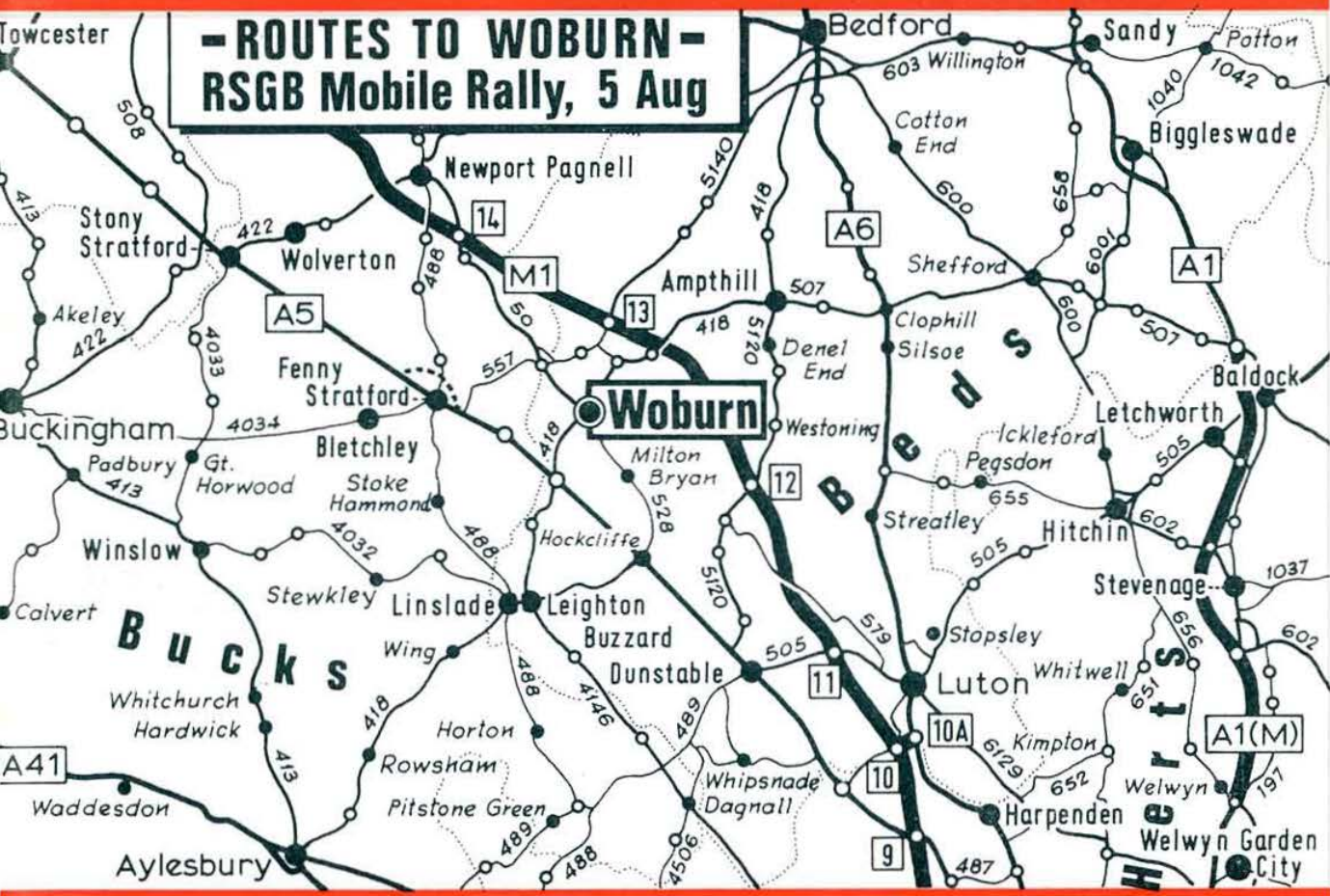
JULY 1973

RADIO COMMUNICATION



RSGB Diamond Jubilee Year

1913 – 1973

Journal of the Radio Society of Great Britain

JULY 1973

RADIO COMMUNICATION

Volume 49 No 7 Price 30p

CONTENTS

Radio Communication **is published by The Radio Society of Great Britain as its official journal on the first Tuesday of each month and is sent free and post paid to all members of the Society**

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Advertising, other than Members' Ads, should be sent to the above address marked for the attention of Mr C. C. Lindsay. Tel 01-837 8688 or 01-686 5839 (advertising only).

LOWE ELECTRONICS

119 Cavendish Road, Matlock, Derbyshire, DE4 3HE

Tel: Matlock 2817 or 2430 9 a.m. - 9 p.m.

John: G3PCY Bill: G3UBO Alan: G3MME

MAIN DISTRIBUTOR FOR YAESU MUSEN EQUIPMENT

Hours: Tuesday to Saturday 9-5.30 (closed for lunch 1-2 and all day Monday)

SERVICE AND SALES (evenings and weekends only): John G3JYG, 16 Harvard Road, Ringmer, Lewes, Sussex. Tel: Ringmer 812071. Sim GM3SAN, 19 Ellismuir Road, Baillieston, Nr. Glasgow. Tel: 041-771 0364. Alan GW3YSA, 35 Pen y Waun, Efail Isaf, Nr. Pontypridd, Glam. Tel: Newton Llantwit 3809. Peter Ward, G3XWX, 47 Radstock Avenue, Ward End, Birmingham B36 8HD.

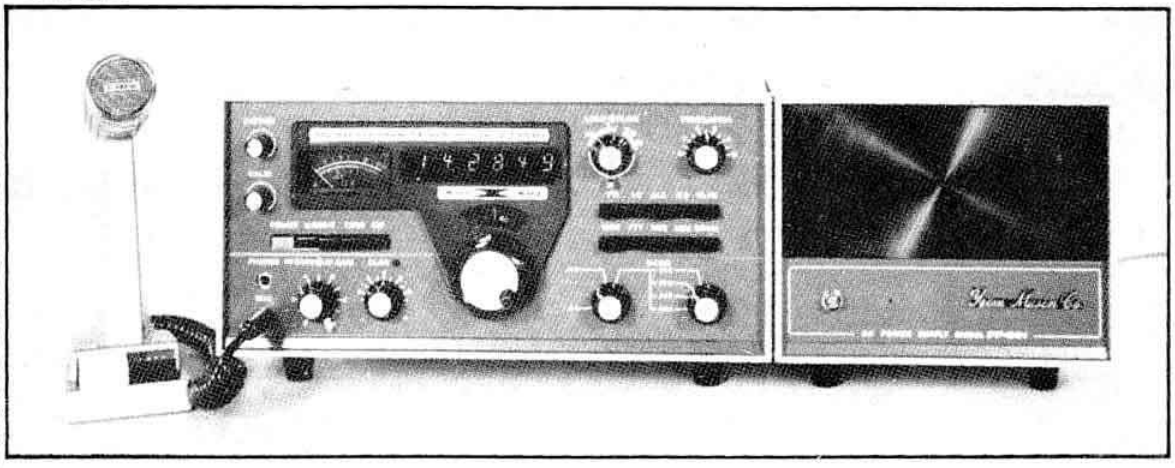
Sim, John, Alan and Peter will be happy to demonstrate New Yaesu Gear by appointment. They also have a pretty good selection of second-hand trade-ins at the right price.

YAESU NEWS

Hints Everyone sooner or later evolves their own pet way of loading up, and this, to them, is the best way. Ideally one should load a linear P.A. to give minimum I.M. products. An underloaded P.A. will degrade I.M. performance drastically and this is often not appreciated. The most sensitive indicator of correct loading in tetrode or pentode P.A.'s is of course the screen current and ideally one should aim at a screen current which has been found to give minimum I.M. distortion. This, however, is a policy of perfection and difficult to realise in practice so the best rule of thumb is to load heavily. There are several popular misconceptions surrounding the tuning and loading of P.A.'s which fall roughly into two groups. Firstly we have the chap who believes that by keeping the carrier insertion at a low level, he is extending the life of the P.A. This is true but unfortunately the impedance presented to the pi tank at this level is far higher than that presented by the P.A. under normal drive conditions. The impedance mismatch will inevitably degrade the I.M. performance. This is the very reason why Yaesu state in their manuals that final loading should be done at full power.

The other group are those who insert plenty of carrier, dip the plate and only load to a low value of cathode current, once again in the belief that they are extending the life of the P.A. Unfortunately this is not so because under conditions of high drive and light loading the poor old screen takes a monumental bashing. A typical figure for a lightly loaded FT401 is 150 mA screen current —a figure which is so in excess of the current rating that the screen structure runs red hot, sags, and may touch the grid with disastrous results. Hence we must emphasise the necessity for a final tuning and loading at full power as recommended by all major manufacturers of Amateur Radio equipment. Obviously, you cannot linger and equally obviously your Tx must be presented with a load of the correct impedance. The foregoing is honest advice and not a sales exercise but we must just mention that the design of our tone pulser was prompted by the need to tune and load at high power without exceeding the PA dissipation.

In spite of specific warnings by us it is inevitable that someone's QSO will be interrupted by a misguided Amateur using one of our pulsers. By all means vent your wrath on us, but bear in mind that if it wasn't a pulser, it would be a carrier—some people just never learn.



THE NEW YAESU FT501 with Digtal Readout £368.50

Having had these in stock for some months now, we have had ample opportunity to evaluate them. Yaesu have taken the best features of their range and combined them in one transceiver to set a new standard in Amateur Radio.

The use of valves in the r.f. and mixer stages permits first class signal handling, evidenced by the way weak signals stand out in a crowded band. The pre-mixed oscillator chain produces the benefits of single conversion while the 9MHz I.F. removes the associated problem of image rejection. The P.A. is the time proven design used in the FTdx401 rated at 560W p.e.p.

The digital readout must be experienced—Yaesu use 9 segment readout tubes having a bright green display which is not only easy on the eyes, but bright enough to be read at a distance and showing marked superiority over both nixies and L.E.D.'s.

The clean layout and grouping of major assemblies shows the usual Yaesu top quality design and workmanship and makes for easy and rapid servicing. As an example of the sort of thought that goes into the design, the digital display is backed up by a normal mechanical readout so that in the event of a fault occurring in the counter, the whole counter unit may be removed and sent to us for servicing without the necessity of going QRT.

The use of 2 sideband filters and one carrier crystal is unusual in Amateur equipment—it is almost invariably confined to commercial equipment many times the price but it does show the efforts Yaesu make to achieve technical perfection. We take a certain amount of satisfaction from tuning in a B.C. station just above the 15m band in the ssb mode and then picking off either sideband at will without retuning. Try this sometime—particularly with music!

All in all, the more we use the FT501, the more we like it and although £368.50 is a very large sum of money, the quantity and quality of electronics that you get for this money is quite remarkable and makes the FT501 outstanding value.

PRICE LIST APRIL 1973 (NOTE REDUCED LINER 2 PRICE)

Price including VAT in brackets

YAESU MUSEN

FR400SD	£175	(£192.50)	FV200	£42	(£46.20)
FL400	£165	(£181.50)	FL2000B	£165	(£181.50)
SP400	£11	(£12.10)	FL2100	£165	(£181.50)
FT401	£265	(£291.50)	FR50B	£65	(£71.50)
FV401	£42	(£46.20)	FL50B	£75	(£82.50)
SP401	£11	(£12.10)	FV50B	£28	(£30.80)
FT101	£280	(£308.00)	FT501D	£290	(£319.00)
FV101	£42	(£46.20)	FP501	£45	(£49.50)
SP101	£11	(£12.10)	Sigmasizer	£180	(£198.00)
FT75	£115	(£126.50)	YC355D	£120	(£132.00)
FP75	£25	(£27.50)	FT2FB	£98	(£107.80)
DC75	£25	(£27.50)	*FT2AUTO	£157	(£172.70)
VC75	£22	(£24.20)	FT101 FAN	£9	(£9.90)
FV50C	£28	(£30.80)	FT101 CW		
FT200	£145	(£159.50)	filter	£16	(£17.60)
FP200	£45	(£49.50)	YD844	£13	(£14.30)
DC200	£54	(£59.40)	TD846	£5	(£5.50)

*FT2AUTO fitted 5 channels Extra channels £3.20 (£3.52)

KARL BRAUN

SE600 DIG	£570	(£627.00)	SE600	£495	(£544.50)
SE280	£220	(£242.00)	DGTC 22	£22	(£24.20)
DGTC 1702	£39	(£42.90)	LVV 270	£38	(£41.80)
TTV 1270	£26.50	(£29.15)	Weir Mosfet		
Liner 2	£120	(£132.00)	Converter	£13.65	(£15.00)

Prices include carriage by Securicor except speakers and microphones which are mailed.

ANTENNAS

2m 'J' Beams 50 or 75 ohms specify which)

2/4Y 4 element folded dipole Yagi with 1" boom	£3.74
2/6Y 6 element folded dipole Yagi with 1" boom	£4.40
2/8Y 8 element folded dipole Yagi with 1" boom	£5.17
2/10Y 10 element folded dipole Yagi with 1¼" boom and 45 Braces	£10.45
2/10XY Crossed 10 element Yagi with 1¼" boom	£13.86
2/14P 14 element Parabeam	£16.28
2/12 6 over 6 with 1" booms	£7.97
2/16 8 over 8 with 1" booms	£9.79

G-Whips

Tribander (20, 15 and 10m)	£12.10
Multimobile 20, 15 and 10m	£14.30
160, 80 or 40m coils for above, each	£4.40
Top whip section for above	£1.10
Flexiwhip 10m with whip	£9.35
160, 80, 40, 20 or 15m coils, each	£4.67
Ranger 160m	£9.35
Duobander 160/80m	£10.45
Base section for all G-Wips	£1.60

The above are normally sent British Rail—should you require 24 hour Securicor delivery, please add an extra £1.50.

