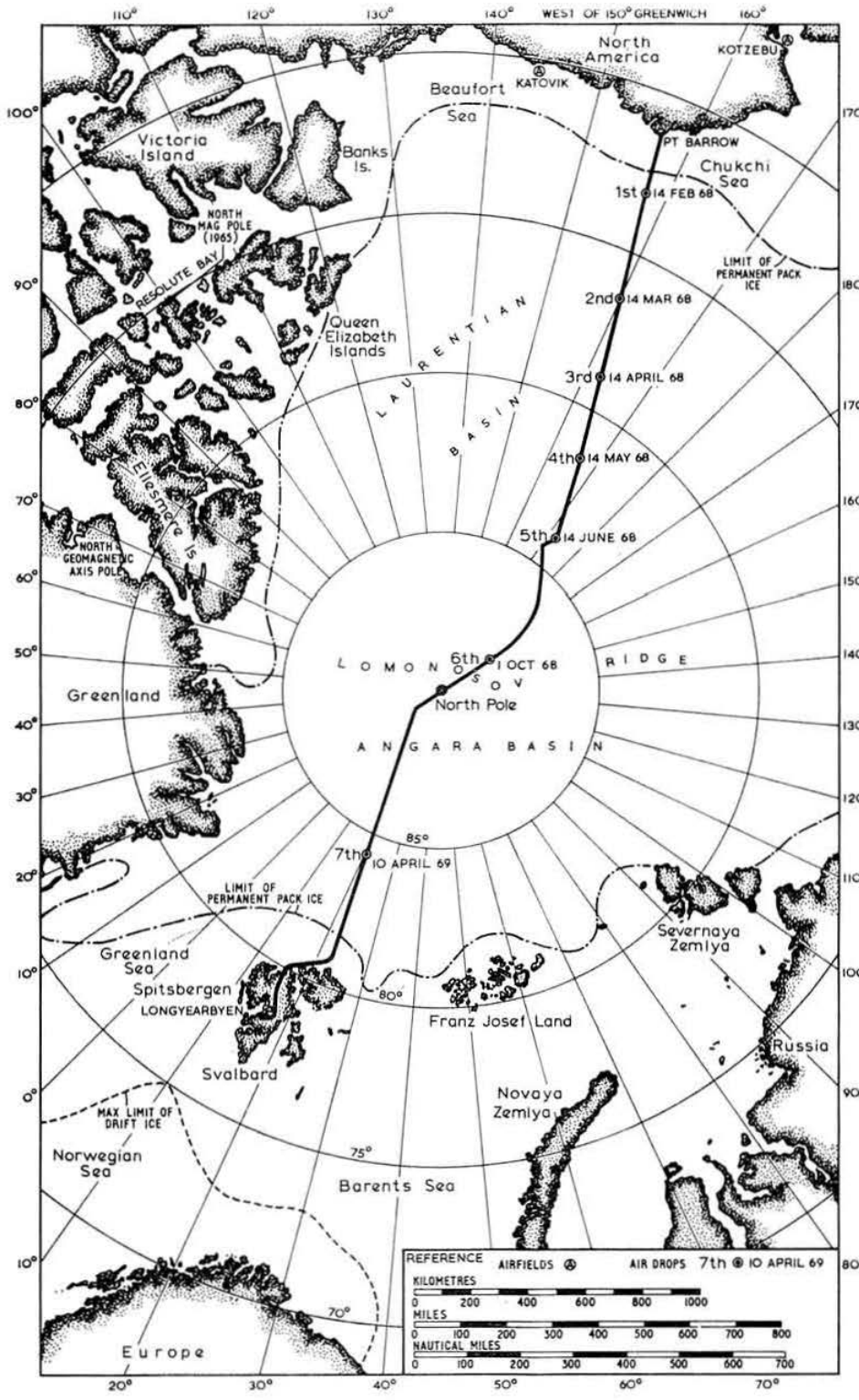
Last month, in the opening paragraphs of Technical Topics, Pat Hawker surveyed with some dismay the current tendency, particularly with American publications, of giving steadily wider coverage to " transient happenings," or expeditions and general operating news, at the expense of technical articles. One amateur who obviously agrees that this is a retrograde attitude, and believes that a large market still exists for technical info, is Jim Fisk, W1DTY. He has just launched a new Amateur Radio magazine, *Ham Radio*, with a policy of " strictly technical." Considerable confidence in this opinion must exist, for there are many who maintain that the American market is well covered by the " three ": *QST*, *CQ* and *73*.

So far, we have seen two issues (the second, April, is illustrated alongside), and a remarkable diversity of subjects. The latest one, for instance, contains articles on Full Blast Operation of TV Sweep Tubes, Linear Power Amplifiers, a Modern Low-Voltage Power Supply, A Grand-Daddy Station Control Centre, Notes on the APX-6 Transponder, How to use Solenoid Rotary Switches, The E-Z Impedance Bridge, a C.W. Monitor and Code Practice Oscillator, The Dynistor, Signal Tracing in Ham Receivers, Replace the Unijunction Transistor, The International EX Crystal, Quement Circular Electronics Slide Rule, Longtail Transistor Biasing, An Improved Transistor Voltmeter, More 144 MHz Moonbounce to Australia, and a Low-Cost Tiltover Tower Base, in 96 pages.

Ham Radio is published monthly by Communications Technology, of Greenville, New Hampshire, and amateurs on the staff are W1DTY, W1CCZ/K2IEO, K1PSR, WA6IAK, and W1NLB.



To save you the problem of converting Sterling into Dollars, the RSGB has made arrangements to accept orders from members for annual subscriptions. The cost is 42s a year, which includes postage for each copy direct from the States.



The British Trans-Arctic Exped-ition

By D. J. COLLINS, A.M.I.Mech.E., C.Eng., G2FLB*

THE challenge of a trans-Arctic journey across the North Pole has been in the minds of Polar explorers for the last decade. Unlike trans-Antarctic journeys which are made overland when large load-carrying vehicles are employed, a trans-Arctic journey entails movement over a frozen ocean containing large stretches of thin, moving ice and open water. Any such journey must therefore be made with the lightest equipment. Dog sledges are the most effective means of transport for equipment, all of which must operate in an extremely hostile environment.

Until recent years the nature of ice circulation in the Arctic Ocean was not understood and almost every attempt at the North Pole has been made against the drift of the ice, the floes carrying the teams back two miles for every ten walked. During February this year a team of four men and 40 dogs led by W. W. Herbert set off from Point Barrow, Alaska, to walk the 3,800 miles to Spitsbergen. They have plotted a course across the Arctic Ocean that will be favourable to the drift of the ice and by using modern communications techniques, radio homing devices and air support they hope to accomplish the only challenging journey left to be made.

In October, 1967 Squadron Leader Freddie Church and the author were asked to produce a radio communications plan for the Expedition. Our first plan was based upon using amateur stations in Northern Greenland and Canada to act as relay stations between the United Kingdom and the sledge party. This plan was not considered reliable enough as we would have little control over the relay stations. The only solution was to set up our own relay station. Freddie Church proposed to set up this station himself and the Expedition Management Committee agreed. The map opposite shows the planned route of the expedition. On a drifting ice island, designated T3, is based a small scientific team. Permission was obtained to set up the relay station on T3, also at Point Barrow and Spitsbergen to the best advantage relative to the position of the sledge party. Discussions were held with the GPO who agreed to issue special licences to four amateurs to operate as fixed stations not in amateur bands. Each of these stations operate under a call-sign of G7AE using a maximum input power of 500 watts, c.w. mode only. The main communications station in the UK is Cove Radio, RAE, Farnborough, Hants.

The sledge party is equipped with Redifon GR345 h.f. s.s.b. packsets covering 2–12 MHz in 1 kHz steps, frequency being set by four decade switches. The transmitter output is 15 watts p.e.p. and receiver signal noise ratio for a 1 microvolt signal is 10dB. This set is being used at approximately 4 MHz using a dipole either between two skis or lying on the ice. The Expedition is, at the time of writing, about 130 miles from Point Barrow where the relay station is set up and excellent s.s.b. communications are being achieved. Power is obtained from 12 volt nickel-cadmium batteries, recharged by a hand generator, the operation of which is not easy after a day's trek in the earth's most hostile environment. The sledge party also carries an Elliott distress beacon that transmits on the v.h.f. and u.h.f. distress frequencies simultaneously. This will operate for homing purposes during air support drops. Without such a device the possibility of a supply aircraft locating the Expedition would be remote. For the winter months it is planned to drop a C and N transistorized h.f. communications receiver type R7020 to the Expedition for use when they drift in their winter quarters during the four months of total darkness.

Freddie Church is equipped with a KWM2 transceiver and a 30L1 linear amplifier. A Plessey PR155 receiver is being used for reception under adverse conditions. The relay station aerial system was a difficult problem; it had to be capable of one-man erection and could not be directional, owing to the rotation of T3. It was also required to be reliable under severe wind and ice conditions in temperatures as low as −70 degrees. The final choice was a ground plane with six radials on the ice and a vertical wire radiator that is suspended by a nylon rope passing through pullies on two 30 foot portable masts. The vertical wire is changed when a significant frequency change is made; not a popular operation for Freddie Church. A long wire from the radio hut to one of the 30ft. masts is used for the 4 MHz communications to the sledge.

Communications between G7AE and the relay station commenced mid-February, the stations licensed being G2BVN, G2FLB, G8KW, G8PB and G8FC. Initially G2FLB operated a KW Viceroy, a KW 201 Receiver and *Q* multiplier, the latter a necessary item owing to the heavy QRM from teleprinters. I had hoped for QRM-free operation outside of our bands! The aerial is a 2 section W8JK, not a popular array in 1968 but an effective fixed beam. The first QSO on it gave a 5/9+10dB report from a VE8 at Alert. Any loss of message has so far been due to QRM and not to the reliability of the radio circuit.

To further propagation studies, the GPO has agreed to allow a number of stations to be nominated by the RSGB Scientific Studies Committee who will be licensed to receive and record signal strengths from the relay station. For several months, whilst on T3, Freddie Church will be very near the North Pole. Hence h.f. communications will be subject to the normal variations that we experience and also Auroral absorption closely correlated to visual aurora and geomagnetic disturbances. Polar Cap Absorption (PCA) which takes place over the Polar Cap often lasts for several days and is connected with solar disturbances. Sudden commencement absorption usually occurs abruptly but conditions return to normal in less than one hour. Possibly the greatest communications hazard, this has already produced R2 reports of G7AE in snow static. This is generated on exposed aerials during periods of blowing snow or ice; noise levels of 50dB above man made and atmospheric levels are often recorded. During winter and spring periods 10–30 per cent loss of intelligibility can be due to snow static.

At present Freddie Church is at Point Barrow and Alaska is no longer rare DX. However when he moves to T3 this will be the first occasion that consistent communications will have been attempted between a British station located close to the North Pole, well within the PCA zone and the United Kingdom, using amateur equipment. The results will be especially useful during the 1968/9 period of high solar activity. The expedition will, of course, carry out scientific studies especially related to weather data. The importance can only be seen when it is realized that during the winter 1968/69 there will be only one other manned weather station in an area of 5 million square miles.

* 2 The Weald, Walden Road, Chislehurst, Kent.

REGULAR FEATURE

TECHNICAL TOPICS

By PAT HAWKER, G3VA

FROM time to time it becomes obvious that there is still a form of division in the Amateur Radio world—a sort of " before and after " the transistor. To a lot of us who came up with thermionics, there is still something a little gimmicky about all this solid-statery. On the other hand, one hears in the industry that some of the younger (post-transistor) engineers get quite flummoxed when asked to have anything to do with valves. A Marconi broadcast engineer dealing with transmitters up to about 750 kW told me recently—and a little sadly—that he represents a fast disappearing race!

For the pre-transistor amateur, one problem is the simple one of identification. The 807 came along in 1936 and the number has been familiar to a considerable proportion of communications people ever since; but semiconductors sprout type numbers like blades of grass in May, and no sooner is one set assimilated than the next batch comes along. Good data books are few and far between and never really seem to keep up with the flood. The European semiconductor code is proving some help in sorting out silicon from germanium devices and indicates the main application category, but regretfully does not distinguish p-n-p from n-p-n types, which would have been useful.

American JEDEC numbers are even less useful, unless to distinguish diodes (1N) from transistors (2N) from tetrode or dual-gate devices (3N). And many of the most useful devices carry, for various reasons, makers' own designations. Nowadays there seem to be masses of transistors available on the surplus market at highly attractive prices—but not carrying any obvious identification at all. This is quite a problem (and would be even more so were it not for the fact that transistor tolerances are so much wider than for valves).

A lot of information can be gleaned from resistance measurements across the junctions (*TTftRA*, page 11) and this technique forms the basis of a lot of the simple transistor tester circuits which have appeared. These can sort out p-n-p from n-p-n devices and provide some information on the beta gain; but that still leaves one wondering about the h.f. and v.h.f. characteristics, maximum voltages, and safe power dissipation. If anybody has worked out a simple but effective method of coping with this problem of identification, I am sure the rest of us would like to know about it. And an even more complicated problem is looming up—how to identify and sort out the connections to surplus unmarked integrated circuits.

Simple Transistor Equipment Repairs

Many amateurs gain their first experience of handling transistor circuits in the course of repairing one of the multitude of broadcast receivers, either for themselves or for a friend; and it is certainly possible to glean quite a bit about the foibles of semiconductor circuits in this way. So we make no apologies for including fairly elementary notes on this subject based on some we originally prepared a few years back for *Radio & TV Servicing*, and derived in part from a popular series of Mullard lectures.

Some two-thirds of all faults on these receivers tend to be of a basically mechanical nature. These include broken fine leads to the ferrite rod coil windings; cracked ferrite rods (these can often be glued with Araldite, Durafix, etc.); dirty or bent switch contacts; " tired " spring contacts in the earpiece jacks short-circuiting an internal speaker; resistors on printed circuit boards being broken during routine replacement of batteries.

Transistors are pretty reliable, but one certainly comes across instances of their failing; in my experience these are most often the a.f. transistors in the output or driver stages. It is often pointed out that the failure of a transistor is usually the result of mal-usage or the failure of an associated component; for this reason care should be taken to check current and voltage conditions and all components which could cause failure before replacing the semiconductor—just as one should always do this when replacing a rectifier in a valve receiver.

A very common fault is still the old problem of noisy volume controls. These can sometimes be cleaned without removing them from the set with the aid of *non-corrosive* lubricants such as Electrolube (available in both grease and aerosol form—the latter as type 2A-X), or Tun-O-Lube which is marketed with a fine metal tube to help inject the lubricant through the gap in the C clip on potentiometers. Neither carbon tetrachloride nor trichlorethylene (lighter fuel) should be used for this purpose since it tends to leave a white deposit which can sometimes become corrosive.

The noise in pots does not always come from the usual fault—a dirty collector ring; in some cases it may be necessary to dismantle the control; and then to clean and regrease the spindle before reassembly; a rather laborious procedure but one which may be necessary to cope with a special pot for which no replacement can be obtained.

When dealing with an equipment with a suspected transistor fault—often denoted by running down the battery as well as not functioning—some care should be taken since a short-circuited transistor can sometimes be as hot as a soldering iron, with a surface which will stick to the fingers and cause a bad burn: not a frequent occurrence but it can happen.

A poor battery condition will not always be detected just by checking the battery voltage on a high-sensitivity meter. Low battery voltage or high internal resistance of the battery

TRANSISTOR IDENTIFICATION PROBLEMS—CHECKING AND REPAIRING TRANSISTOR EQUIPMENT—INTERFERENCE FROM THYRISTOR DEVICES—SCR AND TRIAC CONTROL CIRCUITS—FILTERING SCR AND TRIAC CIRCUITS—COMMON-COLLECTOR MIXER—TRANSISTOR H.F. OSCILLATOR—H.F. PARAMETRIC UP-CONVERTERS IN AIRBORNE TRANSCEIVER—MORE ON SIAs AND TRANSMITTING LOOPS—KEY-CLICK FILTER.

can produce instability, motorboating, distortion, or failure of the local oscillator (completely, or on the higher-frequency end of one or more wavebands). The end-point of battery life is in fact denoted on many receivers by increasing cross-over distortion (a condition caused by the two halves of the waveform in a Class B stage not fitting together without discontinuities); modern temperature and voltage compensated output stages are much more tolerant of low voltage and low temperature than those used in earlier transistor receivers.

A useful method of checking a battery is: (*a*) to measure the voltage on no load (V1); connect a 100-ohm resistor across it and measure it again (V2); then the internal resistance of the battery can be calculated from: $100 \times (V1 - V2)/V2$. Batteries when good should have a typical resistance of say 10 ohms but will usually be satisfactory up to about 50 ohms for a 9-volt unit; above this it should usually be discarded.

When replacing output transistors, look out for the presence of silicone grease: this is often used to improve the thermal conductivity between the transistor casing and the commonly-used small heat sinks. It may thus be important to ensure that a replacement unit has a similar coating. This form of silicone grease is also useful in preventing rubber leads or grommets from hardening or perishing and because of its water-repellent properties can be useful for sealing outside coaxial feeders. Apart from silicone grease, a silicone material in the form of white paste is marketed as Development Compound 2623, this has good thermal conductivity and can be used to improve heat transfer between components and the surface to which they are attached (useful also when dealing with r.f. power transistors).

When first checking a receiver, a good routine is first to check batteries under load; then to *look* very carefully for mechanical faults or dry joints; and only then to start systemmatic testing, working stage-by-stage using a low-voltage signal injector, (e.g. *TTfIRA*, page 91) with a 47 k ohms resistor in series with the probe to limit signals to a safe level, and using a high-resistance voltmeter to check line, collector, emitter and base voltages.

The danger of injecting leakage currents from soldering iron casings or mains operated test gear has been discussed before in *TT*, but these and the usual transistor handling precautions should not be overlooked, even though transistors are more robust than of yesteryear.

Interference from Thyristor (SCR) controls

A good many people are beginning to discover the attractions of thyristors (silicon controlled rectifiers, scr's, triacs, etc.) for the control of domestic electrical appliances; for example for motor speed control of power drills or other units based on small motors, for continuously-variable light dimmers, for the temperature control of soldering irons, and similar applications. However, until fairly recently, the widespread use of these control units has tended to be delayed by the cost of the thyristors and other components. Prices of some of these however have been coming down steadily, and one suspects that thyristor control units, with their innumerable applications, will come into fairly substantial use in the years ahead.

This is fine for the workshop man, and for those who like soft lights with their sweet music—but considerably less so for many amateur operators in urban areas. For there is little doubt that unfiltered or ineffectively filtered thyristor control units can be a vicious new source of electrical interference (r.f.i.).

Much of this interference seems to come from the extremely steep rise in current when the thyristor is triggered and fires; this generates a broad spectrum of interference, which may be radiated directly or carried along the power lines, or the common combination of these paths. Recently, some of the people who spend a good deal of their lives working on the problem of electrical interference at the Electrical Research Association told me that they recognized that the increasing popularity of thyristor dimmers and motor controls could cause serious interference; they feel that there is still a lot to be learned about tackling this problem. Most of us know from bitter experience that the power drill, even without scr control, can be a potent jammer on some frequencies—and any aggravation of such interference cannot be dismissed lightly.

This question also surfaced recently in *QST* (March 1968) when a letter from SM6CPI pointed out that a simple scr motor speed control unit previously described by K1MET (*QST*, December 1967), Fig. 1, was a potential source of interference unless fitted inside a screened and filtered box.

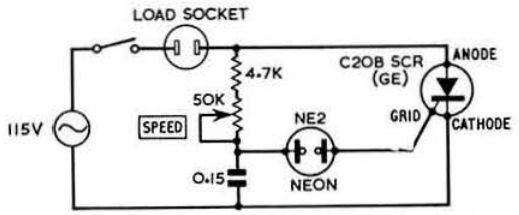


Fig. 1. K1MET's proposed s.c.r. control unit for electric drill motor speed control and similar applications.

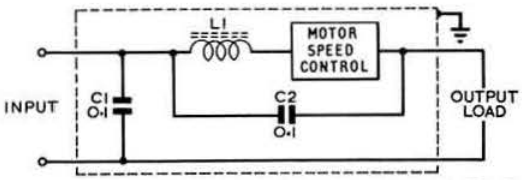


Fig. 2. SM6CPI's suggestions for screening and filtering thyristor control units. L1 is 300 to 500 μH wound on ferrite or iron slug. When used with loads of less than about 50 watts, filter capacitors should not be larger than about 0.05 μF.

He gave details of a suitable arrangement: Fig. 2. For small loads (under 50 watts) he suggests that C1 and C2 should not be larger than 0·05 μF in order to avoid distorting the waveform too much.

One practical difficulty with common sources of electrical interference (not excluding television receivers) is that most succeed in just complying with the requirement of the Wireless Telegraphy Acts in that the signals they radiate are not so strong as to interfere with the local broadcasting stations, but are nevertheless more than sufficient to wipe out many weak signals on some bands.

The prevention of r.f.i. is understandably not a popular topic with consumer appliance manufacturers since effective filters add to manufacturing costs without giving any immediately obvious benefit to the purchaser. Perhaps we should do more to encourage purchasers to complain to the makers when it is found that an appliance causes interference; a difficulty is that many appliances become progressively worse as contacts deteriorate or become worn. Further development of simple " noise blankers " (as opposed to the usual noise silencers in the a.f. stages or at the end of the i.f. strip) acting on a wideband noise pulse to inhibit the receiver front-end in the presence of a pulse might be a worthwhile line of development.

RCA Symposium and Triac Controls

Curiously enough, the day after writing the above notes on scr devices, I went to an RCA technical symposium covering the use of many semiconductors of particular interest to amateurs—including r.f. and a.f. power transistors, linear SICs and MOS FETs. There was also a session on thyristors and triacs, which are essentially two parallel s.c.r. structures oriented in opposite directions, developed specifically for the control of a.c. power. Sure enough, the question of r.f.i. came up.

It was pointed out that the fast switching action when turning on resistive loads with triacs results in a very fast rise in current, forming a current step which is largely composed of higher harmonic frequencies. With dimmers and similar controls this current step is produced on each half cycle of the input voltage; this tends to produce interference primarily on m.f. and h.f., but with an amplitude reducing inversely with frequency and usually fairly low in the v.h.f. region. Most trouble is caused by interference conducted along power lines—and the only solution suggested was the use of two simple " brute force " filters, the more effective

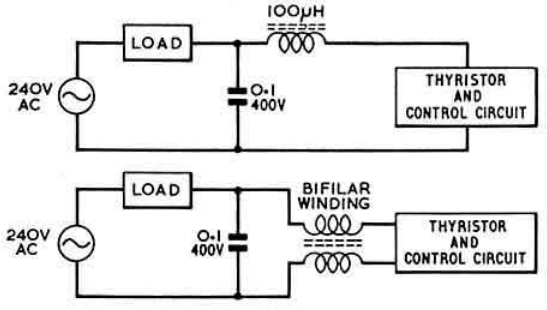


Fig. 3. Further thyristor filter circuits from the RCA symposium papers.

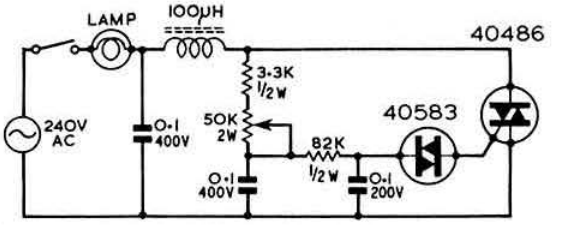


Fig. 4. Double-time-constant lamp dimmer control unit using RCA triacs, and incorporating simple r.f.i. filter.

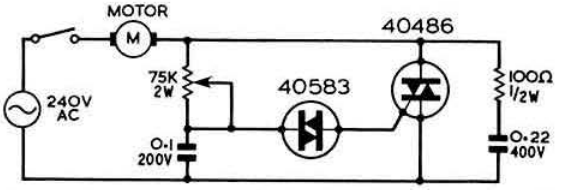


Fig. 5. Induction motor control unit—this would appear to require addition of r.f.i. filter as in Fig. 4.

of which is the one using a bifilar winding on the same core (but watch the question of insulation between the windings): see Fig. 3.

A 240 volt triac light dimmer unit with double-time-constants to minimise the " hysterisis " effect of the simplest single time constant form is shown in Fig. 4. One notes that in small quantities the 40486 is priced by RCA Great Britain at 27s. (the 40583 is not listed in my catalogue). These same two devices can also be used to control the speed, over a range of about 3 : 1, of certain types of induction motors such as shaded pole or permanent split-capacitor motors, including typically fan motors: Fig. 5. But care must be taken to ensure that the range of speed control is not sufficient to stall the motor.

Common-collector Mixer

Some rather harsh remarks have been passed from time to time in *TT* on the subject of using bipolar transistors as mixers. It was therefore interesting to find in *Electronics Weekly* (Patent pointers, 3 April, 1968) a reference to a recent British patent (No. 1,104,928) promising a cure for mixer saturation with its resulting cross-modulation and distortion. This patent has been granted to the French firm CFTH-HB and covers a bipolar mixer configuration claimed to be capable of handling very wide variations of input signal without saturating.

The patent is for transistor mixers connected in the common collector mode; the input signal and local oscillator signal are both fed to the base of the transistor, and the i.f. output is obtained from an i.f. resonant circuit in the low-impedance emitter circuit. According to the specification this enables the mixer to benefit from the high negative feedback. This means, one presumes, that the mixer will have little or no conversion gain—but then diode pairs and quads have appreciable conversion loss.

We checked up on the patent at the Patent Office and found that two circuit diagrams are included in the specification: one for a combined mixer/oscillator and the other (see Fig. 6) for a mixer. As in most patent documents the circuit does not indicate specific component values. It is claimed that

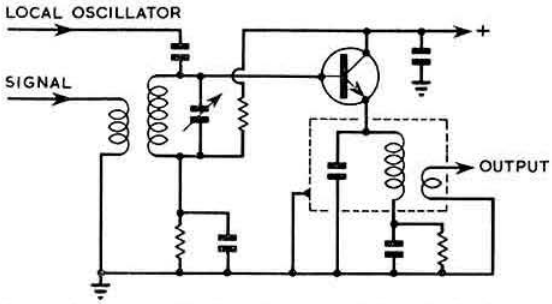


Fig. 6. Common-collector mixer circuit from British patent No. 1,104,928.

the strength of the input signal can approach that of the local oscillator without producing saturation, and the circuit is put forward as a low-noise form of mixer. This might well be worth investigating further for personal use—though of course the circuit could not be designed into a " commercial " receiver without agreement with CFTH-HB.

Another Crystal Oscillator

There have been many published circuits for transistor crystal oscillators that do not require tuned circuits, but yet another has been put forward by an Italian engineer in the " Ideas for Design " section of *Electronic Design* (1 February, 1968). This is claimed as being suitable for crystals from 1-20 MHz operating them on their fundamental parallel resonance frequencies.

The oscillator, Fig. 7, is basically similar to a Pierce oscillator but with an emitter follower which increases the input impedance " seen " by the crystal looking into the base of TR2. The fact that there are two emitter bias circuits, it is

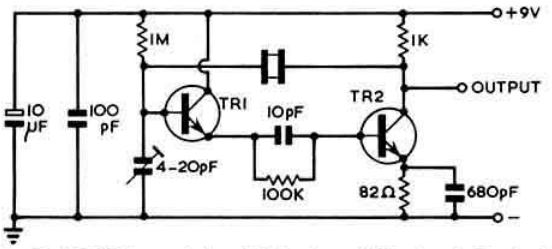


Fig. 7. 1-20 MHz crystal oscillator from " Electronic Design."

stated, helps to reduce gain attenuation with increasing frequency. The two transistors in the original circuit are BSY39, BSY38 but these could be replaced by 2N708, 2N914 or similar devices with cut-off frequencies of the order of 500 MHz.

H.F. Paramps plus the Kitchen Sink

In the course of keeping an eye open for any further developments in h.f. parametric up-converter techniques, I was interested to find (*Electronics*, 15 April, 1968) that there are actually *two* used in a new and extremely sophisticated airborne military h.f. s.s.b. transceiver (AN/ARC-104). This equipment has reached the production prototype stage after having been in development since 1962.

The receiver uses the two h.f. paramp mixers to cover different sections of the full h.f. band with different i.f.s.; a high-band paramp converts 8 to 30 MHz signals, pumped with a 83 to 105 MHz source to provide a 75 MHz i.f. signal which is immediately passed through a 75 MHz crystal filter; a low-band paramp looks after the 2 to 8 MHz signals, being pumped at 33 to 39 MHz with 31 MHz crystal filter and i.f. The whole is stated to form a high-linearity front-end and it is claimed that the varactor paramp " is the only device now made with the linearity and noise figure needed for the first mixer."

The block diagram shows all manner of pump amplifiers, automatic level control and a.g.c. circuits to stabilize the pump amplitudes, which are obtained from voltage controlled oscillators phase locked to the complex frequency synthesizer so as to clean up the signal-to-noise ratio of the pump supplies to better than 40dB; and there seem various sweep inhibit and gate circuits. The end product is a 400W p.e.p. transceiver (one valve used in the p.a.) covering 280,000 spot frequencies spaced 100 Hz apart with a stability of one part in 10^9 per day (one part in 10^8 per month). This must be some package, and for those interested in professional and military equipment trends the article is well worth looking up—others must be wondering just how long before it comes on the surplus market!

Aerials—good or bad?

Two types of aerials discussed in *TT* in recent months continue to be at the centre of some controversy—the Meinke SIA (subminiature integrated aerial) and the US Army transmitting loop.

Several attempts to build SIAs for such applications as broad-band v.h.f./f.m. reception have been reported in *Radio-Electronics*: so far with only limited success. My feeling now is that until more is disclosed on this type of aerial, nothing sensational is likely to be achieved in copying the designs so far published.

Meanwhile, *QST* set out to prove or disprove the transmitting loop, with W1ICP making a close copy of the original published design (*Electronics*, 21 August, 1967 and *TT*, November 1967) with 1½ in. aluminium tubing. He tested it against a number of conventional aerials (*QST*, March 1968) but obtained decidely disappointing results; so much so that he 'phoned the writer of the original article, K. Patterson, to ask for comments. The US Army Laboratory man pointed out that the loop has been used for two years in Vietnam, but added a little extra information which makes it clear that extreme care has been taken to minimize the ohmic losses; it was not revealed in the original article, for instance, that special jointing sleeves and gold plated joints have been used to keep resistance right down at the joints.

To achieve really good results, it rather looks as though one needs almost continuous copper tubing to meet that original claim of " full-dipole up 40 ft."—but then there are many situations where one would willingly settle for something less (for instance on 1·8 MHz where dipoles are few and far between). W1ICP seems to have concluded that a pukka loop could be an expensive project (his version cost almost £30), and that it might work out cheaper to put up a couple of masts. But it is possible that there are applications where the loop—and not necessarily one made of copper tubing—could be effective, once the point has been grasped that the total ohmic resistance at the transmitting frequency

has just got to be brought down to a matter of milliohms—and the loop matching re-tuned up after every frequency shift of more than about 10 kHz.

Here and There

G3JGO draws attention to a note which appears in the American Heath (Heathkit) catalogue. This says: " attention SB101 owners—if you have experienced instability on 40m try removing capacitor C424." Current SB101s do not have this capacitor fitted and it is not shown on the main circuit diagram—if it is there it is in parallel with R401.

A key click filter not involving an iron-cored choke and suitable for cathode-keyed p.a. stages with about 500 volts h.t. is re-published in *Radio-Electronics* (April, 1968) from an item by VU2JN in *The Indian Radio Amateur*: Fig. 8.

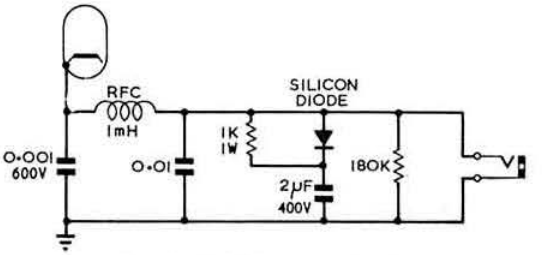


Fig. 8. VU2JN's key-click filter.

This seems to be an adaption of the diode technique now widely used to prevent relay contacts from arcing.

Reflectometers and Directional Power Meters
Continued from p. 363

developed across a capacitor, C_L. This capacitor must be large enough so that $Xc_L << R$ at the lowest frequency of interest. The output voltage V_o is now:

$$V_o = \frac{Xc_L}{R} \cdot 2j\omega \frac{M}{Z_o} \cdot E_F$$
$$= \frac{2C}{C_L} \cdot E_F$$

The graph presented in Fig. 4 compares sensitivities of a conventional reflectometer and the frequency independent types (for the range 2-30 MHz). The inductively compensated version actually acts like a current source of typically $\frac{E_F}{10}$ mA.

For those interested in pursuing the subject further a comprehensive bibliography is detailed below.

Reference

[1] *Post Office Elec. Eng. Journal*, 54, p. 37 (1961).
[2] *Electronic & Radio Engineer*, p. 11, January (1959).
[3] *Electronic Industries*, p. 11, October (1965).
[4] RSGB BULLETIN, p. 256, December (1953)
p. 362, February (1954).
[5] *Wireless World*, p. 137, March (1960).
[6] *Marconi Instrumentation*, **5**, 221, December (1956).
[7] *Proc. IEEE* (Letters), **55**, p. 1199, July (1967).

THE RADIO AMATEUR'S HANDBOOK (45th Edition 1968).

Revised by the HQ Staff of the ARRL. 657 pages copiously illustrated, with 576 valve-base diagrams. Price 50s. postage paid, from RSGB Publications Department.

Another edition of the famous Handbook is now available, and the genuine experimenter will be interested in the changes, for this book has long been a standard manual of sound theory and reliable practice.

The increasing use of semiconductor devices in nearly all branches of communication practice is reflected in the theory chapter, which is enlarged and covers typical uses of Zener diodes, overlay transistors, bias and bias stabilization, matching, paralleling of power transistors, the unijunction, and integrated circuits. Though the treatment is brief and non-mathematical, it is practical and adequate in the context.

The reduction of broadcast interference, and front-end overload protection, are new treatments in the receiver section, and an FET converter for 80 and 40m replaces the valve one. There is also a QRM filter for phone work which looks useful, and a four transistor regenerative receiver which perhaps would be better with a buffer stage between the aerial circuit and the feedback.

The four-band 50 watt transmitter has become a five-band, there is a 5 watt transistor transmitter for 80 and 40, a 75 watt 80 to 10m transmitter replaces the " inexpensive 75 watt " one, and a stable FET v.f.o. replaces the 3-band valve v.f.o. There is additional treatment of a.l.c. circuits, and temperature compensation in oscillators.

Solid-state devices take over the electronic key design, and a relay driver circuit for this use is described.

The s.s.b chapter also sees changes; there are details of how to test a sideband transmitter, of a transverter, of a 50 watt p.e.p. output transceiver for 80m. A transistorized VOX is new, as is also a stable 5 MHz v.f.o.

Two broadband Toroidal Baluns are described; a transistor battery substitute, and a 0-130 volt a.c. bench supply, are new.

R.f. amplification at v.h.f. has been rewritten and includes an FET circuit, also both valve and semiconductor mixer circuits, simple FET converters, a low-noise 144 MHz converter, a transistorized preamplifier, and a converter for 432 MHz, are new.

There is information on TVI prevention and cure at v.h.f., and a g.g. amplifier design for 1296 MHz.

The section on v.h.f. and u.h.f. aerials is rewritten and extended, and the mobile men get many new designs in the converter, transceiver, aerial, and power supply fields.

Motor-tool speed control, semiconductor heat sinks, and circuit board fabrication and etching, are some of the educational " construction practice " material, and the " measurements " section sees two new s.w.r. devices. Data on semiconductors is included this year, but briefly, and only as a guide to types suitable for amateurs.

The book maintains the high quality of its predecessors, and is equally valuable to beginners and advanced amateurs.

T. P. A.

2—5 OCTOBER 1968

BOOK THE DATE NOW

THE EVENT : THE RSGB INTERNATIONAL RADIO ENGINEERING AND COMMUNICATIONS EXHIBITION.

THE PLACE: THE ROYAL HORTICULTURAL NEW HALL, VICTORIA, LONDON, SW1.

The venue of the RSGB show is the same as 1967 but the exhibits will contain many new features of interest to those engaged in communications activities. Transmitters, receivers, test equipment and components of the latest types will be on display.

Make certain that your item of home constructed equipment will be on show. We would like to receive offers now and enquiries should be sent to Alan Gibbs, G3PHG, who is co-ordinating the home construction exhibit.

HM Services will be represented and several Government Departments will show their latest equipment.

CQ W/VE

Part 2

By A. O. MILNE, G2MI

The journey through Ontario, from Windsor to Hamilton was through the counties of Kent and Essex, the signposts referring to Chatham, Tilbury, Lambeth, etc., by the River Thames and into London. While stopping for high tea, a large American car slid by with two uniformed occupants. Along the side the legend: " City of London Police."

On the road again, through the picturesque town of Brantford. Quite a lot of Canadian towns have names only one letter different from a British counterpart. One wonders if the original settlers were not too good at their spelling and had meant to call it Brentford; so to Hamilton where, just over 100 years ago, my own father had been born, when Hamilton was referred to as being in Canada " West!"

