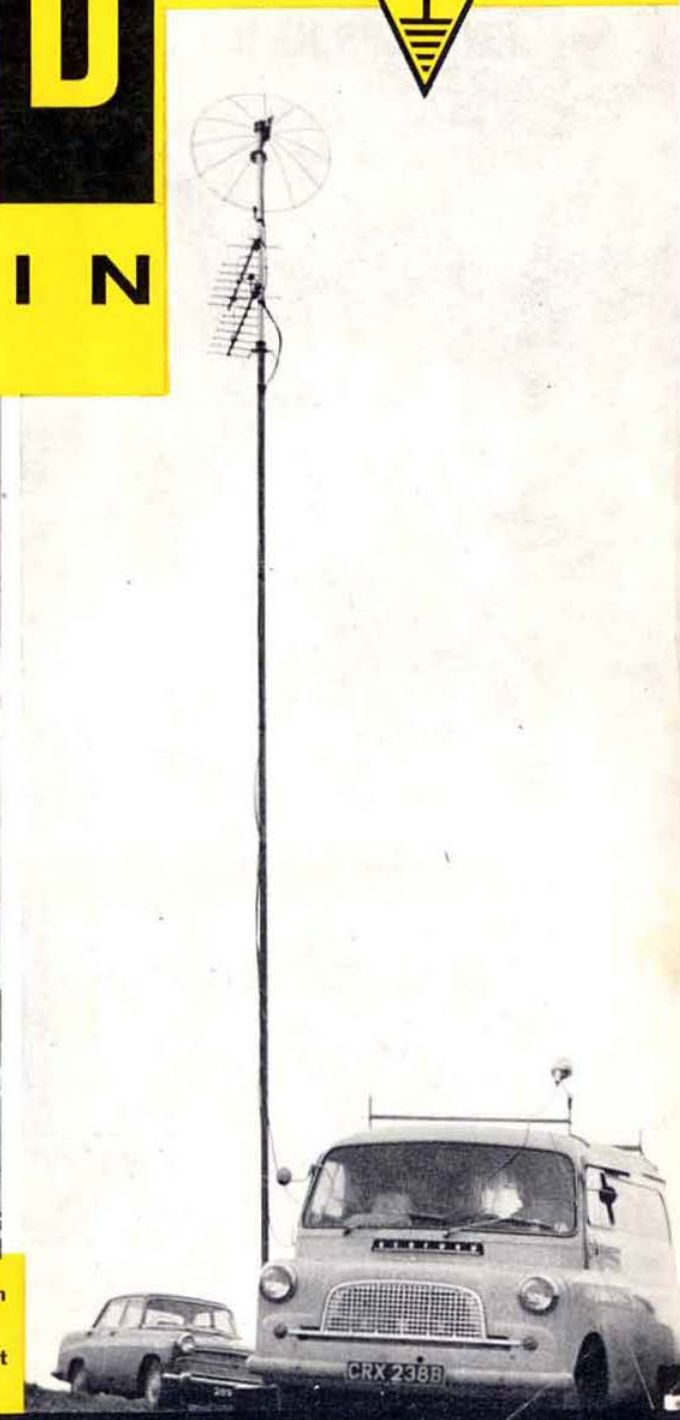
RSGB BULLETIN

OCTOBER 1967
VOL 43, No. 10

Cable and Wireless Satellite ground station on Ascension Island, Mid-South Atlantic (see page 627).



G8ARL Portable operating during the first 1296 Mc/s Contest in May.

JOURNAL OF THE RADIO SOCIETY OF GREAT BRITAIN

EXHIBITION — page 693.

Front Cover

Commercial and amateur approaches to launching u.h.f. transmissions reveal perhaps an embarrassing comparison, but both are capable of good achievements in their respective fields; for G8ARL/P the dish on the right meant first place in the 1296 Mc/s portable Contest on 20-21 May, with a top distance of 106 km. The commercial array is the property of Cable and Wireless, situated on Ascension Island (*photo by courtesy of C & W*).

RSGB BULLETIN

Incorporating RADIO COMMUNICATION

OCTOBER 1967
VOLUME 43 No. 10

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● Upper and lower sideband on all models ● 200 watts P.E.P. input ● Single knob tuning with 2 kc/s dial calibration ● Operate fixed or mobile with appropriate power supply ● Crystal filter type SSB generator ● High performance (1 μV sens.) receiver ● Built-in 'S' meter VOX, PTT and ALC. Dimensions 12¼" wide × 6¼" high × 10" deep.
Model HW-12A (80 metre) covers 3·6-3·8 Mc/s. **Model HW-32A** (20 metre) covers 14·2-14·35 Mc/s but can be easily adjusted for any 150 kc/s of 14 Mc/s band. Designed for easy assembly. Over 90% of the components mount on a heavy duty circuit board. Alignment is easy. Requires only a receiver, VVM with RF probe and dummy load.

HW-12A	**Kit £53.10.0**	**Assembled £68.0.0**
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HP-23E	**Kit £27.10.0**	**Assembled £33.0.0**
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3" MONITOR OSCILLOSCOPE, Model-610E

● Full transmit and receive monitoring facility for SSB-AM-CW-RTTY ● 160 to 10M transmit ● IFs from 455 kc/s to 6 Mc/s receive ● Trapezoidal on transmit if req. ● Built-in two tone generator ● Power input limits 15 W to 1 KW ● Styled for use with Heathkit SB series, but may be used with any transmitter and virtually any other receivers ● Built-in 6 dB step attenuator. Permits reference PEP measurements. Power requirements 110-240 V ac, 50-60 c/s. Size 5" h × 10" w × 11¼" d. Weight 14lb

Kit £37.2.0 **Assembled £47.2.0**

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Gives up to a full 500 kc/s Wideband display. Plus 10 kc/s single-signal display. Spot band openings without tedious hunt and tune procedure—aids accurate signal quality reports.

Kit £57.10.0

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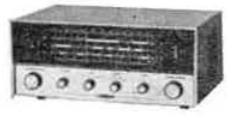
● For the discerning CW operator ● Solid-state fully electronic keyer ● Fast or slow speed adjustment, 15-60 or 10-20 wpm. ● Built-in side tone ● Suitable for LH or RH operators. GB keying only—105V dc at 35 mA max. Built-in power supply.

Kit £21.0.0 **Assembled £28.0.0**

Auto Trans for 240V ac £1.4.6 extra

SHORT WAVE RECEIVER, Model GR-64E



● Make your first shortwave exploration with this inexpensive yet efficient receiver ● Four switched bands ● 3 SW covering 1 to 30 Mc/s plus broadcast 550 to 1620 kc/s ● Bandspread all bands ● Clearly marked illuminated 7" scale ● Noise limiter ● Built-in 5" speaker ● Phone jack output ● Signal strength meter ● BFO for CW and SSB ● Built-in broadcast antenna ● Simple circuit board construction with pre-aligned coils and IF's ● Attractively styled with charcoal grey cabinet, black panel with green and white band markings ● Cabinet size 13¼" w × 6" h × 9" d. Weight 15lb. Power requirements 110/240V ac 50-60 c/s.

Kit £19.19.0 **Assembled £24.19.0**

DE LUXE 5 BAND SW RECEIVER, Model GR54E

also available, full spec. on request.

Kit £44.10.0 **Assembled £57.15.0**

2 METRE AM TRANSCEIVER Model HW-30

● For portable, mobile or fixed use ● Ideal for local and RAEN purposes ● TX 4 watts input ● RX super regen having RF stage ● Operates from 110V (240V ac mod 14/- extra) or from external dc supply ● Complete with microphone Less crystal (8·000-8·111 Mc/s) FT 241 or 243 Types may be used. Weight only 6½lb. Size 9¼" w × 8" h × 6" d.

Kit £23.10.0 **Assembled £33.10.0**

POWER SUPPLY, Model GP-11

Vibrator power supply 6 V dc @ 6 amps or 12V dc @ 3 amps IN. 250 V dc @ 100 mA OUT. Ideal for use with HW -30 or similar unit. Weight 6lb. Size 4¾" h × 6½" w × 4⅛"d.

Kit £9.10.0 **Assembled £12.0.0**

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32 ft high-strong steel construction-self-supporting base size 3ft. square. Aerial mounting accessories available as extras. HT-IG kit (Galv) £43. 15. 0. HT-I kit (Red oxide finished) £37. 15. 0.

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RG-1 Receiver

GC-1U Receiver

HIGH SENSITIVITY GENERAL COVERAGE RECEIVER. Model RG-1 ● Frequency coverage from 600 kc/s to 1·5 Mc/s and 1·7 Mc/s to 32 Mc/s ● Send for details.
Kit £39.16.0 Assembled £53.0.0
OPTIONAL EXTRAS available for models RG-1 and RA-1.

"MOHICAN" GENERAL COVERAGE RECEIVER, Model GC-1U ● In the forefront of design, with 4 piezo-electric transfilters ● 10 transistors ● variable tuned BFO and Zenner diode stabiliser ● **Kit £37.17.6 Assembled £45.17.6**
Suitable Battery Eliminator, Model UBE-1 **Kit £2.17.6**

"AMATEUR" TRANSMITTER, Model DX-100U ● Covers all the "amateur" bands from 160-10 metres, 150 watts DC input ● Own power supply. **Kit £81.10.0 Assembled £106.15.0**

3" OSCILLOSCOPE OS-2 ● A small general purpose scope ● **Kit £23.18.0 Assembled £31.18.0**

REFLECTED POWER METER. Model HM-11U ● Indicates Antenna/Tx match ● **Kit £8.10.0 Assembled £10.15.0**

DX-100U Transmitter

RA-1 Receiver

"AMATEUR" BANDS RECEIVER, Model RA-1 ● Covers all "amateur" bands ● 10-160 metres ● Half-lattice crystal filter at 1·6 Mc/s I.F. ● Provision for fixed, portable or mobile uses ● Switched USB and LSB for SSB ●
Kit £39.6.6 Assembled £52.10.0

Q MULTIPLIER, Model QPM-1 ● May be used with receivers having 450-470 kc/s. I.F. ● Provides either additional selectivity or signal rejection ● Self powered.
Model QPM-16 for 1·6 Mc/s I.F.
Either model Kit £8.10.0 Assembled £12.14.0

"AMATEUR" TRANSMITTER, Model DX-40U ● From 80-10m ● Power input 75W C.W., 60W peak. CC phone ● Output 40W to aerial ● **Kit £29.19.0 Assembled £41.8.0**

VARIABLE FREQ. OSCILLATOR, Model VF-1U ● Calibrated 160-10m ● Fixed output on 160 and 40m ● Ideal for our DX-40U and similar TX ●
Kit £10.17.6 Assembled £15.19.6

GRID DIP METER, Model GD-1U ● Continuous coverage 1·8 to 230 Mc/s ● Self contained ●
Kit £11.9.6 Assembled £14.9.6

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Leads the world in Transmitter/Receiver design. Models now have full RTTY facility.

SB-401E Transmitter

SB-301E Receiver

80-10M deluxe AMATEUR BANDS RECEIVER, Model SB-301E ● Of advanced concept, this model offers unsurpassed value ● Up-to-date design ● Latest construction techniques ● Outstanding performance ● Wt. 22lb. Power req: 115-230V A.C. 50-60c/s 50W. Size: 14¾" × 6⅜" × 13¾". **£125.0.0 (less speaker)**
Assembled £155.0.0

80-10M TRANSMITTER, Model SB-401E ● Designed for lock-in facility with the SB-301E ● A self-powered, filter type Tx. with a P.E.P. of 180W ● Wt. 32lb. Power req: 115-230V A.C. 50-60 c/s
Kit £140.0.0 Assembled £170.0.0

SBA-401-1. Crystal kit required for split frequency operation with receivers other than SB-301. **£15.5.0**

Kilowatt LINEAR AMPLIFIER, Model SB-200.
● Styled for use with Heathkit SB Series but can be used with any other exciter (40 PEP IN for 400 PEP OUT) maximum loading 1200 w dc SSB, 1000 w CW (2) X T160L (or 572B) GG Triodes. Switched 80-10 metres Pi output 50-80 ohms. self-powered 110-240V ac 50-60 c/s. Weight 35lb.
Kit £107.10.0 Assembled £132.0.0

DE LUXE 80-10M TRANSCEIVER, Model SB-101.
● 180 watts input P.E.P. SSB-170 watts input CW on five bands, 80-10 metres ● Switch selection of Upper or Lower Sideband or CW ● Built-in CW side-tone ● Operates PTT or VOX ● Transceiver tuning with Heath SB-Series LMO (Linear Master Oscillator, features 1 kc/s dial calibration) or crystal-control transmit with VFO receive or crystal-control transceive ● Separate offset CW carrier crystal ● Triple Action Level Control ● Built-in 100 kc/s crystal calibrator ● Quiet, enclosed relays ● Fixed or mobile operation with the Heathkit HP-23 or HP-13 power supplies and SBA-100-1 mobile mount ● Fast assembly with circuit board and wiring harnesses ● Simple, fast alignment requires only a VVM RF probe or VOM, a dummy load and a broadcast receiver.

We invite you to compare the specifications of the SB-101 with those of any other make of SSB Transceiver . . . regardless of price! Write to Heathkit . . . we will provide you complete SB-101 specifications with schematic so that you may make your comparison in detail. You will discover it includes all of the high-performance innovations you've heard about. Dimensions 14¾" wide × 6⅜" high × 13¾" deep.
(Weight 23lb.) less speaker
Kit SB-101 £165.0.0 Assembled £200.0.0
Kit SBA 100-1 Mobile mount £8.10.0
Kit SBA 301-2 optional 400 c/s filter for CW £10.10.0

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★ 12 volt DC operation
★ Price £14 17 6.

Coming shortly. QQV03-10 15 watt transmitter. Complete with modulator and power unit. Details and price later.

Components from modern radio telephones

Solid State Power Supply Units 12v DC in 300v 150 ma out complete. Three months guarantee. Neg. or pos. earth. ... **£6 17 6**
As above giving 400v 200 ma **£8 18 6**

Kits. Solid state PSU mark 2 Toroidal transformer, Tapped secondary, heat sinks, 2/OC35-NKT. 404. 12v in 300v 150ma out. Inc. new c's & diodes. Less chassis. P. & P. 4/6 ... **£3 10 0**
As above but giving 400v at 200ma with 2G220 transistors, P. & P. 6/6 ... ... **£4 17 6**

Transistor Modulator Kit. 15 watts. Pre-tested and wired P.C. panel connecting to NKT 404 driving pair OC35 on heat sink. Including transformer to QQV03-10/3-20a and tailored mike insert 300-3500 c/s. Less chassis. P. & P. 6/6 ... ... **£8 18 6**

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Constant impedance, suitable 70cm 50v coil new. 72 ohm BNC plugs 5/- each. **£2 15 0**
Aerial relay up to 200 mc/s 25 watts 6v coil some 12v **7 6**
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Valves
QQV03-10 A grade **7/6**
QQV03-20a A grade **39/6**
QQV06-40a/5894 **38/6**
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6AQ5 **2/6**

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2N457 new **15/-**
2N708 new **3/9**
2N1547 new NKT 12T new **1/6**
Diodes 1N645 new **4/-**
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Modulation Transformers
6V6/EL84pp to QQV03-20a P. & P. 4/6 ... ... **17 6**
6AQ5pp to QQV03-10 P. & P. 3/6 ... ... **12 6**

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Ferrite Pots. 0.6 high, 0.9 wide, 1/6 per doz.
LA2702 **2/6** LA2103 **7/6** LA13 **7/6** LA77 **4/6**

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230 volt to 115 volt with 4 other taps. new
Auto 250w shrouded P. & P. 4/6 ... ... **15 0**
Toroidal transformer for transistor power supplies. With secondary taps up to 400v at 200ma. New 2¼h × 2⅛ × 2$\frac{3}{16}$ circuit provided **47 6**

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QQV03-20a/6-40a base tank cct micro adjustable link mostly 2m some 4m **10 0**

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All new British manufacture
100 microamp 3$\frac{3}{16}$ sq. calibrated 0-100/200 volts 0-20k/50k ohms including 20 way double bank switch **45 0**
0-500 microamp 4½ by 4⅜ **35 0**
0-500 microamp 3$\frac{3}{16}$ sq. **25 0**
0-100 microamp 3⅜ by 3⅜ **37 6**
25-0-25 microamp 3⅜ by 3⅜ **35 0**
0-1 ma 3⅜ by 3⅜ **25 0**
15-30 volt dc all metal 1½ dia. with locking ring **7 6**
Edge reading British 100 microamp calibrated in DB's scale slides out. Depth 3" overall width 2⅜" height 1⅛" **35 0**
Constant impedance plugs and sockets 75 ohm ½" coax N type P.T.F.E. Silver plated. **15 0**
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Low loss coax switch units 2 sw. 11 sockets. P. & P. 4/6 ... **10 0**
Honeywell, Brown, Convertors for cont. balance system (choppers) **£3 15 0**

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Professional type 1 meg. Log new 1/- each 10/- per doz. 1$\frac{1}{16}$ dia. 1¾ overall inc. pins.

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0.1 50wkg ⅜ × $\frac{7}{16}$ × $\frac{3}{16}$ **1/-** per doz
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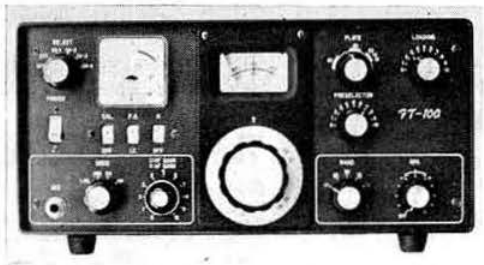
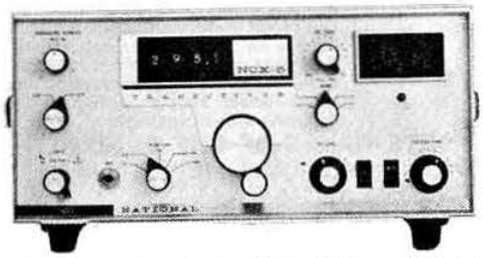
FL-200-B Tx. AM/CW/SSB. 240W p.e.p., 100W AM VOX, PTT, Break-in CW. Sidetone monitoring. Connectors for transceive with the FR-100-B supplied. Note:—The 6JS6A finals are the same electrically as the 6HF5 so the power ratings are *conservative*. **£130.**



FT-100 Transceiver. 150W p.e.p. all transistor except driver and P.A. 13" × 6" × 10" deep. **£180.**

NATIONAL

National 200. Low price transceiver 80-10; 200W p.e.p. SSB, AM, CW. **£160** less p.s.u. (p.s.u. kit £25).



NCX5 Mk.II top quality transceiver, 80-10; 200W p.e.p. SSB, AM, CW. **£225** less p.s.u. (p.s.u. kit £25).

Full details on request.

51 Wellington Street, Matlock, Derbyshire DE4 3GS

Matlock 2817 (2430 after 6)

"By gum, lad, did you see Bill Lowe's stand at the exhibition? Cor, you should have seen the stuff he had. All sorts. He's doing well, that lad. Always said he would. Absolute crook, of course—he makes a fortune out of us mugs. Stingy too. 'How much off for cash, Bill?' I says, "Get lost" he says. Just like that. Rude? Cor, dead uncouth! Unscrupulous too. Sold one feller a crystal filter for an AR88, "Course" he says, "you'll have to modify the I.F. to 9 mc/s". But what a salesman. One SWL bought a morse key for practice, and wound up buying an NCX5 and linear to go with it. One feller says "Is there any guarantee with this?" "Yes" says Bill, "Guaranteed to drive you to an early grave."

NEW STUFF:
PAROS 80-40-20 SSB transceiver £125.0.0. NCX5, NATIONAL 200, SOMMERKAMP FR-100-B, FL-200-B and the new FT-150 TRANSCEIVER. LAFAYETTE HA500, 42 gns. HA700 36 gns. HA350 75 gns. Low impedance headsets, Bug keys, plain keys, electronic keys. 10m transceivers, £10.10.0. Multimeters, Vacuum tube voltmeters, grid dip meters, SWR bridges etc. etc. Codar AT5's. Electroniques front ends. Microphones. Coming soon—the Sommerkamp FT500 all band 500W SSB transceiver. Price £220.0.0. complete.

SECOND HAND RX'S:

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Eddystone EC10	£38. 0.0
1475 with p.s.u.	£12.10.0
Eddystone 358 (ugh!)	£12.10.0
Eddystone 840C	£35. 0.0
Star SR600	£65. 0.0
KW Converter	£10. 0.0
Drake 2B	£75. 0.0
Heathkit RAI	£35. 0.0
A selection of **HRO's** from	£20. 0.0
TCS 12 Rx with p.s.u.	£12.10.0
Green TMR5	£25. 0.0
Hallicrafters SX110	£45. 0.0
SP600, last one to clear	£75. 0.0
Marconi HR22	£85. 0.0
Lafayette HA350	£65. 0.0

SECOND HAND TX'S:

Sommerkamp FL-100 (ex John Rouse)	£90. 0.0
Panda Cub	£25. 0.0
Minimitter Top-2-7	£20. 0.0
Minimitter Mercury	£35. 0.0
Geloso 212	£45. 0.0
Vanguard	£35. 0.0
Geloso "Miniphase"	£45. 0.0
Spy (B2) Transceiver complete	£15. 0.0
KW500 linear	£40. 0.0
Collins TCS12 Tx less p.s.u.	£7.10.0
Heathkit VF-1U	£7.10.0

All Rx's and Tx's fully checked and serviced. If it's not to your satisfaction—just send it back and your loot will be refunded without any question. Carriage £1.0.0.

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12v vibrators, 6d. Circuit boards 6d., (2/6 a selection of 6.) Variometers 5/-, B5 valve holders 3d.
50K carbon pots 1/6, 10K WW pots 1/6. 6 pin Plessey female plugs with 12" cable 1/-. 1000 pF trimmers, tested 1.5 KV 1/-. 2,800 pF solid dielectric variables 1/-, Tubular trimmers 3-15 pF or ½-5 pF, 1/-. B7G printed circuit v/holders 2 for 1/-.
Resistors, capacitors, relays etc., etc. Why not come and have a look round—loads of stuff which I don't bother to advertise. (Why advertise the junk which sells like hot cakes anyway?!)
Try old Bandit Bill for all communications stuff. I don't give any "fabulous bargain offers", "sensational price reductions" or any of that stuff—all I give is a fair deal and good service.
Trades—Alignment—Repairs a pleasure.
H.P.—Sure, the Credit Company are eager to get their handsome rake-off frm you.
Postage: Allow plenty, lads, I'll refund the balance.
A s.a.e. will get you the latest blurb.

73 de Bandit Bill,
VE8DP/G3UBO

P.S. Mechanical filters—just about every two bit radio now has "mechanical filter giving superb selectivity." This doesn't fool the old hands one little bit—but you guys new to the game—WATCH IT.

RADIO SOCIETY OF GREAT BRITAIN

INCORPORATED 1926

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QSL BUREAU MANAGER

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A Transistor Multi-Range Test Meter

By E. SYDENHAM, G3LOK*

THIS instrument was developed in order to fill the need for a sensitive meter, similar in function to the valve-voltmeter, but which could be used independently of a mains power supply. Such a device would be very useful for checking portable equipment " in the field " and also for mobile gear which is not readily removable from the vehicle. The danger of accidental application of mains voltages to transistorized equipment would also be avoided.

The design is based on an original Mullard circuit which was published in Mullard *Technical Communications* Vol. 5, No. 48, June 1961. The basic circuit is shown in Fig. 1, and consists of a two-stage d.c. amplifier using two pairs of BCZ11 silicon transistors arranged in long-tailed pair configuration. The input resistance of this arrangement, with its calibrating shunt resistance, is 10K ohms; full-scale deflection of the meter is obtained with an input current of 1μA, that is, with a terminal voltage of 10mV. This circuit was built up, and was found to work very well as a d.c. voltmeter, but when an attempt was made to use it with an r.f. probe, the results were disappointing. This was found to be due to two factors:

(1) The inefficiency of the probe diode at very low voltages.
(2) The high series resistance incorporated in the probe which is necessary to prevent the probe from imposing an excessive load on the circuit under test.

The idea of working at a higher input voltage, and using the probe resistance as part of the series multiplier was then tried, but this too proved to be unsuccessful; measurements taken from a high-impedance circuit by this method were not comparable with those given by a valve-voltmeter. The only conclusion to be drawn from this was that the current taken from the test-circuit, although only 1μA for full scale deflection, was still too high.

It was therefore decided that a pre-amplifier stage should be added and that this stage should be provided with heavy series negative feedback in order to increase the input resistance. If the pre-amplifier transistors had a gain of 30 times, it should be possible to increase the input current sensitivity by a similar figure and still retain the original voltage sensitivity of 10mV f.s.d.

* Wilford, 1 Churchill Road, Cowes, Isle of Wight.

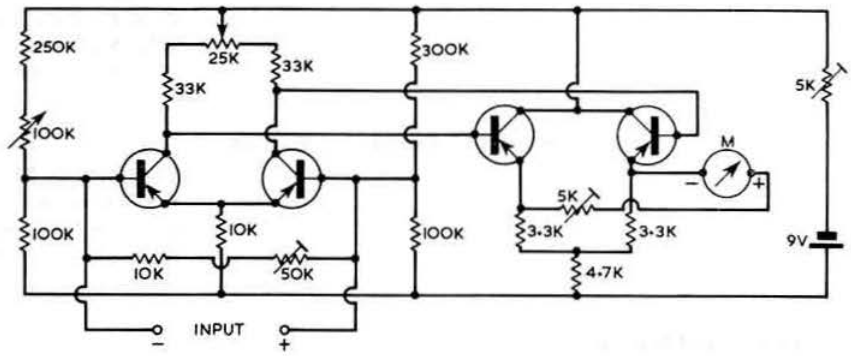


Fig. 1. Original basic Mullard voltmeter circuit.

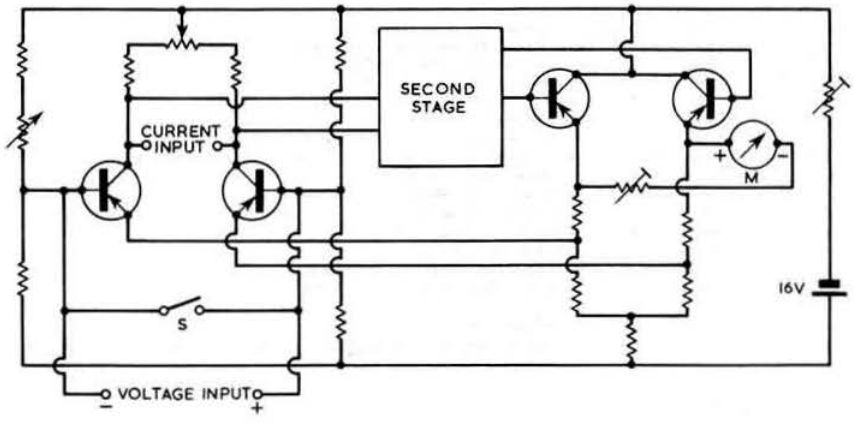


Fig. 2. A negative feedback system.

The basic circuit of the amplifier and pre-amplifier with negative feedback is shown in Fig. 2. In order to operate the transistors on the correct part of their characteristic curve in this three stage amplifier, the supply voltage had to be increased to 16V and the resistance values in the original amplifier had to be altered to suit. If the first stage bases are strapped together by closing switch S, and an input is applied to the second stage bases, this input is subject to parallel negative feedback. This has the effect of decreasing the input resistance and provides a convenient method of incorporating the current ranges.

With the negative feedback in operation, the calibration of the instrument became almost entirely dependent upon the resistance values in the circuit and almost independent of the transistor characteristics; this allowed the variable calibrating resistance of the original circuit to be dispensed with.

There was, however, still one difficulty: the zero-stability was poor and was found to be very dependent upon:

(a) changes in battery voltage; and

(b) changes in temperature.

This was traced to the pre-amplifier transistors whose characteristics were not exactly identical although they had been carefully selected. It was necessary to balance the

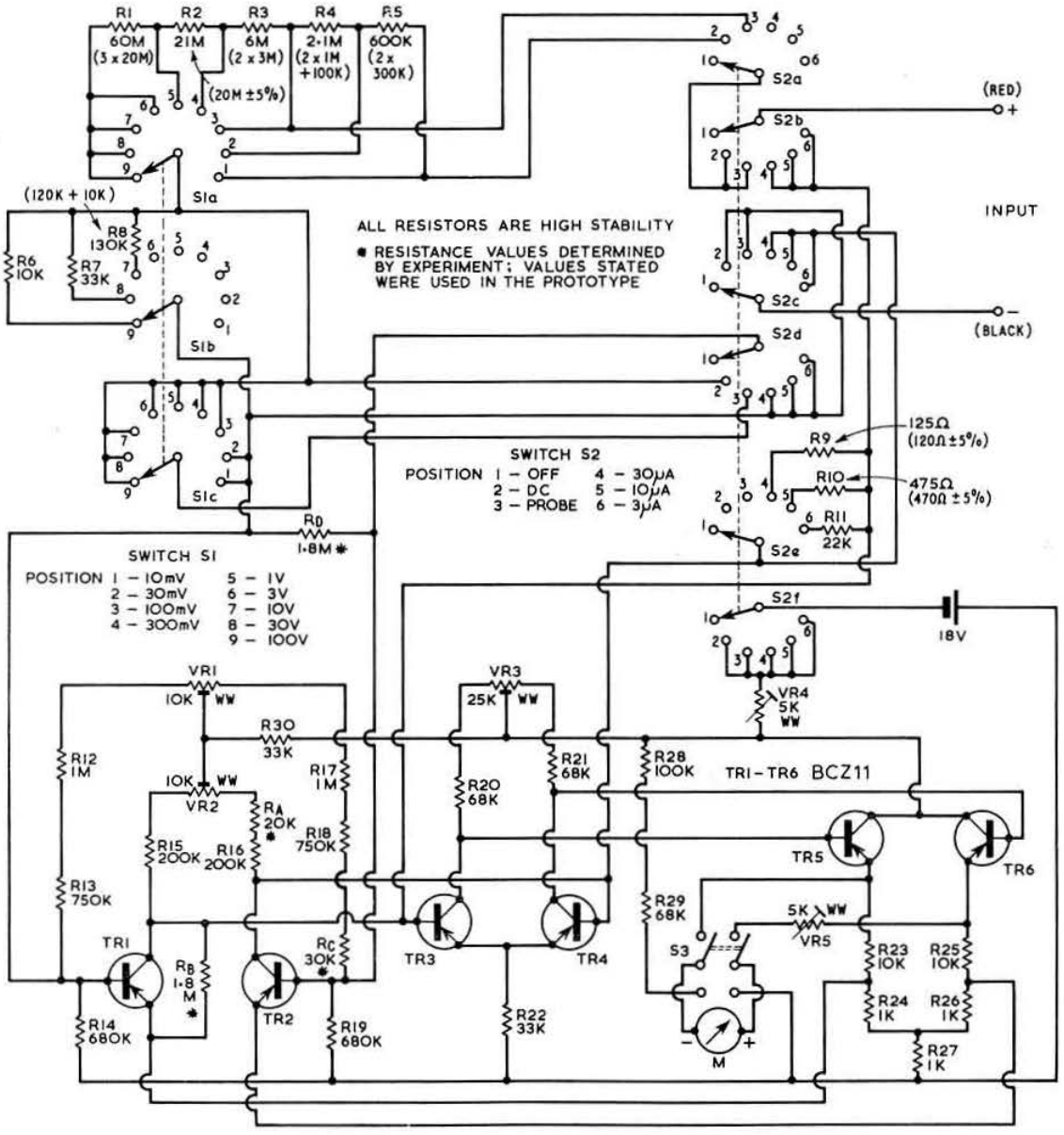


Fig. 3. The circuit of the complete instrument.

transistors so that:

(i) The gain of each amplifier arm was the same;
(ii) The standing currents were equal;
(iii) The two transistors in each pair were at exactly the same temperature.

Referring now to Fig. 3, which shows the circuit in its final form, the gain of one arm of the pre-amplifier was increased by increasing the value of its load resistance by the addition of Ra, and the standing current of the other arm was increased by shunting its transistor with Rb connected between emitter and collector. The base voltages were then equalized by adjusting VR1 and adding Rc to bring VR1 to the approximate centre of its travel. The values of Ra, Rb and Rc had to be found by experiment.

The first and second pairs of transistors were fitted into the heat sinks shown in Fig. 6.

Nine voltage ranges from 10 mV to 100 V d.c. and three current ranges of 3, 10 and 30μA are provided. Up to 3 V d.c. the sensitivity is 30M ohms/volt and above this, the range switching consists of shunting but the total input resistance is maintained at approximately 90M ohms. Two probes are provided—one a conventional diode r.f. probe and one a single-turn loop for r.f. coupling at low impedance. The condition of the internal battery may be checked immediately by the operation of the switch S3 on the meter panel. Two zero balance controls are available externally, VR1 for open-circuit conditions and VR2 for short circuit conditions; the other controls are fitted below the panel as they seldom have to be adjusted.

When the voltage probe is in use, the 10mV and 30mV ranges are inoperative and the amplifier input is short-circuited. This restricts the use of the probe to the ranges of 100 mV and above. As the probe connection is switched directly to the 100 mV switch contact, the two low range resistors R4 and R5 are omitted from the multiplier chain, but these are allowed for in the internal isolating resistor (2·7 M ohms) in the probe. R6, R7 and R8 are the shunting resistors for the 10V, 30V and 100V ranges; this system was used as it seemed impractical to attempt to use resistors in the series multiplier chain with values greater than 60 M ohms. For example, without the shunting arrangement the next series resistance in the chain would have a value of 210 M ohms and this seemed to be getting much too close

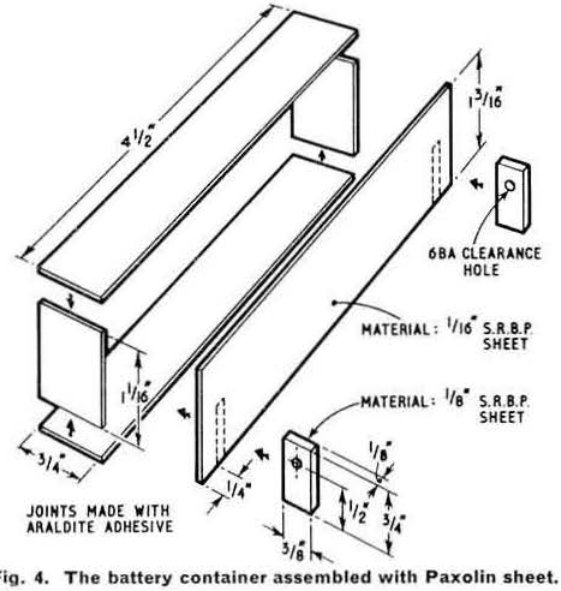


Fig. 4. The battery container assembled with Paxolin sheet.

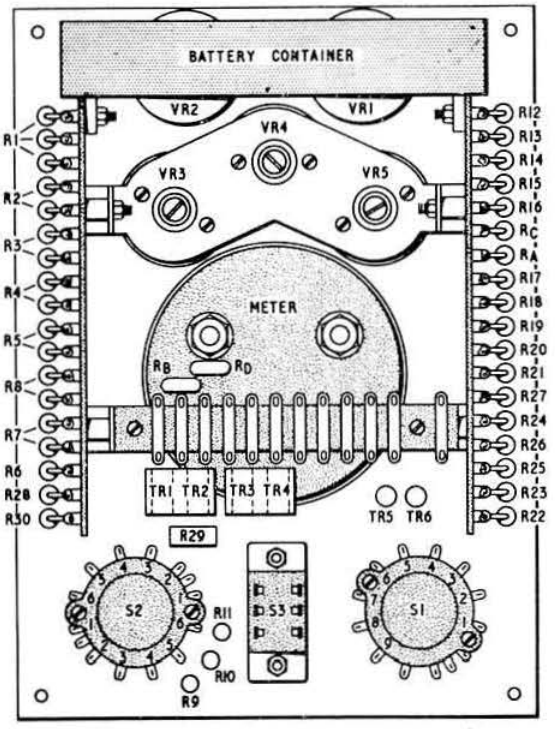


Fig. 5. The component layout.

to the insulation resistance of the circuit boards to be compatible with the maintenance of the calibration.

The layout is not critical, but the greatest attention must be paid to keeping a high insulation resistance; this was found to be most important in the case of the supply batteries which are housed in a special insulated container (Fig. 4). No connections are made to " chassis."

Construction

The instrument is built on a 5½ in. × 7½ in. × ⅛ in. duralumin panel. The resistors are mounted on two miniature 18-way tag panels and the transistors on a separate tag strip. The component layout is shown in Fig. 5. The brackets for the tag strips and internal pre-set controls Figs. 7 and 8, are attached by means of the four fixing studs which hold the 100 μA meter. The external controls VR1 and VR2 are mounted directly on to the panel. Details of the panel are shown in Fig. 9.

When assembling the wiring, Ra, Rb, Rc and Rd should be omitted and the connections for Ra and Rc bridged across temporarily.

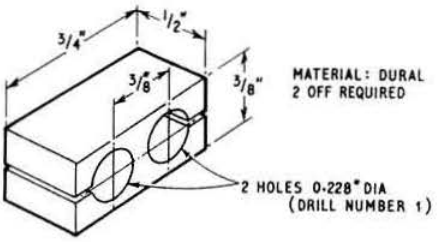


Fig. 6. A dual transistor heat sink (two are required)

Setting-up

Fix a temporary short-circuit between the bases of TR3 and TR4. Turn S1 to the 10 mV range and S2 to PROBE. Move S3 to BATT and adjust VR4 for full-scale deflection of the meter. Return S3 to the working position. Adjust VR3 for balance i.e., so that the meter reads zero. Remove the short-circuit from the bases of TR3 and TR4 and adjust VR2 for balance. Turn S2 to d.c. and adjust VR1 for balance. It may be necessary to exchange TR1 and TR2 and to include a suitable resistor in the position Rc in order to obtain balance (the circuit diagram assumes that the gain of TR1 is greater than that of TR2). Now vary the value of VR4 (i.e. the supply voltage) to check that the balance is maintained. If the meter reads forwards with an increase in supply voltage, it indicates that TR1 has a greater gain than TR2. Insert a resistor Rb, re-adjust VR2 and VR1 as before and repeat the test for balance by varying VR4. Ra and Rc may also need to be changed to allow for different values of Rb. (In the prototype the value of Rb was found to be fairly critical). When Rb has the correct value, varying the supply voltage by the full range of VR4 will not upset the balance of the circuit (a small discrepancy up to 5 per cent deflection is permissible). Re-adjust VR4 so that the meter reads full-scale with S3 in BATT position. Finally, completely re-check the balance.

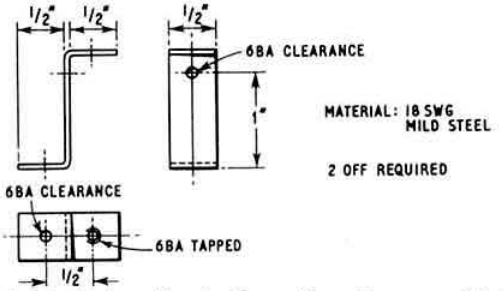


Fig. 7. The tag board bracket formed from 18 s.w.g. mild steel (two are required).

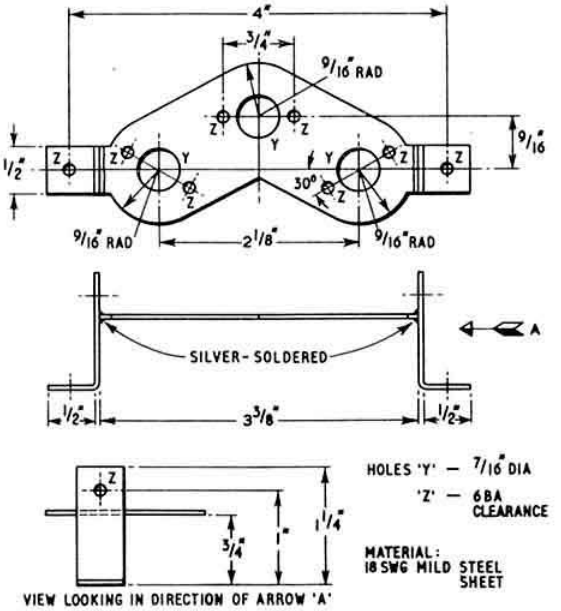


Fig. 8. The internal control mounting formed from 18 s.w.g. mild steel.

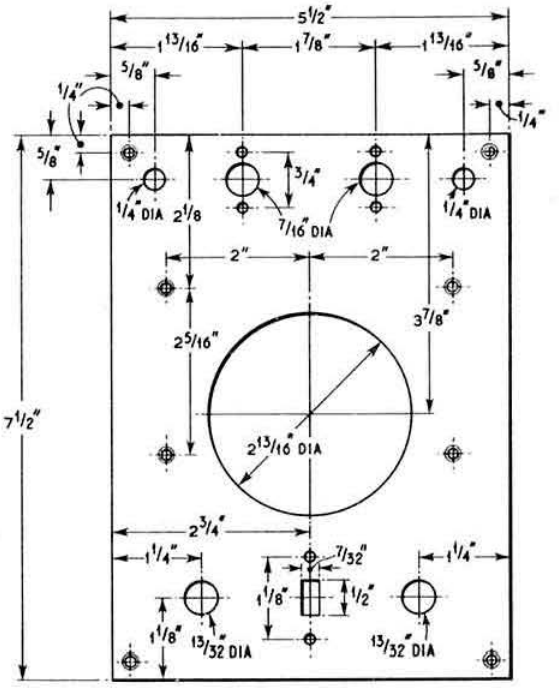


Fig. 9. Drilling plan for the panel.

Note: VR3 must be adjusted with the bases of TR3 and TR4 shorted together. VR2 must be adjusted with S2 in the PROBE position (i.e., the bases of TR1 and TR2 shorted). VR1 must be adjusted with S2 in the " DC " position. S1 remains in the 10mV position throughout. If adjustments are made under any other conditions or in the wrong order the balance will not be correct.

Calibration

Potential differences between 10 mV and 1V are best obtained by passing a known current through a known resistor. The system used by the writer consisted of two accurate resistors (1 per cent or better) of 100 ohms and 200 ohms, a 10 K ohm wire-wound variable resistor, a 9V battery and an Avometer. The circuit was connected up as shown in Fig. 10 and the current adjusted to 1 mA. 10 mV and 30 mV were available at the terminals indicated. In order to obtain 100 mV and 300 mV, the circuit current was re-adjusted to 10 mA.

Apply a p.d. of 10 mV to the input terminals and adjust VR5 to give full-scale deflection. Connect a 300 K ohms ± 1 per cent resistor in series with the input terminals, which

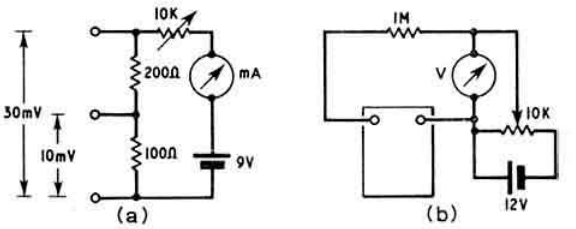


Fig. 10. Low voltage test circuit. Low current test circuit.

should reduce the reading to exactly half (i.e. 5 mV). If this is not the case, add a resistor Rd of suitable value in parallel with the input. The input sensitivity of the instrument will now be 30 M ohms/volt. The higher voltage ranges may now be checked and the multiplier-chain resistors adjusted to give the correct readings. Calibration checks for values from 1 volt to 100 volts may be obtained from a suitable source of d.c. and by using a reliable voltmeter such as the Avometer, for direct comparison.

The current ranges are calibrated by applying a measured voltage across an accurate 1 M ohm resistor; 3 volts for the 3 μA range, etc. As the internal resistance of the instrument on current ranges is low, it will not produce any appreciable error in the readings obtained. Adjustments to the multiplier chain or shunt resistors can be made by introducing a small resistance in series or by connecting a high resistance in parallel. For the higher values of resistance, much can be done by careful selection from a number of resistors of nominally the same value. For example, R1 of 60 M ohms was obtained by connecting three selected 20 M ohms resistors in series.

The Probes

The r.f. voltage probe is shown in Fig. 11: the circuit components are mounted on a small paxolin panel, the whole device being enclosed in a $\frac{5}{8}$ in. diam. duralumin tube. The paxolin panel is supported in slots cut in the plugs, which also close the ends of tube.

The loop probe is built into a $\frac{5}{16}$ in. diam. duralumin tube as shown in Fig. 12. The internal components CR2 and C2 are un-supported, being slipped into the tube surrounded by a suitable length of insulated sleeving.

Both probes are fitted to lengths of screened cable which are terminated in tails suitable for connection to the instrument terminals.