H.F. Beams

AS-203W wide spaced 3 element 20m beam	£72.60
AS-154W wide spaced 4 element 15m beam	£48.40
AS-153W wide spaced 3 element 15m beam	£38.50
AS-104W wide spaced 4 element 10m beam	£40.00
AS-103W wide spaced 3 element 10m beam	£22.00
Polygon 2 element glass fibre kit	£38.50

2m Mobile Whips

Diamond DP-2S gutter mounting ⅝ vertical	£11.55

ANTENNAS

Verticals

Diamond	DP-KB103 80 and 40m	£27.50
	DP-KB104 20, 15 and 10m	£20.90
	DP-KB105 80, 40, 20, 15 and 10m	£38.50
Asahi	Echo 8G 40, 20, 15 and 10m	£22.00

Antenna Accessories

Coax UR43 50 ohms	10p/m
Coax UR67 50 ohm	26p/m
Twin feeder 300 ohm	6p/m
Twin feeder 75 ohm	6p/m
Rotator cable 4 core (AR22)	18p/m
Rotator cable 12 core (TR44 and Ham-M)	35p/m
Baluns HZP (1:1 or 4:1)	£5.50
Rotators AR22R	£27.50
TR44	£49.50
Ham-M	£77.00
SWR Meters Hansen single meter	£5.50
Asahi twin meter	£8.80
Diamond SR435 (VHF/UHF)	£15.40
Dummy load/wattmeter (VHF/UHF)	£38.50
PL259 plugs 33p	Reducers 10p
Sockets 33p	Line Connectors 80p

Station Accessories

Plain brass morse keys	£1.35
Katsumi keyers EK-9X	£9.90
Katsumi keyers EK-108A (mains)	£29.70
Katsumi keyers EK-108D (battery)	£26.40
C.W. practice oscillators	£2.75
Headsets, low impedance, padded	£3.30
Microphones Yaesu YD844 table mike	£14.30
Yaesu YD846 hand mike	£5.50
DM501 hand mike	£3.75

Valves

6AH6, 6BZ6, 6CB6A, 6CL6, 6U8A, 6EW6, 6EW6, 6EH7, 6BM8, 12BY7A, each	66p
6GK6	£1.32
6JM6A	£1.65
6JS6C, 6KD6, each	£2.20
6146B	£3.30

FILTERS

Crystal

S.E.I. QC1246AA 5·2MHz SSB filter	£17.82
S.E.I. QC1246AZ 9·0MHz CW filter	£15.40
S.E.I. QC1246AW 9·0MHz SSB filter 2.5kHz	£11.00
S.E.I. QC1246AY, 9·0MHz SSB filter 2·4MHz	£17.60
Yaesu FT101 CW filter	£17.60
S.E.I. FT101 AM filter	19.80

Mechanical

Kokusai MF455 3AZ CW filter	£15.00
Kokusai MF455 10AZ SSB filter	£15.00
Carrier crystals for the above filters, each	£2.50

Remember that all prices *include* V.A.T. and postage, so you do not have to send extra.

SECOND HAND Prices include V.A.T.

RECEIVERS

Sommerkamp FR500 SDL	£125
Eddystone 680X	£65
Trio JR599	£150
National NC303	£99
Trio 9R59DE	£38.50
Hammarlund HQ170A	£82
Lafayette HA350	£55
Trio 9R59DS	£44
Trio JR500S	£52
Yaesu FR400 SDL	£135
Heath GR78	£66
Eddystone 940	£104
Trio JR310	£65
Eddystone EC10 Mk2	£65

TRANSMITTERS

DX40 + VFO Choice of two	£22
FL500	£115
Labgear Topbander	£15
Hallicrafters HT40	£15
KW Viceroy IV Mint	£77

TRANSCEIVERS

All with p.s.u.'s unless clearly stated

Yaesu FTdx500	£176
KW2000B as new	£176
Heath HW100	£110
KW2000A + AC p.s.u.	£165
Heathkit HW12 and AC p.s.u.	£60
Heath SB101	£165
KW2000 with both p.s.u.'s	£110

Carriage by Securicor £2.00 extra

LOWE ELECTRONICS

GAREX

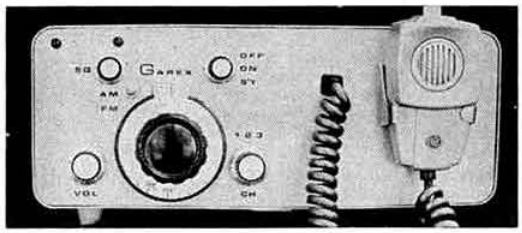
TW GAREX Transverters

Model 1 for use with low power input using transceiver P.S.U.

Model 2 for high power input 10-100 watts. less P.S.U.
Delivery 14 days. £85 each Inc. Securicor despatch.

Sorry no power units available.

Some of the chassis are finger marked; and we are offering these as follows. Slightly marked **£70**. Moderately marked. **£63**. Well marked. **£55**. These are all internal and the external appearance is A1 with the original grey P.V.C. type grained fronts, with matching grey perforated mild steel cases. Any of above can be supplied without QQV06-40a at £5 off any of the prices. Delivery is inc. via P.O. Securicor **£1.85** extra.



TWOMOBILE AM/FM Tx-Rx

TX. Transistor crystal osc & multipliers. YL1080 driver 1080 P.A. output. No standby current. FM or AM at a flick of a switch. 3 position crystal selection. Spot check facility.

RX. Fully transistorized Tuneable covering 144 to 146MHz. Sensitivity 1.0 microvolt emf in. for 500mw audio out. S/noise ratio 10dB or greater for 1 microvolt input. Audio output stage to drive external speaker. Double superhet 2 RF amplifiers. FET first mixer. 1st IF 10.7 MHz. 2nd IF 455kHz. Crystal controlled second FET mixer stage. 6kHz bandwidth. 29 Transistors plus 6 diodes. Neg. or pos. earth. Directly calibrated dial. Squelch. Size 12 × 4½ × 8" deep. Delivery 7-10 days. Price **£105.45** complete, inc. 1 crystal, & PSU built in, for 12V DC Input. Suitable mains power supply and speaker in matching unit, w.12lbs **£18.50** post **35p.**

TX only as above to special order. AM FM SSB RX as previously advertised, 12V mobile. 1 only **£70** inc. delivery. UHF Terlonic sweep generator. 440 to 900MHz. Microwave generator. 10cm dish. 23cm dish. Pen recorder 240/440V. UHF wide band power oscillator M 1141 200MHz (40 watts) to 2500MHz 10 watts).

CHINNOR, OXON OX9 4BT
Telephone Kingston Blount 51476 (0844)

COMPONENTS

Mail Order only. Please send all component orders to
GAREX (W) LTD., 7 NORVIC RD., MARSWORTH, TRING, HERTS. HP23 4LS.

Where G3ZVI will be taking care of them. Lists—Large S.A.E. please.

FM (Phase Mod) RF P.C. board. Fully transistor, assembled. Suitable for 4-9 or 12MHz crystals. Osc. Multipliers and Mod. 24MHz output at 0.5W. 12-14V DC input. Circuit and mod. sheets supplied. Can easily be GDO'd for an 8MHz crystal. Ideal for the front end of a fully transistor transmitter. AM or AM/FM. Please state if 4—9 or 12MHz model is required. **£4.85**

FM/AF Board (TX) to suit phase mod. Board **£1.85**
ditto—slightly soiled **85p**

455kHz FM IF board. **£2.65. 455kHz AM IF** board. **£2.65.**
ditto—slightly soiled **£1.85**

10.7MHz IF board. **£2.35**
ditto—slightly soiled **£1.70**

Mic pre-amp boards. **52p**
FM squelch board **52p**
AM squelch board **27p**

CAMERA VIDEO BOARDS. Completely assembled. **£3.50** inc. post.
ditto—slightly soiled **£2.30**

All the above are assembled and include circuits.

Plug-in Rectifier valve replacement stack. Octal(int) base. Full wave diodes 2·6kV peak at 200 ma plus. **68p** inc. postage.

Modulation Transformers
P.P. OC28/35 to QQV03-20a. Post 25p. **£1.** Driver to suit **50p.**
Single EL84 to QQV03-10. Post 20p **65p**
P.P. EL84 or similar to QQV03-20a. Post 28p. **£1.50**

Type 'O' variable capacitor 410pf, size 1.25" × 1.37" × 1" deep **22p**
Diodes 1AS029 **10p. 12 for £1**

Rectifier Boards 4 diodes for bridge cct, etc. Plus one bias diode RF choke and resistors **8p**
Matrix pins, 100 pkt., lead through types **10p**
4 small assorted VHF pre-set air sp. trimmers **25p**
1 amp cct breakers. Crystals 5.000MHz **25p**; 2 metre 9MHz (low end of band) **50p** all HC6U
Aluminium chassis 6" × 4" × 2.5" h. **45p**

Valves EB91 **10p**; 6BQ7A **15p**; 6BH6 ex. **12p**

Counters Resetable 5 digit, 48V ex **£1.25**

Transistors NKT404/OC28 ex. **10p**; 2G220 ex. **15p**; DT1602 **5p**; NKT404 **20p**; MJ2254 **15p**; 2G228 **25p**; ADY23 **25p.** Diodes 303C33 **15p**; 1N23B **25p**

Relays 12V 2 pole c.o. ex. **15p**; 12V 4 pole co.. ex. **17p**; 12V heavy duty 25a S.C. **35p**; 12V ceramic ins. 4 pole co.. plus 1 make. 8 amp cct **25p**; 2 pole c.o. 2" spacing, ceramic, ideal for HF TX **50p**

Audio kit Transistor, assembled P.C. board. Driver and p.p. out OC28/NKT404. Transformers (3 ohm output) and cct **£1.75**

Mains Transformers Base Station, quick heat QQZO6-40. 110-240 Pri. Sec. 7 windings. 232V, 276V, 60V, 50V, 2.1V, 17.5V and 12.6V. 11.5 lbs. **£3.75**
Charger trans. 14V at 5 amp. 4.4 lbs. ex. C core **70p**
110-240 pri. sec. 170-0-170 at 90ma; 50V at 50ma; 6.3 at 3.3 amp. 4" × 3.5" × 2.7" h. plus 1.25" under chassis. 5.5 lbs. ex. **85p**
110-240 pri. sec. 0-146V-232V at 160ma; 26.5V at 1 amp; 13.9V at 5 amp; 50V at 50ma; 4.75" × 4" × 3.25" h. plus 1.1" under chassis. 10.5 lbs. **£2.50**
230/40 Pri. Sec 380-0-380 @ 240ma C core W 7lbs. 4 × 3·75 × 4·5"h. **£3.75**
230/40/50. Pri. Sec 0-3V @ 5a. 0-21V @ 5a W 10·5 lbs. 4 × 4·25 × 5·25"h **£2.75**
230/40 Pri. Sec 0-72V @ 40ma 0-6·8V @ 10a 0-6·3 @ 4·5a. C core W 5·5lbs 4 × 3·75 × 4·25"h **£2.50**
110-250 Pri. Sec 0-375-390 50V @ 1·5a. 6·3 @ 6a. W 17·5lbs 5 × 6 × 5"h. **£2.85**
200/50 Pri. Sec 6·3 @ 10a 6·3 @ 5a 6·3 @ ·3a 30V @ 350ma 350V @ 370ma C core 5·25 × 6 × 5"h. 12·5lbs. **£3.85**
100/250 Pri. Sec 0-325V @ 350ma 5 × 5·25 × 5"h 15lbs **£1.75**
Small 110 Pri. Sec 300 100ma **2 for 50p**

Filters 50kHz. 455 L **25p**

Chassis Section Mobile PSU 380V at 160ma, complete 90% wired, ex., Bridge Rec **£4.75**
ditto—slightly soiled **£4**

Readybuilt Mobile PSU New chassis section input 12-16 vdc outputs 450V bridge. 50V bias plus. 2.2. and 1.1 heater windings if required. ADZ11 transistors. Potted Toroidal transformer. 450V section will voltage double for SSB HF transmitters, inc. cct. As mentioned in recent article. **£10.85**

Toroidal Transformers

12V dc. input	265V at 150ma output	2.25" × 2" × 1.6"	**£1.60**
All ex.	375V at 150ma	2.75" × 2.5" × 2.5"	**£1.75**
V db.	390V at 200 ma	2.9" × 2.5" × 2.5"	**£1.75**
	400V at 200ma plus		
	250V at 150ma	3.5" × 2.75" × 2.25"	**£2.35**

All potted inc. ccts. ex. denotes ex equipment.

Heat Sinks. 6 trans. OC35 type 1.75 × 4.4 × 1.5"h 2lbs **40p**
2. Trans. 3.75 × 4.4 × 1.5"h **20p**
ditto in 3" width. **20p**

Rectilinear Pots multiturn short sp. pre-set. 10.20 **25p**
100.250.500.1·5k 2k 2·5k ohm. **25p each**

TW cases 4.5 × 12 × 8" deep, perforated, as used with Twomobile. Inc. loose back and front cover. **£4.25**

FM Transceiver RBM A41 38-55MHz. Fully tuneable. Inc. battery holder and back pack assembly.