Dr. Bob Stewart, VE3GKW, ex G3KWI, met us. We were whisked up to the heights overlooking the city where he has his new home in Donlea Drive. Here we were greeted by his wife, Gwynneth and their three jolly youngsters Curiously enough, this was our first time among children. All our friends, up to then, had been around our own age with grown-up sons and daughters. These three were great fun and we got on famously. Considering that Bob and his wife had moved into their new house only a couple of weeks previously, it was a noble effort to have visitors so soon. His station, a Drake TR4, gave us the biggest thrill of the trip. We had finished a QSO with Ernie Ayre, G8OS, who, incidentally, gave us a great deal of help in fixing a sked with my own station, when amongst the terrific QRM came piping through a c.w. signal signing G3UMI, our son, Geoff.

This was a complete surprise because Geoff, although running a Vanguard at that time had an aerial rather less efficient than the proverbial piece of wet string. Anyway we made a QSO of it. This was his very first Transatlantic contact. I wonder if it is any sort of record for such to be made with one's own father? Later that evening Bob took us to St. Catharines, to the home of Douglas and Erie Hall, VE3TB. Doug and his wife had been in England when we left for Canada and we had the pleasure of entertaining them during their visit to London. It was due to their kindness that we were able to visit Niagara Falls and to see so much of the country nearby.

Mike Hexter, W9FKC, a middle-West top DXer, Highland Park, Illinois.

The Falls are an awe-inspiring sight. The clear green water slides over the brink, so innocently, it looks smooth enough to walk on! The great cloud of spray obscures part of the Canadian Falls, and one wants to stop it, just for a few seconds, to get a clear view. We donned the standard waterproof garb, which turns you into a cross between a nun and a penguin, and descended to the tunnels which lead one to behind the falling water. When we got back more water was falling, for the rather dull weather had at last broken and was to persist for the next 24 hours.

After a rather soggy ride; back to VE3TB, who runs the Collins S line to a massive beam, mounted on a tower in the centre of the back lawn, where we were hoping to work my own station with G3GNL at the controls.

As soon as we made our presence known, back came a tremendous signal from G3UMI/A. Geoff, an Instructor at the PO Central Training School, had obtained permission to put the school station on the air.

Later, we were to get a good signal from G3GNL/A but no QSO because of reception difficulties at the Bromley end. Again G8OS went to immense pains to help and acted as a link, via land line, to try to sort out the difficulty.

That evening, Tom Kennedy, VE3NK and Howard Cowling, VE3WT, and their XYLs came along through a veritable cloudburst to meet us. Both are keen DXers and we had a most enjoyable evening.

It was while we were at Doug's home that I received a long distance call from Croft Taylor, VE2MR in Montreal. He had heard from W9EU that we would be in Montreal and offered us the use of his flat. We had already booked a hotel which he said he would cancel and, in fact, presented us with a fait accompli!

Next morning, the rain still teemed down, as we left by Greyhound for Buffalo and thence by the Thruway to New York, 480 miles distant.

Except during the thirty-five minute stop at Herkimer and for the next hour or so, the rain bucketed down, whipped by a savage cross wind; yet, with the same driver throughout, and despite the fact that the last hundred miles or so, were in the dark, we kept up a steady 65 m.p.h. and arrived at the New York bus station on the tick.

After a meal we hailed a taxi and explained to the driver that we wanted to just drive around and see the town. He showed us everything and took us everywhere! When the clock showed $3, he turned to us and said " I got a real kick outa taking you nice folks around. That's it; the rest of the ride is on the house! " No one subsequently really believed this perfectly true story!

Next morning, my very oldest American friend, Ed Hopper, W2GT, met us and spent the day showing us round. This included the trip round Manhattan by boat. A very cheap 3½ hour excursion with a first-rate commentary, marred, in this instance only by a considerable fog. Our view of the famous sky-line and the Statue of Liberty was a rather murky one and when we got to the 86th storey of the Empire State Building, later in the day, we could not see the ground. This was the only time, during the whole month that the weather really let us down.

Ed drove us to his home in Rochelle Park, NJ, where we met, for the first time, Helen Mae. News had come that morning that Earl Lucas, W2JT, had died from a heart attack. This tragedy was particularly poignant because both he and I had been looking forward to our first meeting, after many years of contact over the air. He was

Lucy and Arthur Milne, G2MI, with the plaque presented by members of the North Jersey DX Club.

known all over the world as a great DXer and was a member of the RSGB. We sent a floral tribute on behalf of ourselves and the Society, although we were unable to stay for the funeral.

The North Jersey DX Association had organized a dinner in our honour that evening at the Friar Tuck Inn, Cedar Grove, and about 40 DX-ers and their ladies were assembled to meet us.

After dinner, I was presented with a beautiful bronze plaque, mounted on a maplewood shield.

At the dinner we met John Bondy, W2IQG whose brother is Hugo Bondy, once W2CMY, and godfather to our younger son. We were invited to their home, on the way back to W2GT and John very kindly put a call through to Hugo in Atlanta, Georgia.

On the following day Ed drove us to Colonia, NJ, where Ben and Dorothy Stevenson, W2BXA, had asked us to spend the night. Here we were the guests at still another dinner by a gathering of Hams at the Buttonwood Road House and included in this party were Captain Curt Carlsson, W2ZXM and his wife, Agnes.

Ben runs the Collins S-line and also has a fixed frequency 2m rig. This is the local gang's DX Alerter and is never switched off!

On Sunday morning, Ben handed his station over to me. It was like 80m after the News Bulletin—without the Belgian QRM! The G's were roaring in on 10m and it was fun to work stations like G3DO, G6DW and G3MEA, whom one can seldom contact in England.

Later, we were all the guests of W2ZXM and his wife for a Danish Sandwich lunch at their home in Woodbridge.

We had to be back in New York early the next morning and Ed took us to the Greyhound station from whence we travelled to Hartford, a gracious and attractive town and on to Newington, the Headquarters of the ARRL. The building is most impressive and working conditions for the staff are as good as I have seen in any office.

John Huntoon, W1LVQ, the General Manager and his staff made us most welcome. We were joined for lunch by Bob White, W1WPO and his wife, W1YYM and in the afternoon, we toured the premises. During a visit to the splendidly equipped laboratory, we were thrilled to meet two of the famous names of Amateur Radio: George Grammer, W1DF, and Ed Tilton, W1HDQ. I was presented with a bound volume of the ARRL Handbook, inscribed with the signatures of the entire staff. The very enjoyable and instructive afternoon was completed by a short session at the desk of W1AW. I called CQ on 14 MHz and was immediately swamped with answers. I did manage to work three G stations before leaving for Sturbridge, Mass. and W1RF. Betty Harvey drove us through the colourful New England countryside to their home. What a QTH! The house stands on a hillside with several acres of garden sloping away to the east. They have a panoramic view of some 30 miles. With this sort of location and a rhombic, not to mention a three-element Yagi, no wonder W1RF packs such a punch back in this country.

Cliff Harvey is a master mechanic and his entirely home-made station is a delight to look at as well as to handle. Cliff designs and builds all his own gear, and even manufactures his own printed circuits.

He runs a home-made Citizen's band u.h.f. transceiver in both his and Betty's cars and another in the house. He reports in when still some twenty miles away on the way home from work, hence the cookery schedule is well nigh perfect!

Citizen's band operation is little short of a national scandal on the 27 MHz band where some of the behaviour is quite shocking. Very few people bother with the u.h.f. allocation and so the Harvey's have it to themselves.

With Betty we spent a fascinating day at Sturbridge Old Village with an authentic reconstruction of a colonial township.

On the evening before our departure, a number of the local Amateurs and their ladies were invited to meet us, including W1JFG, who travelled nearly a hundred miles. We thought this was a particularly kindly gesture on the part of our hosts because they were, themselves, leaving for a holiday in Europe only a day later.

Betty took us to Worcester and from there we travelled by bus to Boston. The day-long drive up through the New England countryside, over the White Mountains with the gorgeous autumn colours is unforgettable. The autumn tints, to which we are accustomed are supplemented by the vivid scarlet of the maples. Our arrival in Montreal really brings this account almost to a close. Earlier I referred to VE2MR, who met us at the bus station and was our generous host for the next three days.

We had the run of his beautiful flat and were taken to and from the Expo site each day in his car. This was an absolute godsend because the hotel, at which we had originally booked, was about six miles north of the city. As there was a complete bus and metro strike in progress we would have been virtually marooned.

It was entirely due to Croft Taylor that we were able to spend three absorbing days at Expo but that really is another story.

Suffice to say that we paid two visits to VE2XPO and called CQ England many times without success.

It has been a difficult job trying to condense this story yet doing justice to the large number of kindly folk who went to so much trouble to make our visit happy and successful. Both Lucy and I would just like to say thank you to each and everyone who, without exception, gave us a practical and heart-warming demonstration of the true meaning of the Ham Spirit.

Keeping Track of Oscar

PART 3

W. BROWNING, MIAA, MIMI, FMI, G2AOX *

THE two previous articles on "Keeping Track of *OSCAR*" in the January and February 1966 issues of the RSGB BULLETIN gave details of a system for simple predictions once the official figures became available. The scheme now described has been used and developed by the writer with all the previous Oscars, and many other satellites, and has now been brought down to its simplest form coupled with reasonable accuracy to ensure easy acquisition of the first available orbits, and to calculate the necessary figures.

Like the previous articles, it is only applicable to near circular orbits. The graphs Figs. 5 and 6 cover heights from 175 to 775 Statute Miles, but as they are linear, they can easily be extended downwards if necessary for greater heights. They are calculated on a launch from Vandenberg Air Base in California (120° W-35° N) from where *OSCAR I, II, and III* were launched, and *OSCAR V* will also go up from, whether it is Australis or Euro. If it desired to work on a launch from Cape Kennedy (82° W-28° N), a new set of figures can easily be worked out from the original system, say for 90 and 110 minute periods, and new graphs drawn.

In the past immediately after each launching quite a number of USA stations could be heard on the h.f. bands giving the launch time and sometimes other figures as well. These times and figures must be very carefully watched, as the time of launch may be given in Pacific Standard Time if the station is in California, Eastern Standard Time if it is in New York, or be GMT; all other times must be at once converted into GMT. The height may be quoted in miles or kilometres, and the USA usually use Nautical Miles (6080 ft.), and the graphs on pages 24 and 25 of the January 1966 BULLETIN relating height to Period are in Statute Miles (5280 ft.).

The method of using the following system and graphs is, it is felt, best explained by a worked example, in this case *OSCAR III*, and relate to the actual figures obtained at this station. The information that it had been launched at 18.30 GMT was available 30 minutes after launch, therefore, from Fig. 5 (S/N orbits), it will be seen that the No. 3 orbit will come within range of the UK sometime between 4 hours 7 minutes and 5 hours 3 minutes after launch, and so this reduces the "searching" time to about 56 minutes, less the usual 15 minutes that a satellite can be heard.

OSCAR III was actually heard at this station from 4 hours 36 minutes after launch until 4 hours 50 minutes, with beam headings from 150° at the start, anticlockwise rotation to 45° at the end. Referring now to Fig. 7, the dotted lines A and B represent these beam headings for the first and last times heard, and give an approximate time of 4 hours 45 minutes after launch for the 50° N latitude crossing, marked by the solid arrow, and an inclination angle of about 70°, where the orbit arc runs along the 70° N latitude ring. So on Fig. 5 reading up from the lower time scale of 4 hours 45 minutes to the orbit 3 Line, and across to the left gives an approximate period of 103·5 minutes. Reading across to the right cuts the 70° inclination line at a position of 332° W (or 28° E). Orbit No. 4 should then be heard 103·5 minutes later with a position of the 50° N latitude crossing at about 2° E, or almost overhead in London, and the orbit paths as drawn on Fig. 7 for Nos. 3, 4 and 5 show what beam headings to expect for first and last times heard—where the orbit path lines cross the Audible Range dotted circle, and it can be seen that No. 5 should be tracked with the beam rotating clockwise.

From pages 24, 25 and 27 of the January 1966 BULLETIN, the times and positions for these three orbits can now be easily calculated as a check, and to obtain the Track Separation of 26·1°. Accurate observations of these three first orbits, especially the first and last times heard and drawn on a Plot as Fig. 7 will check the period and position fairly accurately.

Now using Fig. 6, and reading across from the left scale at 103·5 minutes to the No. 8 orbit line, and down to bottom time scale gives a time of 13 hours 47 minutes after launch and across right to the 70° inclination line for orbit No. 8 and then up the top gives a position of 338° W (22° E) for the first N/S orbit. It was actually heard at this station from 13 hours 40 minutes after launch (beam 335°-dotted line C) to 13 hours 53 minutes (beam clockwise to 100°—line D), which when plotted gives a time of 13 hours 47 minutes after launch for the 50° N latitude crossing at about 22° E. N/S orbits Nos. 9 and 10 can then be calculated as per page 27, January 1966 BULLETIN, and plotted on Fig. 7, and the positions of the first and last times heard carefully noted.

Now having carefully observed the first three S/N and the first three N/S orbits, the approximated inclination angle can be checked and very closely calculated, if the beam headings

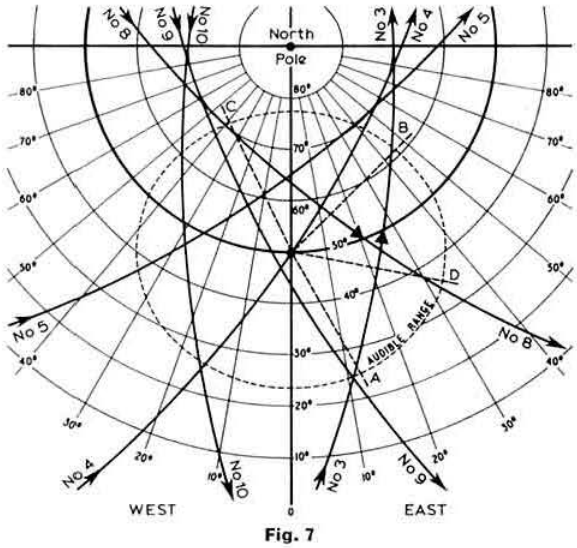


Fig. 7

* 47 Brampton Grove, London, NW4.

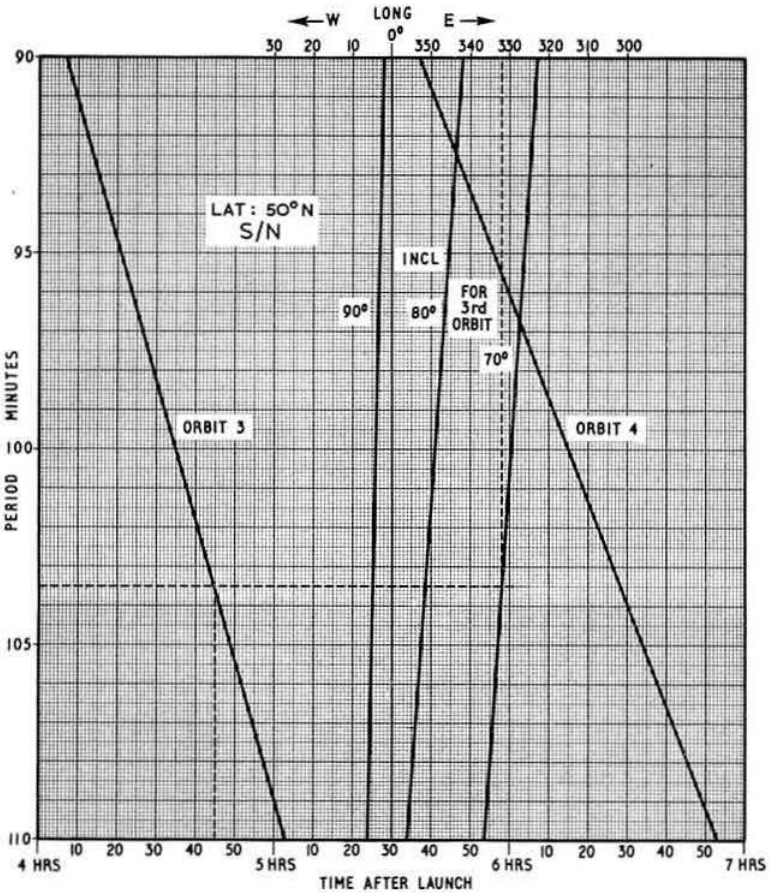


Fig. 5

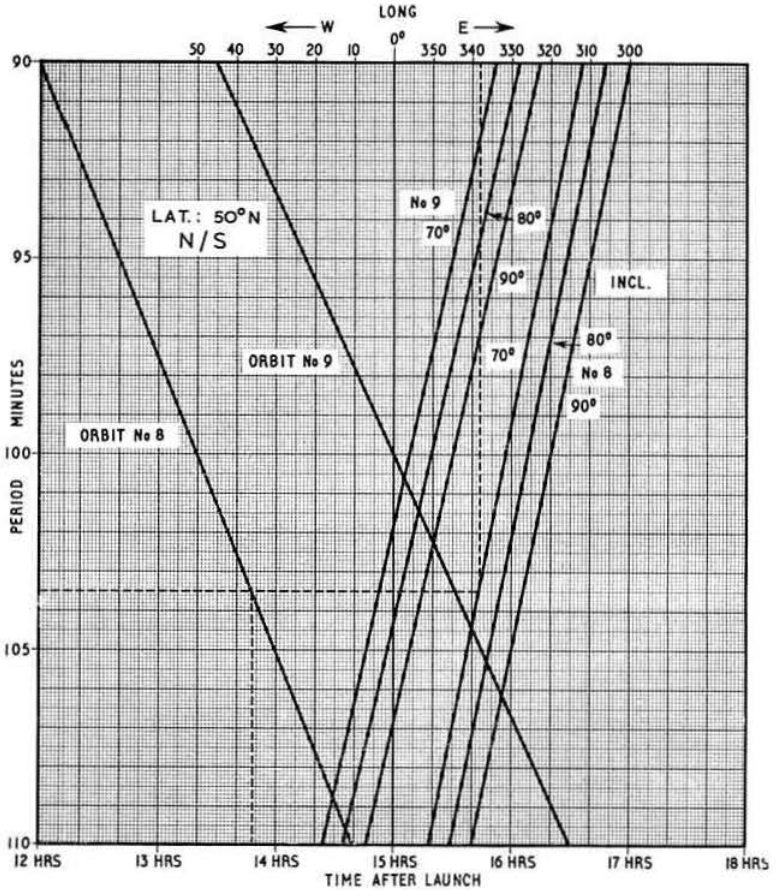
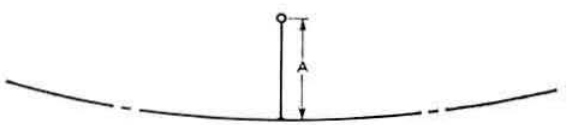


Fig. 6



Construction of the wires for plotting orbits on the Polar Projection map.

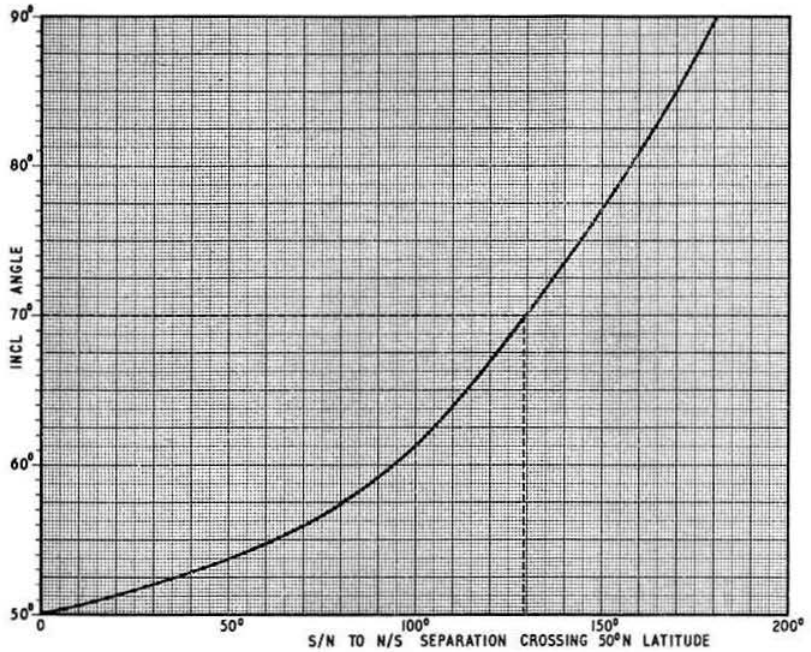


Fig. 8.

are correct for first and last hearings. The figures from corresponding orbits must be used, i.e., Nos 3 & 8, 4 & 9, or 5 & 10, and it must be noted that at the height of this satellite, the difference is 5 orbits in number, but in actual fact, owing to the change from S/N to N/S there is an addition of 0·22 of an orbit to add to the number when measured at 50° N latitude. Using the formula:

(No. of orbits difference plus 0·22) × Track Separation.

gives the following figures: 5·22 × 26·1 equals 135·74° difference in the positions of the S/N and N/S orbits crossing the 50° N latitude line. Now, if the N/S orbit was further East than the S/N one, add the difference, and vice versa. Example: No. 3 S/N was 27·5° E and No. 821·3° E, giving a difference of 6·2°, so *subtract* this figure from 135·74° and the answer is 129·54°. Using the graph Fig. 8, and reading up from the lower degrees scale to the curve, and across to the left gives an inclination angle of 70°. The final agreed figure was 70·1°.

These observations can then be entered on to a plot as per Fig. 3, page 92, February 1966 BULLETIN, and the centre "backbone" line produced, and predictions for the next few days prepared. The same procedure of very carefully observing the beam headings at the first and last lines heard and checking the observed positions of the 50° N latitude crossings with the predicted calculations, if necessary very slightly modifying the figures, will bring the whole plot into line and accuracy.

A blank copy of the Polar Projection plot should be kept ready, and with three or five pieces of stiff wire bent to the orbit shape for every 5° or 10° from 60° up to 85°, as per the sketch, they can then easily be pinned on the plot, with the pin at the N pole, and slewed round to agree with the beam headings. To obtain the actual orbit curve for these wires, set up the orbit ring on the globe at any desired orbit (see page 23, January 1966 BULLETIN) and note the positions the ring crosses every 10° of N latitude). Plot these on the diagram and bend the curved wire to fit, and then add the "T" link in the centre with the distance to the eyehole equal to the Inclination. A drawing-pin through this hole centred at the N pole will then enable the arc ring to swing in its correct position always. If it is swung right over to the left it can then be used for orbits in the opposite direction. The writer has always made a habit of doing all calculations and records of S/N orbits in black ink, and of N/S orbits in red ink with correspondingly coloured arrows on the orbit ring on the globe. If these bent wire orbit path arcs are similarly painted red on one end, they will not be mis-read for direction. They are easily identified by the length of the T-piece connector.

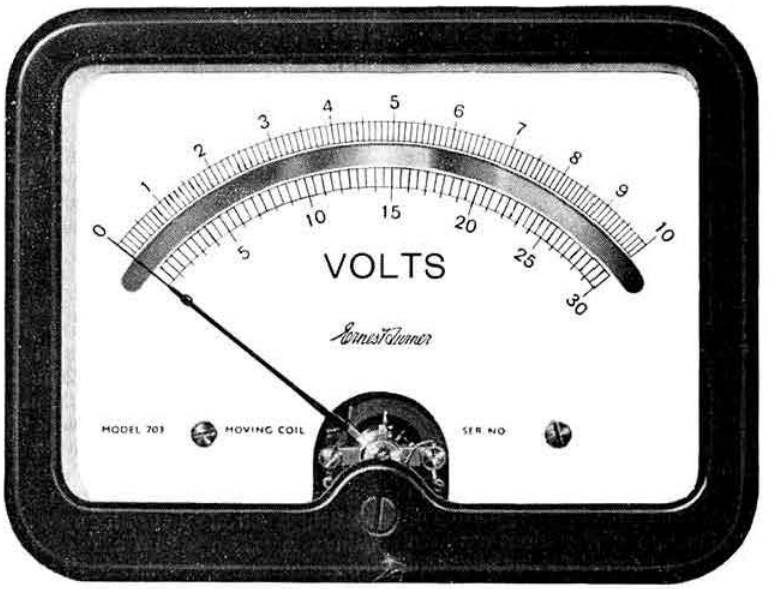
The following table for maximum communication distance via a satellite (station 1-satellite-Station 2) may be of use to predict ahead and make preliminary arrangements with stations in another country. Heights and distances are in Statute Miles.

Satellite height in S. Miles	Orbit period in minutes	Max: Comm: distance station to station in S. miles
100	87·5	1400
200	90·8	1900
300	94·2	2400
400	97·5	2750
500	100·8	3100
600	104·2	3400
700	107·5	3750
800	110·8	4100
900	114·2	4350
1000	117·5	4600

Useful conversion factors

To convert:	Kilometres to Statute miles	x by 0·62
	Kilometres to Nautical miles	x by 0·54
	Statute miles to Kilometres	x by 1·61
	Statute Miles to Nautical miles	x by 0·87
	Nautical miles to Kilometres	x by 1·85
	Nautical miles to Statute Miles	x by 1·15

Special Scaling....



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REGULAR FEATURE

THE MONTH ON THE AIR

By JOHN ALLAWAY, G3FKM*

BY the time that this is being read the amendment to the Amateur (Sound) Licence raising the maximum speed at which call-signs may be sent on c.w. to 20 w.p.m. will have come into effect. A letter received by your scribe from a listener complains that call-signs are not given sufficiently clearly by many phone operators. He says that all possible ways of extending transmissions (including liberal use of " umm " and " aah ") seem to be brought into use, but when the time comes for the call-signs to be given these are frequently dismissed in great haste. An interesting point is that there appears to be no reference in the licence to the way in which a call-sign shall be given on telephony! Mention is made of the use of phonetics, but nothing else.

Matters directly affecting US amateurs, but of interest to all other users of our amateur bands are mentioned in Official Bulletin 168, received from ARRL. The question of forming an outgoing QSL bureau for W stations has been raised, and the matter has been referred for investigation. It is also possible that Novice licensees will be moved from 21 to 28 MHz. Overall studies of band usage, and the effects on this of contests, are to be made. Third party communications between the US and stations in Berlin with call-signs such as DL4Q and DL5Q are now to be permitted.

Top Band News

Readers will be interested to know that US amateurs are to receive additional 160m privileges on 1 July. This results from studies made by a group consisting of US Coast Guard and ARRL representatives during the last year, and will mean substantial increases in available power and frequency segments.

Bob, G3NXV, reports an s.s.b. contact with ZC4RB at 01.30 one morning whilst operating G3NXV/M from his car which had broken down on the M5 motorway! The signals from his KW2000 were Q4 and S5 in Cyprus.

An interesting summary of events taking place during his trip to the Caribbean and S. America has been received from Herb, W0VXO. It is hoped to publish these soon under a separate heading. He is to be congratulated on completing his 160m WAC whilst operating from the bottom of a canyon in Colorado, using an 80m doublet with the feeders tied together! With this he worked 32 Japanese stations, some on s.s.b.

ZC4RB has had over 300 160m QSOs, 178 with the UK. Two G mobiles were raised (see previous paragraph)—G3NYQ/M and G3NXV/M. 90 OK stations were also worked, and a total of 50 countries, 23 of which have already been confirmed. All QSLs will be sent out when Roley returns to G3VIR at the end of June. There is a possibility that there may be some 5B4 activity soon, possibly in time for NFD.

News from Overseas

Ian Wollen, ex-4S7IW, is now stationed at Bahrain, and has the call MP4BGS. He has an HA-14 and KWM2, plus ground planes for 10, 15 and 20m. He will be operating for about four days each month as MP4TCD, from Abu Dhabi, Trucial States, as his work takes him there occasionally. Other calls held include MP4DAU (which is used when Ian operates from MP4DAT's location) and MP4QBX. It is possible that an expedition to Qatar together with MP4BEU, to activate that rather rare place may be arranged in due course. An MP4M call is awaited, as Ian also spends occasional days at Azaiba, just east of the town of Muscat. Apparently signals from DL and I are very strong in Bahrain, and in the few days of activity since MP4BGS got on the air very few G stations have been heard.

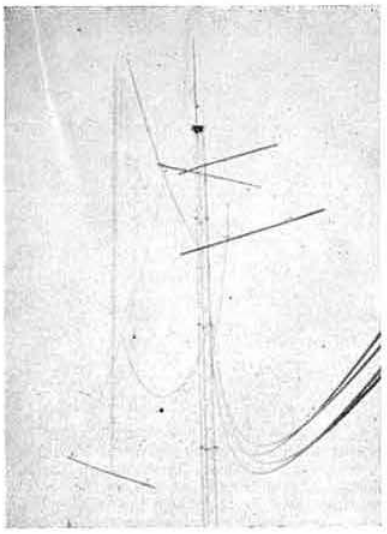
W1YRC reports that he is QSL Manager for 6O1GB, who is currently the only station on the air from Somalia. George is with the US State Department and is active on Saturdays and Sundays at 20.00 on 21,370 kHz. When conditions permit he may also be found on 14,230 at 13.00. He uses s.s.b. only, and expects to be in Somalia until July 1969. Bob has also become QSL Manager for VK9KS, New Guinea for contacts after 7 April, 1968. QSOs before the date *can* be confirmed but there will be delay due to the fact that they will have to be checked with VK9KS. Keith is in Rabaul and operates 14,100—200 kHz between 07.00 and 13.00, and also 21 MHz when conditions permit. It is possible that he will be using a VR4 call occasionally as his business takes him there.

Ack, W4ECI, in a letter to G8KS, points out that he has now forwarded logs and QSL's for all W9WNV and K7LMU operations (including BY4SK) to W0QKC. Specifically mentioned calls include VQ9AA/A, 1G5A, VQ9AA/C, 1B9WNV, VQ9AA/F, FR7ZP, HK0 (both Baja Nuevo and Serrana Bank), VR2, VR5AB, ZK2AF, K7LMU/HS, TI9C, YJ8WW, K1IMP/KC4, PY0XA, ZK1S, FO8M, VK2ADY/VK0, VQ9AA/D, ZM7, 8F3, XW8BF, XZ2, HC8, 1M4A, and 1S9WNV. Ack says that he still has all the old W4BPD logs, and that he is able to deal with QSL requests from those who need cards for any of Gus Browning's expedition stops.

During the *CQ* WW WPX Contest the Italian station I1IJ operated with the call I5LJ from Rome. The operator was " Tony " Privitera, and QSL's should be sent to the address given in *QTH Corner*.

Contrary to the information given in March 1967 MOTA

* 10 Knightlow Road, Birmingham 17. Please send contributions for the **July** issue to reach G3FKM by **12 June**, for the **August** issue by **15 July**, and for the **September** issue by **7 August**.



G3HZP has sent us these three photographs taken when he was last in Sierra Leone. He operated under his 9L1JJ call and was able to put out good signals on 10, 15, 20 and 40m from the aerial farm (left) consisting of a 10m dipole, 15m ZL special, 20m ZL special and an Inverted V trap dipole atop a 70ft. tower. Three other very active 9L1s are in the two photographs (centre & right) taken at a bush party: 9L1GQ, George, 9L1KZ, Dave (Sierra Leone QSL Manager) and 9L1DW, Dave. They each run a KW2000A, KW Viceroy Mk II and KW2000A respectively at their own QTHs, regularly appearing on 10, 15 and 20m for DX, and 40m for the weekend "West Coast" Round Table. *(Photo by G3HZP)*

VP8JG is still very much active! Chris received his copy of the BULLETIN some 12 months late and was dismayed to read that he was supposed to have left there a year previously! He expects to remain on Stonington Is until March 1969, and will be using a KW2000. The best time for contacts with the UK seems to be around 20.00 on 14 MHz. Chris remarks on the sad fact that so few UK stations are to be heard down there—it is possible to work most of Europe with ease at this time but he rarely hears a G. All QSOs will be QSLd in due course, but considerable delay will be experienced as there is only one relief ship a year and patience is therefore needed.

Another well known VP8, this time VP8HJ, has written to say that although he is at present off the air due to pressure of studies, those needing confirmation of QSOs with him may still obtain it from W2CTN. Dave says that VP8s IU, JD, and JF have now left Antarctica, VP8JH is at Signy Is. (S. Orkney), VP8JQ has left S. Georgia, and that VP8HO is still there and on the air on c.w. or a.m. occasionally.

DJ0IR/W7, who has appeared also as FP8DK, wishes to draw the attention of those still awaiting one of his FP8 cards to the fact that he has QSLd every contact via the bureau. His QSLs should be sent to K7GHZ. Don says that all overseas operators' FP8 calls were cancelled by FP8CY (who is the local radio inspector) on 1 January this year, apparently on instructions from Paris. Some of the difficulty appears to have stemmed from an incident last year when FP8AP's application for a US licence was rejected on the grounds that his licence had not been issued from Paris! This happened just after the signing of the reciprocal agreement between France and the US. It is hoped that the situation will revert to normal again soon. Don hopes that he may be able to operate again from St. Pierre next summer, he is a German national and thinks that this may be helpful in obtaining permission.

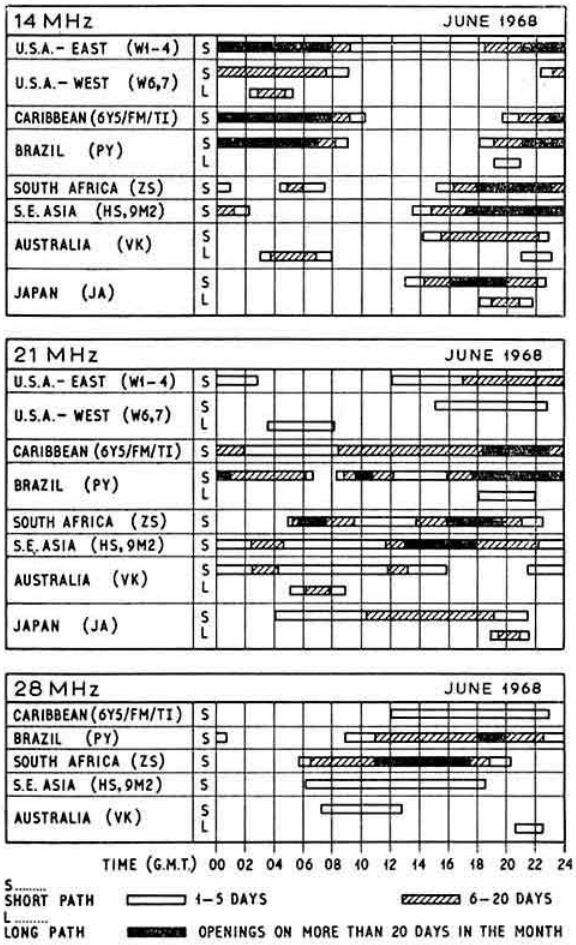
Ray Lawrence, VP2AW, says that there are at present about seven active amateurs on Antigua—VP2s AA, AC, AL, AM, AP, AZ, and himself. He is on almost daily on 10, 15 or 20m with his Swan 350 and trap vertical, looking especially for UK contacts, but so far these have been few and far between. Most of Europe is audible in Antigua from late afternoon (local time) onwards.

The logs of FB8WW's operations, now in the hands of Dorothy, W4MYE, are apparently far from complete—whole days are missing and obviously some QSOs not recorded. The logs from October 1967 (when the previous operator left Crozet Is.) to the time of writing have still not been received. Unfortunately, FR7ZD, who formerly relayed logs to Dorothy has ceased to do so. It is suggested by some sources that this may be due to the recent actions by the ARRL DXCC committee which have annoyed Guy.

Readers will be sorry to hear that Jock White, ZL2GX, lost all his aerial equipment during the recent hurricane. He had the misfortune to have his big tower and TH4 beam crash down on to a smaller tower, with disastrous consequences for both!

Expeditions

G3SGR, together with G3URA, G3VPQ, and G3WDE, is expecting to operate from Eire and N. Ireland during July. They anticipate activity on 160, 4, and 2m, and possibly 70cm. Counties to be visited include Antrim, Derry, Tyrone, Fermanagh, Sligo, Mayo, Connemara, possibly Galway and Dublin, and Armagh (in the order given). Top Band operation will be after 21.00 and v.h.f. activity during the day or early evening depending on conditions. Call-signs are



Propagation Predictions

June, July and August as summer months are most unfavourable for DX propagation because the F2 m.u.f's are considerably lower during daytime than in the winter months. Consequently the h.f. bands (particularly 28 MHz) become unusable on many DX routes. On 28 MHz, therefore, during June contacts with the USA will be very rare. South America too, will only be workable for short periods. On this band the most reliable contacts will be those with South Africa. On 21 MHz the East Coast of North America will no longer be workable every day. Central and South America as well as Africa and Asia will be workable with certainty. Some compensation for the poor DX conditions will be provided by the sporadic-*E* short skip conditions during the summer months, making European contacts possible on 28 and 21 MHz. In the summer 14 MHz is particularly a night time DX band. Contacts with Australia and South-East Asia will sometimes be possible in the afternoon and will frequently suffer from European QRM (often on short skip). On 7 MHz DX contacts are possible propagation wise when the transmission path lies mostly in darkness; however on this band atmospherics and European QRM will frequently spoil the chances. During the day 7 MHz is an ideal band for local contacts and without a dead zone, whilst 3·5 MHz is most suitable at night. The dead zone will not appear on 3·5 MHz even shortly before sunrise.