Performance

The instrument was initially calibrated to plus-or-minus

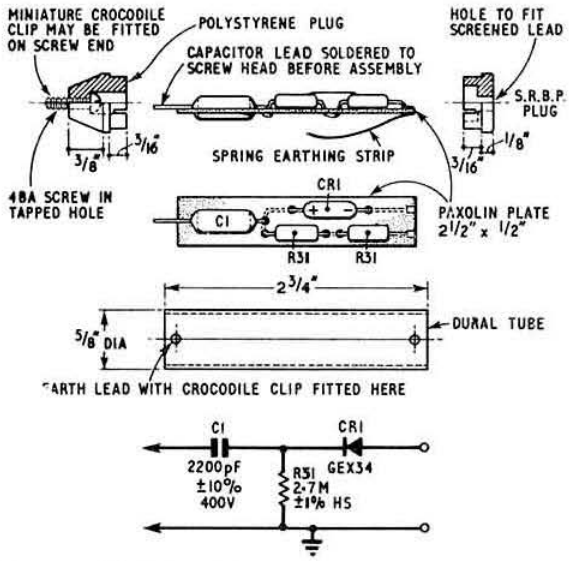


Fig. 11. R.f. voltage probe.

1 per cent and has been extensively used during the past year. A recent calibration check showed a discrepancy of 2 per cent on the 100V range and no appreciable change in the other voltage ranges. The 3 μA range was found to have a 3 per cent error.

Zero stability is reasonably good; it is necessary to allow about two minutes after switching on for the circuit to stabilize itself and after this initial " warm up " period the

(Continued opposite)

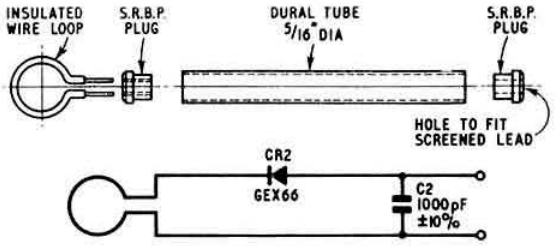
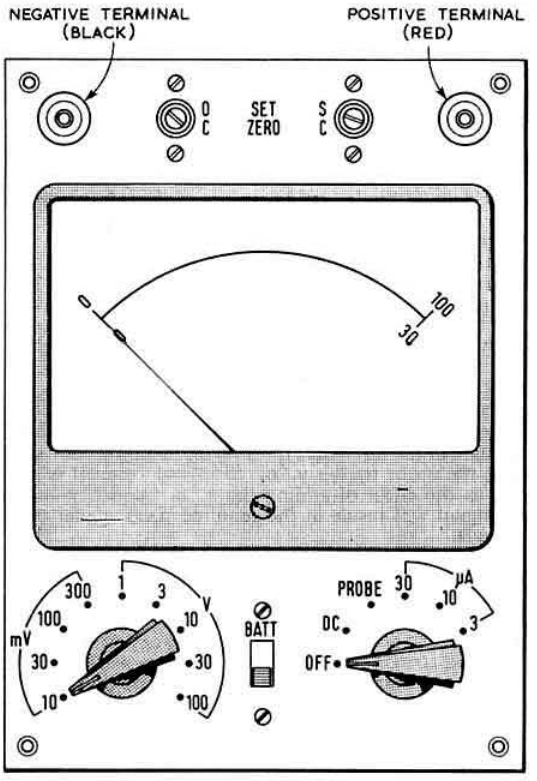


Fig. 12. R.f. loop probe.



Front view of the test meter.

Component List

CR1	GEX 34
CR2	GEX 66
C1	2200 pF ± 10% 400 volt working " Polyester "
C2	1000 pF ± 10% Tubular ceramic 350 volt working
R1	60 M ohms ± 1% High stability (3 × 20 M ohms selected)
R2	21 M ohms ± 1% High stability (20 M ohms ± 5% selected)
R3	6 M ohms ± 1% High stability (2 × 3 M ohms selected)
R4	2·1 M ohms ± 1% High stability (2 M ohms with addition in series)
R5	600 K ohms ± 1% High stability (2 × 300 K ohms selected)
R6	10 K ohms ± 1% High stability
R7	33 K ohms ± 1% High stability
R8	130 K ohms ± 1% High stability (120 K ohms ± 10 K ohms in series)
R9	125 ohms ± 1% High stability (120 ohms ± 5% selected)
R10	475 ohms ± 1% High stability (470 ohms ± 5% selected)
R11	22 K ohms High stability
R12, R17	1 M ohm ± 2% High stability, Metal oxide
R13, R18	750 K ohms ± 2% High stability, Metal oxide
R14, R19	680 K ohms ± 2% High stability, Metal oxide
R15, R16	200 K ohms ± 2% High stability Metal oxide
R20, R21, R29	68 K ohms ± 2% High stability, Metal oxide
R22, R30	33 K ohms ± 2% High stability, Metal oxide
R23, R25	10 K ohms ± 2% High stability, Metal oxide
R24, R26, R27	1 K ohms ± 2% High stability, Metal oxide
R28	100 K ohms ± 2% High stability, Metal oxide
R31	2·7 M ohms ± 1% High stability (2 selected ± 5% resistors in series)
Ra	20 K ohms* ± 2% High stability, Metal oxide
Rc	30 K ohms* ± 2% High stability, Metal oxide
Rb, Rd	1·8 M ohms* High stability
S1	" Maka-switch " assembly with three 1 pole 12-way wafers: A and B, " make-before-break." C, " break-before-make."
S2	" Maka-switch " assembly with three 2 pole 6-way wafers: E-F, " make-before-break." A-B and C-D, " break-before-make."
S3	Miniature slide switch d.p.d.t.
TR1-6	BCZ11 (Mullard)
VR1, VR2	10 K ohms wirewound preset potentiometer
VR3	25 K ohms wirewound preset potentiometer
VR4, VR5	5 K ohms wirewound preset potentiometer

2 Miniature group panels 18-way
1 Miniature tag strip (See Fig. 5)
2 Insulated terminals (1 Red, 1 Black)
2 Small pointer knobs
Tubular spacers for wafer switches and group panel fixing
(The above components are all supplied by Radiospares Ltd.)
Microammeter: Taylor Model 52, 100 μA f. s. d., scale type " C " 0 to 100 and 0 to 30, and Knife-edge pointer

* Resistance values determined by experiment; values stated were used in the prototype.

zero-drift is very small—approximately 1 per cent in half an hour under normal conditions.

Linearity is within 2 per cent on all d.c. ranges, and also when using the r.f. voltage probe on ranges above 1 volt. A useful indication can be obtained from the lower voltage ranges, the maximum full-scale deflection errors being 5 per cent on the 300 mV range and 12 per cent on the 100 mV range. The total current consumption is approximately 1·4 mA.

TVI?

It started on a Monday evening with complaints from neighbours of sparks flashing across the screen. Not the usual type of TVI you may ask yourself: correct, and this was the beginning of a complex tracking down process for G3OSS in Finchley, London, N12. The Post Office arrived and the testing started. Hours were spent spread over many weeks, during which time every piece of equipment was examined from the transmitter to the linear and from there to the aerial. In dismay, after running through the station it was decided that the aerial should be dismantled and re-erected, which is not an easy task with an h.f. six element inverted V beam. Down it came from the BXI tower, it was carefully cleaned and re-erected. Was the TVI cured? No! A clue was fortunately evident, however: flickering was noticed on the s.w.r. meter when the transmitter was first switched on at the beginning of an over. What was left to check? The Gamma match.

Methodically the Gamma match was dismantled to reveal a colony of flying ants! Over the months these insects had been sheltering in the weather proof case, but whenever the transmitter was switched on the r.f. energy literally roasted them, thus forming a partially conductive path, possibly non-linear or it may have just upset the matching.

The Gamma match was cleaned (not an easy task) and G3OSS returned to the h.f. bands without the neighbours monitoring.

The "Cornishman" S.S.B. Transmitter

By J. TAYLOR, G3OFN*

AN increasing number of clubs around the country are undertaking "mass produced" projects. The Cornishman 150 watt, 6 band s.s.b. transmitter, which can be built for less than £15, is one such project. Twenty eight of these transmitters are currently being built at the Cornish Radio Amateur Club, following the design and prototypes of G3LPB and G3OFN. The concept of the Cornishman is a simple approach to attract the newcomer to s.s.b. Alignment can be carried out using little or no test equipment, in fact a receiver with an S-meter will suffice. Unwanted sideband suppression is around 30dB and the carrier is better than 45dB down on the peak output.

In order to achieve the simplicity of the Cornishman, a single conversion to all the amateur bands is used. Fig. 1 shows a schematic diagram of the complete transmitter. The original sideband generation is nominally at 6 Mc/s, but, depending upon the availability of surplus crystals, the generating frequency can be within the range 5773 kc/s to 6773 kc/s, or alternatively within the range 8073 kc/s to 8273 kc/s. The nearer to 7 Mc/s that the generating frequency is, reduces the chances of suppressing this frequency for 40m operation. Therefore frequencies below 6 Mc/s would be the better choice for all band operation. The range 6775 kc/s to 8073 kc/s is definitely out, as this would cause unwanted spurious responses to be generated in the 80m band.

Referring to Fig. 1, the carrier oscillator is followed by a cathode follower isolating stage and then drives the balanced modulator. Audio input to this balanced modulator is from V2a, a cathode follower, which provides the correct impedance match to the balanced modulator. This cathode follower is preceded by a high gain two stage speech amplifier, ensuring that adequate drive will be available when using almost any type of high impedance crystal or dynamic microphone. Following the balanced modulator the unwanted lower sideband is removed by the half lattice crystal filter, which comprises just two crystals which are as purchased—no etching or grinding! Alternative sideband switching can be made available by switching the crystal in the carrier oscillator stage to a frequency on the high frequency side of the passband. However, it will be in the majority of cases, necessary to pull the frequency of the crystal to ensure the same frequency on changing of sidebands. The filter is followed by a class A filter amplifier driving the mixer stage. With the frequencies of sideband generation chosen only a single ended mixer is required. Spurious responses due to the mixing process are well outside the bands in use, and therefore attenuated well below the output level due to the three tuned circuits following the mixer.

The v.f.o. is switched for each band in use, except in the case when the original sideband is generated at about 6·2 Mc/s. With this selection of frequency both the 160m and 20m bands can be covered with the same v.f.o. frequency. The actual v.f.o. frequencies will differ depending on the carrier oscillator frequency and these can be calculated quite simply using the following formulae:

For 160/80/40m lower sideband the lowest frequency of the v.f.o. range will be:

V.f.o. = l.f. band edge + carrier osc. and for 20/15/10m upper sideband the lowest frequency of the v.f.o. range will be:

V.f.o. = l.f. band edge — carrier osc.

As an example, assume a carrier oscillator of 5773 kc/s. For 80m the v.f.o. will be 3500 kc/s + 5773 kc/s = 9273 kc/s. For 15m the v.f.o. will be 21000 kc/s—5773 kc/s = 15227 kc/s.

For the low frequency bands, where l.s.b. is the convention, the final frequency is obtained by subtracting the s.s.b. signal from the v.f.o. Under these conditions sideband reversal will occur and, therefore, in the arrangement described, where the filter accepts the u.s.b. signal from the balanced modulator, l.s.b. will result on the l.f. bands. In the case of the h.f. bands the final frequency is obtained by adding the s.s.b. to the v.f.o. Sideband reversal will not occur, as the effect of adding the v.f.o. frequency and the u.s.b. signal will result in the required u.s.b. signal on the h.f. bands.

The mixer is followed by a class A EF80 driver stage. Due to the fact that the final amplifier is in class AB1, no power is required to drive it—except, of course, that required to overcome circuit losses. Provision is also provided whereby the driver stage can be cathode keyed for c.w. operation. Carrier re-insertion is available for this form of operation as well as "a.m." (carrier and one sideband) and tune-up. The final amplifier is a TT21 in class AB1 running 150 watts p.e.p. input with a pi-network output tank.

Circuitry

Fig. 2 is the circuit diagram of the Cornishman transmitter. The speech amplifier comprises a 12AX7 followed by one

* Chy-yn-Gwel, Woodbine Lane, Illogan, Redruth, Cornwall.

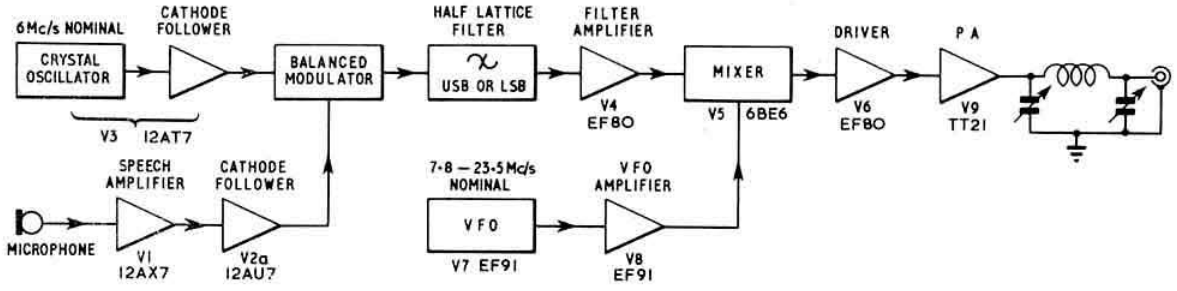
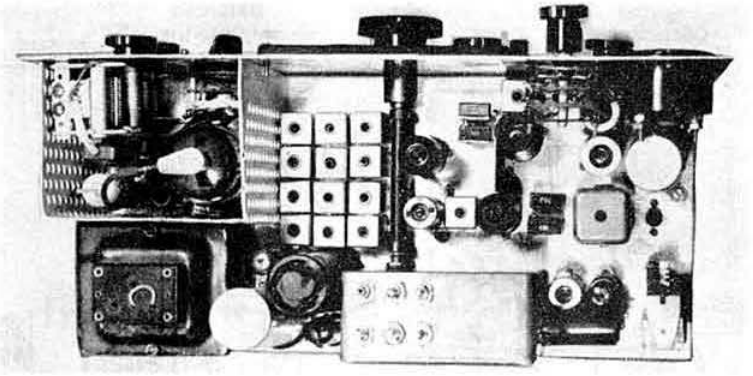
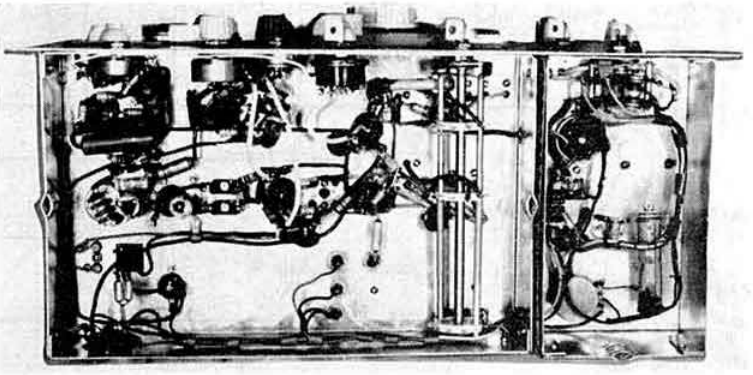


Fig. 1. Block diagram of the Cornishman s.s.b. transmitter, less the power supply which is normally a separate unit.



The top view of a Cornishman. This uses an Eddystone dial with an epicyclic ball drive. This particular transmitter deviated from the prototype layout in the incorporation of a power supply on the main chassis.



View below the chassis of a standard Cornishman. The chassis is in two sections, bolted together.

half of a 12AU7, used as a cathode follower. The other half of this 12AU7 is used as a push to talk (p.t.t.) control amplifier. Normal biasing on this stage is such that the triode is cut off leaving the relay de-energised. When the cathode is earthed, due to operation of the p.t.t. switch, the stage will conduct and operate the relay to perform the changeover functions. The carrier oscillator uses one half of a 12AT7 with its anode tuned. It is essential that no core be used, only a trimming C to bring near resonance, otherwise carrier suppression will not hold. The output is coupled to the other half, a cathode follower, which provides isolation of the oscillator from the balanced modulator in addition to providing a correct impedance match. Carrier re-insertion is by means of the potentiometer with its associated switch in the cathode circuit of this half of the valve. Coupling between the wiper of the potentiometer and the grid of the filter amplifier V4 is via a small capacitor (Cx) made up from 3 in. of semi-airspaced coaxial cable with 2 in. of wire inserted to form a capacitor with the normal inner conductor. The new piece of wire is connected to the wiper of the carrier reinsertion potentiometer, while the original inner conductor, coming out at the other end of the length of co-ax, is connected to the grid of the filter amplifier. The outer braid of the co-ax is earthed to prevent stray carrier radiation from this capacitor. To this end the connections from the co-ax to the grid of the valve and the wiper of the potentiometer must be very short.

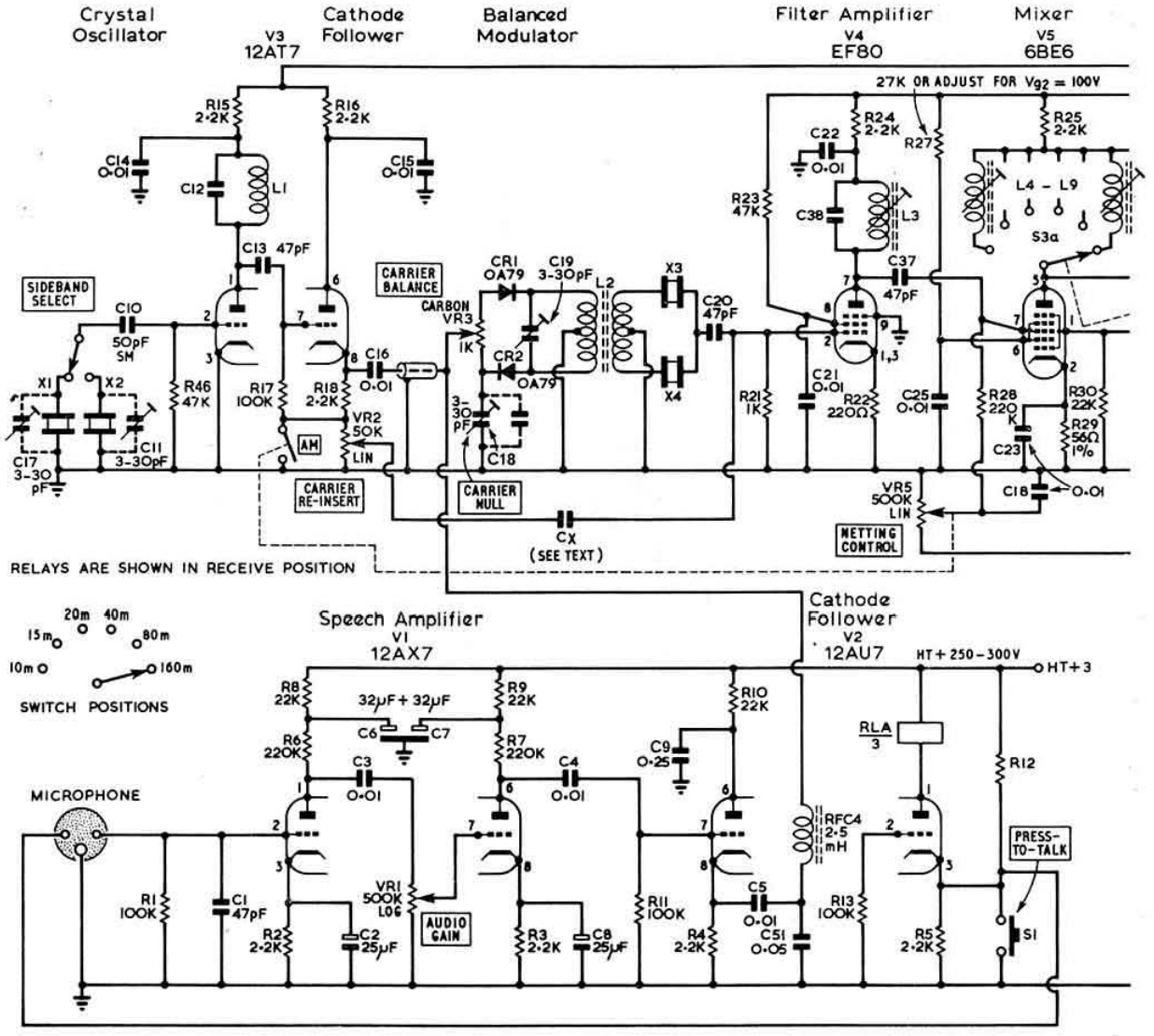
The other output from the cathode goes to the wiper of the carrier balance potentiometer. The balanced modulator comprises two diodes with the potentiometer providing resistive balancing and capacitive balance provided by the trimmer. The filter is a half lattice type made up by crystals X3 and X4. These are selected to have a frequency difference of approximately 2 kc/s.

The mixer is a 6BE6 providing a good conversion gain. The v.f.o. is a high C Colpitts type exhibiting good stability characteristics even on the higher frequency bands. The v.f.o. is followed by a class A untuned amplifier, providing the level required to drive the mixer.

Following the mixer is an EF80 class A driver. Gain control of this stage is effected by means of a 10k ohms potentiometer in the cathode circuit. Provision is also made for c.w. operation by keying the driver stage. A short circuit jack socket is included in the cathode circuit of this valve. For normal s.s.b. operation the key must be removed so that the cathode is returned to earth. The p.a. operates in class AB_1. The biasing to the TT21 grid must be adjusted so the anode is 37·5 watts, for c.c.s. working or 45 watts for I.C.A.S. rating. The anode voltage on the p.a. can be up to 1300 volts, and will provide 150 watts p.e.p. input. Normal operation of the p.a. will be when voice peaks " kick up " the anode current meter to about half full input. This will coincide with the point when grid current will begin to flow.

Construction

From the illustrations shown a general layout of the transmitter can be determined. This is not particularly critical—in fact one of the production models illustrated includes the power supply, whereas the prototype and other production models have this separate. The v.f.o. is built into a diecast box and mounted on top of the chassis at the rear. The prototype was built on two chassis, the p.a. being on one of these and, therefore, providing good screening. However, depending on personal choice, the rig can be built on one chassis. On the prototype the a.f. gain control is mounted on the front panel but production models have this control mounted directly on the chassis.



The overall chassis size, if constructed as a " one-unit " chassis, is 15⅞ in. x 7¼ in. x 2½ in. deep and is 16 s.w.g. The front panel measures 16¾ in. x 7¾ in. These sizes were selected so that the transmitter would fit into a TU5-B case. The v.f.o. assembly is built into a diecast box, Eddystone type 650.

Crystal Filter

The crystal filter uses two crystals in a half lattice configuration. The coupling transformer L2 is made up using a ferrite ring, a suitable type being a WP3808/SF6(SB500) (WP3929) which is available from STC Magnetic Division, Harlow, Essex. Both primary and secondary are bifilar wound on this ferrite ring, after treating the ring with two coats of clear nail varnish or dope. The primary is close wound over ½ in. (7/8 turns) using two lengths of 32 s.w.g. wire twisted together. The bifilar winding technique is illustrated in Fig. 3. The secondary is also bifilar wound and is spaced evenly to use up the remainder of the ferrite ring. If an 8 Mc/s filter is used 40 turns will be required for the secondary. If the choice has been around 6 Mc/s then the secondary must be 42 turns. This also requires the use of 32 s.w.g. wire. The final assembly comprises an i.f. trans-

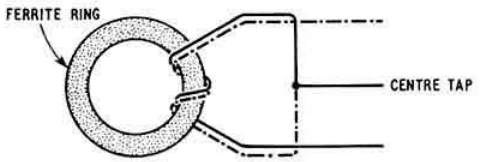


Fig. 3. Method of bifilar winding L2.

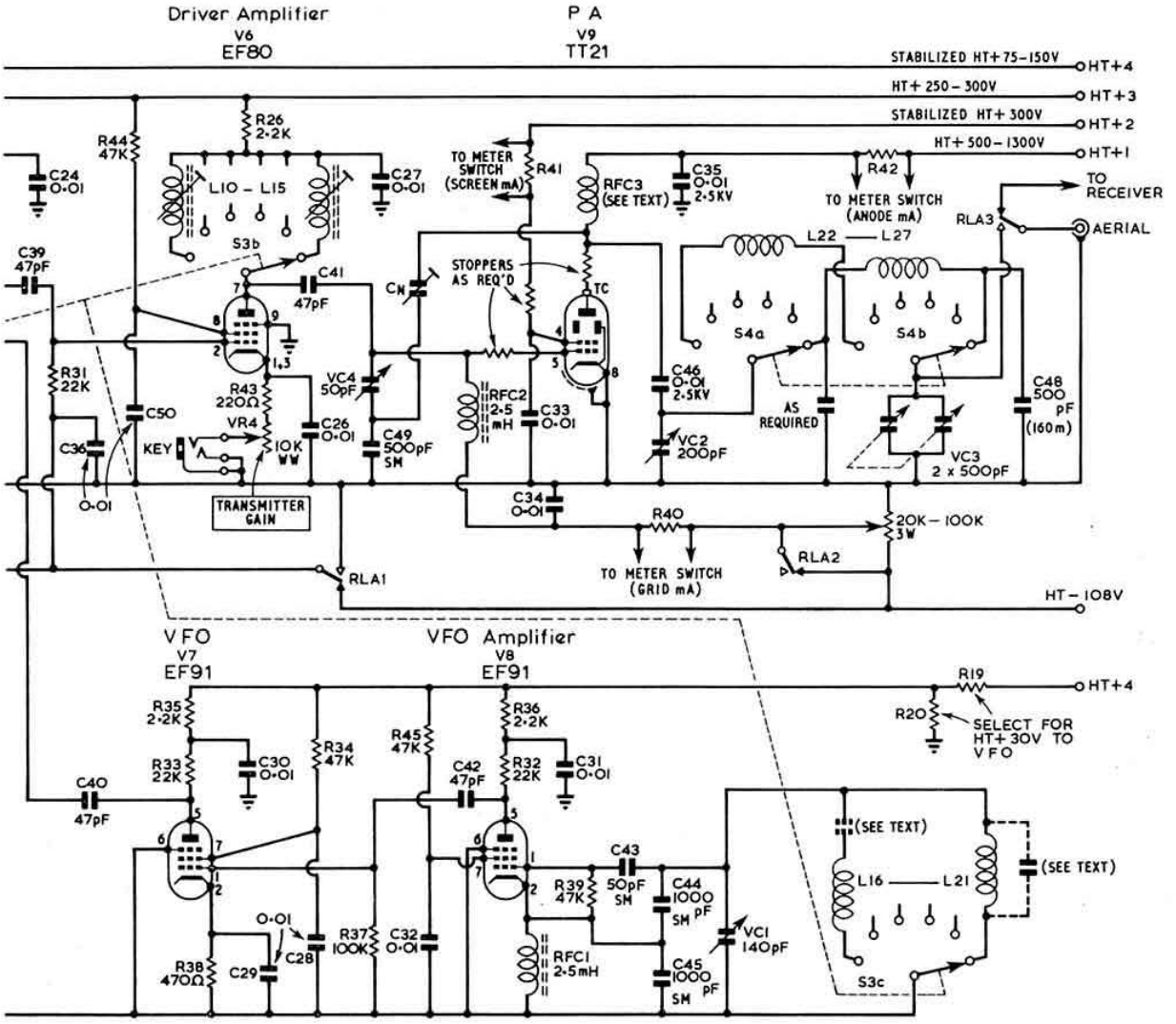


Fig. 2. The Cornishman circuit. It is relatively simple, and with a complete purchase of components can be built for less than £15.

former coil former, with a rubber grommet slid over the former. The toroidal transformer will fit on to the grommet so that the wires can be taken to the tags on the former base, and the assembly is then mounted inside an i.f. can measuring 1¼ in. x 1¼ in. The crystals are surplus FT243 types, available from Henry's Radio, chosen with a frequency spacing of 1·7 kc/s. If three of each frequency are purchased this allows a permutation of the crystals for best results. One of the lower frequency crystals is used as the carrier oscillator and this can be pulled onto the correct frequency with a trimmer across the crystal, for best speech quality consistent with adequate sideband suppression. Of the higher frequency crystals, one of these can be used as the carrier oscillator crystal for the alternative sideband selection. In this case two of the higher frequency crystals should be chosen with the widest frequency separation. The higher of these can be used for the carrier crystal and the other for the filter.

The meter used in an early prototype was a new instrument. Meters available on the surplus market are recommended in order to keep the cost of the equipment down. The meter switch must be of the break before make type to prevent flash-over of the contacts, and Yaxley switch wafers are recommended for this purpose. If the correct type cannot be found then a two pole seven way (or more) switch should be purchased and alternate positions used. The unused contacts must be drilled out and the metal tubular spacers replaced with insulating types.

The anode load coils for the driver and mixer are wound using old TV i.f. transformers with a ¼ in. diam. former. The size is not particularly critical—any available type will do. The v.f.o. coils are wound on ⅜ in. dia. formers; the number of turns are not given because the exact v.f.o. frequency will be determined by which crystal frequencies have been chosen for the filter, but will be about 5 turns for a 9 Mc/s v.f.o. frequency without a slug in the former.

The p.a. pi-tank coil former can be made up using plastic

Coil Data

Coil	Freq.	Turns	S.W.G.	Parallel C PF (Silver Mica)	Former Diam.	Notes
L1	carrier	30-20 (5·7 Mc/s-8·3 Mc/s)	32	200-100	¼ in.	Use no slug. Frequency depends upon carrier used.
L2	carrier	*pri.* 7/8 turns *sec.* 40/42 turns	32		Type WP3808/SF6 (SB500) (WP3929)	Bifilar wind primary and secondary. See text.
L3	carrier	30/35	32	50	¼ in.	Frequency depends upon carrier used.
L4	160m	150	38	150	¼ in.	
L5	80m	90	36	50	¼ in.	
L6	40m	60	32	27	¼ in.	
L7	20m	20	24	15	¼ in.	
L8	15m	15	24	10	¼ in.	
L9	10m	13	24	10	¼ in.	
L10	160m	150	38	90	¼ in.	
L11	80m	90	36	None	¼ in.	
L12	40m	60	32	None	¼ in.	
L13	20m	20	24	None	¼ in.	
L14	15m	15	24	None	¼ in.	
L15	10m	10	24	None	¼ in.	
L16	see text		24	To give required bandspread	¾ in.	Polystyrene former
L17	see text		24	To give required bandspread	¾ in.	Polystyrene former
L18	see text		38	To give required bandspread	¾ in.	Polystyrene former
L19	see text		24	To give required bandspread	¾ in.	Poystyrene former
L20	see text		24	To give required bandspread	¾ in.	Polystyrene former
L21	see text		24	To give required bandspread	¾ in.	Polystyrene former
L22	160	47	20			Former constructed from the cases of seven ball point pens cemented together with Balsa cement. Mount on the chassis vertically by a length of 6BA studding through the centre pen case.
L23	80	27	20			
L24	40	13	20			
L25	20	6	18			
L26	15	4½	18			
L27	10	3	16			

cartridges from discarded ball point pens. Similarly the former for the all-band r.f. choke in the p.a. anode circuit can be made up using seven such cartridges, one as the centre, the other six all around this. These can be glued together using balsa cement. Anchor wires of about 20 s.w.g. can be fixed to this former by heating the anchor wire and inserting through the completed former. Winding details of this r.f.c. are shown in Fig. 4. Alternatively a commercial choke can be used, but this does increase the cost of the transmitter. If the winding instructions given are followed, the resultant r.f.c. will have no resonances inside any of the amateur bands—the only resonance nearby being at 25 Mc/s.

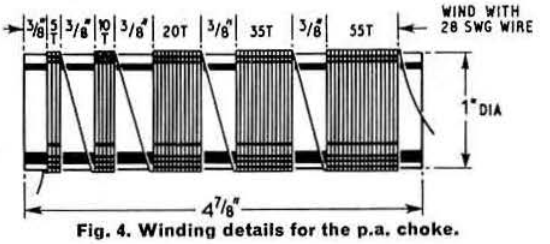


Fig. 4. Winding details for the p.a. choke.

The neutralizing capacitor, C_N, can also be made up in the shack using pieces of perspex, two lengths of 6BA or 8BA studding, four nuts and two metal discs about 1 in. diameter. Fig. 5 shows the method of construction.

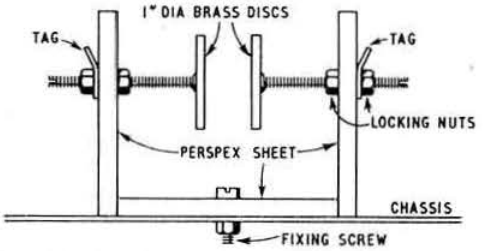


Fig. 5. Construction of C_N, the neutralizing capacitor.

Power Supply

A power supply suitable for use with the Cornishman is shown in Fig. 6. The smoothing capacitors for the p.a. h.t. line are Radiospares electrolytic types with the two sections of 100 μF and 64 μF connected in parallel. These capacitors are 450V working and two in series are suitable for an h.t. voltage not exceeding 800V. If higher voltages are to be used then suitable additional capacitors must be used in series, i.e. three such units would be suitable for an h.t. voltage of up to 1200V. Each capacitor is shunted by a 100 K, 5 watt resistor for voltage equalising. The case of the capacitor, which is the negative connection, should be insulated from the chassis except in the case of the unit at the " earthy " end of the series chain.

Dropping resistors for the stabilised supplies must be selected on completion as they will vary depending upon the actual transformer used. The transformer used to derive the bias supply can be a loud speaker transformer selected to provide 150V to 200V output on the high impedance winding when 6·3v a.c. is applied to the low impedance side.

Alignment

Initially the unit should be run with no anode or screen volts on the p.a. Under these conditions the carrier oscillator and v.f.o. can be checked for oscillation on the station receiver and the v.f.o. brought onto the correct frequency. The anode coils of the mixer and driver may then be brought to resonance after finding the appropriate beat note on the receiver. When enough output is available from the driver the p.a. grid current can be used as an indication for " on the nose " resonance.

The crystal oscillator anode coil must now be brought near resonance by adding parallel capacitance. No slug at all must be used in this coil. Following this the filter amplifier anode coil should be peaked for maximum.

To suppress the carrier and set up the filter, first remove the carrier reinsertion coupling capacitor and retard the carrier reinsertion control to minimum. Advance the audio gain control to about halfway and induce grid hum by inserting an unscreened length of wire into the microphone socket. Using the receiver S-meter as an indication peak the trimmer across the primary of L2. With the audio gain control fully off and C18 at minimum capacity, the carrier balance control should be adjusted for minimum reading on the S-meter. Adjust trimmer C18 to improve null. If this increases the carrier level then it should be connected to the other side of the balanced modulator. Juggling between the potentiometer and the trimmer will eventually produce the best null. It will be necessary to determine the correct side of the carrier balance pot to fit the trimmer C18 by experiment and a further parallel capacitor may be needed to increase C18 to correct value. The signal may now be monitored on the

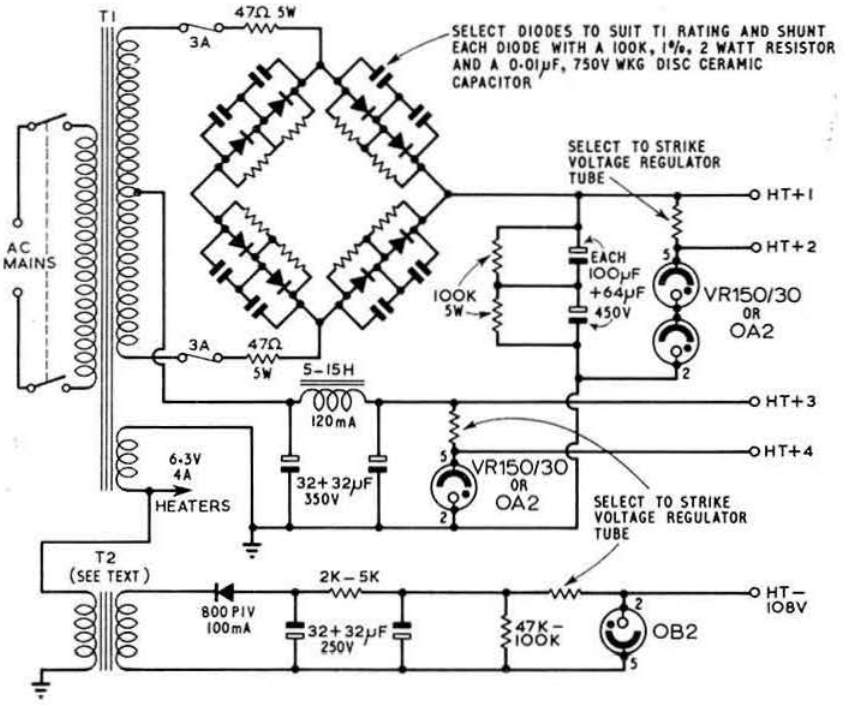


Fig. 6. Power supply circuit for the Cornishman transmitter.

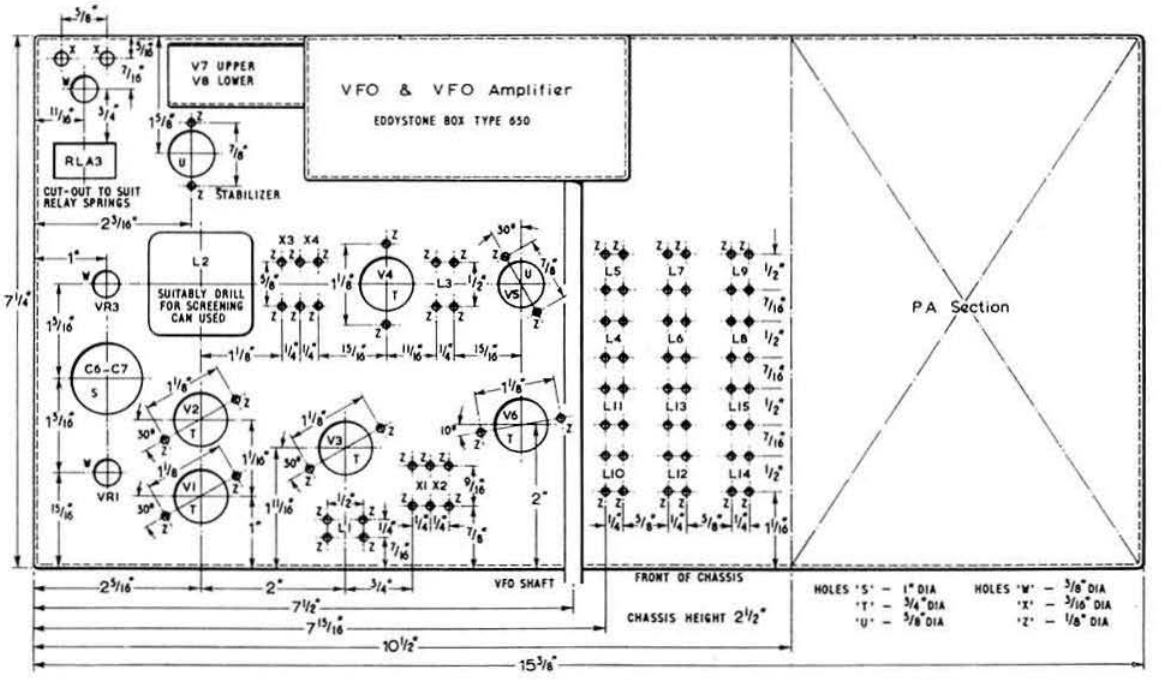


Fig. 7. Complete drilling details for the Cornishman chassis. The template from which this was drawn has been used in the construction of 28 transmitters.

Components List

C1, 13, 20, 37, 39, 40, 41, 42	47 pF ceramic, 350V
C3, 4, 5, 14, 15, 16, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 34, 36, 50	·01 μF disc ceramic, 350V
C2, 8	25 μF, 25V
C6, 7	32 + 32 μF 350V
C9	0·25μF, 350V
C10, 43	50 pF silver mica, 350V
C11, 17, 18, 19,	3-30 pF Philips concentric
C33	0·01 μF disc ceramic 750V
C35, 46	0·01 μF mica, 2500V (Benson)
C44, 45	1000 pF 5 per cent silver mica, 350V
C48	500 pF ceramic, 350V
C51	0·05 μF paper 350V
CX	see text
CN	neutralising capacitor, see Fig. 5
VC1	140 pF, type 586, Eddystone, single section
VC2	200 pF with appropriate fixed padding.
VC3	500 + 500 pF receiver type (Henry's)
VC4	50 pF (Benson or Henry's)
R1, 11, 13, 17, 37	100 K
R2, 3, 4, 5, 15, 16, 18, 24, 25, 26, 35, 36	2·2 K
R6, 7, 28	220 K
R8, 9, 10, 30, 31, 32, 33	22 K
R23, 34, 39, 44, 45, 46	47 K
R12	47 K, 2 watt, for relay coil of 6 K resistance
R19, 20	adjust to give 30V at junction, ratio 1 : 1, 3 watts
R21	1 K
R22, 43	220 ohms
R29	56 ohms, 1 per cent
R27	adjust to give 100V on pin 6 of V5 with no s.b. or v.f.o. input· 27 K for 300V h.t. supply.
R38	470 ohms
R40, 41, 42	meter shunts, as appropriate
VR1	500 K, carbon midget
VR2	50 K, linear, carbon
VR3	1 K, linear, carbon (Benson)
VR4	10 K, wire wound, 1 watt
VR5	500 K, linear, carbon, with switch
	(all resistors 10 per cent carbon ½ watt unless otherwise stated)
S1, 2	1 pole, 2 way (Radiospares)
S3a, 3b, 3c	3 wafers each 2 pole, 6 way with a long shaft assembly (Radiospares)
S4a, 4b	2 pole, 6 way (Benson)

V1 12AX7, V2 12AU7, V3 12AT7, V4 EF80, V5 6BE6, V6 EF80, V7 EF91, V8 EF91, V9 TT21
CR1, CR2, Mullard OA79 or OA81 diodes, matched pair
Valve bases skirts and shields
Crystals
X1, X3, FT 243 type. 5773, 5873, 5973, 6173, 6273, 6373, 6473, 6573
X2, X4, FT 243 type. 5775, 5875, 5975, 6175, 6275, 6375, 6475, 6575
X1, X3, 6673, 6773, 8073, 8173, 8273 kc/s
X2, X4, 6675, 6775, 8075, 8175, 8275 kc/s
Crystal holders, four (Henry's)

RFC1, 2, 4	2·5 mH, ferrite core (Henry's)
RFC3	see text

0-1 mA meter
RLA, 2-15 K ohms coil, triple pole c.o. (Benson)
Microphone socket, recorder type, 3 way, DIN pattern (Radiospares)
Chassis, 15⅜ in. × 7½ in. × 2½ in. (to fit TU5B case), 16 s.w.g. (H. L. Smith & Co.)
Panel, 16¾ in. × 7¾ in. (H. L. Smith & Co.)
Dial, Eddystone type 598 with two couplers No. 50 (¼ in.)
V.f.o. box, Eddystone type 650 diecast

station receiver and the carrier crystal pulled onto frequency with parallel C to provide the best quality. Following this the carrier will have to be re-balanced. Now proceed by reconnecting the carrier reinsertion coupling capacitor to the grid of the filter amplifier and adjusting the carrier balance potentiometer only to regain the same carrier null and C18 if necessary. If a good null cannot be obtained then the value of the coupling capacitor should be reduced by sliding out some of the wire inserted in the co-ax used to form the capacitor. When the null is obtained this may be improved upon by slight adjustment of the trimmer followed by the carrier balance potentiometer.

The next job is to neutralize the p.a. This is carried out, as with all the setting up so far, with the anode and screen supplies to the p.a. disconnected. The p.a. bias voltage must first be set to the correct level and carrier inserted. The receiver should be coupled to the aerial output socket of the transmitter. Peak the grid tune, p.a. tune and p.a. load for maximum output. Adjust C_N for minimum. Peak p.a. tune again and keep repeating this process until the best null is obtained. This procedure should be carried out on the highest frequency band in use.

The audio gain can now be set up by monitoring the signal on the station receiver and advancing the audio gain control until distortion occurs. The correct setting is just back from this point. The resistor from the cathode of the p.t.t. control valve (½ 12AU7) should be selected such that the relay is not operated with the p.t.t. switch released, and that the relay releases quickly on release of the switch.

The final setting up can be the linearity of the v.f.o. tuning range. This can be changed by varying the parallel capacitor across each of the v.f.o. coils if needed. This will be a matter of experiment and, of course, will depend upon the v.f.o. frequency, determined by the original generating frequency. On the higher v.f.o. frequencies a capacitor of value necessary is inserted in series with the v.f.o. coil in question to reduce the effective value of tuning " C " hence a larger coil may be used."