Prices quoted are inclusive of all charges and postage, unless otherwise stated.

MICROWAVE MODULES LIMITED

11 CRANMORE AVENUE, CROSBY, LIVERPOOL L23 0QD, Tel: 051-928 1610 9 a.m.–8 p.m.

OUR EXCELLENT VHF AND UHF EQUIPMENT IS USED EXTENSIVELY THROUGHOUT THE UK AND IS NOW GAINING POPULARITY IN EUROPE AND ALSO IN THE STATES. WE EMPHASISE QUALITY AND RELIABILITY, AND ARE THE ONLY COMPANY IN THIS FIELD OFFERING AN UNCONDITIONAL 12 MONTH GUARANTEE, AND RETURN-OF-POST SERVICE ON MOST REPAIRS.

PRICES DOWN!

As mentioned last month, we have made some effort to lessen the impact of VAT on the Radio Amateur. We are now manufacturing our 2 m and 70 cm converters in large quantities for our home and overseas markets. As a consequence we have been able to cut our manufacturing costs and are passing on these reductions to our customers. These new prices are shown below:

144MHz MOSFET CONVERTER
I.F.s available ex-stock: 14-16, 18-20, 24-26, 27·7-29·7, 28-30MHz.
Price inc VAT **£16.72**
This design has been optimised to obtain the best sensitivity possible with the latest diode-protected dual-gate mosfets. Both RF stage coupling and oscillator injection circuits use band-pass transformers to maximise performance across the band.

144MHz DOUBLE CONVERSION MOSFET CONVERTER
I.F.s available ex-stock: 2-4, 4-6MHz.
Price inc VAT **£16.72**
This unit was developed to meet the heavy demand for a converter suitable for use with receivers having better performance at lower frequencies. It uses two dual-gate mosfet mixers, both fed from the output of a 70 or 71MHz crystal oscillator. Selectivity is obtained at the first IF in the 74MHz range, thereby overcoming the usual problems associated with low-I.F. single conversion converters.

432MHz MOSFET CONVERTER
I.F.s available ex-stock: 14-16, 18-20, 24-26, 28-30MHz.
Price inc VAT **£19.91**
This unit uses a dual-gate mosfet mixer for excellent strong-signal performance preceded by two BFY90 transistor RF stages for high sensitivity. All UHF tuned circuits are printed using Microstrip technology, and a crystal in the 100MHz region is used in the oscillator chain to overcome unwanted beats in the tuning range.

ATK Transmitter, Modulator, and PSU Kits
These kits are now handled directly by G8ATK. Please send all orders and enquiries to: M. Hearsey, "Halcyon", Lawday Link, Upper Hale, FARNHAM, Surrey.

THE LATEST FROM MM!

144MHz DUAL OUTPUT PREAMPLIFIER
This two-stage mosfet preamplifier has two separate isolated outputs, for feeding two receivers, for example. The gain is 18dB, and the noise figure is 2.8dB. The noise figure is individually optimised on each unit using our new automatic noise measuring equipment.
Price inc VAT **£9.90**

144MHz 5 WATT AM TRANSMITTER (as reviewed in May edition of RadCom)
5 watts input, six channel crystal controlled. Supplied with microphone and crystal for 145MHz.
Price inc VAT **£35.75**

144MHz AM RECEIVER
Double Conversion, 6kHz Bandwidth. 2·8dB typical noise figure, 2 watts audio output.
Price inc VAT **£38.50**

VARACTOR TRIPLERS
We manufacture varactor triplers for 432 and 1296MHz. Both are highly stable, with low level harmonic output, and capable of AM operation at the 50% power level. These units are aligned using swept-frequency and swept-power drive sources, the output of each unit being monitored on one of our spectrum analysers. Great attention is paid to harmonic suppression and linearity. All harmonics are greater than 40dB down on the wanted output.

432MHz VARACTOR TRIPLER
Maximum input power at 144MHz: 20 watts. Typical output power (at maximum input): 14 watts.
Price inc VAT **£19.25**

1296MHz VARACTOR TRIPLER
Maximum input power at 432MHz: 24 watts. Typical output power (at maximum input): 14 watts.
Price inc VAT **£27.50**

For The Benefit Of Overseas Readers, We List Our Agents In The Following Countries:

Belgium: Entremat, Avenue Baron Robert de Vironlaan 138, 1710 Dilbeek, Belgium.
France: Vareduc-Comimex, 2 Rue Joseph-Riviere, 92400 Courbevoie, Paris, France.
U.S.A.: Spectrum International, P.O. Box 1084, Concord, Mass. 01742, USA.

ALL PRICES INCLUDE POSTAGE — SEND SAE FOR FURTHER DETAILS

FM FOR 2

With crystals for 144·48 or 145·0.

FM19/2 TWO METRE TX RX 10 watt output, QQV03-10 PA, transistor IF, AF & 6 or 12 volt + or — PSU. Deviation, adjustable up to 5kHz. Fitted one channel, up to eight may be fitted. Circuit of tone unit and connections. Boot mount complete with mic. control speaker and cables. Power requirement, one amp RX, six amps TX. Size 4 × 10 × 13", weight 15lbs. **£45**

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TYPE 10X. 5150 5260 5690 5800 5910 5970 6110 6210 6243 6350 6440 6450 6510 6550 6594 6616 6650 6661 6720 6750 6783 6805 6990 7320 7550 7566 7600 7633 7683 7716 7750 7766 7883 7933 7950 8007 8133 8146 8161 8238 8266 8300 8350 8381 8423kHz.

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15012 15037 13062 15087 15112 15137 15162 15187 15212 15237 15262 15287 15337 15362 15437 15462 15475 15487 15512 15537 15562 15587 15612 15637 15687 15712 15737 15837 15887 15912 15937 15962 15987

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2184 2638 2844 2854 4868 2875 2889 2910 2924 2931 2938 2945 2950 2952 2966 2968 2980 2987 3008 3023 3072 3081 3102 3142 3278 3403 3411 3432 3446 3460 3467 3474 3881 3495 3841 3921 4140 4182 4257 4399 4410 4415 4417 4418 4420 4422 4427 4431 4435 4444 4465 4469 4473 4478 4654 4689 4703 4710 4724 4808 4860 4889 4966 5010 5491 5499 5506 5514 5521 5551 5566 5589 5599 5604 5611 5619 5626 5630 5641 5642 5649 5654 5659 5671 5680 5687 5692 5695 5697 6337 6537 6540 6552 6557 6559 6567 6582 6590 6597 6612 6627 6634 6637 6640 6642 6647 6649 6652 6657 6659 6662 6664 6667 6672 6677 6791 8364 8439 8837 8839 8854 8862 8864 8871 8888 8913 8953 8956 8967 8971 8983

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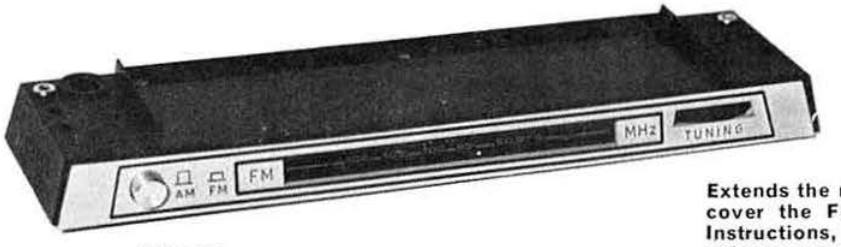

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QTC AMATEUR RADIO NEWS

Good housekeeping

The MPT Liaison Committee has received reports concerning several aspects of amateur activity which, to say the least, pose awkward questions. Illegal operation is not a new problem but, as in other fields, it is now often considered smart to defy both law and reasonable standards of conduct. Permissive operation, no less. A frequency allocation of both national and international value is the 80m band and this is frequently the scene of bad language and deliberate interference.

Monitoring leads to the conclusion that the offenders are located both within, and external to, the UK.

Are there pirates at the bottom of your garden? Not an irrelevant question in view of the known instances where support has been offered to illegal operation by radio amateurs, most, happily, not now holding a licence. The provision of knowledge and equipment is no less undesirable than actual operation of one of the stations that plague the high frequency end of the medium wave band, and other areas of the hf spectrum.

At one time it was accepted that the courtesy of the amateur operator was unquestioned, nowadays the manners heard often leave much to be desired. It seems that the standards have declined with the improvement in equipment. In addition to direct contravention of licence requirements (eg the note in the June issue of *Radio Communication* concerning station identification) we now hear manners so appalling that operators will switch off in disgust.

Where does all this lead to? Unless an improvement is effected, to the loss of frequencies at the next ITU conference. To have the whole-hearted support of our national administration we need their respect not their contempt. If an administration hostile to amateur radio produced at an ITU conference a recording of some of the appalling happenings on 160, 80 or 2m then nothing that could be done subsequently would redeem the position. If you care about amateur radio then ensure that your standards are above reproach.

Can you help GB3LDN?

QQVO2-6, DET24 and TDO3-10 valves or equivalents are urgently required to keep the 23cm beacon GB3LDN operational, in particular TDO3-10s. At the present rate of consumption TDO3-10s are used at the rate of four per year, whereas the other two types have lasted for about 12 months each. All TDO3-10s held at present are secondhand and of unknown age, and this has been the reason why there has been a gradual drop in power output from GB3LDN over the past few months.

Unless further supplies of these valves are received, the present stock of spares is expected to be exhausted within three months, and there would then be no alternative but to switch off GB3LDN.

The entire cost of components for GB3LDN was met by the builders G8ARM, G8AZM and G8AOL and they are unable to afford the cost of spare valves. So that they can judge whether or not to continue with this project, the builders would appreciate signal reports from stations on 23cm so that the coverage of the present aerial system can be ascertained. In this respect they are just as interested to hear from stations who are unable to receive a signal and are within a 100-mile radius of Greenwich.

For signal reports to be useful, details of the type of equipment used must be included with the report and whether the take-off towards Greenwich is good, fair or poor, also details of:

1. Type of aerial, gain and height asl.
2. Type of transmission line, length or expected losses (if masthead pre-amplifiers are not used).
3. Type of receiver or converter, with or without rf stage, type of mixer and i.f. stage following the first mixer together with overall bandwidth of receiving system.
4. In locations where signals are only received at times, band conditions and dates should be included together with band conditions on 70cm.

From this information the beacon-keepers will then be able to decide whether or not to change the present aerials to cover a wider or different area, dependent on the level of interest shown. The future of GB3LDN will depend entirely on the result of this appeal and will be taken as a direct indication of membership interest in this project and whether it should be continued.

Donations of valves, which are adequately packed, should be sent to Mr B. W. Godwin, G8AOL, 20 Pembury Road, Bexleyheath, Kent, to whom signal reports should also be sent.

Radio Amateurs' Examination

The next RAE will be held on Monday 3 December 1973 and applications to sit this examination should be made to the candidate's local examination centre.

The RSGB will provide an examination centre at University College, London WC1. Application forms to sit the examination at this centre are available from RSGB HQ. The fee is £2.10 for RSGB members and £2.60 for non-members. Completed application forms along with the appropriate payment must reach the Society before Wednesday 31 October 1973.

RAE course

It is proposed to form an instructional group at the Shelburne Youth Centre, Hornsey Road (opposite Holloway Road Underground station). Instruction will be given on the theory and practice of radio communication and electronics up to the level of the Radio Amateur's Examination. Emphasis will be on an informal mode of instruction which will be on Mondays, 7-9pm, covering age groups 14-21 approx.

Full details from Shelburne Youth Centre, tel 01-609 0487, F. Smith, warden; or R. Cummins, G3SLF, QTHR.

Morse classes

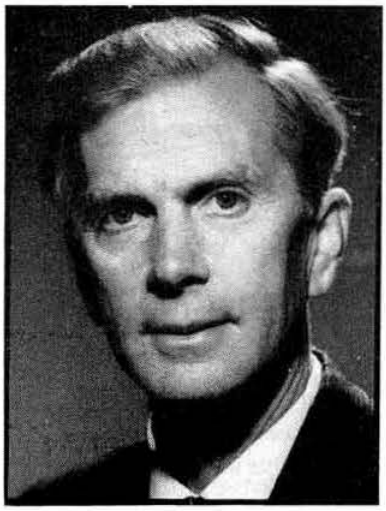
Morse lessons by a long-experienced Post Office coast station operator (1st Class PMG) are being planned to begin in September at the Tennyson Secondary School, Mablethorpe, Lincs. Anyone interested is asked to contact P. J. Bradshaw, G8AWX, 46 Camelot Gardens, Sutton on Sea, Mablethorpe, Lincs LN12 2HP, enclosing an sae.

The Astronomer Royal accepts honorary RSGB membership

Professor Sir Martin Ryle, FRS, G3CY, who was appointed Astronomer Royal in 1972, has accepted an invitation from Council to become an honorary member of the RSGB.

This is the highest honour the Society can bestow on an individual, and it is particularly fitting that Sir Martin, who has been a member of the Society since 1936, and who has made a great contribution to the professional world of radio astronomy, should receive it.