The provisional mean sunspot number for April 1968 from the Swiss Federal Observatory was 81. Activity was fairly evenly distributed throughout the month. The predicted smoothed sunspot numbers for August, September and October are 109, 108 and 107 respectively. It will be noted that the present cycle has now started to decline in activity and this state of affairs will persist for the next five or six years.

expected to be GI3SGR/P and EI4BT/P on c.w. and GI3URA/P on s.s.b.

A similar trip, but in this case to Scotland, will be undertaken by G3's VGT and VGU between 27 July and 10 August. GM3VGU/P should be heard on A1 and A3, with all bands 10 to 160m covered, Top Band activity will be during the evenings. There may also be 2 and 4m activity. Suggestions concerning wanted GM counties should be sent to G3VGU, 31 Carlton Road, Grays, Essex.

It now seems that the projected expedition to Revilla Gigedo Is (4A4A) has had to be postponed until Autumn. The Mexican Navy supply ship which was to have carried the operators will not be able to stay there for more than 48 hours, and this was not considered to be a worthwhile length of time to be at the island. If all is well an attempt to go there will be made by privately arranged transport, possibly to coincide with the *CQ* WW DX (Phone) contest in October.

Those who worked IZ6KDB may be interested to know that his location was Ponza Is, about 60 miles off the Italian coast near Naples. This is in Latina province—one of the difficult ones to work when trying to gain the WAIP Award.

Awards

Information concerning a special award issued by the Radio Society of Rhodesia to commemorate the 15th World Ploughing Contest was unfortunately not received until the last few days of April. Those who worked the special station ZE1WPC (which was on the air from 26 April to 5 May) will receive special QSL cards, and in addition a certificate will be awarded to those who can send a certified list of QSOs with at least five other ZE stations (as well as ZE1WPC) between 04.00 26 April and 24.00 30 June this year. Applications with two IRCs should be sent to WPC Award, PO Box 2377, Salisbury, Rhodesia.

A new certificate is available for those who have worked at least three stations in Mindelo, Cape Verde Is. since 1 January 1968. This is called the **Diploma Ilha de S. Vicente.** A minimum signal report of RST 338 must be recorded on each

QSL, and QSOs may be on any mode. QSLs for the CR4 stations worked, together with five IRC's should be sent to Jose Pedro Afonso, CR4AG, Caixa Postal 55, Mindelo, S. Vicente, Cape Verde Is.

The Italian award—**Worked All Italian Provinces**—W.A.I.P.—is obtained by producing QSL cards confirming contacts with at least 60 Italian provinces since 1/1/49. These may be for A1, A3, or mixed QSO's, and cards may be submitted to certificates managers of IARU societies for checking (this is G5GH for UK stations). The checked list, plus a signed declaration that all rules have been obeyed, and showing full QSO data should be sent with ten IRCs to: ARI, Viale Vittorio Veneto 12, Milan, Italy.

Official Bulletin No. 168 from ARRL HQ mentions the fact that the ARRL Board of Directors have ordered the establishment of a new five band DXCC Award. Details are awaited with considerable interest. Another recommendation is that DXCC members with more than 300 countries be permitted to submit new confirmations in fives, instead of tens (as at present).

The Directory of Certificates and Awards published by K6BX contains details of around 600 operating awards. The Directory is published quarterly from 1 January in each year and may be ordered through G2BVN at a cost (including postage) of 21s. 3d. Stocks of this publication are not held in the UK but orders are passed to K6BX for delivery direct to the subscriber. At the present time the delivery of second class surface mail from the USA is gradually lengthening and some copies of the Directory are taking as long as two months to arrive.

DX Briefs

The expedition by VK8AV to **Portuguese Timor** (CR8) postponed from last autumn, is now rumoured to be imminent as a licence for the operation is said to have been received from Lisbon. QSLs will be handled by K9JJR, 331 Annette Court, Rhinelander, Wisc., USA.

F0FC says that all US holders of French licences under the reciprocal licensing arrangements will soon have F0 calls. F9MS is in possession of logs for FB8YY for the period between 9 March, 1967 and 16 February, 1968.

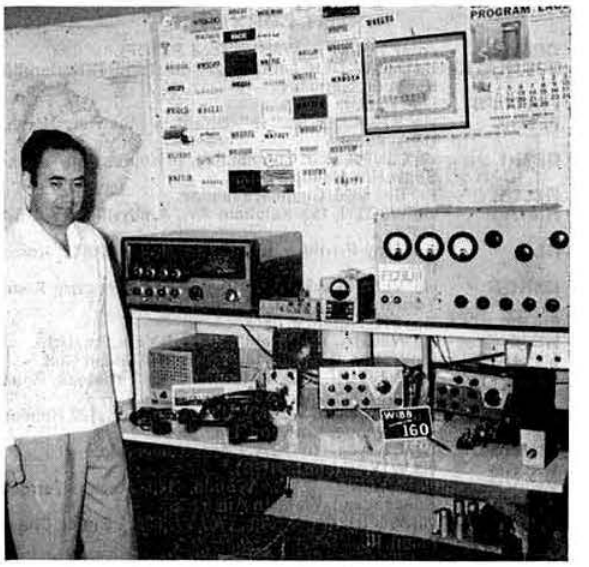
It seems that a number of QSL cards sent out by Arch, VK5XK/VK2, for QSOs with him on Lord Howe Is., were burnt in a fire at Melbourne GPO. Arch will be pleased to send a card to anyone still needing one. His address is Arch Hewitt, 15 Semaphore Road., Semaphore, S.A., Australia.

Jose, PJ2MI, expects to set up a permanent station on the French part of **St. Martin Is.** in the near future. He is often to be found around 14,125 kHz at 14.00 on Sundays, either using his home call or FG7TI/FS7. All future QSLs should be sent *via* VE3EUU with IRCs if direct replies are desired (see *QTH Corner*).

Trevor, 5W1AR, was 5W1AT during the period 15 December, 1968, to 1 April this year. His QSLs still go *via* W4ZXI.

WPX hunters will be interested to know that in future a suffix without a figure counts as a " 0 " (e.g. G3FKM/ZA would count as ZA0). This is different from the old ruling in which the number in the operator's call-sign was added to the suffix letters—in the example given this would have been ZA3.

According to W4MLF, WA6ZZK is the proud owner of three 125 ft. towers, one of which is alleged to support a 9 element wide spaced 20m beam! Having once visited California your scribe is almost prepared to believe this . . . Incidentally, Iris and Lloyd Colvin, W6DOD/W6KG, will be moving into a new home early in July, and hope to be on the air once more working DX with a big signal instead of being DX themselves.



Hercillio Ferreira, PY2BJH, of Sao Paulo, Brazil, hopes to be using his 1 kW linear on 160m shortly ! He already holds many Top Band records. *WIBB Print*

There is now an amateur operator on **Cocos Keeling Is.** This is VK9KC, who is at present awaiting the arrival of his equipment.

HKARTS reports that John, CR9AH, who has been in Western Canada, will be returning to **Macao** during April. No information on possible activity from there is available.

VE7PY is contemplating a trip to the **Tokelau Is.** (ZM7) next October, to coincide with the *CQ* WW DX Contest.

Band Reports

Although rather disappointing at times the h.f. bands have been yielding quite a number of interesting DX signals during the last month. Interest in the l.f. bands has shown its usual decline at this time of the year, although G3JAG points out that 40m is producing strong DX signals in the early morning. It is of course now winter in VK and since we expect to hear them on this band during *our* winter it is logical that the opposite should occur and that we should be strong signals with them now. This would appear to be so. Prize nuisance of the month on 40m was an a.m. signal from AEA—a US military station in Germany, heard testing on 7025. Is this really necessary?

Many thanks to the following contributors for their help in compiling this section: G2BOZ, G2HKU, GW3AX, G3AAE, G3HZP, G3JAG, G3SML, G3SZG, G3URX, G3WDN, G3XDV, G4MJ, G8JM, G8VG, 9J2BC, BRS-6604, BRS20439, BRS25429, BRS28198, A5126, A5135,

QTH CORNER

CR6LF After 16/4/68 via W3HNK (see PZ1CF).
DJ5JK/CT3 via DJ2IW, Dr R. Lentzsch, Arndtstr. 19, 75 Karlsruhe-Rueppur, Germany.
FG7TI/FS7 (see PJ2MI).
FP8DK via K7GHZ, 3213 "R" Street, Vancouver, Wash., USA 98663.
GB2NI via G3UFG, R. J. Constantine, 14 Holdsworth Terrace Shaw Hill, Halifax, Yorks.
HC5DR PO Box 4926 Cuenca, Ecuador.
HM1AJ via W2CTN, 159 Ketcham Av., Amityville, NY, USA 11701.
I5LJ via Tony Privitera, 10 Piazza Bologna, 00162, Rome, Italy.
IZ6KDB via VE3ACD, M. J. Wolfson, 305 Rosemary Road, Toronto 10, Ontario, Canada.
I0ART Box 511, Florence, Italy
KS6CN via W3LMA, 109 Pinehurst Road, York, Pa., USA
MP4BGS IanWollen, Post Box 138, Bahrain, Arabian Gulf.
PJ2MI via VE3EUU, A. H. Iseman, 67 Tavistock Road, Downsview, Ont., Canada
PZ1CF After 1/1/68 via W3HNK, Joe Arcure Jr., 126 Henderson Avenue, Norwood, Pa., 19074
VK9KC C. M. Hayes, c/o DCA, Cocos-Keeling Is.
VK9KS via W1YRC (see 6O1GB).
VK0VK via VK6CD C. C. Woods, 146 Anzac Terrace, Bassendean, Western Australia.
VP2AW via W9FIU, Roger Ries, 1707 W. Clark Street, Champaign, Ill., USA
VP8JR R. Williams c/o BAS, Port Stanley, Falkland Is.
VP8JT via VE1ASJ (not AFJ), PO Box 41, E. Riverside, NB, Canada.
VR6TC Box 1, Adamsville, Pitcairn Island.
W4BPD All past operations to W4ECI 3103 4th Av. South, Birmingham, Ala., USA. 35233.
KL7MU, W9WNV All past operations to Art Altemiller, W0QKC, 8713 Charlton Lane, Afton, Mo., USA. 63132.
ZD8Z via W6CUF, Box 473, Redwood Estates, Calif., USA. 95044.
5W1AR via W4ZXI, PO Box 463, Perrine 57, Florida, USA.
6O1GB via Robert G. Beaudet, 30 Rocky Crest Road, Cumberland, RI USA. 02864.
8P6CA J. M. Richardson, Warners Terrace, Christ Church, Barbados.
9G1GC via W3DUC, Linn Pitman, 216 South Aiken, Pittsburgh, Pa., USA.

RSGB QSL Bureau: Hayes, Bromley, Kent

1968 COUNTRIES TABLE

	160m	80m	40m	20m	15m	10m	Total
G8JM	—	—	—	155	84	61	300
9J2BC	—	—	17	106	54	64	241
G8VG	5	15	18	28	34	44	144
G3IAR	—	33	23	79	53	19	207
G3OLY	—	3	—	77	19	38	137
G3VJG	—	2	9	10	16	12	49
G3TBK	—	1	14	9	12	14	50
G3PQF	6	3	23	36	4	19	91
G3XDV	15	7	16	37	1	17	93
G3ING	9	11	12	5	11	7	55
G3VPS	12	21	13	30	—	—	76
BRS 25429	3	55	54	171	125	93	490
A5390	4	13	15	110	92	87	321
A5154	3	25	19	134	93	68	342
A4886	11	55	47	171	90	64	438
BRS28198	2	32	46	66	32	92	270
A5662	11	28	17	84	52	60	240
A3942	14	38	36	58	60	50	256
A5126	2	31	31	81	53	44	242
A5135	3	19	23	84	36	38	203
A5489	—	7	5	58	36	37	143
A5610	10	71	17	35	25	31	191
A5943	5	15	30	29	30	23	162
A5466	3	20	17	79	27	12	158
A5459	8	25	16	67	19	15	150
A5437	3	24	3	19	18	6	73

(This month's table is in order of 15 plus 10m totals)

A5154, A5459, A5637, A5723, A5852, A5920, and an anonymous SWL in Barkingside who did not sign his letter!

Some interesting signals reported are mentioned below, (all c.w. signals printed in italics, the rest are s.s.b.):

160m. ZB2AY (01.15), ZC4RB (01.05 etc).

80m. *EA6BN* (04.22), IZ6KDB (22.13), OA8V (23.38), PJ5MM (05.05), UF6FE (00.08), ZC4RB (02.50), ZL2AWN (05.50).

40m. CN8AW (20.40), CR6IV (20.55), DJ2IB/CT3 (07.30), *KP4UW* (01.35), *PZ1CQ* (04.32), *TI8JR* (05.39), VK's (06.30), *YO3SC/MM* (Off Dakar, 25 watts, 21.30), ZL2BCG (06.20), ZS1JA, ZH (20.00), 4A1CCW (06.12).

20m. Very good to S. America some mornings and again in the late evening. AP2SG (20.25), CE9AG (22.30, S. Shetlands), EA6ITU (18.10), FK8AU (19.39), FG7TI/FS7 (20.50), FO8CA (06.54), HM1AJ (21.34), HR6EB (23.15), HS3DR (17.49), JW2BH (20.25), KC4USY (Ross Is. 07.44), KJ6CF (07.50), KM6BI (07.10), MP4TCE (17.51), PY0BLR (00.53), TN8AA (21.05), *TY2AB* (18.52), VK9WD (T.N.G. 16.45), VP8JT (20.55), VQ8CS (20.21), VR1L (08.00), VR6TC (06.11), *ZD5V* (19.13), ZK1BQ (16.18), 9N1BG (19.07).

15m. CP5DM (21.50), CR5SP (21.39), *CT2AA* (13.52), *FY7YI* (14.30), WB2UAE/HI3 (22.20), *HL9TW* (09.58), KG6SC (10.45), KH6TD (07.08), KR6RL (12.40), KW6EJ (11.15), *KX6ER* (12.07), MP4BFJ (08.45), MP4DAT (17.17), *PY0BLR* (17.50), TJ1AL (13.15), VK9LR (11.45), VK9XI (15.35), VP2AA (21.45), VP8JH (17.18), VQ9DH (18.29), VR6TC (20.35), VS9MB (10.08), YS1XEE (18.56, QSL via WB4BOJ), ZL5AA (Antarctica, 08.21), *4A1ZV* (15.40), 4S7PB (20.00), 5W1AS (08.42), 7Q7AM (17.22), 9K2BJ (13.42), 9N1MM (15.44).

10m. CP5AK (15.00), *CR7IZ* (13.46), EA0AH (14.09), *FY7YI* (14.30), HL9TS (11.06), *KG4CX* (19.50), LU's (14 to 15.00), PY's (13 to 15,00), *PY0BLR* (18.55), *ST2SA* (15.25), *TA1QR* (13.35), *TJ1AJ* (14.24), VK9CR (New Britain, 10.28), VP8s JG, JJ, (18.30), *VQ8AW* (13.51), *VQ9B* (18.02), VS6FZ (09.25), VU2DKZ (07.54), XW8AX (10.35—QSL via W6KTE), YA1ZC (09.06), ZD7DI (11.50), *ZD8RB* (10.44), ZD9BE (17.40), *ZE1WPC* (17.53), 5R8AX (14.39), 5Z4JH (16.30), *9L1JP* (18.25), 9Y4JR (16.06).

Contests

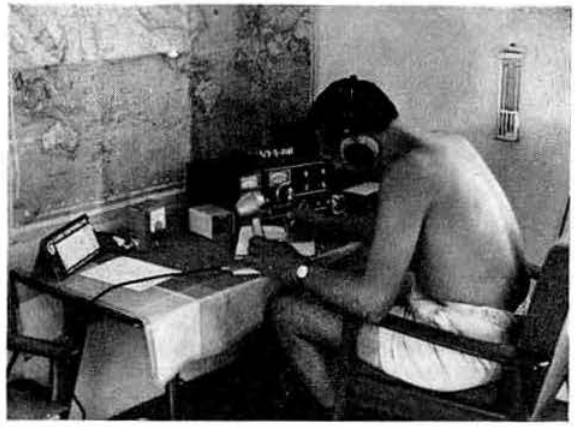
Due to the kindness of W1WY the results of the *CQ* **WW DX Contest** (Phone section) which took place last October have now been received. Entries were up to a total of 1280 (as opposed to just over 1000 in 1966), but once again only a tiny group of UK amateurs showed any interest—only 33 out of the many thousands licensed. However, England did excel itself by producing the world's fourth highest score in the multi-band single operator section. This was achieved by **G3HDA**, who won the W4BVV Operator's Trophy. The W2GHK, Stuart Meyer Trophy for the world highest 20m score (single operator) was won by our guest **G5AA**. Congratulations to both these operators on their very excellent performances—it is believed that neither of these trophies have ever been won by G stations before. Top European scores were made by GM3RFR on 80m, by G3NLY on 40m,

and by G2BOZ on 10m. The overall winner of the single operator section (all band) was once again W9WNV, this time as VK2ADY/9 with over 5,000,000 points. The top multi-operator single transmitter station was I4GAD (2,764,320 points), and the top multi-operator multi-transmitter station OF2AM (9,259,941 points). In the list below numbers after call-signs indicate: Band (A = All), Score, No. of QSOs, Zones, and Countries worked. Certificate winners are in bold face type.

Single Operator					
G3HDA	**A**	**1,567,346**	**1645**	**108**	**265**
G3KZQ	**A**	**1,031,985**	**1296**	**87**	**198**
G3UXF	A	507,424	1123	62	95
G3DYY	A	372,548	678	83	151
G2AJB	A	75,624	274	42	95
G3MWZ	A	33,558	180	32	70
G3JFY	A	10,800	79	25	25
G2BOZ	**28**	**280,675**	**960**	**32**	**77**
G3KMA	28	107,695	448	29	56
G3ESF	28	63,144	316	29	43
G3LSF	**21**	**322,800**	**993**	**35**	**85**
G3FKM	**21**	**302,763**	**918**	**36**	**93**
G3VZD	21	73,260	274	31	68
G5AAM	**14**	**824,344**	**1634**	**39**	**144**
G5YC	14	109,038	1069	28	74
G3OXL	14	42,528	266	28	68
G3NLY	**7**	**58,982**	**410**	**19**	**58**
G5HZ	7	23,980	220	15	40
GM3BCL	**A**	**302,267**	**596**	**62**	**141**
GM3JDR	A	99,553	414	32	81
GM5AGM	A	7,930	111	16	49
GM3KGT	**21**	**119,988**	**760**	**20**	**46**
GM3SSB	**14**	**14,364**	**141**	**17**	**40**
GM3VNN	14	5,502	103	10	32
GM3SVK	**A**	**424,480**	**805**	**71**	**153**
GM3RFR	**3/5**	**7,913**	**159**	**9**	**32**
GW3SFC	**14**	**19,368**	**142**	**23**	**49**
GW3NNF	**7**	**14,025**	**241**	**10**	**41**
Multi Operator—Single Transmitter					
G3WYX	**A**	**828,180**	**1160**	**81**	**177**
G6LF/P	A	743,084	885	68	134
G3VYG/A	A	451,605	804	81	150
G3IAR	A	361 250	697	76	174
GW3NWV	**A**	**951,080**	**1496**	**75**	**161**
Multi-operator—Multi-transmitter					
GB2SM	**A**	**1,929,272**	**2281**	**99**	**250**

Results of the 1967 **VK/ZL/Oceania Contest** have been received from Jock, ZL2GX. In the Telephony section the top VK was VK6XX (19,320 points), and top ZL ZL1AIX (19,080 points). European leader was DJ2YL, who had 7140 points, only slightly ahead of the top G—**G3RJH**—who had 6960 points. Other G entries were G3IAR (897 points) and G3KSH (162 points). The leading VK in the C.W. section was VK6RU (19,005 points), and leading ZL ZL1AJU (18,965 points). Top European was DL7AA (6975 points), and UK scores were as follows: **G3SSO** (3472 points), G4CP (3190 points), G5RI (3025 points), G5RP (2241 points), G2DC (1728 points), G3DYY (1638 points), and **GM3JZK** (306 points). Details of the 1968 event will be given in July *MOTA:*

The 1968 **Independence of Colombia Contest** will be held between 00.01 20 July and 23.59 21 July, and will cover all bands 10 to 80m (s.s.b., a.m., and c.w.). Contacts with HK stations count 5 points, and with other participants 1 point. The multiplier consists of the total number of HK districts plus DXCC countries worked. Contest exchanges consist of report plus serial QSO number. Colombian stations send report followed by their HK zone number. No cross mode



Ray, VP2AW, Antigua, searching the band for UK stations.

contacts are permitted. There are single operator, multi-operator (one transmitter), and multi-operator (multi-transmitter) sections, and logs should be sent to: Independence of Colombia Contest, c/o LCRA, Ap. 584, Bogota, Colombia, before 30 September. Note that each country worked on a different band is a new multiplier, and that HK0 (San Andres Is.) counts as Colombia *and* San Andres *and* HK0 (a multiplier of 3). Certificates will be awarded to all winners. A very few log sheets are available from G3FKM.

Those interested in winning a very handsome certificate may wish to take part in the **Venezuelan Contest** which starts at 00.00 6 July and finishes at 24.00 7 July. This is phone only, and covers all bands 10 to 80m. Exchanges consist of report plus serial number of QSO (starting from 001). There are single operator (single or multi-band) and multi-operator (multi-band only) categories. The object is to work as many stations on the American continent as possible. Contacts with YV count 2 points, with other American stations 1 point. A multiplier consists of the number of YV and US call areas worked—in the case of multi-band entries this becomes the sum of the multipliers on each band. Logs should show date, time, station worked, number sent, number received, multiplier, points, and separate sheets should be used for each band. These, together with a summary sheet giving full details and QTH in block letters should be sent to RCV, Independence Contest, PO Box 2285, Caracas, Venezuela. Certificates will be awarded to all non-American stations who work at least five YV's plus at least five other American countries, and who send along eight IRCs. This is a beautiful certificate, and in your scribe's opinion well worth having.

* * *

Many thanks are due to the following for permission to use information given in their publications: *NARS News* (5N2AAF), the *L.I.DX.A. Bulletin* (W2GKZ), the *DX'er* (K6CQF), *DX News Sheet* (Geoff Watts), the *Ex-G Radio Club Bulletin* (W3HQO), the *DX'ers Magazine* (W4BPD), *QUAX* (SM4DXL), the *West Gulf DX Bulletin* (W5QK), the *Florida DX Report* (W4BRB), *CQ DX* (ARI), the *HKARTS Newsletter*, and *DX'press* (PA0FX). Please send all items for the **July** issue **to reach G3FKM no later than 12 June,** for the **August** issue by **15 July,** and for the **September** issue by **7 August.**

FOUR METRES AND DOWN

By JACK HUM, G5UM*

FOURTEENTH ANNUAL

Reporting the 1968 International V.H.F./U.H.F. Convention

WHEN by the end of March ticket applications for the Fourteenth International V.H.F./U.H.F. Convention had topped 70, after only one announcement in *Radio Communication*, it was clear that the event was off to a good start. And when at the V.H.F. Committee's final pre-Convention meeting Frank Green, G3GMY, announced that 131 had sent him bookings for the Dinner and 240 for the afternoon lecture session, he did so with satisfaction tinged with anxiety about how to get them all in at the Winning Post Hotel, at Whitton in Middlesex.

As it turned out, the venue's big hall *did* get them all in, though some of the 271 who thronged it that afternoon had to stand at the back. This total, and the 145 (appropriate figure) who sat down to the dinner that evening, helped notch a new high in Convention attendance records.

Numbers such as these were attracted largely by the diversified lecture session which had been organized for the afternoon, and by the fact that the V.H.F. Convention Dinner has over recent years established itself as arguably the top social event of the Society calendar.

In opening the afternoon tech-session Geoff Stone, G3FZL, the Society's V.H.F. Manager and Chairman of the V.H.F. Committee, disclosed some of the background work which preceded the allocation of the 2m band to Class B licensees: how G8AGO and G8AAZ initiated a questionnaire with which to sound out members' views on the subject, and how the RSGB had requested the GPO to arrange for Class B men to do a year's operation on 70cm before being granted 2m facilities. " However, the GPO were not able to administer the proposal," Geoff went on, adding that " . . . the responsibility remains with the G8-plus-three licensees to maintain the quality of their operating and of the technical advancement they have demonstrated on 70cm . . . it would be a great pity if because they have 2m they were to become no more than users of black boxes."

Then G3FZL announced the welcome extension of the 4m band down to 70·25 MHz, another outcome of the Society's co-operation with the GPO; coupled with it came the lifting of restrictions on 70 MHz amateur operation in the north west of Scotland.

Although G3FZL did not suggest it, one felt that now at last the opportunity had arrived to plan " Four " in a straightforward and easy-to-remember manner free of the trammels which had hedged it about in the past, and that it was a " natural " that henceforth the pattern on this band should be c.w. in the bottom 100 kHz and phone in the rest, choosing your preferred frequency in the light of local circumstances, but not of course forgetting the two spot frequencies reserved for mobile calling and RAEN.

* * *

In the G3FZL introductory discourse another surprise was yet to come: that HB9RG had arrived at the Convention and would contribute an extra item to the lecture programme with a talk on his recent Earth-Moon-Earth successes. This he duly did just before the mid-afternoon break.

First speaker in an impressive line-up of technical talent was Tom Douglas, G3BA. His subject: getting going on sideband on v.h.f. Tom gave it as his opinion that " by contrast with the h.f. bands a considerable amount of development work is going on all the time at v.h.f. " He felt that some of the operating procedures presently used could be brought more in line with modern practice, notably co-channel working. From this it was a short step to a description of the transverter principle of applying s.s.b. from an existing h.f. bands transmitter as he himself had described in " Tech Corner " in April last year.

The G3BA emphasis on the importance in sideband working of good netting and thoroughly stable oscillators was picked up by the next speaker on the list, Arnold Mynett, G3HBW. His subject, Phase Locked Oscillators, might have appeared to some listeners to be something for the future, despite the elegant phase-locking oscillator circuit displayed on the blackboard, using FET's and capable of providing output in the 50–150 MHz region. As if to show the development is much nearer than many may imagine, G3HBW displayed a transceiver he had built for 144–146 MHz in which *three* phase-locked oscillators are used (this equipment was later to secure for G3HBW top place in the Constructors' Contest).

Moonbounce

In addition to the advent of Class B licensees on to 2m the other big talking point during the weeks up to (and at) Convention 1968 was the transatlantic Earth-Moon-Earth contacts which had been achieved on 23cm only a week or

* Houghton on the Hill, Leicester LE7 9JJ. Send reports for the July issue by 12 June, and for the August issue by 15 July.

THE CONVENTION

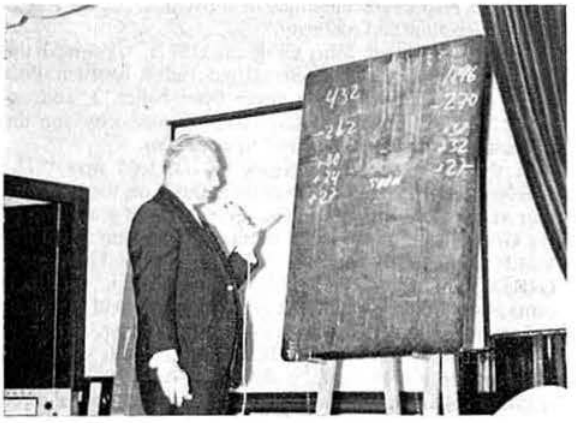
Above: Some of the 271 who packed the meeting hall at Whitton during the Fourteenth International V.H.F.-U.H.F. Convention. On the platform: G3LTF. On the screen: his 23cm dish.

Top right: Mr H. Stanesby from the GPO proposes the toast to the RSGB.

Right: G3LCK discusses the JXK converter.

Bottom left: HB9RG compares system gain on 23cm and 70cm for moonbounce.

Bottom right : G3BA receives the Thorogood Cup.



two before. To have G3LTF and HB9RG to talk about these successes could hardly have been more topical.

G3LTF traced the history of E-M-E transoceanics from the 1965 contacts on 70cm through to the present day, paying special tribute to the work of VK3ATM in establishing the world point-to-point record (via the moon) on 2m by working K2MWA in 1966. Some magnificent colour slides illustrated the team effort which is a characteristic of British moonbounce, many separate stations participating in mutual collaboration. Of the future, Peter thought there was promise of three-continent E-M-E contacts in the years ahead. These could be on 23 and 70cm; the vast size of aerial required for 2m E-M-E made development on this band less likely.

Then HB9RG described E-M-E on the continent, which began back in 1960 with co-operative effort between Swiss and German amateurs, and culminated in Hans's first two-way with The States on 23cm in September 1964, and first sideband transatlantic on 70cm in July of 1965. Calculations he had made showed a system gain of 8dB in favour of 1296 over 432, which was quite something considering that E-M-E signals could well be below the noise for much of the time in spite of the use of 70 foot dishes and parametric front-ends. Hans revealed that he had 45 watts of sideband ready to have a go at E-M-E on 13cm!

Gib-to-UK

System gain came into the picture very prominently in the next tech-talk. So did co-operative effort. Three members of the South Coast group, G3JHM, G3JVL and G8AIX, described in turn the various possible methods of sustaining the Gibraltar-to-UK path on 70·26 MHz, how the problem of a shortage of 52dB system gain was overcome and how an ingenious automatic keyer designed for ZB2VHF in its beacon mode used 40 transistors and computer-logic circuit principles—a technique that could have application for automatic transmissions over an E-M-E path on 23cm.

During the 1967 openings ZB2VHF in its manually operated mode worked 83 stations in the UK, said G3JHM, contacts being made to 1450 miles, almost on the edge of the theoretical range. Don stressed the need for more regular observers on the ZB2VHF signal (on 9H1MB too, the Malta beacon, at extreme range indeed for people in the Midlands and North). He recommended watching Radio Algiers on 70·286 MHz as an indicator of 4m conditions. It usually appeared 5-10 minutes before ZB2VHF.

"Shop Window"

Something quite new at the Convention Tech Session was "Shop Window," an idea which emerged from V.H.F. Committee discussions on how to involve trade exhibitors more actively. Bluff Vic Hartop from J-Beams dealt with the relative merits of long Yagis and slots. No "versus" about it, he emphasized: you selected what met your requirements in respect of bandwidth and mast-depth availability.

The other "Commercial" was about JXK Converters with G3LCK as a satisfied customer warning members that with today's high performance FET front-ends you might hear more than you could work.

Thirteen Centimetric

Group collaboration helped achievements on Moonbounce and in 4m propagation observations: this had already been emphasized in earlier lectures that Convention afternoon. The theme was stressed once more when Dr Dain Evans, G3RPE, mounted the stage at the Winning Post to describe progress on 13cm. He was able to report a hot item of news to the effect that only the previous Saturday G3MCS/G8AGM had worked G5FK at 25 miles on 2300 MHz, signals being S4 each way over roughish Chiltern country.

Here are a few quickies from the G3RPE discourse that was full of good practical technical advice:

A signal source of 1152 MHz is useful not only for 13cm but for 3·4, 5·6 and 10 GHz as well: it can be derived from eight times 144 MHz.

Don't decry the s.e.o. One member of the G5FK club built a MOPA for 2300 MHz which drifted only 100 kHz per hour. It used new semi-conductors still under development.

Try a BFY90 as a cheap and cheerful transistor capable of giving good stability and 100 mW out, which if fed to a typical high gain 13cm dish could give 100 watts e.r.p. Runs off 12 volts.

* * *

By the time Dr Evans had dealt with 13-centimetric questions the clock had run round to 5.50 p.m., and the next item on the agenda was the traditional raffle. Something quite new at this point on the programme was the bring and buy sale (10 per cent mark-up for Convention funds). Some of the items bought and sold were snazzy enough to be in the Constructors' Competition—perhaps they *had* been in earlier years.

Of the Constructors' Competition itself, judged by two Guests of Honour, Mr H. Stanesby of the GPO, and HB9RG, as always there was a display of home built equipment which attracted the eye by the sheer beauty of its finish and the intellect by its circuital ingenuity.

The Dinner

Roll top jerseys jostled Sunday-best suits at the dinner that evening, indicative of the cheerful informality which, as we suggest above, has helped make the affair one of the top social events of the RSGB year.

After the eating, the speeching: Mr H. Stanesby, Deputy Director of Engineering at the Post Office, proposed "The Radio Society of Great Britain." Commenting in favourable terms on recent successes with E-M-E and centimetric propagation, he declared that "we in the Post Office have a very great respect for the amateur movement . . . we recognize its discipline and maturity."

In reply President John Graham, G3TR, welcomed the excellent co-operation which existed today between Post Office and Society ("it has never been better"), and expressed RSGB thanks to the licensing authority for the extension of the Class B permit to cover 2m.

In the next toast Bert Allen, G2UJ, told why "The London U.H.F. Group" regularly appears on the list every year at the Convention Dinner. For it was at a meeting of the Group back in 1955 that the idea of holding a real live V.H.F/U.H.F. Convention was put up by Phil Thorogood, G4KD, founding father of the London Group. And so it came about that the first ever Convention was held that year, 125 attending and 100 sitting down to the dinner. Speakers then were G3FZL and G3HBW, as in 1968. Guest of Honour then was Dr R. L. Smith-Rose—as in 1968!

When G4KD responded, bits of his "other job" showed

through. He is the London Regional Representative, and fully aware that a strong RSGB is a " must " if the right representations are to be made at the right times and in the right places. It wasn't surprising that he had a word or two to say to the Convention diners about their personal responsibility in securing new members.

Proposing " The Visitors " Fraser Shepherd, GM3EGW, observed of Dr Smith-Rose that he was probably the oldest member of the RSGB present that night, and therefore " the father of the house," and of Dr J. A. Saxton, year by year a keen visitor to the V.H.F./U.H.F. Convention, that his scientific work had percolated down to influence very considerably the amateur approach to v.h.f.

Fraser welcomed also Fred Lambeth, G2AIW, who had for years " laboured mightily in his capacity as BULLETIN v.h.f. contributor, and now keeps his hand in as IARU Region 1 V.H.F. Secretary." And on matters international there was a welcome too for OE1VKW, I1SWX, HB9RG and EI6AS.

Finally, Fraser welcomed Mike Dormer, G3DAH, both in his capacity as v.h.f. contributor to *Short Wave Magazine* and as " one who has served v.h.f. friends as a member and latterly as chairman of the RSGB V.H.F. Contests Committee."

Standing up to reply, G3DAH amused everyone by saying " . . . you see before you a split personality!" Mike has of course recently taken over from A.J.D. a column which down the years has had an important positive influence on the trend of v.h.f. affairs in this country. G3DAH passed on to his hearers the sincere good wishes of G6FO, editor of *The Magazine*, for the success of the Fourteenth Convention.

Trophy Time

Then it was time for G3FZL to invite the President to hand to G3HBW the 1962 V.H.F. Committee Trophy as winner of the Constructors' Contest, and to G3BA the " G4KD Trophy " (officially the International V.H.F. Trophy) for his outstanding work in promoting the cause of sideband at v.h.f. And surprise, surprise, when the Dinner Ticket Lucky Number was drawn, G3BA won the 10-element J-Beam!

A final bit of good news: G3FZL has earmarked the Winning Post for the 1969 Convention on 26 April next.

Transatlantic on " Twenty-Three "

This is how G3LTF, Peter Blair of Chelmsford, worked The States via the Moon on the 1296 MHz band, following his success in earlier years in getting across on 70cm.

On 12 April signals from the Crawford Hills, NJ, V.H.F. Club, W2NFA, were copied at G3LTF but were strangely unintelligible. A talk-link on 14 MHz reported that Peter was being heard over there via E-M-E. Soon G3LTF tumbled to the fact that the US station was transmitting its f.s.k. with 1296·0016 MHz mark and 1296 space, when in fact it had been agreed that mark would be on 1296 MHz. Which goes to show the fantastic order of selectivity required in E-M-E receivers. Early on 13 April contact was made with W2NFA on 23 cm.

A mildly eerie experience for G3LTF was hearing his 23cm signals relayed back to him live, going out UK-Moon-US on 1296 and coming back US to UK via the 14 MHz link—with a 2½ second delay after he pressed the key.

When the G3LTF dish, following the movement of the Moon, ran out of room in the Chelmsford back garden, Peter went to bed well satisfied that both he and HB9RG had " got across " on " Twenty three " that morning.

On 14 April a second contact was made from 00.50 to 01.20 GMT, and the W2NFA signals were monitored until 02.35 GMT.

Mean signal level of W2NFA at Chelmsford was 8 to 10dB over noise, sounding like RST349—though there were peaks 16 to 18dB above noise; this in a bandwidth of only 100 Hz. At the front-end of the receiving set-up is a parametric amplifier 1 to 1·5dB noise factor at 15-18dB gain into a 2-stage transistor preamp (5dB n.f.) into the station 23cm transistor converter, out at 12MHz, mixed again down to 2 MHz and into a R1475 to give bandspread of the order of 10 kHz spread across half an inch of scale!

Following the R1475 is an ultra-sharp audio filter.

On the transmit side a straightforward line-up drives a 2C39 tripling to 1296 MHz followed by a 3CX100AS b.a. to drive a similar valve to the full 150 watts at 23cm.

Dominating the back garden a 15 ft. diameter dish (just visible in the slide projection on page 387 this month) is polar mounted and equipped with crossed dipoles each fed from the two outputs of a 3dB coupler to achieve 90° phase shift, and giving l.h. circular polarization.