Supplementary Review of the National NCX-5

In February 1967, RSGB BULLETIN p. 84, the National NCX-5 MKII was reviewed. It was suggested that due to low sensitivity of the particular model under test there could have been a fault. Lowe Electronics of 51 Wellington Street, Matlock, Derbyshire, who have now taken over the sole national agency offered another equipment as a cross check.N

One of the modifications listed on the National modification data sheet is the addition of a resistor in series with the r.f. gain control. This limits the maximum gain. The value of the resistor is given as 220 ohms, but 470 ohms has been fitted on both the original and second equipment. Lowe suggest a " demodification " by shorting out the series resistor. In the second model supplied the demodification had no apparent adverse effects.

Sensitivity checks showed a 10 dB improvement over the original and the signal-to-noise ratio was better than 20 dB on all bands—a 7 dB improvement.

The A.G.C. was very much improved although it could not be classed as very good. In the original, an 80 dB increase in input signal resulted in a 40 dB increase in output. On the second model the increase was 20 dB.

The second equipment was returned to standard and checked again. The sensitivity figures were degraded by 4 dB, but the other figures were degraded only to a minor degree.

Enquiries from operators of the NCX-5 MKII and tests on the second model show that the particular equipment originally reviewed was not a good example of its type. This is a pity and emphasizes what was written in the first review of the series—" Ideally it is necessary to test a number of identical equipments but this is not possible . . . it is hoped that the good things are typical and the poor things exceptional."

G3EDD

Modern Log Book Keeping

S. WHEATON-SMITH, G3ROW*

NOT much has been written on the art of log book keeping, and it is usually treated as a boring necessity. However, I have been using a new approach which is far less monotonous, and is in keeping with the modern trend of life, namely automation.

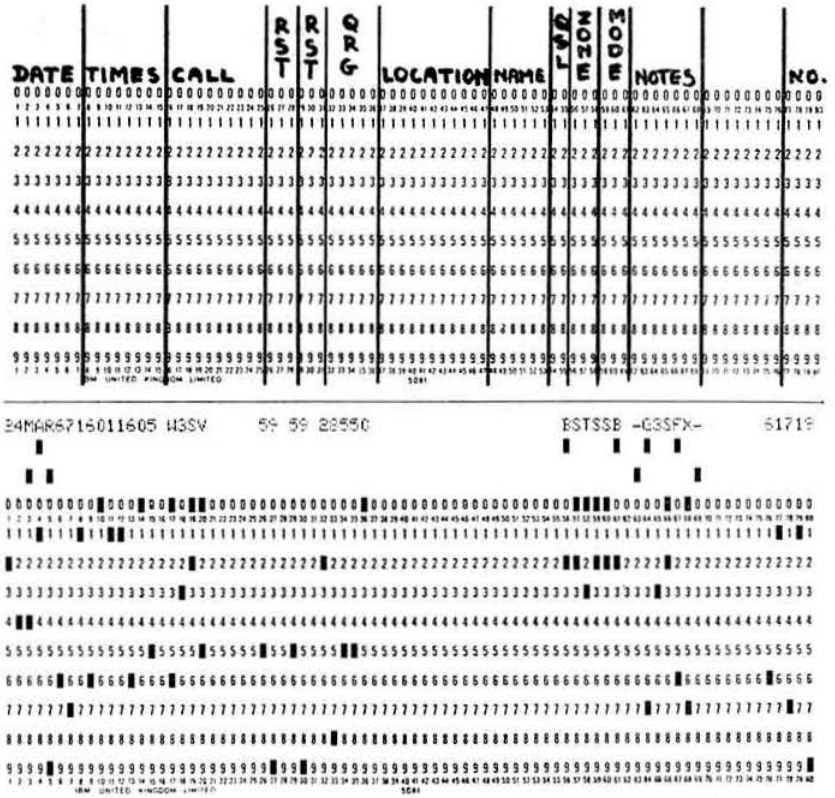
Before discussing this application for a digital computer, a few words on how such a machine works and how it is programmed would not be out of place. A digital computer stores data and instructions in binary code. Each binary number (or " bit ") is stored in one ferrite core (usually) and groups of cores make numbers or characters called bytes; for example, the binary representation for " A " is 010001. Each byte in the computer is addressable, that is the program can refer to the contents of any byte. Programs are sets of instructions that perform the required results—the program shown (much simplified but still workable) reads cards, moves data from the cards and prints the results. Programs are also stored in the computer in binary form in machine language, which differs with different types and makes of machine. On a 1401 computer " read a card " is 000001 in binary or simply " 1."

Machine codes are difficult to work with and actual addresses of data and instructions are clumsy to handle, so programs are usually written in a symbolic language, where instructions are easy to remember and where data and instruction addresses can be referred to by symbolic means rather than actual addresses. The symbolic instruction for " read a card " is " R." The date can be referred to as " date " not location 47 or wherever it may be. A program supplied by the manufacturers then translates this quickly to the machine language. The program shown is in a symbolic language called " Autocoder." Other languages are used in writing programs, but all of them end up in machine language before programs written in the language can be run. Before discussing the purpose of this article, it must be stressed that a manual log book is still kept to comply with the GPO rules, and the logbook produced by the computer is for operator convenience only. My log is in several parts; chronological all band, 160m, 80m, 40m, 20m, 15m, 10m, a.m., c.w., s.s.b., and alphabetical call-sign order. Checking to see if a station has been worked before is swift and to the point. The other programs are useful only on a large scale, for instance, the contest marking program.

Producing a Program

The idea of maintaining an automated log book was first suggested by a comment in the contest section of *QST*, about a station that punched out its log book and programmed a computer to keep track of the score. Therefore, as I am engaged in electronic data processing, I decided to write a program to keep track of my contacts. Compared with a business program, of course, this one was relatively straightforward, and all that was needed was to decide what the program was to do and how to do it. First of all the data had to be punched onto cards to form the input; it was decided to have these cards punched first as this process is independent of the program in that the program is formed around the data rather than vice versa. Each card has 80 character columns and onto each card went a line in the old manuscript log book. The date, times, call sign and report, frequency, location, name and *QSL* information, followed by a note on the time zone, GMT or BST, the mode of operation, general notes and the card serial number were punched (the serial number is used to sort the cards out if an accident were to happen). The cost of card punching was 100 cards at £1, and the station here had some 1500 cards.

Having got the data cards punched the worst hurdle was over and the program simply had to be arranged to do the following jobs: put heading and page number on top of each new page, and for each card read in, sort out the data so that it looked presentable, put decimal points in the fre-



Top: **The layout of a typical data card. Information is stored by punching holes in the appropriate positions.** *Below:* **A punched card bearing details of contact no. 35 on the log page shown overleaf.**

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quency section, and only print the date when at the top of a new page or on a date change. The only other features of the basic program were to keep track of the total number of contacts the number of times certain other predefined stations were worked. On the last card, the final totals and subtotals were printed as a final line.

The program was written for work on an IBM 1401 installed in a London computer service bureau. The program was written in the mnemonic language "Autocoder," and then processed on the machine to produce a program in binary machine language. This process is called assembly and only takes a couple of minutes for a short program. If the data were very complicated or if there were hundreds of thousands of contacts, magnetic tape would have been used for data storing (not necessary here luckily).

Finally the assembled machine language program was placed in the card reader and followed directly by the data cards, after checking for any logical or other errors of course. Then the button pushing ceremony followed, and the program was read into the machine memory at the rate of 800 program cards a minute with the occasional manual thump of the fist. Now is the decisive part in the program's life, for it is this particular point where something—if something is going to go wrong—will happen. Usually the first data card is read, the printer is activated, silence follows, whereupon the little flashing lights stop flashing and the problems start. Fortunately, this time it didn't stop; for once all was well—it worked. The card reader runs at 800 cards per minute, the printer runs at 600 lines per minute, and as there are 132 characters to a line it does not take long to run through the process. Three minutes later, with masses of paper on the floor, the job was finished. Machine time sells at £10 per hour so this is quite an efficient way of duplicating a log book.

So much for the basic log book—what else can be done with those data cards? There are many possible programs: one sorts through all the cards, checks the status of *QSL*ing, and, if one is needed, the computer lists all of the relevant information. Another program not quite completed at the time of writing, checks through the cards and lists the call-sign and what country the contact is from, as taken from the standard countries list, also checking the QSL cards received to see whether they qualify for any more certificates. There is a device called a card sorter and this will arrange the cards in band order 160 to 10m, in each band chronologically of course, so the cards when run on the first program show up as separate band log books. If one had access to a really large machine the DX and USA call books could be put on disc (and updated of course), then not only would the computer list the contact but also on a second printer fill in a QSL card and address it! The last idea of course is rather farfetched from the amateur point of view.

Log books of the future will be punch card charts, and as you fill it in, a girl will come and punch up your cards for you. In many years' time everyone will have one of these infernal machines, you will simply hear a call-sign, tap this information on a keyboard, then reply to him. In the meantime the computer has swung the aerial in his direction, filled in the log and QSL card and taken care of all other boring chores.

A page from G3ROW's computer-producer log book

***** G 3 R O W ******** PAGE 1

DATE	TIME	TIME	ZONE	WORKED	REPORT	REPORT	FREQUENCY	MODE	LOCATION	NAME	QSL	NUMBER	-INFO-
25 FEB 67	1100	1112	GMT	G3VXO	59	59	28.637 MCS	SSB				00001	-G3SFX-
	1112	1119	GMT	5R8AX	57	59	28.637 MCS	SSB	TG9EP-QSL-	JOHN	1	00002	
	1235	1239	GMT	VP7V1	59	59	28.581 MCS	SSB			1	00003	
	1629	1638	GMT	WA2ERO	57	56	28.590 MCS	SSB	ALBANY	JACK		00004	
	1638	1655	GMT	W5YGR	58	58	28.551 MCS	SSB	LOS CRUCES	GUS		00005	
	1655	1703	GMT	W2BAI	57	57	28.551 MCS	SSB	N.J.	RAY		00006	
	1704	1705	GMT	W5BCU/5	56	58	28.551 MCS	SSB	TEXAS			00007	
	1705	1710	GMT	W1CP1	57	57	28.551 MCS	SSB	RHODE ISL.	SKIPPE	9	00008	
26 FEB 67	1234	1240	GMT	PY2PE	58	58	28.600 MCS	SSB	SAN PAULO	EVEN	4	00009	
	1435	1240	GMT	K1YZW	59	59	28.550 MCS	SSB		WALTER		00010	
	1550	1558	GMT	WA0KMF	59	59	28.550 MCS	SSB				00011	
	1558	1600	GMT	W8BCJ	58	59	28.550 MCS	SSB				00012	
	1600	1618	GMT	3C3GKW	58	58	28.550 MCS	SSB	ONTARIO	BOB	1	00013	
	1619	1623	GMT	WB2PJD	56	58	28.550 MCS	SSB	N.J.	LENNY		00014	
	1623	1625	GMT	K5AIQ/5	58	58	28.550 MCS	SSB	GALVESTON	PETE	1	00015	
	1625	1631	GMT	VE3BVD	57	58	28.550 MCS	SSB			1	00016	
	1640	..	GMT	3C3BIF *	59	58	28.550 MCS	SSB		JIM	1	00017	
	..	1645	GMT	WA3DYG *	57	58	28.550 MCS	SSB		JOHN		00018	
	1645	1650	GMT	WA9NOI	57	58	28.550 MCS	SSB	1ST EUR/10	RICK	1	00019	
	1651	1658	GMT	YV5ANS	55	59	28.550 MCS	SSB		JERRY	1	00020	
11 MAR 67	1325	1330	GMT	K8AXG	59	59	28.611 MCS	SSB				00021	
	1435	1440	GMT	W3AFB	59	59	28.548 MCS	SSB	DELAWARE	FRANK		00022	
	1440	1446	GMT	W9SCV	58	59	28.548 MCS	SSB				00023	
	1450	1458	GMT	W0GUB	58	59	28.548 MCS	SSB	KANSAS CITY	TOM		00024	
	1458	1514	GMT	W2BAI	58	59	28.548 MCS	SSB		RAY		00025	
12 MAR 67	1123	1125	GMT	MP4TBD	58	59	28.550 MCS	SSB				00026	
	1258	1308	GMT	WA4NMA/1	56	59	28.550 MCS	SSB	MAINE	DON		00027	
	1430	1540	GMT	K1YZW	58	59	28.550 MCS	SSB	IPSWICH	WALTER		00028	
	1600	1605	GMT	K5VRF	58	59	28.550 MCS	SSB	EL PASO			00029	
	1606	1609	GMT	W1ZVK/M	58	59	28.550 MCS	SSB		JIM		00030	
	1610	1618	GMT	W0EXS	58	59	28.550 MCS	SSB	COLORADO	YARDLY		00031	
	1622	1625	GMT	W1DTB	58	59	28.544 MCS	SSB	BOSTON	PAUL		00032	
	1625	1626	GMT	VE2OC	58	59	28.545 MCS	SSB				00033	
	1626	1627	GMT	K1SJA	58	59	28.545 MCS	SSB	SPRINGFLD.	LYNN		00034	
24 MAR 67	1601	1605	BST	W3SV	59	59	28.550 MCS	SSB				00035	
	1624	1629	BST	W8LZV	59	59	28.630 MCS	SSB				00036	
	1629	1640	BST	K3IZS	59	59	28.630 MCS	SSB		DALE		00037	
	1641	1650	BST	W7PEY	59	59	28.630 MCS	SSB	TUSCON	NAT		00038	
25 MAR 67	1104	1108	BST	YA5RG	59	59	28.631 MCS	SSB		WOLF		00039	
	1548	1603	BST	VP5RS	59	59	28.631 MCS	SSB				00040	
	1603	1605	BST	WA5DAJ	59	59	28.583 MCS	SSB	GARLAND	LEN		00041	
26 MAR 67	1150	1155	BST	PY4CH	59	59	28.550 MCS	SSB	BRAZIL	BOB		00042	
	1158	1200	BST	CR7BV	55	55	28.620 MCS	SSB		SILVA		00043	
	1200	1204	BST	KW8AL	58	58	28.618 MCS	SSB		PHAM		00044	
	1207	1211	BST	WB2AAV/MM	58	59	28.616 MCS	SSB	MED	GEORGE		00045	
	1410	1434	BST	W2CTC	59	59	28.556 MCS	SSB				00046	
	1434	1435	BST	W1DYE/M	59	59	28.556 MCS	SSB	N.HAMPS			00047	

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PG LIN  LABEL   OP    OPERANDS                                  IDENT ERRORS

 1 010          CTL   33                                        LOGBK
 1 019          DCW   E                                         LOGBK
 1 020  HEAD1   DC    C          2                              LOGBK
 1 04   DATE    DCW   $DATE$                                    LOGBK
 1 06   TIME    DCW   $TIME$                                    LOGBK
 1 06   ZONE    DCW   $ZONE$                                    LOGBK
 1 07   CALL    DCW   $WORKED$                                  LOGBK
 1 08   RST     DCW   $REPORT$                                  LOGBK
 1 09   FREQ    DCW   $FREQUENCY$                               LOGBK
 1 10   MODE    DCW   $MODE$                                    LOGBK
 1 11   QTH     DCW   $LOCATION$                                LOGBK
 1 12   NAME    DCW   $NAME$                                    LOGBK
 1 13   QSL     DCW   $QSL$                                     LOGBK
 1 132  INFO    DCW   $-INFO-$                                  LOGBK
 1 133  CMNTS   DCW   $          $                             LOGBK
 1 14   NO      DCW   $NUMBER$                                  LOGBK
 1 15   PAGE    DCW   $PAGE 0007                                LOGBK
 1 16   DATIN   DCW   2000000000                                LOGBK
 1 170  NUMBER  DCW   2000000                                   LOGBK
 1 171  EDIT    DCW   $ 0.   AMHZ$                              LOGBK
 1 175  BEGIN   SW    1,47                                      LOGBK
 1 176  AMPL    R                 HEATH AMC CAS COMPARE CARD    LOGBK
 1 177          SS    2                                         LOGBK
 1 180          MLC   45,HEAD1                                  LOGBK
 1 187          MLC   47,EDIT             MCS MORE MHZ          LOGBK
 1 188          CW    47                                        LOGBK
 1 189          SW    1,8                                       LOGBK
 1 19           SW    12,17                                     LOGBK
 1 20           SW    26,29                                     LOGBK
 2 01           SW    32,38                                     LOGBK
 2 02           SW    48,56                                     LOGBK
 2 03           SW    59,63                                     LOGBK
 2 04           B     OFLO                                      LOGBK
 2 05   START   RCV   OFLO                                      LOGBK
 2 060          BIN   LSTCD,2                                   LOGBK
 2 061  READ    R                                               LOGBK
 2 062          SS    1                                         LOGBK
 2 105  CARYON  C     7,DATIN                 LL                LOGBK
 2 106          BE    GOON                    LL                LOGBK
 2 111  COLIN   SW    3,6                     *                 LOGBK
 2 113          MCS   2,202                   DA                LOGBK
 2 12           MLC   5,206                   MO                LOGBK
 2 13           MLC   7,209                   YR                LOGBK
 2 14           CW    3,6                     *                 LOGBK
 2 150          MLC   7,DATIN                 *                 LOGBK
 2 151          CC    J                                         LOGBK
 2 16   GOON    MLC   11,216                                    LOGBK
 2 17           MLC   15,222                                    LOGBK
 2 18           MLC   58,227                                    LOGBK
 2 19           MLC   25,237                                    LOGBK
 2 20           MLC   28,245                                    LOGBK
 3 01           MLC   31,253                                    LOGBK
 3 011  MLCHA   EDIT,265                                        LOGBK
 3 02           MCE   36,262                                    LOGBK
 3 03           MLC   61,271                                    LOGBK
 3 04           MLC   47,283                                    LOGBK
 3 05           MLC   53,290                                    LOGBK
 3 06           A     *-6,NUMBER                                LOGBK
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PG LIN  LABEL   OP    OPERANDS                                  IDENT ERRORS

 3 07           MLC   NUMBER,307                               LOGBK
 3 08           MLNS  54,294                                    LOGBK
 3 09           MLNS  55,296                                    LOGBK
 3 091          C     69,CMNTS                                  LOGBK
 3 092          BE    CRAIG                                     LOGBK
 3 093          MLC   69,CMNTS                                  LOGBK
 3 095          MLC   69,320                                    LOGBK
 3 096          NOP   0,0,0                                     LOGBK
 3 10   CRAIG   A                                               LOGBK
 3 11           CS    320                                       LOGBK
 3 12           CS    299                                       LOGBK
 3 13           B     START                                     LOGBK
 3 14   OFLO    CC    I                                         LOGBK
 3 15           MLC   HEAD1,270                                 LOGBK
 3 16           CW    PAGE-2                                    LOGBK
 3 17           A     *-6,PAGE                                  LOGBK
 3 18           CW    PAGE-2                                    LOGBK
 3 19           MCS   PAGE,299                                  LOGBK
 3 20           R                                               LOGBK
 4 01           CS    299                                       LOGBK
 4 02           CS    320                                       LOGBK
 4 03           CC    K                                         LOGBK
 4 04           MLC   DATE,206                                  LOGBK
 4 05           MLC   TIME,216                                  LOGBK
 4 06           MLC   TIME,222                                  LOGBK
 4 07           MLC   ZONE,228                                  LOGBK
 4 08           MLC   CALL,237                                  LOGBK
 4 09           MLC   RST,245                                   LOGBK
 4 10           MLC   RST,253                                   LOGBK
 4 11           MLC   FREQ,265                                  LOGBK
 4 12           MLC   MODE,271                                  LOGBK
 4 13           MLC   QTH,281                                   LOGBK
 4 14           MLC   NAME,290                                  LOGBK
 4 15           MLC   QSL,296                                   LOGBK
 4 153  OOOA    MLC   QSO,312                                   LOGBK
 4 154          MLC   INFO,319                                  LOGBK
 4 16           MLC   NO,307                                    LOGBK
 4 17           R                                               LOGBK
 4 18           CS    320                                       LOGBK
 4 19           CS    299                                       LOGBK
 4 20           CC    J                                         LOGBK
 4 21           S     CMNTS                                     LOGBK
 5 01           B     DATIN                                     LOGBK
 5 02           B     START                                     LOGBK
 5 120  LSTCD   R     BEGIN                                     LOGBK
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The program listing for the production of a log book; each line represents one program card. The instructions are in "Autocodor"

Noel Eaton, VE3CJ, Director of the Canadian Division of ARRL, presides over the ARRL Forum.

(Photo by VE2AXR)

DRINKING CANADA DRY

by **SYLVIA MARGOLIS**
RSGB Public Relations Officer

TO snipe at your national Amateur Radio organization is good, clean sport.

Everybody does it, even people closely concerned with the running of the Society. The national organization stands for Authority, the father-figure, and we are all of us teenage rebels at heart. It's no different with other hobbies, like caravanning, motoring or sailing, nor even with professional organizations for doctors or engineers. The parent body is dead from the neck up (or down), stuffy, reactionary, or just plain bloody-minded, according to what you expect it to do for your own interests.

The sport flourishes in Britain, although recent executive trends in RSGB have shown the Society to be as responsive, with-it and forward-looking as anything can be that is both British and official! But there will always be somebody to grumble in the back row of AGM's, to write furious letters, to preach sedition at rallies and secession at conventions. It's that old " them-and-us " syndrome again!

The American Radio Relay League is as much victim of the game as any smaller Amateur Radio Society. But, being by far the biggest Society in the world, all its troubles, unlike those of the newly-weds, are big ones, discussed and aired noisily and with a vituperation and gusto that strike the phlegmatic British as gaudy and in slightly bad taste!

So perhaps it was just as well that neither of the two people who represented the RSGB at the 1967 ARRL National Convention—RSGB President Barney Patterson, GI3KYP, and I, the Society's Public Relations Officer, should have been Anglo-Saxon. Thus unhampered and uninhibited, we were able to plunge into the maelstrom of ARRL, in its borrowed exotic background of French-Canadian Montreal, with a verve and a lively participation that could be said to be sadly un-British. But ARRL seemed to approve, for Barney and his wife, Anne, were last seen driving south, into the United States, with ARRL President Bob Denniston, W0NWX, whilst Bob invited me to the 1969 ARRL Convention, which is scheduled to be held in his home State of Iowa.

This was the first National ARRL Convention to be held outside the United States and it was a token of the United States' respect for Canada, and of the huge interest engendered all over North America for the Canadian Centennial and Expo 67 that Montreal was chosen for the venture.

Strange city, Montreal, whether you pronounce it Montree-all or in the correct French way. A divided city, touchy and explosive, it is an uneasy mixture of two cultures—dominant British and vociferous French. European newcomers to Canada are happiest of all in Montreal, with its cosmopolitan atmosphere, its old sections, the gingerbread decoration on the houses carefully preserved, and more gourmet restaurants than I have seen anywhere else in the world.

And to the vacationing US citizen on the spree, a trip to Montreal is a reasonable substitute for that coveted trip to Europe that is an ideal part of the American Way of Life. The international ambiance, the quaintness, the cultural opportunities and, above all, the French usage, give the city a spice and a foreign-ness that make it seem truly " abroad " to the native North American. Street signs are in French, all the policemen and taxi drivers and bus drivers and shop

. . . And the author, Sylvia Margolis, RSGB Public Relations Officer, in her turn addresses the Convention.

Photo by Montreal Radio Club)

assistants speak French, and have been known, on occasions, to forget their English completely when it comes to giving change. And the Mayor of Montreal is as French as *eau de vie*, a quiet, dapper man called Jean Drapeau. He it was who galvanised the city until it has become one of the most vital metropolis in North America. Only four years ago they decided that Montreal would be the scene of the 1967 World's Fair, allowing the city nothing like enough time for preparations, so that everybody thought the venture would fall flat on its face. Under Drapeau's guidance, or goad, things soon began to hum like 20 metres when a VR6 is on, and Expo 67 is a success that surprised the bemused Quebecois as much as it did the rest of the world.

I went with my host, Dr Arthur Leith, VE2MD (G3ONO), to the Friday evening Convention Registration. The vast ballroom of the Bonaventure Hotel, with its beautiful crystal chandeliers, was to be the scene of the Convention. Outside was a long corridor, with a bar at each end, set up by a thoughtful hotel management. Along this corridor were the rooms occupied by the exhibitors at the Trade Show. They didn't exactly tout for custom, but the whole set-up had something of the Bazaar about it. When you got inside a room, expecting it to be full of Eastern Promise, it was almost a disappointment to find nothing there more exciting than prosaic communications equipment, and nobody more exotic than an old friend like Irv Strauber, K2HEA.

That corridor was really the heart of the Convention, for it was there, commuting between the two bars, that all the ragchews took place. And everybody knows that it is for ragchews, and for ragchews alone, that radio amateurs assemble, even if the programme, like this one, should include a wealth of technical sessions and portentous meetings, and be lustrous with distinguished names. Ragchew groups were scattered along the length of the corridor, hardly seeming to move because as somebody left a QSO to join the next one, he was replaced at once. There were the inevitable extroverts wearing hats with miniature beams, rebels self-conscious in sweaters, among the dark suits, or characters in ties embroidered with enormous callsigns. But this is an essential part of the ra-ra-ra and razzmatazz of US Conventions.

I saw lots of famous callsigns and familiar callsigns, which up to now had been only callsigns and voices, and which blossomed at Montreal into faces and personalities. Amateur radio has many facets, but I still think this is one of the most exciting—to put a face to a callsign.

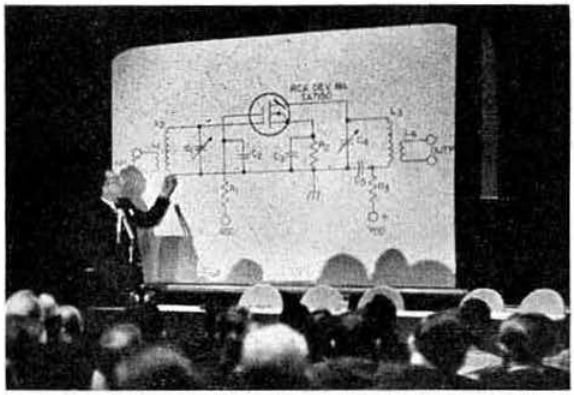
The only time they could pin Mayor Drapeau down to open the Convention was at 9.30 a.m. This was a bit hard on some of the participants, who had been celebrating reunions and their DX scores with their cronies the night before, drinking Canada Dry. But they turned out valiantly, if rather battered, and about 500 congregated to see Mayor Drapeau escorted in, with picturesque 18th century pomp, by the *Compagnons Franches de la Marine*, and to hear him declare open the 1967 ARRL National Convention.

The ARRL President, Bob Denniston, W0NWX, described Amateur Radio as the greatest international fraternity there is. He said the US now had reciprocal licensing arrangements with 27 countries and quoted VE/W cooperation as one of the best examples of that fraternity. About 50 American visitors had obtained VE licences for the Convention. Indeed, the mobile antennas bristling in the car-park outside, made the event look more like a mobile rally than an indoor Convention. Bob welcomed the overseas guests, including EL2S, GI3KYP, HP1JC, LA5HE, VP2AZ, VP9DC, VP9DM, XE1YJ, ZD8DX and President of the Liberian Amateur Radio Club, who conveyed a message to the Convention of " love, brotherhood and fraternity."

They escorted Major Drapeau out—he had about four more things to open that morning—and then we sat back and relaxed, waiting for the fun. For, after the Opening Ceremony, ARRL Top Brass accepted questions from the floor, always a dangerous thing to do, because you never know when some nut is going to explode the whole occasion. But the questions seemed to be the same ones that we get at the RSGB's Annual General Meetings, or at any ORM throughout Great Britain! The ARRL people handled the queries with a deftness and smoothness that gained my admiration, but then they're smart cookies, these, controlling a business with a largish turnover. One point intrigued me particularly —$200,000 (about £70,000) was raised *by the ARRL members* to build those swish new Headquarters in 1963!

The afternoon's programme included several valuable technical sessions and a glossy fashion show for the ladies, although there did seem to be many of the gentlemen, too, enjoying the fashions, especially when the models were showing lingerie and beach wear. This was very interesting and went further to prove something we suspected during the Girlie Show at the London S.S.B. Dinner in May—that there are some radio amateurs who have hearts inside them, not just v.f.o.s! They had briefed the fashion show commentator to suit the occasion. Introducing a chinchilla-trimmed coat, at umpteen dollars, she purred: "Encourage your husband to buy himself a new receiver, ladies, then you can treat yourself to this with a clear conscience!"

To set up a National Convention on this scale is a formidable task, especially when it concerns radio amateurs. Quick as they are on the mark when there is an opening on two metres, they are so lackadaisical in committing themselves to an organized social programme that anybody who has ever tried to get an Amateur Radio event off the ground will sympathise with the Montreal Amateur Radio Club. To them fell the responsibility, in collaboration with the



One of the lecture sessions: George Hanchett Jnr, W2YM, of RCA, explains how a MOSFET can be utilized in a communications receiver.

(Photo by VE2AXR)

Radio Amateur du Quebec Inc., of administering the 1967 Convention. But, under the dynamic lead of its Steering Committee Chairman, Al Daemen, VE2IJ, the Convention was served by some devoted, tireless and efficient workers, including some very charming ladies, whom we could do with over here, to help RSGB.

Eleven hundred people assembled for the Convention Banquet, which is a lot of people. From the Top Table we could hardly recognize the faces at the furthest end of the ballroom. But the guest of honour, Commodore O. C. S. Robertson, G.M., coped easily with the multitude. 6 ft. 7 in. tall, he must be the biggest public speaker in the business. He told how it was Amateur Radio which made him give up being an Arctic explorer. After a long session under the Polar ice in a submarine, they emerged into the open air and two radio amateurs on board set up a ham station on an ice floe. Soon they were able to patch the Guvnor right to his home. The first words the Commodore's wife said were: " Where did you put the car keys? " It was then that he decided that, once communications had made it impossible for him to escape into the wilderness, it was time to give up exploring. But communications were particularly useful to a man in Nelson's Service. If you wanted to do something in the Navy that you weren't supposed to do, you could always blame the breakdown in communication on lack of communications!

Climax of the evening was the entrance, escorted by the *Compagnons Franches de la Marine*, with fife and drum, of the biggest blueberry pie I have ever seen. It was 6 ft. in diameter and provided a portion for every diner. Blueberry pie is a Quebecois speciality. Leading the procession was a chef, flourishing a massive knife, which had been specially made and engraved as a souvenir of the occasion, although heaven knows if they will ever find a use for it, unless they do get round to ceremonial beheadings of people who clash with ARRL. It might be cheaper, and more conclusive, than getting involved in lawsuits.

RSGB President, Barney Patterson, GI3KYP, chats with Irv Stauber, K2MEA. That's John Huntoon, W1LVQ, on Barney's right.

(Photo by Montreal Radio Club)

After the dinner Barney, Anne and I were surrounded by scores of people who wanted our autographs. Again and again we were complimented on the impression we had all made on the Convention, as RSGB representatives. This talk of our being among the best ambassadors RSGB had ever sent to a Convention was very flattering and very kind. But it was as much a direct compliment to you, the members, who put us in our positions, as to us personally. You chose us and we tried to do you proud.

But this was only one of the many manifestations we found of the respect that other national Societies have for RSGB. I found this attitude wherever I went in North America. RSGB is regarded as a bastion of integrity, of commonsense and balanced thinking, a reputation that we must strive to live up to and maintain!

A vivid example of this feeling occurred at Montreal. I had been instructed by Council to spread the word everywhere in North America about RSGB's appointing me as the first-ever Public Relations Officer to be commissioned by a national Amateur Radio organization, and to describe our unique " Welcome to London Project," which is unequivocally a British " first." I was to blow, as loudly as I could (and I can blow loudly!) that trumpet which we British are only just beginning to learn how to exploit. The British Pavilion at Expo 67 is an example of our new smashing trumpeting and is one of the most successful exhibits at the Show.

Five times I was given the chance to spread the message, throughout W1, 2 and 3. Audiences ranged from a very select seven people, when the Potomac Amateur Radio Club gathered to meet me for a special lunch, with Bob Booth, W3PS, the ARRL Counsellor, as host in Washington, to a gathering of a thousand people at the Long Island Hamfest and Picnic, where my sponsor, Stu Meyer, W2GHK, introduced me as " that well-known *young* lady," for which sentiment his signal should be increased to a constant 40dB over 9!

In Montreal, Harry Dannals, W2TUK, Hudson Division Director of ARRL suggested that we, in RSGB, should act as consultants for his Division, to advise them on the setting up of a " Welcome to New York Project," similar to what we have got going in London. As they were expecting the imminent arrival of a party of French amateurs, who had requested a reception, they were going to be thrown in at once at the deep end. Harry and I spent a useful hour at a party in New Jersey given for me by the late Dr Harold Megibow, K2HLB, on the bones of the system and he made a lot of notes. I even found him a French interpreter, the wife of one of his own members, as I had to be in Washington the day the French were expected.

Of course this was all very funny and there was a great deal of laughter and joshing between the two Society Presidents, Bob Denniston and Barney Patterson, about " copyright " and " reproduction rights " due to RSGB for having thought of the idea first. But it was also a tremendous compliment to RSGB that an original British idea should be copied, with proper acknowledgement, so quickly by one of the most important divisions of the largest Amateur Radio organization in the world.

Barney told Bob: "Don't bother to thank us. We won't let you forget it in a hurry!"

Bob Denniston invited us up to his suite to celebrate the end of the Convention. Noel Eaton, VE3CJ, introduced me to a very special blend of Canadian whisky. After several

doses, laced with Canada Dry to make the stuff palatable, we were feeling very little pain and we got several ARRL and IARU problems sorted out to everybody's satisfaction. At least the solutions seemed viable enough at the time.

At 2 a.m., Anne Patterson, Nell Denniston and I were hungry, so we all went out to find a meal. We were delayed a little because Bob had forgotten where he had parked his car. We all sat on the steps of the Hotel Bonaventure and thought about it for a bit. Then somebody found the car and we ate at Wendy's All Night Joint, which was as much a surprise for Wendy as it was for us. I got back to my host's house at 5 a.m., but it was all in the name of Public Relations. Besides, I had been in the most august company it was possible to find in Montreal that night, with two national Presidents and their wives, and Rag, LA5HE, who, the youngest of the party, disgraced his generation by falling asleep in the car!

But it was during the party in Bob's suite that I made a most exciting discovery. I wanted to go to the bathroom, but it was already occupied—by John Huntoon, W1LVQ, General Manager of ARRL, and Dick Baldwin, W1IKE, Assistant General Manager, and they were counting the takings, *in the bathroom*! I had to wait until they had finished and balanced the books. This was a very interesting revelation indeed. Perhaps we need not spend all that money on Doughty Street. Perhaps we could carry on the affairs of RSGB in the Ladies Room at the Coventry Street Corner House!

BOOK REVIEW

TRANSISTOR BIAS TABLES. VOLUME 2-SILICON. By E. Wolfendale, B.Sc.(Eng.), M.I.E.E. Published by Iliffe Books Ltd. 10in. × 7½in. 82 pages. 25s.

This is the second book of bias tables by Mr E. Wolfendale. The first one dealt with germanium transistors.

This book presents tables which have been reproduced from a computer print-out showing the values of the three resistors (i.e. emitter resistor and the two base potential divider resistors) used in the conventional transistor bias circuit to achieve a given quiescent collector current. It is normally an easy matter to calculate the required values of bias resistors which will give satisfactory performance in a circuit operating in a room temperature environment but much more complicated to achieve optimum operation over a wide temperature range. The value of the tables lies in the fact that they cater for operation up to temperatures of 55°C, 100°C and 150°C and down to −10° or −40°C. There is a selection of eleven values of collector currents arranged in the order 0·1 mA, 0·3 mA, 1·0 mA, 3 mA etc. up to 10A and for each collector current there are six supply voltages ranging from 3V to 24V. The designer has a choice of five Beta values from 20 to 300. The calculated resistances are rounded off to the nearest 10 per cent preferred values and the actual collector current, which differs slightly from the value aimed at because of this rounding off, is shown. The collector current at the lower temperature limit is also shown when it is assumed that resistance tolerance and Beta tolerance act adversely to decrease the current and at the higher temperature limit with tolerance combining to further increase the current.

There is an explanation of how to interpolate to cover cases where the supply voltages or collector currents lie between the values given in the tables.

This book is obviously of value to the circuit designer in industry particularly the aerospace industry in which equipment must operate over a wide temperature range. It is more difficult to see the value to the radio amateur or home constructor who seldom meet such problems. However, to those who design with the aid of graphs, abacs and tables this book would be a powerful addition to their armoury.

M. H. M.

By P. SIMPSON, G3GGK and B. ARMSTRONG, G3EDD

The National 200 Transceiver

A NEWCOMER to the British Amateur Radio Market is the National 200 Transceiver. This unit is designed to compete in the low cost market and the price is £160 without the power supply unit. The British Sole Agent, Lowe Electronics of 51 Wellington Street, Matlock, Derbys, who offered the equipment for review, can supply a Lowe style power unit kit for £25 or a National NCXA p.s.u. for £58.

General Description

As a general rule, price is proportional to facilities and complexity, and when a unit is aimed at a low cost market it is only to be expected that various facilities found on higher cost equipment are omitted. The National 200 has no VOX, choice of sidebands or incremental receiver tune, although there is provision for an optional 100 kc/s calibration oscillator. Full band coverage of 80 though 15m is provided but only one 600 kc/s section of 10m (28·5—29·1 Mc/s) is covered; there are no switch positions for more than this one segment so that although the tuning scale has the relevant calibrations for the entire band and the necessary crystal can be substituted for the one provided, the substitution involves removing the top section of the case (six screws). In addition a capacitor has to be removed from across the oscillator coil if the bottom part of 10m is wanted. All this means is that the operator has to make up his mind which 10m segment he wants, and stick to his decision.

The receiver is a single superhet with a 5·020 Mc/s i.f. Selectivity is provided by a crystal filter with a 6:50dB shape factor of 2·2:1. In order to obtain good frequency stability on 40, 15 and 10m, the local oscillator frequency is made up from the 8·7 to 9·3 Mc/s v.f.o. which is subtracted from, or added to, the output from a crystal oscillator. On 80 and 20m the v.f.o. operates on its own. The S-meter amplifier doubles as the transmit audio amplifier.

Apart from the v.f.o. arrangement the transmitter is conventional. C.w. is carrier insertion type but it is not break-in. The transmitter is activated by either the panel mounted MOX switch or by the microphone pressel.

A.l.c. is taken from the p.a. bias line and a voltage doubler feeds the a.l.c. bias to the i.f. amplifier grid. External a.l.c. from a linear can be fed to a phono socket on the rear panel. Also situated on the rear panel are phone and key jack sockets, an octal plug for the optional 100 kc/s calibrator, carrier insertion and S-meter zero setting potentiometers, tags for an external relay, a 12 way small Jones type power socket and a UHF series S0239 aerial socket.

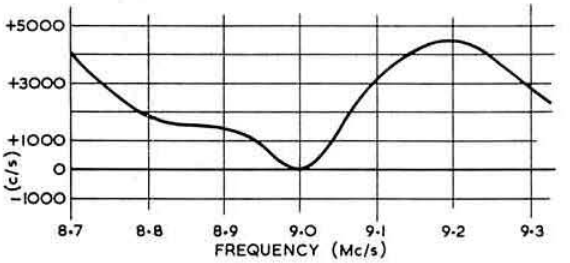
All aluminium construction is used. The blue fine crackle perforated case is in two sections—top and bottom. A simple mounting cradle is provided for mobile use.

The v.f.o. drive combines epicyclic and gear reduction and the dial is driven by a split disc friction arrangement. The main tuning knob rate ranges from 5 to 30 kc/s per turn. The scale is calibrated in 5 kc/s divisions with the actual carrier frequency at 100 kc/s intervals. Calibration can be achieved by shifting the cursor.

TESTS

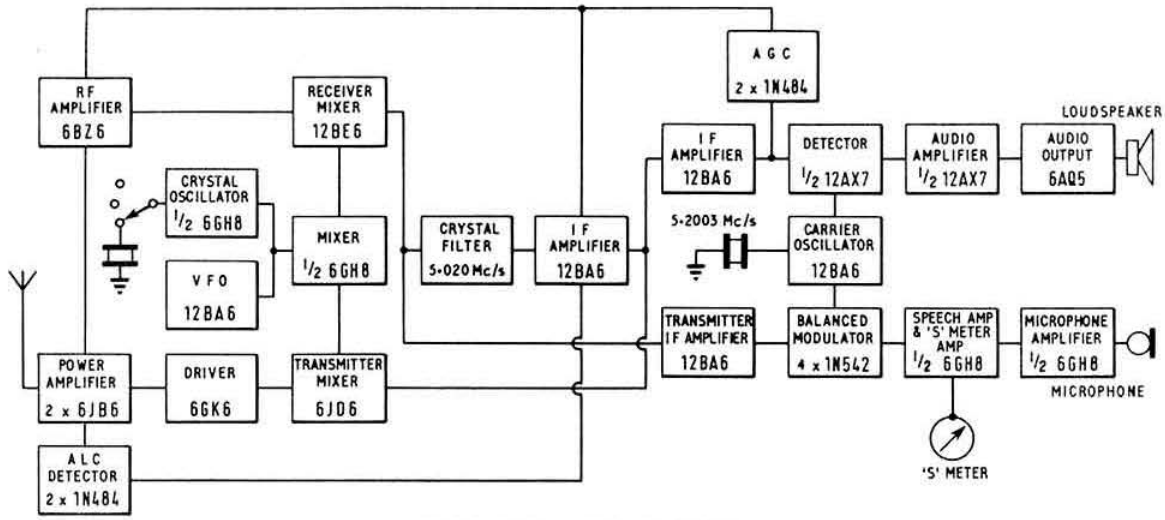
THE V.F.O.

For the calibration and linearity test the adjustable cursor was set centrally as the 100 kc/s calibrator was not available.

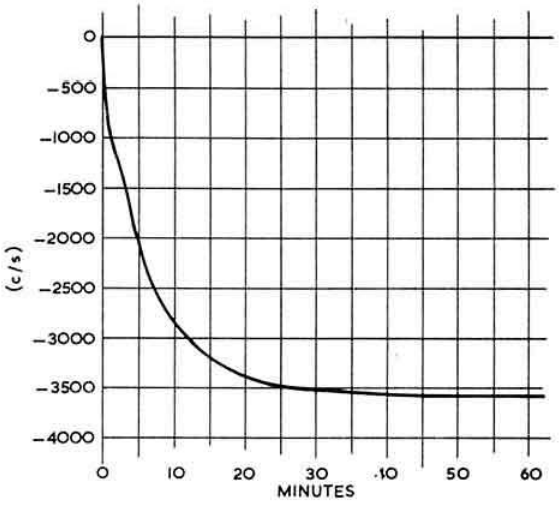


Nominal Frequency (Mc/s)	Error (c/s)	Linearity Ref. Mid-scale (c/s)
9·300	—2146	+2841
9·200	—431	+4596
9·100	—1750	+3237
9·000	—4987	0
8·900	—3574	+1413
8·800	—2178	+1809
8·700	—985	+4002

In all previous reviews, the frequency drift measurements from the first count after switch on have been characterised by very little drift during the first minute or so and then the drift starts as soon as components start to warm up. In the NC 200 the initial drift during the first minute (which tends to be academic anyway) amounted to nearly 1 kc/s. However, as the results show, the National specification of 1·5 kc/s nominal in the first 30 minutes after 5 minutes warm up is met.



Block diagram of the National 200.



Time from Switch-on	Frequency drift (c/s)
1 minute	−965
2 ,,	−1209
3 ,,	−1457
5 ,,	−2018
10 ,,	−2861
15 ,,	−3217
30 ,,	−3536
45 ,,	−3593
1 hour	−3594

The v.f.o. stability with ± 10 per cent mains input variation was less than 40 c/s—a good figure. The v.f.o. had an interesting feature in that it continued to oscillate (but would not start) at 100 volt a.c. input on the 240V tap. The frequency in this condition was less than 100 c/s different from that at nominal voltage in spite of the fact that the stabiliser had extinguished.

The backlash and resettability were measured as in previous reviews and were both less than 200 c/s.

The Crystal Oscillators

The v.f.o. and carrier crystals had compression mica trimmers across them—an unexpected feature in a low cost equipment. As will be seen from the results below all the v.f.o. crystals were not quite on nominal, so the crystal trimmers were adjusted. The error could not be fully trimmed out on the 25·1 and 14·6 Mc/s crystals and the 25·1 Mc/s crystal stopped oscillating as soon as the capacitance was reduced. A replacement crystal proved satisfactory.

Nominal Crystal Frequency (Mc/s)	Error (c/s)
5·2003	−95
21·500	−1808
25·100	+2848
14·600	−339

RECEIVER

Signal-to-Noise Ratio

The signal-to-noise ratio was measured at 1μV p.d. input. The results were very good, varying from 25dB on 15m to 30dB on 80 and 40m.

Sensitivity

Unlike its big brother, the NCX-5 which was previously reviewed, the NC200 had plenty of sensitivity. A 1μV p.d. input produced greater than 2 watts audio output on all bands.

A.G.C.