Sir Martin is currently Director of Radio Astronomy at the Mullard Radio Astronomy Observatory, outside Cambridge, which members may remember was in the news last year when the new "5km telescope" was commissioned. In addition to this directorship, he is also the first holder of the Chair of Radio Astronomy in the University of Cambridge, a position which was established in 1959.



Professor Sir Martin Ryle, FRS G3CY,

Photo: Edward Leigh

Since 1948 Sir Martin has been involved with a number of "firsts" in the fields of solar and stellar radiation, including the demonstration that solar radiation comes roughly from the area of the visible disc; identification of the radio stars Cygnus A and Casseipeia A; the discovery of the galactic halo; the first report on the orbiting of Sputnik I; and the discovery, in 1968, of pulsars (now thought to be the long-sought neutron stars).

He is also well known as an exponent of evolutionary theories of the universe, based on his observations of distant radio galaxies, and also, more recently, the behaviour of "quasars".

Sir Martin was elected a Fellow of the Royal Society in 1952, and his knighthood was bestowed in 1966. The Gold Medal of the Astronomical Society is just one of a long list of other honours that he has been awarded, both in this country and overseas.

Callsign badges

Complaints have been received regarding the delivery of callsign badges ordered through the RSGB; the expected six weeks' delivery having in some cases extended to over three months. One of the reasons is that the company supplying these badges has experienced production difficulties and the supply of one-off badges is becoming increasingly costly.

The manufacturers have now increased their prices to the RSGB by a considerable amount with the result that the Society is making a loss on each order. In addition it is often necessary to enter into correspondence to chase each order, and mistakes in manufacturing still occur which result in further correspondence.

Regretfully it is felt, therefore, that the RSGB should no longer handle orders for these items; the Society will, however, handle orders for members who are prepared to wait for them to be processed, but the prices will be about double those previously advertised and will be quoted on request.

Reciprocal licensing in Italy and Poland

A notice published in the Italian Gazzetta Ufficiale No 113 of 3 May 1973 announces that amateurs of the countries of the European Economic Community may now obtain Italian licences without the necessity of a formal agreement.

Applications should be sent to: Direzione Centrale Servizi delle Poste e delle Telecomunicazioni—Direzione Centrale Servizi Radio Elettrici, Via Cristoforo Colombo 153, I-00100 Rome, Italy.

The MPT advises us that applications for Polish licences must be made in duplicate to the licensing office, Panstwowa Inspekcja Radiowa, ul Świetokrzyske 3, 00-360 Warsaw, and should be sent via the Polish Radio Amateur Society, Polski Zwiazek Krótkofalowcow, skrytka pocztowa 320, 00-950 Warsaw, at least three months before the applicant proposes to start operations in Poland.

Full details of all addresses at which the UK amateur will stay while in Poland must be included in the application. At the moment mobile operation is not permitted in Poland.

Restrictions lifted

We are advised by the MPT that the language and rtty restrictions affecting licensed foreign radio amateurs in the UK have recently been reviewed. As a result it is proposed to allow them to use this mode of transmission and any recognized spoken language.

Suitable provision in the alien licence for these facilities will be made as soon as possible.

World Telecommunication Day 1973

The anniversary of the founding of the International Telecommunication Union—the organization which is responsible for the regulation, co-ordination, and planning of telecommunications on a world-wide basis, was marked by World Telecommunication Day on 17 May. The UK contribution to this occasion was again the amateur radio station GB2ITU, located at Tonbridge School, Kent, and operated by members of the school's radio society.

GB2ITU was on the air from 12 to 20 May, with activity mainly on 3·5, 7 and 14MHz. KW equipment (KW2000B transceiver, linear amplifier, Ee-zee match, swr bridge, and

Tim Hughes, G3GVV, Immediate Past-President of RSGB and Director of Technology at Tonbridge School, operating GB2ITU with two members of Tonbridge School Radio Society. Looking on is Norman Maddock, G2AJS, an honorary member of that society

low-pass filter) functioned faultlessly through long periods. Dipoles were used on the two lower bands, and a TH3 beam on the higher frequencies. Every contact has been confirmed by a special QSL card despatched via the RSGB QSL Bureau.

Diamond Jubilee Station GB3RS

GB3RS will be operated from Tonbridge School, Kent, between 30 June and 14 July. All bands 3·5 to 28MHz will be used, A3J being the mode. A special QSL card (sent via the RSGB QSL Bureau) will confirm all contacts.

QSL Bureau

From 11 June the address of the sub-manager for the G8FAA to G8GZZ series, Mr R. E. Parkes, will be 10 Hill Top Road, Cheltenham, Glos GL50 4NN.

RSGB Region 7 ORM

Saturday 6 October 1973

"Winning Post", Whitton, Middlesex

The Official Regional Meeting will commence at 2pm and will be chaired by Regional Representative Robin Hewes, G3TDR, assisted by Alan Foss, G8EAY, deputy RR.

Guest speakers will include Roy Stevens, G2BVN, RSGB Council member and chairman of the Technical and Publications Committee; Bill Green, G3FBA, RSGB Council Member and member of the Membership and Representation Committee; and Andrew Holloway, G3VUQ, secretary of the Interference Committee.

RSGB Region 10 Diamond Jubilee ORM and Dinner

Saturday 22 September 1973

University College, Park Place, Cardiff

The event opens at 11am with a comprehensive trade exhibition, with items ranging from sophisticated equipments to components and aerials.

A home-constructed equipment competition will take place and entries for this, giving brief details, must be sent to GW3RWX at least a week before the event. There will also be a raffle.

Talk-in facilities on 2m will be available through the courtesy of the local Raynet group, using 144·35, 144·48 and 145MHz, and possibly on top band.

A large car park will be available on the site and a coffee and snack bar will be open throughout the day.

The Official Regional Meeting will commence at 2.30pm and the RSGB Council will be represented by Executive Vice-President George Jessop, G6JP; Roy Stevens, G2BVN, and Cyril Parsons, GW8NP. Chairman of the meeting will be Regional Representative David Thomas, GW3RWX.

At 5.30pm F. J. H. (Dud) Charman, MBE, G6CJ, will give a lecture demonstration entitled **"The 120th performance of the 6CJ aerial circus."** This demonstration has never been given in Wales and this is a unique opportunity to see one of the most outstanding demonstrations in amateur radio.

The dinner will take place in the Senior Staff Dining Club of the college at 7 for 7.30pm. The club is licensed and is located in Park Place near to the main college site.

Admission to the day's events is by ticket, cost 25p.
Cost of the dinner: £2.
Tickets may be obtained from Mr Don Green, GW3MRI, 4 Ogwen Drive, Lakeside, Cardiff. Dinner tickets must be taken up by 12 September in order to meet requirements of the College Catering Officer. An sae sent when applying for tickets would be greatly appreciated. Cheques and postal orders should be made payable to Don Green.

Oscar 6 predictions

The following information is provided with acknowledgement to the Radio and Space Research station, Slough.

Date	Orbit No	Equatorial crossing	Time of crossing
7 July	3,314	167·8°W	0801
14 July	3,402	177·8°W	0841
21 July	3,490	187·7°W	0921
28 July	3,577	168·9°W	0805

The approximate increments for each orbit are: +115 minutes and +28·7°W.

Amateur Radio Association Bahrain

His Excellency the Heir Apparent of the State of Bahrain, Sheikh Hamad bin Essa Al Khalifa, MP4BSH, has accepted the Presidency of this association.

Amateur Radio Licensing was recently re-introduced in

RSGB NATIONAL MOBILE RALLY

Woburn Abbey, Bedfordshire

Sunday 5 August 1973

From 11am

Attractions will include a large trade exhibition, RSGB bookstall and enquiries stand, grand raffle, Raynet stand, BARTG stand, GB3PI repeater demonstration, and a bring-and-buy stand. All will be under cover of the largest marquee yet.

Bring-and-buy rules: (*i*) All items to be marked with vendor's name, callsign, and price expected. (*ii*) All items to be coded "1 of 1", "2 of 4" etc. (*iii*) No item accepted for sale after 2.45pm. (*iv*) All unsold items to be collected by 5pm. (*v*) The RSGB accepts no responsibility for unclaimed items. (*vi*) 10 per cent commission will be charged on each item sold.

The RSGB makes no charge for entrance to the rally but all visitors must pay for entrance to Woburn Park, in which the rally takes place, at the rate of 50p per car irrespective of the number of passengers.

Car parking for the rally will be in a specially reserved car park adjacent to the marquee and not in the normal Woburn Abbey car park.

All the normal Woburn attractions will be available at small extra charges. Various bars and cafes are available nearby.

How to get there:

From the south via the M1—Leave the M1 at intersection 13 **not 12 as signposted**. Turn left off motorway and follow signposts through Husborne Crawley to Woburn Abbey.

From the south via the A5—Turn right at Hockliffe and follow the A50 to Woburn.

From the north via the M1—Leave the M1 at intersection 14 and follow the A50 to Woburn.

From the north via the A5—Turn left at A418, 5 miles south of Fenny Stratford, and follow to Woburn.

From other directions make for the points indicated above and proceed as indicated. **Avoid routes signposted to "The Wild Animal Kingdom" or "Game Reserve".** The rally takes place in Woburn Park and correct routes are signposted to "Woburn Park" or "The Abbey". Also watch for RSGB signs.

the State of Bahrain, and this task is being undertaken by the Permanent Frequency Committee for the Gulf Area and Sultanate of Oman whose address is PO Box 831, Bahrain. MP4B licences are issued in the normal manner, to suitably qualified persons who are of residential status in Bahrain. It is not anticipated that there will be any change in the MP4B calls in the near future.

The QSL Bureau Manager is Ian Cable, MP4BBW, PO Box 425, Awali, Bahrain. There are at present 16 members of the association and there is a reasonable amount of activity from MP4B.

RAOTA reunion

The fifteenth reunion of the Radio Amateur Old Timers' Association was held on 18 May at the Bonnington Hotel, London, when 50 people attended.

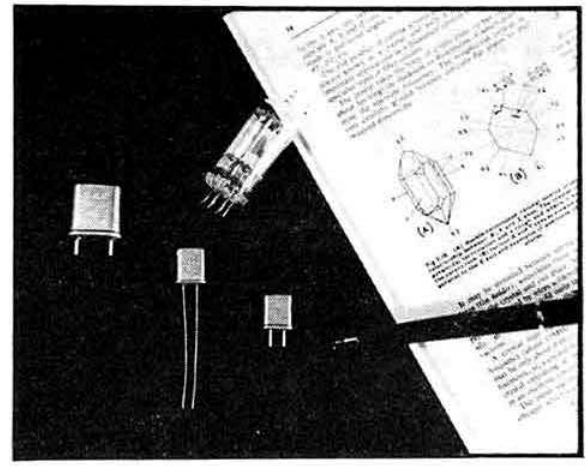
The highlight of the evening was a colour-slide show by "Dud" Charman, G6CJ, of pictures taken on his recent visit to New Zealand and Australia. A vote of thanks was proposed by Mr H. A. Bartlett, G5QA, chairman.

RAOTA membership is open to licensed amateurs who have held a transmitting licence for a period of 25 years or more. Details can be obtained from the hon secretary, Miss May Gadsden, 79 New River Crescent, London N13 5RQ. Tel 01-882 1272

Seen at the RAOTA reunion. L to r: G2UV, the man who introduced the QSL card; G6MN, the man who printed the first card; G2IY and G6CJ. (*Photo: G5UM*)

The crystal oscillator is an important concept in radio technology. The object of this article is to present up-to-date circuits for crystal oscillators using solid state devices, and show how the different frequency ranges are covered.

The article first appeared in the November 1972 issue of *Electronics Australia*, and is reproduced here by courtesy of the editor.



On the right are some of the quartz crystal packages currently available in this country. The glass evacuated bulb has a B7G base, and exhibits a good resistance to temperature effects; the metal can types (l to r: HC-6U, HC-18U with fly leads, HC-18U) score where space is at a premium

Quartz crystal oscillator circuits

by JOHN FOSTER and DAVID RANKIN *

ANYONE who is interested in electronics sooner or later comes across a component called a quartz crystal. Particularly in the specialized field of communications, the quartz crystal assumes a most important role as a precision frequency control element.

It is interesting to note that of all physical phenomena known to man, the one that can be measured most accurately today is frequency, and one of the most accurate frequency sources is the caesium beam frequency standard. However, even in this device the output signal is actually generated using an ultra-precise quartz crystal. The final accuracy is achieved by comparing the crystal frequency with an atomic resonance associated with the element caesium.

Unfortunately, despite the importance of quartz crystals, there is a widespread lack of knowledge concerning their use—among not only hobbyists but also professionals. It is hoped that this article will help to remedy the situation.

Crystal types

There are several ways of classifying crystals—three that come readily to mind are type of cut, mode of vibration and frequency range. As a starting point, though, the "type of cut" classification is as good as any. The commonly produced cuts are as follows:

(a) The bimorph, duplex bar, or JT cut plate—for the frequency range 400Hz to 10kHz.
(b) The XY flexure plate—for the frequency range 1·5 to 10kHz.
(c) The NT cut flexure plate—for the frequency range 3 to 100kHz.
(d) The +5°X bar—for the range 40 to 150kHz.
(e) The GT cut plate—for the range 90 to 200kHz.
(f) The CT and DT cut plates—for the frequency spectrum 100 to 550kHz.
(g) The AT plate—to cover the range 950kHz to 105MHz and above.
(h) The BT cut plate—to cover the range 3 to 30MHz.