When one contemplates the formidable amount of hardware, brought to life by engineering know-how allied to infinite patience, that is a prerequisite for E-M-E working, one begins to wonder if forecasts that " Moonbounce across the Atlantic will be common in five years' time " aren't rather optimistic. What is certain is that given the precise scheduling which obtained during the April tests, more European operators will " get across " when Moon declination is favourable. Individually and in groups, several in the UK are ready to try.

Contest Roundup

Now that the rules for V.H.F. National Field Day 1968 have been published local groups and clubs will no doubt be laying their plans for participation, remembering that the event is as little as three months off. It will not have gone unnoticed that in the rules published last month several of the subjects which have been discussed in " Four Metres and Down " over the last year or so have been taken into account, and there is a continuing interest by the V.H.F. Contests Committee in seeking participants' views. " How do you want the event to be run in the future? " is in effect what the questions on page 325 are asking, and by answering them in a constructive way members will be helping the V.H.F. Contests Committee to make it an even more enjoyable one.

* * *

To show what perspicacity will do G2WS and G8AKE have won the second leg of the 1967–8 Cumulatives, just as they did the first, on 2m and 70cm respectively. Who will give them a run for their money *next* Autumn?

* * *

" Typical contest weather " dogged the Second 70 MHz Open in April and the First 432 MHz Open in early May.

Numerous portables were out for both events. Some were heard reporting they were suffering from water in the rig.

Because there were fewer stations around than usual there was a feeling that " it's not worth putting in such a low score." This isn't true, of course. The point is covered on page 328 last month. To travel hopefully is better than to arrive: it doesn't matter if you stand no chance of winning, but it *does* matter if your entry, however lowly, is not in the final table.

In spite of the weather many participants on 4/5 May had success on 23cm, and we hear that some interesting results may emerge when the tables are compiled.

* * *

All who intend to have a go at the Sixth 144 MHz (Open) Contest are invited to shine their beams on the north west of England. Once again the Ainsdale Radio Club are organizing the Annual RSGB Region 1 V.H.F. Contest, timed to coincide with the national event. Plenty of signals on 4m, 2m and 70cm should be in evidence from the area on 4 August—and the Club's Hon. Sec, Norman Horrocks, G2CUZ, hopes to be in a position to give Westmorland to those who want to work that county on v.h.f.

* * *

Observations during the various RSGB contests of this year show many portable stations failing to announce their locations. Not only is this contrary to licence requirements but it *does* help a listener who may be getting a weak and watery signal to know which way to turn his beam to bring it up to readability. So during every CQ, announce where you are.

* * *

Among those unhappy about the new " concentric circles " contest rules is G3FDW. He has recalculated the results of the 70 MHz Open (page 255, April) and reports that on a points-per-kilometre basis the top placings would have been G3RLE, G3LAS and G3MEH and not G3MEH, G3LAS and G3RLE as in fact occurred. Under the new rules, he feels, remote stations are at a disadvantage.

Propagation Paths

One of the talking points on 70cm for many months past has been the consistency with which G8AKE of Melton Mowbray and ON4HN of Zomergem have sustained their nightly schedule on the band, come wind or weather (quite literally).

ON4HN has now turned in a typescript giving a day by day account of this schedule together with another schedule he has been keeping with F3JN, plus some extremely interesting observations on the London beacon GB3GEC, the whole lot related to barometric pressure and weather conditions. His report covers the three months January to March this year, and records temperature variations from −6 degrees to plus 17 Centigrade. It represents precisely the kind of detailed observation that the RSGB Scientific Studies Committee is likely to find valuable to augment its knowledge of u.h.f. propagation characteristics.

During January the G8AKE-ON4HN link failed on only three nights, during the 29 nights of February only five times, and in March only once. At each end the power level is 150 watts—but this still makes visitors to the by no means good G8AKE site at Melton wonder how he does it. One of the answers is superb front end performance on the receiving side, and putting out as much aerial as the local gales safely permit. Another is operating skill, as the station's performance in every 70cm contest testifies.

Another operator noted for his ability to work out to extreme range, and like G8AKE blessed with a no more than average site, is Mike Gibbings, G3FDW, of Retford in North Notts. To help him pursue his observations on 4m propagation he seeks co-operation from any members at about 150 miles-plus to the south west, and in GW, GI and EI. What is to be especially investigated is the " dawn lift " on " Four ", so an ability to rise at dawn on a once or twice weekly basis will be required of would-be co-operators. The period of the intended schedules will be about three months. Letters to him to assist what should be a very useful project should go to 14 Howbeck Lane, Clarborough, Retford, Notts.

Investigation of what he calls " the Pennine flutter " type of propagation is nearly complete, and G3FDW hopes to pass along details soon.

Seaborne on " Two "

The chance to work a Maritime Mobile on " Two " is rare indeed (the stir caused by G8AO/MM operating on the North Sea between the Tyne and the Thames will be vividly recalled by all who laid in wait for him all those years ago).

Any moment now G3UJB/MM should be audible in Zone 5 of the 2m band from m.v. *Huntingdon*, due in London early this month, calling at Hamburg and Hull first. The transmitter is a TW2 and there is a 4-element Yagi.

Says G3UJB: " I regret that I will be able to tune only the first 400 kHz of the band due to the fact that the converter feeds the h.f rig on 14 MHz, and as yet I have only the one crystal."

So listen for him between 144·7 and 145·1 and call him between 144·0 and 144·4—and we wouldn't mind betting that a few calls ripped out at the c.w. end won't be wasted.

Expeditionaries

Although G8APX had to alter his holiday plans after the publication of his " Skeds Wanted " here, he nevertheless enjoyed a profitable journey to the Far North (looked at from his Hertfordshire home). Motoring over the mountain roads around the Moray Firth he was heard by GM3ODP, who obligingly alerted GM8AGU, '3WML and 'JFG, and

Watch your Varactors!

A comment has been received by the Society that interference has been caused to important research work by amateur operated portable stations.

It appears that the use of varactor multipliers in final stages of transmitters on 70cm is particularly likely to cause interference outside the band, and therefore all members who intend to operate during this month's 432 MHz Portable Contest are urged to make quite sure that no emitted products occur outside our own frequency assignments.

The radio astronomy frequency of 408 MHz is especially prone to interference.

Where varactors are employed, the use of a straight p.a. as the output stage is recommended, together with a thoroughly effective high-Q break.

We might add that the complaint received was not made officially. Amateurs' own commonsense in operating will ensure that it does not reach this stage.

good 2m contacts resulted. Later these stations (except 'ODP) worked GM8APX/M on 70cm, as did GM8AZS of Elgin.

* * *

Almost upon us is the expedition to the Channel Islands mounted by the well known team of G3OUF, G3OHH, G3PLX, G3PMJ and G3TEY. Operative dates are 8 to 21 June inclusive. On 4m they will be putting out on 70·41 MHz and on 2m somewhere in the vicinity of 144·1, with 70cm taking three times the 2m frequency. Special attention has been paid to the converters to be taken along, and all return noise factors better than 4dB.

As departure date is imminent Peter Martinez, G3PLX, feels it may be a bit late for people to write for schedules, and invites telephone calls to Waterlooville 51372 (STD 07014) for this purpose. Schedules may be arranged for all weekday evenings and any time of the day for the two weekends of the expedition.

And now Andorra: look out for the G3PUO team from that rare Pyrenean fastness between 15-30 June. They will be on 145·41 sideband evenings and weekends with operation on the h.f. bands daytimes. Look out for them there to fix skeds on 2m. They are going to try to persuade permission for operation on " Four " even though this is a " UK particular " band. As well as G3PUO, there will be G3RIK, G3JIJ, G3WFK and G3RXH—some noted 4m call-signs.

Around the Groups

Another outstanding lecture is billed for the 21 June meeting of the South East V.H.F./U.H.F. Group. Arnold (" FET ") Mynett, G3HBW, is to talk about transistors at u.h.f./v.h.f. Meeting place: Rutherford College, University of Kent, Canterbury.

At the Radio Society of Harrow collective effort has produced some startling results. Constructional projects include converters for 4m, 2m and 70cm and a c.c. converter for 20, 15 and 10m, all units transistorized and FET-fitted, designed by—Arnold Mynett. This year already more than 70 of these kits have been sold to members, and last year some thirty 4m and 2m locally built transmitters were sold. With a chap like G3HBW around the place the answer to that question " How do I get started on v.h.f.? " is much simplified!

Beaconry

Alan Strong, G3WXI, who is connected with the Department of Physics at Sheffield University, asks " Four Metres and Down " to sound out the u.h.f. membership on the desirability of erecting a 70cm beacon on a well elevated site on the Pennines about 20 miles from Sheffield.

It is organisations such as his which generally have the facilities to hand for keeping beacons on the air 24 hours a day, and that means designing them to do so *before* they go on the air as well as maintaining them afterwards. One sometimes hears tell of folks who think " . . . it would be jolly nice to have a beacon locally . . . let's put one up ", regardless of the technical implications and even of the fact that a special licence needs to be obtained from the GPO after the whole project has been vetted by the V.H.F. Committee of the RSGB.

Aware of these factors, G3WXI thinks that a northern 70cm beacon would be of some value to the membership—

BEACON STATIONS

Call-sign	Location	Nominal Frequency	Emission	Aerial Direction
GB3ANG	Craigowl Hill, Dundee	145·985 MHz	A1	
GB3GI	Strabane, N.I.	145·990 MHz	A1	N/SE
GB3GW	Swansea	144·250 MHz	A1	E.N.E.
GB3GM	Thurso	145·995 MHz	A1	N
GB3GM	Thurso	70·305 MHz	A1	N/S
GB3GM	Thurso*	28·185 MHz	A1	N/S
GB3GEC	W. London	434·00 MHz		
GB3SX	Crowborough, Sussex	28·195 MHz	A1	E/omni
GB3VHF	Wrotham, Kent	144·50 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
12 March	21.35 GMT	332 Hz low
19 March	10.30 GMT	190 Hz low
28 March	08.51 GMT	410 Hz low
3 April	09.25 GMT	240 Hz high

but naturally wants to know first how many " customers " it is likely to have.

* * *

As will be known from RSGB News Bulletins, the Rhodesian 4m beacon is now operative as ZE1AZE on 69·998 MHz (only 27 kHz below our newly extended 4m band), and offers the possibility of transequatorial reception in the UK. Don Hayter of Worthing, G3JHM, who is making a special study of 70 MHz propagation, would be particularly glad to have reports from members of even the most fleeting evidence of this interesting if difficult target.

* * *

Note that GB3GM on 145·995 MHz now beams north, is now on the air and will offer a useful aurora-alerting signal.

Skeds Operative

G3FDW of North Notts with G2AFD of Malvern every Monday at 21.00 BST on 70·2 MHz, on s.s.b. with VOX. A welcome is extended to any would-be participants, c.w., a.m. or sideband.

Multi-ways on Mondays at 10 p.m. clock time are observed by the following: G3NWU, Hartlepool, 145·45, G3TKB, Durham, 145·895, G8ANQ, Whitby, 145·549 and G8BAG, Crook, Co. Durham, 144·75 MHz. Afterwards all search the band for further contacts.

G8ANQ reports that GM5YK/A in his *alter ego* of GB2RS is nearly always audible in the Tyne-Tees area when he beams south. Many GM operators call him after the news bulletin and then make a point of looking for stations south of the border.

Tech Corner

From G3PKV (Rudd Thornton, Welwyn Garden City):

To reduce beats in a converter from unwanted oscillator-chain harmonics I tried the circuit shown at Fig. 1. Adjustment is critical but once the oscillator is set up it locks reliably; it will shift in frequency by about 400 Hz before oscillation stops when the coil is damped by touching it.

Without the crystal in circuit it is important to check that

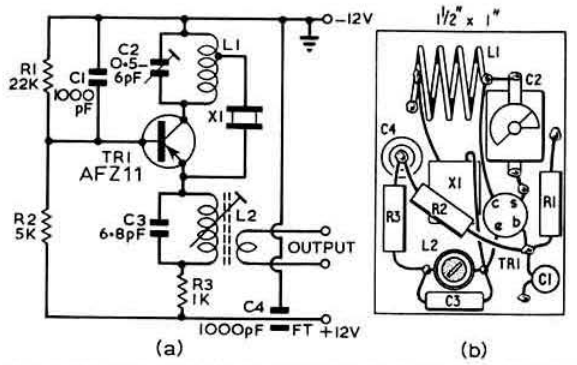


Fig. 1. (a) The harmonic crystal oscillator using an AFZ11 or similar transistor to provide single stage drive for a 2m mixer, as recommended by G3PKV. Component values not already marked are: C2, 0·5 to 6pF air spaced trimmer; L1, 3¾ turns of 18 s.w.g. ⅜ in. diam. by ⅜ in. long, tapped ¼ to ⅜ in. turn from cold end for crystal; L2, 5 turns 28 s.w.g. on 4mm slug tuned former, turns spaced 1/16 in., output via 2 turn link ⅛ in. from cold end. Crystal: 98·75 MHz, fifth overtone for output on 138·25 MHz.

(b) The G3PKV harmonic oscillator requires a careful layout, as shown in this sketch.

there is no oscillation (touch L1 while watching for any change in current). Then insert the crystal and adjust L2 and C2 for a peak in current. Then connect the load and increase the inductance of L2 to compensate.

The setting of C2 is critical for reliable starting but output is adequate to drive the source of a 2N3819 mixer via a two turn link on L2. If the crystal is tapped more than one turn up on L1 the circuit oscillates unlocked, but may have a component at the desired frequency, which can be very deceptive.

The circuit has been tried with several wire ended STC miniature crystals with marked frequencies from 50 to 100 MHz, and all could be locked on the 7th or 9th harmonics to give useful power out.

From G3BLP (John Haydon, Woldingham, Surrey):

Further to the problem of portables on nearby " mountain tops," and to the contribution by G3JGO in the April " Tech Corner," certainly it is true that there are poor receivers around from the overload and cross-modulation point of view, but there are also many poor transmitters, particularly portable ones. The attitude often seems to be that anything is good enough for portable work; in fact, this has been said to me when I have told a " Stroke P " station that his signal is rough or unstable.

A step in the right direction is a limiter and 3 kHz filter which would stop the worst excesses; but inverter noise and harmonics are also persistent offenders. Indeed, one can hear the same offending transmitters year after year operated by the same persons. One group which traced some trouble from this cause reported that it proved to be the source of some annoying interference they had been suffering on their companion 70cm station during V.H.F. NFD.

Of course, before criticising other people's transmissions one should make sure that as far as is practicable one's own receiver is free of blame. The use of a local v.h.f. signal generator enables one to determine the level of incoming signals, and interestingly enough very few exceed 10mV into the converter. A recent test at G3BLP was to feed the output from a high quality signal generator modulated 100 per cent at 4 kHz into the 2m receiver at levels up to 200 mV. This signal tuned cleanly on the receiver and the worst spurious response was 60–70dB down. Of course, a two-signal test would be more stringent, but cross-modulation is a different problem, and when it occurs the modulation of the unwanted signal is present only when the carrier of the wanted one is there.

By satisfying himself by tests of this kind that what he hears on his receiver is fairly close to the truth, the operator will be well equipped to assess the quality of the signals he hears transmitted on the amateur v.h.f. bands.

Xtal Xchange

Like many G8-plus-three men newly on " Two," G8BAW of Tottenham has a crystal that brings him out towards the low end of the band and wants to dispose of it. Any offers for 144·35 MHz to John Baxter at 7 Woodside Gardens, London, N17. Wants London zone crystal in exchange.

" I operate a TW Communicator and find it prefers 6 MHz crystals " says G3IJU, and offers the following: HC pattern, 8003·63, 8061·25, 8068, 8079·28, 8092·5 kHz. FT243 pattern, 5873·333, 8024, 8036, 8075, 8650 kHz. He wishes to exchange these for FT243 pattern crystals anywhere between 6005 and 6075 kHz. Letters to E. Briggs, 31 Blenheim Crescent, West Ruislip, Middlesex.

Here and There

" I must thank all those who have done so much to get 2m for the G8-plus-three . . . have Quickstarter transistor converter and 15 watts to a 3-10 all ready to go but not much operating time . . . still have A-levels to cover "—G8BAW, Tottenham.

* * *

" Apropos using the QQV03-10 as a modulator, I have a QQV06-40A as the audio output stage of a QRO rig for 2m and 70cm. How else can one get 50 watts r.m.s. sine from 3 valves on a 6 by 6 in. chassis with 600 volts h.t.? And it provides a spare valve when going Stroke P, as long as one has a keying socket in the rig! "—G3WXI, Sheffield.

* * *

" I would also like to voice my support for a mobile frequency for ' Two ' "—G3UJB, Wickford.

* * *

" Have we a nominated calling frequency for mobile on 2m? "—G3IJU, West Ruislip.

* * *

" I suppose LE7 9JJ is the GPO's version of the QRA Locator! "—G3LTF, Chelmsford.

* * *

" How we in Ainsdale Radio Club hate that darned MHz notation you have adopted . . . To us it is just plain stupid " —G2CUZ, Southport.

* * *

" The G8-plus-3 stations are certainly welcome on 2m, although a small number of the signals heard leave something to be desired—but then, so do those of the regular occupants. The same comment applies to out of zone operation "—G3BLP, Woldingham.

IARU

Region 1 calling

INTERNATIONAL AMATEUR RADIO UNION

By R. F. STEVENS, G2BVN

Reciprocal Licensing

The following countries have a reciprocal licensing agreement with the UK:
Austria, Belgium, Denmark, Finland, France, Germany, (Federal Republic), Israel, Luxembourg, Monaco, Netherland, Portugal, South Africa, Sweden, Switzerland and the USA.

In some cases, e.g. Switzerland, the agreement is not truly reciprocal as the same facilities are not available on both sides. However the administrations concerned have agreed that the existing conditions will be amended as soon as possible. In the case of Switzerland this entails an alteration to the Federal laws.

Application forms for licences in France and Yugoslavia may be obtained from RSGB Headquarters. It will be noted that a formal agreement has not been concluded with the latter country. However the National Society, the SRJ, has been successful in obtaining facilities for visitors.

Republic of Ireland

It has been announced that in future all visitors to the Republic will be issued with a call from the series EI2VAA to EI9VAA. This system is already operative.

Canada

It came as a considerable shock to Canadian amateurs to learn that as from 1 April, the licence fee was to be increased from $2.50 to $10.00. There was apparently no prior warning.

Finland

At the present time mobile licences cannot be obtained in Finland. However, portable operation for a period of up to 14 days is permitted by adding a suffix comprising the number of the radio district in which operation is being carried out. The practical effect of this is that all facilities except mobile in motion are available to the visitor.

France

The administration has decided to replace separate licences for fixed station portable and mobile operation by a single composite licence. There is the minimum of formality and it is not necessary for the amateur to notify the authorities the details of the vehicle in which mobile equipment is installed if it is other than a hired car.

Bulgaria

From G6CL, Secretary of the Region 1 Division, it is leant that the Bulgarian National Society has made application to join the Region 1 organization. This will bring to 30 the number of Region 1 Member Societies.

Beacons

The following is a revised version of the list of V.H.F. U.H.F. beacons which appeared in September, 1967.

MHz		MHz	
28.000	DM3IGY	145.250	LA3VHF
28.195	GB3SX	145.260	OY7VHF
29.005	DL0AR	145.300	LA4VHF
69.998	ZE1AZE	145.900	DL0SG
70.100	9H1MB	145.950	OE1XXA
70.260	ZB2VHF	145.960	SM4MPI
70.305	GB3GM	145.960	OK1KVR/1
		145.971	DL0PR
144.002	DL0DE	145.985	GB3ANG
144.005	OE5THL	145.986	OZ7IGY
144.010	SP2VHF	145.990	GB3GI
144.100	DL0RG	145.990	YU1VHF
144.150	OE7IB/P	145.995	GB3GM
144.250	GB3GW	145.995	OE5THL
144.500	GB3VHF	146.000	YU2VHF
144.675	OK1KCU/1	432.005	DL2IF
144.800	OH8VHF		
144.900	OH3VHF	432.018	OZ7IGY
145.000	SM4UKV	432.030	SP7UHF
145.068	DM2AKD	432.034	OK1KCU/1
145.150	LA1VHF	433.000	DL1XV
145.200	LA2VHF	434.000	GB3GEC

Region 1 QRA Locator Maps

The set of four QRA Locator maps covering the whole of Region 1 (except Africa) are now available from RSGB Headquarters. The cost (postage extra) is 30s. a set. These maps were initiated by the Region 1 V.H.F. Committee and the first sets were brought to RSGB by H. Dr Lauber, HB9RG, who was responsible for their production.

Meetings

The Annual General Meeting of the UBA was held at Genval, near Brussels, on 11/12 May and the RSGB was represented by the President, Mr J. C. Graham, G3TR, M. Andre Jacob, F3FA, President of the REF also attended and the IARU Region 1 was represented by G2BVN.

The next triennial Conference of the Region 1 Division will take place at Brussels between 5 and 10 May, 1969. There are now 30 Member Societies in the Division and it is hoped that most will be represented. Any Affiliated Societies or RSGB Groups who wish to submit matters which they feel should be dealt with at this Conference are asked to send their views, without delay, to the writer c/o Headquarters.

RSGB SLOW MORSE PRACTICE TRANSMISSIONS

These Slow Morse Practice transmissions are sponsored by the RSGB. Alterations and additions to this list should be sent to the Honorary Organizer, M. McBrayne, G3KGU, 25 Purlieu Way, Theydon Bois, Essex.

Clock Time	Call-sign	MHz	Town
Sundays			
09.30	†{G3KZZ / G3TNF	1·920	South Shields, Co. Durham / Gateshead
09.30	G3HZL	1·940	Isleworth, Middlesex
10.00	G2FXA	437·000 to North	Stockton-on-Tees
10.00	G3TTK	1·860	Coalville, Leics.
10.00	GM3PIP	3·590	Mintlaw, Aberdeen
10.15	G3CGD	1·875	Cheltenham
10.30	G2FXA	437·000 to South	Stockton-on-Tees
10.30	G3NPB	1·875	St. Ives, Cornwall
11.00	G2FXA	1·900	Stockton-on-Tees
11.30	G3KKU	1·940	Liverpool
12.00	G3HVI	1·890	Stoke-on-Trent
12.00	G3GNS	1·910	Weston-super-Mare
17.30	G3TNF	1·920	Gateshead
20·30	G3UQL	1·915	Brentwood, Essex
Mondays			
17.30	G3TNF	1·920	Gateshead
18.00	G3SWR	1·980	Birmingham
18.30	GW3UMB	1·880	Colwyn Bay
18·30	G3NCZ	1·920	Blackburn, Lancs.
18.30	G3RXH	1·910	Skipton, Yorks.
19.00	G3WGU	1·880	Bispham, Lancs.
19.00	†{GC4LI / GC2FMV	3·600	Jersey, C.I.
20.00	G3KAN	1·990	Northampton
20.00	G3IBJ	1·910	Southampton, Hants.
20.00	GI3JEX	1·860	Belfast
20.00	G3UXI	1·915	Harlow, Essex
20.00	†{G3WDW / G3VTY	1·915	Leeds, Yorks.
20.15	G3SAZ	1·845	Ashford, Middlesex

† Alternately

Clock Time	Call-sign	MHz	Town
Tuesdays			
17·30	G3TNF	1·920	Gateshead
19.00	†{G3UFO / G3XAM	1·980	Wirral, Cheshire
19.30	G3SWP	1·850	Doncaster, Yorks.
19.30	G3WGU	433·500 to South-East	Bispham, Lancs.
20.00	G3UPA	1·850	Meriden, Warks.
20.00	†{G3FAU / G3KSS / G3OVT	1·980	Stevenage, Herts.
20.00	G3FWW	1·880	Burnham-on-Sea, Soms.
20.00	G3TPV	1·910	Hythe, Hants.
20.00	GM3UWX	3·590	Bishopton, Renfrewshire
20.30	G3UNV	1·845	Ashford, Middlx.
20.30	G2ABC	1·915	Woodford, Essex
21.00	G4RS	1·865	Blandford, Dorset
21.30	G2ABC	144·750	Woodford, Essex
22.00	G3HZM	1·925	Manchester

Clock Time	Call-sign	MHz	Town
Wednesdays			
17.30	G3TNF	1·920	Gateshead
18.30	G2FXA	1·900	Stockton-on-Tees
19.30	G3WGU	433·500 to South-East	Bispham, Lancs.
19.30	G3UJD	1·825	Farnborough, Hants.
20.00	G8QU	1·970	London, N22
20.00	GM3PIP	3·590	Mintlaw, Aberdeen
20.30	G3HZL	1·845	Isleworth, Middlx.
20.30	G3KGU	1·915	Theydon Bois, Essex
20.30	G3SJE	1·870	Harrow, Middlx.
21.00	G3HVI	1·890	Stoke-on-Trent
21.00	G3LQI	1·990	Lancing, Sussex

† Alternately

Clock Time	Call-sign	MHz	Town
Thursdays			
17.30	G3TNF	1·920	Gateshead
18.00	G3SWR	1·980	Birmingham
18.30	GW3VBP	3·590	Barry, Glam.
18.30	GW3UMB	1·880	Colwyn Bay
18.30	G3NC	1·968	Swindon, Wilts.
19.00	G3WGU	1·880	Bispham, Lancs.
19.30	G3GNS	1·910	Weston-super-Mare
20.00	GI3JEX	1·860	Belfast
20.30	†{G3ROE / G3RSF / G3TIQ	1·915	Harlow, Essex
21.00	G4RS	1·865	Blandford, Dorset
Fridays			
17.30	G3TNF	1·920	Gateshead
18.30	G3NCZ	1·920	Blackburn, Lancs.
18.30	G3VLT	1·913	Chelsfield, Kent
18.45	G3UQL	1·915	Brentwood, Essex
19.00	G3NPB	1·875	St Ives, Cornwall
19.30	G3PQF	1·825	Farnborough, Hants
20.00	†{G3UCZ / G3WIX	1·915	Pudsey, Yorks. / Bradford, Yorks.
20.15	G3SAZ	1·845	Ashford, Middlesex
Saturdays			
09·30	G3UNV	1·940	Ashford, Middlesex
10.00	G3PLE	1·820	Stourbridge, Worcs.
13·00	G2FXA	1·900	Stockton-on-Tees
14.00	†{GC4LI / GC2FMV	3·600	Jersey, C.I.
17.30	G3TNF	1·980	Gateshead
17.30	G3EFS	1·913	Bromley, Kent
18.45	G3WTA	1·920	Morpeth, Northumb.
20.00	G3KPO	1·980	Peterborough
20.00	G3WPR	1·915	Ilford, Essex
21.00	G3TTK	1·823	Coalville, Leics.

† Alternately

LISTENERS: THESE SLOW MORSE PRACTICE TRANSMISSIONS ARE PROMOTED SPECIFICALLY TO HELP YOU, AND UNLESS YOU PLAY YOUR PART IT WILL BECOME INCREASINGLY DIFFICULT TO KEEP THE SERVICE GOING. IF YOU BENEFIT FROM ANY OF THESE TRANSMISSIONS YOU OWE IT TO THE OPERATOR CONCERNED TO LET HIM KNOW YOU LISTEN. THIS SERVICE IS A CALL UPON THE OPERATOR'S LEISURE TIME, AND HE IS MORE LIKELY TO SACRIFICE IT TO HELP YOU, IF HE KNOWS HE HAS AN AUDIENCE.

OUR NEW HEADQUARTERS

The "Harrow Challenge" has produced the response given in the table below, and we are grateful to the clubs and groups mentioned. It has not been possible to produce a "league table" for with the exception of Harrow no club has advised us of its membership total; so the list is alphabetical. The Harrow donations represent an amount of nearly 5s. 8d. per member; when sending your donation add the membership total and leave the arithmetic to us!

For the record, this makes 16 clubs (out of a total of 250 affiliated to the Society) which have subscribed for nearly £300 of Debentures and have sent donations totalling £72 7s. 10d. by 20 May. Others we know are making regular collections—to these we say please send us what you have "on account" so that we can put you in the lists. We are even grateful to the club that wrote in to say "Sorry—we cannot afford to send anything" because we know the interest and goodwill are there, and our appeal has not been simply ignored.

Clubs and Groups	Debentures	Donations
Bedford and District Amateur Radio Club	£25	
Belfast and District RSGB Group	£25	
Crawley Amateur Radio Club		£5 10 6
Cray Valley Radio Society		£10 0 0
Crystal Palace Club		£11 0 0
Glasgow University Radio Club	£25	
Radio Society of Harrow	£25	£29 2 4
Mansfield Amateur Radio Society		£5 0 0
March and District Amateur Radio Society	£50	
Mid-Ulster Group RSGB	£25	
North Kent Radio Society	£25	
Painton Radio Society		£5 0 0
South Dorset Radio Society		£5 5 0
Stockport Radio Society	£50	
Wimbledon Radio Club		£2 10 0
Wirral Amateur Radio Society	£25	

Wirral Amateur Radio Society

The Wirral Amateur Radio Society will be running a DXpedition from Friday, 21 June to Sunday, 23 June, 1968 to Trawsfynydd, Merionethshire. Twelve members, with ten call-signs among them, will be setting up three stations to work the high frequency bands and also the 160m band. The Society's call-sign, GW3NWR/P, will be used on top band and the other call-signs to be used include GW2AMV/P and GW2FOS/P. Aerials for 160m and 80m will be suspended from balloons, while a cubical quad, a dipole or a long wire will be used for the higher frequencies.

DXpeditions run by this Society in the past have always been very successful and consequently it is hoped that this year's event, which is being organized by the same team, will prove to be even more outstanding, both from a technical and a recreational point of view.

The Secretary of the Wirral Society is J. J. M. Phillips, G3PXX 16 Collingham Green, Little Sutton, Wirral, Cheshire.

GILWELL PARK, NEAR CHINGFORD, ESSEX

12 miles N.N.E. of London
(by kind permission of the
Camp Chief, Gilwell Park,
Mr John Thurman, O.B.E., J.P.)

RSGB NATIONAL MOBILE RALLY

Sunday, 23 June, 1968

Talk-in stations will be on 160, 80, 4 and 2m from 10 a.m. on Sunday. Camping and caravan parking will be available from Friday evening, and although no reservation is necessary prior notification to G3TUM would be helpful. A providore and grocery supermarket will be open nearby. You will be able to see trade and public service displays, there will be tours of Gilwell Park Scout camping ground, and a Scout camp fire will take place on Saturday evening. Raffles will be held, and there will also be a bring and buy sale. Please price any surplus equipment for sale before putting it on display and remember that a deduction of 10 per cent will go towards rally funds.

A BROCHURE ISSUED BY THE SCOUT MOVEMENT GIVING GENERAL INFORMATION ABOUT GILWELL PARK AND INCLUDING A COMPREHENSIVE ROUTE MAP AVAILABLE FROM (FOOLSCAP S.A.E. PLEASE) G3TUM, QTHR.

Organized by RSGB Mobile Committee

The Society's Council and Representation

We feel that many members may not be aware of how the RSGB scheme of Representation works, and how the membership at large can communicate its wishes to Council. This prompts us to give a brief outline of the system, described below, but for those members requiring fuller details a special leaflet has been prepared and can be obtained from RSGB Headquarters on request.

Council

The Council of the RSGB consists of a total of not more than 18 members made up in the following way:

The President, who is elected by Council and serves for one year and may be any Corporate Member.

The Immediate Past President who is the retiring President and serves also for one year.

The Executive Vice-President who is elected for each year by the Council from its membership at the first annual meeting of Council and serves for that year.

The Honorary Treasurer is elected by Council for a period of three years and may be any Corporate member of at least three years' standing.

The total number of Council Members must not exceed 15, eight of whom are elected on a national basis and seven are elected on a Zonal basis. Each Council Member serves for a period of three years and may be re-elected for further periods of three years.

Zonally elected Council Members may only be nominated by and voted for by Corporate Members living within a particular Zone and Council Members for a Zone must be resident within the zone they represent.

All Council Members must have been Corporate Members for not less than three years immediately prior to the date of their nomination.

Casual vacancies on Council caused by retirement etc. are filled by Council for the period up until the end of the year in which the appointment was made.

Regional, Area and Affiliated Society Representatives

Regional Representatives are elected by the Corporate Members living within a Region for a period of three years and can be re-elected for further periods of three years. The Regional Representative must be resident within the Region he represents.

Area Representatives are elected by Corporate Members living within the Area covered by the Area Representative, who must also reside in the area.

Area Representatives serve for a period of three years and the Areas they cover are on a geographical basis, viz, North Birmingham, South-East Manchester. In the case of London the Areas may be based on groups of Postal Districts.

Area Representatives will not be appointed unless the total membership in the Area proposed has a total membership of at least 10 members.

Affiliated Society Representatives represent local Radio Societies, Clubs or Groups which are Affiliated to the RSGB.

Societies, Clubs or Groups may appoint one of their members to act as ASR in which case they should advise RSGB Headquarters of his name and address. If no member is specifically appointed ASR then the RSGB will recognize the Society Secretary as the ASR.

The term of appointed service of an ASR is determined by the Society concerned and any change should be notified to RSGB Headquarters.

Details of the Zones which are represented by Council Members and the Regions which are served by Regional Representatives are as follows:

Zone	*Comprising Regions*
A	1 and 2
B	3 and 4
C	5, 7, 8 and 16
D	6, 9 and 17
E	10 and 11
F	15
G	12, 13 and 14

Region 1 (North Western)	Cheshire, Cumberland, Lancashire, Westmorland, the Isle of Man.
Region 2 (North Eastern)	Durham, Northumberland, Yorkshire.
Region 3 (West Midlands)	Birmingham (Postal Area), Hereford, Shropshire, Staffordshire, Warwickshire, Worcestershire.
Region 4 (East Midlands)	Derbyshire, Leicestershire, Lincolnshire, Northamptonshire, Nottinghamshire, Rutland.
Region 5 (Eastern)	Bedfordshire, Cambridgeshire, Hertfordshire (outside London Region), Huntingdonshire.
Region 6 (South Central)	Buckinghamshire (outside London Region), Gloucestershire (excluding Bristol), Oxfordshire.
Region 7 (London)	London Postal Districts, Middlesex, Surrey and all other territory within 25 miles of Charing Cross.
Region 8 (South Eastern)	Kent(outside London Region), Sussex.
Region 9 (South Western)	Bristol, Cornwall, Devonshire, Dorset, Somerset.
Region 10 (SouthWales)	Brecknockshire, Cardiganshire, Carmarthenshire, Glamorgan, Monmouthshire, Pembrokeshire, Radnorshire.
Region 11 (North Wales)	Anglesey, Caernarvonshire, Denbighshire, Flintshire, Merionethshire, Montgomeryshire.
Region 12 (North Scotland)	Aberdeen, Angus, Banff, Caithness, Inverness, Kincardine, Moray, Nairn, Orkney, Perth, Ross and Cromarty, Shetland, Sutherland.
Region 13 (East Scotland)	Berwick, East Lothian, Fife, Kinross, Mid-Lothian, Peebles, Roxburgh, Selkirk, West Lothian.
Region 14 (West Scotland)	Argyll, Ayr, Bute, Clackmannan, Dumbarton, Dumfries, Glasgow (Postal Area), Kirkcudbright, Lanark, Renfrew, Stirling, Wigtown.
Region 15 (Northern Ireland)	Antrim, Armagh, Down, Fermanagh, Londonderry, Tyrone.
Region 16 (East Anglia)	Essex (outside London Region), Norfolk, Suffolk.
Region 17 (Southern)	Berkshire (outside London Region), Hampshire, Wiltshire, the Channel Islands, Isle of Wight.

The next election for Regional Representatives and Area Representatives will take place in October/November. 1968, for Representatives to serve for the period 1 January, 1969-31 December, 1971.

Casual vacancies for Regional Representatives and Area Representatives caused by death or resignation, may be filled by Council for the remainder of the period for which the original Representative would have served.

The duties of Regional, Area Representatives and Affiliated Society Representatives cover quite a wide field and it is not proposed to do more than summarize these in this article. Full details are available from RSGB Headquarters and a new leaflet is being prepared which not only gives full details of the various duties but also what expenses may be incurred together with a summary of the general Scheme of Representation of the RSGB.

A Regional Representative is the Council's representative in the Region he represents and provides liaison between the Council and the members in his Region.

He will submit to Council, resolutions, recommendations and suggestions put forward by his Area and Affiliated Society Representative.

He will organize Official Regional Meetings.

He may at his discretion appoint one or more Deputy Regional Representatives to help in the work of administering the Region, and he will advise Headquarters of the names of any such Deputies.

He may organize Regional Lectures.

He will organize meetings with ARs and ASRs and render brief reports on these meetings to Council.

An Area Representative is expected to organize (or to assist in the organization of) local meetings and similar activities.

To give advice to and invite those interested to participate in local activities.

An Affiliated Society Representative is expected to liaise between his Affiliated Society and the Regional Representative.

To assist the AR and RR in all ways to promote local activity and to assist all the members of his Society.

SOCIETY AFFAIRS

A brief report on the April 1968 meeting of the Council

THE meeting was held on Monday 8 April, and was attended by The President (Mr J. C Graham in the Chair), Messrs B. Armstrong, N. Caws, J. Etherington, R. J. Hughes, A. F. Hunter, E. G. Ingram H. E McNally L E. Newnham, F. Parker, A. D. Patterson, J. Petty, R. F. Stevens, G. M. C. Stone, J. W. Swinnerton, G. Twist, E. W. Yeomanson, (Members of the Council), C. P. Pope (Secretary), A. E. Dowdeswell (General Manager) and T. R. Preece (Assistant Editor).