Rather like the NCX-5, the a.g.c. performance was somewhat indifferent as the following results show.

Signal Input Relative to 1μV p.d. Input (dB)	Audio Output Rel. to Test Level at 1μV (dB)
+20	+10
+40	+16·5
+60	+20
+80	+21

The S-meter

The edgewise S-meter was very sensitive and tended to give optimistic readings. On 14 Mc/s the following results were obtained:

Meter Reading	dB rel. to 1μV P.D.
S1	−4
S2	0
S3	+7
S4	+12
S5	+16
S6	+19
S7	+22
S8	+25
S9	+28
S9 + 20	+38
S9 + 40	+47

The variation with band showed:

Frequency (Mc/s)	dB Rel. 1μV P.D. to show S9
3·5	+24
7·0	+19
14·0	+28
21·0	+31
28·5	+26

Birdies

The 20 and 80m bands were free. Fifteen metres and the one 10m band had one very low level response each, and 40m had none in the first 100 kc/s, but two less than 1μV equivalent between 7·1 to 7·2 Mc/s. Outside the amateur band there were two weak birdies and one real rock crusher on 7·395 Mc/s, but this is, of course, academic in amateur circles.

Strong Unwanted Signal Handling

Blocking was measured by using two signal generators. One was set to the receiver tune frequency at such a level to give 14dB signal-to-noise ratio. The second signal generator was set 20 kc/s from the tune frequency and its level increased until the signal-to-noise ratio was degraded by 3dB. The unwanted signal was in excess of 80dB above the on channel signal.

Intermodulation was measured by feeding two strong signals 10 kc/s apart and looking for intermodulation products 10 kc/s above the upper frequency and 10 kc/s below the lower frequency. The unwanted signals were in excess of +80dB rel. 1μV p.d. to produce an unwanted signal of S1 on the S-meter.

These are excellent results particularly in view of the high overall gain.

Spurious Responses

The image rejection was quite good as might be expected from the use of a 5·020 Mc/s i.f. The minimum figure was 49dB on 15m, the best being 95dB on 80m.

I.f. rejection varied from 58dB on 15m to 76dB on 20m. This lined up with observations on the air, but i.f. breakthrough was present, to a small degree, even with the aerial disconnected.

Selectivity

Checking selectivity gave some unexpected trouble. During sensitivity checks it was noticed that tuning of the signal generator as indicated on the S-meter was very critical. A check on the transmit audio response which should be substantially that of the filter showed a 10dB peak at 2·3 kc/s and a smaller response at 3·7 kc/s which gave a wide filter passband.

Lowe Electronics offered a second equipment for test which showed the same tendency but was much better. A detailed plot of the 5·020 Mc/s crystal filter on the second equipment was carried out showing that although the 6:50dB shape factor of 2·2:1 (why not 1:2·2?!) was met, there was still an unwanted filter response just outside 3 kc/s from carrier, but other than that the main passband was relatively smooth although with a "humped" rather than a flat response. The apparent discrepancy in the measurements can be accounted for by i.f. regeneration, but since the reviewers are unlikely to be paid by National for sorting out their "oddies" the investigation was not pressed to a final conclusion.

THE TRANSMITTER

Power Output

The transmitter was tuned for maximum power output into a calibrated 50 ohm load in the c.w. condition with carrier insertion. It was found necessary to adjust the rear panel carrier insertion control for optimum results.

Band	C.W. Power Output (watts)
80m	140
40m	140
20m	120
15m	68
10m	80

It should be noted that the loading figure of 300 mA was aimed at, but not reached on 15 and 10. The handbook gives a rating of 120 watts input on c.w. which should be 150 mA.

The transmitter was next checked using two-tone input of 1 and 1·8 kc/s. The audio output was increased so that a measurement could be made at 25dB i.p. as in previous reviews. It was soon apparent that the NC200 would not give much output at that i.p. level so the level of 20dB was used. 20dB is not good, but acceptable.

Band	Peak Envelope Power (watts) with 20dB I.P.s
80m	86
40m	80
20m	100
15m	108
10m	116

Carrier and Unwanted Sideband Suppression

These figures were checked on 3·8 Mc/s during the two-tone test. The unwanted sideband suppression was 49dB and the carrier suppression related to p.e.p. degraded from 42 to 32dB when audio drive was applied. These figures are typical of current transceivers.

Transmitter Audio Response

On the second model check (see previous receiver selectivity comment) the response showed a peak at 2·3 kc/s when an audio generator was connected to the microphone input. Owing to this peak the 6dB points (relative to the crest of the peaks) were at 1150 and 2800 c/s, with a small secondary response at 3·4 kc/s.

Keying

The keying was clean and free from chirp and clicks.

TVI

Channels 6 and 11 were clear on all bands. Channel 5 needed an additional low pass filter on all bands except 21 Mc/s. Channel 1 which, as has been explained in previous reviews, is a barely acceptable picture, suffered interference on all channels. The addition of a low pass filter to the NC200 and a high pass filter to the television set almost cleared the interference. Surprisingly, 7 Mc/s was worst. In a good TV service area there should be no real problem.

TECHNICAL SPECIFICATION—NC-200

Frequency Range	With crystals supplied—3·5–4, 7–7·3, 14-14·5, 21-21·5, 28·5-29·1 Mc/s (two additional crystals required if coverage of entire 28–29·7 Mc/s band is desired).
Power Input	200 watts p.e.p. s.s.b.; 200 watts c.w.; 100 watts a.m.
R.F. Power Output (Nominal)	120 watts p.e.p. s.s.b.; 120 watts c.w.; 30 watts a.m.
Types of Emission	S.s.b. (u.s.b. 20, 15 10m, l.s.b. 80 and 40m) a.m. c.w.
Output Impedance Range	40–60 ohms minimum, Pi-network.
Frequency Determination.	Single conversion with premixed crystal-controlled high frequency oscillators and tunable v.f.o.
Operating Facilities	(All modes) Full a.g.c. and S-meter on receive (s.s.b.) PTT or front panel manual operation on transmit with automatic carrier insertion, a.m. detector on receive; (c.w.) grid-block keying on transmit with automatic carrier insertion product detector on receive.
S.S.B. Generation	Crystal lattice filter; 6-50dB shape factor 2·2 : 1; Bandwidth 2·8 kc/s at 6dB; Centre frequency 5·202 7 Mc/s. Solid state balanced modulator.
Dial Calibration	5 kc/s; identical on all bands.
Tuning Ratio	45 : 1; Identical on all bands.
Frequency Stability	Nominal 1500 c/s on first 30 minutes after 5 minute warm up; long term stability nominal 400 c/s in room ambient conditions.
Suppression	Carrier —50dB, unwanted sideband —40dB,3rd order distortion products —30dB at full output.
Receiver Sensitivity	Nominal 0·5μV for 10dB S/N in s.s.b. mode.
Audio Output	Better than 2 watts; 3·2 ohms.
Microphone Input	High impedance (dynamic microphone recommended).
Metering	Back-lit edge reading; p.a. cathode current on transmit; S-units on receive.
Controls	Front panel; Main tuning, Band selector, Audio gain, R.F. gain, Calibrator, Exciter tune, P.A. Tune, P.A. load, Dial adjust, Function, MOX-OFF Switch, Microphone input, Microphone gain, Rear panel; Antenna, bias adjust, phones or speaker, key, power input, External ALC input, Calibrator socket, External relay control, carrier insertion, S-meter adjust.
Valve and Semiconductor Complement	16 tubes, 10 semiconductors; parallel 6JB6's in p.a.
Dimensions	6⅝ in. high, 13⅜ in. wide, 11 in. deep.
Mechanical	⅛ in. solid extruded aluminium front panel, satin-anodized off-white; perforated aluminium enclosure with grey-blue wrinkle enamel finish; Gloss black knobs with aluminium caps. Universal mobile mount included.
Weight	15 pounds.
Power Requirements	700V d.c. at 300 mA, 280V d.c. at 200 mA, —80V d.c. at 10 mA, 12·6V at 5A.
Accessories	AC-200 power supply (operates from either 117 or 234V a.c. 50–70 c/s and supplies all necessary operating voltages); XCU-27 100 kc/s plug-in crystal calibrator.

ON THE AIR

After investigating the mysteries of the selectivity, the surprising fact was that reception quality was quite acceptable, albeit a bit " toppy," and no-one had any adverse comment on the transmitted signal other than, again, it was a bit toppy. " Reasonable communication quality " is how someone put it.

The NC200 handled quite well with the main slight criticism being the " dead " feel of the tuning knob. It was not possible to see the tune frequency of the dial at a glance particularly on the open part of the scale at one end. One had to pick out the 100 kc/s calibration frequency (there are vertical columns of seven numbers) and then refer back to the scale edge 5 kc/s points. At certain times of the day the 5·020 i.f. was a problem since at the test site there is a very strong commercial RTTY station on that frequency which broke through. On 80, 40 and 20m this was no problem since the general din on these bands completely swamped the breakthrough. On 15 and 10m the breakthrough was quite annoying at times.

One of the benefits of having r.f. circuits common to both transmitter and receiver is that the p.a. anode and exciter tune control are kept on tune as a natural process of adjustment of the receiver. Once the optimum position of the p.a. load control is found on each band by experiment, the operator can go straight to transmit without having to go through the usual transmitter tuning procedures necessary if separate r.f. circuits are used. This feature is very convenient.

On c.w. there is no audio monitor, a feature which many operators prefer.

THE HANDBOOK

The handbook is well presented and its 20 printed pages contain plenty of information including layout diagrams and a code list which includes mechanical items. The separate circuit diagram is easy to follow. One amusing spelling error in this age of competitive Japanese equipment is the reference to the " Clystal lattice filter."

GUARANTEE

The National guarantee is for 90 days on a labour and all material basis and for the rest of one year on a material only (excluding valves and transistors) basis. This is conditional on the return of a guarantee form which asks for comment on workmanship, performance, etc.

CONCLUSIONS

At £160 the NC200 is probably the lowest cost ready-made transceiver on the British market. It is fair to say that it falls short of more expensive transceivers in several respects. In this world one rarely gets something for nothing, and so one gets what one pays for. Value for money is something on which every individual has different ideas and this is the reason why the reviewers rarely state their views, but in this case in the opinion of the reviewers it would be unreasonable to expect more for £160.

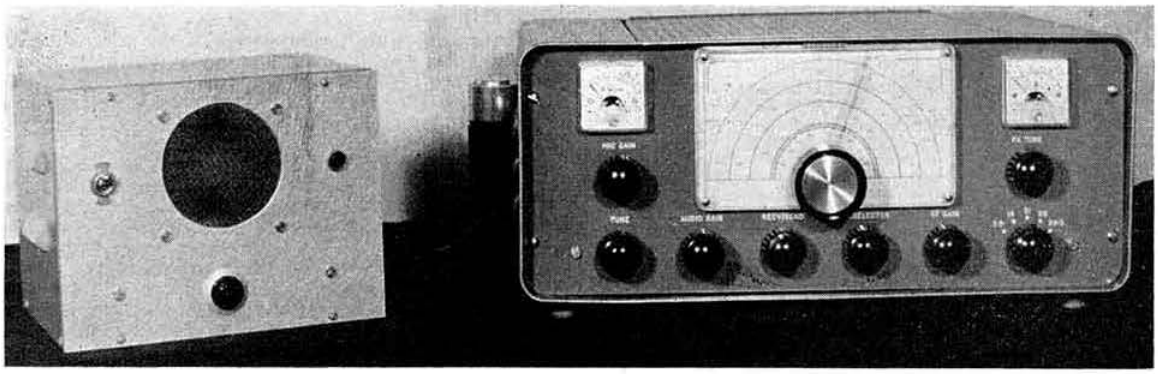
COMMENTS FROM LOWE ELECTRONICS

Once again an excellent review—just plain facts without bias for or against.

The opening remark " price is proportional to sophistication " is of course the crux of the matter. All I say is—" what else can you get at the price? "

With regard to the humped filter response, the main point to bear in mind is that the rig sounds OK—and this surely is the paramount factor.

The spelling error in the handbook i.e. " clystal lattice filter " should with honourable respect read " Clystal Rattice Filter." Ah, so! Joking apart, the National 200 is, of course, manufactured in the States.



The G3MVZ S.S.B. Transistor Transceiver

By F. E. GARRETT, G3MVZ*

FOLLOWING the description of G3MVZ's transistorized exciter in the October 1965 BULLETIN, a tremendous amount of interest has been shown with letters received from amateurs in many countries who have either built the complete exciter or used sections of the circuit to be incorporated into their own equipments. This exciter has been in regular use at G3TFW and can frequently be heard on 80m. Since it was put on the air it has been found to be exceptionally stable, and only minor adjustments have been necessary to the free running carrier oscillator or the balanced modulator.

The writer invariably spends a holiday at a bungalow on the South Coast where he enjoys having a QSO on 80 and 20m, but with luggage space at a premium it is essential for the equipment size to be kept to a minimum. Naturally the next step appeared to be a fully transistorized equipment running reasonable power, and a complete transceiver seemed to be the ideal arrangement. Plans for this were accelerated by the arrival of a large airmail parcel from the USA containing a large assortment of devices plus data sheets and an interesting selection of power transistors.

It was decided that the transceiver should use a high frequency filter around 9 Mc/s as crystals at this frequency are readily available on the surplus market and reasonably cheap. Alternatively, a commercial filter with a pass-band around this frequency could be incorporated.

While the main interest would be in 80m operation it was felt that owing to the excellent transistor characteristics available the opportunity should be taken to include 20, 15 and 10m, 40m being omitted as the writer has never had any particular inclination to use this band.

A number of points have to be considered when design commences, not the least being the multiplicity of tuned circuits and the desirability of single knob control, and it was therefore decided that this transceiver should be single conversion on 80m and double conversion on the remaining bands. As is normal in transceivers the i.f. stages were to be common to both the receiver and transmitter but separate mixers used for the receiver and transmitter. The equipment uses 29 transistors and nine diodes.

THE RECEIVER

As already mentioned the receiver is single conversion on 80m but double conversion on all the other bands, the first mixer being used on 80m as an additional r.f. stage following the normal r.f. stage.

A.g.c. is applied to the r.f. stage, this being the only stage so controlled as it is not easy to control the i.f. stages since they are complementary to the transmitter. This is followed by a first mixer which produces the first i.f. of 3·5 Mc/s, the collector being wideband coupled to the second mixer which produces the 9 Mc/s i.f. It will be noticed in this latter mixer that there is apparently no tuned circuit in the collector, the load being supplied by the r.f. choke, RFC2. In fact, however, the 9 Mc/s filter appears as the tuned load, which in turn feeds the two stage amplifier. It was found unnecessary to neutralize the stages and the gain is more than adequate. The i.f. stages feed a product detector and a conventional amplifier to provide adequate output. The product detector is free from distortion, the injection from the carrier oscillator being more than adequate to cope with all signal levels. The i.f. amplifier also feeds the a.g.c. amplifier and S meter circuit where a further stage of amplification is provided before the signal is rectified and fed to the d.c. amplifier via the gating diode CR4. The circuit has been arranged for a time constant of about one second. The action of this circuit is very simple and effective, a positive voltage being applied to the base of TR17 causing it to draw more current. The voltage drop across the collector load resistor increases, reducing the voltage applied to the controlled stage, and this will vary from a no-signal level of about 1·8 volts to, on very strong signals, about 0·8 volts, this being measured at the junction of the 100K ohms and 47K ohms resistors. The S meter circuit is arranged in a bridge formation, zero reading or balance being set by the 25K ohms potentiometer on zero signal, the sensitivity control being the 2K ohm potentiometer in parallel with the meter.

The V.F.O.

This circuit is the very popular W3JHR " synthetic rock " circuit which the writer used in the original exciter, and which has proved exceptionally stable. It covers a frequency range of 5 to 5·5 Mc/s and the output is kept sensibly flat over the entire coverage due to the damping resistor of 4·7K ohms in parallel with the output coil L6. Coupling is by means of a low impedance winding at the cold end of this coil. The supply is stabilized by the Zener diode CR5. The whole unit has been built into a diecast box which makes for a very rigid assembly and isolation from adjacent circuits.

* 28 Greenway Gardens, Croydon, Surrey, CRO 8QG.

Crystal Oscillator

This is an interesting circuit arranged as a third overtone oscillator, the output being injected into the first receiver mixer to provide the i.f. of 3·5 Mc/s. The crystals used were the miniature HC-6/U variety which are obtainable on the surplus market, and are ground for overtone operation. It will be seen that feedback is obtained with the 5 pF capacitor between the collector and emitter of the transistor. On 3·5 Mc/s the oscillator is inoperative, but on 14, 21 and 28 Mc/s the appropriate crystal is selected and the one coil, L11, resonated to its third overtone by appropriate capacitors. The entire oscillator with the exception of the crystals and the switch wafers was built into an Aladdin screening can; the general form of assembly can be seen from the photograph.

THE TRANSMITTER

Audio and Test Oscillator

The audio circuits are entirely conventional using two high gain low noise transistors. In practice it is possible to drive the transmitter fully with the audio gain advanced about one third. No provision has been made for insertion of carrier, and for tune-up purposes a test oscillator providing two tones has been incorporated. This can be brought into operation by the switch S2 which powers the test oscillator and selects its output instead of the microphone.

Carrier Oscillator and Balanced Modulator

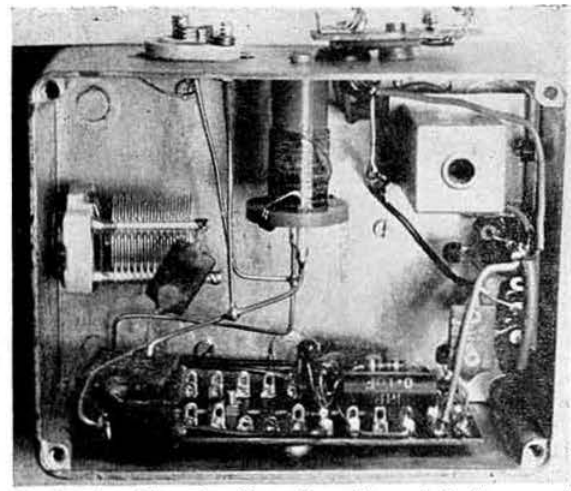
The carrier oscillator is entirely conventional and, as with the crystal overtone oscillator, the entire assembly is constructed in the Aladdin former and screening can containing T1. This ensures complete screening and the balanced modulator is built immediately underneath the can. The usual precautions should be observed with the balanced modulator, namely complete uniformity of construction, each diode and its associated resistors being placed as a mirror image of its " opposite number." Carrier balance is obtained with the 200 ohm variable resistor which should have a carbon track and not wirewound. Due to possible unbalance in the stray circuit capacities a further improvement may be obtained by fitting a 30 pF Philips trimmer from one of the resistor/diode junctions to chassis. The correct connection will have to be ascertained by experiment.

Transmitter Mixers

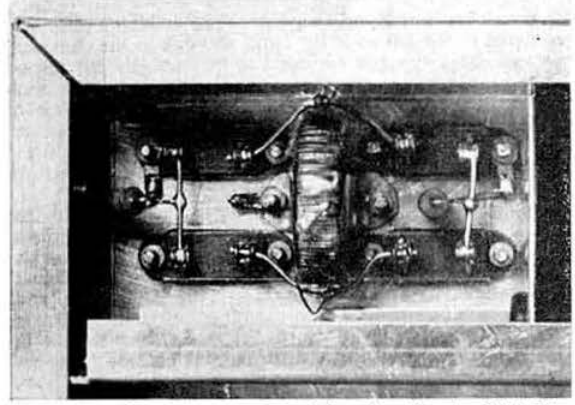
These mixers are identical with the receiver mixers except for the tuned collector circuits in the second mixer. It will of course be observed that while the v.f.o. is applied to the second receiver mixer, it is applied to the first transmitter mixer, a similar reversal taking place in respect of the overtone crystal oscillator. It is essential that all the transistors used in these mixers are matched and of the same type, for it will be noticed that there is a common emitter configura tion for each pair of mixers, the supply being switched to the collectors depending whether on TRANSMIT or RECEIVE. If the mixers are not completely matched there may well be some small frequency shift between transmit and receive frequencies. Additional tuned circuits in the form of series resonant traps L13, L14, L15 are incorporated on the collector circuit of the second mixer in order to attenuate any slight residual break-through from the overtone oscillator which might be passed to the driver and linear amplifier.

R.F. Coils

Incremental inductance tuning is used in both the receiver and transmitter circuits other than the wideband couplers. This method was adopted in order to reduce the number of coils that were built into the circuit and in practice has worked out extremely well. The higher frequency bands, namely



The interior of the v.f.o. diecast box. The main tuning capacitor is on the left, and above it to the right is the oscillator coil wound on a Denco polystyrene former.



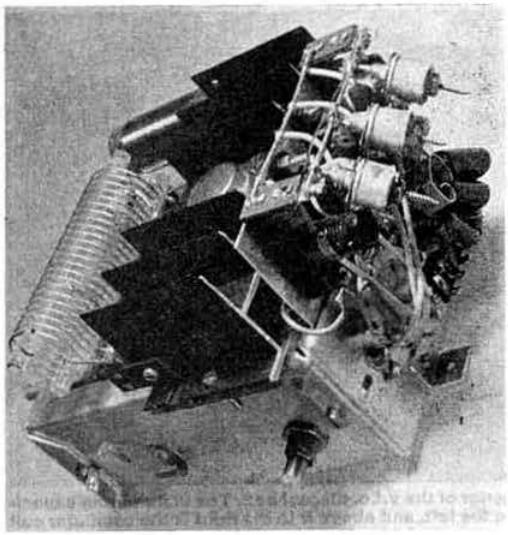
The under-chassis compartment housing the toroidal filter coil and crystal bases.

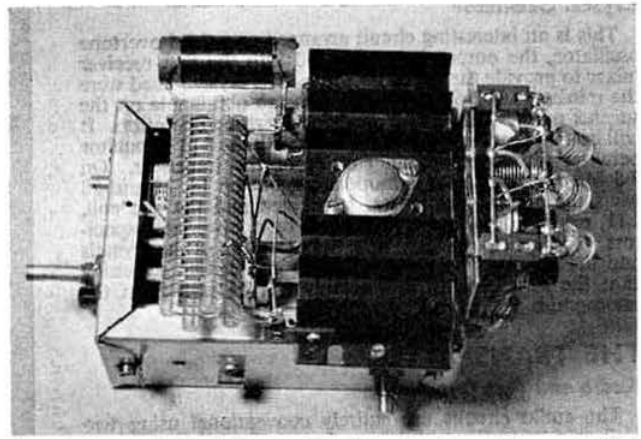
14, 21, and 28 Mc/s are tuned by one coil with appropriate padding and trimming capacitors. However, on the lowest frequency band of 3·5 Mc/s, an additional inductance is switched in with the appropriate padding and trimming capacitor. The main tuning for all bands is by means of the three gang 25 pF capacitor.

Driver and Linear Amplifier

This part of the circuit will probably be of the greatest interest to readers and certainly caused the writer more headaches than the remainder of the entire circuit. It is essential that the driver and linear amplifier are completely shielded from each other and adequately decoupled, but at the same time coupling leads should be kept as short as possible. Furthermore it is essential to use an adequate heat sink in the linear amplifier. As multiband operation is required, necessitating switch leads to the tank coil, these should be as short as possible. From the photograph it will be seen that the method of construction appears somewhat unconventional but this form was adopted after a number of prototypes had been tried and discarded.

The driver is operating in Class A and is completely conventional, the output being coupled to the linear amplifier by





The optimum method of mounting the output transistor, providing bandswitching, allowing free convection of heat and yet keeping the driver stage close to the output stage can be clearly seen from these photographs. The chassis is assembled from Home Radio (Mitcham) chassis kit parts.

the usual low impedance winding. The collector coils are resonated in the centre of the band and due to the damping effect of the device will be found to be relatively flat across the band. There is more than adequate drive on 80m, and on 20m the drive is sufficient to talk the linear amplifier to its maximum current, about 20 watts p.e.p. input. However on 15 and 10m, due to the higher drive requirements of the output transistor as the frequency rises, it is limited to approximately 12 watts p.e.p. input.

The linear amplifier was originally designed around the SE3034, a device specifically produced for the American Citizens band equipment and designed to run at 5 watts d.c. input with a V_{ceo} of 60 volts. It is reasonable to assume that a power device can be operated up to a third of its V_{ceo} and investigation was started with the object of running two in parallel at a current of 1 amp. When such devices are in parallel it is essential for a small emitter resistor to be included in each device to assist in balancing the current flow, thus allowing for production spreads. Unfortunately this arrangement was not at all satisfactory and the author saw the demise of an alarming number of devices. The project was abandoned and it was decided to use a single device with a maximum of 25 volts applied to the collector and a current limit of 850mA. A further problem that has not been encountered with circuits published so far is the requirement for multiband operation. It is inconvenient for plug-in coils to be used, nor can the popular pi-tank be employed until the v.h.f. range is reached because the very low output impedence of the device would necessitate exceptionally large tuning capacitors and this would be quite unacceptable and impracticable in this case. It would have been possible for single band operation to use a Pi-L network but again, owing to multiband operation and the additional switching complications, this was abandoned.

Finally, the simplest form, as appearing in the circuit, was adopted. The criteria were:

(*a*) the transfer of maximum r.f. energy to a 50 ohm dummy load

(*b*) a standing wave ratio to this load not exceeding 1·5 on any band

(*c*) avoidance of undue heating and destruction of the device.

This circuit has proved very satisfactory in service but it is essential that the transmitter is not operated unless an appropriate dummy load or matched aerial system is connected. It will be seen on reference to the circuit that the aerial is permanently connected to the transmitter tank circuit, the aerial relay simply switching the receiver r.f. circuits. This arrangement has no detrimental effect on the receiver performance but is a safeguard to the linear amplifier.

A word will be in order concerning the standing current applied to the device which is controlled by the bias potentiometer. This should be in the region of 25 mA for the device specified and should be maintained at the minimum figure possible consistent with good linear operation.

Power Supply

This incorporates two circuits. Four diodes are used in a full wave bridge circuit followed by electronic stabilizing and smoothing which obviates the need to use chokes and large smoothing capacitors. Furthermore, it provides overload protection to the entire equipment, the output being sensibly constant up to 1·5 amps after which the voltage falls rapidly.

The second section is an additional safety device which protects the linear amplifier only and limits the maximum current which can be drawn to approximately 850 mA. This figure is dependent on the resistor marked " R " and will be obtained by using 1 ft. 6 in. of 36 s.w.g. enamelled copper wire. This figure may of course be exceeded up to the maximum safe limit of the device by reducing its value.

Construction

The sections of the transceiver were built as sub-assemblies, each on its own tag-board, as can be seen from the photograph. Each section was assembled before being incorporated into the main chassis.

The crystal filter was constructed and tested with the aid of an LM 14 frequency meter and a valve voltmeter as has been described in articles published elsewhere. The 500 ohm input and output resistors provide adequate loading. The toroidal coil was constructed on a 1 in. diameter ferrite ring and consists of 18 double turns of 20 s.w.g. enamelled copper wire bifilar wound (36 turns in all). The whole assembly was mounted in a separately screened compartment, the crystals being enclosed in a small box on top of the chassis.

VALVE VOLTMETER R.M.S. CHECK VOLTAGES

Audio	Collecter TR24	Gain at Normal Gain at Maximum	0·5V 1·25V
R.F.	Junction of each diode and balancing resistor	With carrier balanced out and pot. At centre of travel.	0·25V
	Carrier oscillator	Collector TR25	0·95V
	V.F.O. input	Mixer Emitter	0·1V
	Overtone oscillator using correct crystals should be equal on all bands	Mixer Emitter	1·1V
S.S.B.	Collector of Driver TR 28	3·5 Mc/s	8·25V
		14 Mc/s	11·0V
		21 Mc/s	11·0V
		28·5 Mc/s	11·0V
A.G.C.	Receiver measured at junction of 100K and 47K resistors in A.G.C. amplifier	All controls at maximum preselector peaked	No signal 1·8V Max signal 0·9V

Audio and s.s.b. measurements made with two tone oscillator switched on and audio gain set for maximum transmitter output measurements made with Heathkit Model V7-A/UK

ALIGNMENT OF THE RECEIVER

The equipment required comprises an audio output meter which may consist of a multimeter on its low voltage a.c. range, a valve voltmeter, and a signal generator.

(a) The I.F. Amplifier. Alignment should be started with the i.f. amplifier, the valve voltmeter being connected on the 1·5 volt range to the input of the product detector. The signal generator should be connected to the collector of the second receiver mixer, care being taken to isolate the input with a blocking capacitor if necessary. With the signal generator set at the centre frequency (9 Mc/s) of the crystal filter, the i.f. amplifier coils should be resonated, the signal generator output being reduced as alignment proceeds.

(b) The Carrier Oscillator. The carrier crystal may now be inserted and the valve voltmeter transferred to the emitter of the product detector. The carrier oscillator coil should now be resonated for maximum output.

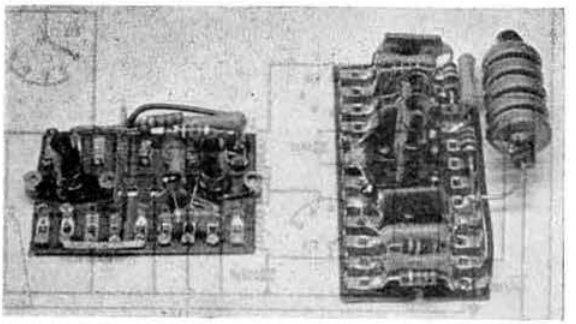
(c) The V.F.O. The signal generator should now be reconnected to the base of the second receiver mixer via the blocking capacitor and set for 3·5 Mc/s, the audio output meter being connected to the audio output transformer low impedance winding. The carrier crystal should be left in position. The range switch should be set to 3·5 Mc/s and the v.f.o. should be set to its highest frequency—i.e. the tuning capacitor at minimum capacitance. The band-set capacitor of 25 pF should now be rotated until a signal is peaked on the audio output meter. It should now be possible to swing the v.f.o. to maximum capacity, the signal generator providing the same indication on the audio output meter at 4 Mc/s.

Finally the v.f.o. should be set to the centre of the band and the valve voltmeter connected to the second receiver mixer emitter TR3. The coil L6 should be peaked for maximum output and this should be constant over the entire band.

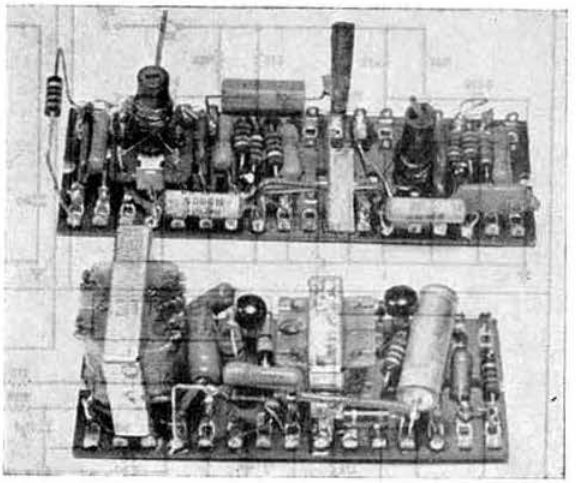
(d) Wide band Coupler. The signal generator should now be connected to the base of the first receiver mixer and the cores of the wide-band coupler, T7, should be resonated at approximately 3·65 Mc/s and 3·75 Mc/s. By swinging the v.f.o. and the signal generator between 3·5 and 4 Mc/s a sensibly flat response should be obtained in the audio output meter.

(e) Crystal Oscillator. The transceiver should now be switched to 28 Mc/s, the signal generator disconnected and the valve voltmeter applied to the first mixer emitter. The coil L11 should be resonated with the iron dust core until maximum is indicated on the valve voltmeter. The band-change switch should be switched on and off a number of

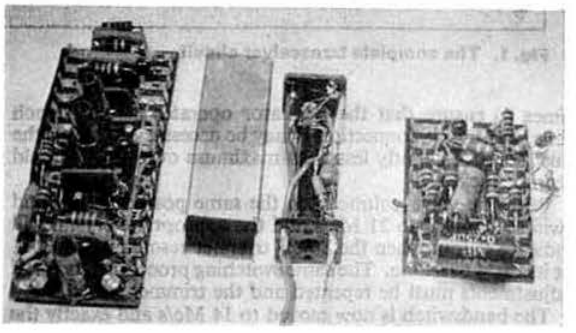
Construction of the tag board sub-assemblies.



Receiver r.f. stage (left) and mixers (right).



Receiver and transmitter i.f. stages (upper) and the audio output stage (lower).



Transmitter mixers (left), the overtone oscillator with its can, and the transmitter audio input stages (right).

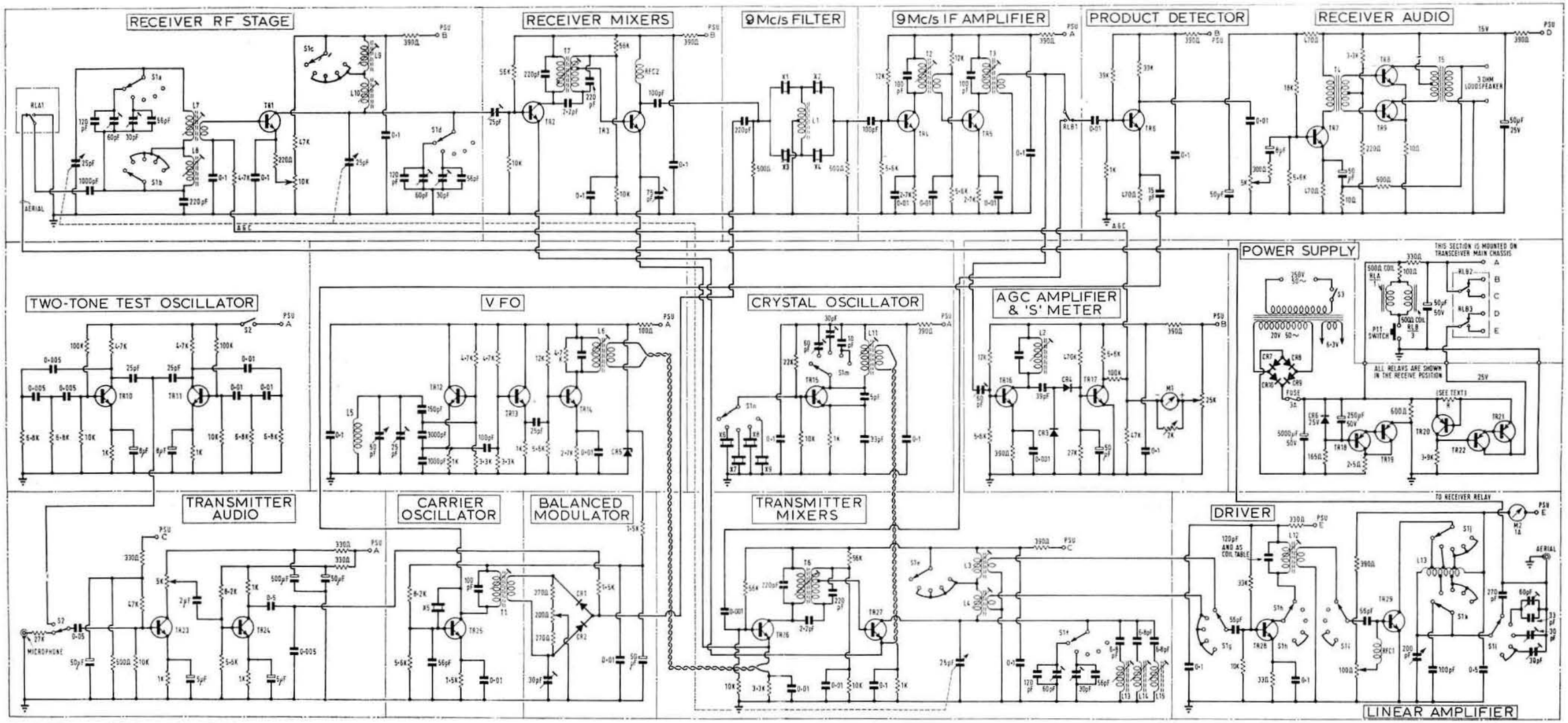


Fig. 1. The complete transceiver circuit.

times to ensure that the oscillator operates instantly each time, and in this connection it may be necessary to adjust the dust core for slightly less than maximum output. It should then be locked.

With the valve voltmeter in the same position, the band switch is moved to 21 Mc/s and the appropriate crystal will indicate output when the 30 pF trimmer resonates with L11 at its third overtone. The same switching procedure and final adjustments must be repeated and the trimmer sealed.

The bandswitch is now moved to 14 Mc/s and exactly the same procedure followed.

(f) R.F. Stage. The valve voltmeter should now be disconnected and the signal generator connected to the aerial input. The 60 pF input capacitor to the a.g.c. amplifier should be temporarily disconnected. The transceiver is switched to 28 Mc/s, the signal generator to a similar frequency and the v.f.o. swung until a faint signal is indicated on the audio output meter. The pre-selector capacitor should be at almost minimum capacitance. The cores of L7 and L10 should be adjusted for maximum output, the signal generator input being reduced progressively.

The transceiver is now switched to 21 Mc/s, the signal generator again being set to the same frequency, and the v.f.o. swung until a signal is indicated on the output meter. It should now be possible to peak this signal with the pre-selector.

The transceiver is now switched to 14 Mc/s and set up as before with the preselector almost at maximum capacitance. Finally the Philips trimmers associated with L7 and L10 are peaked for maximum output in the audio meter.

The transceiver is finally switched to 3·5 Mc/s, the coils L8 and L9 now being in circuit and the same procedure is adopted with the appropriate capacitors, the pre-selector being at maximum capacity.

(g) S-Meter and A.G.C. The S meter should now be adjusted for zero reading. The 60 pF trimmer in the input to the a.g.c. amplifier which was temporarily disconnected in para (f) should now be reconnected and set for approximately 75 per cent capacitance. With the signal generator set for 3·75 Mc/s and the pre-selector peaked on this frequency, the a.g.c. amplifier coil L2 should be resonated for maximum indication on the S-meter.

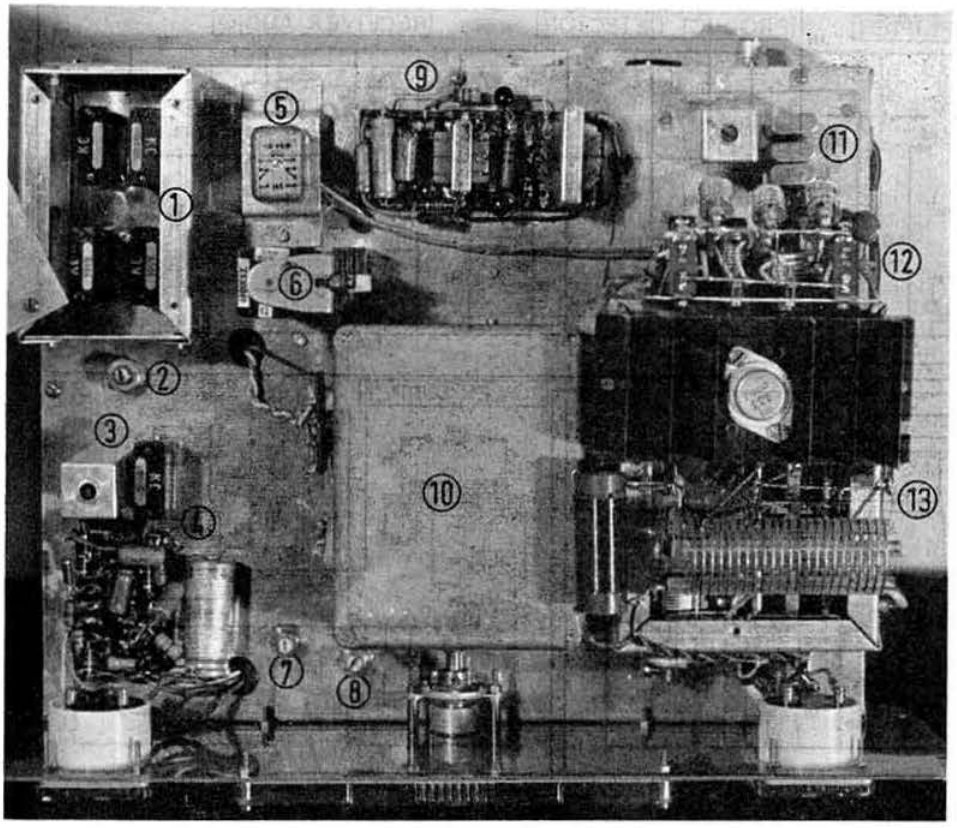
(h) Final Trimming. The 30 pF coupling capacitor between the r.f. stage and the first mixer should be set at approximately 15 pF to obtain the best signal-to-noise ratio, and the 75 pF trimmer in the second mixer emitter TR3 is adjusted for maximum output in the audio meter.

This completes the receiver alignment.

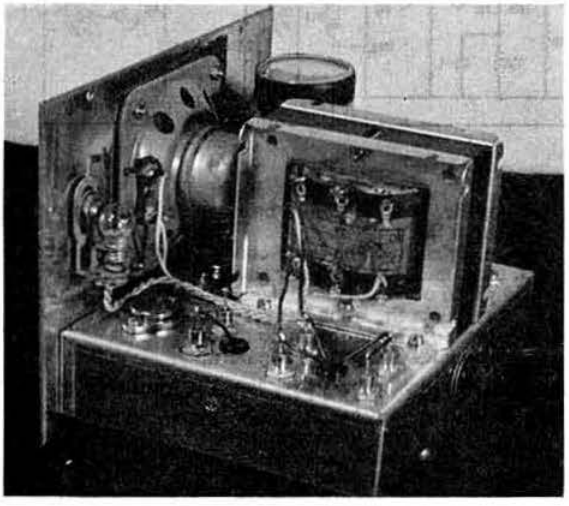
ALIGNMENT OF THE TRANSMITTER

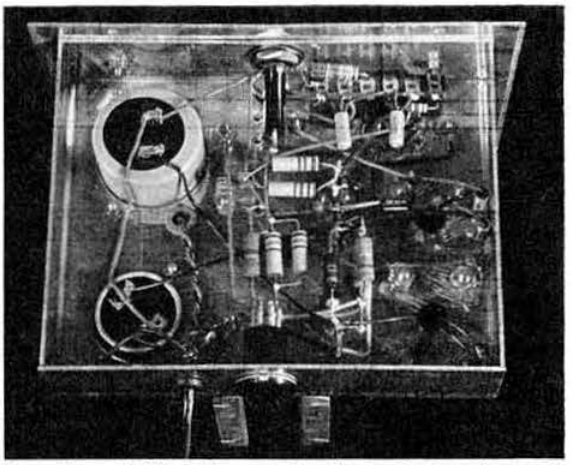
As has been previously emphasized, the first requirement is for the linear amplifier to be terminated with the correct load.

With the bandswitch set to 28 Mc/s, the transceiver pre-selector set at 28·5 Mc/s together with the v.f.o., the trans-

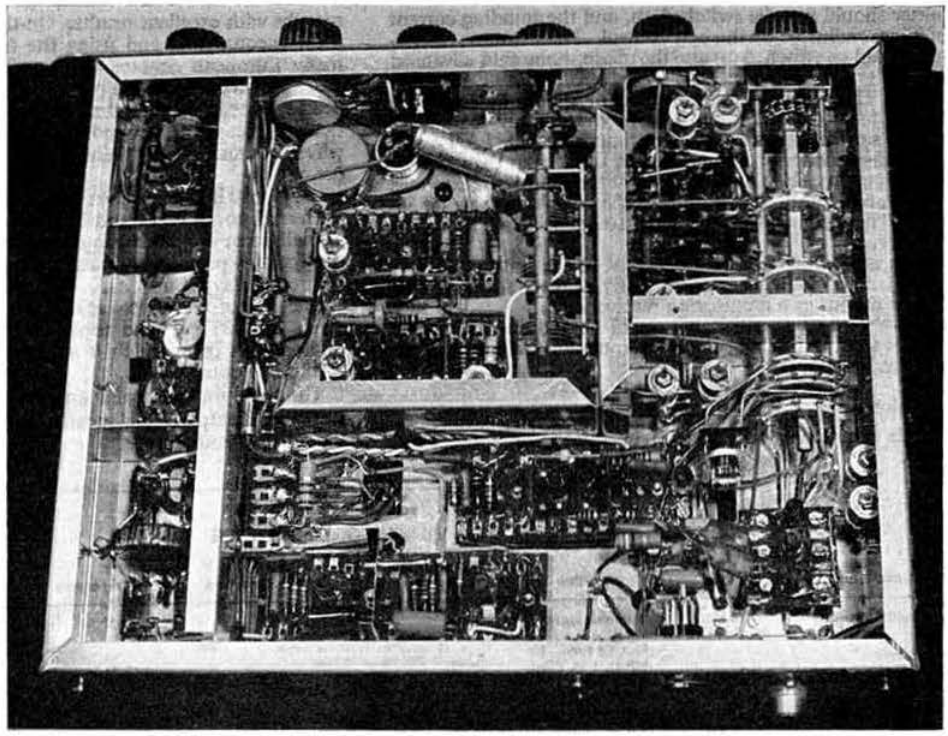


The layout of units and controls above the chassis. (1) 9 Mc/s filter; (2) carrier balance control; (3) carrier oscillator and crystal; (4) transmitter audio stages; (5) aerial relay; (6) power relay; (7) S meter zero control; (8) sensitivity control; (9) receiver audio output stages; (10) v.f.o. box; (11) overtone oscillator and crystals; (12) p.a. driver stage; (13) linear amplifier.