It should be noted that these ranges are the "possible" ones, but many manufacturers restrict the ranges they offer for practical (usually economic) reasons.

The very low frequency crystal cuts, the JT, XY and NT, are quite specialized devices that have up to four separate connections for one crystal. They are unlikely to find any use outside some quite well-defined professional applications and consequently will not be considered in this article.

Similarly, the GT cut crystal plate is for specialized frequency standard applications and will not be discussed further as it is now an obsolete type.

The other four classes of crystal unit are fairly common, with the AT type in either the fundamental or overtone mode being the most widely used.

Suitable modern oscillator circuits designed for these common types of crystal will now be discussed. Most of these are designed to treat the crystal unit as a low-impedance device—ie operate it in the series resonant mode—and this approach tends to be favoured by crystal manufacturers because it gives reliable and non-critical operation. However, it should be emphasized that the circuits are presented mainly for guidance, and other configurations can also be quite satisfactory.

* 1879 Malvern Road, East Malvern, Victoria, 3145, Australia

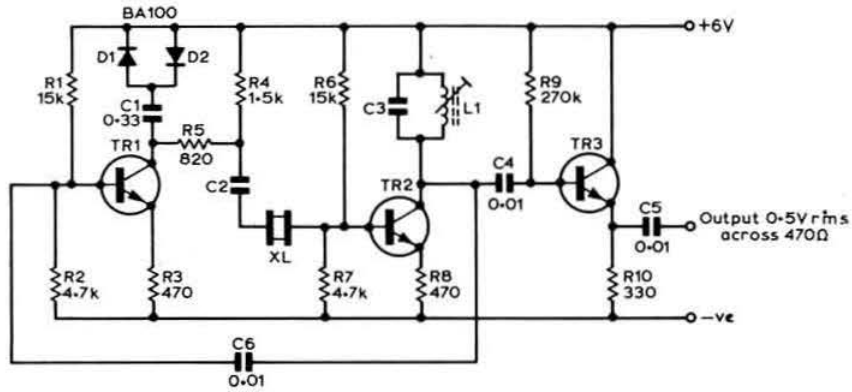


Fig 1. Recommended oscillator circuit for 50–150kHz, +5°X bar crystals

Notes on component values—Fig 1

TR1, TR2, TR3	BC108 or similar.
D1, D2	BA100 or similar.
XL—Crystal unit	QC2 for 55–65kHz QC3 for 65–85kHz QC13 for 85–150kHz
L1	800–2,200μH 520 turns 37swg enam wound on 7·62mm dia former with Neosid F25 core.
C2	For crystals calibrated at series resonance C2 = 1,000pF. For crystals calibrated at parallel resonance, C2 = specified load capacitance of 30, 50 or 100pF. Adjust L1 for max output with parallel resonant crystals or for nominal frequency with series resonant crystals.
C3	For 50– 75kHz, C3 = 0·01μF, 70–100kHz, C3 = 0·004μF, 100–150kHz, C3 = 0·0022μF.

Crystal units of the +5°X bar type are usually manufactured to cover the frequency range 50 to 150kHz. The +5° bar operates on its fundamental mode with a longitudinal vibratory motion.

The physical size of crystals at these frequencies is relatively large and unless care is taken to maintain crystal power dissipation below the permissible limit of 0·1mW (100μW) there is a probability that mechanical stresses will be set up which will result in the complete destruction of the quartz bar. Oscillator circuits designed for crystals of this type should therefore preferably employ some positive amplitude-limiting device for the protection of the crystal.

The 50 to 150kHz range

It is necessary when selecting suitable oscillator circuits to take into account the possibility of the crystal being excited into modes of oscillation other than the intended one. For this reason, frequency selective components should be employed in the circuit to maintain oscillation at the intended frequency.

The accompanying circuit (Fig 1) has been found to be satisfactory in all respects and is recommended for +5°X bar crystals in the 50 to 150kHz range.

Because the 5°X cut exhibits a maximum turnover temperature of +45°C, it is recommended that for best frequency stability of an ovened crystal, the oven temperature be as close to 45°C as possible. Over the temperature range of —20 to +70°C this type of crystal will remain typically within 0·015 per cent of its frequency at 23°C.

The usual holders available for this class of crystal are the British style F, a glass evacuated bulb with a B7G base, or the USA type HC-13U metal can which is an elongated version of the USA HC-6U can (British style D). The metal can is a little smaller in volume but the glass holder has the advantage that because of evacuation the crystal unit will exhibit a lower series resistance, ie higher activity.

The 150 to 500kHz range

Quartz crystal plates cut at the appropriate angles and mounted in a suitable fashion may be made to vibrate in a face shear mode. The two most useful cuts of this class are known as the CT and DT. The CT is useful over the frequency range 300 to 550kHz and the DT 150 to 300kHz.

The crystals may be specified for operation in either a series or a parallel resonant circuit. However, crystals finished to the correct frequency for a parallel condition may be satisfactorily used in a series resonant circuit when a capacitor equal in value to the nominated load capacitance is placed in series with the crystal unit.

The recommended circuit shown in Fig 2 may be used with crystals calibrated for either the series or parallel resonant condition.

With crystals of CT or DT cut, it is preferable to employ an oscillator which has frequency selective components other than the crystal in order to prevent any tendency for the crystal to oscillate in a different mechanical mode and frequency from that intended. The principal unwanted mode is usually of the order of twice the frequency of the wanted mode. This fact is not generally known but there is no

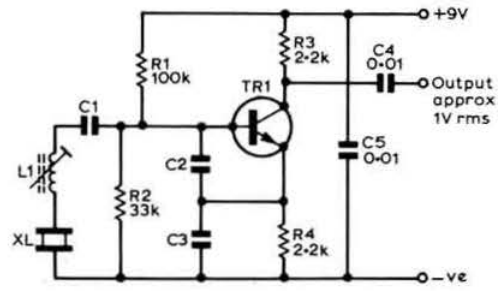


Fig 2. Recommended oscillator circuit for 150–500kHz

(See over page for notes on components.)

Notes on component values—Fig 2

TR1 BC108, SE1002 or similar.

L1 33swg enam wound on 7·62mm dia former with Neosid F25 core. For frequencies between 150 and 300kHz, L1 should be 800–2,200μH, or 520 turns. For frequencies between 300 and 550kHz, L1 should be 360–960μH, or 280 turns.

C1 For crystals calibrated at series resonance, C1 = 0·01μF. For crystals calibrated at parallel resonance, C1 should be equal to the specified load capacitance, typically 30, 50 or 100pF.

C2, C3 For CT cut crystals, C2 = C3 = 680pF. For DT cut crystals, C2 = C3 = 1,000pF.

doubt that the use of aperiodic (untuned) circuits can give rise to troublesome frequency problems.

Crystal units in the range 200 to 550kHz are usually available in the well-known metal holder type HC-6U (British style D) although the flying-lead version of this holder (HC-33U) can be obtained to order. In addition, the British style E holder—a glass evacuated bulb with a B7G base—can be obtained, with the advantage that frequencies in the range 150 to 200kHz may also be supplied.

Typical frequency *v* temperature performances of these classes of crystals are as follows:

CT: ±0·02 per cent over the range −20° to +70°C or ±0·006 per cent over the range 0° to 60°C.

DT: ±0·01 per cent over the range −20° to +70°C or ±0·005 per cent over the range 0° to 60°C.

The CT cut plate, and to a lesser extent the DT cut plate, exhibit a tendency for the series resistance to increase at high temperatures, so it is recommended that these types of crystal are not operated at temperatures higher than +70°C.

The 0·95 to 21MHz range

Crystal units manufactured for the frequency range 950kHz to 21MHz generally have an AT cut quartz plate operating in its fundamental mode. Over this frequency range, crystals may be specified for operation in either a series (resonant) or parallel (anti-resonant) condition. Unless this operating condition is correctly specified, the crystal unit may not operate on the correct frequency. Typically, over the frequency range there may be between 2 and 15kHz difference between the resonant and anti-resonant conditions, the series resonant condition being lower in frequency.

If a crystal is required for use in a parallel condition, it is necessary to specify the capacitance present in the circuit. Limitations apply with regard to the size of capacitance permissible at certain frequencies. The commonly preferred values of capacitance are:

0·95 to 10MHz — 30 or 50pF.
10 to 21MHz — 20pF.

Due to mechanical considerations, the available types of crystal holder may be restricted at particular frequencies. It should be noted that the electrical specifications available become severely restricted under 2MHz. The normal ranges are as follows:

0·95 to 4MHz — HC-6U (style D)
4 to 21MHz — HC-6U (style D), HC-18U (style J), and HC-25U (style K).

It should also be noted that with the smaller holders at the lower end of their frequency range, the activity of the crystal unit will not be as good as that of a crystal in the larger holder at the same frequency.

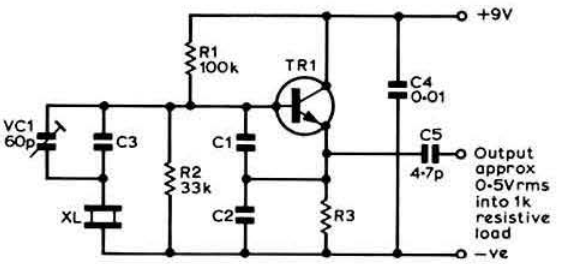


Fig 3. Recommended circuit for AT fundamental parallel crystals, 0·95–21MHz

Notes on component values—Fig 3

TR1 BF180, SE1010 or similar.
R3, C1, C2, C3 According to frequency, see following table.

F (MHz)	R3 (Ω)	C1 (pF)	C2 (pF)	C3 (pF)
0·95-3	3·3k	220	220	680pF for 50pF crystals* Not required for 30pF crystals*
3-6	3·3k	150	150	120pF for 50pF crystals*
6-10	2·2k	150	150	33pF for 30pF crystals*
10-18	1·2k	100	100	Not required. 20pF crystals*
18-21	680	68	33	only for these ranges

* The terms "20, 30 and 50pF crystals" refer to the capacitance load used when these crystals are measured in standard test sets, and are not related to any static capacitance present within the crystal unit itself.

Many crystal oscillator circuit variants exist which are capable of satisfactory operation; in most cases it is preferable to use a circuit in which the mode of operation is clearly defined and which is capable of adjustment to the crystal's nominal frequency.

Suitable circuits for parallel and series operation of AT fundamental crystals are shown in Figs 3 and 4. The accompanying tables indicate the component values required for each frequency range.

These circuits are designed for non-critical adjustment and operation with readily available components. In each case, an output of at least 500mV rms is available across a load of 1,000Ω in parallel with 15pF. The circuits are intended for use with supply voltages from 5 to 10V dc, and over this voltage range frequency stabilities of 0·001 per cent (10ppm) may be expected.

Frequency variation with temperature, assuming the use of suitable components, is largely dependent on the crystal unit. Typically, over the temperature range 0° to 60°C a temperature stability of ±0·001 per cent may be readily achieved. When ordering, the required stability over a given temperature range should be specified, together with the adjustment tolerance required. Full details of temperature ranges, frequency stabilities and tolerances are available from reputable crystal manufacturers but it should be noted that the AT cut is capable of a frequency/temperature performance of an order of magnitude better than the low frequency types discussed previously.

Overtone operation for the 15 to 105MHz range

Crystal units above about 21MHz in frequency are usually of the overtone type. The basic cut of the crystal plate is the same as that of the fundamental mode AT plate but the vibratory mode is different—a thickness shearing action

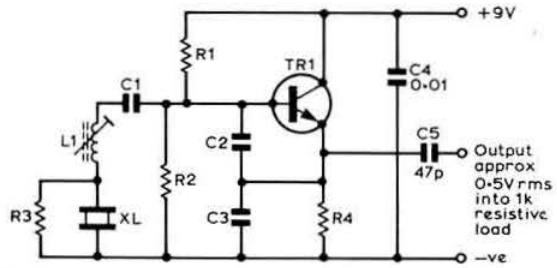


Fig 4. Recommended circuit for AT fundamental series mode, 0·95–21MHz

Notes on component values—Fig 4

TR1 BF180, SE1010 or similar.
L1 Close wound with 37swg enam on 7·62mm dia former with Neosid F25 core.
R1, R2, R3, R4, C1, C2, C3 See following table.

F (MHz)	R1 (kΩ)	R2 (kΩ)	R3 (Ω)	R4 (Ω)	C1	C2 (pF)	C3 (pF)	L1 (turns)
0·95-1·65	68	33	Not req'd	2·2k	0·0047μF	680	680	140
1·6-2·5	68	33	"	2·2k	0·0047μF	680	680	65
2·5-4·0	68	33	560	1·5k	0·0047μF	220	220	65
4·0-6·0	15	6·8	560	1·5k	0·001μF	270	270	40
6·0-10·0	15	6·8	560	1·5k	150pF	220	220	26
10·0-15·0	15	6·8	560	680	100pF	220	220	16
15·0-21·0	15	6·8	560	680	100pF	100	100	10

takes place in two planes through the cross-section of plate for third overtone units (and three planes for fifth overtones) instead of the single plane that occurs with fundamental mode operation. To enhance this overtone "shearing" action the quartz plate must be specially processed and calibrated for frequency at the desired overtone of operation.