No apologies for absence were received.

Membership and Affiliation

Council approved the election of 164 Corporate members, 40 Associate members and Corporate Membership to 15 Associates.

The subscriptions of five members were waived due to blindness or disability.

Life membership was granted to Mr S. W. Malin, BRS3520.

Council accepted the applications of the following for affiliation:
Heriot-Watt Amateur Radio Society, GM3WEE, Edinburgh;
Secretary: Mr Jarlgrov, LA3LK.
Maghull Ormond Drive School Radio Club (Liverpool);
President: Mr Ormesher.

Radio Communication Handbook

Mr Stevens reported on a Meeting between the Editor, Printers and others on 3 April. He stated that the book would probably consist of 832 pages and that 2000 copies should be available by 30 September. Council approved a first print of 15,000 copies.

RSGB Call Book 1969 Edition

Mr Stevens reported on the print cost of the 1969 Call Book and after some dicussion it was decided to increase the price of the 1969 edition by 6d.

Northern Radio Societies' Association

This Association was holding a Third Convention on 19 May and after a short discussion it was decided that Mr J. R. Petty and Mr A. E. Dowdeswell (General Manager) would attend as representatives of the Society.

New Headquarters

Mr Stevens reported that the work on the building was progressing satisfactorily. Council agreed that Messrs Caws, Stevens and Swinnerton be empowered to make decisions on minor repairs and renovations to the new HQ.

Mr Caws reported on the financial situation with respect to the new HQ and was preparing a report for publication in *Radio Communication*.

Recommendations of Committees

V.H.F. Contest Committee (27.2.68).

Council approved the awards for the following contests: 1967 Listeners' Championship, 2nd 144 MHz (C.W.) Contest, 70cm Section Cumulative Activity Contest, 1st 70 MHz Open Contest and the 1st 144 MHz S.S.B. Contest.

Finance and Staff Committee (5.3.68)

A. That no action be taken to raise the ceiling figure of subscriptions and that no action be taken at this time to introduce family membership.

C. & D. To accept proposals for contributory pensions on behalf of Mr Dowdeswell and Mr Pope.

V.H.F. Committee

A. That Mr T. B. Douglas, G3BA, be awarded the International V.H.F. Trophy in recognition of his consistent v.h.f. work and in particular his encouragement of the s.s.b. mode of operation.

B. That the Fifteenth International V.H.F./U.H.F. Convention be held on Saturday, 26 April, 1969 at the Winning Post Hotel, Whitton.

Mobile Committee

A. That Mr Yeomanson be appointed Treasurer of the Mobile Committee.

B. That Mr A. F. Hunter be asked to organize a Scottish Mobile Rally during 1968.

H.F. Contests Committee

A. That the Edgware Trophy be awarded to the Maidstone YMCA Amateur Radio Club, G3TRF as winners of the Affiliated Societies' Contest 1968.

Committee Meeting Minutes

Council approved the following Minutes:

Mobile Committee (8.1.68); Finance & Staff Committee (10.2.68); Exhibition Committee (16.2.68); V.H.F. Contest Committee (27.2.68); RAEN Committee (2.3.68); Membership & Representation Committee (4.3.68); Finance & Staff Committee (5.3.68); GPO/TVI liaison Committee (12.3.68); V.H.F. Committee (13.3.68); Exhibition Committee (15.3.68); Education Committee (16.3.68); Mobile Committee (20.3.68); H.F. Contests Committee (21.3.68); Scientific Studies Committee (25.3.68) and V.H.F. Contests Committee (26.3.68).

Council was in session for 4½ hours.

Obituaries

ARTHUR BROWN, G3IOO

With deep regret we record the passing on Sunday, 28 April, 1968, of Mr A. Brown, G3IOO, " Nat " to many of his friends, who died in hospital in Shrewsbury after a short illness.

Nat's 2m and 70cm signal from Oswestry on the Welsh border was for many years something of a beacon for v.h.f. men in London and the Midlands and his enthusiasm for amateur radio and v.h.f. in particular was infectious. He was always ready to offer a helping hand to the SWL and budding amateur and many will remember with pleasure the informal dinner parties for v.h.f. enthusiasts which he organized in the area.

He was a keen golfer and some-time organizer of the " Two Metre Open Golf Championship " played at Oswestry the year that he was Club Captain!

To his understanding wife Phyl and his two daughters we extend our heartfelt sympathy. G.N.R.

H. BOAKES, G8SB

It is with great sorrow that we record the death of Harry Boakes, G8SB, who died in hospital on 1 May after a comparatively short illness.

Harry had not long moved from his Sale QTH to a small business in Northenden which was being run by his wife and daughters. He served in the RAF during World War II as a Signals Officer, home and abroad. His activity in Amateur Radio extended back many years with v.h.f. his prime interest. A founder member of the North West V.H.F. Group, his enthusiasm for v.h.f. portable contests knew no bounds and was an inspiration to all who knew him—a great loss to the v.h.f fraternity and his friends in the North West.

To Margaret his widow and four daughters may we extend our deepest sympathy. J. G. B.

BOB KING, G2FMT

The many friends Bob King made at the " Farmyard " in Bucks, during World War II, will be saddened to hear of his death at the age of 65 years in his Cheltenham home on 31 March.

Bob had suffered ill health for nearly three years and had to make an early retirement from his firm last year. Although he had not been active on the air for the last few years, he maintained his amateur licence, and retained an interest in the hobby, often listening on the bands. Although of a quiet and retiring disposition, Bob was friendly by nature and always gave a warm welcome to visitors to his home.

Deepest sympathy is extended to his widow Vera, who nursed him with great devotion during his long illness.

LETTERS

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

Technicians on Two

From: R. C. Hills, G3HRH, Welwyn, Herts.

I see from the announcement on page 248 of the April *Bulletin* (it will always be thus to me) that the constant nagging of the vociferous minority of G8 + 3s has at last eroded away the better judgement of the Society's V.H.F. Committee to the extent where they have recommended Council to ask the GPO to extend the "B" licence down the spectrum to include the whole of the 145 MHz band, with a successful outcome. Indeed I needed no written announcement in lieu of the cacophony on the band on the first Saturday night of the extension. I suppose that in one way it was welcome in that it did legalize the several well modulated signals from Class "B" stations which have always characterized the two metre band in some areas right from the start of the licence.

I was, as it happened, chairman of the V.H.F. Committee when the class "B" licence was first introduced, and at that time I was vigorously opposed to its extension to include 2m. This licence was aimed at those serious, and often well qualified professionals who were interested in a permit to transmit because the sort of experimental work they wished to carry out involved such a permission. This in turn provided a well needed boost to the sparsely occupied u.h.f. bands, which I would remind all are shared with others, and are increasingly coveted by commercial interests. And at the very height of the pressure on those bands, and 432 MHz in particular, the bulk of the activity is transferred to 145 MHz (an exclusive amateur band) in order that those not skilled enough for u.h.f. could natter on two.

There are still, and I am thankful to them, those G8 stations who are remaining on seventy to carry on the very good work that they have pioneered on that band, but I fear that from now on the class "B" licence will be little but a short cut to a private radiotelephone for nattering on two, requiring no more skill than the ability to read the small ads for second hand TW equipment.

I know there will be many who disagree with my view of the situation but I know of several who are not without experience in Amateur Radio who see the dangers of this extension as I do. All one can hope is that the old 2m stations will become tired of the QRM and will gravitate to seventy to restore the balance.

QRA Locators and the Georef System

From: W. F. Blanchard, G3JKV, East Grinstead, Sussex.

OK1DE is to be congratulated on his command of the English language—to write a technical letter in a foreign language is something I am sure few English amateurs would wish to attempt!

But I am afraid I cannot also congratulate him on his arguments against Georef, since I, in turn, must completely disagree with his statements and conclusions. Before giving my reasons, I think it only fair to other readers to point out that OK1DE is obviously referring primarily to a paper circulated to all European Amateur Radio national organizations which put the pros and cons of all current grid systems, but which has not been published anywhere. Because of this, anyone referring back to my article in the January issue of *Radio Communication* may be slightly baffled by certain of OK1DE's references. Copies of this paper are available from the RSGB, incidentally, for anyone seriously interested.

Mr Dvorak's opening statement that the most important part of my argument is that QRA is not accurate enough is not correct. I have always based my opposition to it on the major ground that it is needlessly complicated and difficult to understand. That it is also less accurate than Georef is also true, but if v.h.f. addicts decided that QRA's accuracy is sufficient for their purposes it would, in my submission, affect the case for the adoption of Georef hardly at all. Therefore, all Mr Dvorak's statistical arguments, even if they were true, would not affect the case, but they are not even all true. His statements in paragraphs 3-7 actually apply to *any* positioning system and I do not take exception to them, but his worst case given in paras. 9, 10 and 11 is a little difficult to understand, although whatever interpretation is put on his figures it does not seem to prove anything very much, since it would be quite easy to quote a similar example for Georef which would come out with a smaller error.

I do not agree with para. 12 at all. In the admittedly rather few contest logs I have seen, the QRA locator has been the most accurate indication of position given. In any case, contest committees are not going to welcome having to rework every distance in the top few scorers' logs simply because the initial locator was too inaccurate! Is this not in fact the precise case against having too inaccurate a grid system?

Para. 13 is, I think, adequately answered by saying that since I state in my article that the amateur's prefix will take out much of the ambiguity which would result if the first two letters of Georef were dropped, I had better allow QRA the same facility!

OK1DE's para. 14 is factually incorrect. The Georef grid does not reach a ratio of 1 : 2 until 60° N or S, and is actually about 1 : 1·7 at our latitude. The fact that its error is bigger one way than the other has already been taken into account in my accuracy calculations, and is not of any practical significance. QRA varies from a square in the same way, although it is so constructed that it is nearly a square at our latitude. That errors will not average out, producing a systematic error, is as true for QRA as for Georef, since any grid other than a rather improbable one which would produce a circular lattice would have the same fault. His conclusion is therefore incorrect.

Para. 15 is also incorrect factually. The biggest difference between the two systems, *assuming* that both had the same basic grid area, would only be some 12 per cent but over the full circle this would average out, and there would actually be no difference at all. Also, since QRA starts out with an error some three times larger than Georef, it is always going to be at a disadvantage anyway. The conclusion that Georef could actually end up with an overall error bigger than QRA is rubbish.

I feel that in making statements about the relative speed of finding QRA and Georef positions, OK1DE is working in the dark to some degree—I do not think it likely that NATO maps with Georef overprint are available to the general public in Czechoslovakia, and therefore he has probably never seen the maps I refer to in my article. Certainly, the amateurs who have tried both systems are n no doubt about which is quicker.

In any case, his diagram is incorrect. It shows the ZL 80 quadrangle correctly, being 7½ minutes of latitude by 12 minutes of ongitude, but the Georef quadrangle it shows is not MKPG, which is a quadrangle of 60 minute sides. He actually shows a quadrangle of 6 minutes sides, which is not used anywhere in Georef. Possibly he has misread the Georef article, where it was mentioned that if greater accuracy is required, the basic one minute quadrangle can be subdivided into tenths, but these would be quadrangles of six seconds, and would give an accuracy of a few hundred feet. The Georef quadrangle MKPG, drawn to the same scale as the ZL 80 one, should actually be 10 times bigger all round than the one OK1DE has illustrated, making a nonsense of his statement following the diagram.

With his last few paragraphs I am, obviously, in complete disagreement. He has not touched upon my main argument at all, which is simply that Georef is easier to understand and apply, and there is no support throughout his letter for the bald statement that the introduction of Georef would cause considerable complications. He has similarly not mentioned the difficulties of deriving QRA in the first place, where it is virtually mandatory to obtain latitude and longitude first, plot it on a QRA map and then read off QRA. With Georef, as soon as lat. and long. is measured, half of the Georef locator is immediately available, and since the letters remain the same over quite large areas, reference to a simple table supplies the rest. No need for special maps, even for re-plotting, and no need to be stuck with a map of one scale only. If you need more accuracy, use a larger scale map!

Summarizing, I find nothing in Mr Dvorak's letter which genuinely affects the case for Georef.

Extortion

From: E. W. Elliott, G3BYY, Wraysbury, Staines, Middlesex.

This month's issue provides yet another spread of members' free advertisements. Do any statistics exist to show the percentage of sales? I doubt if it is a high one. Most advertisers seem to have a vastly exaggerated view of the value of their second hand items. With the widespread collapse of retail price maintenance surely nobody pays the full retail list price for any expensive equipment when buying for cash? This applies whether it be radio equipment, photographic equipment, cars or motor cycles and so on. I know that I don't. I expect, and get, anything up to 20 per cent discount for cash.

That being the case, second hand equipment even if advertised as " unwanted gift must sell emigrating next week " or any of the other well worn gimmicks is not worth more than 60 per cent of list price in mint condition. Some members are asking 85 per cent—what a hope! And the prices they ask for the historical relics of World War II such as AR88s, HROs, etc.; some of these receivers are nearly thirty years old. It's the same as using a World War I receiver in 1948!

If advance in design had not rendered equipment like this valueless by 1950 then it would appear the various research laboratories have been wasting their time. Or is it the carefully controlled surplus market by a ring of traders that keeps these artificial prices going?

Which Aerial

From: D. MacLennan, G3KGM, Sidcup, Kent.

As a satisfied Joystick user I would like to answer some of the comments made by G3RNL (*Radio Communication*, May 1968).

The Joystick, when operated as per the manufacturer's instructions, will equal, and sometimes outperform, any other *Multiband* aerial. This has been proved by the Doyen and expert of 160m, W1BB, who found the " signal to noise ratio better than with Vee. " His Vee aerial is 520 ft. long. " *CQ* " *Magazine* test report concluded that the Joystick " will work as well as a 3 ele beam. " W6TYP, QRP World Record holder, established the record with a Joystick and 18 ft. of feeder from " this not so good QTH." GC3USE, a Club DXpedition reported in the then RSGB Bulletin, worked VKs, PYs, Ws etc a total of 600 QSOs and 55 countries with a Joystick 15 ft. high, found that " the logs do credit to the Joystick." Operating was confined to one weekend.

To suggest that these experts cannot *really* believe that the Joystick is designed to compete with a full size resonant aerial, reminds one of Antonio in the Merchant of Venice, who said " The Devil can quote Scripture for his purpose. " In my personal experience the Joystick has outperformed all other aerials that I have used, including a 3 ele. beam on its design frequency.

In the last paragraph of G3RNL's letter (*Radio Communication* May, 1968) one reads that . . . " The tests were designed to show just how much of a compromise this was . . . " (reference to the Joystick). How can this statement or fact be reconciled with the second paragraph of the same letter viz . . . " that we did not set out, as has been suggested, deliberately to run down the Joystick," or with his article " Which Aerial? " (*Radio Communication*, March, 1968). Such contradictions in terms, along with the results achieved by the *CQ Magazine* test team; W1BB and W6TYP, etc., prove beyond any doubt the truth of Locke, in his Essay on Human Understanding, when he said " No man's knowledge, here, can go beyond his experience."

Buy British

From: C. Pedder, G3VBL Downing College, Cambridge.

Your correspondents (February 1968) seem to regard British manufacturers as paragons of virtue. How I wish this was the case. The much lamented (by Mr Shears) decline in the number of companies engaged in the production of amateur equipment has left his company with a virtual monopoly in this country. This in my view, does not encourage development in design techniques.

US firms are able to " afford " Customer Relations Depts. by virtue of a large home market potential. Due to the intensely competitive nature of the amateur market these PR departments are a must. Of course one must ask " at wha tcost to the customer? " In order to obtain a true comparison of prices in the two countries it is necessary to select a piece of equipment manufactured in this country and a comparable rig made in the USA. If one now looks at the number of weeks' salary, of the average man in the US, which are needed to buy his rig, and if a similar calculation is performed for his British counterpart, it is obvious that the British gear is twice as expensive, at a conservative estimate. How can this be explained? The myth of the large home market is soon disposed of. In the US with 300,000 amateurs (including technicians and novices) ten manufacturers of h.f. band s.s.b. gear spring immediately to mind; this country with 13,000 amateurs has only one such manufacturer. Thus the effective size of the market per manufacturer is only twice as big in the USA. The reason for the cheapness of equipment is simple . . . competition.

Turning now to a different country, Japan, let us take as an example the Yaesu-Musen (Sommerkamp) line of equipment. What British receiver has performance comparable to the FR100B receiver at comparable cost? One British receiver with narrower coverage and inferior performance (sensitivity, selectivity, a.g.c. etc.) costs more (here I refer to pre-devaluation costs) and this despite punitive shipping costs and import duty, to say nothing of cuts for a couple of dealers! Cost apart, though to my knowledge there is no receiver made in this country, for the amateur market, that has the same performance as this particular equipment. Not too long ago we in theWesternWorld looked upon the Japanese as imitators. The time has now come to bury our pride and do a little imitating ourselves.

The basis of our civilization is world trade, and the British amateur has no duty to subsidize inefficient companies, as Messrs, Fare and Shears would seem to suggest . . . in fact quite the opposite.

It goes without saying that I have no connection with any radio manufacturer.

From: J. J. Forbes, G3JKU, Coulsdon, Surrey.

Mr Fare (February 1968) raises some very valid points, for no one will disagree that a similarly priced British product that has been inspected and tested to full quoted specification is not equal or superior to the imported version. However faulty rogue equipment does appear on the market, and herein lies the crux of Mr Powell's letter in January 1968. Unless some firms realize that sound Customer Service Depts are of paramount importance, then regrettably more will continue to fall by the wayside.

Mr Shears, in February 1968, regards the timing of Mr Powell's letter as being inappropriate, and goes on to say that perhaps the RSGB should intervene. This is only sound if the findings are published and not pigeon holed.

From behind the flag that he is waving, does Mr Shears seriously suggest that we buy British irrespective of quality and after sales service? I notice that you advertise a comprehensive list of imported goods yourself and indeed some of your bread and butter lines, are designed around imported components. Does this imply, that you don't object to us buying imported gear, provided you are the seller? With respect, I suggest Mr Shears wants the entire proverbial cake.

I am delighted to hear that your production efficiency in the past year has risen 23 per cent and wish you all success in the highly competitive USA market, and trust when the 300,000 USA licence holders are using KW gear, you don't trade in the Mini for a Thunderbird.

Panda Cubs

From: G. Lovelock, 9V1NT

The trouble mentioned by G6NU in the February issue is caused by the field radiated by the smoothing choke affecting the v.f.o. coil. It should be noted that every type of choke radiates a field of one sort or another, and such a field is at its strongest where the soldering tags are. In the case mentioned the tags are right next to the v.f.o. box and said box does not provide sufficient screening against the field.

The solution is to unbolt the choke and turn it through 90° so that the solder tags are over the back of the chassis. In doing this ensure that the tags are not likely to come into contact with the rear wall of the case. Also, if necessary extend the length of the leads to and from the choke. Fit a screen of as heavy gauge metal as you can get hold of the whole depth of the chassis between the power supply section and the v.f.o. It may be necessary to re-drill the chassis in places. This should effect a cure.

Band Plans and Intruders

From: Capt. W. H. Windle, G8VG, Dartford, Kent.

May I ask if the European Band Plan could be given a great deal more publicity. The interlopers there are increasing almost daily and it would seem that many of them couldn't care less. Surely it is not beyond the knowledge of the USA forces in Europe that there is such a thing as amateur band allocation. I reported the intrusion of a USA station on 20m some years ago and although the Society took it up with the people concerned and had them get off the band, I was informed that the culprits did not know of the amateur band allocation. I did not believe the excuse at the time and I am still of the opinion that someone was trying it on. Once again I am listening to a test transmission by an American Service Station on 7036 kHz telling the world that it is a "Service Station giving a Test Transmission," on s.s.b. When one listens on 40, in particular, I suppose one might feel inclined to forgive such an intrusion on the grounds that Band Planning is a lot of bilge anyway, if the use of the c.w. end by over 100 different phone stations is an indication. The servicemen may easily get the idea that it is a case of do as you like. I recently told a station, G three letter, that under the band-planning scheme he should not be operating phone on 7028 kHz. He replied that it did not matter, he could use whatever frequencies, within the band allocation, that he liked. He added "It is only a gentleman's agreement anyway." If these characters will not leave the c.w. end alone may I suggest that the sooner we get the allocation as a condition of our licences the better, at any rate to those of us who use the c.w. end. The list of call-signs of phone stations using the c.w. end has accumulated since 1 January last. It is not only the more recently issued calls but amongst them are some G2 two letters.

RSARS

From: G. S. Symons, G3DSS, Major, Royal Signals (Retd.), Pimperne, Blandford Forum, Dorset.

Listening on 80m over the past few weeks I have been surprised to hear charges levelled against the Royal Signals Amateur Radio Society. The two main complaints seem to be that the RSARS should be "The Army Amateur Radio Society" and not "belong" to the Royal Signals, and that the RSARS award scheme is restricted to members of the Society.

Taking the first point, to my knowledge attempts to form an Army Amateur Radio Society were being made in 1952, and had started much earlier. Because of the failure of these attempts G2EC founded the RSARS in face of considerable indifference and evasion from the Establishment. It was the Society's policy to accept as members anyone who claimed a loose connection with any Branch or Arm of the Army. I think this is still the case and among the membership there are certainly many non-Royal Signals serving soldiers.

The talkative gentlemen can only be objecting to the inclusion of "Royal Signals" in the Society's title. This was a "means to the end" at the time of formation, and is a monument to the efforts of G2EC if nothing else. Anyone else who can get round the Ministry of Defence in this way will certainly have my heartiest congratulations.

In the matter of awards, this surely is a matter for the members of the Society. The RSARS awards are intended to stimulate activity among its own members, not to wallpaper radio shacks in general. The running expenses of the Society come from members' subscriptions, and the organization from voluntary spare time effort, and with these considerations in mind the membership voted when the awards scheme commenced, that it should be for members only.

It is very easy to knock organizations these days. How much more difficult it is to take constructive action. I shall watch the talkers' efforts with interest.

World at their Fingertips

From: C. M. Denny, G6DN, Blackpool, Lancs.

In your excellent publication, "The World at Their Fingertips" the author, my good friend John Clarricoats, mentions "unquestionably the first wireless exhibition held in Great Britain" as that organized by the Wireless Society of London in 1919.

Actually the Newcastle and District Amateur Wireless Society held an exhibition in 1914, I was Secretary at the time and notified interested journals which duly reported the matter.

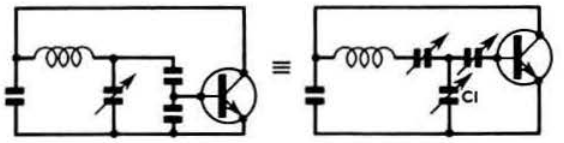
We in the North were on the ball radio wise even in those early days and John agrees I should advise you of the correction.

The Vackar

From: B. Priestley, G3JGO, Slough, Bucks.

I have just seen *TT* and the remarks on the Tesla/Vackar v.f.o. (April issue). I also made a 28 MHz Vackar in the course of my job and agree that it can give a good performance, but I feel that Jordan is plugging it a bit too hard for the following reasons:

By doing a delta-star transform on part of the Vackar it becomes a Clapp/Gouriet with an extra capacitor, which is redundant as far as I can see:



It is now clear that the constancy of excitation is due to C, decreasing as the frequency rises, i.e., the constancy of output is paid for by increased susceptibility to variation in input capacitance.

Secondly, the comment that "stability" is completely independent of L/C ratio. In his paper in the April 1950 *Wireless Engineer*, Gouriet derives an expression for the $\frac{d\omega}{d\phi}$ of the oscillator and deduces from it that a large L/C ratio is desirable to minimize instability owing to phase shift (caused by intermodulation of harmonics). Recently I had cause to look closely at this paper and found that ϕ is not the phase shift in the amplifier but is related to it by the L/C ratio and if $\frac{d\omega}{d\theta}$ is calculated (where θ is the phase angle of g_m) it is related to Q but not to the L/C ratio at all!

Obviously in practice there will be an optimum L/C ratio to maximize Q but this is the important factor.

Thus as I see it the Vackar is a form of Clapp which may have advantage at times, but it is selling one sort of stability to buy constant excitation and some flexibility in design (since one capacitor can be set arbitrarily).

If one really wants stability, a.g.c is desirable, which knocks one of the Vackar's advantages straight out, but of course the average amateur wants simplicity and a lot of output!

Hertz

From: Gerald Lander, HB9AJU/G3OOH/DJ0BF/F0FR. Geneva, Switzerland.

I have read with some amusement the desperate rearguard action being fought by a number of British amateurs against the introduction of the "continental" term "Hertz."

G3CNC should, of course, have chosen a better argument. The point at issue is not that of calling *inventions* by the names of the persons associated with them but rather one of finding a uniform term for a *unit of measurement*. If G3FKM, G3CNC (and others) object to "Hertz," then they must also logically refuse in future to use "Farad," "Henry" "Volt," "Ampere," "Ohm," "Maxwell," "Oersted," etc., etc.—all commemorating famous scientists and inventors.

Perhaps the real problem is that Heinrich Hertz did not have a British passport. If Herr Hertz's experiments had been carried out by Mr Fred Bloggs or Mr Quentin Cholmondely-Smythe, presumably we would have no objections to kiloBloggs or to MegaCholmondely-Smythes.

. . . and Thank You, Sir

From: D. Cox, G3KHZ, Kempston, Bedford.

Congratulations and thank you for persuading the GPO to change the licence conditions so that we may now transmit our call-signs at reasonable speeds.

I feel especially pleased and relieved as I had occasion to write to the RSGB regarding a Post Office warning I had received for transmitting my call-sign at speeds in excess of 12 w.p.m.

CONTEST NEWS RULES—RESULTS

Winter Cumulative Activity Contests

A very disappointing response was again noted for this contest, with a total entry one less than the previous series. Admittedly, conditions on 144 MHz have been poor of late, but this cannot account entirely for the small number of logs received. In view of the evident lack of interest in contests of this type it has been proposed that they be deleted from the calendar.

Congratulations go to G2WS and G3AKE for their winning entries and to the runners-up, G2BHN and G8AKT. Subject to Council approval, they will receive Certificates of Merit.

144 MHz Contest

Position	Call-sign	Score	QSOs	Aerial	Power (Watts)	QTH
1	G2WS	2135	49	4/4 Slot	72	Weston-super-Mare
2	G2BHN	573	26	4/4 Slot	65	Yeovil, Somerset
3	G3VJO	145	15	8 element	15	Redbourn, Herts.
Disqualified	G3USF	Rule 2				

432 MHz Contest

Position	Call-sign	Score	QSOs	Aerial	Power (Watts)	QTH
1	G8AKE	20290	92	2 × 14 ele.	150	Melton Mowbray, Leics.
2	G8AKT	8773	75	24 ele	24	Sandy, Beds.
3	G2XV	6004	51	40 ele stack	100	Gt. Shelford, Cambridge
4	G3COJ	4841	67	14 ele	150	High Wycombe, Bucks.
5	G8AOD	1984	44	10 ele	12	East Grinstead, Sussex
6	G8AUM	1182	49	18 ele	13	Berkhamstead, Herts.
7	G8AFA	742	24	2 × 24 ele	150	Yeovil, Somerset
8	G8ARD/ G3XFW	294	15	18 ele	22	Yeovil, Somerset
9	G8ATM	2	2	10 ele	20	Newark, Notts.
Disqualified	G3NNG GW8ASA	Rule 18(i) Rule 2				

Stratford-on-Avon D/F Qualifying Event

Sunday, 14 July, 1968.
Map: Ordnance Survey, sheet 144, Cheltenham and Evesham.
Assembly: 13.00 BST for start at 13.20 BST.
Location: Pershore Bridge, NGR 953452.
Frequencies and Call-signs: To be announced at the start.
Organizers: I. A. Cobbold, G3RPJ, 5 Avenue Road, Stratford-on-Avon, and J. R. Vickers, G3ORI, the Flat, Charlecote Park, Warwick.
Entries and Tea: Intending competitors are asked to notify the organizers before 1 July of the numbers in their parties requiring tea.

General Rules for V.H.F. Contests

In Rule 9(a) Reword (ii) to read " Location Information—QTH must be sent," The General Rules were published in the January issue of *Radio Communication*.

Fifth 144 MHz (S.S.B.) Contest

1. **Date and Time.** 24 June, 1968, from 20.00 to 22.00 BST.
2. All **entries** must be sent to the adjudicator at: V.H.F. Contests Committee, " Summerleigh," Beltinge Road, Herne Bay, Kent.

The following rules will apply: 3b, 4, 5a, 6a, 7c, 8c, 9a, 10a, 11 to 18, 20, 23, 26 to 28.

Third 70 MHz (Portable) Contest

1. **Date and Time.** 21 July, 1968 from 09.00 to 17.00 BST.
2. All **entries** must be sent to the adjudicator at: V.H.F. Contests Committee, 60 Merlin Grove, Beckenham, Kent, BR3 3HU.

The following rule will apply: 3b, 4, 5a, 6a, 7b, 8a, 9a, 10a, 11 to 19, 25 to 28.

Summer Top Band Contest

1. **When:** 21.00 GMT on Saturday, 6 July, to 02.00 GMT on Sunday, 7 July, 1968.
2. **Eligible Entrants:** The contest is open to licensed amateurs in all parts of the world who must operate in accordance with the terms of their licences. Multiple operator entries will be allowed.
3. The **General Rules** published in the January 1968 issue of *Radio Communication* relating to RSGB H.F. Contests will apply.
4. **Contacts:** C.w. (A1) only in the 1·8-2·0 MHz Band.
5. **Scoring:** (a) UK Stations. 3 points for each completed contact plus a bonus of 5 points for each new county within the British Isles and a bonus of 5 points for each new country outside the British Isles.

(b) Overseas Stations: may only claim points for contacts with British Isles stations, and will score 3 points for each contact plus a bonus of 5 points for each new county worked.

6. **Contest Exchanges:** RST reports followed by the contact numbers starting at 001 and the county code letters given on page 63 of the January 1968 issue of *Radio Communication*, e.g., for a contact from Surrey 589001 SY. Overseas stations need only send RST reports and serial numbers. All reports must be acknowledged with " R."
7. **Logs:** (a) Must be tabulated in columns headed (in this order): " Time GMT," " Call-sign of station worked," " My report on his signals and serial number sent," " His report on my signals and serial number received," " County code letters received," " Bonus points," " Total points claimed." The county code letters as sent must be entered at the top of each log sheet.

(b) The cover sheet must be made out in accordance with RSGB H.F. Contests General Rule 4. The declaration must be signed.

(c) Entries must be postmarked not later than 22 July, 1968.

8. **Awards:** At the discretion of the Council, certificates of merit will be awarded to the winner and the runner up in the British Isles, and also to the leading overseas station.

A certificate of merit will also be awarded to the non-transmitting member submitting the best check log.

Special Events Stations

GB2LAD from Lossiemouth Air Day, 13 July 1968. This demonstration station will be operating 80m and 20m s.s.b. c.w. from the Royal Naval Air Station, Lossiemouth, home of the Tenth Fleet Air Arm. In addition to flying displays and sky diving, indoor exhibits of equipment used by various branches of the Service will be on display.

GB2FJA from the Cliffe Festival Weekend, Rochester, Kent, 29-30 June, 1968. This exhibition station will again be operating all bands 160-10m s.s.b.

GB3RN from Lee on Solent Air Day, 15 June 1968. Talk-in stations on 1910 kHz, 70·2 MHz and 145·3 MHz are included in the Royal Navy Amateur Radio Society's exhibit in the " Dunning " Hangar, which is the second east of the control tower. Expected guests will include ZS5BF.

Affiliated Societies and Clubs

The 1969 edition of the RSGB Call Book is now being prepared and any alterations to the information which appeared in the 1968 edition should be notified immediately to Headquarters by club secretaries. Alterations which have already been advised and acknowledged require no further action from Societies.

BERU 1968

The Thirty-First BERU Contest, held on the 9-10 March, was noteworthy for the very high scores made by the winning stations in both the High and Low Power sections. In the Senior section, the winner, Neville Jackson, 9J2VB (ex G3IAD), made the record score of 5100. In second place is the 1967 winner, Don McVicar, VP7DX, with 4991 points, and third is VE1TG, who scored 4802. All three leaders took advantage of the excellent conditions on the 21 and 14 MHz bands, and some good, if short, openings on the 28 MHz band which gave them the opportunity of working large numbers of UK stations at a very fast QSO rate.

This technique could not of course be used by the leading UK entrant, David Courtier Dutton, G3FPQ. In order to make his winning score of 3940 points, he found it necessary to spend long periods searching for bonus points. The second highest placed UK station is " Rusty " Russell, G5WP, with a score of 3840 points. Both he and G3FPQ are regular high scoring BERU contestants, who have previously occupied the top UK position.

The Senior Rose Bowl miniature will be awarded to 9J2VB, and the Colonel Thomas Rose Bowl to G3FPQ. Certificates of merit will go to VP7DX, VE1TG, G5WP and the prefix leaders as shown in the results table.

Low Power Section

In his first attempt at a BERU contest, Andre Saunders, 5Z4KL (Ex GM3VLB), wins the Junior Rose Bowl miniature, with the highest score ever achieved by a competitor in this section. His 3090 points gave him a runaway victory over Frank Johnston, G3IDC (ex VS1FJ), who was the runner-up with 1985 points. In third place is VK4SS with a score of 1720. A special mention must be made of the efforts of 9H1AX in this section, for because of local problems he operated exclusively on 3·5 MHz and gave useful bonus points to a number of competitors.

Receiving Section

Once again this section was dominated by Eric Howell, BRS24775, who repeated his 1967 success by turning in the top log with a score of 3365. While this was slightly lower than his 1967 score, it was still good enough to allow him to retain the Receiving Rose Bowl for another year. In second place once again, is E. H. Sherlock, BRS6604, who scored 2915. A number of good logs were received from overseas, however, all but two of these unfortunately had to be classed as check logs, as they were unscored and were not accompanied by declaration forms. Eric Trebilcock, BCRS195, again submitted a very useful entry, as did S.Sgt. R. Garvey, ORS26813/9V1.

Equipment Used

In order to satisfy those who like to know what equipment the leading stations used, 9J2VB had a Drake T4X/R4A combination with Vee Vee beams for the h.f. bands and fixed inverted Vees for 7 MHz. VP7DX used a KWM-2A transceiver with a TA-33 beam and verticals on the h.f. bands, a two-element beam for 7 MHz, and phased inverted Vees on 3·5 MHz. VE1TG worked with a KWS-1 and 75A4, with separate 5-element beams, curtain arrays and verticals. G3FPQ had a 100W transmitter, a home-built receiver, a three band quad, separate Yagis for 28, 21, 14 and 7 MHz and verticals for 7 and 3·5 MHz. G5WP used an all home brew station with an 813 transmitter, a three band quad and ground plane aerials.

In the Low Power section, the leaders all used home constructed transmitters with commercial receivers. 5Z4KL a SX28 with a three band quad and separate dipoles. G3IDC used a Racal RA17 with a Vee beam, and VK4SS, an SR600 and all-band phased array.

The two leaders in the Receiving section used Drake 2B receivers with short vertical aerials.

High Power Section

Position	Call-sign	Points
1	9J2VB*	5100
2	VP7DX*	4991
3	VE1TG*	4802
4	VE2NV*	4357
5	VE2YU	4215
6	ZL4BO*	4060
7	G3FPQ*	3940
8	G5WP*	3840
9	VE2WA	3819
10	9J2BC	3785
11	VK8NO*	3765
—	G3SSO†	3715
12	G5RI	3673
13	5N2AAF*	3547
14	G3FXB	3440
15	9J2W	3165
16	VO1AW*	3130
17	G2DC	2990
18	G3GFG	2976
19	VE2BV	2885
20	VE3AU*	2880
21	VE2AYU	2855
22	G5RP	2840
23	VK3AXK*	2805
24	VE2AYY	2550
25	VE3BWY	2535
26	VE2LY	2385
27	G3GGS	2375
28	G2DU	2350
29	VE3BJK	2340
30	VK3MR	2255
31	VE7AXM*	2160
32	ZC4BI*	2145
33	G3GEW	2125
34	5Z4SS*	2030
35	G6RC	2040
36	G3LZQ	2015
37	VS6FX*	2000
38	G3PVL	1965
39	VK2VN*	1900
40	VE3BMB	1885
41	G6CJ	1845
42	ZL1HV	1825
43	G3AKF	1785
44	VK2BPN	1775
45	VE1EK	1765
46	G3LPS	1750
47	G5VU	1730
48	5Z4KO	1727
49	G5PQ	1705
50	G6XL	1665
51	VE3BS	1650
52	G3EBH	1627
	G3LQI	1627
54	G3KMA	1625
55	G2NH	1610
56	G3KHA	1550
57	G3APN	1535
58	ZD5X*	1515
59	VK4FH*	1505
60	G3JJG	1490
61	G3URX	1450
62	9J2MX	1445
63	G5HZ	1440
64	G2AJB	1430
65	G3VDL	1410
66	G3GJX	1405
67	G3TIF	1370
68	9J2CL	1345
69	GW2DPD	1295
70	G2FYT	1280
71	G3VW	1270
72	ZL2AVY	1215
73	VE7HQ	1210
74	VE3BS	1190
75	G3OXI	1165
76	G8KU	1150
77	VK3OB	1145
78	G3JFY	1120
79	G3HZL	1065
80	GW3CW	1060
81	GW3MPB	1055
82	G2BLA	1015
83	G3KPU	1005
84	G3HRY	955
85	VK2NS	940
86	G5DF	915
87	G3GMK	900
88	VE1DB	890
89	G2HAO	880
90	GM2HCZ	875
91	VK6NK	805
92	G2HLU	745
93	G2KK	665
94	VE6VO	642
95	G3KSH	615
96	G2BW	580
97	G2ZR	560
98	G3RJB	505
99	VE5PM	500
100	G2DUP	460
101	VE1AE	395
102	G3WP	365
103	VE4FS	350
104	VE2SD	325
105	VQ8RAF	320
106	VK5KO	305
107	VK0AD	250

* Certificate winners

† Not eligible as entry: multi-operator unchecked score.