Two views of the power supply. The mains transformer is manufactured by Douglas and delivers 0-30V at 2A (MT3AT).



An underchassis view of the transceiver and identification diagram.

TRANSISTOR AND DIODE TABLE

Function	Circuit Ref.	Type	Maker	Remarks
Receiver R.F.	TR1	BF165	Fairchild	
Receiver Mixer Transmitter Mixer	TR2, TR3, TR26, TR27	BC134	Fairchild	Essential to be matched pairs
I.F. Amp	TR4, TR5	BC134	Fairchild	
Product Detector	TR6	BC134	Fairchild	All these types
Receiver Audio	TR7, TR8, TR9	BC115	Fairchild	are available
Two-tone OSC	TR10, TR11	BC118	Fairchild	in UK from
V.F.O.	TR12, TR13, TR14	BF163	Fairchild	S-G-S Fair-
Crystal OSC.	TR15	BF163	Fairchild	child stockists
A.G.C. AMP	TR16	BC134	Fairchild	
A.G.C. AMP	TR17	BC115	Fairchild	
Transmitter Audio	TR23, TR24	BC114	Fairchild	
Carrier OSC.	TR25	BF163	Fairchild	
Transmitter Driver	TR28	BSX32	Fairchild	
Linear Amp	TR29	BD111	Fairchild	This is not the exact equivalent; an ITT type 2N3643 would be more suitable.
Power Supply	TR18, TR20, TR22 TR19, TR21	OC82 OC28	Mullard Mullard	
Diodes	CR1, CR2, CR3, CR4	OA79	Mullard	Matched Pair CR1, CR2
	CR5	OAZ204	Mullard	
	CR6	OAZ230	Mullard	Two in series
	CR7, CR8 CR9, CR10	3F10-D		

THIRD OVERTONE CRYSTALS (HC-6/U)

Crystal	Band	Frequency
—	3·5 Mc/s	Nil
X6	14 Mc/s	18·00600 Mc/s
X7	21 Mc/s	25·00500 Mc/s
X8	28·25 Mc/s	32·22222 Mc/s
X9	28·75 Mc/s	32·77777 Mc/s

LINEAR AMPLIFIER TANK CIRCUIT

Codar Coil 40-818 Ind. 5·1 μH

Frequency	Collector Tap from Cold End	Total turns in circuit	Output Capacitance
3·5 Mc/s	7 turns	24 (All) Note: On this band add 100 pF s.m. switched in parallel with tuning capacitor.	270 pF s.m.
14 Mc/s	2 turns	8 turns	60 pF trimmer + 33 pF s.m.
21 Mc/s 28 Mc/s	½ turn	2 turns	30 pF trimmer 30 pF trimmer

The output capacitors are adjusted with the Linear connected to a 50 ohm dummy load. Capacitance is increased until sufficient loading is effected. If overcoupled the output will fall.

BRIEF SPECIFICATION OF THE S-G-S FAIRCHILD BD111

Maximum Ratings		
Operating junction temperature		+150°C
Total dissipation at 75°C case temp.		15W
Total dissipation at 100°C case temp.		10W
Collector to base voltage	V_{cbo}	60V
Collector to emitter voltage	V_{ceo}	60V
Collector to emitter voltage	C_{ces}	60V
Emitter to base voltage	V_{ebo}	5V
Collector current (10μS pulse)	Ic	10A
Base current	Ib	2A
Electrical Characteristics		
High frequency current gain (f = 20 Mc/s) (I_C = 500 mA, V_{CE} = 5V)	h_{fe}	5 (typ.)
Output capacitance (I_E = 0, V_{CB} = 10V)	C_{ob}	80 pF (max.)
Emitter transition capacitance (Ic = 0, Vbe = 0·5V)	Cte	500 pF (max.)
Junction to case thermal resistance (I_C = 500 mA V_{CE} = 2V)	J-C-O	5°C/W (max.)

mitter should now be switched on, and the standing current of 25 mA adjusted by the bias control. The two-tone oscillator should be switched on and the microphone gain advanced until a small indication is observed on the linear amplifier meter. The amplifier tuning capacitor should be resonated for an indication of r.f. output to the dummy load. L12 should now be resonated for maximum output, L3, L4 and padding capacitors being peaked as L9, L10 in the receiver. This procedure should be repeated at the centre and extremes of each band until finally on 80m the wide-band coupler T6 should be resonated at the same frequencies as T7 in the receiver.

This now completes the alignment of the transmitter and the balanced modulator can be finally adjusted for minimum carrier output in a monitoring receiver.

A very pleasing sideband signal should be heard, the correct sideband being selected automatically depending on the band in use.

Conclusion

This transceiver has been in operation for about eight months with excellent results. On-the-air reports have been most encouraging, and using the transceiver " bare-foot " many European contacts as far afield as Switzerland and Norway have been made on 80m. On 20m the Atlantic has been spanned using a cubical quad and the writer was particularly pleased at the report of 5 and 6 received from one W whose comment was " What a nerve! I am running 2 kW p.e.p."

A KW600 linear has been borrowed and this can be driven to the full power on 80 and 20m. The writer has constructed a small linear amplifier using a pair of 5B/254M valves which comfortably provide 180 watts p.e.p., and this will be used on future holiday excursions.

The writer wishes to acknowledge the invaluable help given by G3TFW who took and processed the excellent photographs from which it is easy to visualize the general method of construction.

The panel was fabricated and engraved by F.N. Fowler of Bromley, Kent, and this greatly enhances the appearance of the finished equipment.

COIL AND TRANSFORMER TABLE

Coil and Function	Frequency	Winding	Resonating Capacitance
L1, toroidal filter coil	9 Mc/s	18 double turns, 20 s.w.g. enam., bifilar wound (36 turns), 1 in. diam. ferrite ring.	
L2, a.g.c. amplifier	9 Mc/s	20 turns, 30 s.w.g. enam.	100 pF s.m.
L3, 2nd transmitter mixer	3·5 Mc/s	*pri.* 50 turns, 30 s.w.g. enam. *sec.* 12 turns 38 s.w.g. at cold end	25 pF variable + 60 pF trimmer and 120 pF s.m.
L4, second transmitter mixer	14 Mc/s 21 Mc/s 28 Mc/s	*pri.* 8 turns, 24 s.w.g. enam. *sec.* 3 turns 24 s.w.g. at cold end	25 pF variable (+ 30 pF trimmer and 56 pF s.m. on 14 Mc/s)
L5, v.f.o.	5 to 5·5 Mc/s	26 turns, 24 s.w.g. enam. ½ in. diam. polystyrene former	50 pF variable and 25 pF trimmer (band set)
L6, v.f.o. output	5 to 5·5 Mc/s	*pri.* 40 turns, 36 s.w.g. enam. *sec.* 10 turns, 36 s.w.g. enam. over cold end	75 pF s.m.
L7, r.f. stage (as L4)			
L8, r.f. stage	3·5 Mc/s	50 turns, 30 s.w.g. enam.	25 pF variable + 60 pF trimmer and 120 pF s.m.
L9, r.f. stage (as L8)			
L10, r.f. stage	14 Mc/s 21 Mc/s 28 Mc/s	8 turns, 24 s.w.g. enam.	25 pF variable (+ 30 pF trimmer and 56 pF s.m. on 14 Mc/s)
L11, overtone oscillator 20m 15m 10m	18 Mc/s 25 Mc/s 32·25 Mc/s	*pri.* 12 turns, 24 s.w.g. enam. *sec.* 3 turns, 24 s.w.g. enam. over cold end	60 pF trimmer, 30 pf trimmer, 10 pF s.m. respectively
L12, transmitter driver	3·5 Mc/s	*pri.* 35 turns, 28 s.w.g. enam., close wound. *sec.* 12 turns, 28 s.w.g. enam. at cold end	150 pF s.m.
	14 Mc/s	*pri.* 12 turns, 24 s.w.g. enam., spaced wire diam. *sec.* 3 turns, 24 s.w.g. enam., interwound at cold end	30 pF trimmer + 33 pF s.m.
	21 Mc/s	*pri.* 6 turns, 24 s.w.g. enam., spaced wire diam. *sec.* 2 turns, 24 s.w.g. enam., interwound at cold end	30 pF trimmer + 25 pF s.m.
	28 Mc/s	*pri.* 5 turns, 24 s.w.g. enam., spaced wire diam. *sec.* 1 turn, 24 s.w.g. enam., interwound at cold end	30 pF trimmer + 25 pF sm.
L13, crystal trap	18 Mc/s	40 turns, 36 s.w.g. enam.	6·8 pF series s.m.
L14, crystal trap	25 Mc/s	30 turns, 30 s.w.g. enam.	6·8 pF series s.m.
L15, crystal trap	32·25 Mc/s	20 turns, 30 s.w.g. enam.	6·8 pF series s.m.
T1, carrier oscillator	9 Mc/s	*pri.* 20 turns, 30 s.w.g. enam. *sec.* 20 turns, 30 s.w.g. enam., pile wound at cold end	100 pF s.m.
T2, i.f. amplifier	9 Mc/s	*pri.* 20 turns, 30 s.w.g. enam. *sec.*, 4 turns, 30 s.w.g. enam. over cold end	100 pF s.m.
T3, i.f. amplifier (as T2)			
T4, audio driver		R. Spares T/T6	
T5, audio output		R. Spares T/T7	
T6, wideband coupler	3·5 to 4 Mc/s	*pri.* 45 turns, 30 s.w.g. enam. *sec.* 45 turns 30 s.w.g. enam., tapped 15 turns from cold end	*pri.* 220 pF s.m. *sec.* 220 pF s.m.
T7, wideband coupler (as T6)			
RFC1		100 turns, 36 s.w.g. enam. ¼ in. diam.	
RFC2		single pie on ferrite core	

All coils except L1, L5, L12, T4 and T5 are wound on Aladdin 0·25 in. diam. formers with dust cores, close wound except where stated. L12 is wound on a ⅜ in. diam. Aladdin former type F804/PP5892 with dust core. L11 and T1 are in screening cans. After winding all coils are fixed with polystyrene cement. Select dust core types according to frequency involved. S.m. denotes silvered mica.

The wideband couplers T6 and T7 are each wound on a pair of Aladdin formers (see photograph). Half of each base is sawn off thus permitting very close mounting of 0·1 in. They are top coupled with a 2·2 pF ceramic capacitor.

L3 is damped with a 4·7 K ohms resistor to prevent drive becoming excessive on 3·5 Mc/s.

JOINT IQSY/COSPAR SYMPOSIUM ON THE RESULTS OF THE IQSY, 17-29 JULY, 1967

By C. E. NEWTON, G2FKZ*

BRIGHT and early on Tuesday morning, 18 July, I battled my way right across London through the rush-hour traffic to attend the IV Session of the IQSY COSPAR Symposium held at South Kensington.

I had little idea just what would transpire as I had not attended such a high level scientific forum before. There were abstracts of the many lectures in the official book, so I genned up and went along, since I could not have unlimited time off work I had to pick what I considered were the most relevant sessions in relation to the Society's Scientific Studies Committee's work.

The lecture by Ruth Hedeman of McMath Hulbert Observatory of the University of Michigan concerned the solar aspects of IQSY. Just how quiet was the quiet sun? She put the facts so convincingly, backed up by solar pictures and world-wide observatories' data, that there was little doubt that it had been a relatively active sun, and if her predictions are correct, we will have to wait until the end of the century for really quiet solar activity.

She showed a synodic chart of sunspots over the periods 1961-66, and this enabled one to follow the drift of the very active centres of the higher latitudes to equatorial zones or vice versa. The quietest solar period occurred late summer 1964, the quietest week was 24-30 July, 1964, with the quietest day 26 July; the longest interval without any significant spots or plages was 15-29 September. These results fit in very well with our own observations, as well as the verification that the solar minimum was not all that quiet.

We are, in fact, on the crest of a longer-term cycle which lifts the minimum up. The previous similar to IQSY was in 1867, so really quiet conditions when it may be quite easy to work the States on 160m will not be here until about the year 2000.

To put it all in perspective, solar cycle 20, the present one, has, for at least the first 16 months of its life shown a preponderance of northern hemisphere solar activity with the old cycle 19 activity regions bursting out again. This effect is greater than at the start of any cycle during the past 100 years.

With the advent of satellites and space probes, a better understanding of the interplanetary magnetic field is slowly emerging. Considerable work has been done on the Earth's Magnetosphere, and if one compares the present model with that originally proposed by Van Allen, there is very little resemblance. Norman Ness of NASA Goddard Space Flight Centre showed some most remarkable photos. These were Rocket Cronagraph pictures at 1·5 A.U.† superimposed on an optical ellipse. This showed a solar coronal "Spiked Helmet" which reached out to at least 15 solar radii showing the filamentary structure of the magnetic field connected to the Sun.

Coming nearer to home, the World Magnetic Survey received much attention, and some most interesting work has been done at Exeter University. The generally accepted theory that atmospheric tidal motions cause ionospheric currents to be induced in the *E* layer, is being investigated, but unfortunately, lack of magnetic observatories in many parts of the world have prevented a world-wide picture of the Sq. field‡ being drawn up so it is planned to measure the Sq. variations (the average usually taken over 15 day periods), both by means of a satellite *POGO*-1 which was launched in October 1965 and the development of a stabilized platform which can be anchored in remote parts of the Pacific Ocean. It is hoped that these anchored stations can operate unattended for about one year, the idea being to fill in the gaps between the magnetic observatories. To speed up the analysis of magnetic observations an Automatic Standard Observatory (ASMO) using nuclear magnetometers to measure field components to a very high accuracy has been developed which records in digital form for automatic analysis by computer.

In parallel, studies of ionospheric behaviour and geomagnetic variations are being made. The World Magnetic Survey Project was started during 1957 (beginning of IGY) and has continued up to date, observations being made by ships, aircraft and satellites as well as the land based observatories. It is hoped that a start can now be made in preparing a magnetic map of the world. It is not until you realize what a tremendous job this has been that one feels that the Earth's magnetic field has been a very neglected science.

A. V. Jones (University of Saskatchewan) presented a most interesting paper on the Spectroscopic Morphology of Aurora. Though this dealt in detail with the Visual aspects it was most interesting to find that there seems to be connections with sporadic-*E* occurrence and the observed Alpha Beta hydrogen lines during aurorae.

D. K. Bailey—ESSA Boulder, presented a paper showing the daytime decreases in intensity of propagation at low frequencies (23 Mc/s) by Forward Scatter, the reason being abnormal ionization just below the *E* region. By using riometers at the mid-path position, forward scatter paths of 1154 km were found to be in the height region of 70 km by day and 85 km at night, with low absorption values when sporadic-*E* was observed at *night*. Three causes of such ionization have been identified:

(*a*) solar X-rays emitted during flares and affecting only the illuminated hemisphere;
(*b*) solar protons, together with a small fraction of heavier particles emitted during some flares, and observable, for example, as the PCA phenomenon in the polar caps; and
(*c*) electrons precipitated from the vicinity of the boundary of the trapping region, and observable in the regions bounded approximately by L values of 4 and 8.

The first of these causes will not be discussed further.

For present purposes, it is assumed that the particles arrive approximately isotropically over the upper hemisphere. For a scattering height of 70 km, typical of daylight conditions, there is an effective atmospheric cutoff or threshold energy of about 10 MeV for protons, and about 400 keV for electrons. The latter energy value provides the justification for the term REP event, or relativistic electron precipitation event, that has been assigned to the cases of absorption ascribed to (*c*) above.

At night when the scattering region lies at about 85 km, a height below which the electron removal processes grow progressively more effective than during daylight, riometers may observe considerable absorption, but decreases in the scatter signal are not observed either for proton or electron precipitation. During electron precipitation, however, E_s propagation is often observed; it can be accounted for

(Continued on page 684)

*61 Merriman Road, Blackheath, London, SE3.

†A.U. = Astronomical Units.

‡Sq. field is the Solar Daily Variation on Quiet Days (averaged over 15 days).

THE MONTH ON THE AIR

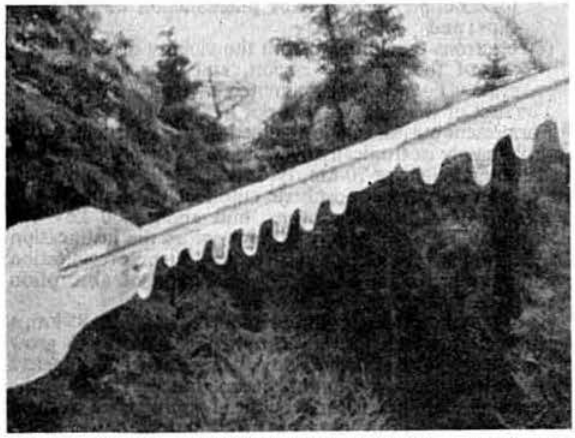
By JOHN ALLAWAY G3FKM

DURING the recent visit to the UK of WA6SBO and W9WNV Bill and Don gave some hints on how to behave in a DX pileup to help the distant operator to choose *your* call to come back to. Whilst meant to be particularly applicable to their expedition they would obviously be helpful on nearly all similar occasions. Suggestions were: (i) Do not call zero beat with a station which has just finished a contact. (ii) Search for a comparatively quiet spot within the announced band of frequencies being tuned for replies and stay there for a while—do not keep changing calling frequency too often. (iii) Keep calls short and emphasize your own call not the call of the station you are calling—*he knows his*! (iv) Keep to one set of phonetics.

The latest ARRL Bulletin gives the news that incentive licensing in the USA is about to come into being after all, starting next year. This will mean that only certain amateurs who have taken a more advanced theory and code examination will be permitted the use of the entire frequency allocation. By November 1969 about half of the US phone bands will be reserved for Extra and Advanced Class licensees, and the lower 50 kc/s of the 3·5, 7, 14 and 21 Mc/s bands will similarly be reserved for c.w. use for these stations. It would seem that 28 Mc/s is not involved in any changes. Some changes come into effect in November 1968, one of these being that amateurs who hold Extra Class licences, and who have been licensed for more than 25 years may apply for two letter call-signs.

W3HNK wishes to repeat the offer mentioned in a previous *MOTA* to give his services as US QSL manager for any DX station who would like his help. Anyone interested is invited to contact Joe at the address given in *QTH Corner*.

• 10 Knightlow Road, Birmingham 17. Please send reports to arrive not later than 11 October for the November issue, 15 November for the December issue and 8 December for the January issue.



The ice build-up on VO1FB's 700 ft. longwire aerial back in January this year. The wire itself is only 16 s.w.g. copperweld!

News from Overseas

Those who, like G3FKM, have been used to hearing VP8HJ handing out contacts in nearly every major contest, will be very sorry to hear that Dave has sold his transmitter and is now off the air. This is because he has to study for some examinations and he writes to say that if he still had any Amateur Radio gear he would be unable to resist the temptation to get on the air instead of spending his time studying! In his letter Dave asks for his thanks to be expressed to " all the great guys I met on the bands in five years . . . " He will continue to listen on his AR88 during the remaining 3 years of his stay in VP8, so we may hope that VP8HJ's absence from the bands may only be of a temporary nature after all.

In a letter to G2MI, Roger, 5A4TP (G3KCE), tells of the difficulties which beset Libyan amateurs during the recent Middle East troubles. As from 22 June all 5A4 licences were suspended and all gear taken into safe keeping by the Dept. of Communications. On the first night of the troubles Roger deemed it wise to destroy all 4X4 cards in his possession, as a safety measure. In the course of this operation his card index system was completely disorganised and all his cards became mixed, so that he no longer knows which have been answered. Apologies are therefore extended to anyone still waiting for a GC3KCE or 5A4TP card. Unfortunately nothing can be done to right the situation until the logs are de-impounded, and anyone reapplying is advised to send another card via the bureau. At the time of writing things seemed to be returning to normal outwardly so it is hoped that licences will be reissued soon.

The logs for all operations by BV1USA during the period December 1962 until its close down in August 1966 are now in the hands of Tom Renfro, W7MVC. Tom says that many cards have been sent to the Taiwan American Radio Club and are now stranded. Efforts are being made to obtain these and answer them, but so far it has not been possible to get them. He will be happy to verify any QSO during this period upon receipt of QSL with s.a.e. and IRC (see *QTH Corner*).

The latest letter from Al, VK4SS, who keeps us all informed regularly of the latest goings on in Oceania, says that VK4HG is becoming rather cross at the bad manners of some stations trying to work him and has started to close down when matters get too bad. He is looking for Europe at 07.00 and 20.30 and Al confirms that QSLs should be sent only via the VK3 bureau. There is apparently a station currently active on Niue—ZK2AE, but he seems to be on 80m a.m. so is not likely to cause a stir in Europe. VK9GZ is on Anir Is. in Papua and is on 20m s.s.b. around 06.00 occasionally.

Readers will be pleased to learn that in spite of the present difficulties in Nigeria, Amateur Radio is still permitted. Mike Dransfield, 5N2AAF says that all amateurs have had to register with the police but have been told that there is no question of withdrawing licences at present. Now that 5N2ABL (G3HZG) is back in the UK there are no licensees in Biafra. The number of Nigerian amateurs seems to be dwindling, 5N2AAE should be active again soon after return from leave in the UK, 5N2AAH is now in Kenya but is

unable to obtain a licence on the strength of his 5N2 call, 5N2AAM is back in California as W6DZX, 5N2AAR is back home in Rochester, 5N2AAS is home in Hereford, 5N2AAW leaves for Angola soon, and 5N2AAZ is now 5Z4KY in Nairobi. Mike also says that 5N2ABA will be leaving soon to live in Alderney, 5N2ABD is home in Worthing and 5N2ABF is on leave in the US! Of the few left 5N2AAJ is the only Nigerian citizen currently active although 5N2AAK is still around. 5N2AAV is trying to interest a number of students at Minna Technical Institute in radio, 5N2ABG is very active on 10, 15 and 20m, and 5N2ABH also has spasms of activity. Conditions on 10m are improving and Mike expects a peak in September/October.

G3MCY will be active on all bands (including 160m) from Cyprus with effect from 20 October. His call will be ZC4GM, and 160m skeds will be welcomed. See *QTH Corner* for address.

Barry Street, 9H1AM, informs us that an exhibition station 9H1SD will be on the air from 19 to 22 October. The exhibition will be a joint Services Searchlight and Static Display with the emphasis on telecommunications and electronics. The station will be on from 11.00 to 18.15 each day and will use 10, 15 and 20m. Operators will be 9H1AL for the Army and 9H1AM for the RAF. There are apparently a number of pirate stations currently active from Malta using the call-signs 9H1AW, 9H1AX, 9H1AY, 9H1AZ, and 9H1BA. The MARS Awards Committee have finalised details of a Malta Award Certificate and full details will be given when they are available.

Top Band News

The August *Bulletin* from W1BB gave a summary of recent 160m DX, including reports of contacts between Stew and G3VYF, G3RXH, and G6BQ. It seems that the band has been unusually good some nights between 02.00 and 04.00, and it is hoped that this is a good omen for the coming winter season. Preliminary details of the **Transatlantic DX Tests**, which are to be held again this year are as follows: tests will take place on Sundays 3, 17 and 31 December, 14 January, 4 and 18 February, between 05.00 and 07.30 GMT. Five minute calling and listening periods will be used (fuller details will be published later). The writer is pleased to see that "First Timers" mornings are to be repeated, an improvement suggested this year by G3SXW is that one or two of the stronger stations should be present on these occasions to help. Tentative dates for these tests with possible calls of helping stations are as follows: (European/African First Timers), 17 December (G3PQA), 7 January (G6BQ), 4 February (G3SED). The mornings for W/VE First Timers will be 7 January (VO1FB) and 4 March (W2EQS).

It is believed that G3MCY will be active from **Cyprus** as ZC4GM from 20 October. He will be using a KW2000A and will be on other bands as well, but his main interest will be 160m. Skeds will be arranged by request and interested readers should contact Flt. Lt. G. C. Moore, Officers Mess, RAF Episcopi, BFPO 53.

Hereford Amateur Radio Club will be making an expedition to **Radnor** during the weekend 21/22 October. Their call-sign will be G3HVX/P and they will concentrate on 160m in order to help the county chasers.

A later special bulletin from W1BB sets out details of **Transpacific DX Tests.** Whilst these are of academic interest only to European stations, overseas readers may be interested to have details which are as follows: 2, 16, 30 December, 13 January, 3 and 17 February between 13.30 and 16.00 GMT. Frequencies—W (W. Coast) 1975-2000 kc/s, (E. Coast) 1800-1825 kc/s, JA 1807·5-1812 kc/s, VK/ZL 1800-1860 kc/s. W/VE stations call during the first five minute period and then alternate five minute periods listening for replies during the intervening five minute spells.

Katashi Nose, KH6IJ, very well known to c.w. DXers, and Professor of Physics at the University of Hawaii, discussing plans for 160m operation with W1BB (seated).
(W1BB)

W0GDH of Kansas City displays QSL cards for what is believed to be the first 50 state WAS on 160m.
(W1BB)

Awards

Reorganisation of the awards department of *CQ Magazine* is now complete and applications for WAZ and WPX will be dealt with more expeditiously than they have during the last few years. Basic rules for the **Worked All Zones** award demand QSL confirmation of contacts with stations in each of the 40 world zones as defined by *CQ*. All contacts must have been with authorised land based stations, and altered or forged cards will result in disqualification of the applicant. Special telephony and s.s.b. certificates are issued; these require confirmation of two way phone or s.s.b. as the case may be to be stated on the QSL cards. Applications, consisting of the 40 QSLs plus a check list and eight IRCs should be sent to the DX Editor, PO Box 205, Winter Haven, Fla., 33881, USA. Zone maps and application forms may also be obtained from this address by sending a request and s.a.e. plus one IRC. In due course it is possible that cards for this award will be checked in the UK. An announcement will appear in *MOTA* when this arrangement has become effective.

The **WPX** award is given for working and confirming prefixes—300 phone or c.w., 200 s.s.b., or 400 mixed being the basic number required. Endorsements are given for each 50 additional prefixes confirmed, for band/prefixes (1·8 Mc/s-35; 3·5 Mc/s-150; 7 Mc/s-250; 14 Mc/s-300; 21 Mc/s-300; and 28 Mc/s-250), and for continental prefixes (N. America-126; S. America-88; Europe-146; Africa-80; Asia-68; and

Two well-known Brazilian DX'ers, Joe, PY2CQ and Sonia, PY2SO. Joe is one of the few PY's on RTTY. He has WAC and 30 countries worked on this mode.

Oceania-51). Cards need not be sent but must be in the possession of the applicant and may be asked for. The two or three letter/numeral combination which forms the first part of any amateur call is the prefix, and any prefix will be considered legitimate if its use was authorised by the governing authority. A suffix in the case of a portable station would count only if it were the normal prefix used in that area, e.g., G3FKM/ZS6 would count as ZS6. Calls without numbers (RAEM for example) are considered to be 0 after the first two letters (RAEM = RA0). In the case of countries which have changed prefixes both may be counted. Applications must be made on official forms which may be obtained from the address given earlier by sending a 8½ × 11 in. s.a.e. plus IRC. The award itself costs eight IRCs.

Contests

The Radio Society of Ceylon is organising this year's **VU2/4S7 Contest** which as usual will consist of two parts, telegraphy (06.00 18 November to 06.00 19 November) and telephony (same times 25/26 November). All bands are permitted but no cross band QSOs will count, and stations entering both sections must submit separate logs. One contact per band is allowed with any one station. Serial numbers consisting of report and number of QSO (starting from 001) should be exchanged. Contacts with India and and Ceylon count 2 points, other QSOs 1 point. Logs should show date, time (GMT), call-sign, number sent, number received and points claimed. Separate sheets should be used for each band. A summary sheet should show details of equipment, call-sign, name and address, total score and how it is arrived at, and a statement that all rules and regulations were observed. They should be sent to RSC Contest Committee, PO Box 907, Colombo, Ceylon no later than 31 December. SWLs may enter this contest and should log only VU and 4S7 stations, otherwise logs and scoring are the same as for the transmitting section.

The Phone section of the **1967 CQ Worldwide DX Contest** will commence at 00.00 21 October and finish at 24.00 22 October. This contest covers all bands 1·8 to 28 Mc/s, and exchanges consist of report plus zone number (in the case of the UK this is 14). QSOs with stations in different continents count 3 points, with stations in one's own continent 1 point. Contacts with stations in the entrant's own country count only for country/zone credit not for any points. The multiplier is the total number of zones and countries contacted on each band. Final score is (a) single band, zones plus countries multiplied by QSO points. (b) Multi-band, sum of countries and zones on each band multiplied by total QSO points. There are three divisions, single operator, multi-operator single transmitter, and multi-operator multi-transmitter. Only single operator entrants may enter the single band category. It should be pointed out that for "country" purposes this contest uses the ARRL plus the WAE listing. This means that GM (Shetland) counts separately from GM (Scotland), and also that Sicily (IT) is a multiplier. Official rule sheets and log forms are available from *CQ* WW DX Contest, 14 Vanderventer Ave, Port Washington, LI, NY, 11050, USA. It is hoped that a number of these will reach G3FKM shortly in which event they will be distributed to applicants!

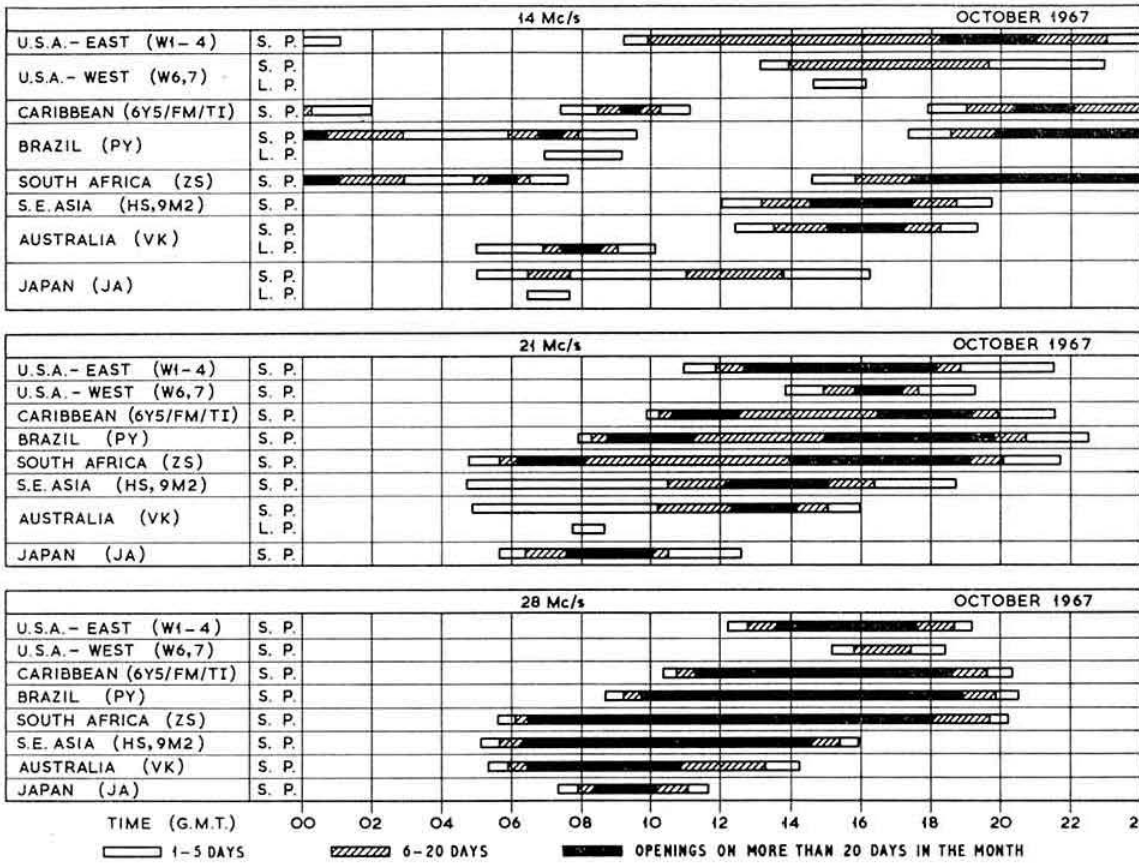
Reminders of two other contests taking place in October—the **VK/ZL Contest** (Phone, 7/8 October, C.W. 14/15 October) described on page 311, May BULLETIN, and the **RSGB 21/28 Mc/s Telephony Contest** on 14/15 October. Full details of this are given on page 257, April BULLETIN. With

QTH CORNER

BV1USA	(*see text*) W7VMC, 8703 N.E. 94th Avenue, Vancouver, Wash., 98662, USA.
CT2IW	Norberto Harting, B. do Rosario, Lote 83, Cascais, Portugal.
FL8FP	B.A. 188, Djibouti, French Somaliland.
HK0AI	W8WHM, 438 Hamilton St., Fortville, Ind. USA.
KG6SA	USCG, Navy 935-Box 338, FPO San Francisco, Calif., 96950, USA.
OY9IM	Box 184, Thorshavn, Faeroe Is.
PY0TX	via LABRE, or PY1TX, PO Box 4, Resende, RJ, Brazil.
TA1SK	via DL2OE, Gustav Haase, Fichtestr. 19, 6056 Heusenstamm, Germany
TA4EK	via DJ4EK, Juergen Thun, Muensterelfelerpl. 3, 5 Koeln-Suelz, Germany.
TI2JCC	(QSOs since 1/8/67) W3HNK, 126 Henderson Av., Norwood, Pa., 19074, USA.
VK5XK/2	(Lord Howe Is.) Arch Hewitt, 15 Semaphore Rd, Semaphore, SA, Australia.
VK9GZ	Pouch Bag, Rabaul, Territory of New Guinea.
VQ8AC	(Temporary QTH) 77 Oxford Gardens, London, W10.
VQ8CBB	via WA6SBO, 2466 Homesite Dr., San Diego, Calif., 92115, USA.
VQ8CBR	via K0TCF, 423 Miriam Avenue, Kirkwood, Missouri, 63122, U.S.A.
VQ8CCR	Box 14, Curepipe, Mauritius.
VQ8CHR	via K0TCF, 423 Miriam Avenue, Kirkwood, Missouri, 63122, USA.
W3DWG/VR6	via G3DO, 33 Ladywood Rd, Four Oaks, Sutton Coldfield, Warwicks.
XW8CC	American School, APO San Francisco, Calif., 96352, USA.
XW8CE	via WA1CFC, 770 Shennecossett Rd, Groton, Conn, USA.
ZB2AP	via WA8QJK, 2145 Chesaning Dr. S. E., Grand Rapids, Mich., 49506, USA.
ZC4CM	Flt. Lt. G. C. Moore, Officer's Mess, RAF Episcopi, BFPO 53, Cyprus.
ZS9H	Box 17, Gaberones, Botswana.
5L2KG	via YASME Foundation, Box 2025, Castro Valley, Calif., 94546, USA.
9L1GQ	PO Box 907, Freetown, Sierra Leone.
9M2NY **9M6NY**	via 9V1NY, R. H. Williams, 15B Jalan Berjaya, Singapore 20.

RSGB QSL Bureau: G2MI, Bromley, Kent.

Propagation Predictions



In the northern hemisphere the daytime F2 m.u.f's reach their highest values for the year on October and November. With the present sunspot activity they will be high enough for all regions to be worked on 28 Mc/s. On this band, therefore, North America and Japan should come through reliably, especially in the latter half of the month, and on favourable days (i.e. with above average F2 m.u.f's) also Western North America. Short skip conditions, for contacts from 500 to 1100 miles, will only occur in exceptional conditions this month, and in the coming winter months. This also applies to 21 Mc/s and as on 28 Mc/s all continents should be workable on this band. The path to Western North America will be reliable. 14 Mc/s offers good DX possibilities in the evening and during the day it will be suitable for European traffic as well as DX. On 7 and 3·5 Mc/s the transmission paths will increase somewhat during daytime. On 7 Mc/s during daytime the dead zone will not arise. With the approach of the winter season, DX conditions on 7 Mc/s will improve, when the greater part of the transmission path lies in darkness; the best period on this band will be after midnight. Interruption of local traffic on 3·5 Mc/s by the dead zone will only take place rarely in the latter half of the night.

The provisional sunspot number for August 1967 was 99·1 with the period of greatest activity lying in the second half of the month. The predicted smoothed sunspot numbers for December, January and February are 101, 103 and 104 respectively.

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conditions on the h.f. bands expected to be at their best for some years this promises to be a really interesting event.

Results of the **1966 Tops C.W. Club's Eighty Metre Activity Contest** show that of a total of 141 entrants there were only six from the UK! The winner was DJ6SI/LX with 53,088 points, the leading G being G3PHW with 4454 points. In the multi-operator section GW3OAY (45,153 points) was only just beaten into second place by OK3KAG (47,600).

One final reminder—the **RSGB 7 Mc/s DX Contest** (Phone) takes place over the weekend of 28/29 October, and the C.W. section on 11/12 November. Full rules will be found on page 408, June BULLETIN.

DXpeditions

It is hoped that Hermann, TJ1QQ, will be making his trip to **Spanish Guinea** (EA0) during October. At the time of writing Iris and Lloyd Colvin who are at present operating from **Liberia** as 5L2KG are trying to make arrangements to join in on the trip. According to reports received TJ1QQ also has permission to operate from **Annobon Is.** in the South Atlantic. Frequencies to watch would appear to be 14,005, 14,103, and 14,110 kc/s.

Rumours received from two sources indicate that there should be some activity from **St Peter and Paul Rocks** (PY0) during November or December. PY7AOA is said to be the person making the trip according to one source. and he is said to favour 14,100 and 14,005 kc/s. According to the other informant the operation will start on 4 December and will have two call-signs—PY0DX and PY0SP! Let us hope that this is the real thing and not yet another non-starter.

G3URX, a regular reporter to MOTA who has worked a considerable amount of DX using 30 watts or less to a vertical aerial.

According to information received from VK4SS, VK5XK/2 will be on from **Lord Howe Is.** from 3 October to 20 October. Readers may remember that Arch visited Lord Howe last year. This time he hopes to be on all bands 10 to 80m, mostly c.w. but with some phone operation. One frequency given is 14,038 kc/s and VK4SS offers to arrange skeds. For those who may be interested it was found last year that the best time for Europe was 12.00 to 16.00 on 20m, a little earlier on 40m. VK4SS may be reached at 35 Whynot St, West End, Brisbane 6, Queensland, Australia.

Further to the remarks concerning DI2LE in last month's *MOTA*, information from W7LVI published in *The DX'ers Magazine* says that DI2LE is authorised to operate on all amateur bands 3·5 to 28 Mc/s from his boat only. As this is a catamaran he is able to pull it up onto the beach for land-based operation! He received permission from the Australian authorities to use his equipment on Cocos Keeling Is., but was not given a VK9 call. Permission has been applied for operation from Rodriguez Is. (VQ8) but no information has been received about this so far. From the Indian Ocean Jurgen will go to Rio de Janeiro via Capetown, and then hopes to visit some of the VP2 areas before returning home to Hamburg in the late summer of 1968. Incidentally, Jurgen is not the same DI2LE who operated from St Peter and Paul Rocks.

W4CHA, who will be remembered as VK2BRJ/VK9 a few months ago, says that he made 10,000 QSOs from Norfolk Is. He is hoping to start a new trip during January and February, which may take him to VR1 and VR2, but he says that Nauru is definitely *not* on the agenda.

In the unconfirmed rumour category are a proposed visit to **Brunei** by G3NWQ during October. (his VS5 call-sign is not known), and a possible trip by ZL4MO and ZL4PH to **Chatham Is.** in December. Those who may be wondering what happened to the expedition proposed by K6CAA some months ago will be sorry to learn that he had to abandon the idea.

At the time of writing Don Miller, W9WNV, had just opened up from **Rodriguez Is.** with his VQ8CBR call He was accompanied by Steve, VQ8CC and also Larry, VQ8CHR. Unfortunately some domestic trouble has overtaken Bill, WA6SBO, and he had to return to the US late in August. He is hoping to be able to return to carry on the expedition with Don in the not too distant future. During his stay on **St Brandon Is.** Don appeared to have considerable success and VQ8CBB was heard on all bands 3·5 to 28 Mc/s. No definite plans for the future have been announced yet, but some further interesting stops are hinted at.

Band Reports

This section of *MOTA* has suffered as a result of many of its regular contributors' absence on holiday, but the following are sincerely thanked for their help: G2GK, G2LB, G3AAE, G3HDA, GM3MBC, G3SML, GM3SVK, G3UMV, G8DI, G8JM, SM2BYD, BRS22299, BRS27358, A4038, A5032, A5105, A5135, A5182 and A5224.

The autumn season will be under way by the time this is being read, but during August and early September conditions have not been particularly good on any band, and several correspondents have expressed disappointment with 28 Mc/s. A report from ZS6UR, via G3SML, says that he has been receiving BBC 1 TV sound and Paris TV sound on his television set in Johannesburg, and has been receiving both pictures and sound from Nigeria. Senior readers will remember the previous sunspot maximum when the old 5m band was available and many DX contacts were made on it.

The only DX signal reported on 3·5 Mc/s is VQ8CBB who was RST 449 on c.w. one night between 01.30 and 02.00. Unfortunately no QSO resulted, although he was working a number of W stations. Don was also a fair signal on 7 Mc/s c.w. and was worked by a number of Gs at around 22.45. Other interesting stations in evidence on this band were PY7LAK (21.40), UD6BV (21.52), ZB2AP (21.05) and ZD8RB (21.10) who were on s.s.b. and CE8AA (23.20), CR6AI (22.01), CX3BH (23.55), UW0AF (21.15) and 5H3KJ (22.15) on c.w.

As usual 14 Mc/s has been carrying the bulk of the DX signals. Conditions seem to be very good to VK and ZL around 06.00, and the stations from the Pacific Islands are still being reported in the early mornings, and also can be copied around 17.00. Stations in Asia and Australasia are also to be heard in the late evening. Amongst the more exotic call-signs in evidence during the last month were AP2CH (07.45), FK8BK (07.00), FO8's AA, AB, AG, BT, BU, BV, and BZ (06.30-08.30), HC6GM (01.35) HS1RZ/3 (17.46), KC4USC (05.45), K8BWM/KG6 (17.10), KH6EDY (Kure Is., due to leave soon 07.50), KJ6CF (05.35), TA2FM (07.33), TJ1QQ (Trying out his s.s.b. equipment preparatory to leaving for EA0 18.59), VK8KK (07.50), VP8JC (20.18), VQ8CBB (04.40-23.00), and 5W1AS (07.12). All these were on A3J; on A1 were AP5HQ (17.08), FB8WW (12.20), FB8YY (07.45), KX6ER (07.15), OD5EL (on the air again after the recent troubles, 20.55), VS9OS (22.20), and XV5AA (21.00).

Although 21 Mc/s has been very variable it has been extremely good at times. One particularly interesting station reported by G2GK is BY5JB was who contacted one day around 12.00. Unfortunately due to QRM his QTH was not copied with any certainty, but sounded like Taipei. Further information on this one would be welcome. Other stations on c.w. included FB8XX (07.40), FW8RC (08.80), FM7WO (18.47), HK0AI (22.00), KR8DE (17.22), VS6FO (12.00), ZD3G (16.50), 5L2KG (17.56), and 9M8II (15.40). On s.s.b. CE0AE (20.50), EA9AQ (09.15), FP8CA (13.24), HS1JP (15.50), KG6SF (11.46), KH6FRI (07.00), KL7AHB (10.15), KX6s DR, FB (10.15), TI4DZ (21.21), TN8AA (20.20), VK9VM (10.25), VK9WD (13.50), VK9XI (Christmas Is. 15.34), VP8JC (17.38), VQ8CBB (17.30), VR2DK (07.58), W3DWG/VR6 (17.46). Often a good signal at this time on 21,335 kc/s according to G3DO who acts as his QSL manager for Europe, Asia and Oceania, ZD7KH (14.04), 4W1C (17.50), 6O1GB (20.00), 9M2PO (17.00) and 9X5PB (17.10).

Lastly 28 Mc/s. At the time of writing things seem to be improving but otherwise nothing very exciting has been

happening. VQ8CB/A (Mauritius) was in evidence during the c.w. section of the WAE Contest (08.11), the only other signals reported have been on s.s.b. and included FG7XT (18.25), FH8CD (17.28), VQ8CBB (16.15), ZD7DI (18.55), ZD8CX (19.10) and 9L1GQ (18.00).