An important point to grasp is that operating a crystal unit on its third or fifth overtone is quite different from operating the crystal on its fundamental and extracting the

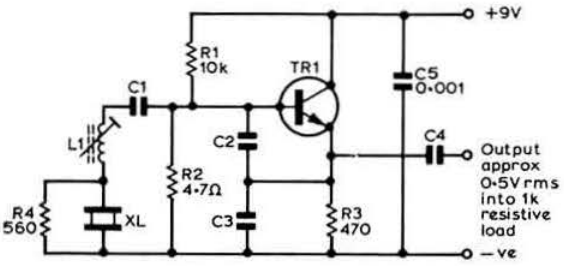


Fig 5. Recommended oscillator circuit for 15–63MHz third overtone AT cut crystals

Notes on component values—Fig 5

TR1 BF180, SE1010 or similar.
L1 Wound on 7·62mm dia former with Neosid F25 core.
C1, C2, C3, C4, See following table.

F (MHz)	C1 (pF)	C2 (pF)	C3 (pF)	C4 (pF)	L1
15-20	100	100	68	33	12 t 33swg close-wound
20-26	100	100	68	33	8 t 33swg close-wound
25-31	100	68	47	33	8 t 33swg close-wound
30-43	100	68	47	33	6 t 21swg close-wound
42-55	100	68	47	33	5 t 21swg 6mm long
48-63	68	33	15	15	5 t 21swg 6mm long

NB Under no circumstances should a tuned circuit at the crystal overtone frequency be included in the collector circuit of TR1 as this configuration will result in oscillation not controlled by the crystal.

third or fifth harmonic. With overtone operation, the oscillation frequency is not an exact multiple of the fundamental frequency. For this reason the fundamental frequency should NOT be specified when ordering an overtone crystal, as this will simply confuse the issue.

Third overtone crystals are useful in the frequency range 15 to 63MHz, while fifth overtones apply to the range 50 to 105MHz. Because a crystal made for operation on one specific overtone tends to be quite active on its other overtones, it is desirable to provide external circuit elements to prevent oscillation at either the fundamental or an overtone other than the desired one. It is also preferable to specify crystals for operation in the series resonant condition. Many crystal manufacturers calibrate overtone crystals at series resonance as standard practice.

The circuits shown in Figs 5 and 6 are typical of many in use for overtone operation. With the crystal short-circuited the oscillator should operate at or near the required frequency. With the crystal in circuit, L1 should be adjusted for either (a) minimum rf voltage across the crystal or (b) for the exact frequency required. Ideally, these two points would be coincident, but the condition is rarely achieved in practice owing to the need for a manufacturing tolerance on crystal frequency.

If L1 is of incorrect size it is possible for the oscillator to operate on a different order of overtone. For this reason adequate equipment should be available to check the output frequency.

The BT cut plate crystal has been somewhat overshadowed by the AT cut crystal because over a temperature range its frequency/temperature performance is inferior, ie 50ppm (total) over 0° to 60°C as compared with, say, ±10ppm for the AT cut. However, for operation in crystal ovens the BT cut can very closely rival the performance of the AT plate. Very largely, the performance achieved will depend on the quality of the oven used.

For a given frequency the BT cut plate is thicker than the corresponding AT crystal and thus it can tolerate slightly

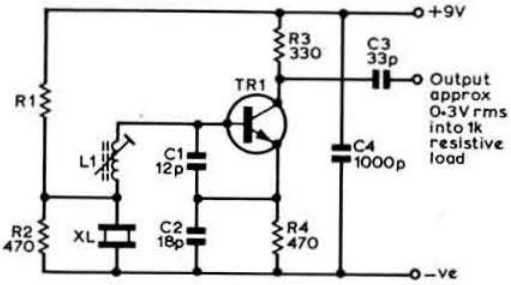


Fig 6. Recommended oscillator circuit for 50–105MHz fifth overtone AT cut crystals

Notes on component values—Fig 6

TR1 BF180, SE1010 or similar.
R1, L1 See following table.

F (MHz)	R1	L1	
50-70	2·7kΩ	7 t 6mm long	Wound with 21swg enamelled wire on 7·62mm diameter former with Neosid F29 core
60-85	2·7kΩ	5 t 5mm long	
80-105	1·2kΩ	3 t 6mm long	

NB Under no circumstances should a tuned circuit at the crystal overtone frequency be included in the collector circuit of TR1, as this configuration will result in oscillation not controlled by the crystal.

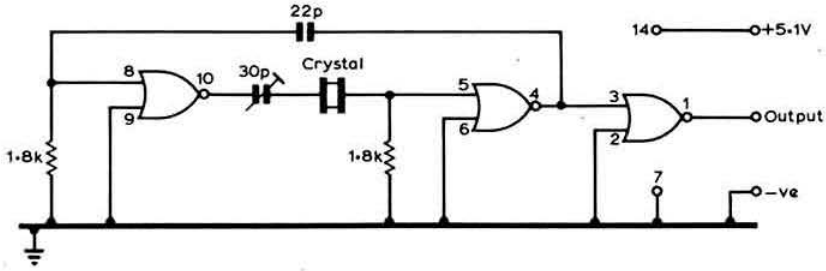


Fig 7. A reliable and tested circuit for a clock pulse generator using ttl digital ic devices. Although NOR elements are shown here, NAND or inverter elements may be used as an alternative, as shown in the text

higher drive levels. In addition, the BT can be readily produced as a fundamental plate at a frequency of 30MHz.

Figs 3 and 4, quoted for AT fundamental plates, may also be used for BT crystals in the frequency range 4 to 30MHz. Because the piezo-electric coupling factor for the BT cut plate is not as great as for the AT at a given frequency, the former will have a slightly inferior activity figure.

The final circuit (Fig 7) shows a recommended configuration for the use of an AT cut fundamental mode crystal in a digital "clock" oscillator using a ttl integrated circuit.

Basically, the crystal is operated in the series resonant condition, connected as part of a feedback loop around two ttl inverters which are biased into the linear region. A third inverter is used as an output buffer.

Bias for the two gates used in the actual oscillator is provided by means of 1·8kΩ resistors from each input to ground (negative). A 30pF trimmer capacitor in series with the crystal may be used to adjust the oscillator to exact frequency.

The circuit shows the use of NOR gate elements from an ic device such as the 7402, and when these gates are used the redundant inputs are merely connected to ground as shown. NAND gates may be used instead, and in this case the unused inputs would be taken to the positive rail. The simplest way of all would be to use actual inverter gates, as these will have no redundant inputs. But note that whichever type of ttl gate is used, the biasing resistors are always taken down to ground as shown.

All the circuits described have been used in practice, and should give both professional and hobbyist users satisfactory results if the details given are faithfully followed. The circuits are not the simplest which have been published, but they avoid the troubles that many of the simpler circuits exhibit.

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[2]. D. H. Rankin, "Overtone operation of quartz crystals", *Amateur Radio*, March 1967 page 2, May 1967 page 5.

[3]. Radio Communication and Electronic Engineering Association, UK. "Guide to the specification and use of quartz oscillator crystals".

New equipment .....

Advance Alpha multimeter

This digital multimeter will provide serious competition to the conventional analogue instrument by virtue of its versatility and low price. The instrument covers dc voltage, dc current, ac voltage, ac current and resistance in 24 ranges. These ranges cover the following:

1mV – 1kV dc
1mV – 500V ac
0·1μA – 1A ac and dc
0·1Ω – 10MΩ

The display of the instrument is by three l.e.d. indicators with decimal point. The maximum reading is 999 with over range usable to 1,200. An unusual feature of the instrument is the display brightness control which will provide extended battery life.

The Alpha can be operated from a PP9 battery; a mains power unit which fits in the battery compartment, or a rechargeable power supply. The manufacturers claim a battery life of up to 300 hours depending upon the brightness setting.

The dimensions of the multimeter are 5in by 2½in by 7in and the weight 2lb. It is considered that an instrument of

this type has the advantages of reliability, compactness and low power consumption, in addition to the benefit of a high input impedance. The latter is typically 10MΩ on the dc voltage ranges.

The price of the basic Alpha multimeter in small quantities is £55. The power supply options and the carrying cases are additional. Full details of the Alpha multimeter can be obtained from Advance Electronics Limited, Raynham Road, Bishop's Stortford, Herts.

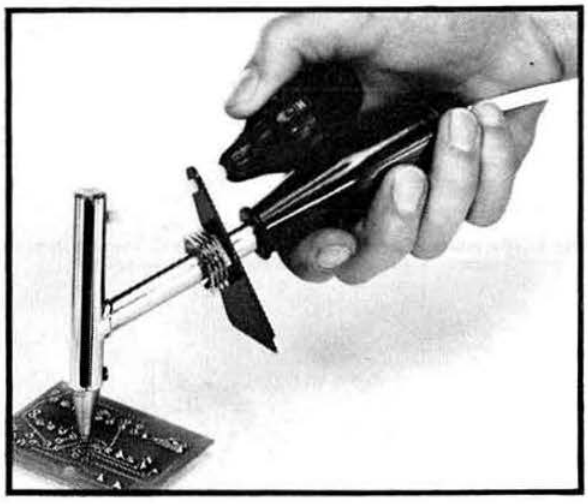
Heath scanner receiver

Shortly to be available on the UK market is the GR-110, a vhf band-scanning monitor receiver. This unit can be adapted to cover (with suitable crystals) any 9MHz of the portion 146 to 174MHz. Manual or automatic scanning can be selected and the latter scans the eight selected channels at the speed of 17 channels per second. Push buttons select channels which it is not desired to monitor and there is provision for a priority channel. The unit includes a built-in speaker and a power supply accepting either 120/240V ac or 12V dc. The maker's specification quotes sensitivity as less than 1μV for 20dB of quieting and the receiver uses 30 transistors, 8 integrated circuits and 17 diodes. Numerical readout is by a seven-segment indicator tube. The frequency coverage of the equipment indicates that it will not be confined to amateur use but that it will also have professional and business applications.

Enquiries regarding the GR-110 should be sent to Heath (Gloucester) Ltd, Gloucester GL2 6EE.

Adcola de-soldering gun

Adcola Products Ltd have introduced a new de-soldering instrument which does not require air or vacuum lines. Known as the R500 the gun is of particular use on printed circuit boards where it can be used vertically over the joint. The gun reaches operating temperature in about 2min and release of the air bulb sucks up the solder into the barrel to leave a clean joint.



The R500 is available for a range of voltages between 6 and 250, and has a bit rated at 30W. It is obtainable from electronic equipment dealers at a price of £6.72 plus VAT.

Toko coils

Toko (UK) Ltd now have available a range of coils suitable for vhf use, and designated type S18. High stability and high Q are claimed for the coils, which are available with several optional types of core, and they can be tuned from top or bottom. Full details and specification are obtainable from Toko (UK) Ltd, 470 London Road, Slough, Bucks SL3 8QY.

BOOK REVIEW

The Radio Amateur's Handbook, 1973 edition, by the headquarters staff of the ARRL. 704 pages, copiously illustrated and with many tabulations. Obtainable from RSGB, 35 Doughty Street, London WC1N 2AE. Price £2.80 inclusive of postage and packing.

Away back in 1925, F. E. Handy, W1BDI, then ARRL communications manager, produced a 32-page Traffic Department Handbook which did not allow itself to be so narrowly restricted and blossomed into a 200-page 1st edition of *The Radio Amateur's Handbook* in 1926. The phenomenal growth and sales in the years since then, four-and-a-half million copies, and now a 50th edition of 704 pages, is a monumental achievement; "the lone author has been supplemented by a team of editors and writers", and the handbook has become, especially to older amateurs, an institution and a source of immense interest and help, not to mention nostalgia.

F. E. Handy is now in retirement, but is an Honorary-Vice-President of the ARRL, and to him this 50th edition, with his portrait, is most deservedly dedicated.

After the extensive revision in every department in the 49th edition there has been no resting on laurels. Much new material has been added, and many modifications made. Only a few of these can be mentioned in this limited space.

There is a new code-practice set, and a generous treatment of toroidal inductors and transformers, with design data related to certain core types.

A new section on operational amplifiers shows an ic internal circuit, basic circuits, and six typical applications, and will be welcome. The valve type of regulator circuit has made its exit, and there is a 15V 5A regulator using an ic and a power transistor. Indeed, there is an enlarged treatment of ic regulators, high-current output regulators, fixed-voltage ic regulators, switching regulators, and a two-terminal limiter. A practical circuit, with values, is given for a 28V 100W switching regulator. There is a new universal power supply, 800V at 300mA dc, 300V at 175mA dc, and 0 to —130V at 25mA; also ac 6·3V at 11A or 12·6V at 5·5A. Choke filtering ensures good regulation on 800V and 300V and there is protection against damage due to transients. A most useful-looking 12V battery charger will have a general appeal.