Low Power Section

Position	Call-sign	Total Points	Power
1	5Z4KL*	3072	25
2	G3IDC*	1985	25
3	VK4SS*	1720	25
4	VK2QK*	1239	24
5	VK3RJ*	1195	25
6	G3LHJ	1107	25
7	VK3ZC	1100	25
8	G3GNS	1011	25
9	G3OOU	985	10
10	G3JKY	830	24
11	G3JVJ	805	25
12	GM3WOJ	235	25
13	GM4GK	220	24
14	G3APZ	185	25
15	9H1AX	130	12

Receiving Section

Position	Call-sign	Total Points
1	BRS24775*	3365
2	BRS 6604*	2915
3	A4886	1645
4	BCRS 195*	1505
5	ORS 26813/9V1*	945
6	A5821	400

* Certificate winners

Conditions

In spite of a lower than predicted sunspot count during the contest weekend, the MUF was high enough at times to provide some fair to good openings on the 28 MHz band on both the North-South and East-West paths. The 21 and 14 MHz bands were open for most parts of the Commonwealth during much of the 48 hours. Conditions on the 7 and 3·5 MHz bands were quite good, compared with previous years, but there was far less activity due to the 21 and 14 MHz bands being open for longer periods.

Rules

A large number of entrants have asked for changes in the rules for future BERU contests. In the main, these changes relate to the method of scoring, and in particular to the bonus system. There are some who want a higher bonus for the l.f. bands, others want extra bonus points for contacts with the rare ones, but the majority ask for a bonus for the first, second and third contact with each prefix area. Other suggestions include making G, GC, GD, GI, GM and GW separate prefix areas; limiting the contest to 24 hours; the introduction of a multi-operator or club section, and increasing the power of the Junior section to 50 watts. The Committee will consider all these suggestions when the rules for the 1969 event are formulated.

Activity

An analysis of the logs during the checking procedure, shows that nearly 1500 UK and Commonwealth stations were active during the contest. This compares with about 1000 in the 1967, and 800 or so in the 1966 events. This additional activity was mainly from the UK and was therefore of little use to those entrants who because of location and other factors, need a high bonus content in their score. On the other hand, it certainly helped the overseas entrants, who believe that an ultra-fast QSO rate, coupled with a moderate bonus, is the sure way to win BERU.

In view of this higher activity, it is surprising that less than 10 per cent took the trouble to send in entries. Perhaps it was the very high serial numbers that were being exchanged towards the end of the contest, or the thought of having to rewrite many pages of log sheets that scared them off. One potential entrant is likely to be disappointed when he sees the Results Table. As he was unwilling to rewrite his rough log, he sent it in as a check log without a declaration form. If this log had been scored and sent as an entry, it would have been well up with the leaders in the Low Power section.

Logs

While the majority of the logs were of a high standard, a few entrants sent carbon or photocopies of their rough logs. The Committee, who spent over 100 man-hours checking BERU, wish to put on record, that one log of 26 pages pushed their powers of extra sensory perception almost to the limit. While they will always do their best with such a log, it is almost inevitable that some points will be lost during the checking process because of the difficulties created by alterations and crossings-out. A number of entrants were good enough to send in prefix check lists with their logs. This is a most helpful timesaver for the Committee, which is much appreciated.

Comments

" Nothing can beat BERU for the quality of signals and the high calibre of operators," (VE1TG). " Sorry to say that some G stations had poor notes on 28 MHz, and a few did not seem to be able to read c.w.," (5N2AAF). " Not a dirty note anywhere," (VK2NS). " BERU is an excellent training ground for NFD operators. Any chance of two 24 hour contests per year in place of the present 48 hour stint?" (G3OOU). " Thanks for a fine contest with a bunch of really good operators," (VE7HQ). " My first BERU since 1959, when I was VE4SX, still the same gang and the same top class signals," (VE7AXM). "Much harder work on low power from G than when I last tried it from VS6DN," (G3JKY). " I am still suffering from shock—I went on with 10 watts and a piece of wire and still people worked me," (G3UFM). " My first BERU for 12 years. Operating standards consistently high but one needs a team to keep up with the boys," (G2BW). " My first BERU entry for 20 years," (G2NH). " For the c.w. man, BERU is the Bees Knees," (G3GEW). " I do not think the RSGB is providing enough pre-contest publicity for BERU," (VE1EK). " Better pre-contest publicity please," (VE2BU). " Many VK and ZL stations were unaware of the contest until it was too late. Any chance of getting WIA to publish dates and rules for the next BERU? " (VK7AT). " I have always been disappointed with the write-up on BERU. Can this include details of the equipment used by the leading G stations? " (G2DC). " Extra bonus points for the second and third contact with each call area would help the flagging G scores," (VE2NV). " I should like to see GD and GC count as separate call areas for bonus," (ZC4BI). " Extra bonus for l.f. bands please," (ZL4BW). " Differential bonus for each continent as for the 7 MHz contest please," (G2DC). " Do not change the rules; a thoroughly good contest as it stands," (G3AKF). " If we don't do something about the intruders there won't be any more BERU," (VP7DX). " How can one stop the annual application of W's, who wish to join the commonwealth," (5N2AAF). " Who in hell is this BERU only guy," (W . . . overheard by VK2NS). " A wonderful contest but hard going due to unwanted callers," (9J2VB). " Too many Russian stations think they are part of the Commonwealth," (9H1R). " Reckon I should have built a new transmitter not a receiver," (G3HZL). " I made a mistake in the dates and missed the first 18 hours," (ZD5X). "Why is it that the local TV sets start to receive me at the same time as the Commonwealth stations?" (GM3WAJ). " My effort was a leisurely one having been disrupted by a badly timed wedding," (G2FYT). (Yours—OM?)

Finally the Committee would like to thank all those that sent in check logs for this contest. These include: G3AAQ/M, G6LX, GW3JI, VE1AST, VE2BYY, Bert VE2?, VE3ADV, VE3WB, VE5AJ, VE5AT, 9H1R, RLZ20967, SWL Davy, SWL/VK Margots, SWL/ZB2 W. O. Smith and SWL Tallering.

How the leaders made their scores

		9J2VB	VP7DX	VE1TG	G3FPQ	G5WP	5Z4KL	G3IDC	VK4SS
28 MHz	prefixes	24	19	19	28	23	6	13	11
	contacts	266	178	165	62	38	76	19	15
21 MHz	prefixes	23	24	17	32	28	24	22	12
	contacts	248	164	130	104	113	174	65	20
14 MHz	prefixes	26	27	24	28	32	28	19	17
	contacts	159	186	214	102	115	124	47	33
7 MHz	prefixes	8	11	11	18	16	2	5	14
	contacts	20	76	105	53	53	6	14	26
3·5 MHz	prefixes	—	7	6	8	8	—	3	6
	contacts	—	37	41	20	17	—	4	11
Totals	prefixes	83	88	77	114	107	60	62	60
	contacts	693	641	655	341	336	380	149	105

Low Power Contest 1968

The 80m Low Power Contest, held this year on Sunday, 31 March, has again been won by Michael Crowther-Watson, G3IAR, who scored 4,670 points from 49 QSOs. In second place was Philip Bagshaw, G3NEO, with 4,420 points from 46 contacts, and close behind came John Petty, G4JW, who made 41 QSOs worth 4,310 points. Only two stations—G3DOP and G3IGU—used transistorized transmitters. The remainder employed valves ranging from half of a 12AU7 (G3IAR) to the ubiquitous 807 (G3ILO and G3NUA) in their p.a. stages. The H.F. Contests Committee welcomes the increased support for this event, and has noted the demand for its continuation.

" Revert to a system of multipliers for the number of counties " —G4JW. " Cut the contest short by two hours "—G3UFY. " Hard going from sunny Devon "—G3GDW. " Very pleased with the reports on the 1W Tx, didn't think it could be done "—G3WPH.

Subject to Council approval, G3IAR will receive the 1930 Committee Cup, and G3NEO will receive a Certificate of Merit.

BRS6604 will receive a Certificate of Merit for his useful check log.

G3IDG, G3JVJ, G3OLB, and G3XEU are thanked for their helpful check logs.

Position	Call-sign	Points	Power	County
1	G3IAR	4670	0·45W	KT
2	G3NEO	4420	0·5W	YS
3	G4JW	4310	0·5 W	YS
4	G3IGU	3700	0·48 W	YS
5	G3NYA	2396	0·42 and 3·7 W	WK
6	G3UFY	2380	0·4-1·7 W	SY
7	G3WPH	2250	1 W	LE
8	G3DOP	2240	0·25 W	GR
9	GM3PFQ	2200	0·5 W	FE
10	G3USE	1700	1 W	BD
11	G3GDW	1040	0·5 and 1W	DN
12	G3ILO	610	1 and 3 W	GR
13	G3JEQ/P	410	5 W	SY
14	G3NUA	160	4 W	DH

Rules for the RSGB 7 MHz DX Contest 1968

Radio Amateurs throughout the world are invited to take part in the seventh RSGB 7 MHz DX Contest to be held on 26-27 October and 9-10 November, 1968. Because of lack of support in previous years, there will be no Multi-Operator section.

Rules

1. Duration: Each section of the contest will take place between 18.00 GMT on the Saturday and 18.00 GMT on the Sunday as follows:

C.W. 26-27 October, 1968. **Phone:** 9-10 November, 1968.

2. Eligible Entrants: The contest is open to licensed amateurs in all parts of the world who must operate in accordance with the terms of their licences.

3. Contacts: Contacts must be made in that portion of the **7 MHz band** for which the entrant is licensed. Contacts with unlicensed stations will not count for points. Proof of contact may be required. Only one contact may be made with a specific station whether fixed, portable, mobile or alternative address in each section. Duplicate contacts must be logged and clearly marked as duplicate without claim for points.

4. Contest Exchanges: An exchange of RST (or RS) reports followed by a three figure serial number starting with 001 for the first contact and increasing by one for each successive contact and for each separate section (for example, 58002, etc.) must be made before points can be claimed.

5. Entries: Entries (*a*) should be clearly typed or written on one side only of foolscap or International A4 size paper; (*b*) must be ruled in columns headed (in this order): (i) Date/Time (GMT); (ii) Call-sign of station worked; (iii) I sent him; (iv) He sent me; (v) Bonus points; (vi) Total points claimed; (*c*) must be addressed to the **H.F. Contests Committee, Radio Society of Great Britain, 35 Doughty Street, London, WC1, England,** the name of the contest being clearly shown on the top left hand corner of the envelope which must be postmarked not later than 25 November, 1968. Log sheets are available from RSGB Headquarters (28 Little Russell Street).

SAMPLE COVER SHEET

RSGB 7 MHz DX Contest 1968 **Claimed score**.....

Call-sign .....

Name .....

Address .....

Transmitter ..... Aerial(s) .....

Receiver .....

DECLARATION: I declare that this station was operated strictly in accordance with the rules and spirit of the contest and I agree that the decision of the Council of the RSGB shall be final in all cases of dispute. I certify that the maximum input to the final stage of the transmitter was ..... watts.

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

Failure to provide and sign the declaration may involve disqualification of the entry.

6. Scoring: British Isles stations may not work each other for points. Overseas stations may only claim points for contacts with British Isles stations (G, GC, GD, GI, GM and GW).

Each completed contact between a British Isles station and a station in any one of the six Continental areas will score as follows:

Contacts between British Isles and Continent of Europe 5 points
Contacts between British Isles and Continent of North America 15 points
Contacts between British Isles and Continents of South America, Africa and Asia ... ... 25 points
Contacts between British Isles and Continent of Oceania ... 50 points.

Bonus points:

British Isles Stations: A bonus of 20 points may be claimed for the first contact with each new country. For the purposes of scoring, the **RSGB Countries List** will apply with the exception that VE, VK, W/K, ZL and ZS call areas will each count as separate countries.

Overseas Stations: A bonus of 50 points may be claimed for the first contact with each British Isles country-numeral prefix, i.e. G2, G3, G4, G5, G6, G8, GC2, GC3, GC4, GC5, GC6, GC8, GD2, GD3, GD4, GD5, GD6, GD8, GI2, GI3, GI4, GI5, GI6, GI8, GM2, GM3, GM4, GM5, GM6, GM8, GW2, GW3, GW4, GW5, GW6, GW8.

7. Awards: At the discretion of the Council the Thomas (G6QB) Memorial Trophy will be awarded to the leading British Isles entrant and a certificate of merit to the leading station in each of the other five British Isles countries. A certificate of merit will also be awarded to the runner up in the Trophy winner's country and to the three leading overseas entrants.

Listeners' Section

1. Duration: Each section of the contest will take place between 18.00 GMT on the Saturday and 18.00 GMT on the Sunday as follows:

C.W.: 26-27 October, 1968. **Phone:** 9-10 November, 1968.

2. Eligible Entrants: The contest is open to short-wave listeners throughout the world. All entrants agree to be bound by these rules. Only the entrant may operate his receiving station for the duration of the event—holders of amateur transmitting licences are not eligible to take part.

3. Entries: Entries (*a*) should be clearly typed or written on one side only of foolscap or International A4 size paper; (*b*) must be ruled in columns headed (in this order) (i) Date/Time GMT; (ii) Call-sign of station heard; (iii) Report and serial number sent by station heard; (iv) Call-sign of station being worked; (v) Bonus points; (vi) Total points claimed; (*c*) must be addressed to the **H.F. Contests Committee, Radio Society of Great Britain, 35 Doughty Street, London, WC1, England.** The name of the Contest must be clearly shown on the top left hand corner of the envelope, which must be postmarked not later than 25 November, 1968. Log sheets are available from RSGB Headquarters (28 Little Russell Street, London, W.C.1). All entries must contain the following declaration:

I declare that this receiving station was operated strictly in accordance with the rules and spirit of the contest and I agree that the decision of the RSGB shall be final in all cases of dispute. I do not hold an amateur transmitting licence.

Date ..... Signature .....

4. Scoring: British Isles entrants may only log overseas stations working UK stations in the contest. Overseas entrants may only log British Isles stations in contact with overseas stations in the contest. A station whether fixed, portable, mobile or alternative address may be logged only once for the purpose of scoring. *CQ or test calls will not count for points.*

For British Isles entrants, each completed log entry of a contact between a British Isles station and a station in the following continents will score as indicated:

Continent of Europe ... ... 5 points
Continent of North America ... ... 15 points
Continents of South America, Africa and Asia ... 25 points
Continent of Oceania ... ... 50 points

For overseas entrants, each completed log entry of a contact between the British Isles station and any other station in the contest will score as indicated:

Where the listener is in continent of Europe ... ... 5 points
Continent of North America ... ... 15 points
Continents of South America, Africa and Asia ... 25 points
Continent of Oceania ... ... 50 points

5. The Committee reserves the right to disqualify any entrant whose log is consistently inaccurate.

Bonus Points:

British Isles Entrants: A bonus of 20 points may be claimed for the first station logged in each new country. For the purpose of scoring the **RSGB Countries List** will apply, with the exception that VE, VK, W/K, ZL and ZS call areas will each count as separate countries.

Overseas Entrants: A bonus of 50 points may be claimed for the first station logged in each British Isles country—numeral prefix, i.e. G2, G3, GM4, etc., as listed in Rule 6 for the Transmitting Contest.

6. Awards: A certificate of merit will be awarded to the leading entrant in each of the British Isles countries and to the three leading overseas entrants.

Rules for the RSGB 28 MHz Telephony Contest 12-13 October, 1968

Radio amateurs throughout the world are again invited to take part in the annual RSGB 28 MHz Telephony Contest to be held this year on 12-13 October. Attention is directed to the change in scoring.

1. Duration: The contest will start at **07.00 GMT** on **Saturday, 12 October,** and end at **19.00 GMT on Sunday, 13 October, 1968.**

2. Eligible Entrants: The contest is open to licensed amateurs in all parts of the world.

3. Licence Conditions: Entrants must operate in accordance with the terms of their licences.

4. Contacts: Contacts may be made using any telephony system for which the entrant is licensed. Contacts with unlicensed stations will not count for points. Proof of contact may be required. Only one contact may be made with a specific station, whether fixed, portable, mobile or alternative address. Duplicate contacts must be logged and clearly marked as duplicates without claim for points.

5. Contest Exchanges: An exchange of RS reports followed by a three figure serial number starting with 001 for the first contact and increasing by one for each successive contact (for example, 58001, 56002, etc.) must be made before points can be claimed.

6. Operators: Only the entrant will be permitted to operate his station for the duration of the contest. Multiple operator entries will not be accepted.

7. Entries: Entries (*a*) should be clearly typed or written on **one side only** of foolscap or International A4 size paper; (*b*) must be ruled in columns headed (in this order) (i) Date/Time (GMT); (ii) Call-sign of station worked; (iii) I sent him; (iv) He sent me; (v) Bonus Points; (vi) Total points claimed; (*c*) must be addressed to the **H.F. Contests Committee, Radio Society of Great Britain, 35 Doughty Street, London, WC1, England,** the name of the contest being clearly shown on the top left hand corner of the envelope, which must be postmarked not later than 28 October 1968. Log sheets are available from RSGB Headquarters (28 Little Russell Street) on request.

8. Scoring: British Isles stations may not work each other for points. Overseas stations may only claim points for contacts with British Isles Stations (G, GC, GD, GI, GM and GW). Scoring will be as follows.

British Isles Stations. Each complete contact will score **5 points.** In addition, a bonus of **50 points** may be claimed for the first contact with each new country. For the purpose of scoring, the RSGB countries list will apply, with the exception that VE, VK, W/K, ZL and ZS call areas will each count as a separate country.

Overseas Stations. Each completed contact with a British Isles station will score **5 points.** In addition, a bonus of **150 points** may be claimed for the first contact with each British Isles country-numeral prefix, i.e. G2, G3, G4, G5, G6, G8, GC2, GC3, GC4, GC5, GC6, GC8, GD2, GD3, GD4, GD5, GD6, GD8, GI2, GI3, GI4, GI5, GI6, GI8, GM2, GM3, GM4, GM5, GM6, GM8, GW2, GW3, GW4, GW5, GW6, GW8. Contacts with GB stations will score **5 points** only.

9. Awards: The **Whitworth Trophy** and a certificate will be awarded to the leading British Isles entrant. In addition, **certificates** will be awarded to the leading station in each of the other five British Isles countries, and to the runner-up in the Trophy winner's country.

Certificates will be awarded to the 1st, 2nd and 3rd overseas stations.

SAMPLE COVER SHEET

RSGB 28 MHz Telephony Contest **Claimed score**.....

12-13 October, 1968 **Call-sign**.....

Name .....

Address .....

Transmitter .....

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

DECLARATION: I declare that this station was operated strictly in accordance with the rules and spirit of the contest and I agree that the decision of the Council of the RSGB shall be final in all cases of dispute. I certify that the maximum input to the final stage of the transmitter was ..... watts.

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

Failure to sign the declaration may involve disqualification of the entry.

Rules for the RSGB 28 MHz Telephony Receiving Contest, 12-13 October, 1968

1. Eligible Entrants: The contest is open to short-wave listeners throughout the world. All entrants agree to be bound by these rules. Only the entrant may operate his receiving station for the duration of the event. Holders of amateur transmitting licences are not eligible to take part.

2. Duration: The contest will start at 07.00 GMT on Saturday, 12 October, 1968, and end at 19.00 GMT on Sunday, 13 October, 1968. The RSGB 28 MHz Telephony Contest for transmitting amateurs will take place during the same period.

3. Entries: (*a*) To count for points, logs must show, in columns: (i) Date/Time GMT; (ii) Call-sign of station heard; (iii) Report and serial number sent by station heard; (iv) Call-sign of the station being worked; (v) Bonus points claimed; (vi) Total points claimed.

(*b*) Entries should be set out on **one side only** of foolscap or International A4 size paper, must be postmarked not later than 28 October, 1968 and must be addressed to the **H.F. Contests Committee, Radio Society of Great Britain, 35 Doughty Street, London, WC1, England.** The name of the contest must be shown clearly at the top left hand corner of the envelope. Log sheets are available from RSGB Headquarters.

(*c*) All entries must contain the following declaration:

I declare that this receiving station was operated strictly in accordance with the rules and spirit of the contest and I agree that the decision of the Council of the RSGB shall be final in all cases of dispute. I do not hold an amateur transmitting licence.

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

4. Scoring: British Isles entrants may only log *overseas stations working UK stations in the contest.* Overseas entrants may only log *British Isles stations in contact with overseas stations in the contest.* A station whether fixed, portable, mobile or alternative address may be logged only once for the purposes of scoring. CQ or test calls will not count for points.

British Isles Entrants. Each complete log entry will score 5 **points.** In addition a bonus of **50 points** may be claimed for the first station logged in each new country. For the purposes of scoring the RSGB countries list will be used, with the exception that VE, VK, W/K, ZL and ZS call areas will each count as separate countries.

Overseas Entrants. Each complete log entry relating to a British Isles station heard will score **5 points.** In addition a bonus of **150 points** may be claimed for the first station heard in each British Isles country-numeral preffx, i.e. G2, G3, GM4 etc., as listed in Rule 8 for the transmitting contest.

5. Awards. The **Metcalfe Trophy** and a certificate will be awarded to the leading British Isles entrant. In addition, **certificates** will be awarded to the British Isles runner-up and to the 1st, 2nd and 3rd overseas entry.

6. The Council of the RSGB reserves the right, on the recommendation of the Contests Committee, to reject any entry that is consistently inaccurate.

* * *

The closing date for posting entries is 28 October, 1968.

LOOKING AHEAD

16 June—Painton Mobile Rally—Cancelled.

19 June—Mid-Sussex Mobile Evening, Clayton Windmills, South of Hassocks, on the Sussex Downs. Talk-in on 160m and 4m. Refreshments with G3JGR's famous home-brew will be available.

Mobile Rallies

23 June—RSGB National Mobile Rally, Gilwell Park, Essex. (see page 395).

30 June—11th Annual Longleat Mobile Rally, Longleat Park, near Warminster, Wilts. Entrances on the A362 Frome to Warminster Road. Talk-in stations on 160m and 2m, from 10 a.m. Covered marquee trade show. Refreshments available. Limited overnight camping and caravan allowed on night of 29th. Book with G3JMY.

30 June—Pembroke Mobile Rally, 2 p.m., Regency Hall, Saundersfoot, near Tenby, Pembrokeshire. Talk-in on 1876 kHz and 144·35 MHz, vertical polarization. Refreshments will be available together with adequate car parking facilities.

6 July—RAFARS Hamfest, RAF Station, Locking, near Weston-super-Mare, Somerset, from 2 p.m. Talk-in stations on 160m and 2m.

6-7 July—Cheltenham Festival Rally, Pittville Park, Cheltenham.

7 July—South Shields Mobile Rally.

14 July—Worcester Mobile Rally.

21 July—Cornish Mobile Rally, Pentire Head, Newquay, Cornwall.

28 July—Saltash Mobile Rally.

4 August—Plymouth ARC Picnic, Yelverton.

18 August—Torbay ARS Mobile Rally, Dartmouth Football Ground, close to the Naval Helicopter Station, Tournstall. Talk-in station on 160, 80, 4 and 2m a.m./s.s.b.

18 August—Derby Mobile Radio Event, Rykneld School, Derby.

25 August—Swindon Mobile Rally, Lydiard Park.

2 September—Peterborough Mobile Rally, River Bank, Peterborough.

2-5 October—RSGB International Radio Engineering and Communications Exhibition.

22 September—Scottish Mobile Rally, The Cartland Bridge Hotel, Lanark.

CONTESTS DIARY

1-2 June	—(DARC) 3·5-28 MHz, C.W.
8-9 June	—(UBA), 1·8-28 MHz, C.W.*
8-9 June	—National Field Day
23 June	—Second 432 MHz (Portable) Contest
24 June	—Fifth 144 MHz (S.S.B.) Contest
30 June	—Rugby D/F Event (page 327)
6-7 July	—Summer Top Band Contest
6-7 July	—Venezuelan Contest (see page 385)
13-14 July	—High Power H.F. Field Day (see page 254)
14 July	—Stratford-on-Avon D/F Event
20-21 July	—Indepedence of Columbia Contest (see page 385)
21 July	—Third 70 MHz (Portable) Contest
28 July	—St. Albans D/F Event
3-4 August	—Sixth 144 MHz (Open) Contest
10-11 August	—(DARC), 3·5-28 MHz, C.W.
11 August	—Oxford D/F Event
1 September	—(DARC), 3·5-28 MHz, C.W.*
7-8 September	—(DARC), 3·5-28 MHz, Phone
7-8 September	—V.H.F. National Field Day
7-8 September	—VU/4S7 DX Contest (C.W.)
14-15 September	—VU/4S7 DX Contest (Phone)
15 September	—80m Field Day
21-22 September	—(SSA), 3·5-28 MHz, C.W.
22 September	—D/F National Final
28-29 September	—(SSA), 3·5-28 MHz, Phone
5-6 October	—Third 432 MHz (Open) Contest
12-13 October	—28 MHz Telephony Contest
12-13 October	—Second 1296 MHz (Open) Contest
19-20 October	—11th Jamboree on the Air
26-27 October	—7 MHz C.W. Contest
7-10 November	—7 MHz Phone Contest
11 November	—Seventh 144 MHz (S.S.B.) Contest
16-17 November	—Second 1·8 MHz Contest
1 December	—Fourth 70 MHz (C.W.) Contest

* Restricted to Members only

RSGB QSL Bureau Sub-Managers

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

G2:	J. W. Russell, G2ZR, 45 Shakespeare Avenue, Bath.
G3, 4 and 5 two-letter calls and GC:	E. G. Allen, G3DRN, 65a Melbury Gardens, London, SW20.
G6 and G8:	A. J. Mathews, G6QM, 62 Ashlands Road, Hesters Way Estate, Cheltenham.
G3AAA-BZZ:	C. C. Olley, G3AIZ, 157 Wanstead Park Road, Ilford, Essex.
G3CAA-DZZ:	C. A. Bradbury, BRS1066, 13 Salisbury Avenue Cheltenham.
G3EAA-HZZ:	W. J. Green, G3FBA, "Meadway" Links Avenue Brundall, Norfolk, NOR86Z.
G3IAA-KZZ BRS and A numbers:	G. L. V. Butler, G2BUL, 995 London Road, Thornton Heath, Surrey.
G3LAA-NZZ:	C. R. Emary, G5GH, Westbury End, Finmere, Buckingham.
G3OAA-PZZ:	J. H. Brazzill, G3WP, 43 Forest Drive, Chelmsford, Essex.
G3RAA-RZZ:	K. Walden, G3OLN, 250 Gloucester Road, Cheltenham, Gloucestershire.
G3SAA-TZZ:	E. G. Allen, G3DRN, 65a Melbury Gardens, London, SW20.
G3UAA-VZZ:	P. R. Cox, G3RYV, 20 Allenby Road, Maidenhead, Berks.
G3WAA-G3XZZ:	R. W. Martin, G3RWM, 76 St Paul's Crescent, Coleshill, Warks.
G5AAA series, all prefixes:	E. G. Allen, G3DRN, 65a Melbury Gardens, London, SW20.
GD:	T. R. Moore, GD3ENK, "Glyn Moar," St. John's, Isle of Man.
GI:	R. R. Parsons, GI3HXV, 45 Erinvale Avenue, Finaghy, Belfast.
GM:	D. Macadie, GM6MD 154 Kingsacre Road, Glasgow, S4.
GW:	J. L. Reid, GW3ANU, 28 Waterston Road Gabalfa, Cardiff.

Postage, letter rate: 2 oz. 4d., and 2d. for each additional 2 oz.

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

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

Radio Amateur Emergency Network

By S. W. LAW, G3PAZ*

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

WHEN men (or women) who possess both special skills and a strongly developed social sense get together, much may be accomplished of benefit to the whole of our complex society. Such is human nature, however, that the majority may be unaware of what goes on. We need no apology therefore if we occasionally mention the excellent work done by people who, like ourselves, do what we can to help things along by making our " hobbies " work for the common good. In the past, for example, we have mentioned the Voluntary Emergency Service with the intrepid young riders who go at a moments notice at high speed to deliver that which may well save a life. There are times, however, when even a beautifully tuned motor-bike with a highly skilled rider may be faced with a journey which is quite impracticable in the time—what then? Simply this—that a privately owned aeroplane quietly takes off at short notice and the vital cargo arrives in time. The pilot will be just such another voluntary worker as we have discussed. He will be a member of that all-too-little-known body the National Air Guard, all of whom are private individuals whose pleasure is to fly. Radio Communication is constantly maintained on the v.h.f. channels. One point worthy of note is that, due to the nature of these activities, the majority of the members hold a Board of Trade Radio Operators Licence. Any RAEN members who might be interested in this licence should obtain the publication C.A.P. 46 price 3s. 6d. from Her Majesty's Stationery Office.

Red—And Green

Those who have access to the East Anglian TV and press will know already the impact made by " Exercise Red Rail " in that area. In this remarkable joint endeavour, facilities were given to our User Services by British Rail for the simulation of a railroad disaster under the conditions of darkness. A number of coaches due for scrapping were suitably disposed on railway property and " dressed up " with the assistance of volunteer " casualties " to realistically represent the horrors of the real thing. The Norfolk Group were well represented on this all-night exercise and as the venue was off the public highway the Police readily agreed to the use of the green flashing identification lights on the RAEN " Signal Points." Normally, of course, our green lights are only for use in genuine emergency and not during exercises. Voluntary workers came from far and wide to take part in the exercise, and the TV camera team got some excellent material. That G3HRK and his merry men put up a good show goes without saying. Their further night exercise on 8/9 April (Exercise Viking) shows a degree of dedication that should be an example to us all. The area covered was a 28 mile stretch from Norwich to Swaffham in the west. Five stations plus two link stations were in operation from 22.00 on the Saturday until 10.15 on the Sunday morning. Fifteen licensed and six SWL members manned the two mobile, three /P and two /A stations. More news of this enterprising Group later.

Procedure Sub-committee

The sub-committee on RAEN procedure have now submitted a draft of their suggestions for the modification and simplification of the message forms. Subject to the approval of the RAEN Committee, these changes will be made known to all Groups in due course. Suggestions as to the actual voice procedure when message-passing are still under consideration.

4m Frequencies

We hear that the group of members in South Buckinghamshire who are trying out the 4m band may be settling for 70·36 which will just clear the Surrey frequency of 70·365 MHz sufficiently to avoid any interference with normal working yet permit of liaison on wide-band receivers. That this is quite practicable is proved by tests between G3NGK and members in NE Surrey—and again by the visits of G3IKL/M (Rugby, 70·375 MHz) and G3PMJ/M (Manchester, 70·362 MHz). Incidentally, the London Terminal RAEN station G3NAT is on 70·392 MHz for those who have enquired.

Hold-up

The Surrey Group were prevented from holding their AGM in April owing to a near-emergency in the area connected with some missing young people in the vicinity of Dorking. Some fast work was called for on the part of the CC, but the well-known Surrey RAEN net proved its worth on this occasion by not only alerting members as to the possibility of a callout but saving them a wasted journey to a venue which was very much occupied during the sudden crisis. The AGM was postponed until the next meeting.

Patience

To judge from the correspondence on the subject, the question of the future widening of our scope is exciting some interest both on the part of our members and those who may be affected by such extensions as may be agreed upon in the future. We must in fairness point out that much water must of necessity flow under the bridges before any definite agreements are reached, and we feel that we should remind members that patience must be the watchword. By all means let the Committee have your views and suggestions—they are welcome; but a gestatory period is bound to precede the fulfilment.

Recurrent Theme

We so often mention registration in these columns that we can almost feel the mental impact as our readers see that word in print yet again! This time it is important—if you examine your registration card you will find that it is stamped to 30 June, 1968. SEND IT IN NOW!

Tough Baby

The v.h.f. members on 4m so often think in terms of the Reporter or Ranger that the virtues of the Bantam (made by the same well-known concern) may have been overlooked. The performance that can be obtained from this little fellow is quite remarkable. One member of our acquaintance uses his as a mobile installation, as a portable and even as a home station, carrying it with him wherever he goes and using it in the most unlikely places (comment uncalled for!). The little rig gets hooked up to anything that remotely resembles an aerial and it always gets out. Admitted he spends rather a lot on batteries, but one can't get something for nothing (even at the Club Junk Sale). The Bantam is not the easiest rig to find, but those who see one should latch on.

Reprise

It will very soon be the end of June. SEND THAT CARD IN NOW!

* 11 Chisholm Road, Croydon, Surrey, CRO 6UQ.

CLUB NEWS

REGULAR FEATURE

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

OCCASIONALLY we receive requests from Radio Amateurs and SWL's in the process of forming a Radio Club for publicity to assist their project. Last month such a request was received from R. W. Plumb living in Yeadon, Nr. Leeds, Yorks. He's interested in forming an SWL Club and invites comment from Short Wave Listeners in the Leeds and Bradford area. Enquiries should be addressed to T. W. Plumb A5082, " Bankfield ", Haw Lane, Yeadon, Nr. Leeds, Yorks.

REGION 1

Ainsdale (ARC).—5, 19 June, 3 July, 8 p.m., 77 Clifton Road, Southport.

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

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

Blackburn (ELARC).—6 June, 4 July, YMCA, Limbrick, Blackburn.

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

Bury (B & RRS).—11 June (W1BB Tape Lecture), 9 July (Introduction to Colour TV by G3RSM), 8 p.m., The George Hotel (Private Room) Market Street, There was an exceptionally well attended meeting when the club held its " Junk Sale " in April and with G3WBH behind the hammer a quantity of equipment was sold, resulting in a further increase of the club funds. G3VVQ.

Chester (C & DARS).—Tuesdays, 8 p.m., YMCA.

Crewe & District.—1 July, 8 p.m., 80 Albert Street. All enquiries to the Area Representative, R. Owen, 10 Circle Avenue, Willaston, Nantwich, where visitors will be welcome.

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

Halifax (H & DARS).—Fridays, 14 June (AGM), 8 p.m., The Sun Inn, Rastrick. Fortnightly talks by G. Drake, G3SJD, entitled " Simple Receivers " are now in progress for the benefit of SWL's who will shortly it is hoped demonstrate practically what has been learnt! G3WLW.

Leyland Hundred Amateur Group.—Weekly Net, Thursday, 1915 GMT (1915 kHz).

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

(NLRC).—7, 21 June, 5 July, 8 p.m., Landsbury House, 13 Crosby Road South, Liverpool 22.

Macclesfield (M & DRS).—18 June, 2 July, 8 p.m., The George Hotel, Jordangate.

Manchester (M & DARS).—Wednesdays, 7.30 p.m., 203 Droylsden Road, Newton Heath, Manchester 10. Secretary—G. Tillson, G3TJX, 95 Kelverlow Street, Oldham, Lancs.

(SMRC).—Fridays, 7.45 p.m., Rackhouse Community Centre, Daine Avenue, Northenden.

North West V.H.F. Group have unfortunately lost their existing Headquarters, but are now meeting on a temporary basis every Tuesday at 50 Great Ancoats Street, Manchester. Members are asked to keep in touch with the Committee for any changes which may take place at short notice.

Preston (PARS).—13, 27 June, 11 July. Meetings at " Windsor Castle " (Private Room), St Paul's Square.

St Helens (SES).—Recent meetings included lectures on circuit design and on electronics in Civil Defence, and a film show on magnetism. Meanwhile, construction of the club transmitter has been held up by trouble with postal supply of components! 11 June (Lecture), 25 June (Natter Nite), 7.30 p.m., IVS Centre, 55 College Street. The Society is also busy planning its part in the St Helens Centenary Celebrations—radio and its offspring electronics must be one of the more important changes of the last 100 years! It is intended (with the help of amateurs from neighbouring towns), to operate a station under canvas throughout the three day Gala in Sherdley Park at the end of July.

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

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

Stockport.—12, 26 June, 10 July, 8 p.m., Royal Oak Hotel Castle Street, Edgeley.

Warrington—Culcheth (CARC).—Fridays, 7.30 p.m., Chat Moss Hotel, Glazebury. Secretary, A. N. Edwards 6 Ellesmere Road, Culcheth.

Westmorland.—7, 21 June, 5 July, 7 p.m., The Allen Technical College, Sandes Avenue, Kendal.

Wirral (WARS).—April meetings comprised an illustrated lecture by R. Blain, G3NTI, on the Collins 618 T3 S.S.B. Transceiver and a symposium on the remote tuning of oscillators, this being accompanied by several demonstrations of members' equipment. Forthcoming meetings:—19 June (NFD Discussion), 22-23 June (DX-pedition), 3 July (Surplus Equipment Sale), 17 July (Evening D/F Contest), 8 p.m., Scout HQ, Harding House, 76 Park Road West, Claughton, Birkenhead, G3FXX.