DX Briefs

VR4CR reports that he had to abandon BERU due to too much QRM from W, JA and U callers. Art may sometimes be found on 14,018 kc/s between 07.00 and 08.00 on Sundays, and says that he would appreciate a few contacts with the UK.

ZL1AI, who recently returned to New Zealand from Kermadec Is., says that there is unlikely to be any more amateur activity from Kermadec until the end of 1968 unless the relief going there in November turns out to be an amateur after all. There is a possibility that ZL1AI himself may be stationed on Ellis Is. (VR1) next January or February.

VK9YW will be the call-sign of VK3AHS when he visits New Guinea in late October. He expects to be there about a month and will have an FT100 transceiver and inverted vees for 15, 20 and 40m.

Vlad, UA1CK/JT1 is believed to be finishing his stay in Mongolia around 1 September and returning to Leningrad. He hopes to send out QSL cards soon.

VK8AV hopes to make his trip to Portuguese Timor during the ten days commencing about 12 October. He will sign VK8AV/CR8 unless he is issued with a CR8 call at the last minute.

W3DWG/VR6 has been busily handing out contacts with Pitcairn Is. recently. He has now made arrangements with G3DO to handle his QSL cards. Apologies to all who have now been given a third address to write to for these VR6 cards, but the writer knows that this one works!

During a business visit to Melbourne G3AAE met the Chief Engineer of the Australian Antarctic Division who turned out to be ex-VK0IJ. He said that no further Australian occupation of Heard Is. is planned, but that an application for a visit in 1968 by an American scientific team has been received. It is not known whether there will be an amateur in the party, but if there is there will be no difficulty in his obtaining a VK0 licence.

9L1GQ is listening for UK stations most evenings at 18.00. His favourite frequencies are around 21,350 and 28,500 kc/s. VP8IE (S. Georgia) is now very busy handing out s.s.b. contacts and may be found frequently at 18.00 and later, a favourite frequency being 14,132 kc/s.

CR9AH has now left Macao and is believed to be in Canada. Recent developments in that part of the world do not suggest that there will be much more activity from this area.

1967 Countries Table

	1·8 Mc/s	3·5 Mc/s	7 Mc/s	14 Mc/s	21 Mc/s	28 Mc/s	Total
G8JM	1	—	12	186	122	47	368
G3IAR	10	48	45	138	104	57	402
GM3SVK	16	15	35	130	100	24	320
G8DI	—	25	37	94	78	25	259
9V1LK	1	4	21	85	55	42	208
7Q7LZ	—	—	7	89	78	36	210
G8VG	1	18	27	46	66	59	217
G3KSH	3	22	26	46	42	33	172
SM2BYD	—	28	58	—	71	—	157
G3ING	7	13	21	32	26	26	125
G3PQF	2	23	28	24	17	41	135
G3TBK	4	10	20	25	34	3	96
G3VOK	14	36	6	38	1	7	102
G3OJV	1	1	22	21	16	20	81
G3VWC	3	5	22	19	24	3	76
G3VJG	—	3	11	20	26	71	131
9J2BC	—	—	2	29	16	43	89
G3JVJ	14	10	2	1	2	4	33
A4886	8	27	35	218	87	53	428
A4568	9	40	37	157	128	93	464
BRS28198	1	41	37	131	63	51	324
A3942	12	51	55	110	76	63	367
BRS27806	3	23	40	116	121	103	406
BRS25429	5	53	40	114	77	76	365
A5004	4	54	29	112	41	48	288
A5273	5	48	42	93	71	52	311
A5105	1	27	25	109	65	42	269
A4038	7	12	15	111	181	102	427
A5135	2	21	28	81	71	23	226
A4182	3	29	25	69	56	48	230
A4552/VK	—	1	2	80	10	2	96
A5126	3	18	14	66	44	10	155
A5153	2	17	12	57	31	8	127

This month's table is in order of 7 plus 14 Mc/s totals.

Very many thanks to all contributors, and special thanks and acknowledgements to the following: **DX News Sheet** (*Geoff Watts*), **The DX'ers Magazine** (*W4BPD*), **The West Gulf DX Bulletin** (*WA5LES*), **Florida DX Report** (*W4BRB*), **CQ DX** (*ARI*), **On The Air** (*ON4AD*), **DX'press** (*PA0FX*), **NARS News** (*5N2ABA*), the **L.I.DX.A. Bulletin** (*WB2EPG*), and the **DX'er** (*W6PHF*). Please forward all items for the **November** issue to reach G3FKM **no later than 11 October**, by **15 November** for **December** issue, and by **8 December** for **January** issue.

Give it a chance

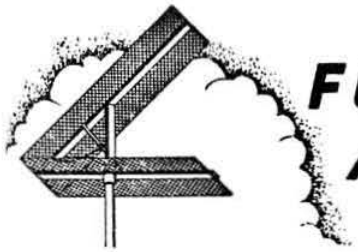
How do you connect your mobile rig to the car battery? There are only 12 volts nominal when the average car is stationary, and it is hardly fair to expect a good flow of current through any tatty old piece of wire just hooked on anyhow. Think of a conductor—then double it! Have a look at the conductors on your starter-motor; now you're getting somewhere! Don't twist the wire on to the terminals in a blood-knot—get the gas-ring or blowlamp going and solder on some beefy terminations. Throw out those " modern " battery terminals and go back to the good old-fashioned clamps that do up with a spanner. One thing, however, don't forget to include a 35 ampere fuse in the live lead—just in case. Naturally you always carry spare fuses, don't you? Good luck with the extra " S " points.! G3PAZ

Can You Help?

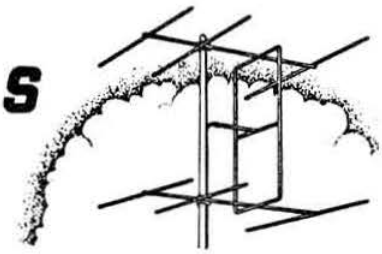
● J. H. Lepper, GM3JHL, 42 Inch Crescent, Bathgate, West Lothian, Scotland, who wishes to borrow or purchase a manual containing the circuit diagram and alignment procedure for the Hammaland Super-Pro BC-779B receiver? It is the metal octal version with push pull 6F6's, separate p.s.u. and tunes 1240 kc/s-40 Mc/s in five switched bands.

● F. C. H. Hinton, G3AS, 12 Clarence Road, Dorchester, Dorset, who requires information on the Panda Cub transmitter?

● A. W. Brooks, VU2XL, c/o Bengal Ingot Co. Ltd., 5 Hide Road, P.O. Box 17205, Kidderpore, Calcutta 43, India, who needs details of the re-calibration procedure for the W1191-A frequency meter.



FOUR METRES AND DOWN



By JACK HUM, G5UM*

Flashback to Field Day

"FIVE killed in gales." "Airliner blown back on runway after take-off" . . . two typical newspaper headlines on Monday, 4 September, the day after V.H.F. National Field Day, 1967. In other words, a rough time was had by all, perhaps not so rough as during Field Day weekend of 1966, but bearing remarkable resemblance to it as torrential rain swept the country on the Sunday morning and high winds—with a dash or two of sunshine—in the afternoon.

From which it will be apparent to all who understand the relationship between weather situations and v.h.f. propagation conditions that the latter were very very normal over V.H.F. NFD weekend, a state of affairs masked by the big signals coming off well sited hilltop transmitters. They would have been saturating if conditions were good: as it happened, only the weather was.

Normal or not, Continentals in large numbers, participating in the coincident IARU contest, were reported by very many V.H.F. NFD contestants (it is to be hoped that a larger number of UK stations will this year have put in entries for the IARU contest: last year G2JF handsomely won the 2m section, and from all we hear, the team at that station was making a strong bid to repeat the performance this time).

Two Field Day participants who were in exceptionally exposed positions, the Alderney team and the Isle of Man one, enjoyed an especial satisfaction in spite of the gales booming outside: they worked one another on "Two." But GD3NUE/P suffered rather severe damage of one sort and another . . . the 4m tent ripped up and a 10-over-10 with its 50 ft. mast crashed to the ground and damaged another aerial as it fell.

Derek Bradford, G3LCK, who teaches in Kent, took a party of his boys from the Simon Langton School at Canterbury out for a V.H.F. NFD foray to give them an idea of what v.h.f. sounds like. Agreeing with most observers that conditions were nothing special, he reports nevertheless "that 2m was full of DLs at around three in the morning." As an experiment, the first three hours were spent on the key. Result: three stations worked. In the next 15 minutes on phone three more were contacted. "Who kids who that c.w. is used on v.h.f.?" quips Derek. One cannot help remarking, though, that if c.w. had been used for the *last* three hours a very different result might have emerged, for then it is that everyone is digging for the last few contacts, phone or c.w.

Finally, a few observations on Field Day procedures from G3LCK will find a sympathetic response in those who know the contest and provide guidelines for those who don't:

"1. The aerial rotating system must be right in the operator's hand. Ours wasn't.

"2. A 10-element long Yagi is far too directional for contest working. We have a feeling that a bi-directional stack—say, eight half-waves stacked—would be better; or about a dozen halos and five-eighths spacing up a long pole, eliminating twiddling, would be a good thing.

"3. We would *prefer* to use c.w., though we must be in a tiny minority. Is v.h.f. *really* the retreat of those brassed off with the h.f. s.s.b. rat race and who have forgotten all their c.w.? (Of course not: listen to G3IMV).

"4. Given a first class receiving set-up, 10 watts transmitter power is not enough to work all that you can hear."

"Twenty-three" in the Ascendant

Taking it for granted that one of the purposes of V.H.F. National Field Day is to develop the state of the v.h.f./u.h.f. art (if we don't, then we degenerate into a lot of number-swopping robots with the implication that you might as well do the whole job by computer), then there is no question that the 23cm part of it is the most important of all at the present time.

Each year Field Day activity on 1296 Mc/s develops steadily, and this time large numbers of stations were heard calling on 70cm for contacts on the next band up—and able to switch to it at a moment's notice. In many cases 23cm links were established by c.w., which seemed to show that it is a useful facility to have around even though phone is the favoured mode on v.h.f.

This year's priority problem on "Twenty-three" was keeping the aerial on target in the heavy gales that pestered most sites. One station had devised an elegant locking device like a railway signal lever that gripped a disc at the base of the rotating mast and effectively prevented it from moving after the 23cm dish had been aligned on the wanted signal.

Productive though 23cm was of several long haul contacts, perhaps the most sensational item of news from Field Day weekend is one relating to "the next band up, again," namely, 13 centimetres, and in view of other developments here, this must have a section to itself. . . .

To France on "Thirteen"?

Operating portable during V.H.F. National Field Day from Telegraph Hill, 7km west of Hitchin in Hertfordshire, Brian Greenaway, G3THQ/P, worked G3PSH/P at Brill in Oxfordshire on the 2304 Mc/s band. The path distance was 31 miles, and there is every reason to believe that this may be a UK record.

Where do we go from here? Why, to France! And why not? Already F2FO is ready and waiting to attempt contacts with any British stations which can establish themselves within visual distance of the French coast, and invites the setting up of schedules both on 2304 and 10,000 Mc/s. On both bands he has worked F5BO/P over a line of sight path of 45km, that on 13cm, strangely enough, being on 13 May last, almost exactly at the time Heath Rees was demonstrating 13cm equipment at the London V.H.F. Convention

* Houghton on the Hill, Leicester. Send reports for the **November** issue by **13 October**, and for the **December** issue by **9 November**.

accompanied by the sound of G5FK coming in on c.w. from Wembley, seven miles away.

The contact between F2FO/P and F5BO/P on 10,000 Mc/s took place on 26 August. Both this and the one on 13cm are claimed as " firsts " in France.

Correspondence with F2FO suggesting future schedules on either band should be addressed to M. Claude Paillard, 161 rue de Bagneux, 92 Montrouge, France. There is pioneering work to be done here, and it is confidently expected that there will be no lack of British challengers ready to master the technical problems which the s.h.f. bands offer.

Certificate Number One for " 23 "

Now back to 1296 Mc/s matters for another top flight item of news . . . well, it won't be news to the many people who have already heard about it and discussed it over the air, but it *is* something which, we said, would deserve bold type when it happened. So bold type coming up:

The first award of the RSGB " Four Metres and Down " certificate for operation on the 1296 Mc/s band will be made to Bill Hawthorne, G3MCS, whose station is in Buckinghamshire, between Aylesbury and High Wycombe.

By working GB2GC on 28 August, G3MCS won the third country required to permit a submission of a claim for " Twenty-three." It is worthy of note that he worked ON4ZK on 1296 Mc/s as long ago as November of 1964. After that, the G cards came in steadily as county after county was worked to reach the required 20 counties confirmed.

Among those who will wish to congratulate Bill are the many other 23cm operators who have succeeded in working outside these islands and are awaiting the cards that will enable them, too, to stake a claim for " FMD 23."

An opportunity to secure a few more counties worked comes this next weekend with the arrival of the Second 1296 Mc/s Open Contest. May it help towards the issue of more " Four Metres and Down " certificates for the band. Full details page 606 last month.

" Brute Force Blowtorch "

Because the general standard of " Stroke P " contest operation is so high, stations with poor signal quality are all the more obvious, and polite though we may be to one another over the air they do come in for some scathing (and deserved) criticism *off* the air—and indeed in print from time to time, within the bounds of libel.

The following comments by BRS26234 (Ewan MacDuff) of Ashington in Sussex, deserve the attention of all transmitting members who take to the hills during v.h.f. contests:

" I would like to register the strongest possible protest against portable stations which invade the Downs with unnecessary transmitting power. They seem to have no thought for local listening stations, who have no recourse but to close down when subjected to 150 watts into stacked 14-element Skybeams almost at the bottom of their gardens. It seems an emphatic shame that the BRS man should lose his pleasure because of these people, who operate with the subtlety of a maladjusted blowtorch. Other competitors seem to get on quite well with only a fraction of this order of power.

" There is a phrase used in the sporting world which aptly sums up these crude and thoughtless efforts: Brute force and blank ignorance."

We ought to add that these comments were received before V.H.F. National Field Day took place, though they may well have been valid then. We can only hope not.

Long Path Communication at 432 Mc/s

In the nature of things, much of the day to day communication which takes place in the 70cm band is of the medium to local kind that we regard as typical of the ultra-highs. It is well to remember, then, that a good many operators are constantly striving to extend the range of the band well beyond its normally accepted radius. The work of G2XV reported here a few years back is a case in point: months of patient operating during which almost the whole of England was worked culminated in a contact with GM3FYB in which no help was given either by site (G2XV is in the flatlands of Cambridgeshire) or by conditions.

Among the many Class B licensees who are engaged in similar work is Paul Nickalls, G8AQA, who has just completed a series of tests with G8ARM of Blackheath in South London over an " impossible " path of 193km from his home at Nailsea in Somerset. Neither station enjoys any assistance whatever from site, yet right from the initial nightly schedule in mid-June it was found possible to exchange information, generally at a level of Readability 3. Contact was disrupted only by heavy rain at each end.

" Much has been learned from these skeds about operating under weak signal conditions with considerable QSB," reports Paul, and he goes on to offer the following comments:

1. Phonetics are useless: they take too long.
2. On some contacts c.w. would have been useless, too; the carrier would disappear or sound like a string of dots.
3. Only small bits of information should be transmitted on each over; they should be repeated in quick succession but distinctly.
4. Once contact has been established call-signs should be sent once only at the beginning and once at the end of each over. All irrelevant comment should be avoided. It is frustrating to receive on peaks of QSB only the call-signs being transmitted and none of the required data.
5. Reports should include maximum and minimum readability and strength and if possible an average.
6. When calling a station repeat your own call-sign more often than that of the wanted station; the other operator will easily recognize his own call-sign but may not recognize your own, especially if it is new to him.
7. If after having called CQ you intend to take a long time tuning the band investigating every weak carrier, announce that you are " carefully " or " slowly " tuning the band; the calling station will be encouraged to give a long call.

" The main thing," concludes Paul " is to repeat everything until a peak of QSB catches the information."

During the Somerset-to-London tests G8AQA started at the 20 watt level and an 18 element Parabeam, and graduated

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

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

* Not operational.

RSGB V.H.F. BEACON STATION GB3VHF

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

Date	Time	Error
8 August	10.17 GMT	700 c/s low
23 August	12.45 GMT	750 c/s low
29 August	10.16 GMT	800 c/s low
6 September	12.58 GMT	440 c/s low

to 35 watts to a QQV06-40A p.a. and two 18 element beams. At G8ARM the input was 20 watts to a DET24 and the aerial an 18 element Parabeam. Both stations had transistor preamps.

Listeners' Multipliers

Last month BRS26234 of Ashington in Sussex put forth the suggestion that the 70cm band multiplier for the V.H.F./U.H.F. Listeners' Championship could be usefully dropped from 3 to 2.

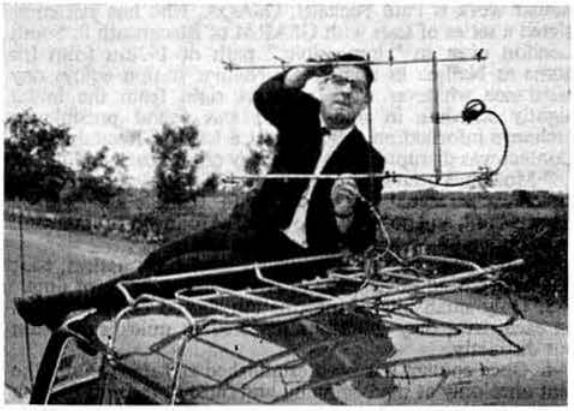
Support for this view comes from BRS15744, also of Sussex, who draws on his experience of a listening session during V.H.F. NFD last month. Although through external preoccupations Ron Ham was able to put in only 3 hours 10 minutes of listening on the 70cm band, he logged 26 stations and seven locators, which on 2m would have been worth 425 points but on 70cm, thanks to the " times three " bonus, was worth 1275 points.

" When you think of the long plod required on 2m and 4m to amass points which a 70cm man can earn in a much shorter time, I think there is proof that the band bonus for 70cm is too high."

No doubt the V.H.F. Contests Committee would like to mull over this one in the light of the fact that in many areas 70cm activity now matches (and sometimes exceeds) that on 2m.

EI-Xpeditionary

G8APX, Bill Jarvis of Watford, one of the small number of 70cm mobileers, operated as EI2BN/M a couple of months ago. The picture shows his 6-over-6 mounted with the lower section approximately one half wavelength above the car roof, a position found by trial to give the maximum radiated field strength.



One of Bill's most unusual contacts was with EI7AF, who quickly assembled a 70cm transmitter, receiver and corner reflector for a first and (so far) only two-way on " Seventy " —an unusual example of enthusiasm, as Bill says.

Sideband Frequency for "Four"

" Please, please, not 70·35 Mc/s as a sideband calling frequency on 4m. It is *not* clear of RAEN, as suggested, but is in fact the lower marker of the miserable 50 kc/s which RAEN are permitted to use."

Thus Eric Yeomanson, G3IIR, commenting on last month's G3BA suggestion that 70·35 Mc/s might be used for this purpose—a thought put out, we might add, as a talking point to get some discussion started.

G3IIR goes on to give an insight into the importance of the 4m band to RAEN operations: " We are trying our hardest to cram the county groups into the 50 kc/s available and avoid mutual interference. S.s.b. on 70·35 could be devastating. It is no answer to assert that members should use more selective receivers: many of them have to rely on what is available. In any case, for this type of work, a less selective receiver is desirable. Can 'Four Metres and Down' use its influence to persuade sideband to move a little further away? After all, there are another 650 kc/s in the band."

More "Spor" on "Four"

None of us needs telling how difficult it is to keep a constant watch on our v.h.f. bands for signs of auroral and sporadic-*E* manifestations: after all, the daily bread does have to be earned, whether or not it be regarded as an irritating necessity between QSOs. And if you *do* keep a sustained listening watch you may be sure that the band will open ten minutes after you have gone to bed (they will tell you about it on the net next evening). It's that well-known law.

How valuable it may turn out to be to keep the receiver running while one is pottering around in the radio room was emphasized to Trevor Brook, G3WBQ, when on a quiet August Bank Holiday his 4m rig suddenly produced a CQ from GI3PDN at RS59. A contact quickly resulted from the G3WBQ site in Surrey, but unhappily no other southern stations appeared, in spite of the fact that a quick look on Sound Radio Band 2 or on 4m would have disclosed the presence of much sporadic-*E* activity from the Continent.

The moral as always: don't rely entirely on what the barometer suggests, but tune around whenever you can. A very special incentive now exists to do so. It is spelt 9H1MB and its frequency is 70·1 Mc/s. The Malta beacon is located on the highest point of the island, 900 ft. a.s.l., and puts 30 watts into a 4-element Yagi. Sequence of operation is steady carrier with a break for call-sign every two minutes.

Just to Remind You . . .

It was said in respect of last winter's cumulative contests that the participation would have been greater had more publicity been given to them. A reminder, then, that there are two more " cumulatives " during the present month, the second of which, on 21 October, gives an opportunity really to exercise the c.w. capability of 2m. See page 606 last time —and keep that page handy as a reminder both of the dates and the rules of the remaining " cumulatives " of the present year.

Between October's two " cumulatives " comes the Third 432 Mc/s Open over a 24 hour period of 14/15 October. Late Autumnal propagation has a habit of turning in some surprises, so the possibility of good openings during this contest lends it additional attractiveness. Once again, rules are on page 606; note where log-entries have to be sent.

* * *

Meteor scatter specialists will need no reminding that the Leonids group is due in November. In the past it has been productive of some very long range coverage on 2m, for example Belgium to Czechoslovakia. The OK stations seem to do particularly well in this field: MS has helped OK2WCG to work 27 countries on " Two," while OK1VHK during the Perseids of August reached as far as EI2A. Congratulations to both—and to their patience in waiting for the final " R," which came after a three hour session.

* * *

This section seems to have turned into " DX news," so here's another item: PX1JQ and PX1MA in Andorra are said to be on 144·35 and 144·6 Mc/s at an 8000 ft. location and with half a kilowatt at that!

Alpborne Repeater

Few who recall the translator-type *OSCAR* will ever forget the stir it caused as it accepted trans-Atlantic 2m

signals through its trigger mechanism and reradiated them in another part of the band. Operating on rather similar lines—except that it is alpborne and not airborne—is a translator station which has been installed on Mont Tendre in the north western Alps of Switzerland.

Accepting signals between 144·0 to 144·1 Mc/s, it will reradiate them on 145·8 to 145·9 Mc/s. Stations local to the translator are being asked to trigger it between 144·1 and 144·2 Mc/s for reradiating on 145·9 to 146 Mc/s.

According to *Veron V.H.F. Bulletin*, received via G2AIW, the device gives out some 35 watts of c.w. into an omni-directional aerial system having a gain of 20dB over a dipole. Call-signs used are HB9ADT and HB9AGG.

It would seem that the technique to use is to watch for southerly openings and then to attempt to trigger the device in the British c.w. segment of 2m, listening for replies in the high end. If our Continental friends are on the air doing the same thing there ought to be opportunities for EDX working with, in particular, those stations in the vicinity of the translator who might never work outside their valleys without its aid.

But there is not much time: the installation will be dismantled in November before the Alpine gales get at it.

It is understood that HB9ADT/HB9AGG is also used to furnish met. information to Geneva on radio command.

News from Expatriates

A void was created in Midlands u.h.f. activity when G3NBQ left Coventry to take up an appointment in Mauritius. Although blessed with a perfect v.h.f. site on the island—but nobody to work, as there is no v.h.f. activity there—Peter contrives to keep in touch with what is going on back home both via "Four Metres and Down" and on "Ten" and "Twenty." His sideband on 14,110 kc/s has talked back to many of his old colleagues who knew him well on "Two" and "Seventy Cems."

Encouraged by what he read of the Gibraltar to UK link on 4m, Peter has been having thoughts around the possibility of establishing a 70 Mc/s beacon on Mauritius. That the path distance to the UK is five times longer than the 1,200 mile ZB2 to G hop is a deterring prospect rendered less formidable by Peter's possession of a site 2,000 ft. up and with nothing in the way as far as the horizon.

Old friends can contact Peter Burt (we nearly forgot to mention that he is VQ8CG) care of IAL, UKAEA Field Station, Plaisance, Mauritius.

* * *

From the other side of the globe comes news from VE2LI, one-time G5LI, whose distinctive "swinging" Morse code will be recollected by many who were on "Two" in the early days when he operated from Northwood in Middlesex. Established in Canada these last 16 years, he says in a letter to G3MCS that "the UK activity on 70cm and 23cm which I read about positively makes my mouth water!" Within reach of his Montreal site there is only one other 23cm station, and he is at ten miles range. This does not by any means discourage him, and indeed the purpose of his letter to his old friend G3MCS was to seek details of latter-day British techniques on 1296 Mc/s, of which the G2RD cavity in particular has impressed him.

He reports fair activity on 70cm, and with about half a kilowatt he can work down to Boston at 350 miles.

Farewell, "RUF"

Soon to be an expatriate will be R. H. Swain, G3KXA, widely known on "Four," "Two" and "Seventy" as GW3RUF/P or, a little less frequently, as GM3RUF/P, enlivener of many a v.h.f. and u.h.f. contest as he operated often in very uncomfortable situations—from Snowdon, Brecon and Abergavenny. He is emigrating to New Zealand very soon.

Over the years he has been the medium for running, almost

RHODESIA TO HAVE "FOUR"

It has been announced by the Controller of Telecommunications that amateurs are to be given use of 69·75 Mc/s to 70·15 Mc/s with almost immediate effect. There will be a power limit of 25 watts for fixed stations and 10 watts for mobiles, and the facility is granted on a condition of non-interference with other services. It is hoped to put a beacon on 70·000 Mc/s with a view to trans-equatorial scatter experiments with the UK.

Credit is due to the Radio Society of Rhodesia for the part it played in obtaining this 4m concession.

single handed, the Midlands Contest Club, and its famous call-sign of G(GM, GW) 3RUF. It would be fitting if somehow or other the club and its call-sign could be preserved; anyone with practical suggestions to offer in this context should get in touch with G3KXA at 145 Mill Lane, Bentley Heath, Solihull, Warwickshire, as quickly as possible.

Says G3KXA in a final letter to "Four Metres and Down.":

"I would like to thank my competitors and all v.h.f. types—whom I consider to be a fine body of chaps—for all the grand contests and QSOs I have enjoyed for the last five years . . . I have some good memories to take to New Zealand with me. Perhaps one day I shall be able to work back to the UK via satellite stations."

Bandplanning for "Four"

The meeting of the Society's V.H.F. Committee at which *inter alia* the subject of planning 4m was due to be discussed took place on 20 September at just about the time this issue of the BULLETIN was on the presses. Three "expert witnesses" were due to have attended it.

From G2CUZ comes a comment typical of several heard on the air: "We of the Ainsdale Radio Club do not like 4m band plans. Have a c.w. section, a mobile spot frequency and an s.s.b. spot frequency but leave the rest open. If anyone is on 4m in that width of a band we can find them, and so can anyone else."

Friday Night is All-Ireland Night

Enthusiasm for All-Ireland Night on two should not be allowed to wane when conditions appear to be normal—nor are we suggesting that it does. The spell of anomalous propagation that favoured the first of them on 8 September occurred at an appropriate moment, but cannot be expected to pop up so conveniently *every* Friday at ten o'clock in the evening.

There are plenty of westerly situated UK 144 Mc/s stations who can work EI/GI at almost any time, and it will fall to them to assure the friends across the water that there is always someone standing by for them on "Two." To members farther inland All-Ireland Night will frequently produce a low-signal situation, but it will also prove the truth of the G3BA belief that if you know when and where to direct the beam, and you are assured that somebody is waiting at the other end of the circuit, then communication on "Two" across the Irish Sea is possible at virtually any time.

So under normal conditions use that 144 to 144·1 Mc/s segment to full effect with plenty of slow c.w. CQs. Most imperatively, say how you will be tuning, for you may well receive replies in the Irish zone of 145·8 to 146 Mc/s. Announce your intentions with "QHL" or "QLH" or, if you propose to concentrate on one end only, then "QLF" or "QHF."

Groups Are Active

In many areas the specialist v.h.f./u.h.f. groups are getting down to their autumn programmes. The South East meet on 20 October at Wye College to hear G2FKZ talk on "Radio

Propagation at V.H.F." The Coventry-and-Birmingham restarted on 13 September with a very successful gathering at the " Mason's Arms," Solihull, including a buffet supper. And the Leicestershire were due to have held their inaugural meeting on 21 September: their next is scheduled for 19 October as a transistor symposium, but full information will be put out on GB2RS.

Down in London the doyen of them all, The London U.H.F. Group, meets on the first Thursday of each month at that very attractive venue, the Whitehall Hotel in Bloomsbury Square.

Please keep " Four Metres and Down " and " Forthcoming Events " *au fait* with all V.H.F. Group meetings, either done or to do, so that adequate publicity may be given them.

Stuart Yeomanson is on " Four "

Last November, Stuart Yeomanson, G3UNF, with a promising career at Leeds University ahead of him, suffered a severe and most unusual accident. He was thrown off a bus as it rounded a corner in Leeds and the head injuries he sustained not only caused partial paralysis of the left arm and leg but have left him sightless.

Later, when he was removed to a hospital not far from his home in South London, he derived a great deal of pleasure—and indeed solace—from a low power 2m equipment with which he was able to keep in touch daily with his father, G3IIR: the nurses put the halo out of the window when he wanted to go on the air.

By now Stuart should be on 4m. His father has built him a 25 watt equipment, and the hospital authorities, marvellously co-operative, have agreed that an aerial may be erected on the roof.

Many " bedfast " members in the London area already operate on " Four " during weekday daylight hours, and will need no reminding of the pleasure they will give to G3UNF by making contact with him on the band.

Skeds Operative

By G3MCS, near High Wycombe in Bucks. (144·3 Mc/s) with G3SHX of Margate (144·89 Mc/s) every Monday at 18.00 GMT. As soon as contact is established on " Two," operations are transferred to 70cm.

Skeds Wanted

By G3WBQ with any GI, GM and EI stations on 4m. He is on 70·190 Mc/s every evening (" By the way, I am opposed to *any* bandplan for 4m! " he remarks). Write to him direct: Trevor Brook, Saxonholme, Orestan Lane, Effingham, Leatherhead, Surrey.

Tech. Corner

From **G8AMK** (L. J. Parry, Bracknell, Berks.):

A number of 70cm tripler designs using varactor diodes have appeared in the BULLETIN in past months, and it is felt that members who wish to adapt this technique for " the next band up " will be interested in the following design for 23cm.

The circuit diagram of the writer's varactor multiplier to triple from 432 Mc/s to 1296 Mc/s is shown at Fig. 1. The diode is an MA4060A. It will take a maximum r.f. input of 12 watts at 70cm; driven with 10 watts it will produce about 5 watts of r.f. at 1296 Mc/s. Near equivalents are the Mullard BAY66, while with a BAY96 a maximum r.f. drive input of 30 watts can be used.

The circuits L1, C1 and L2, C3 are tuned to the input frequency of 432 Mc/s; L3 and C4 are tuned to the idler frequency of 864 Mc/s, while L4, C5 and L5, C7 are tuned to the final output frequency of 1296 Mc/s.

The capacitors C2 and C6 provide coupling between the two input and the output circuits. The coupling between the two output frequency circuits should be kept as low as possible to achieve maximum attenuation of the input and idler frequencies in the output circuit.

The present unit, inspired by a design in the ARRL Handbook, is built into a box 3¼ by 3¼ by 1 in. deep made

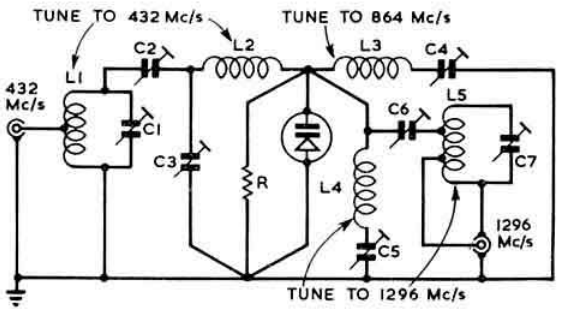


Fig. 1.

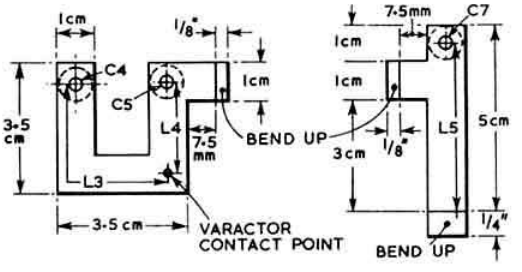


Fig. 2.

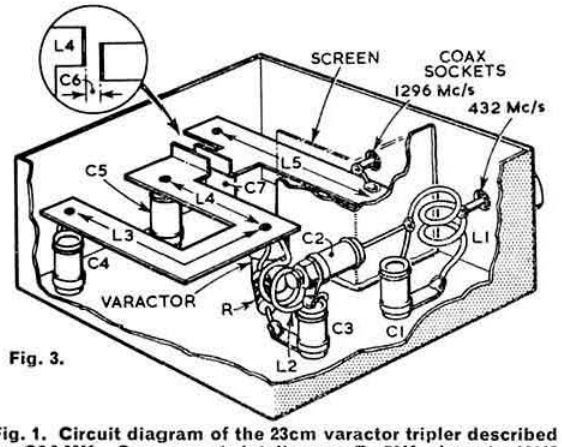


Fig. 3.

Fig. 1. Circuit diagram of the 23cm varactor tripler described by G8AMK. Component details are: R, 50K ohms to 100K ohms. C1, C2, C3, 0·5—5·0 pF Mullard. C4, 2BA brass screw with ¼ in. diam. disc soldered to the tip. C5, C7, 2BA brass screw. C6, ¼ in. flange bent up on strip lines (see Fig. 3). L1, 3 turns centre tapped for input connection, consisting of 18 s.w.g. wound to ¼ in. diam., ½ in. long, with ¼ in. leads. L2, 2 turns ¼ in. diam., ¼ in. long, with leads ¼ in. and ¾ in. (18 s.w.g.). L3, L4, 0·015 in. copper sheet cut to dimensions shown at Fig. 3.

Fig. 2. Constructional details of the 23cm inductors, made from copper sheet.

Fig. 3. The mechanical layout of the varactor tripler described by G8AMK should be adhered to as closely as possible.

from sheet brass with the corners and the internal screen between output and input well soldered down. For component layout see Fig. 3. For details of the strip lines see Fig. 2.

Layout and connecting leads should conform as closely as possible to the diagram. In particular, the junction of the varactor with L2, L3, L4 and the bias resistor should be as small as possible. Aim in fact for minimum possible common connection.

It might be added that about 50 per cent efficiency is achievable if a tight fitting lid is provided for the box. If flanges are fitted, preferably soldered to the side of the box, and hank bushes fitted with kitchen foil covering the base of the box and acting as a gasket for a tight fitting lid, the efficiency will go up to 55 per cent. However, silver plating box and lid will increase efficiency by only 2 per cent and seems unnecessary under amateur conditions.

In using varactor triplers it should be remembered that tuning adjustments may be reflected from one circuit to another. The possibility of spurious output and the need for careful adjustment have been the subject of earlier comments in the BULLETIN.

When the device has been set up, amplitude modulation may be applied to the 432 or 144 Mc/s driver stages (or to both). Slight f.m. is present in the 1296 Mc/s output and is resolvable at the receiving end just by sliding down one of the sidebands.

From G3PTO (John Reynolds, Wolverhampton):

One or two people have asked me for the circuit I use for narrow band f.m. on 2m. It is shown at Fig. 4. I should acknowledge that it was provided by G3BA, who I understand uses the same system.

The diode can be a DDOO8 or a BY100. The crystal is at 6 Mc/s and the grid inductor L1 has 24 turns of 28 s.w.g. on a $\frac{3}{8}$ in. slug tuned former.

In case the response as plotted on the G3PTO equipment may be of interest this is shown at Fig. 5.

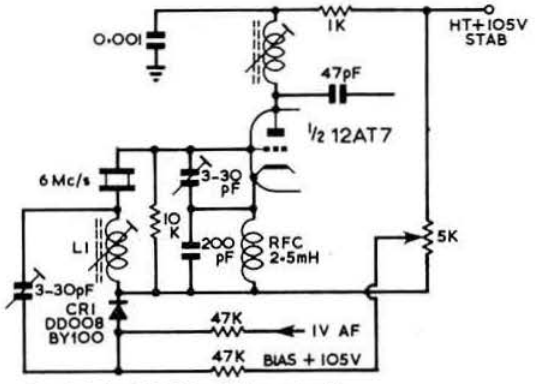


Fig. 4. The G3PTO n.b.f.m. circuit.

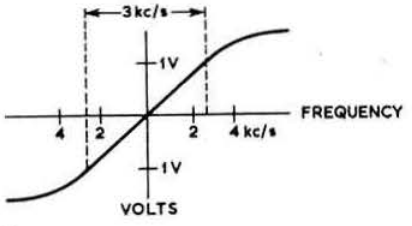
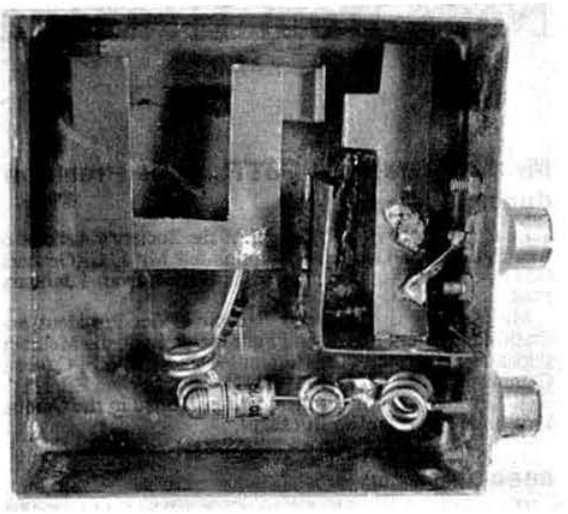


Fig. 5.



A photo of G8AMK's prototype 23cm varactor tripler.

Here and There

" My apologies to all stations waiting for a Somerset QSL for 70cm. I now have some printed and will be sending them out soon. Anyone wanting a QSL quickly should send his card direct. He will receive one back direct. Otherwise cards are sent via RSGB "—G8AQA (QTH: The Rectory, Nailsea, Somerset).

* * *

A sad blow for G3PTO of Wolverhampton: his shack (outdoors) was seriously damaged by fire and much equipment lost. Never discouraged, John has been operating " Stroke P " just lately, but reports it may well be Christmas before main station operations can be resumed in full.

* * *

A cyclostyled sheet giving data for the construction of parabolic reflectors has been prepared by *VERON V.H.F. Bulletin*. Copies may be had from G5UM if a stamped addressed envelope is sent.

* * *

" I was unable to receive during the August 70cm contest, as a Stroke P station who had set up a quarter of a mile away swamped the entire band with 150 watts of r.f. At times, his signal mixing with strong local mobiles projected an assortment of these along the 20-30 Mc/s i.f. range of the 680X. So with a view of his two 14-element Yagis from the radio room window, my 14-element disconnected from the converter and the S-meter over the top, BRS15744 was fried "—BRS15744, Storrington, Sussex.

* * *

A change of duties compelling weekend working prevents G2DHV from contest participation—a regular who will be missed. But he is still liable to pop up at any time on " Two " as ON8IR, PA9DHV or G2DHV/DL, mobile or fixed.

News from Headquarters

Mr J. C. Graham, G3TR, to be President during 1968

In accordance with Article 10 of the Society's Articles of Association, the Council has appointed Mr J. C. Graham, G3TR, to the office of President with effect from 1 January, 1968.

Mr Graham is at present Executive Vice-President and Chairman of the Finance and Staff Committee, the Membership and Representation Committee and the H.F. Contests Committee.

A " Profile " of Mr Graham was published in the October 1966 issue of the RSGB BULLETIN.

RSGB Dinner Club

The next meeting of the Dinner Club will be held on Friday, 20 October at 7.30 p.m. for 8 p.m. at the Kingsley Hotel, Bloomsbury Way, WC1, only a short distance from RSGB Headquarters. This is an informal function to which all members are welcome but particularly overseas visitors who may be in the UK at the time. Tickets are 25s. each and bookings, accompanied by a remittance, should be sent to Society Headquarters.

Special Events Station

GB3EAR from the El Alamein Reunion at Perth on 7 October, 1967. The reunion, at which Field Marshall Viscount Montgomery of Alamein is to be present, marks the 25th Anniversary of the battle. It is organized by the 51st Highland Division and contacts with veterans of the battle or ex members of the Highland Division will be especially welcome. The station, operated by the Lowland Royal Signals Amateur Radio Club, will be on 80m and 20m s.s.b. between 12.00 and 17.00 GMT.

Pirates Fined

As a result of Post Office enquiries into the suspected unlicensed use of wireless telegraphy transmitting equipment, the following convictions have been obtained on using wireless transmitting apparatus without the appropriate licence contrary to the provisions of Section 1 of the Wireless Telegraphy Act, 1949.

At Bristol Magistrates Court on 24 July, a Mr Phillip Henry Musgrove of 4 Apsley Villas, Kingsdown Parade, Bristol 6 was fined £20 and ordered to pay £5 5s. costs with forfeiture of apparatus. At Greenwich Magistrates Court on 25 July were Mr Anthony Tadeusz Kowal of 11 Adamsrill Road, London, SE26 who was given a conditional discharge and ordered to pay £5 5s. costs, and Mr Richard Graham Straker of 55 Mayow Road, London, SE26 who was fined £5 and ordered to pay £5 5s. costs.

Can You Help?

● M. Timms, A5322, 17 Penn Road, Southcourt, Aylesbury, Bucks, who requires the circuit diagram and any other information on the 621T set?

● D. A. Skingley, A5634, " Gilfach," North Road, Whitland, Carms., who requires information on the Marconi R1475 Type 88 Ex RAF Communications receiver?

Amateur Radio Licences

The following are the total number of Amateur Radio Transmitting Licences in force on 31 August, 1967.

Amateur (Sound) Licence " A " 12,445.
Amateur (Sound) licences " B " 658.
Amateur (Sound Mobile) Licence " A " 2,373
Amateur (Sound Mobile) Licence " B " 18.
Amateur (Television) Licence 183.

There were also 12,016 Model Radio Control Licences in force.

Representation 1966-68

The following members have been appointed:

Deputy Regional Representative, Region 12:
D. W. Adaway, GM3UBK, 44 Princes Street, Thurso, Caithness.

Area Representative, South East Somerset:
G. L. Parris, G8ARD, 2 Ashford Grove, Yeovil, Somerset.

Affiliated Societies Representative:
CHINGFORD RSGB GROUP:
D. A. Platt, G3JNJ, 22 Charcroft Gardens, Ponders End, Middlesex.

The following member has resigned from his post as Region 16 Representative.
P. J. Naish, G3EIX, 6 Mildmays, Danbury, Chelmsford, Essex.

Silent Key

We record with sorrow the passing of M. S. Urquhart, VK6MU, of Cottesloe, Western Australia.

Obituaries

A. W. FOWLER, G3FR

The death occurred at the age of 64 on 20 August of A. W. Fowler, G3FR of Sutton-in-Ashfield Notts. Arthur had been in failing health for a number of years and as his illness became worse he spent less time on the air. A keen Top-Band phone operator he was well known to many amateurs in Nottinghamshire and Derbyshire.

He had held positions in the Mansfield RSGB Group before and after the war and until lately took an active part in local amateur affairs. He leaves a widow and two married daughters to whom we offer our sympathy.

F. N. F. B.

JOHN REGAN, G3KKE

It is with deep regret that we have to announce the death of John Regan, following a car accident on Wednesday, 9 August.

" Jack " as he was to all his friends, was first licensed in August 1955 and his numerous contacts made him many friends both in this country and abroad.

His amusing anecdotes and infectious laugh will be sadly missed at local Club meetings, and we of the East Ham RSGB Group tender our sincere sympathies to his widow and children, John and Pat, in their tragic loss.

E. W. B

Society Affairs

A Brief Report on the August, 1967 Meeting of The Council

THE Meeting was held on Monday, 14 August, 1967, and was attended by Messrs A. D. Patterson, President (in the Chair), B. Armstrong, N. Caws, J. Etherington, J. C. Graham, E. G. Ingram, H. E. McNally, F. K. Parker, J. F. Shepherd, R. F. Stevens, G. M. C. Stone, G. Twist, E. W. Yeomanson (Members of the Council), D. W. Robinson (General Manager), H. J. Hallen and T. R. Preece (Headquarters staff).

Apologies for absence were submitted on behalf of Messrs L. E. Newnham and J. W. Swinnerton.

A letter of resignation from Mr J. C. Foster, G2JF, was tabled and this was accepted, with regret, by the Council. There was unanimous appreciation of the past services of Mr Foster.