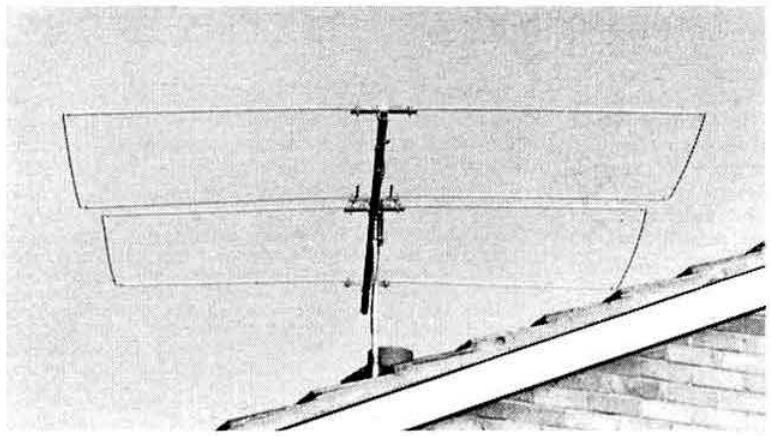
Special attention to harmonic suppression and stability has been given to the design of a 2W solid-state transmitter for 80, 40, 20 and 15. A beginner's receiver using plug-in converters for 80, 40 and 15m and a single integrated-circuit audio stage is described, and claims high performance at minimum cost. In the VHF and UHF Receiving Techniques chapter, only one valve circuit appears, a super-regenerative detector. Helical resonators for front-end selectivity are described and a design chart supplied. There are modified fet pre-amplifier designs for 50, 144 and 220MHz, and a new high-performance 2m converter said to be free of spurious responses, unconditionally stable, having a low noise figure, and with high overall gain. This looks to be a good project for a moderately experienced amateur.

An ultra-portable cw station for 40m is attractive. A dual-gate mosfet as a product detector, a 3-stage stable audio amplifier with 90dB gain and bandwidth of 2·5kHz accompanies a varactor-tuned local oscillator, and a 1μV signal "is easily copied". The receiver takes 14mA at 12V, and 100mA key-down drain of the keyed crystal oscillator gives an output of 650mW. The circuit includes a t-r switch, and should appeal to Raynet operators.

A transmatch for QRP rigs, a single ic and one transistor electronic keyer, a 2W fm 2m transmitter with 25 or 50W amplifiers for a 13·6V car system, and a 2m fm receiver to match, are all noteworthy. Especially so is a heterodyne deviation meter which can check the audio deviation of an fm transmitter, and can be used as a signal source to aid setting a receiver on frequency; its ranges are 0-1,000Hz, 0-10kHz and 0-20kHz.

It is pleasant to see a 75m ssb transceiver designed by Adrian Ryan, G3VJN, using solid-state devices everywhere except the 6939 pa. Integrated circuits have been freely used to simplify the circuit and improve reliability. Three items in the specification should be of interest: single-tone rms power input 18W; carrier and unwanted sideband suppression 50dB; 1μV cw input to receiver for 65mW af output.

T.P.A.



The Zygi beam aerial for 20m

by ZYGMUNT T. CHOWANIEC, G3PTN*

THE author's interest in aerials dates from before the second world war, when, as a member of the Polish Radio Society, he experimented with wire aerials. When he obtained a G licence in 1962, the first steps leading to the development of the beam aerial described in this article were, though at the time unknowingly, taken.

A transmitting aerial for the 20m band was constructed in the form of a rotary half-wave loop, horizontally-polarized and mounted on top of a 32ft mast. A loop was chosen because a rotary dipole would, in certain directions, have overhung a neighbour's garden. It was found that although the theoretical gain of a loop is 1dB lower than that of a dipole, in practice the performance was perfectly satisfactory. In time, objections to the size of the aerials were overcome and the loop was replaced with a variety of different beams until the QTH had to be changed.

For a while the author used a multiband vertical, but having been spoilt by the performance of the high-gain aerials at the previous QTH, satisfaction did not last. Experiments were started with the aim of producing a 20m monoband beam of reduced dimensions, as it was felt that a full-sized yagi would have an adverse effect on otherwise good neighbourly relations. After some work on electrically shortened dipoles, it was decided to use loop elements.

A wooden frame was constructed and wire loops were formed, making it easy to see if the shape could be altered without impairing the performance of the aerial, and to see how the radiation resistance would be affected. The loop which was eventually evolved (Fig 1) had sides of approximately 1:2 ratio, and dimensions for the 20m band were 5ft by 11ft 6in. It was found that the radiation resistance was reduced from about 50Ω for a square half-wave loop, to 48Ω for a rectangular half-wave loop.

The next task was to combine two loops to form a directional beam. In a very short time the author found that loops cannot be used as parasitic elements if mounted in the same plane—to achieve the desired effect all elements must be fed.

At this stage the loops forming the beam were installed in the loft, using rafters as supports (see Fig 2), and the length of phasing line was determined empirically for the best forward gain with an acceptable back-to-front ratio. The aerial was used for several months, and when the author was satisfied that the performance was consistent the aerial was constructed, as a self-supporting structure, out of aluminium

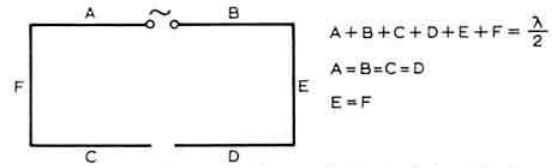


Fig 1. The basis of the Zygi beam. A dipole is bent to form a rectangle of approximately 1:2 sides ratio

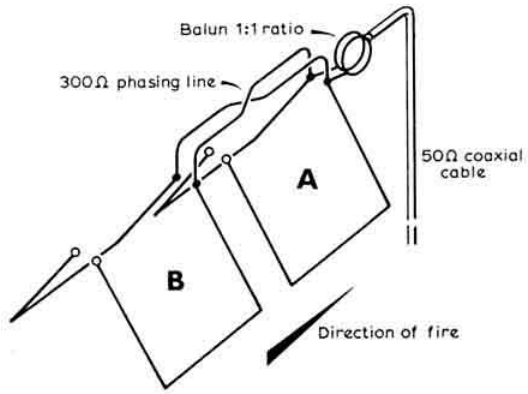


Fig 2. The complete Zygi beam. Both elements are fed, as loops cannot be used as parasitic elements if mounted in the same plane.

* 33 Elmete Drive, Leeds LS8 2LA.

alloy tubing. It was mounted on a 5ft mast attached to a chimney, conveniently located in the centre of the house and of relatively easy access (see photo), making a total height above the ground of 27ft.

After several adjustments to the resonance and spacing of the elements, the input impedance of the array was measured, an swr curve drawn, and an approximate polar diagram determined (see Fig 9). The beam was then transferred to a 34ft mast at the side of the house, where it has now been in operation for over 12 months.

Constructional details

Reference to Fig 3 shows how the main components fit together, in semi-diagrammatic form.

The most convenient way of handling the ½in and ¼in od aluminium tubing is to cut it into 6ft lengths. One end of each of the lengths of ½in tube is slotted and crimped with pliers to receive the ¼in tube (see Fig 4), and the tubing can then

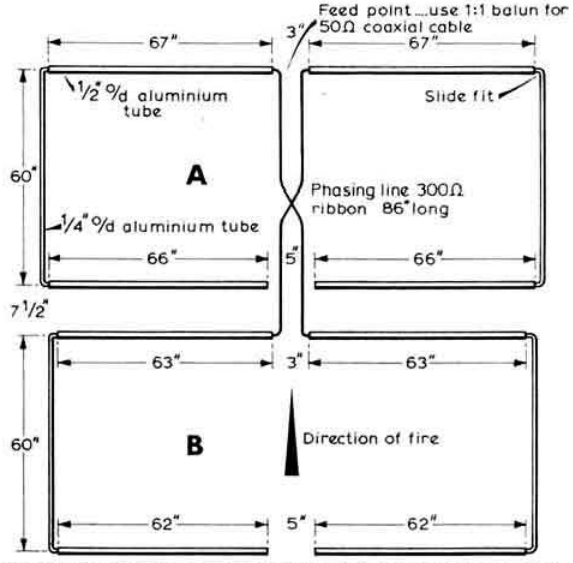


Fig 3. Overall physical constructional details of the complete aerial. Approximate resonant frequency of element A is 13·75MHz, and of B is 15·5MHz, without the phasing line. With the phasing line in place, element A is adjusted for minimum swr, and element B for best back-to-front ratio at 14·2MHz

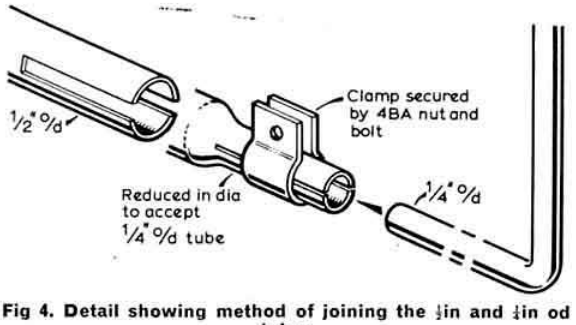


Fig 4. Detail showing method of joining the ½in and ¼in od tubes

be cut to the exact length required—67in (two), 66in (two), 63in (two), and 62in (two).

The ¼in tube has to be tailored to fit the crimped ends of the ½in tube, which involves bending up 6in (at both ends) at 90°. The way the two tubes fit together is shown in Fig 4, the objective should be a smooth bend in the ¼in tube, which is possible if a piece of soft copper wire is inserted prior to bending. The wire can easily be withdrawn afterwards.

The lengths of dowelling which join the cross-members at the centre are next prepared. Four pieces are needed, two 9in and two 11in. The end 3in of each piece must be turned or filed down to provide a tight fit in the ½in tube, then all the dowelling should be given several coats of protective sealing, such as varnish or shellac. The 9in prepared dowelling pieces are used to join the 67in and the 63in cross-members, while the 11in pieces join the 66in and 62in cross-members.

Electrical connection to the feed points (marked on Fig 3) is by means of 2BA bolts, which are put through the ½in tubing *and* dowelling. The first nut is tightened securely, and the second left finger-tight to facilitate making the electrical connections.

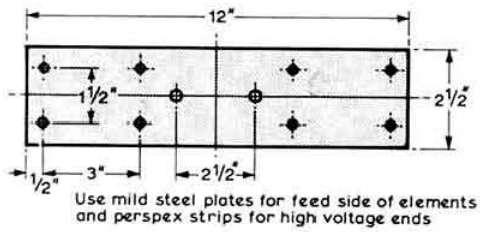


Fig 5. Drilling details for the mild steel and the Perspex plates

Fig 5 shows the drilling details for the metal or Perspex (metal for the feed point ends, Perspex for the high voltage ends) plates used to fix the assembly to the boom. The edge ¼in of the metal plates is bent up at 90° for improved rigidity. Small pieces of pvc tubing are used as insulation between the cross-members and the U-bolts holding them, while smaller pieces of the same material can be used to space the cross-members ½in from the plate. Detail of this portion of the structure is shown in Fig 6, which also shows the positioning of the 2BA bolts mentioned above. The plates are fastened to the boom (shown as a dotted line in Fig 6) by 2½in U-bolts (not shown).

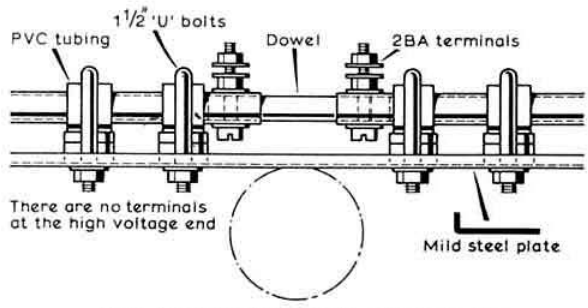


Fig 6. Assembly details of the element ends

An aluminium plate 4in by 10in is used to fasten the boom to the upright, and must be drilled out to take 2½in U-bolts, as in Fig 7. Once the cross-members have been mounted on

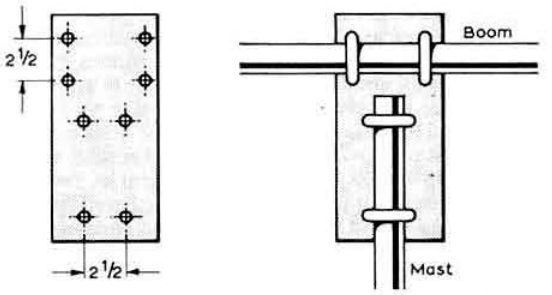


Fig 7. An aluminium plate fastens the boom to the mast

the boom, the end-pieces of ¼in tube can be fixed in place. They are held in position by clamps made from 2in by ½in aluminium which have to be slipped onto the crimped end of the cross-members before the final assembly. Fig 4 shows an exploded view of these joints, which allow the adjustment necessary for resonating the beam to a given frequency.