REGION 2

Barnsley (B & DARC).—14 June (Ladies Night), 28 June (Transistor Receiver by W. W. Williams), King George Hotel, Peel Street, Barnsley. 28 June will be the last meeting as there is a Summer recess until the AGM on 13 September.

Bradford (BRS).—8-9 June (NFD), 18 June (NFD Inquest), 25 June (Visit to Leeds & Bradford Airport, Yeadon, provisional), 7.30 p.m., Bradford Technical College, Great Horton Road, Bradford. As part of a policy to improve the quality of their " Junk Sale " it has been renamed " Surplus Equipment Sale " and members asked not to dig out rusty gear which should have gone into the dust bin years ago. The result was encouraging, and a crowded meeting had a good selection to bid for—items supplied by David Pratt G3KEP whose constructional ability is well known. Bill Scarlett G3RXS made a lively auctioneer, keeping up a flow of cheery chat to the chink of silver and the rustle of notes!

Hull (H & DARS).—7 June (Preparation for NFD & " Oscillators " by G3PQY), 14 June (" Colour TV " by G3OHT), 21 June (Future Outdoor Activities), 28 June (" Radio Control " by G3AGX), 7.45 p.m., 592 Hessle Road, Hull.

Northern Heights.—5 June (Visit to Manchester & District Radio Club), 8-9 June (NFD & Demonstration Station at Halifax Charity Gala, Call sign G2SU/P), 19 June (" Transistorized Transmitters " by S. R. Webb, G3TPW), 3 July (" Colour TV," by member of the Baird TV Co.), 7.45 p.m., Sportsman Inn, Ogden, Halifax. At the AGM there were not as many changes as expected. Chairman David Howell, no change, Secretary/Treasurer A. Robinson G3MDW (still no hope of him having a rest) Minute Secretary J T. Riley G3TCS, in place of Mary G3OMM who has been ill and hopes to resume next year. Committee—G3UI, G3TQA, G8AFV, G3UGF and SWL Iain Ross. The trophy was presented to G3UBI and G3UGF for winning last year's DX Foxhunt. Next year's syllabus was discussed and if all goes well the members are going to be very busy indeed as there are some very good ideas being put forward by the Committee and there should be some startling results. A very good visit was made to Richard Allen Speakers.

A book has been presented to Stew W1BB for making the excellent talk on Top Band DX'ing which has been around most of the

The North Midlands Mobile Rally was held on Sunday, 28 April, at Drayton Manor Park, and turned out to be a very successful event. This was reflected by the good attendance, which reached about 2500 people in the afternoon. Fortunately, the weather was very kind, which enlivened the event considerably. The Rally was opened by Bob Palmer, G5PP, President of the Midland Amateur Radio Society, as seen in the left-hand photograph. The picture on the right is a view of a small section of the car park. This rally was a joint venture by the Midlands ARS and the Stoke-on-Trent Radio Society, under the supervision of Mr G. Farrance, G3KPT. *(Photos by G5PP)*

Clubs in the country. There are over a thousand signatures in the book.

Pudsey (P & DRC).—5 June (Discussion on NFD), 8-9 June (NFD), 12 June (Discussion on NFD), 19 June (Surplus Equipment Sale), The Gem Cock Hotel, Pudsey Road, Leeds 13. The club continues to expand with a membership standing at 56. On 1 May, G. Leonard of BBC Radio Leeds presented an informative talk on microphones to club members.

Scarborough (SARS).—Thursday, 7.30 p.m., rear of 3 Trinity Road, Scarborough.

South Shields (SS & DARC).—Fridays, 7.30 p.m., Trinity House Social Centre, Laygate, South Shields.

York (YARS).—Thursdays, 6 June (Visit to Local Glass Works), 7.30 p.m., British Legion Rooms, 611 Micklegate, York.

REGION 3

Birmingham (MARS).—Third Tuesday in the month, 7.45 p.m., Midland Institute, Margaret Street, Birmingham 3. The North Midlands Mobile Rally held on 28 April prove once again a profound success with over 400 visitors signing in. One mobile arrived via the local canal signing. *G3NNU/MM!*

(South).—5 June (Surplus Sale), 7.30 p.m., The Scout Hut, opposite Bob's Cafe', St Stephen's Church Hall, Pershore Road, Selly Oak.

(Slade).—Fortnightly, 7.45 p.m., Committee Room, The Church House, High Street, Erdington. Further details from D. Grant, 85 Stanford Avenue, Great Barr, Birmingham.

Bromsgrove (B & DARC).—Second Friday in the month, 8 p.m., Co-op Hall, Bromsgrove.

Coventry (CARS).—7 June (Final Preparations for NFD), 14 June (" Space Probes and Satellites," by Howard Miles of the British Astronomical Society), 21 June (Night on the Air), 28 June (D/F Expedition). Further details from Secretary, G. Jaynes, 20 Belgrave Road, Wyken, Coventry, CV2 5AY.

Dudley (DARC).—14 June, 15 June (G3RXK/A operating from the Rowley Regis Scout Group Gala at Britannia Park, Blackheath), 28 June, 8 p.m. Art Gallery, Dudley.

East Worcs (EWRC).—13 June (" Radio in Nigeria " Lecture and Film by Mike Dransfield, 5N2AAF), Old Peoples Centre Park, Redditch.

Hereford (HARS).—7 June (Junk Sale), Trinity Hall, Whitecross Road, Hereford.

Lichfield (LARS).—18 June, 7.30 p.m., Swan Hotel, Lichfield.

Leamington Spa (MWARS).—Mondays, 10 June (Grand Junk Sale), 8 p.m., 28 Hamilton Place, Leamington Spa.

North Staffs (NSARS).—Third Tuesday in the month, Moorland Road Junior School.

Salop (SARS).—13 June (RAF Cosford, arrive by 7.30 p.m.), 27 June (MEB Station Spring Gardens, Ditherington, arrive 7.30 p.m.).

Stoke on Trent (SoT ARS).—Thursdays, 7.30 p.m., 2 Racecourse Road, Oakhill.

Sutton Coldfield (SCRS).—10 June, 24 June, Sutton FC Clubhouse, Coles Lane.

REGION 4

Burton on Trent (BoT ARS).—9 June (D/F Practice 3 p.m.-5 p.m. starting from the Club Room—G3NFC/P), 19 June (D/F Practice 7.30 p.m.-9 p.m., starting from Derby Airport Road, SK 289300—G3NFC/P), Club Room, Stapenhill Institute, Burton on Trent. *G3ACR.*

Chesterfield (C & DARS).—29 June (Informal picnic Rally in Clumber Park, 2 p.m. onwards—Bring your own food—Talk-in Station 160m). *G3VDI.*

Derby (D & DARS).—5 June (Surplus Sale), 8-9 June (NFD Glebe Farm, Blagreaves Lane, Littleover), 12 June (Film Show), 15 June (Exhibition Station at Chatsworth Park), 19 June (D/F Practice, details as Burton on Trent), 22 June (Exhibition Station at Brailsford OAP Hall), 23 June (70cm Contest from Harboro Rocks, Brassington), 26 June (" My Communications Receiver" by P. Skirrow, G3UJP), 29 June (Exhibition Station at Rolls Royce Nuclear Dept., Raynesway, Derby), 7.30 p.m., Club Room, No 4, 119 Green Lane, Derby. The Society's Calendar is very full and more help on outside functions would be appreciated. Attendance at meetings steadily increases so much so, that it is now a question of arriving early if you want a seat. A recent visitor to the Society was MP4BEU. The major project at present is The Mobile Radio Event to be held at the usual venue, Ryknеld School, on Sunday, 18 August. *G2CVV.*

Grimsby (GARS).—13 June (Autopsy on NFD and " Bring your problems "), 27 June (D/F Hunt), Members are asked to note that meetings are now held at The North Lincs Photographic Society's Room, Bk 50 Welholme Road, commencing at 8 p.m. *G3RSD.*

Hunstanton.—16 June (Bucket and Spade Party organized by G3JEC ,G3SAW and G3ANM) Brookes Park Refreshment Rooms, Car Park near the Pier. Talk-in Station G3ANM/P on 160m. *G3ANM.*

Leicester (LRS).—Mondays 7.30 p.m., Sundays 10.30 a.m., The Club Rooms, Gilroes Estate Cottage, Groby Road, Leicester. Between 5 June and 8 June the Society will be participating in the " Leisure 68 " Exhibition at Granby Halls. The Society's stand will feature a typical amateurs " Shack". An RAE course has also been organized by Dan Johnson G3UQX from 8 p.m. to 9.30 p.m. on Monday evenings. *G3LRS.*

Mansfield (MARS).—First Friday in the month, 7.45 p.m., New Inn, Westgate, Mansfield.

Melton Mowbray (MMARS).—6 June (Annual Dinner, a Male only do) Crown Inn, Sproxton. Further details from G3FDF.

Newark (NSWC).—Mondays, Thursdays, 7.30 p.m., Guildhall, Guildhall Street, Newark.

Nottingham (ARCN).—Tuesdays, Thursdays, 7.30 p.m., Room 3, Sherwood Community Centre, Woodthorpe House, Mansfield Road, Nottingham.

Worksop (NNARS).—Tuesday (RAE Class), Thursdays (Lecture), 7.30 p.m., Club Room, 13 Gateford Road, Worksop.

REGION 5

Bedford (B & DARC).—6 June (Visit to Baldock Radio Station), 8-9 June (NFD), 13 June (" Making an Audio Oscillator" by G3SME), 20 June (Microphones in Practice), 27 June (Club Station, G3WTP on the Air), 29 June (Treasure Hunt), 4 July (Tape/Slide lecture—

" The Human Machine as a Radio Operator "), " The Dolphin Inn ", The Broadway, Bedford. *G3VBA*.

Bishop's Stortford (BS & DARC).—Details of Meetings from Andrew Marriott, G3VWS, 21 Thorley Hill, Bishop's Stortford, Hertfordshire.

Cambridge (C & DARC).—Fridays, 7 June (" Analysis of Mobile Contests" by Brian Armstrong, G3EDD), 14 June (Visit to the Synchrotron—arranged by R. Gouldstone, G3TAG), 21 June (Informal), 28 June (Informal). 7.30 p.m., Club Headquarters, Corporation Yard, Victoria Road, Cambridge.

Dunstable (D & DARC).—Particulars of Meetings from Roger Bryant, G3WBC.

March (M & DRAS).—Tuesdays, 7.30 p.m., at Old Police Headquarters, High Street, March, Cambridgeshire.

Shefford (S & DARS).—Thursdays, 6 June (NFD Final Arrangements), 8-9 June (NFD at Topplers Hill), 13 June (NFD Post-Mortem), 20 June (V.H.F. Field Day Planning), 27 June (Basic Circuits, by G3VMI), Morse Classes 7.45 p.m., Meetings 8 p.m., Church Hall, High Street, Shefford, Bedfordshire.

REGION 6

Gloucester (GRC).—Second and Fourth Thursdays in the month (Morse practice included each evening), 7.30 p.m., Lamb Inn, Market Parade, Gloucester.

Cheltenham RSGB Group.—Meetings take place regularly on the first Thursday of the month, 6 June, 8 p.m., The Great Western Hotel, Clarence Street.

Chiltern ARC.—Last Thursday of the month at The British Legion Hall, High Wycombe. The Chiltern Top Band Contest was won by G3VOD—Club section, and G3RXO—non Club section), with A5271 as leading club S.W.L. Friday night is 4m Net Night run by G3PQH. All enquiries to M. J. Pemberton, 205 Bowerdean Road, High Wycombe, Bucks.

Oxford (O & DARS).—Second and Fourth Wednesdays of the month, Cherwell Hotel, Water Eaton Road, N. Oxford. Secretary, P. Bradley, G3UJO, 114 Netherton Road, Appleton, Abingdon, Berks.

REGION 7

Addiscombe (AARC).—7.30 p.m., 11, 25 June, 158 Lower Addiscombe Road (Toc H Hall), East Croydon.

Ashford (Middlesex) Echelford (ARS).—13, 27 June. 7.30 p.m., St Martin's Court, Kingston Crescent. Ashford.

Barking (B & D REC).—Every Tuesday and Thursday, 7.30 p.m., Gascoigne Recreation Centre, Gascoigne School, Morley Road, Barking, Essex.

Bexleyheath (NKRS).—13 June (NFD Inquest), 27 June (Junk Sale), 7.30 p.m., Congregational Church Hall, Chapel Road, Bexleyheath.

Chingford Group.—Fridays. Telephone 01-524 0308.

Chingford (SRC).—Fridays except first in month, 8 p.m. Friday Hill House, Simmons Lane, Chingford, E4.

Croydon (SRCC).—18 June, 7.30 p.m., Blue Anchor, South End.

Dorking (D & DRS).—11 June (Informal Meeting), Wheatsheaf, Dorking. 23 June (70cm Portable), 25 June (Informal Meeting), Royal Oak, Brockham.

Ealing (E & DARS).—Tuesdays, 7.30 p.m. Northfields Community Centre, Northcroft Road, W13.

Edgware (E & DARS).—Second and fourth Mondays in the month, 10 June (Informal—Post Mortem on NFD), 24 June (" V.H.F. Frequency and Power Measurement " by G3MNO), 8 p.m., St George's Hall, 51 Flower Lane, Mill Hill, London, NW7.

Gravesend (GRS).—Third Wednesday, 8 p.m., R.A.F.T.A. Club, Overcliff Road.

Guildford (G & DRS).—14 June (V.H.F. NFD Discussion), 28 June (Open Air Meeting at Newlands Corner), 8 p.m., Guildford Engineering Society in Stoke Park.

Hampton Court (TVARTS).—First Wednesday, 7.30 p.m., Cardinal Wolsey, Hampton Court.

Harlow (DRS).—Tuesdays and Thursdays, 7.30 p.m., Mark Hall Barn, First Avenue.

Harrow (RSH).—7 June (Pre-NFD arrangements), 14 June (Junk Sale), 21 June (Practical), 28 June (G2MI—Talk on running QSL Bureau). Roxeth Manor School, Eastcote Lane.

Hemel Hempstead (HH & DARS).—7, 21 June, 8 p.m., Rucklers Lane Hall, Kings Langley.

Holloway (GRS).—Mondays (RAE), 7 p.m , Wednesdays (Morse), 7.30 p.m., Fridays (Club), 7.30 p.m., Montem School, Hornsey Road.

Kingston (K & DARS).—Second Wednesday each month, 8 p.m., YMCA, Eden Street.

Leyton and Walthamstow.—Tuesdays, 7.30 p.m., Leyton Senior Institute, Essex Road, London, E10.

London U.H.F. Group.—First Thursday each month, 7.30 p.m., White Hall Hotel, Bloomsbury Square, Holborn.

Loughton.—14, 28 June, 7.30 p.m., Loughton Hall (Nr. Debden Station).

Maidenhead (N & DARC).—18 June, 7.30 p.m., Victoria Hall, Cox Green, Maidenhead.

New Cross.—Wednesdays and Fridays, 8 p.m., 225 New Cross Road, London, SE14.

Norwood & South London (CP & DRS).—15 June, 8 p.m. (Junk Sale for NFD funds), Emmanuel Church Hall, Barry Road, East Dulwich.

Paddington (P & DARS).—Thursdays, 7.30 p.m., Beauchamp Lodge, 2 Warwick Crescent, W2.

Purley (P & DRS).—First and Third Fridays, 8 p.m., Railwaymen's Hall, Side Entrance, 58 Whytecliffe Road, Purley.

Reigate (RATS).—First Wednesday in the month (RSGB General Manager Eric Dowdeswell, G4AR talks on his activities in Sudan), 7.45 p.m., George & Dragon, Cromwell Road, Redhill.

Romford (R & DRS).—Tuesdays, 8.15 p.m., RAFTA House, 18 Carlton Road, Romford.

(Havering & DARC).—12, 26 June, Goodchild House, Western Road Romford.

Scouts (ARS).—9 June (Visit to H.M. Ships at Portsmouth), 20 June (Talk on Computers by D. Griffiths, B.Sc.), 7.30 p.m., Baden Powell House, Queensgate, South Kensington, SW7.

Sidcup (CVRS).—6 June, 8 p.m. (" Commercial Oscilloscopes " by Mr I. Lever), 8 p.m., All Saints Church Hall, Berata Road, New Eltham. June 20 (" Natter Nite "), 8 p.m., Congregational Church Hall, Court Road, Eltham.

Slough (SDR Group).—First Wednesday every month, 7.30 p.m., United Services Club, Wellington Street.

Southgate Radio Club.—13 June, 7.30 p.m., Parkwood Girls School. (Behind Wood Green Town Hall).

St Albans (Verulam ARC).—19 June, 7.30 p.m. (Dr Evans, G3RPE (GEC) on 13cm), Cavalier Hall, Watford Road, St Albans. On 19 June Dr D. S. Evans, G3RPE will be guest speaker for the evening: his subject needs hardly any announcement for those who have read his recent exploits in last months *Radio Communication* He participated in the first cross channel QSO on 13cm for which Verulam ARC deservably congratulates him.

Sutton & Cheam (SCRS).—18 June, 8 p.m., The Harrow Inn, High Street, Cheam.

Welwyn (Mid-Herts ARS).—13 June (U.H.F. & V.H.F. Brains Trust with leading operators on Panel), 8 p.m., Welwyn Civic Centre, Welwyn.

Westminster (CSRS).—Note new meetings now Second Tuesday of each month. 11 June (Kit Building Programme), 6 p.m., Civic Service Recreation Centre, Monck Street, Westminster.

Wimbledon (W & DRS).—7 June (Annual Junk Sale), 28 June (Rag Chew—Pre-Camp Meeting) 8 p.m., St John Hall, 124 Kingston Road, South Wimbledon, SW19.

Wembley (GECARS).—Thursday, 7 p.m., This Club is now open to non-GEC Employees by invitation. Telephone ARNold 1262 first. Sports Club, St Augustin Avenue, North Wembley.

REGION 8

Canterbury (EKRS).—Details of meetings from Secretary, G3MDO.

Crawley (CARC).—12 June (Informal). For details please contact G3FRV. 26 June (" Short Wave Listening in Thailand " by Mike Dransfield, G3JKO/5N2AAF), 8 p.m., Trinity Congregational Church Hall, Ifield, Crawley, Sussex. Preparations are now well ahead for NFD 1968 when G2DP/P and G3TR/P will again be entered. Club Station G3WSC has been on the air during recent 1·8 MHz and V.H.F. Contests *G3FRV*.

Maidstone (M YMCA ARS).—Wednesdays, 8 p.m., " Y " Sports Centre, Melrose Close, Cripple Street, Loose. Fridays 8 p.m., RAE and Morse classes.

Medway (MARTS).—Hold this month the first D/F Contest, further details from Secretary G3UXH.

Mid-Sussex (M-SARS).—6 June (Mystery Evening), 7.45 p.m., Marle Place Further Education Centre, Leylands Road, Burgess Hill. 19 June (Mobile Evening), 7.45 p.m., Clayton Mills. NGR TQ 301131. At this mobile meeting talk-in stations G3RXJ/P and G3VAB/P will be operating on 70·26 MHz and 1·875 MHz respectively. Refreshments, together with G3JGR's famous home-brew will be available. The Constructional Contest Trophy will be presented at this meeting.

Tunbridge Wells (WKARS).—14 June (RSGB Tape Lecture), 28 June (Difficulties in S.S.B. Construction, by G3SSE—G6SSE/T).

Worthing (W & DARC).—Tuesdays, 8 p.m., Wilmot Youth Centre, Littlehampton Road, Worthing. *G6KFH/T*.

REGION 9

Bristol, RSGB Group.—17 June (Home Constructed Equipment). Anyone may bring along Home Brews. The G5FS Trophy will be awarded for the best effort and will be held for one year. 7.30 p.m., Becket Hall, St Thomas Street, Bristol 1. The Group invite all old and new friends and families to join them at the Group's Annual Rally, this year is the eleventh, on 30 June at Longleat Park, Warminster. It's the friendliest rally with no organized events, a glorious setting in a lovely park and just the place for a ragchew. *G3PFD*

Bristol (BARC).—Mondays and Thursdays, from 7.30 p.m., University Settlement, 41 Ducie Road, Barton Hill, Bristol 5.

Burnham-on-Sea (BoS ARS).—Second Tuesday in each month, 8 p.m., Crown Hotel, Oxford Street.

Cornwall (CRAC).—First Thursday in each month, 7.30 p.m., South Western Electricity Board Social Centre, Pool, Camborne. Six members gained A Licences in the year, 20 are expected to sit the RAE, two courses have been run this year by G3NPB and G3OCB. Peter King, G3WKP has been made a Life member of the Club in recognition of his work in producing the "Link" which is widely read not only in Cornwall but far afield. The Club will be holding its Mobile Rally on 21 July at Pentire Head, Newquay. *G3NKE.*

S.S.B. Group.—Second Thursday in each month, 7.30 p.m.

V.H.F. Group.—Third Thursday in each month, 7.30 p.m., both Groups at The Barley Sheaf, Truro. *G3OCB.*

Exeter (EARS).—First Tuesday in each month, 7.30 p.m , George and Dragon, Blackboy Road, Exeter. You are invited to bring yours along, especially home brewed equipment. Transport can be arranged if contact is made to the Secretary. 2 July ("Single Sideband on 80" by GM3OFY). G3HMY.

Plymouth (PRC).—First and Third Tuesdays in each month, 7.30 p.m., Virginia House, Bretonside, Plymouth. The Annual Picnic will take place on Sunday, 4 August at Yelverton near Plymouth. *G3UQF.*

Royal Air Force ARS. Locking, near Weston-super-Mare Saturday, 6 July from 2 p.m. Hamfest. Tours of the Stations Radar and Radio workshops, G8FC on display and the Radio Museum. Talk-in on 160m and 2m with field strength tests and frequency measuring contests. Celebration dinner in the evening in Weston-super-Mare Grand Atlantic Hotel. *G3GNS.*

Saltash (S & DARC).—14 and 28 June, 7.30 p.m., Burraton Toc H Hall, Warraton Road, Saltash. *G3SN.*

South Dorset (SD RS).—First Friday in each month, 7 June (Eve of NFD) 7.30 p.m., Labour Rooms, West Walk, Dorchester. 5 July (Open Air gathering at the Hardy's Monument, 777 ft a.s.l. G3SDS/P the Club station will be on 144 MHz, supported by G3EGV, G3RZG, G6SV and G8BCH on 70 MHz, and 432 MHz. All are welcome. *G3AKF.*

Taunton RSGB Group.—14 June, 7.30 p.m., Lecture Theatre, Taunton Technical College. *G3WNV.*

Torquay (TARS).—Every Tuesday and Friday, 7.30 p.m., Club Headquarters, Bath Lane, Rear Belgrave Road, Torquay. Visitors very welcome. *G3VNG.*

Wells (WARS).—Every Monday, 8 p.m. EMIE Sports and Social Club, Chamberlain Street, Wells. *G3MQQ.*

Weston-super-Mare (WSM ARS).—First Friday in each month, 7.30 p.m., Westhaven School, Ellesmere Road, Uphill, WSM. 7 June, NFD Briefing. May meeting was very well attended to listen to an interesting talk by F. A. Jackson, G3LIF on his proposed construction of a light weight transceiver by modules. NFD site is the usual site behind the Locking Camp. *G3GNS.*

Yeovil (YARC).—Wednesdays, 7.30 p.m., Park Lodge, The Park, Yeovil. 26 June, RSGB Tape Lecture "International Conferences by G2MI." Recent events included on 10 April an exhibition of slides of the Hammerlund DXpedition followed at later meetings by the presentation of two RSGB tape lectures "Amateur Radio as my Window" and "Radio Aurora". April closed with a talk by C. Atkins, G8AFA on Mobile and Portable operating. *G3NOF.*

REGION 10

Blackwood (ARC).—The Club meets at 7.30 p.m. on Friday evenings. Lectures, practical courses and courses for the RAE are part of normal Club activities. The Club station is active under the call-sign GW6GW. The address of the Blackwood Amateur Radio Club is off High Street, Blackwood, Mon. *G6BK.*

Barry College of Further Education (ARS).—Meetings are held on Thursday evenings at 7 p.m. at the College, Colcot Road, Barry, Glam. Club call-sign GW3VKL.

Cardiff (RSGB) Group.—Monday, 10 June (Valve and Transistor Testing Night), 7.30 p.m., T.A. Centre, Park Street, Cardiff.

Llanelli Boys Grammar School (ARS).—Society meetings are held on Friday afternoons at 3.30 p.m., to which all interested radio amateurs are invited.

Pontypool (ARC).—Meetings are held on Tuesdays at 7 p.m., in the Educational Settlement, Rockhill Road, Pontypool, Mon.

Pembroke (ARC).—GW2OP's Bucket and Spade Party will be held on Sunday, 30 June, at the Regency Hall, Saundersfoot, near Tenby from 11 a.m. Normal monthly meeting of the Club will be held on Friday, 28 June at the Headquarters, Defensible Barracks, Pembroke Dock.

Rhondda (ARS).—Meetings are held at the Pengelli Hotel, Treorchy. A very comprehensive programme of instructional and practical work is carried out, and details are available from the Secretary, Mr Cyril Parry, GW3PHH, 34 Cae'r Gwerlas, Tonyrefail, Glam.

University College, Cardiff (ARS).—Full details of the activities of this Society are available from the Secretary, c/o Students Union, Dumfries Place, Cardiff.

REGION 11

Rhyl (R & DARC).—Second Tuesday of the month, Rhyl Silver Band Room, Windsor Street, Rhyl. "Receiving S.S.B. Transmission" was the subject of the lecture on 14 May by F. Pardy, GW3DZJ and D. Evans, GW3IVK. The latter described in detail the advantages of s.s.b. over a.m. transmissions, while GW3DZJ gave a convincing demonstration by working I1CAK on a "G Whip" in a corner of the Clubroom. *GW3UTG.*

REGION 13

Edinburgh (LRS).—13 June (Surplus Sale), 27 June (AGM), 7.30 p.m., Board Room, YMCA, 14 South St Andrew Street, Edinburgh.

REGION 14

Ayrshire (AARG).—5, 19 June, 7.30 p.m., Peter Boyle Bowling Club, Craigie Road, Ayr.

Auchenharvie (A & DARS).—6, 11, 13, 18, 20, 25, 27 June, 7.30 p.m., Auchenharvie Community Centre, Stevenston.

Glasgow University (GURC).—14 June, 7.30 p.m., Engineering North Building, University of Glasgow.

Greenock (G & DARC).—7, 21 June, 7.30 p.m., Arts Guild, Campbell Street, Greenock.

Lowlands Royal Signals Group (LRSG).—18 June, 7.30 p.m., 21 Jardine Street, Glasgow.

Mid-Lanark RSGB Group.—21 June (SWL Night), 7.30 p.m., YMCA, Brandon Street, Motherwell.

REGION 15

Belfast and District RSGB Group.—Third Wednesday in the month, 8 p.m., War Memorial Building, Waring Street, Belfast.

REGION 16

Ipswich (IRC).—26 June ("Transistorized Gear" by B Kidby), 7.30 p.m., British Red Cross H.Q., Gippeswyk Hall, Gippeswyk Avenue, Ipswich. *G3UJR.*

Norwich (NARC).—Mondays, 10 June ("Linear Amplifiers" by G3MPN), 17 June ("Inductors" by G3PTB), 24 June (A Radio Panel Game), 1 July (Debate—Is V.H.F. Worthwhile?), 7. 30 p.m., Old Lakenham Hall, Lakenham, Norwich. *G3PTB.*

REGION 17

Basingstoke (BARC).—Third Saturday in the month, 7 p.m., Chireham House, Reading Road, Basingstoke.

Chippenham (C & DARC).—Tuesdays, 8-9 June (NFD), 25 June (D/F Hunt and Barbeque—arrangements will be made to disclose location to those not participating), 29 June (Demonstration of club activities at the "Chippenham at Home" Carnival in Monkton Park), 7.30 p.m., Chippenham High School for Boys, Hardenhuish Lane, Chippenham. The present schedule of the club is to arrange a Lecture or Special Event for the last Tuesday and during the summer months to arrange regular Direction Finding contests for the second or third meeting. *G3PQG.*

Farnborough (F & DRS).—Second and Fourth Tuesdays in the month, 11 June ("Communications" by A. L. Stretton), 25 June (Annual Construction Contest), 7.30 p.m., 310 Farnborough Road, Farnborough, Hants. *G3NVM.*

(Continued on page 415)

MEMBERS' ADS

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

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

FOR SALE

SB101 complete, brand new; can't stop building Heathkits! (No, I'm not parting with the SB301/401 yet!). BC221, £25. Quad complete centre assembly, £5. Rotary guy rings for 2 in. dia. mast, 25s.H. Perkins, G3NMH, 24 Hook Street, Hook, Swindon, Wilts. Wotton Bassett 792.

Shorrock Mk V, aircraft RX, 108–144 MHz, m.w. & l.w. in v.g.c., £25. Also Eagle RX60 RX 160-10m used, very little, £12. Will accept £35 for both. G. Winter, G3XCW, 68 Sheringham Road, Birmingham 30.

Pye Ranger TX with 2m converter built in (i.f. 21 MHz), £10. Separate p.s.u. £5. Buyer collects. J. Williams, G3ILT, 28 Sunmead Close, Fetcham, Leatherhead, Surrey.

Heathkit RG1, £25. G2DAF TX, McCoy filter, Eddystone dial, £35. TCS 12 TX, £6. R107 RX £4. E. Workman, 121 Norton Road, Coleshill, Birmingham.

Table Topper TX 813 p.a., p.s.u., a.t.u. £80. CR100, £25. Codar AT5 d.c./a.c. p.s.u's., control unit, £32. PR120V plus spares, £80 only has to be seen. Wanted, s.s.b. gear, G3HQU, 243 Rawlinson Street Barrow in Furness. Barrow 2303.

HRO, modernized with nine coils covering all amateur bands including 14 MHz b s. plus p.s.u. and Codar pre-selector, £15. Wilcox Gay v.f.o. and H/B., 30s. Buyer collects pse, S. C. Walters, G3IMK, 61 Sussex Gardens, Chessington, Surrey. 01-397 6924.

BC221M freq meter, 125 kHz–20 MHz, built in p.s.u., with calibration book and original manuals. Good cond., deliver Midland area, £16. D. H. Perks, Arvon, Wolverhampton Road, Cheslyn Hay. Tele 708.

Star 550, amateur bands RX, s.s.b./c.w./a.m. product detector, 3·5 MHz XTAL marker, mechanical filter, as new. £40 o.n.o. W. Rivis, The Bungalow, Hampstead, Grange over Sands, Lancs.

RSGB Bulletin 1960–67, *SWM* 1960–67, *CQ* 1961–67, 1s. each. Doz. lots. ARRL H/B 1963, 25s. RSGB Handbook 1962, 20s. Joystick 40s. All carriage paid. F. J. Sweeney, 58 Grosvenor Road, Epsom Downs, Surrey. Ashtead 2689.

Codar CR45 RX, five coils, FB cond, £5 10s. G. D. D. Gammack, Heathside Cottage, Woolley Green, Maidenhead, Berks. Littlewick Green 558.

Full size 20m beam and cradle, professionally made by engineer, £15. L.M. Frequency meter with mod., p.s.u. and original charts £18. Truvox Tape Recorder, Mk 8, £15. TW Twomobile and l.s., £23. Also numerous valves. E. R. Martin, G6MN, 6 Kedleston Road, Worksop. Tel 3415.

Large quantity of post-war *SWM* for disposal. Offers to: S. R. R. Kharbanda, 39 London Road, Harston, Cambs.

100W TX, Geloso, 2 × 807s, 80–10m, good commercial appearance, three separate p.s.u., quality a.m., UM2, aerial change over, c.w. All in AR88 case, metered, £20, or w.h.y., camera etc. cash available. C. V. Taft, G3PDT, 239 Hagley Road, Birmingham 16, Warks. EDG. 1895.

Mohican RX, £18 or exchange for SB-10U s.s.b. adaptor. F. L. Parsons, G3MIX, 96 Blackmoor Lane, Maidenhead, Berks. Maidenhead 26723.

Five 9 in. re-entrant horn loudspeakers "Alchut" type PA-15, 8 ohm, complete with universal mounting. Guaranteed "as new" cond. Cost £7 10s. each will accept £5 each plus p.p. A. K. Davies, 18 Banbury Avenue, Blackpool.

Moving house, must sell, 100W modulation xfmr as new, £4. 240V stabilized p.s.u. £1 each. Two 14 in. 'scope displays, £2 10s. each. S.a.e. for details. T. R. Wiltshire, 12 Leslie Road, Winton, Bournemouth.

HRO 5T RX, b.s. and g.c. coils, p.s.u., l.s., manual, mint cond., £30. 145·45 MHz TX, mod TR1986, converter R114, 7 to 9 MHz i.f. p.s.u., smart case, one switch control, £10. C. B. Jones, G3RCU, 90 Abbey Road, Sandbach, Cheshire.

XTALs FT243, 3540, 3590, 3640, 3860, 7173·33. 10X 1995, 3505, 3687, 7s. 6d. 2106, 5500, 5675, 5700, 3099·4, 16,335 kHz, 5s. looking for Codar PR30X, Withers TW2, quality Tape Recorder, offers to W. H. Fletcher, G3NXT, Holmdale, Martin, Lincoln.

NCX5 Mk II, 200W s.s.b./a.m./c.w. digital readout to 100 Hz. A.c. p.s.u., l.s. Perfect order and appearance. Current price, if available, over £350. Will sell for £200. D. R. H. Jolly, Little Russel, Lytchett Minster, Nr Poole, Dorset. Lyt Min 142.

Minimitter Mobile Whip, sprung base universal joint, top sections and coils for 160/80m, £7 15s. 6d. BC348 with 85 kHz second i.f. double super het, p.s.u. and converter for 21/28 MHz. £15 10s. D. Byrne, G3KPO. Jersey House, Eye, Peterborough. Eye 351.

70cm, 8 over 8 beam with rigid balun, £1 10s. 70cm p.a. complete with 4CX250B in Eddystone box, £7 10s. Valves QY4-250. 10s. each. Set of five XTALs for 2m, 10s. the lot. All postage extra. R. C. Hills, G3HRH, 73 Warren Way, Digswell, Welwyn, Herts. Welwyn 4769.

Have 273 *Bulletins* and *SWM*'s., 1931–1966 to exchange for any complete volumes of pre-war wireless (not Ham) magazines, or *RSGB Bulletins*, August 1929, January 1930 and July 1933 with covers. F. A. Herridge, G3IDG, 96 George Street, Basingstoke, Hants.

Valves, 2C39A, 20s., QV04/7, 5s. QQV02/6 20s. 832 10s. QY3-65 (4/65A) 20s. Also many others, see previous adverts, state needs, enclosing s.a.e. G. A. Jeapes, 165 Cambridge Road, Great Shelford, Cambs.

Lafayette KT320 RX, 550 kHz—30 MHz, excellent condition. Amateur Bands bandspread, £20. Evenings/weekends, buyer collects. Wanted cheap, working AR88 or good cheap Radiovision Commander RX. Also XTAL calibrator and Joystick. N. A. Mason, 60 St Mary's Crescent, Ruddington, Notts.

RA1 RX with XTAL cal and l.s. £35. AT5 TX and a.c. p.s.u. unused £20. Tape recorder £15. C. G. Powell, 1 Wenwell Close, Buckland Wharf, Aston Clinton, Aylesbury, Bucks. Aston Clinton 600.

Automatic Channelmaster Rotator, virtually unused, £14. Rotary guy ring £2. Xfmr for linear, primaries, catering for 100–260V, secondary 2800–3000V at a conservative 280 mA, £6. M. J. Underhill, G3LHZ, Munzil, Whitehall Drive, Ifield, Crawley, Sussex.

150 W, a.m./c.w. 3·5–28 MHz TX, Geloso osc., p.a.—2 × 807's, mod 807's, with speech compressor, Variac p.s.u. fully screened to prevent TVI. Highest offer secures, must go. W. G. Harbinson, 10 Deramore Park, Belfast 9, NI. Tele 665754.

RAE. Complete 31 lesson British National Radio School correspondence course including Exam papers and model answers 1960–65, £6 post paid or offers or part exchange for 70cm Tripler/Amplifier. G. L. Fitton, G8AVG, 29 Okus Grove, Swindon, Wilts.

Du Mont 304-A oscilloscope 110/230V £20 o.n.o. Heath Two-er HW-30, £15. Owner gone abroad. G3HUA QTHR.

Electronic organ. Complete free-phase note Generator Chassis, full compass, with Key contacts and Octave couplers, together with large p.s.u. and vibrato oscillator (ex Selmer Commercial Organ), £12. D. T. Wilson, G8APS, 177 Dower Road, Four Oaks, Sutton Coldfield, Warks.

Cossor 339 'scope in good working order with manual, £12 o.n.o. Airmec type 259 televet with manual, includes 'scope, sig. gen., pattern gen., wobbulator etc. Offers? R. J. Ward, G2BSW, c/o Newman, 231 Moor Green Lane, Birmingham 13. 021 SOU 3456.

CR100 RX, average cond., £15. G. K. Laycock, G3XFZ, 90a Shrewsbury Lane, Plumstead, London, SE18.