Membership and Affiliation

The Council approved the election of 174 members (125 Corporate and 49 Associate) and accepted 8 transfers from Associate to Corporate membership.

Affiliation was granted to:

(1) Barking and District Radio and Electronics Club.
(2) Holloway School Amateur Radio Group.

New Headquarters Building

The Treasurer reported that formal completion had taken place and authority was given for the commencement of the necessary repairs and renovation work prior to occupation by the Society. The General Manager was asked to submit proposals for the usage of the building. (A leaflet giving full details of the new Headquarters was distributed with the September issue of the BULLETIN and further copies of this may be obtained on request from Headquarters.)

Walker Memorial

Council accepted with thanks the kind offer from the widows of the late W. K. Walker, G2WO, and J. H. Walker, G5JU, respectively, to donate a chair for use by the General Manager in the new Headquarters.

70cm band

The attention of Council was drawn to an article appearing in *Electronics Weekly*, which emphasized the need for more frequencies for commercial mobile radio. The article suggested that this need could be partly met by the use of frequencies now used by amateurs in the band 420-450 Mc/s (actually 427-450 Mc/s). It was arranged that a comment would appear in the BULLETIN.

Voting on Proposals for Membership of the IARU

Aye votes were cast in favour of the membership applications of :

1. Radio Club of Honduras
2. Central Radio Club of Bulgaria
3. Association des Radio Amateurs Ivoriens

1967 International Quiet Sun Year/Committee on Space Research Assemblies

It was reported that two members of the Scientific Studies Committee had attended the IQSY/COSPAR Assemblies in London during July.

Publications

Progress reports were given in connection with the *Amateur Radio Handbook*, the *Radio Data Reference Book*, the *Amateur Radio Circuits Book* and *World at Their Fingertips*.

The Council approved in principle the proposal to publish a range of specialized handbooks.

Visit of the President to North America

Mr Patterson reported on his private visit to North America including attendance at the ARRL National Convention at Montreal and mentioned the warm welcome that he had received throughout the trip.

It was noted that Mrs Margolis, the Society's Public Relations Officer, had also attended the Convention whilst on holiday in N. America.

Mrs. H. Rouse

It was reported that a substantial sum had been paid to Mrs H. Rouse under the terms of the Society's Staff Pension Scheme.

TVI problems

Representations had been made to the GPO on behalf of a number of members. It was reported that full operating privileges had been restored to Mr R. A. Delahunt, G4QD.

QRA Locator System

It was noted that no supply of the new QRA locator maps was yet available. A leaflet was tabled which provided details of an alternative system known as *Georef*. Further publicity will be given to this system and it will be brought to the attention of the IARU Region 1 Division.

Minutes of Meetings of Committees

Minutes of the following Committee Meetings were accepted as reports: V.H.F. Contests (22.6.67), Education (15.7.67), V.H.F. (17.7.67), Technical (19.7.67), Exhibition (30.6.67), Finance and Staff (23.6.67), H.F. Contests (20.7.67).

The Council was in session for 4¾ hours.

FIRST RESULTS FROM ARIEL III

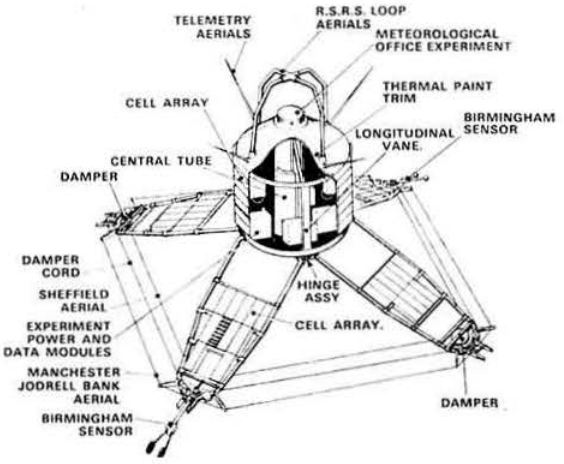
First results from experiments carried by Ariel III, the first all-British satellite launched successfully by the US National Aeronautics and Space Administration (NASA) for the Science Research Council on 5 May, indicate that the satellite and its experiments are continuing to operate satisfactorily. Considerable scientific information of much interest has been obtained, and we feel that a brief summary of the projects would be interesting to amateurs as some bear relevance to investigations into propagation of radio signals.

The SRC Radio and Space Research station terrestrial noise experiment has already provided information about noise levels over the equatorial regions and also recorded intense storms over Western Europe during the first few days after launch. The voltage levels due to this terrestrial noise were on occasion greater than 100 times the galactic noise. Full interpretation of the data depends on analysis of ionospheric data from other sources.

A Meteorological Office experiment to measure molecular oxygen at 150 km and 250 km by observing the way the Sun's ultra-violet light is cut off by the oxygen as the satellite enters the Earth's shadow has worked successfully. Data obtained during the first week of operation, before the satellite entered the " all Sun " condition, will allow the distribution of oxygen to be determined over a large portion of the Earth. A signal has been observed when the satellite is in the Earth's shadow; it is thought this unexpected feature may be due in some way to the sensors collecting charged particles as it orbits in the ionosphere.

Birmingham University has two experiments on board Ariel III which measure local electron density and temperature along the orbital path. Measurements received so far indicate that both experiments are functioning correctly and variations in the measurements made throughout the orbits reflect the higher level of solar activity which is occurring as we approach sunspot maximum.

The Manchester University experiment to measure the intensity of cosmic radio waves on frequencies lower than those which normally penetrate the ionosphere, and in particular to find the variation of intensity from different parts of the sky, has been functioning well.



The Sheffield University apparatus for the study of the nature, intensity and world-wide occurrence of radio waves at frequencies below 20 kc/s has been completely successful. Signals have been recorded on every orbit with intensities up to 10 million times the minimum detectable level. Zones of emissions at high latitudes are probably associated with auroral activity (energetic charged particles precipitating into the Earth's atmosphere): those at lower level have uncertain origin. Intense whistler activity (which originates in lightning discharges) has been observed at medium latitudes. Strong signals from GBR (Rugby radio station) have been received both when the satellite is near the transmitter and when it is over South Africa, which shows that energy from the transmitter can penetrate the ionosphere and travel approximately along the magnetic field line to the other hemisphere. It is of interest, however, that on some orbits GBR has been picked up at locations remote from both the UK and South Africa.

IQSY/COSPAR Symposium (continued from page 649)

satisfactorily as resulting from layer formation in the 95 to 100 km region by much softer precipitating electrons than produce the daytime absorption. Under some conditions, especially after auroral break-up, the E_s propagation, observed obliquely over the scatter paths near the auroral zone, exhibits unmistakable evidence of absorption. The r-type of E_s layer is found to be virtually exclusively responsible in winter (when the detailed observations were made) for the oblique-incidence propagation attributed to the E_s layer over the scatter path. The contribution of auroral hydrogen to this type of layer is not considered important for layers having the required critical frequencies of about 5 Mc/s and greater.

The highly amusing paper by B. J. O'Brien (Rice University, Texas) provided so much food for thought, that I find it difficult to summarize. He rather made a plea that instead of everyone operating in their own isolated spheres, we should all work as one, and look at the auroral problem more *en masse*. He put many arguments forward to show just what we know, or, if you like, do not know, about the very basic fundamentals. He reviewed the numerous measurements of electrons and protons precipitated into the atmosphere to cause aurorae and the devices carried by balloons, rockets and satellites, but in spite of them all, no one has yet proved that the particles come from the Sun, in fact, they may be terrestrial in origin, but under solar influence and the interaction between solar wind and the magnetosphere, some speeding up process could occur to accelerate particles. In fact, he asked the question, " What's going on just under Van Allen's Belt? " Rocket measurements had shown particle energies are doing different things, showing clear patterns of periodicity and sporadic events, and flux densities at any given latitude can vary as much as 10^6 to 1.

In an attempt to sort out the puzzle they (Rice University) had made a satellite " Aurora I," and he had just heard that it had been successfully launched. This could look down to the Visual Aurora by night or by means of ultra-violet sensors detect daylight aurorae. It also recorded a range of spectral lines (Visual), and at the same time the respective particle energy levels are measured coming down, the information being continuously transmitted so whoever wants to receive it can do so. At the time of writing this I do not have the telemetric data but understand it is a simple code, so " *Aurora I* " may well answer many of our own radio aurora puzzles.

I have chosen the above abstracts as being directly relevant to our own SSC work; but there was much more over a very wide range of subjects, unfortunately the requirements of earning one's living rather clash with the desire of attending all the meetings, but even so, I found it very stimulating offering food for thought to sustain me for a long time to come. As to how we stand in relation to other organizations in what we scientifically do, I rather felt that though we are a small organization, it does not stop us having big ideas and carrying them through.

Radio Amateur Emergency Network News

By S. W. LAW, G3PAZ*

None so Deaf?

When the RAEN Committee ask, via this column, for comments, brickbats, reports and what-have-you from members it is very gratifying to have a good response in the shape of a large pile of assorted correspondence. While we are on the subject let us thank all those who thoughtfully enclose stamped envelopes—it not only helps to keep the funds up to scratch but also saves precious time in replying. So far, so good. What *does* worry us, however, is the letters which petulantly state that the writer joined RAEN two-three-four years ago and has not been invited to take part in an exercise for umpteen years, doesn't get a Newsletter and, in short, feels left out in the cold! When we check on this sorry state of affairs we find that his County Controller has no record of the member—for the very good reason that he is (unwittingly perhaps?) *no longer a member*. Why is this? Because he has not re-registered!

Let us make this quite clear, at the risk of boring our regular readers, *you must send your card in for re-registration every year, or you cease to be a member*. Moreover, you will not get a Newsletter, your County Controller will not have you on his list of members, you will not be up-to-date with new issues or amendments to the *RAEN Manual* and you will not be included in the insurance scheme which covers all RAEN members (if you don't know of this, please ask us). The fact that the Police won't allow you near an incident without a valid card is not likely to worry you because you can't be called out anyway! So please, get those cards in to the Hon. Registrations Secretary, R. A. Ledgerton, G2ABC, 1 Latchingdon Gardens, Woodford Bridge, Woodford Green, Essex.

QRV?

Don't forget that the RAEN Contest takes place on Saturday and Sunday, 7-8 October. The complete rules are in the July issue of the RSGB BULLETIN. We hope to see a record entry for 1967.

Good Show?

Were you at the RSGB Rally at Woburn? Owing to the time that this column is written we can give you no tit-bits in this issue, but that does not mean that anecdotes or comments with a RAEN slant would not be very welcome. Send in your thoughts or experiences on this year's effort.

Upstage?

Those groups who use the 4m channel extensively could save a lot of heartburning amongst the newer amateur fraternity who have just got going on *four* if they would develop the habit of qualifying their " overs " with some such expression as " Blankshire Raynet. " It still seems to be difficult for some 4m enthusiasts to realize that RAEN activity on this band is strictly confined to 70·375 ± 25 kc/s, and therefore the majority of RAEN groups operate " Simplex " with crystal controlled receivers. Hence the impression gets around that RAEN types are " upstage " and don't mix with the common herd! Our vocabulary is quite extensive, but it is apt to be strained by the chap who spends ten minutes calling a single-channel station on some other frequency and then lets it be known (in no uncertain terms) what he thinks of stations that " ignore " him! We often wonder if some of these chaps have ever *read* their licences—it's all there.

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Anywhere—Anytime?

Our thoughts and good wishes go out to the amateur fraternity in and around the city of Fairbanks, Alaska where the local river overflowed suddenly and caused widespread devastation in the city coupled with the complete breakdown of all communications. Those who remember the disaster at Lynmouth some years ago and the terrible floods on the East Coast will agree with our oft-repeated cry that " It *can* happen."

Germinating

We note with interest that more attention is being given to the provision of radio-telephone facilities to organizations geared for the relief of victims of accident and disaster. We of RAEN are only too pleased to note this tendency, since we have never at any time sought for any monopoly in this field, but only try to provide a service that can be called upon at any time to help out when other communication systems are overloaded or put out of action. Needless to say, should the authorities decide at any time to grant us facilities to widen the scope of our activities we would be only too pleased to extend our framework in order to better our usefulness in times of emergency.

Area Activity

Those in the Wirral Peninsula area who have expressed interest may care to contact the AC for that area—G3NTI—QTHR. Don't forget, however, to send in your application to the Hon. Registration Secretary (see first paragraph). This last sentence goes also for those in Kent, which G3BPT informs us is coming along nicely. There will be activity also in Cumberland when the registration position is sorted out. Another area getting on is Glamorgan, where it is understood that things are well under way. We hear that Carlisle now has a useful nucleus of activity, and we hope to get more news at a later date. Some whispers have trickled through about Lincolnshire, but so far nothing definite. Needless to say we would be delighted to receive news from any area that has information to impart, so please don't hesitate to drop a line to this column or to the RAEN Committee.

Three Guesses!

That RAEN Trophy will be on the move again in due course. Have *you* any ideas on the knotty problem of its next home? The RAEN Committee have already had thoughts about the subject, and it must be agreed that it has some fine points. Perhaps you may care to play " Hunt the Thimble " (silver, of course!) and see how near you guess the Cup's destination this time?

We Like It!

It has been known for certain amateurs to enquire of RAEN types " Why do you do it? " Those who have been on a tough call-out in bad weather and all that goes with it, might well (when they have calmed down) quote the Immortal Bard—" Sweet are the uses of Adversity, which like the toad, ugly and venomous, wears yet a precious jewel in his head."

CONTEST NEWS — RESULTS—REPORTS—RULES

Hints for Contests Entrants

From time to time, the H.F. Contests Committee is asked why points are deducted from claimed scores, why entries are disallowed, and how entrants can assist the Committee in the latter's task of checking logs. It is hoped that the following will act as a guide and as a source of information.

1. **Read the Rules Carefully,** and note whether the general rules apply.
2. Use RSGB Log Sheets and Cover Sheets. These are available from Headquarters on request.
3. Write (or type) clearly and accurately. Do not alter letters or figures; rewrite them if necessary.
4. Make certain that you claim the correct number of points and bonus points. Check that your addition of points is correct. Remember that these are always scrutinised by the Committee!
5. Use separate Log Sheets for each band, in accordance with the relevant rules.
6. Log duplicate contacts; this is necessary for checking purposes. Only claim the score once!
7. In the Log Sheets of multi-operator entries; insert the operator's call sign against *each* contact. The purpose of this is to prevent the unfair deduction of points through bad operating by a particular operator.
8. Ensure that the Cover Sheet is completed, with particular reference to the Power Declaration.
9. Post your entry as soon as possible. Checking starts immediately after the date given in the rules.

Points are deducted for the following reasons

(i) Incorrect recording of call-signs. It is the responsibility of *each* station to see that the call sign is correctly repeated; this includes the suffix /A, /P, /M.
(ii) Incorrect recording of contest exchanges (e.g. RST and/or Serial Number)
(iii) Contacts which have not been acknowledged by the other station.

Summer Top Band Contest, 1967

This year's Summer Top Band Contest held on 8-9 July, brought 51 entrants' logs; the figure for last year's contest was 67, whilst the First Top Band Contest of 1967 was 47. Support for contests of this type, on this band, therefore appears to be strong; it is interesting to note that nearly half the entrants hold call signs in the T, U, V, W, series.

" Let's have some rules published next time, chaps! " was G3OLB's observation echoed in varying form by many others. The H.F. Contests Committee apologizes for this omission. To rectify this G3TR—Chairman of the Committee, and Executive Vice President—despatched by post a copy of the rules to all last year's entrants. All logs were very carefully scrutinized, and where necessary re-scored on the basis of 3 points per contact, plus a bonus of 5 points for each station outside the British Isles.

The leading station G3BMY (Halesowen, Worcs), used a home made transceiver and a half wave end-fed aerial; he held second place in the First Top Band Contest 1967. In second place was G3SQX (Southampton), with a v.f.o.-Class A Buffer-Buffer Amplifier-p.a. transmitter, AR88D, and a centre fed inverted V dipole, 120 ft. high in the middle; he was 24th in the corresponding event last year, when operating from Warwickshire. Third came G3VOC, " Veteran Operators' Club for Telegraphists " (Sidcup, Kent); the equipment consisted of a transceiver using a 6CH6 p.a., and two half wave inverted V's at right angles, centre height 150 ft.

We were particularly pleased again to receive a log from 9H1AE, the only overseas station to submit one. The interesting letter accompanying the log contains the following comments: " Tear down the 160 metre dipole—discard the Top Band TX"; these were the first terrible thoughts at 02.00 GMT on Sunday, 9 July, after the contest was over and 9H1AE had collected the fantastic score of *zero* . . . " conditions on the band were not as noisy as it could be, in fact I've heard the static level higher in May than it was during the night of 8-9 July. The static was there, of course, but G3SQX was easily readable, possibly thanks to the Racal receiver. Very puzzling how G3SQX was RST 569 increasing to 579, yet with the exception of G3SJY, was the only G station audible throughout the period! The G's were there without a doubt, the first report heard from G3SQX contained a serial number 075 and the last one heard was 107, so those boys must have been working someplace but a thorough search of the band failed to dig any of them out. Only two OK/OL stations were heard—and worked—throughout the period! These chaps did not seem to be as interested in the contest as they were last year."

Check Logs were received from A3942 and G3AKY. Special commendation must be made of the former's log, neatly kept, covering the whole period of the contest, with over 90 entries; it is good to note that an Associate Member again covers a c.w. contest. At the opposite end of the age-scale, G3AKY proudly tells of his " three score and ten years, and a glass elbow! "

Position	Call-sign	Score	Position	Call-sign	Score
1†	G3BMY	341	15	G3OLB/A G3RXO	269
2†	G3SQX*	336			
3	G3VOC*	325	17	G3BIK	264
4	G3BFP	307	18	G3IGW	263
5	G3UBW	300	19	G2DC G3JVJ G3VMW G3WLE*	250
6	G3SJJ	294			
7	G3CGD/P G5BK/A *	292			
9	G3TTQ*	291	23	G3TVW	243
10	GW3NNF*	287	24	G3VLT	239
11	G3SSO*	285	25	G3EFX/A*	236
12	G3SJP*	282	26	G3IGZ	234
13	G3TIR	274	27	G3TNO*	232
14	G3BDQ	270	28	G3TAA	229
29	G3FVA/A*	218	43	G3WHR	162
30	G3VMQ	214	44	G3RYV G3WKZ	161
31	G3SKC	204			
32	G3KLT	202	46	G3AKF	159
33	G3LCH	200	47	G2BTO	150
34	G3VFD	196	48	G3UJX	110
35	G3SJX	192	49	G2VV	106
36	G3HZL	191	50	G3WKL	91
37	G3USE	190	51	G3VXV	70
38	G3SXW	182	52	9H1AE	
39	G3TZM	176			
40	G3PHW G3SIA	174			
42	G3VTY*	163			

* Multi-operator entry.
† Certificate winners.

Comments from Competitors

G3TIR: Enjoyed the Contest very much; feel a bit concerned about the strengths of some of the signals heard for ten watts; some put the coastal radio stations in the shade! G3RXO: These five hour contests keep the QSO rate up and the " drag " factor down. G3BIK: A noticeable improvement in all round operating standards. G3IGW: Conditions excellent, gear 100 per cent, why did I not get more contacts? G3TNO: This is the first time I have entered any contest. Must say great fun! Rules seem fair. G3SKC: Would like to know how the experts get rid of the " noises in the head " after four hours with " cans " on, but nevertheless an enjoyable contest. G3TZM: Conditions on the band were favourable at this QTH, and there were hundreds of stations on the band. G3WDW: It is surprising the number of people who have rubber clocks. G3UVX: The more experienced stations were very patient with the newcomers, who in the stress of contest operating find it almost impossible not to make mistakes. G3TVW: Stupid scoring system. G3BDQ: The scoring system is very fair.

Observations

(a) Logs: With one exception these ranged from good to excellent. However, it is of interest to note that 15 entrants did not use RSGB Contest Log Sheets; it should be emphasized that the use of RSGB Log Sheets speeds and assists the task of checking, and that these sheets are available for the asking from Headquarters.

(b) Signal Reports: There is a growing tendency to give overgenerous and surely inaccurate signal reports. One of the highest scoring stations gave 599 to 93 per cent of the stations worked.

First 432 Mc/s Contest 1967

The first 432 Mc/s contest, held on 27-28 May produced a total of 58 entries. The G8 + 3 entry still dominates the band with 35 entries.

Although conditions generally were about average the overall winner G3NNG/P worked a total of 115 stations. One station was overheard to remark that he did not think that there were that many stations active on 70cm.

G3NNG reports that " conditions were appalling, after the first four hours activity was very low and the going very slow, the first 10 stations being worked in 19 minutes, the last 10 stations in 5 hours! A lot of stations were heard that could not be raised with my low power. A total of 34 counties were worked, equivalent to a new county every third contact. Average distances were 106·3 km per contact."

From the logs received it would appear that a great majority of stations went QRT from 01.00 GMT to 06.00 GMT on the Sunday morning. Several stations have requested that 24 hour operation is preferred. As propagation conditions on 70cm are so unpredictable it is intended to continue with 24 hour contests, leaving it up to the individual if he requires a break half way through.

The furthest contact was between G8AKE and ON4HN, a distance of 360 km, which would have been considered only workable on good lift conditions a few years ago.

The most popular choice of p.a. valves was the QQV03-20A with an average input of 25 watts. Four varactor multipliers were used. G8AWN/P used a TW-2 running 15 watts on 2 metres followed by a BAY96 varactor tripling to 70cm. G8AUE used a more unusual line up of a pair of PC88s in push pull with an input of 5 watts.

On the receiver side transistors appear to have almost taken over from the valve, at least in the front end of the converters.

G2XV remarks " What a pity the G8 + 3 stations cannot use c.w."

G8ABQ asks if it could not be a condition of entry that stations adhere to the 70cm band plan, so that portable stations sitting on top of mountains do not wipe out the DX stations for the less fortunate individuals.

Listeners logs from BRS26234/P and BRS15744 are acknowledged and will be credited to the Listeners' Championship. BRS15755, Storrington, Sussex managed to log 48 stations even with a 150 watt station half a mile away. Check logs are also acknowledged from G3EFX/A and G8AHF.

Congratulations go to G3NNG/P the overall winner who will receive the miniature cup. G8AKM/P will receive a certificate of merit as runner up and G8AKE will receive a certificate of merit as leading fixed station.

Posn.	Call-sign	Score	QSOs	QTH	TX P.A.	RX (F-E)	Aerial
1	G3NNG/P	12229	115	Uffington	DET24	TIXM101	2×8/8
2	G3AKM/P	9677	99	Newbury	03/20	BF180	8/8 & 13 ele
3	G8AMU/P	9130	92	Worthing	4/150A	AF186	14/14
4	GW3RUF/P	8660	68	Brecon	02/6	A2521	10 ele
5	G8ABQ/P	6862	71	Malvern	06/40	AF139	18 ele parabeam
6	G8ADC/P	6821	88	Dunstable	03/20	2N3478	10/10
7	G8AKE	6534	64	Melton Mowbray	4CX250B	BF180	2×14 ele
8	G8AGU/P	6312	37	South Molton	06/40	BF180	14 ele
9	G2AUD	5254	61	Bletchley	06/40	FET	24 ele
10	G8AGY/P	5000	58	Leek, Staffs	GL6442	GL6229	8/8
11	G8ABP	4819	66	Birmingham	06/40	GM0290	14 ele
12	G8ACI	4811	51	Fareham	06/40	AF239	2×14 ele
13	G3PAQ/P	4555	53	Luton	03/20	AF239	18 ele parabeam
14	GW8ACG/P	4496	49	Flintshire	DET24	AF139	6/6
15	G8AKQ/P	4222	45	Sheffield	02/6	GM290	8/8
16	G8AAY/P	4200	43	Poole	03/20	A2521	18 ele Bi-Square
17	G8AGQ/A	4103	42	Sheffield	06/40	GM0290	14 ele
18	G3PMH	3857	39	March	4CX250B	GM290	8/8
19	GW8ASA/P	3486	33	Monmouthshire	03/20	GM0290	10 ele
20	G8AWN/P	3454	27	York	BAY96	AF186	18 ele Parabeam
21	G3OBD/P	3369	38	Shaftesbury	03/20	AF239	32 ele Collinear
22	G8APV/P	3269	61	Tatsfield	02/6	GM0290	18 ele
23	G8AKT	3213	40	Letchworth	03/20	AF139	24 ele
24	G3CZU/P	3194	67	Dorking	DET24	EC88	18 ele Parabeam
25	G2XV	3121	36	Cambridge	06/40	AF186	40 ele stack
26	G8AEJ	2912	64	Croydon	06/40	BF180	18 ele Parabeam
27	G8APQ/P	2862	52	Epsom Downs	03/25	G2YH	14 ele
28	G3NJF/P	2722	22	Claxby Lincs	03/20	AF139	48 ele Stack
29	G3VZV/P	2646	37	Oakham Northants	03/20	GM0290	14 ele
30	G8AUE	2571	35	Shottle	2xPC88 push pull	AF239	18 ele
31	G3LHA/P	2541	40	Coventry	03/20	AF186	6/6
32	G8ALB/P	2482	34	Royston Herts	02/6	G3JXK	8/8
33	ON4HN	2330	17	Zomergem Belgium	4X150A	AF239	64 ele stack
34	G8ANS	2285	52	Hatfield	03/20	2N3478	18 ele Parabeam
35	G8AHE/P	2223	34	Rugeley Staffs	02/6	GM0290	14 ele
36	G3WKL/A	2161	30	Crowborough Sussex	02/6	GM290	18 ele Parabeam
37	G5UM	1970	30	Leicester	03/20	AF139	14 ele
38	G3TND	1961	26	Felton Somerset	03/20	AF139	18 ele Parabeam
39	G8ARM	1920	49	Greenwich	DET24	G3JXK	18 ele Parabeam
40	G3WKZ	1917	47	Wembley	4CX250B	2N3819	6/6
41	G8AAZ	1786	51	Wimbledon	03/20	BF180	14 ele
42	G3WHK	1614	50	Morden Surrey	Bay96 03/20	BF180	14 ele
43	G8AOL	1552	33	Bexleyheath Kent	03/20	BF180	18 ele Bi-Square
44	G3VRW/P	1501	31	Burnley Lancs	03/20	AF139	8/8
45	G8ARD	1448	18	Yeovil Somerset	06/40	AF139	18 ele Parabeam
46	G8AQA	1320	20	Nailsea Somerset	03/20	BF180	18 ele Parabeam
47	G3OUL/P	1264	24	Wigan	03/20	AF139	18 ele Parabeam
48	G8AND/A	1063	39	Clapham Common	03/20	A2521	8/8
49	G8AJC/A	1052	12	Canterbury	02/6	AF139	16 ele
50	G8AWV	1023	30	Hampstead	BAY96	G3JXK	18 ele Parabeam
51	G8ANY	992	19	Blackpool	03/20	GM290	6 ele
52	G8AOV	967	26	Slough	03/25	EC88	2 × 14 ele
53	G2WS	819	15	Weston-super-Mare	03/20	Transistor	6/6
54	G3VXK/P	725	13	Wigan	03/20	AF139	18 ele Parabeam
55	G5FK	723	23	Wembley	TT23	A2521	10 ele
56	G3JDM/P	498	9	Gailey Staffs	02/6	AF239	10 ele
57	G8ANY/P	259	6	Preston	BAY66	GM0290	6 ele
58	G8ABZ	247	8	Rotherham Yorks	03/20	AF139	10 ele

Third 70 Mc/s Contest (Portable)

Thirty-three counties were represented in the forty-nine entries received for this contest. Especially welcome were four GIs, two GMs and EI3SU, the latter operated by Southampton University Radio Club.

The winner was GM3RIK/P, operated by G3RIK and G3SBI. They used a QQV06-40A running 50W to make 50 contacts, only seven of which were worth less than 100 points. The aerial was a 4 over 4 at 25 ft. and the converter used an AF186 in the r.f. stage. Runner-up was G3WIN/P, the station of Windscale Amateur Radio and Electronic Society. Using a v.x.o. driving a QQV03-20A running 15W, G3BJD, G3RHE and G3RYJ made 86 contacts; the best being with G3WOR/P at 420 km.

Conditions appear to have been average with a few good patches. The best contact was that between GM3RIK/P and G3WDX/P, the latter being one of two stations entered by the Radio Society of Harrow.

Most transmitters used QQV06-40s, 3-20s or 3-10s. Other finals included p.p. EL91s (GW3OIW), TT15 (GW3ITZ, G3TND), 829B (G3PUO), p.p. 6F17s (G3SBL), 5763 (G3KLZ) and 6J6 (G3NFT). Several Communicators, B44s, Pye and BCC sets were used. Receivers showed more variation and r.f. stages are listed in the table.

The 4 element Yagi was the most popular aerial with 23 used, followed by the 3 element (9), 4/4 (8). and 6/6 (3). Other types used were 6, 7 and 8 element Yagis, a 5/5 and a cubical quad.

Several entrants commented on distance measurements and the use of the QRA Locator. It should be pointed out that an accurate Locator for an inland station can only be obtained from the Latitude and Longitude (obtainable from an Ordnance Survey Map). The QRA map should only be used for measurements.

Measurements on a " 10-mile " map can be made by using a

(Continued)

ruler marked in sixteenths of an inch, each of which represents a kilometre.

Comments

This club would very much like to see the rules amended to state that stations must operate within their own county, and objects to clubs coming from far afield and sitting on top of us for contests. (G3WOR, Worthing and District ARC).

I think this contest will go a long way in proving that the only requirement for a band plan is a c.w. section. (GM3RIK).

Only two stations were heard carrying on conversations with people behind them while supposedly called CQ. (G3NFT).

Position	Call-sign	Points	QSO's	Receiver	Ft. a.s.l.	QTH
1	GM3RIK	21672	50	AF186	1300	AL
2	G3WIN*	20895	68	6CW4	1000	CD
3	G3THQ	19957	74	GM0290	602	HF
4	GI3VPK	19014	61	TW	1000	AM
5	G3WDX*	18197	56	FET	780	DT
6	EI3SU*	18125	46	E88CC	2473	
7	GW3UCB*	17524	69	2N3823	2529	CV
8	G3NdF	16973	53	6CW4		LN
9	G3OBD	16035	73	E88CC	911	WE
10	G3NKS	15864	87	6CW4	659	SX
11	GI3TLT	15564	62			DW
12	G3UUP*	15562	54	FET		DT
13	GW3TCU	15445	57	E88CC	1134	MG
14	GW3OIW	14966	78	PC900	1820	FT
15	G3WOR*	14772	100	E88CC	783	SX
16	G3TJW	14606	42	E88CC		DN
17	GW3ITZ*	14435	71	E88CC	970	FT
18	G3PMJ	13690	65	AF186	1603	SD
19	G3ULT*	13643	67	Nuv.	975	BE
20	G3EFX*	12763	39	GM0290	300	NK
21	G3OJE	12099	79	E88CC		BS
22	G3VRW	11495	51	AF139	1250	LE
23	G3PUO	10538	41	FET	1150	LE
24	GI3ILV	10238	43	TW		AR
25	G3RCV*	10052	77	TSTR	882	SY

I suggest we cut out all this precise measuring. (G2WS)

Contest ending at 8 p.m. is too late. (G3JEQ).

Awards

Subject to Council approval, GM3RIK will receive a miniature cup and G3WIN a Certificate of Merit.

Check Logs

Logs received from G3ABM/P, G3BXS/P, G3OHH, G3TNN, G3VSA, BRS15822, BRS28005, A4752 and A5032 are gratefully acknowledged.

Position	Call-sign	Points	QSO's	Receiver	Ft. a.s.l.	QTH
26	G3RWM	8957	44	TW	630	NR
27	G3WIR*	8842	48	NUV		OX
28	G3KLZ	8509	44	E88CC		WR
29	G3SBL*	8462	45	B44	1240	SD
30	G3TND	8272	35	FET		ST
31	G3RLE	7578	29	TW/B44	400	YS
32	G3FD	7566	46	TSTR	790	BD
33	G3JEQ	6992	63	6CW6	890	SY
34	G5UM	6480	32	TSTR		LR
35	G3PXL	6457	35	PYE	1200	DY
36	G3ULV*	6080	35	B44	450	LE
37	G3OMU	5728	40	PYE	650	HE
38	G3PAO	5144	55	BCC		HF
39	GM3EGW	4974	15	AFZ12	1000	KS
40	G3ERO	4481	36	TW	500	HF
41	GI6YM*	3372	35	B44	1085	DW
42	G3VPF	2594	15	AFZ12	870	DT
43	GW3HWR	2321	10	6AK5	1330	CR
44	G2WS	2096	12	TSTR		ST
45	G3NFT	1936	14	EF183	900	DN
46	G2AVC	1387	19	B44	533	HE

* Club stations

Disqualified: G3OXD General Rule 6
G3UHF Rule 5
G3LHA General Rule 7

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144 Mc/s S.S.B. Contest

Thirty six single sideband stations took part in the society's first ever two metre s.s.b. contest, held on 14 August, 1967.

The winner of the contest was Tom Douglas, G3BA, whose winning score was made up by working 35 different stations and 88 contacts. G3BA receives the congratulations of the V.H.F. Contests Committee. He had obviously realised the importance of the station multiplier, whereas many went out for the maximum number of contacts, making little effort to look for different stations. The highest numbers of contacts were made by G3MED with 136 contacts, closely followed by G3SHK with 134, but neither of them sent in logs! The number of entries represents only 14 per cent of the s.s.b. stations active during the contest, which is rather disappointing (thus no other awards have been made). However the contest did achieve its basic aim, which was to encourage those with two metre s.s.b. equipment to make themselves heard. S.s.b. stations taking part ranged from Northern Ireland to Germany, with an entry from PA0IJ.

The s.s.b. activity in terms of numbers of stations active was higher than had been expected and even the two metre s.s.b. diehards were working stations that they had never worked before. The committee hopes that these " new" stations will not only appear in the next two metre s.s.b. contest, but operate on the band regularly in the interim period.

The following s.s.b. stations were active during the contest: G2DQ, G2PL, G2DCG, G3BA, G3AOO, G3BHW, G3DIV, G3HTE, G3IOE, G3JOP, G3JWZ, G3KEN, G3KFX, G3KTU, G3LQR, G3LUB, G3MED, G3MHT, G3MNQ, G3NAS, G3NEO, G3NOC, G3OHC, G3OUL, G3PWJ, G3RME, G3SHK, G3TWQ, G3UHF, G4MN, G5AIJ/M, G6CW, G6MN, G6TA, GI5AJ, PA0IJ, in addition PA0IJ worked the following continental stations: PA9EH, DJ4WN, DL9DL, DJ5DM, DJ2HI, DL6CP/M, DJ8QL.

Conditions during the contest were poor, described by PA0IJ as " extremely bad—it was pouring rain, with from time to time thunder and static rain." The longest contact recorded was between G3BA and PA0IJ at 316 miles (506 km), with G3BA receiving a report of RS 54.

PA0IJ sends a page of comments and suggestions. He says that not enough advanced warning of the contest was given to the continent, and he is very pleased to see that the contest is not restricted to RSGB members only.

The Rules

Undoubtedly it took some resolve for G3BA to concentrate on working stations rather than going for sheer numbers of contacts, but this technique worked. In SE England many repeat contacts were being made at the exclusion of longer distance contacts. In fact towards the end of the contest G3MED, G3SHK, G2NH and G2PL were working each other at such a speed that they had difficulty in logging the contacts, only one station took the hint in the rules about log keepers. The fault in the rules was in allowing an unlimited number of repeat contacts, although everyone considered that allowing some form of repeat contact would be a good idea. From G3BA comes " Repeats, quite OK, good idea as it keeps things fast and furious." G2NH suggests only a certain number of repeat contacts be allowed, one in a given time period, which would allow time for working DX stations without being called by one's neighbour every few minutes. Another suggestion to encourage DX working (in a repeat contact structure) is to give a sliding scale of points, increasing with longer contacts.

So that s.s.b. operators may have the type of scoring system that they wish for this contest, it is proposed to send a questionnaire to those who took part (those on the above list) so that the rules for the next s.s.b. contest can be decided by popular demand.

The V.H.F. contests committee thanks all those who took part in this first two metre s.s.b. contest and G3SEA for his check log and suggestions.

Finally G3BA says—" More please," and so to oblige him and PA0IJ (!) the date for the next two metre s.s.b. contest will be 8 January 1968, the rules to be published following analysis of the questionnaires.

Results

Call	Position	Score	QSO's	Stations	P.e.p. input
G3BA	1	8190	88	35	600
G2NH	2	1740	83	10	100
G3MNQ	3	1652	45	14	90
G3OUL	4	1224	102	12	100
PA0IJ	5	1176	27	12	750

Second 1·8 Mc/s Contest 1967

The rules for this year's Second Top Band Contest are as follows:

1. **When:** 21.00 GMT on Saturday, **18 November, 1967,** to 02.00 GMT on Sunday, **19 November, 1967.**

2. **Eligible Entrants:** All fully paid-up members of RSGB resident in G, GC, GD, GI, GM, and GW.

3. The General Rules published in the January, 1967 issue of the RSGB BULLETIN relating to RSGB contests will apply.

4. **Contacts:** C.w. (A1) only in the 1·8-2 Mc/s band.

5. **Scoring:** Six points for the first 10 contacts with any one county; three points for the eleventh and subsequent contacts with that county.

6. **Contest Exchanges:** RST reports followed by the contact number starting with 001 and the county code letters given on page 50 of the January, 1966, issue of the BULLETIN, e.g. for a contact from Surrey 579005SY. All reports must be acknowledged with " R."

7. **Logs:** (a) Must be tabulated in columns headed (in this order): " Date/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," " Points claimed." The county code letters as sent must be entered at the top of each log sheet. RSGB Log sheets must be used (available from HQ on request).

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

(c) Entries must be postmarked not later than **4 December, 1967.**

8. **Power Input:** The d.c. input to any stage of the transmitter shall not exceed 10 watts.

9. **Awards:** At the discretion of the Council, the *Somerset Trophy* will be awarded to the winning station and certificates of merit to the stations placed second and third. In addition, the *Maitland Trophy* will be awarded to the Scottish member with the highest aggregate number of points in this contest combined with the First 1·8 Mc/s Contest 1967.

Second 1·8 Mc/s Contest 1967—Listeners' Section

This section is a trial to determine the support for such an event, and its future will depend upon the number of entries received, and upon the comments received from non-transmitting members. The attention of entrants is drawn to the duration of the event which is for the first three hours only of the transmitting section.

1. **Duration:** 21.00 GMT to 23.59 GMT on Saturday, 18 November, 1967.

2. **Eligible Entrants:** All fully paid up members of the RSGB who do not hold an Amateur (Sound) Licence A. Only the entrant may operate his station.

3. **Entries:** (*a*) should be clearly written or typed, preferably on RSGB contest log sheets (available from HQ on request accompanied by a large s.a.e.), in columns headed (in this order) (i) Date/Time GMT; (ii) Call-sign of station heard; (iii) Report, serial number and county code letters sent by station; (iv) Call-sign of station being worked; (v) Points claimed;

(*b*) must be addressed to the H.F. Contests Committee, Radio Society of Great Britain, 28 Little Russell Street, London, WC1, and must be postmarked not later than 4 December, 1967. Envelopes must be marked " Second 1·8 Mc/s Contest."

4. **Scoring:** For each completed log entry of a c.w. contact between two stations 6 points may be claimed.

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

5. **Declaration:** 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 for the bands below 30 Mc/s.

Date..... *Signature*.....

Entrants are invited to submit brief details of their equipment, as well as comments on the event, with the logs.

6. **Awards:** At the discretion of the Council, a certificate of merit will be awarded to the leading entrant, and to the runner-up if more than 10 entries are received.

LETTERS TO THE EDITOR

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.

Referring to the first paragraph of " The Month on the Air " in the August, 1967 edition of the BULLETIN, some amplification of the position seems called for.

Post Office permission was sought to pass greetings messages to and from members of the British Antarctic Survey Expedition on Anarctica.

The Expedition has an authorised Wireless Station which may send and receive telegrams over the public network (via the Falkland Islands) at standard rates at any time. Furthermore each member of the Expedition is able to send and to receive one free air letter a month.

Therefore there was no justification for relaxing clauses 1(1) b (i) and 16(3) of UK Amateur Licences in respect of Antarctica; and after consultation with the London Office of the Survey Expedition, permission to pass third party messages to members of this Expedition was withheld.

Had there been complete absence of commercial communication and we had received a request, initiated by an expedition, for traffic in the Amateur Service we should have considered the matter accordingly.

Yours faithfully,
C. E. GODSMARK

Radio Services Dept.,
General Post Office.

RSGB QSL Bureau

I want to thank you and your office for the very fine work that you do and the very prompt service that the QSL Bureau offers. I want very much to stay an active member of the RSGB Bureau, even though I will be residing in the United States. I would also like to add, that I think that the RSGB Magazine is one of the finest, up to date and informative magazines concerning Amateur Radio published. I have only held a reciprocal amateur licence in Great Britain for a year, but in that year, through the amateur field, I have met some of the finest people ever. I believe that the Amateur Radio Operators of the United Kingdom are some of the most up to date, polite and courteous and informed Amateurs in the field.

Thanking you for a year of very fine service.

Sgt. Wayne D. Mears.

RAF Mildenhall, Suffolk, England.

NFD '67

On behalf of the Oxford and District Amateur Radio Society —and, I am sure, of all clubs who took part in NFD—I would like to congratulate the H.F. Contests Committee on the remarkable speed with which the results were calculated and published this year.

P. BRADLEY, G3UJO.

Hon Secretary, O & DARS

Doppler Shift at 70 cm?

G8AJV reported an apparent frequency shift to me whilst I was in mobile QSO with him from the M1 (his station being static). As I was travelling almost directly away from him, at 70 m.p.h., the possibility of a Doppler shift was mentioned.

However, calculation shows this to be almost certainly irrelevant. Using the formula $f_1 = f_0(c - v)/c$, where f_0 and f_1 are the transmitted and heard frequencies, c is the speed of radio waves, and v is the relative velocity of transmitter and receiver, the calculated shift (for $f_0 = 433$ Mc/s) would be about 45 c/s. Even with an ultra-stable b.f.o. in use at the receiver, such a low beat frequency would surely escape detection, unless an 8 or 9 figure digital frequency meter were monitoring the signal!

Measurable Doppler shifts would be more likely on the 23 and 13 cm bands. I wonder whether there are any mobiles using these bands, and if so, whether they have any observations?

W. H. JARVIS, A.Inst.P., G8APX.

Bushey, Herts.

CLUBROOM

A Monthly Survey of Club and Group Activities

For further information on membership or the activities of a particular club, application should be made to the person whose call-sign is indicated at the end of the item. Full addresses may be obtained from the RSGB Amateur Radio Call Book.

YOU may notice that this month's feature is somewhat shorter than usual; this is because of the week early publishing date for this issue, allowing it to appear on the first day of the RSGB Exhibition. It is hoped that contributors who submitted reports after our closing date of 1 September will bear with us on this occasion. We now move straight to the reports.

Addiscombe ARC reports successful past meetings which included talks on computers and another on simple transmitters. *G3VLT.*

Bedford and District ARC recently visited the GPO Wireless Station at Baldock which was a great success and enjoyed by everyone who attended. One member is apparently still in raptures over the use of a CR100 receiver for monitoring Maritime Channels. Conclusions drawn from the visit were that if your aerial does not have at least 750 ft. of wire in it you're not even trying, it seems that the Rhombic is now accepted as the best all round wide band aerial providing it is erected high enough, but if it's a Sterba Curtain for VK on 15m, a cage dipole for 80m or a self tuning s.s.b. receiver you want they have them all at GPO Baldock. *G3VBA.*

Our comments last month on general lack of publicity given by the press to the activities of radio amateurs would seem to be a little premature as is evident by a report from the **Chester and District ARS.** The Society recently mounted an expedition to the Orkney Isles which resulted in extensive coverage in the local press in addition to reports in two national dailies. Highlight of it all was a three minute television interview for the BBC television programme "Wales Today." Sometime later P. J. Holland, Chester Secretary was asked to participate in a Radio Interview for the BBC International Service. For this he was joined by RSGB Council member Ted Ingram, GM6IZ who answered questions of a more general nature. Full credit must be given to the Chester club for its initiative in preparing such an expedition and for seeing it through. *G3TZO.*

Chairman of the Southport RS, Ray Jones, G3NKL, was recently married at Knowle Green Church, Nr. Longridge, Lancs., to Marjorie Hesketh. The best man was Nigel Waring, G3WQP.