Jennen Trio communication RX model JR101. Same as Lafayette HE30, £25 o.n.o. Will deliver up to 100 miles. Wanted XTAL for 465 kHz XTAL filter. C. Curgenven, Beech House, Uffculme, Nr Cullompton, Devon.

Exchange one unmodified BCC69G (high band) for BCC69D (low band). S. T. S. Evans, G3VGO, Tryfan, 9 Praze Road, Newquay, Cornwall.

Heathkit RG1, few months old, as new, offers around £35. KW Vanguard Mk II, 160–10m v.g.c , £35. Can deliver if necessary. C. T. Hanley, G3VAC, C.S.O.S. Hostel, Flowerdown, Winchester, Hants. or QTHR.

CSE 2A10 top band mobile TX complete with mic. Brand new, boxed and unused, £30. D. M. Pratt, G3KEP, 30 Lyndale Road, Eldwick, Bingley, Yorks. OWR66 3699.

160/80m 40W, TX. Two p.s.u., 35W mod. TX/RX relay and muting self contained. Grid block keying and press to talk. Worth £25. Best offer secures. View and dem. by appointment. R. J. Hulbert, G3SRY, 310 Gander Green Lane, Cheam, Sutton, Surrey.

Pye base station, high band, TX on 2m, RX high band un-mod. complete in cabinet £20. High Band TX un-mod., slightly marked £10. Low band TX un-mod., as new, £15. P. E. Lindsley, G3UDV, 47a St Mary's Road, Ealing, London, W5.

Codar AT5, 160/80 TX, a.c. p.s.u., perfect cond. £15. H. Pettis, G5AFO, Box 504, RAF Croughton, Brackley, Northants.

Base for ground plane vertical fit 1½ in. tube with 37 ft., 50 ohm H/D co-ax, 17s. 6d. Xfmrs, Woden 650-0-650V, 250mA, 5V ½A, 45s. Webbs 625-0-625V, 250mA, 6·3V 1A, 40s. Admiralty 865-0-865V 180mA 40s., Parmeko 500-0-500V 160mA, 30s. W/D 1600-1500-0-1500-1600V 500mA 80s. C. C. Olley, G3AIZ, 157 Wanstead Park Road, Ilford, Essex.

*RSGB Bulletin*s Vol. 30, July '54 to Vol. 41 Dec. '65 with index's offers to cover carriage for the lot Per vol or individual copies. F. W. Crabtree, G3BK, 28 Regent Avenue, March, Cambs

BC221, charts, a.c. p.s.u. £18. 'Scope type CT52 £15. HRO six coils, a.c. p.s.u., 6BA6 front end, £10. LG300 chinese copy £12. Pp. 807 mod. p.s.u. £10. Commando s.s.b. TX, 6146 p.a. 80–10m £60. 01-866 4357.

Antenna-Liner, automatic control £10. Transistors, OC44, '45, '76 and OC83 all 2s. each plus postage. R. F. Griffiths, G3JTQ, 63 Fyth Cross Road, Twickenham, Middx.

Heathkit RG1 RX in mint cond. complete with H/B and set of spare valves, £28. Buyer inspects and collects. E. F. Pitt, G3VRY, 17 Waldegrave Road, London N8. 01-888 9482 after 6 p.m.

RAE course, TR13046, 10 ch XTAL controlled. Best offer around £5, secures either. Numerous hard bound novels that must go as well, Cpl. Wynn, UP21, A.E.T.W., Army AVN Centre, Middle Wallop. Hants.

KW Vanguard, 160–10m Mk I, new SB10U built, new KW201 RX (getting divorced!) offers? L. G. Tonkinson, G3NKC, 8 Little Warton, Road, Nr Tamworth, Staffs. Polesworth 2452.

Eddystone EC10, good cond. £32 carriage paid. Two section aluminium mast with guys, 20ft. £6. Buyer collects. Most copies *Bulletin, SWM,* & *PW* from '63, offers? J. R. Walker, 41 Carr Bank Lane, Sheffield, S117FB.

Codar PR30 pre-selector £3 15s. Reject or unit No. 1 Mk II 1·2 MHz-12 MHz, 15s. KT88's new, 20s. each. K. G. Selleck, G3SNU, Coplands, Dartington, Totnes, S. Devon.

With Effect from 1 July

There is no doubt in our minds that the idea to offer a free advertisement service to members is paying off. Logically, however, contributions have started to snowball, and are reaching the point where you are sending enough in to embarrass us, bearing in mind the quota of *Radio Communication* pages allowed by our annual budget. We will, therefore, have to draw the line somewhere. Naturally, if you are keen to sell some equipment, you need a guarantee that your advertisement will appear, and so any means of selection, or cutting the For Sale advertisements to a specific number of pages is quite impossible. The solution, as we see it, lies in the question of priorities. For Sale ads. are of considerable interest to a large proportion of readers, more so, in fact, than the Wanteds, and it is here that we shall have to cut. If Members' Ads run too long, we will tailor them to fit the available space by including a convenient number of Wanted Ads, without holding any over to the following issue. If you are desperately seeking equipment or information, however, it will still be possible to ensure the inclusion of a request by writing to Sawell and Sons Ltd., in the usual way for Classified Advertisements, and enclosing the appropriate remittance.

There will no longer be any charge for members' Wanted Ads.

For sale or exchange, XTALs, 10X 1752·5, 1767·5, 1772·5, 1922·5, 2100, 3510, 7040, 7050 kHz. Octal 2500, 8000 kHz. 10XJ 5315, 5961·5, 6450, 6500, 6550 kHz. FT241A, 26·6, 26·8, 27·8 MHz, FT243/P4, 6400, 6535·42, 6650, 6710, 10000 kHz. Required FT243, 6005-6075. E. Briggs, G3IJU, 31 Blenheim Crescent, West Ruislip, Middx.

Lafayette KT 320 communications RX in excellent electrical and mechanical cond. Unmarked. Coverage 0·5–30 MHz, nine valves, one r.f., two i.f , b f.o. Q mult., excellent b.s., manual, boxed. Buyer collects, £22 o n.o. Pearce, 52 Northumberland Avenue, Reading, Berks. 82570 evenings.

2m Nuvistor G & D converter in original cond. £5. 2m 4 over 4 slot beam, £1. Cast aluminium Quad spiders, unused £5 pair. Full details s.a.e. W. Moorwood, G3CAQ, 4 Grafton Place, Bilston, Staffs.

1155A RX & p.s.u., l.s., spare valves all working suitable SWL with spare time for mods. Deliver ten miles if necessary. Best offer over £5 secures. P. G. Strivens, 17 Orchard Way, Kemsing, Sevenoaks, Kent. Sevenoaks 61747.

Eddystone 840C v.g.c. recent re-alignment, excellent s.s.b. resolution, £35 o.n.o. R. G. Armitage, G3TZE, 2 Dorchester Court, Trent Gardens, Southgate, N14.

HRO working, but requires attention, seven g.c. coils, one b.s. Best offer over £10. Home built dual p.s.u. available. A. Bryan, G2CAJ 21a Ifield Road, London, SW10. 01-352 4734, Monday, Tuesday or Thursday evenings only.

Heathkit Station DX100, SB10, £80. RA1, QPM 16, XTAL Cal, £30 includes aerial c/o relay, cables etc. Will deliver 100 miles or carriage extra. S. C. Cammies, G3VNI, 5 Willingdon Place, Granville Road, Walmer, Deal, Kent. Deal 3409.

Signal generator type 101, laboratory instrument range 380–630 MHz, piston attenuator etc. cal. charts. Offers above £5. B. Hackney, G6YP, 18 Crofton Road, Orpington, Kent. Orpington 24982.

BC348, modified, built in p.s.u., 1 MHz XTAL cal., single end valves, signal meter, mod b.f.o., XTAL gate perfect £15. Buyer collects. 150W amp. £10. Complete not working 500W 200mA p.s.u. perfect, £6. W. F. Holford, G5NG, Fairacre, Coldharbour Lane, Thorpe, Egham, Surrey.

V.H.F. RX, Hallicrafters S27 and S36A, 27–143 MHz both in first class condition, £40 each. Also Minimitter 160m mobile whip. Never been used from new, £4. S. Jesson, 181 Kings Acre Road, Hereford. Tele. 3237.

DX40, '67 mint with XTALs, £25 o.n.o. Topmobile RX £12. Heathkit. GR64 RX in mint cond. £30 o.n.o. J. Worthington, G3COI, Foxhills, Orton Lane, Penn, Wolverhampton. Wombourn 2288.

Eddystone 750 RX and LG50 TX both excellent with home brew mickey match and l.p.f. Will pack and dispatch passenger train. J. Gorrie, GM3DVX, 32 Allan Park Road, Edinburgh 11.

Transmitting valves, QQVO6-40 with base, 30s. 2 × 813 30s. each. 4-250 with base, £8. 2 × 811, £1 each. 4 × TZ40, 7s. 6d. each. Please add packing and postage. T. H. Hayhurst, G3NJE, 25 Ashburn Road, Heaton Norris, Cheshire.

BC-221-N freq. meter with H/B and cal. charts, £20. Codar T28 160/80m RX £13. Halson mobile aerial complete with 80m loading coil, £5. All equipment, first class. Buyers collect. I. M. G. Miller, c/o Worman, 39 Boswell Road, Sutton Coldfield, Warks. 021-354 2664.

144 MHz TX XTALS for X12 mult. to 144·25, 144·35, 144·55, 144·65 & 144·95 MHz, 7s. 6d. T. Chapman, G3PTQ, 25 Desmond Avenue, Cherryhinton, Cambs. OCA3 47230.

KW77 RX amateur bands 160–10m, slot filter, n.l., etc. £50 o.n.o. Heathkit RG1 g.c. RX with l.s. £25 o.n.o. J. W. Garrett, 201 Bishops Oak Ride, Tonbridge, Kent. Tonbridge 61656.

Eddystone EC10 with a.c. p.s.u., three months old £42 10s. plus carriage. F. G. Dougherty, 18 Headland Road, Newquay, Cornwall. Portable battery Tape Recorder with 2 d.s. morse tapes. 70s. pp. A. G. Thornburn, G3WBT, 27 Banklands, Workington, Cumberland.

29/41 ft. sectional vertical aerial, stay assemblies, pegs etc. 60s. Tuning units type B to suit, 25s. RF27, 25s. Muirhead precision. S.M. drive, 25s. Power unit type 3, 40s., 813's used tested, 20s. collect or carriage extra. S. A. G. Cook, G5XB, Little Orchard, Gallows Tree Common, Reading, Berks. Kidmore End 2195.

Lafayette PR30X pre-selector, Joystick, Heathkit QPM1 Q-Multi. Nombrex type 27 sig. gen. G & D 2m Nuvistor converter Mk 3, less 6450 kHz XTAL. Sinclair Z-12 audio amp. Offers? M. J. P. Evans, GW3UCT, 4 Gower Crescent, Baglan, Port Talbot, Glam.

R103A RX covering 160/80/40m plus XTAL controlled converter for three h.f. bands, £15. Walters 101, twin track tape recorder, £15. All excellent cond. Offers, please include s.a.e. J. Morris-Casey, G8JC, 4 Kennels Lane, Fern Hill Heath, Worcs.

Minimitter 150W TX, 80–10m a.m./c.w., table topper, good condition ready to operate, spare valves, £25 collect. HRO-octal-seven g.c., one b.s. coils, p.s.u. £15, collect. Consider exchange. D. W. Payne, G3KCP, Hideway, Neville Road, Crowborough, Sussex.

Brand new KW E-Zee match, £10 or will exchange for 10m or multiband beam and rotator with cash adjustment. Four 8400 kHz XTALs, 20s. N. L. Kinch, G3XEE/DL2TX, 28 Shaftesbury Avenue, Feltham, Middx.

Channelmaster automatic rotator as new, ½ hours use only, £15. B. Curthoys, G3VEJ, 63 New Road, Burntwood, Nr Walsall, Staffs. B'Wood 340.

Panda PR120V, manual £32. AR88D S meter manual £32 or both £60. Buyer collects. S. Hubbard, G3RUC, 150 Bradbury Lane, Hednesford, Staffs.

RTTY CRM 1, tuning indicator, less 'scope tube. Offers? D. Evans, G3OUF, 80 Argyle Road, Ealing, W13.

Viceroy Mk 3, £70. FR100B still in guarantee, £95. Buyer collects or pays carriage. Also Hallicrafters HA1 keyer, offers? R. G. Cary, G3DYY, 43 Foxhills Crescent, Lanchester, Durham.

150W c.w. TX, 80–10m, v.f.o., 800V p.s.u. and a.t.u. Built from Minimitter modules, tested and cleared by GPO for TVI. £35. Buyer must collect. S. Alderton, G3UXV, 2a Goldings Road, Loughton, Essex. 01-508 3013.

HW12, £35. HRO MX, p.s.u., eight g.c. coils, £15. 80–10m TX. Geloso v.f.o., p.s.u. £10. BC375 TX, TU-B £5. El Bug £3. XTAL cal, 1000–100–10 kHz, £2. Collect Birimingham or Kent. P. V. L. Newman, G3UUU, 144 Tessall Lane, Birmingham 31. 021-875 4411.

R1475 no p.s.u. mod to cover part 160m, with circuit. Buyer collects or arranges collection. R. A. Butterworth, G8BI, 20 Ravenfield Road, Welwyn Garden City, Herts. WG 23676 after 6 p,m.

HW32, mod to HW32A spec. by Daystrom, £40. Tiger 200, 80–10m, 150W, £32. G. Brownlow, G3WMU, 1 Widdicombe Way, Brighton.

Mosley TA32 two ele Tri-Band beam fine cond. price £12 including carriage. R. H. Moore, GI3PLL, 1 Club Road, Ballykelly, Limavady, Co. Londonderry.

200W mod and speech amp. Class B T240S, quality speech, rack fitting, £12. New TX blower, 25s. New Japanese sideband filter, 450 kHz, list price £10, selling £7. Wanted XTAL 6·5 MHz. A. Parker, G3KH, 133 Station Road, Cropston, Leicester LE7-7HH.

HRO Senior with S meter, all a.b. coils with b.s. for 80/40/20/15/10m, a.c. p.s.u., l.s., spare set of valves, H/B, fine unmodified cond. Accurately aligned. Offers near £30. R. C. Greenleaf, G3VAG, 27 Ernest Road, Wivenhoe, Essex. Colchester 78260.

Clearing shack, DX100U plus spare valves, £45 o.n.o. BC453 Q-5'r, 50s. Many spares, valves, l.s. etc. Prefer buyer collects but will deliver up to 30 miles. P. Garthwaite, G3OXR, 7 Park Avenue, New Lodge Estate, Barnsley, Yorks.

Shack clearance, 'scope s/b Solatron stab. p.s.u. 500V 200mA, variable stab. p.s.u. 300V 100mA fixed mech. Bug aerial wire capacitors resistor xfmrs and others £40 o.n.o. Will break down. G. C. Reid, G3OUX, 11 Coombe Close, Langley Green, Crawley, Sussex.

Cossor 339 'scope good working cond. £12 o.n.o. Details write R. L. Dowdell, 150 Chadacre Road, Stoneleigh, Epsom, Surrey. Buyer collects.

Lafayette HE30, 550 kHz-30 MHz, b.s., b.f.o., Q mult., excellent order · Offers, no silly ones! Collect or will deliver 15 miles radius. J· Walker, G2DCF 16 Himley, Road, Clayton Estate, Manchester 11. Lancs.

115V, 400 Hz, 500V inverter-regulator, 24V input, unused £4 10s.! 5000V micas, ·001, ·0004, ·0002, ·0001, ·00005, 5s. e.g. Imhof cabinet less panel, needs respray, 15s. Size 21½ × 10½ × 10½ in. 2/726A Klystrons, fittings £1. J. Casson, G2ACT, 14 Station Road, Upper Poppleton, Yorks.

Job forces mobile only, latest mech filter G2DAF RX (less Q-Mult) and TX (less p.s.u.) and matching l.s. in three matching cabinets by G4BI £50 the lot. M. G. Luker, G2ANG, 36 Winston Gardens, Branksome, Poole, Dorset.

Super TX professionally built, 80/40/20/10m enclosed rack. PP 813 fully metered TZ40 mod, inspect and collect, £35. R. Sunter, G3DH, 18 Bramhall Park Road, Bramhill, Cheshire. Tele 1954.

Ribbon mic magnets with ribbon fixing 10s. Five for 30s. D.F. goniometer, fully screened silver plated case with coax output 30s. Resistance meter 5 to 5000 ohms, 10s. All post free. Write lists, M. Mann, G8ABR, Flat 71, Queens Road, Tewkesbury, Glos.

Mohican mint £28, RTTY type 44 keyboard perforator Mk 2, £3. Chokes 10s. each. 5-25 H 250mA 20 H 300mA. Parmeko 4-20 H, 0-250 mA. Xfmrs 620–550–350 ct 250 mA. 5V3A. Woden DTH18 1250-1000 ct, 300 mA, 5V5A, £3 each. R. L. Whorwell, G3CTR, 65 John Kennedy House, Rotherhithe Old Road, London, SE16.

Eddystone 840A late model, grey hammer finish. Excellent cond. any others over £20. Delivery in Hants or Carriage extra. Wanted. Codar PR30 pre-selector unpowered version about £3 10s. Delivery if possible. R. Woodley, 63 Station Road, Romsey, Hants SO5 8DP.

HRO-MX RX, nine g.c. coils, clean cond. l.s. p.s.u., phones. Will accept £20. H. C. Pryse, G3WXT, 36 Hart Road, Byfleet, Weybridge, Surrey.

R107 RX in good working order, S meter and muting, will deliver 20 miles. J. A. Clarke, G3TIS, 40 Morland Avenue, Dartford, Kent.

150W a.m./c.w. TX, 80–10m in 6 ft. rack, fully metered, Hefty p.s.u., changeover relay, worked DXCC, £22 10s. R206 RX 550 kHz-30 MHz Codar pre-selector and calibrator, £25. £45 the lot, carriage to be arranged. S. A. Mickel, GM3WDF, 15 Orleans Avenue, Jordanhill, Glasgow, W4. 041 SCO 2946.

Top Band v.f.o. p.s.u. 100 kHz, 10 kHz multi vib. b.s. dials for h.f. bands, all in cabinet s.a.e. details £8 plus carriage. R. M. Morris, GW3HJR, Parc House, Y-Parc, Grossfaen, Pontyclun, Glam.

J-Beam, 2m 8 over 8 beam, as new £4 10s. plus carriage or will deliver 30 miles. A. M. Smith, G3IAS, 21 Hamsey Green Gardens, Warlingham, Surrey CR3 9RS. Upper Warlingham 3002.

Q multi by Minimitter hardly used, bargain at 45s. pp. C. Malcolm, GM3BXW, 26 St Clair Avenue, Giffnock, Renfrewshire.

Panda Cub all band a.m./c.w. 30W TX excellent working cond. QSL's to prove it! Impoverished student needs cash, will deliver within reason, £17. P. Sandiford, G3STF, 19 Bucknalls Lane, Garston, Watford, Herts. Garston 2887.

" Sphinx," s.s.b./a.m./c.w. TX, output at least 0·6A all bands 160/80/20m. Immaculate cond., green cab., grey panel. Overhauled by makers last year, complete with Delta control unit. £50 o.n.o. Buyer collects or arranges carriage. L. E. R. Hall, G3IGI, 24 Calthorpe Road, Walsall, Staffs. 021-357 3840.

Woden xfmr, 1250-0-1250V and 1000-0-1000V at 300 mA with 5V, 0·5A. As new £2 10s. plus pp. F. H. Chambers, G2FYT, 25 The Crescent, Henleaze, Bristol.

J-Beam, 70cm 14 ele beam, excellent cond., never used outside, £4 10s. o.n.o. Prefer buyer collects. TW 2m Communicator Mk 2 required. State cond. and any mods/accessories. S.a.e. please to C. J. Horrobin, G3TZW, 50 Fletcher Road, Stoke, Stoke on Trent, Staffs.

KW Viceroy Mk 4 180W, p.e.p., s.s.b./a.m./c.w., vox, mint. cond. with a.c. p.s.u. having all silicon rectifiers, stabilized bias, etc. £110. M. G. Shaw, G3OXF, 74 Oakdene Road, Orpington Kent, BR5-2AN.

Valves for Wavemeter 1191, 6s. each, pp. A. G. Edwards, G3MBL, 244 Ballards Lane, London, N12.

Offers for G2DAF RX, table top a.m./c.w.TX, 80-10m, alloy mast 30 ft. 2 in. dia. Will deliver RX or TX 25 miles. T. J. Devine, G3KBO, Crombie Villas, Otford Lane, Halstead, Sevenoaks, Kent. Knockholt 2079.

Complete s.s.b. station including KW Vespa TX only, £95. Send s.a.e. for photograph. Pye marine RX, dry batteries, 160/80m, £10. 40 copies *SWM* unmarked 1s. 6d. each or offers. G. N. Dale, G3PZF, 18 Lezayre Road, Green Street Green, Orpington, Kent.

Electroniques QP 166 with Eddystone 898 drive and cabinet, all mint cond. £11. HRO-MX with eight g.c. coils, l.s. p.s.u. £18. Clearing shack, various items. Carriage extra. Prefer buyer collects. J. J. Lockyer, G3OVA, 23 Beechwood Road, Kings Heath, Birmingham 14.

Shack clearance, 3 ele 20m beam, type A320 offers! Cal. No. 10, 10s. 30 ft. vertical mast with base insulator, 20s. Valves, min 807, 6146, etc. xfmr, chokes, capacitors rectifiers, all going for almost a song. T. J. Griffiths, G3NPZ, 7 Somaford Grove, East Barnet, Herts.

Marconi Wavemeter, TF643B with call charts 20-300 MHz, £5. Buyer collects F.GR. Cook, The Old Lodge, Silvermere, Cobham, Surrey.

Complete a.m./c.w. TX 120W 80–10m, high level mod, Woden UM3, full relay control, Philpotts cabinets, £30. Minimitter Q multi, unused, £3. Prefer buyer inspects and collects TX. C. G. Tomkinson, G3MUT, c/o ITA Transmitting Station, Brockford, Stowmarket, Suffolk.

Anybody wanting a report of a.m. and s.s.b. signals on 160-10m please contact I. R. Mountford, Royle Farm, Drakelow, Burton-on-Trent, Staffs. Burton 3940.

Fantavox HE-50 RX, 535 kHz-30 MHz, b.f.o. S meter etc. Almost new £10. Buyer collects. D. Austin 9 Mansfield Road, Intake, Sheffield S12-2AE.

Eddystone 840A immaculate, perfect working order, £25 o.n.o. W. P. Tyrrell, 26 Vereker Road, (Basement), London, W14.

WANTED

Wanted urgently, tuning units for RDO v.h.f. RX. Will pay any reasonable price for units working. Also interested in units not working. Will arrange postage to and payment from my English address, K. H. Hagemans, Van Hoornbeekstraat 14, The Hague, Holland.

R107 a.f. output xfmr. All offers acknowledged and postage refunded. E. Postans, G4AC, 7 Moorfield Road, Woodbridge, Suffolk.

AR88D spares. C86, part no. M253132-1 capacitor, b.f.o. trimmer, 3-25 mmF required (porcelain block holders broken). C. Sminus 41 Rangemore Drive, Eastbourne 5X.

Linear Amp; Z match or Collins RX. Available exchange or sell. Leica M3 with Elmar, pair Whitley T12 heavy duty tweeters, all as new E. H. Osborne, G2TS, Ascot Cottage, Cropton, Pickering, Yorks.

TW-2 TX, must be good cond. XTALs not essential, p.s.u. not required. Offers. L. N. Goldbrough, G3ERB, 56 Kings Lane, Bebington, Cheshire.

1132A v.h.f. RX service manual. Pye 9 in. television, working, are there any about? B. J. Payne, 159 Micklefield Road, High Wycombe, Bucks.

6 ft. Standard 19 in. rack. Also AR88 front panel. Finish immaterial. P. Dutfield, G3OBD, 16 Talbot Drive, Parkstone, Poole, Dorset.

TW 2m Communicator required for Holiday. Price including carriage giving cond. to L. J. N. Kirkby, G3BRJ, Trefaes, Westalla Road, Yelverton, Devon. Tele 2942

Bulletin July '44, Oct '48, May '49, Aug '51. Can offer *Practical Electrical Engineer* 1932–1935 incomplete. R. J. Pigou, 52 Rowan Road, Bexleyheath, Kent.

RAE Course, British National Radio School if possible, but not essential. Details to M. Costello, 73 Rosslyn Crescent, Luton, Beds. Manuals wanted for the following, CR100 RX, AR77 RX, Panda Cub TX. J. A. Rainbow, 14 Temple Road, Bishopthorpe, Yorks.

Pye Ranger high band and prefer high power type. Also Pye f.m. Ranger, BCC69 TX/RX for 2m, 9851·3 kHz XTAL and 600-0-600V, 1A xfmr. B. Robertson, 12 Hazel Close, Mildenhall, Suffolk.

Compact TX/RX for 160m, A3/A1 or A1 for 12V mobile operation. London area or nearby counties only. Buyer inspects. G. H. Woolner, G4BC, 35 New Road, Wood Green, London, N22. 01-888 3428.

S meter for AR88D. W. J. Robinson, 296 Myton Road, Warks.

Small 2m or 10m portable transceiver for mobile operation, prefer 6V p.s.u. A. S. Clelland, G3UUQ, 397 London Road, Cheam, Surrey.

H/B or circuit for Minimitter RX MR/44. Purchase or loan. B. Dodds 1 Croft View, Killingworth, Newcastle upon Tyne, NE12 OBT.

Original p.s.u. for B2 TX/RX. Must be in perfect working order in original tin box unit. No mods. For sale. AR88LF, perfect cond. £25. Buyer collects. C. T. Wakeman, G4FN, Broadwater House, Clifton Terrace, Southend-on-Sea, Essex.

Ex Govt. Bug Key, " Vibroplex " type in good cond. A. L. Ibbetson, G3XAQ, 5 Pickles Field, Batley Carr, Batley, Yorks.

Loan of 240V a.c. diesel or petrol generator during August for DXpedition. R. J. Day, G3VGT, 42 Carlton Road Grays, Essex OES5 5677.

Any information on transceiver type A Mk III, contained in attache case, valve line-up, 7Q7, 7H7 (3), 7C5. Can photostat. Loan fee offered for H/B or circuit. G. R. B. Wilson, G3APV, 18 Eskdale Avenue, Seascale, Cumberland.

TW 2m Communicator in reasonable cond. All letters answered. Also mobile p.s.u. for same. G. A. A. Gale, G8APH, 1 Wilwyne Close, Caverhsam, Reading, Berks.

Companion mod/p.s.u. for LG300. P. Hughes, G3IZH, 42 Gordon Road, Westwood, Morgate, Kent. Thanet 24949.

CLUB NEWS

continued from page 411

Harwell AERE (ARC).—Third Tuesday in the month, 7.30 p.m., Social Club, AERE Harwell. *G2HIF.*
Maidenhead (M & DARC).—First Monday in the month (Formal), Third Tuesday in the month (Informal), 7.30 p.m., Victory Hall, Con Green, Maidenhead.
Portsmouth (P & DRS).—Wednesdays, 7.30 p.m., Room 5, Twyford Avenue, Community Centre, Portsmouth.
Reading (RARC).—Second and Fourth Tuesdays in the month, 8 p.m., St Pauls Hall, Whitley Wood, Reading, Berks. *G3LFM.*
Southampton RSGB Group.—Second Saturday in the month 7 p.m., Engineering Lecture Theatre, Lanchester Building, The University, Southampton. *G3HKT.*
Southampton University (ARC).—Thursdays, 8.30 p.m., Union Bar, The University, Southampton. *G3WEA.*
Swindon (S & DARC).—Alternate Wednesdays, 12, 26 June, 7.30 p.m., Penhill Junior School, Swindon. *G3JAP.*

The compiler also acknowledges receipt of Newsletters from the following: **British Railways ARC, IRTS News, Radial** and the **RAF ARS.**

CLASSIFIED ADVERTISEMENTS

RATES: Private advertisements 3d. per word, minimum charge 5s. Trade advertisements 9d. per word, minimum charge 12s.

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SCOTTISH HOME AND HEALTH DEPARTMENT

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Applicants are invited from men, aged 21 or over, for three posts, two at Edinburgh and one at Thorntonhall, East Kilbride.

QUALIFICATIONS: South theoretical and practical knowledge of wireless engineering and wireless communications equipment including V.H.F. apparatus required. Appropriate C & G or similar qualification an advantage Must be able to drive private and commercial vehicles.

Salary: £911 (age 21) to £1,076 (age 25 or over): scale maximum £1,242.

Initially these posts will be unestablished (non-pensionable) but after one year of continuous satisfactory service the successful candidates may have an opportunity of becoming established. Write:

Establishment Officer,
Room 365A, St Andrews House,
Edinburgh, 1

for application form. Closing date 5 July, 1968.

ELECTRONICS ENGINEER

We require a DETERMINED man to join a Team engineering television receivers. The successful applicant will become a liaison engineer in the country's biggest, fastest, finest TV plant, solving design and production problems, large and small, in a well equipped laboratory (usually under pressure, with production wizards, large and small, breathing down his neck). The position offers a daily challenge, with every day different.

If you think you can help to design or build really advanced factory test equipment, tell us. We might invite you to show us.

Please apply to the Personnel Manager at the address below:

ultra RADIO & TELEVISION LTD

Fareham Road, Gosport, Hampshire Tel. Fareham 2781

GRUNDIG

SENIOR PRODUCTION FOREMAN

Applicants for this vacancy will require a sound experience in Electro/Mechanical Line Assembly and/or Electronic Testing under mass production conditions, and should have served an appropriate apprenticeship.

Experience in the supervision of male and female production operatives is essential. The preferred age group will be 28–45.

This is a Staff position offering attractive working conditions in a modern factory. Five day week. Superannuation and Life Assurance Scheme, Canteen services, etc.

Please apply in writing, giving particulars of age, education, employment history and salary requirements to:

The Personnel Manager,
GRUNDIG WORKS (N.I.) LIMITED
Tape Recorder Manufacturers,
Dunmurry . Belfast.

DEVELOPMENT ENGINEERS

required by a medium-sized Electronics Company for the following categories of design work:

(1) Solid-state S.S.B. circuitry

(2) UHF Receiver circuit techniques.

For both of these positions practical ability and enthusiasm are even more important than formal qualifications. The Company offers the facilities fo a first class laboratory fully equipped with modern test equipment.

All enquiries will be treated quite confidentially. Please apply to Box X7368, c/o *Radio Communication*, 4 Ludgate Circus, London EC4.

TV SERVICE ENGINEER required for new department. Genuine career post for experienced technician, congenial conditions. Eric Parvin, 201 Acomb Road, York. Tel. 78283.

RADIO AMATEUR.—Young man required for sales and service at the London Heathkit Centre. Must be licensed and active. Apply Daystrom Ltd., 233 Tottenham Court Road, London, W.1.

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LICENSED AMATEUR, married, three children, experienced administration and marine electronics with initiative and willingness to work seeks employment Southern England. Willing try any work that offers interest and challenge.—Box No. X7366, c/o *Radio Communication*, 4 Ludgate Circus, E.C.4.

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QSL CARDS: Two-colour, variable design, attractive from only £3 3s. per 1000 (inclusive). Send foolscap s.a.e. for samples to ARA Press, 46 Moat Ave., Green Lane, Coventry.

100 PAGE illustrated catalogue No. 17 of Government and manufacturers electronic and mechanical surplus, also a complete new section of the latest semi-conductors and miniature components, includes a credit voucher for 2/6. Send for your copy now. Price 3/- Post Free. Arthur Sallis (Radio Control) Ltd., 93 North Road, Brighton.

SERVICE SHEETS. Radio, Television, Tape Recorders 1925-1968 by return post, from 1/- with free fault-finding guide. Catalogue 6000 models, 2/6. S.a.e. enquiries.—Hamilton Radio, 54r London Road, Bexhill, Sussex.

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If you are 19 or over, with practical experience in at least one of the main branches of telecommunications, fill in the coupon now. Your starting salary would be £828 (at 19) to £1,076 (at 25 or over); scale maximum £1,242 (rates are higher at Heathrow). Non-contributory pensions for established staff.

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Apply today, for full details and application form.

Write for details to: Mr. T. H. Mallett, B.Sc., (Eng.). C.Eng., M.I.E.E., Room 754, The Adelphi, John Adam Street, London, W.C.2, marking your envelope 'Recruitment'.

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Address

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National Air Traffic Control Service

RRC/1

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Sommerkamp FT-DX 150 transceiver, 80–10 metres	215	0	0
Sommerkamp FT-DX 500 transceiver, 80–10 metres	250	0	0
Swan Line Equipment:			
Swan 500 SSB transceiver, 80–10 metres	250	0	0
Swan 350 SSB transceiver, 80–10 metres	216	0	0
Swan 230-XC power supply (to suit 500 or 350)	49	0	0
Swan 410 VFO and adapter	61	15	0
Hallicrafters Equipment:			
SX-130 Communications receiver	86	15	0
SX-122 Communications receiver	148	5	0
SX-146 SSB receiver, 80–10 metres	137	5	0
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Eddystone Radio Ltd.:			
Eddystone EA12 Amateur bands receiver, 160–10 metres	193	0	0
Eddystone 940 Communications receiver	143	0	0
Eddystone 840C Communications receiver	70	0	0
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Eddystone EB35 receiver	62	10	0
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Trio JR-60 14 tubes amateur communications receiver, 540 kc/s.–30 mc/s., plus 142–148 mc/s.	61	19	0
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Lafayette Communications Receivers:			
HA-500 Amateur bands receiver, 80–6 metres	44	2	0
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K.W. Vespa Mk. II transmitter (with P.S.U.)	135	0	0
K.W. 2000A SSB tranceiver, 160m.–10m. (with P.S.U.)	232	0	0
Mosley Electronics (Beams):			
TA-33Jr. Triband three element beam	27	5	0
TA-32Jr. Triband two element beam	19	5	0
TA-31Jr. Triband dipole	11	11	0
V-3Jr. Triband vertical	8	5	0
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Swanco CSE Equipment:			
Swanco CSE 2A10 solid state transmitter	43	7	0
Swanco CSE 2AR solid state receiver	44	0	0
Swanco CSE type II A.T.M.A. mobile/fixed portable antenna	9	15	0
Swanco CSE safety mobile microphone, **Type MM2**	2	17	11
Swanco SP.44 2 metre converter	10	10	0
Swanco SP.144 with mains P.S.U.	13	13	0
Swanco 100 kc/s. calibrator	5	19	6
Halson Mobile antenna, now all weather, all bands system	6	17	6
Extra coils (when more than one band is required)	3	17	6
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Echelford BI 4 transmitter for 4 metres	30	0	0
Echelford MI 4 transmitter (mains or mobile)	40	0	0
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Full range of **Drake Equipment** available to order.
Full range of **Heathkit Equipment** available to order.

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	£	s.	d.		£	s.	d.
CR.70A receiver	19	10	0	**CR.45RB**	11	7	0
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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
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	£	s.	d.
Joystick std.	4	15	0
Joystick de-luxe	5	19	6
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Type 4 tuner	4	4	0
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Shure 201	4	10	0
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Shure 444	10	12	6
Shure 401A	5	10	0
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SX28 RECEIVER and Handbook. Good mech order but not working Buyer collects. Offers to G3KI, The Horns, Crondall, near Farnham, Surrey.

K.W.VANGUARD MK. II.—160–10 Metres and Lafayette HE80 RX 550kHz–30MHz plus 142–148MHz. Both in good condition, £35 each or £60 the pair. Ring Robins Halnaker (Sussex) 333, weekday evenings.

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NATIONAL H.R.O. with 6 coils, (Bandspread on, 10m, 20m., 15m., 80m., and ordinary coverage of 40m and Top Band). Perfect Cond. also included an R1155, £35 o.n.o.—41, Crabtree Lane, Great Bookham, Surrey. Tel. 4743.

SAVE £50. Heathkit SB300-E receiver in mint condition. Professionally wired. £120. Telephone 01-942 7246 or Box X7365.

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

1 WATT TRANSISTOR AMPLIFIERS on printed circuit less 6 components only, 8/6 post free, complete kit, 17/-. Circuit supplied. BJM Electronics, 92 Hainault Road, London, E.11 (mail order only).

P.S.U. for relay control systems, 230 volt AC input, 55 volts DC 6·3 volts AC out. Suitable for bias supplies with additional smoothing, blue hammertone case. Price £3/19/6 each cash with order, plus postage and packing.—Magnetic Controls Ltd., Upper Stone Street, Maidstone, Kent.

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(INCORPORATED 1926)

PATRON H.R.H. THE PRINCE PHILIP, DUKE OF EDINBURGH, KG

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Radio Society of Great Britain,
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Shop and Shack Shortcuts	34/–

73

Care and Feeding of a Ham Club	9/–
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Better Shortwave Reception	27/6
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S-9 Signals	9/6

EDITORS AND ENGINEERS

Radio Handbook	88/6

MISCELLANEOUS

Basic Electricity (*Dover*)	25/6
Basic Electronics (*Dover*)	23/6
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Dictionary of Radio and TV (*Newnes*)	38/–
Electrons, Atoms, Metals and Alloys (*Dover*)	19/6
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Transistors in Practice (*World Publications*)	30/9
Understanding Television (*Data*)	40/–
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World Radio TV Handbook	43/–

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