Cornish RAC will be meeting on 5 October when J. Taylor, G3OFN will present a talk entitled "Aerial History and Developments." *G3OFN.*

Crawley ARC met on 13 September when Mr J. Smith of Mullards gave a lecture and demonstration on Lasers. By now of course the usual post mortem, in common with other clubs, on V.H.F. NFD would have taken place and the results are no doubt encouraging. *G3FRV.*

Cray Valley RS have arranged a visit to the BBC Frequency Checking Station at Tatsfield, Surrey for Saturday, 7 October. It is unfortunate that the party cannot exceed 12 members on this occasion but those who cannot manage this trip may be interested in a visit to the Crystal Palace BBC Television Transmitter, arranged for 7 November at 8 p.m. A further announcement on this visit will be made in the Cray Valley RS Newsletter *QUA* at a later date. *G3VLX.*

Crystal Palace and District RC met on 20 August when Bob Burns, G3OOU talked on frequency counters. The counter demonstrated by Bob seemed to make the BC221 look very inferior in comparison and the offer to measure crystal oscillators within one c/s was taken advantage of. *G3FZL.*

Ealing and District ARS took full advantage of the new V.H.F. NFD rules and operated three stations on four bands. From Telegraph Hill, 7 miles west of Hitchin, Herts., G3THQ operated a 70 Mc/s and 13cm (2304 Mc/s) station and from Paddlesworth (the village consisted of a Pub only—"The Cat") 3 miles north of Folkestone, Kent, G3OUF operated on 144 Mc/s with G8ART on 70cm. All stations worked well with the exception of 2m which seemed doomed from the start. The RA1 receiver being used as the tunable i.f. had received a thud on the way down and was only resolving the strongest of signals. An urgent telephone call to London sent G3TVL round to G8AWE QTH to pick up his AR88, but unfortunately his wife eager no doubt to clear it from the front room gave Peter a set which was being overhauled. On arrival at Paddlesworth the delighted faces were soon to drop when the thing was switched on. Two faults occurred, one on the audio side which was solved by thumping a valve periodically and another more serious, a shifting v.f.o. No sooner than a station had been tuned in, it shifted 500 kc/s or so around the band. Following a night's operating under these conditions it was decided to call it a day and at around 9 a.m. Sunday morning the 10 over 10 aerial was dismantled and the G3OUF team left for London leaving G8ART happily working the Continentals on 70cm. *G3OUF.*

Another club attracting much publicity from the press both local and national was the **Forest Glade DX Club.** Its planned trip to Red Sands Fort in the Thames Estuary to operate during V.H.F. NFD brought a lot of attention in the press but was cancelled by the GPO. It was thought that the limitation section of the amateurs' licence which prohibits operation in an estuary referred only to ships and over surface vessels. However the GPO

advised the club that operation from an estuary in any form is not permitted whether it's from an Island, Fort or what have you.

We don't know what part RTTY plays in the running of the **Glenrothes ARC** but this month's report measured 36 in. by 8½ in.! On 1 October it is hoped to have a Mullard film show. Failing this E. H. Ross will give a slide show on Cyprus and the Antarctic. *GM3LWS.*

Hereford ARS have now settled down with a membership around 40 of whom some 25 per cent are now licensed. It is unfortunate that the club have had to change its premises so soon, but one or two sights are under surveillance. At present the group meet at Mortimer Hall, Mortimer Road, at 7.30 p.m. *G3RJB.*

Midland ARS met on 18 July when its Chairman, Bob Palmer, G5PP talked on his new Top-Band transmitter, the circuit of which was published in the August Newsletter. We also wish G6RKU/T luck with the Morse for that " A " licence. On the TV side Howard has recently increased his power to 50W on 70cm. *G3JDJ.*

Plymouth RC's mobile picnic went off without a hitch last month, the only comments made being on the lack of activity on 4m and 2m. In fact these talk-in stations had very little to do. The subject for two meetings during October will be a talk on transistors and on the RSGB. *G3SGV.*

Salop ARS members manned an exhibition station at the Annual Traction Engine Rally at Church Stretton on August Bank Holiday. The more popular h.f. bands were worked including 80m and 20m using an Eddystone 680X receiver, Sphinx transmitter and a KW trap dipole aerial. Members are asked to note that the AGM will be held on 12 October when your presence will no doubt be appreciated. *G3WNI.*

The **Southdown ARS** was founded only four months ago and yet by this date is a flourishing young club. The recent programme will give an idea of its activities. On 4 September, a GPO speaker talked on " Relays " while later on the 14th a visit was arranged to the Police Radio Headquarters at Eastbourne, Sussex. *G3POQ.*

The second **Stratford-upon-Avon and District RC** mobile picnic was held on 20 August at the Recreation Ground, Stratford opposite the Royal Shakespeare Theatre. Among the 22 mobiles attending were G5PP and G3JFH who together with families made the total attendance in excess of 100. The local town council are to be thanked for their part played on the day by waiving the usual 2s. 6d. parking fee and providing a roped-off area for the mobiles. Talk-in facilities were provided on Top Band by G3OOQ and G3RPJ and the usual raffle was won by G3SFV/M with the wife of G3HBX taking the Ladies' prize. *G3OOQ.*

Newsletters were also gratefully received from the **Hong Kong ARTS, Echelford ARS, Guildford and District RS, RAIBC, Royal Signals RS, Saltash and District ARC, Southgate RC, Wessex ARC,** and **Wolverhampton ARS.**

It would assist the compiler of Clubroom if reports could be typed double spaced and *concise* in content. If you use long hand please print unusual words. **Deadline** for the **November** issue is **6 October** and for the **December** issue **10 November.**

A general view of the Cornish Amateur Radio Club's Mobile Rally held at Pentire Headland, Newquay on 23 July.
(Photo by G3VJB)

Last September, 13 year old Christopher Richmond, A4774, of Redbridge, Ilford, Essex, was rejected as too young for an RAF course. Undaunted, he was accepted elsewhere, and is now G3WPR. This is no mean feat as he virtually started from "scratch." His debut on the air was made with a KW160 and R107. Plans are now in hand for a home-constructed h.f. rig.
(Photo by G2HR)

A Rather Embarrassing Moment

By I. G. SWAN, BRS24547*

OUT for a quiet Sunday afternoon run in the car with his family, G3NRP was travelling along the A74 towards Larkhall when his wife observed, " We just passed two amateurs working from the back of that red mini."

Looking in his mirror, Peter, G3NRP, saw the mini and the two individuals, accompanied by a considerable assortment of equipment. He at once said, " That must be Tom and Ian (GM3MXN and BRS24547) up to something; we will go back and catch them at it."

He turned the car and drove back down the road, and, on approaching the mini, crossed and stopped with a squeal of brakes and a quick CQ on the horn.

Imagine his horror when the two supposed amateurs looked up, and Peter realized that they were not Tom and Ian. But he did recognize the blue shirts, black ties and big feet of two police constables in plain clothes setting up a radar speed trap. After a muttered, red faced, " Sorry I thought you were someone else," Peter shot away hoping that his number plate was covered with a solid layer of mud. Of course, he also forbade his wife to speak to him while he was driving!

* 40 Catherine Street, Motherwell, Scotland.

Forthcoming Events

Details for inclusion in this feature should be sent to the appropriate Regional Representatives by the **first of the month** preceding publication. A.R.s and club secretaries are reminded that the information submitted must include the date, time and venue of the meeting and, whenever possible, details of the lecture or other event being arranged. Standing instructions cannot be accepted.

REGION 1

Ainsdale (ARS).—4, 18 October, 1 November, 8 p.m., 77 Clifton Road, Southport.

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

Ashton under Lyne (AUL & DARS).—Fridays, 7 p.m., Rooms F52 and F53, Ashton College, Beaufort Road.

Blackburn (ELARC).—5 October (Mullard Film Show), 2 November (Talk by Maurice Jackson, G2FMU).

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

Bury (B & RRS).—10 October (" 40 Years of Amateur Radio," by G3BN). 14 November (Constructional Competition and Quiz versus Manchester and District RS), 8 p.m., Old Boars Head Hotel (Private room), Crompton Street. Club nets Tuesdays, 8 p.m., Sundays 11 a.m.

Chester (C & DARS).—3 October (Top Band Net Night), Tuesdays, 8 p.m., YMCA.

Crewe & District.—2 October, 6 November, 8 p.m., 80 Albert Street.

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

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

(NLRC).—13, 27 October, 10 November. Landsbury House, 13 Crosby Road South, Liverpool, 22.

(ULARS).—Meetings re-commence in October—Apply to Students Union for details.

Macclesfield (M & DRS).—10, 24 October, 7 November, 8 p.m., The George Hotel, Jordangate.

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

(SMRC).—Fridays, 7.45 p.m., Rackhouse Community Centre, Daine Avenue, Northenden.

Morecambe.—4 October, 1 November, 125 Regent Road.

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

Preston (PARS).—5, 19 October, 2 November, 7.30 p.m. " Windsor Castle " (Private room), St. Paul's Square.

St Helens (SES).—3, 17, 31 October, 7.30 p.m., IVS Centre, 55 College Street.

Southport (SRS).—Wednesdays, 8 p.m., Sundays 2.30 p.m., The Esplanade. Thursday, 12 October (Visit to British Rail, Edge Hill), 7.30 p.m., Tuesday, 7 November (Visit to HMS " Inskip," Nr. Preston), 8 p.m.

(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.—4, 18 October, 1 November, Royal Oak Hotel, Castle Street, Edgeley.

Warrington—Culcheth (CARC).—Fridays, 7.30 p.m., The Harrow Inn, Culcheth.

Westmorland.—6, 20 October, 3 November, 7 p.m., The Allen Technical College, Sandes Avenue, Kendal.

Wirral (WARS).—4, 18 October, 1 November, 8 p.m., Harding House, Park Road West Claughton, Birkenhead. (Annual Dinner), Friday, 3 November.

REGION 3

Birmingham (Bournville).—Fridays, 8 p.m.

(MARS).—Third Tuesday in the month, 7.45 p.m., Midland Institute.

(South).—Third Wednesday in the month, 8 p.m., Scout Hut, Pershore Road.

Bromsgrove (B & DARC).—Second Friday in the month 8 p.m., Co-op Hall.

Cannock (CCARS).—5 October (AGM), Bridgtown Social Club, Walsall Road, Cannock.

Coventry (CARS).—20 October (" Demonstration," by Daystrom Ltd).

Dudley (DARC).—6 October, 20 October (AGM), Art Gallery, Dudley.

Hereford (HARS).—First Friday in the month, 7.30 p.m., Holmer Scout Group HQ, Holmer Rd, Hereford.

Mid-Warwickshire (MWARS).—Every Monday Evening, 7 Regent Grove, Leamington Spa.

Nuneaton (NARS).—Meetings Thursdays Fortnightly, Anchor Inn, Hartshill.

Salop (SARS).—12 October (AGM), 27 October (Society's Dinner Dance the Oak Hotel), Old Post Office Hotel, Milk St, Shrewsbury.

Stourbridge (STARS).—3 October (" Basic Differences between s.s.b. and a.m.," by Mr Boakes), The Library, Longlands School, Stourbridge.

Stratford (S-u-A & DRC).—6 October Friday (" The Electron Microscope," by G3OOQ), 20 October, Friday (" Raynet and Point to Point," by G3FKO), 3 November, (Eddystone Evening), Halls Croft, Old Town, Stratford.

Sutton Coldfield (SCRS).—9 October, 25 October, The Fox, Walmley.

Wolverhampton (WARS).—16 October, 30 October, Nechells Cottage.

Worcester (W & DARC).—Informal meetings each Saturday 8 p.m., 35 Perdiswell Park, Droitwich Road, Worcester.

REGION 5

Bedford (B & DARC).—5 October (Setting up an Amateur Station), 12 October (Operating your Amateur Station), 19 October (NFD Club Transmitter), 26 October (AGM), 2 November (Club Project—The TDO), Club HQ, " Dolphin Inn," Broadway, Bedford.

Cambridge (C & DARC).—Fridays, 7.30 p.m., Club Headquarters, Victoria Road, Cambridge.

(CUWS).—Alternate Tuesdays during University Term. Freshmen welcomed, 8.15 p.m., Psychology Department, Downing Site.

Luton (L & DARS).—Tuesdays at ATC Headquarters, Crescent Road, Luton, Bedfordshire. CW and Elementary Theory, 7.30 p.m. each week.

March (M & DRAS).—Tuesdays, 7.30 p.m., Old Police Headquarters, High Street, March, Isle of Ely.

Royston (R & DARC).—Wednesdays, 8 p.m., Manor House Social Club, Melbourn Street, Royston, Hertfordshire.

Shefford (S & DARS).—5 October (Debate on Questions in Recent Quiz), 12 October (Junk Sale & Natter Nite—Visitors with Cash cordially invited!), 19 October (" Elementary Radio Circuits," by G3VMI), 26 October (Design & Construction of Morse Monitor—G3VMI), 2 November (Films on Industrial Electronics—G3TDW), 7.45 p.m., Church Hall, High Street, Shefford, Bedfordshire.

REGION 6

Cheltenham RSGB Group.—First Thursday each month, (October—Films), 8 p.m., Great Western Hotel, Clarence Street, Cheltenham.

Gloucester (GRC).—Second and fourth Thursday each month, 7.30 p.m., with Morse Practice. Lamb Inn, Market Parade, Gloucester.

REGION 7

Acton, Brentford and Chiswick (ABCRC).—17 October, 7.30 p.m., Chiswick Trades and Social Club, 66 High Road, Chiswick.

Addiscombe (AARC).—10 and 24 October, 7.30 p.m., 158 Lower Addiscombe Road, (Toch H Hall).

Ashford (Middlesex) Echelford (ARS).—12 and 26 October, 7.30 p.m. St. Martin's Court, Kingston Crescent, Ashford.

Bexleyheath (NKRS).—12 October, (It's Natters Evening! and Club Station), 26 October (Donated Junk Sale), Church Hall, Chapel Road, Bexleyheath.

Chingford Group.—8.15 p.m. 6, 20 October. Royal Forest Hotel, Chingford.

Chingford (SCR).—Fridays except first in month, 8 p.m. Friday Hill House, Simmons Lane, Chingford, E4.

Croydon (SRCC).—19 October, 7.30 p.m., Blue Anchor, South End.

Dorking (DR & DRS).—10 October, 8 p.m., Wheatsheaf. 24 October, 8 p.m. Star & Garter, Dorking.

Ealing (E & DARS).—Tuesdays, 7.30 p.m., Northfields Community Centre, Northcroft Road, Ealing, W13.

East Ham.—3, 17 October, 7.30 p.m., 12 Leigh High Road, East Ham.

East London.—15 October, 3 p.m., Wanstead House, The Green, Wanstead, London, E11.

East Molesey (TVARTS).—First Wednesday, 7.30 p.m., Prince of Wales, Bridge Road, East Molesey.

Edgware & Hendon (EADRS).—9, 23 October, 8 p.m. John Keble Hall, Church Close, Deans Lane, Edgware.

Gravesend (GRS).—Third Wednesday, 8 p.m., RAFTA Club, Overcliff Road.

Guildford (G & DRS).—13 October (Talk by G3LXP on /M), 8 p.m., 27 October (Discussion on 7 Mc/s Contest). Guildford Engineering Society in Stoke Park.

Harlow (DRS).—Tuesdays & Thursdays, 7.30 p.m. Mark Hall Barn, First Avenue.

Harrow (RSH).—21st Anniversary Month's Programme. Special programme every Friday, except Friday 20 October, which will be 21st Anniversary Supper at Clay Pigeon Hotel, Field End Road, Eastcote. Tickets from G3TUX or Committee. 6 October (International Amateur Radio by G2BVN), 7.30 p.m., Roxeth Manor School, Eastcote Lane.

Havering (H & DARC).—11, 25 October, 7.30 p.m., Romford.

Holloway (GRS).—Wednesdays, Fridays, 17.30 p.m., Monten School, Hornsey Road.

Hounslow (HADRS).—6, 20 October. Canteen, Mogden Main Drainage Department, Mogden Works, Isleworth.

Ilford.—Thursdays, 8 p.m., 103 Heath Road, Chadwell Heath, Romford.

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 in each month, 7.30 p.m., White Hall Hotel, Bloomsbury Square, Holborn.

Loughton.—6, 20 October, 7.30 p.m., Loughton Hall (nr. Debden Station).

Maidenhead (M & DARC).—17 October, 7.30 p.m. Victoria Hall, Cox Green, Maidenhead.

New Cross.—Wednesday and Friday, 8 p.m., 225 New Cross Road, London, SE14.

Norwood & South London (CP & DARS).—21 October (Hi-Fi Evening, G3IIR & G3FZL) 8 p.m., C.D. Centre, Council Depot, Woodgates Road, SE12.

Paddington (P & DARS).—Wednesdays, 7.30 p.m., Beauchamp Lodge, 2a Warwick Crescent, W2.

Purley (P & DRC).—6, 20 October, 8 p.m., Railwaymen's Hall, Side Entrance, 58 Whytecliffe Road, Purley.

Reigate (RATS).—11 October, 7.30 p.m. (Meteorology & VHF by G2FKZ), George & Dragon, Cromwell Road, Redhill.

Romford (R & DRS).—Tuesdays, 8.15 p.m., RAFTA House, 18 Carlton Road.

Science Museum (CSRS).—3 October, (Hi-Fi Equipment and Good Listening Techniques, by Mr Ralph West, Northern Polytechnic Lecturer and Mr Peter Clifford) 6 p.m., Science Museum, South Kensington.

Scouts (ARS).—19 October, 7.30 p.m. (Introduction to Radio Control by R. Tisdall). Baden Powell House, Queensgate, South Kensington, SW7.

Sidcup (CVRS).—5 October, 8 p.m. (Talk by Electroniques (S.T.C.) Ltd.), 7 October (Visit to B.B.C. Tatsfield), 7 November (Visit to Crystal Palace Television, Transmitter). 19 October, 8 p.m., Informal evening at Congregational Church Hall, Court Road, New Eltham, SE9.

Slough (SDR Group).—First Wednesday every month, 8 p.m., United Services Club, Wellington Street.

South London Mobile Club.—14, 28 October, 7.30 p.m. Clapham Manor Baths, SW4.

Southgate & District.—12 October, 7.30 p.m., Parkwood Girls School, (behind Wood Green Town Hall).

St Albans (Verulam ARC).—16 October, 7.30 p.m., Cavalier Hall, Watford Road, St. Albans.

Sutton & Cheam (SCRS).—17 October, 8 p.m., The Harrow Inn, High Street, Cheam.

Welwyn (Mid Herts. ARS).—12 October, 8 p.m., Welwyn Civic Centre, Welwyn.

Wimbledon (W & DARS).—13 October, Annual Junk Sale. St. George's Road, Wimbledon, SW19.

Wembley (GECARS).—Every Thursday, 7 p.m., this Club is now open to non-GEC Employees by invitation. Please telephone ARNold 1262 first. Sports Club, St. Augustin Avenue, North Wembley.

REGION 8

Crawley (CARC).—11 October (Informal) for details contact G3FRV. 25 October (" V.H.F. Equipment," by Brian Armstrong, G3EDD), 8 p.m., Trinity Congregational Church Hall, Ifield.

REGION 9

Bristol RSGB Group.—23 October, 7.15 p.m., Transport House, Victoria Street, Bristol 1.
(BARC).—Mondays and Thursdays, 7.30 p.m., 43 Ducie Road, Barton Hill, Bristol 5.
Burnham-on-Sea (B-O-SARS).—Second Tuesday in each month, 8 p.m., Crown Hotel, Oxford Street, Burnham-on-Sea.
Cornwall (CRAC).—First Thursday in each month, 7.30 p.m., Staff Recreation Hall, SWEB Headquarters, Pool, Nr Camborne.
(CRAC V.H.F. Group).—Third Thursday in each month, 7.30 p.m., The Coach and Horses, Pydor Street, Truro.
Exeter.—First Tuesday in each month, 7.30 p.m., George and Dragon Inn, Blackboy Road, Exeter.
Plymouth (PRC).—Tuesdays, 7.30 p.m., Virginia House, Bretonside, Plymouth.
Saltash (S & DRAC).—Alternate Tuesdays, 7.30 p.m., Burraton Toc H Hall, Warraton Road, Saltash.
South Dorset (SDRS).—First Friday in each month, 7.30 p.m., Labour Rooms, West Walks, Dorchester.
Taunton.—Alternate Thursdays, 7 p.m., Lecture Theatre, Taunton Technical College.
Torquay (TARS).—Last Saturday in each month, 7.30 p.m., Club HQ Belgrave Road, Torquay.
Wells (WARS).—Mondays, 8 p.m., EMIE (Wells) Sports and Social Club, Chamberlain Street, Wells, Somerset.
Weston-super-Mare.—First Friday in each month, 7.30 p.m., Technical College.
Yeovil (YARC).—Wednesdays, 7.30 p.m., Park Lodge, The Park, Yeovil. 27 October (Lecture by Daystrom Ltd., with demonstration of Heathkit equipment), 7.30 p.m., Joint meeting with Street, Taunton, Wells, South Dorset and Royal ARS Groups.

REGION 10

Blackwood (ARC).—Fridays, Lectures and practical programmes. Section devoted to RAE, 7.30 p.m., Blanche Cottage, off High Street, Blackwood, Mon.
Cardiff (RSGB Group).—9 October, 7.30 p.m., TA Centre, Park Street, Cardiff.
Pembroke (ARC).—Last Friday of month. 7.30 p.m., Defensible Barracks, Pembroke Dock.

REGION 13

Edinburgh (LRS).—12 October ("Lighthouse Radio," by GM3VBB), 26 October (Visitors Night), 7.30 p.m. YMCA, 14 South St Andrew Street, Edinburgh 2.

REGION 14

Ayrshire (AARG).—4, 18 October, 7.30 p.m., Seaforth House, Seaforth Road, Ayr.
Auchenharvie (A & DARS).—3, 5, 10, 12, 17, 19, 24, 26, 31 October, 7.30 p.m., Auchenharvie Community Centre, Stevenston.
North Ayrshire (NAARC ATC).—1 October, 7.30 p.m., Ardrossan ATC, The Academy, Ardrossan.
Glasgow University (GURC).—13, 27 October, 7.30 p.m., Engineering North Building, University of Glasgow.
Lowland Royal Signals (ARC).—3, 10, 17, 24, 31 October, 7.30 p.m., 21 Jardine Street, Glasgow.
Greenock (G & DARC).—6, 20 October, 7.30 p.m., Art's Guild, Campbell Street, Greenock.
Mid-Lanark RSGB Group.—20 October (Mystery Night) 7.30 p.m., YMCA, Brandon Street, Motherwell.

REGION 15

Belfast and District RSGB Group.—Third Wednesday in each month, 8 p.m., War Memorial Building, Waring Street, Belfast.

CONTESTS DIARY

7-8 October	—Second 1296 Mc/s Contest (Open) (see page 606, September)*
7-8 October	—RAEN Contest (see page 465, July 1967)
7-8 October	—VK/ZL/Oceania Contest (C.W.)
7-8 October	—WADM (C.W.)
14-15 October	—RSGB 21-28 Mc/s Telephony Contest (see page 257, April)
14-15 October	—Third 432 Mc/s Contest (Open) (see page 606, September)*
15 October	—D/F National Final
21-22 October	—CQ WW DX Contest (Phone)
28-29 October	—RSGB 7 Mc/s DX Contest (Phone)
11-12 November	—RSGB 7 Mc/s DX Contest (C.W.) (see page 408, June 1967)
12 November	—International OK DX Contest (C.W.)
18-19 November	—Second Top Band Contest (page 689)
25-26 November	—CQ WW DX Contest (C. W.)
3 December	—Fourth 70 Mc/s Contest (G.W.)

***Qualifying contests for V.H.F./U.H.F. Listeners' Championship.**

MEMBERS' ADS

These advertisements are published free of charge for the benefit of the Society's members. The number of words is limited to 30 (not including the address), and we cannot give any guarantee that an advert will appear in any specific issue. It is essential that we receive the advertisement at RSGB Headquarters by the first of the month for the following issue, and it must be accompanied by the wrapper from the previous month's BULLETIN. The address on the wrapper must, of course, agree with that in the advertisement. We cannot accept any responsibility for mistakes, but please print or type the advertisement to minimise the chances of errors being introduced.

No trade announcements can be printed here, but these can be submitted in the usual way for Classified Advertisements.

FOR SALE

Six QCC filter crystals, three 459 kc/s, three 461 kc/s and two b.f.o. crystals 458·6 kc/s and 461·4 kc/s together with i.f. transformers. £12 10s. J. G. Holland, G3GHS, 164 Hook Rise North, Tolworth, Surrey.

FT243 crystals, 5825, 5906·67, 6140, 7625, 8500 kc/s 3s. 6d., postage 6d. Wanted crystals approx. 560, 1600, 1820, 7800 kc/s. D. J. Walsh, " Combe Down," Ballylynch, Carrick on Suir, Co. Tipperary, Ireland.

Minimitter Tri-Band Beam, £6. Wanted DX40 TX or cabinet. F/O C. L. K. Ledger, G3UBI, RAF Officers Mess, Royal Air Force, Andover, Hants.

Minimitter 150W TX, a.m./c.w. £42 10s., MR37 RX, £12 10s., Kokusuai filter, 2·1 kc/s, new, £7 10s. 1000pF, 2kV, variable, 15s. each, carriage extra. J. G.Wardhaugh, G4LA, 20 Hallgates, Hexham, Northumberland.

BC453 " Q Fiver," fair condition, £2 15s. T. J. Brooke, GW3GHC, 32 32 Elgar Crescent, Llanrumney, Cardiff, S.Wales.

Auto transformer, Douglas MT4, 150W, 115V-200V-230V-250V, 25s. including postage. 115V motor with 100-1 reduction gear, suitable etc. 9s. 6d. inclusive, H. Owen, G2HLU, 223 Church Road, Earley, Reading, Berks.

Heathkit " Q " multiplier, QPM-1 for 450-470 kc/s i.f., tested and unused, £5 10s., Joymatch Antenna tuner 2A 550 kc/s-1·5 Mc/s, as new £2 10s. G. F. Brown, 45 Hawthorn Ave., Bearsden, Dundarton.

J-Beam 4m, 4 ele. Yagi, B44 Mk 3, Pye PTC 114 RX, Lot £4. You collect. L. M. Airey, G3GEJ, 14 Brandles Road, Letchworth, Herts.

Heathkit DX100U impeccable condition, £55, Heathkit SB10U, factory aligned and checked, as new, £25. Prefer sell as pair, Heathkit " Q " multiplier £5 and RAF Astro compass, £1 10s. J. W. Thexton, G3URE, 78 Greenfield Road, Brunton Place, Gosforth, Newcastle on Tyne 3.

SX28 RX with product detector, spare valves and two loud speakers, recently re-aligned, Genuine, £23. C. R. Keeble, G3TUU, 7 Wobourn Ave., Kirby Cross, Essex.

46 Set, less crystals and transmit/receive switch, not tested, 7s. must be collected. M. R. Lake, 36 Thatches Grove, Marks Gate, Romford, Essex.

Four Pye reporter radio telephones 60-80 Mc/s as new, easily modified, see June 1967 RSGB Bulletin. £6.Wanted, Good oscilloscope and wobbulator, perfect condition and manual essential. R. H. Webb, G6XY, 22 Southbank Road, Kenilworth,Warwickshire.

Four 2C39 valves with sockets 30s, or 10s each. Spare cavity 5s, RF24 15s., RF27 30s. R107 RX p.s.u. with plugs 40s. CQ New Sideband Handbook, mint, 18s. postage extra.W H Fletcher, G3NXT, Holmdale, Martin, Lincoln, Lincs.

PCR RX, speaker and internal p s.u. £5, 19 Set Mk 3—v.h.f parts removed—£1 10s New variometer 15s. original p.s.u. inc. leads e.t.c. 15s. S. M. Marshall, 18 Anne Way, Hainault Ilford, Essex.

1131 modified, 150W amateur bands TX with v.f.o. £15. Buyer collects. J. Clarricoats, G6CL, 16 Ashridge Gardens, Palmers Green, London N13.

Viceroy Mk II with p.s.u., £80. Eddystone 888A with accessories, £75, Hudson base/mobile equipment for 4m, £7 pair, o.n.o. For full details delivery send s.a.e. W. E. Thompson, G3MQT, 8 Coventry Road, St. Leonards on the Sea, Sussex.

KW Viceroy s.s.b. TX Mk IV in mint condition less p.s.u. £85 o.n.o. G3FZL (tele 01-6999, 6940)

Two Cathodean Crystals for ½ lattice filter, 461·5 kc/s and 458·5 kc/s plus matching Electroniques coils, HSO 1·1, HSO 460 (b.f.o.), three de luxe i.f.'s 460. Circuit available, cost £6 6s. offers. L. B. Uphill, G3UCE, 349 Heysham Road, Morecambe, Lancs.

AR88LF, S meter, product detector, crystal calibrator, manual, £30 160-10m 150W a.m. table TX. £15. 200 *Bulletins*, 200 *SWM*, 24 *PW*, 35 *PE*, 72 *Which?* Marconiphone player, £10, Elizabethan 4 track tape recorder, £20. J. E. Burnitt, G3GXD, 24 Gardenwood Road, East Grinstead, Sussex.

25Y5, 30C1, 30C17, 30L17 85A2, 954, 1561, 8002, AZ31, DH77, DL94, DY87, EA50, EAC91, E91, EB34, EB41, EB91, EC52 10s. for six, many overs, state needs with s.a.e. G. A. Jeapes, G2XV, 165 Cambridge Road, Great Shelford, Cambridge.

Heathkit Mohican, little used, £25. Panda Club TX, 6146 p.a. 160-10m, £25. S.s.b. chassis, many parts £5, various bits, N24 amplifier, trans-transformers, 10W, 5/10-type amplifier, offers to clear shack, going compact. B. R. H. King, G3SGK, Littlehurst, Gerrards Cross, Bucks.

Eddystone EC10 with Eddystone mains conversion unit and manual £33. Also Lafayette KT-320 with manual, £15. Buyer to collect. G. H. Laurence, 10 Gladstone Street, Newcastle upon Tyne 2. Northumberland.

KW77 RX, 160-10m, slot filter, noise limiter calibrator etc, good condition, £60, Heathkit RG1 general coverage RX with speaker, £25 o.n.o. J. W. Garrett, 21 Meadow Road, Tonbridge, Kent.

TA12C with modulator-dynamota p.s.u., £8, T1154 40s., 6 ft. 6 in. GPO type 19 in. rack, 50s. Command TX £4, RX B-624 (type R5019) modified 2m, 30s. RF26, RF27's 15s. each. Buyer collects. G. F. Ripley, G3KFW, 47 Rough Common Road, Canterbury, Kent.

G8KW trap dipole little used, 97 ft. feeder, complete. £4 10s. T. Groombridge, G3TDP, 28 Sprotlands Avenue, Ashford, Kent.

Millen " R9er " with plug in coils for 10, 15 and 20m. £7 o.n.o. *RSGB Bulletins, QST, Hi Fi News, Gramophone, Tape Recorder* and *SWM* 1953-66. Offers, buyer collects. R.W. Hewetson, 20 Terront Road, London, N15.

Heathkit Mohican transistor RX as new complete with manual £25. Wanted information on Hallicrafters SX42 RX. H. R. Perrin, G8ALY, 30 Franchise Street, Kidderminster,Worcs.

Lafayette HE30 RX, 8 valves, Q Multi b.f.o., n.l., Bandspread, 550 kc/s-30 Mc/s, manual and speaker. Surplus to requirements and room wanted. First £16, callers only. H. C. Pryse, 36 Hart Road, Byfleet, Weybridge, Surrey.

R208 RX, needs slight attention, otherwise good on 20-15-10, £4. Also RF25 unit complete, 5s. R1155 not working, OK for spares £25s. Buyer inspects and collects, after 9 p.m. G. E. Watson, 25 Underwood Road, Wood Seats, Sheffield 8, Yorks.

HRO coilpacks, 0·9-2, 3·5-7·3 Mc/s., 15s. each, 14 Mc/s bandspread 30s. Stripped HRO case, with tuning gang and i.f.t.'s, offers. Unused Electroniques, amateur bands Qoilpax QP166, £10 10s. All o.n.o. D. Thom, G3NKS, 12 Willow Road, Redhill, Surrey.

KWM 2, " Q " multiplier and blanker, £425. PM 2 p.s.u. £60. D.c. p.s.u. £40, mobile mount £35, case £25, Hallicrafter SR42 transceiver with v.f.o., a.c. and d.c. p.s.u., mobile mount £75. Heath I0 10E £35, HO 10E £25. J. M. Hern, G3NAC, 29 Gallagher's Mead, Andover Hants.

Modern Wireless, Vol. 1, first eight issues, February-September 1923. Good condition, neatly bound, offers. J. F. Wilson, G3UUT, 22 Askham Lane, Acomb York.

R1155 RX overhauled, top band conversion, N-drive, noise limiter, built-in p.s.u. Prefer buyer to inspect and collect, £8 10s G Elliott, G3FMO, 3 Sandgate Avenue, Tilehurst, Reading, Berks.

Variac 100R Claude Lyons 2KVA, £5 R10 around 10 cm, £3 Marconi Sig. Gen. 1-130A, 100-150 Mc/s 10s. p.s.u. No. 247, 600V 200mA, 10s. RF105 unit 70cm tripler 30s. H. F. Smith, G2DD, 74 Braithwaite Gardens, Stanmore, Middlesex.

Marconi speech inverter, 2446B, Duplex 19 in. rack in case, 10 valves, 24 ferrocubes, 3 kc/s XFAL, handbook. Four QY3-125/bases/top-caps, transformer 10V CT 10A. Two main safety-gate switches. Sensible offers to R. W. Martin, G3RWM, 76 St Pauls Crescent, Coleshill, Warwickshire.

DX100 and SB10 (TVI proof!) £75 o.n.o. Unused 813's in maker's cartons £2 each. prefer buyer collects. B. Priestley, G3JGO, 43 Raymond Road, Langley, Slough, Bucks.

HRO Senior professionally re-aligned BS coils for 10, 15, 20 and 40m, stab. p.s.u. paper capacitors replaced with polyester and many metal oxide resistors fitted £19 10s. W. C. Weaver, 50 Wattleton Road, Beaconsfield, Bucks.

Complete correspondence course for RAE, cost £13. Set morse records, Radio servicing 4 parts, various textbooks and slide rule, cost £4. £10 the lot, o b o. R. F. Parker, 50 Sherbourne Close, Hove 4, Sussex.

Reed-relays, three reed switches in one coil, 5s. per set, post 9d., four or more post free. Your choice of coil resistance—100Ω, 1100Ω or 3600Ω—if possible, mine if not A. J. Whittake, 18 Laughton Crescent, Hucknall, Nottingham.

Variac, 2A, as new, brand new beam position indicator meter (Ham-M). cost £9, beam position indicator unit with p.s.u. in Philipot's cabinet and beautiful selsyn 360 movement. Offers H. E. Perkins, G3NMH, 24 Hook Street, Hook, Nr. Swindon, Wilts.

Gone s.s.b. Complete station, DX100U, AR88LF, Mic, Bug Key, Co-ax relay, balun, speaker Nearest £90 the lot Will deliver 100 miles. Extra over. T. A. Sheen, G3MPA. 76 Leader Road St. Columb Minor, Newquay, Cornwall.

Minimitter Mobile TX and control box, £10, bug key £2 15s., HE30 RX £20. Buyer collects or Carriage extra. E. E. Meachen, G3SFV, Wyngarth Meriton Road, Lutterworth, Rugby. Warks.

Unused Grundig GDM 18 moving coil microphone in case with lead and plug, £4 4s. (cost £7 7s.). G. F. C. Layzell, G3AMM, 26 Newland Drive, Scunthorpe, Lincs.

Pye Wavemeter G73 plus crystal calibrator G42, mains, six ranges, 2 Mc/s-2·4 Mc/s, metered. carrier/mod. switch, £8, RF27 modified for TV/DX 20s, 40 in. vertical aerial with balun 20s. J. J. Smyth, GI3AOB, " Strathleven ", Toome Road Ballymena, Co. Antrim, N. Ireland.

Radiovision Commander double con. RX. Full electrical bandspread on all amateur bands, £20 o.n.o. Delivery possible. C. R. Goodall, G2AFQ, 145 Bury & Bolton Road, Radcliffe, Manchester, Lancs.

SX24 RX, 550 kc/s-42 Mc/s in good working order, suit SWL £8. Buyer must collect. P. T. Pitts, G3GYE, 53 Lime Grove, New Malden, Surrey.

Marconi B40 RX, " S " meter, U.s.b.-l.s.b. switch, £19 10s. Wanted, smaller RX or 160-80m transceiver. Many other good bits for sale. Callers if possible. E. D. Dunn, G2RP, Meadow Cottage, Holloway Road, Duffield, Derbys.

Eddystone 750 RX-VK5 on 160m last season. £45 or best offer over £35. M. G. Whitaker, G3IGW, Rose-Dene, Wood Lane, Hipperholme, Halifax, Yorks.

NCX 5 Mk II complete with a.c. p.s.u., d.c. p.s.u., mic, auto keyer, multiband KW aerial, three band dipole, total £320, going for quick sale at £200. Any trail, delivered UK. G. Lusty, G3DWI, Dover's House, High Street, Chipping Campden, Glos.

Most *Bulletins* Vol. 23-41 and *SWM* Vol. 4-21 many rare 6d. each. S.a.e. for list or specify. B. E. Gee, " Magnolia House," Ravensden, Bedford.

AR88LF with Handbook, £30. RCA 12W speech amp. £5. Panda TX, 80-10m less p.s.u. £10. Metered 750V p.s.u. £5. Five HRO coils, 50-200 kc/s and 2-14 Mc/s £2 10s. lot. Capt. F. H. Humphris, G5IZ, 448 Warwick Road, Solihull, Warks.

Minimitter 160, 80 and 40m mobile TX with control unit £12. Transistorized TR7 160m RX requires new r.f. coils £3 10s. B. Lord, G3PHN, " Newfield House," Moira, Burton-on-Trent.

CR100/2 with Handbook, £10. Collins TCS TX, much modified, built-in speech amp. £12. 600V 250mA p.s.u. £3. Factory built Jason JTV2 switched FM-TV tuner, £15. Buyers collect. A. J. Davies, G3PBI, 40 Spring Grove, Loughton, Essex.

Complete kW s.s.b. station, National NCX-5 transceiver, Heathkit SB-200 linear, workshop built, Hy Gain TH3 Tri-bander 3-ele beam, rotator, control, all mint with handbooks, present cost price £460, sell £325. Lt.-Col. D. H. Baynham, G3DHB, Battlemoor, St John Road, Hythe, Kent.

WANTED

Case for 52 set, also RAE course. Details and price please. R. Chappell, 2 Vale Close, Dronfield, Nr Sheffield, Yorks.

417A two off, 6CW4 with base and offers for QQV06-40, 5B254/M, 813 two off. G. J. Shipway, G3RQI, 3 Hill House, Berry Hill, Taplow, Nr Maidenhead, Bucks.

Circuit details and handbook for Cossor ganging oscillators 343 and 3343. C. J. M. Wozencroft, GW3GIN 50 Romilly Road, Cardiff, South Wales.

GPO or RAF ground station type morse key, BC221 and a 2m TX G. Sherwood, G3CZT, 11 Meadowcroft Close, East Grinstead. Sussex.

Three inch magslip transmitter and/or receiver. F. W. Pearce, G3TVG, 36 East Road, Langford, Biggleswade, Beds.

Two metre 10 ele Sky beam and aerial rotator. G. C. Badger, G3OHC, 23 Aulton Road, Four Oaks, Sutton Coldfield, Warwickshire.

KW Viceroy Mk III or KW " Z " match also Codar AT5, TX, T28 RX, a.c./d.c. p.s.u., control unit, " FIF " whip—Urgent, cash waiting. M. Williams, GW3LCQ, " Dwyros," 12 Penrhos Avenue West, Llandudno Junction, Caerns.

HRO and crystals 11·71 kc/s and 6·0733 kc/s (!) State price and details. A. E. Reeve, G8WN, 20 Bartley Avenue, Rushington Estate, Totton, Hants.

Two PP3/250 valves or equivalent—LP4, PX4 or 4XP—in good working order. State price. R. Hankinson, 41 Maison St. Louis, St. Saviour Jersey, C.I.

Circuit for 36 set, as attached to front panel of p.s.u. Loan of this panel would be appreciated. C. C. Wilson, G3CCW, 11 Grosvenor Street, Liscard, Wallasey, Cheshire.

General coverage communications receiver for a SWL. Must be in good working condition and at reasonable price. Give details please. S. K. Jassal, 62 Malvern Street, Newcastle upon Tyne 4.

Reliable 2m mobile. Negative earth. D. A. Pilley, G3HLW, 27 Oxted Rise, Oadby, Leicester. (Tel. Oadby 4714).

Ten Eddystone six pin coils and bases. W. G. Duncan, GM2HFV, 12 Ivanhoe Place, Dundee, Angus, Scotland.

Urgent. Woden mains transformer type MD 892 88, as used in the Mullard Dual-Trace Oscilloscopes types L101/2 and L101/3 State price Cash paid. P. A. Tory, G3VMQ, 10 Park Road. Burgess Hill, Sussex.

CR100 at £10 will probably need attention. Will collect 40 miles. Also worm drive from TU5B series of tuners. G. G. Carter, Ivy Cottage, Fittleworth, Nr Pulborough, Sussex.

Codar RQ10 " Q " multiplier and Ex WD class D Wavemeter No. 1 Mk II ZA17489. Repairable items considered. All letters answered. D. F. Thompson, " Holmleigh," 7 Station Road, Farnborough, Hants.

RSGB Bulletins Vol. 32 No's 1-5, 33 No. 5, 39 No's 7-12, 40 No's 1 & 2. State price, and condition. R. E. Short, G3GNR, 3 Park Meadow, Princes Risborough, Bucks.

160m modification kit for Hammarlund HX-50 TX. Also mobile converter for amateur bands, with or without broadcast. Any i.f. D. Dumbleton, G3HCM, 11 Woodburn Close, Allesley Park, Coventry, Warwickshire.

Seconded co-axial cable, low loss v.h.f. pattern for 200 W. Not less than 25 yards. State postage. A. H. Parker, G3KH, 133 Station Road, Cropston, Nr. Leicester, Leics.

Copies of *QST* issued prior to 1931, *Radio* before 1940 and a pre war copy of the Amateur Radio Call Book. K. C. Lay, G5LY, Plot 226, Riders Bolt, Hurchington Manor Estate, Bexhill on Sea, Sussex.

CLASSIFIED ADVERTISEMENTS

Government of UGANDA

REQUIRES

TELECOMMUNICATIONS ENGINEERS

for the Ministry of Internal Affairs, on contract for one or two tours of 21-27 months each in the first instance. Basic salary, according to age and experience in the scale £747-£1,389 a year, liable to Uganda Income Tax. In addition an allowance, normally TAX FREE, ranging from £600-£816 a year will be paid by the British Government direct to an officer's bank account in Uganda. Gratuity 25% of total emoluments. Educational allowances. Outfit allowance £25. Liberal leave on full salary. Accommodation provided at reasonable rental or hotel allowance in lieu. Contributory pension scheme available in certain circumstances.

Candidates between 30 and 45 years of age, who will serve as Superintendents/Assistant Superintendents of Police (Radio), must possess a City and Guilds Final Certificate Course 49 or equivalent qualification with at least 6 years practical experience including installation and maintenance of fixed and mobile V.H.F. equipment (A.M. and F.M.); H.F. medium and low power S.S.B. and D.S.B. transmitters and receivers; Radio teleprinter equipment; Small diesel and petrol electric generating plants. Duties will include the supervision and instruction of local maintenance staff under training.

Apply to CROWN AGENTS, M. Dept., 4 Millbank, London, S.W.1. for application form and further particulars, stating name, age, brief details of qualifications and experience and quoting reference M3D/62331 /RC

Government of ZAMBIA

REQUIRES

TELECOMMUNICATIONS TECHNICIANS

for the General Post Office on contract for one tour of 36 months in the first instance. Commencing salary according to age and experience in scales (including overseas addition) indicated below. A supplement of not less than £200 a year is also payable direct to an officer's home bank account. Gratuity 25% of total salary drawn. Both gratuity and supplement are normally TAX FREE. Liberal leave on full salary or terminal payment in lieu. Free passages. Quarters at low rental. Children's education allowances. Contributory pension scheme available in certain circumstances.

Candidates for appointment as Equipment Technicians (salary scale rising from £1460 to £1855 a year) must possess at least the Intermediate City and Guilds Group Course Certificate and have had ten years or more training and practical experience in one or more of the following branches: (i) Carrier Systems: (ii) H.F. and V.H.F. Radio: (iii) Telegraph Machines: (iv) Automatic Exchanges. (Reference M3D/62916RC)

Candidates for appointment as Line Technicians (Salary scale rising to £1580 a year) must possess at least two appropriate City and Guilds Certificates and have had ten years or more training and practical experience in one or both of the following branches: (i) Underground and Overhead Cable Distribution: (ii) Subscribers Installations. (Reference M3D/62959RC)

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