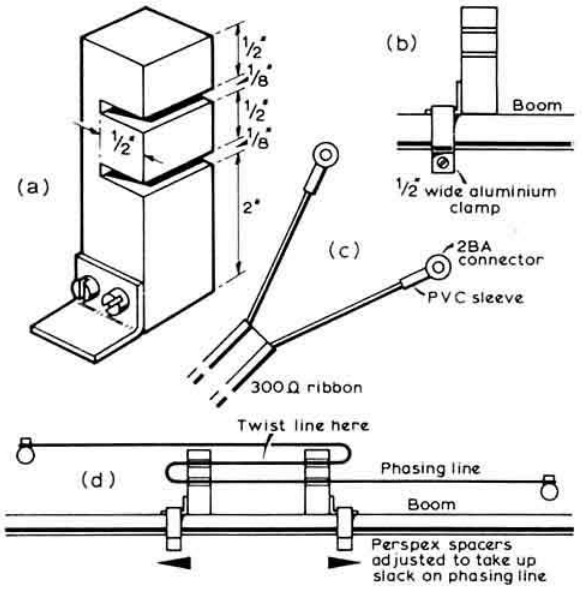
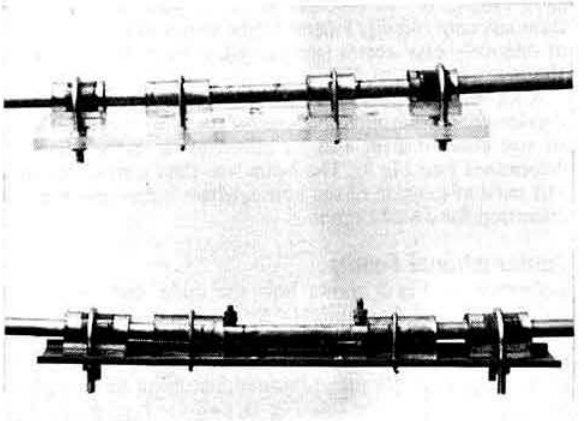


Fig 8. The phasing line is spaced by two Perspex formers, constructed as shown here; 2BA connectors are soldered to the feedpoint end of the line, and any exposed solder covered with pvc sleeving

The boom material (2in od tubing) can be cut to 11ft in length, and the mast clamp plate mounted in the centre.

The 300Ω feeder used as a phasing line is cut accurately to 7ft 2in long, and fixed to the balun at one end, and the other end is fitted with 2BA connectors. Any exposed solder should



Close-up of the dowelling assembly. In the foreground is one of the feed-point ends, in the background a high-voltage end mounted on the Perspex plate. Note the insulation and packing between the elements, U-bolts and base plates

be covered with tight-fitting pvc sleeving. The balun itself should be mounted as close as possible to the feed point. To support the phasing line, and allow some adjustment, two spacers are made out of 3in by 1in by ¼in Perspex, as shown in Fig 8.

The total weight of the complete aerial is approximately 14lb.

Initial adjustment

The initial adjustment of the aerial may be carried out with a gdo and impedance bridge (or swr meter). Element A should be resonated to 13·75MHz, and element B to 15·5MHz, with the phasing line unconnected. Adjustment of the resonant frequency is effected by telescoping the ¼in tube into the ⅜in tube. On the prototype it was found that extending the sides by 1in lowered the frequency by approximately 100kHz. If any such alterations to the physical dimensions are made, however, symmetry must be maintained, and both sides adjusted an equal amount.

When the phasing line is connected, and correctly supported by the Perspex spacers, the resonant frequency of the beam as a whole can be determined. This should be done with the aerial at its intended working height, but failing this a length of coaxial cable, cut to an electrical half-wave at operating frequency, should be connected between the balun and the impedance bridge allowing instruments to be used at a convenient height.

The swr should be 1·1:1 at 14·2MHz, or the preferred operating frequency, and adjustment of element A will reduce the swr, should it be too high. Adjustment of element B seems to have little effect on the swr, although it can be used to optimize the back-to-front ratio.

Evaluation

Evaluation of the prototype has been carried out over a considerable length of time, as a fixed-direction indoor beam and also as a rotary array. Not only electrical behaviour was looked at but also mechanical stability.

The beam as described exhibits an input impedance of 42Ω and offers a reasonable match to 50Ω coaxial cable, so it

can be fed with a 75Ω feeder, providing the balun has a 1·6:1 step-up ratio. The balun used by the author was constructed on the lines of the G3HZP transformer described in the *Radio Communication Handbook*. Using 50Ω feeder, the swr at the point of resonance is 1·1:1 rising to 2:1 at the band edges. In practice, if the aerial is resonated at 14·2MHz it will not be necessary to alter the settings of the atu, if one is used. See Fig 9(b).

There will be a change of resonance in rain of approximately 75kHz due to the insulators at the high-voltage end of the loops. However, with the Perspex insulators used there is no problem with either corona discharge or tracking in heavy rain, even when full 400W p.e.p. output is fed to the aerial. Because of the element construction, the array is mechanically very stable and has low wind-resistance. During gale-force winds there is no detectable change in swr when the elements are flexing. Good performance under bad weather conditions is due to the relatively flat swr curve.

When the design was conceived the author felt that, with a physically small aerial, forward gain is the most important and back-to-front ratio should take second place, this being contrary to normal practice. The back-to-front ratio of the array described is in the order of 8-10dB.

The beamwidth at the half-power points is approximately 70°. Attempts were made to measure the gain of the aerial, but owing to the inability to erect a reference dipole, the gain was estimated by comparison with a V-beam (2 by 240ft, not terminated) beamed permanently on Canada. The theoretical

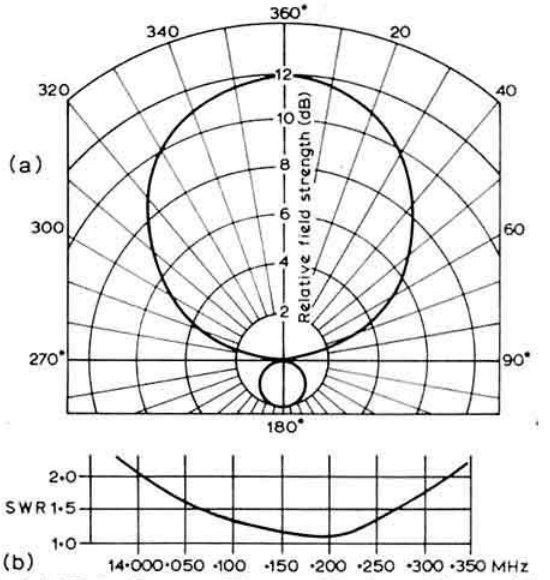


Fig 9. (a) Polar diagram of the complete beam, (b) swr of the beam on 14MHz band. Input impedance 42Ω, front-to-back ratio 10dB, beamwidth ±70°

gain of this array is 6·7dB and in practice it performs as well as, and sometimes better than, a 3-element yagi or cubical quad. Over 1,000 contacts have been made with mainly Canadian, American and Australian stations and the 2-element beam has been found to perform as well on the majority of contacts, sometimes being marginally better than, sometimes a little below, the V-beam. Therefore the author thinks it is safe to assume that the forward gain is no less than 4dB.

The array described, being of the end-fire type, cancels high-angle radiation and works well at low height. At present the aerial is 34ft above ground, but for a part of the test period it was 27ft and at this height displayed the same general characteristics with a slight drop in signal strength.

Most of the stations worked have reported that with the 2-element beam there appears to be less fading than on the V-beam. Comparison tests were also made with a TH3 beam located about two miles from the author's QTH and again the performance was comparable, signal reports being sometimes marginally better than, sometimes slightly below, those on the TH3.

Materials required

Quantity	Description
4	12ft lengths aluminium alloy tubing ¼in od
2	12ft lengths aluminium alloy tubing ½in od
1	12ft length aluminium alloy tubing 2in od
16	U-bolts, 1½in
8	U-bolts 2½in
4	2BA, 1½in bolts, cadmium or nickel-plated
8	2BA nuts, cadmium or nickel-plated
8	4BA, ½in bolts and nuts, cadmium or nickel-plated
1	Piece of aluminium, 10in by 4in by ¼in thick
2	Perspex strips, 12in by 2½in by ¼in thick
2	Steel strips, 12in by 2½in by 18swg
8	Aluminium strips, 2in by ½in by 18swg
2	Perspex pieces, 3in by 1in by ¼in thick
1	Length of dowelling, ¼in dia
1	Length of pvc tubing, ½in wall
1	3-yard length 300Ω ribbon feeder
6	2BA connectors
1	Balun transformer, 1 : 1 ratio
1	Length of coaxial feeder

Conclusion

In view of the small physical size of the aerial (7ft turning radius) and a performance comparable to that of a 2-element yagi, the author feels that it will be of interest to a number of amateurs with restricted space. It is perhaps worthwhile to repeat a comment passed by a neighbour: "I have not seen that type of tv aerial before, what channel is it for?"

This design makes possible the construction of a 7MHz beam of a size acceptable to most (22ft by 23ft), and even 3·5MHz is quite feasible. This aerial design is covered by British Patent (provisional) Number 26716, but amateurs who wish to do so may construct and operate a G3PTN Zygi beam for their own personal use.

The author would like to thank G3XER and G3ZBA for help given with evaluation of the beam, and G3GXQ for reviewing this article before publication.

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Reception of GB3SX (28MHz) in Malawi

Covering the period May to August 1972, with general comments on propagation conditions

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Introduction

Activity from 7Q7LZ began in February 1967 and extended to September 1972 when the operator prepared to return to the United Kingdom. During this period there was considerable interest in the UK-Malawi path at hf on the amateur bands and also the direct BBC World Service frequencies, so extensive use was made of the BBC transmissions as well as station GB2SM and beacon GB3SX (on 28MHz) to assess propagation conditions. An opportunity presented itself at 7Q7LZ to make regular observations of GB3SX during the northern hemisphere summer period of 1972, and it was thought that a detailed study would be of particular value during a period of the year when daytime F2 MUFs in Britain reach their minimum value and during a declining phase of the sunspot cycle. It was not initially envisaged that very comprehensive records would be kept, but once the project had been started it was realized that the job had to be done well to have a chance of producing useful information. In the light of current interest in hf propagation phenomena, and with the aim of stimulating further interest in the world-wide hf beacon project, the results obtained over the GB3SX-7Q7LZ circuit between May and August 1972 have been analysed and are presented below.

GB3SX

The beacon station GB3SX is part of the RSGB contribution, under the aegis of the Scientific Studies Committee, to the world-wide hf beacon project, originally proposed by DARC and since adopted by IARU Region 1 Division. GB3SX was the second station in the network and commenced operation early in 1970. It is sited at Crowborough, Sussex (51°N, 0°E).

Over the period covered by this report the transmitter used was a modified DX40U run at low power in the interests of reliability. At first the aerial was a simple dipole slung in a N-S plane, fed with coaxial cable but without a balun. There is a slight tilt to the aerial, the higher end being to the north at approximately 40ft, with the other end about 5ft lower. Between 1700gmt on 18 July and 0800gmt on 19 July, and from 1100gmt the same day, the aerial was changed to a ¾λ vertical, hoping this would give a better all round service. In the event the service to the south was not much improved, the signal to the Far East was impaired and the swr left something to be desired. Therefore, at 1930gmt on 27 September 1972 the dipole was brought back into use.

For the purposes of comparison and analysis, the output power of the beacon may be taken as 10W. F1 keying is employed with a shift of approximately 850Hz.

7Q7LZ

The receiving station was located about four miles north of Mzuzu in the Northern Region of Malawi, grid co-ordinates 11°30′S, 34°E approximately. The site was on a very gentle slope about 4,300ft asl, with a clear view to the distant horizon in the direction of Europe. The aerial was a Hy-Gain TH4 beam, with a nominal gain over a dipole of 8·9dB at 28MHz, at a height of 33ft above ground. The receiving converter was a crystal-controlled version of the G2DAF Mark I front end, employing a cascode ECC84 in the rf stage. The receiver itself was a much-modified R107 using a tunable i.f. of 5·685MHz. The distance from Crowborough to Mzuzu is approximately 4,800 miles.

Illumination of the path

Malawi lies just sufficiently far to the east of the United Kingdom for conditions of almost simultaneous sunrise near the summer solstice and simultaneous sunset near the winter solstice to prevail. Thus, during the period under review there was little difference between sunrise times at Crowborough and Mzuzu, but considerable difference in sunset times.

On 1 May, Mzuzu sunrise was at 0353 and at Crowborough sunrise was at 0441. Crowborough sunrise became earlier and the Mzuzu sunrise very slightly later and occurred simultaneously (and hence over the whole path between them) on 29 May at 0400 and again on 16 July at 0409. Between these dates Crowborough sunrise preceded Mzuzu sunrise by no more than 14min. After 16 July, Mzuzu sunrise again occurred earlier than that at Crowborough, the times being 0352 and 0514 respectively by 31 August.

The difference in longitude means that the sun reaches its zenith at Mzuzu 136min before its zenith at Crowborough. The mean times are 0944 and 1200 respectively, but vary slightly during the year because of the elliptical nature of the earth's orbit.

Sunset at Mzuzu was at 1529 on 1 May, becoming earlier until it was 1522 around 1 June, and then later to reach 1537 by 31 August. Sunset times at Crowborough, however, were always considerably later, being 1913 on 1 May, reaching 2012 around 26 June and then becoming earlier again to 1847 by 31 August.

The mean sunrise, zenith, and sunset times for both stations during each of the four months are shown in Fig 1. The chief

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features of the GB3SX-7Q7LZ path during May to August were that the whole path became illuminated early in the morning quite quickly. At the other end of the day, however, it took several hours for the path to pass into the region of darkness, beginning at the Mzuzu end of the circuit and ending at the Crowborough end.

Method of recording

No pen recorder was available at 7Q7LZ so monitoring had to be done the hard way. Although it was expected that this would be an arduous undertaking, this did not prove to be the case, and after a few days it was found possible to live a fairly normal life and still monitor the beacon channel for many hours each day.

Records were kept in the form of a daily line across a sheet of graph paper, during periods of observation, using a red line to record presence of the beacon signal and a black line to record periods of monitoring when no signal could be detected. Changes in colour were recorded to the nearest 15min and marked by a short vertical bar. This was thought to be sufficiently accurate for the purpose of the study and allowed for later analysis of the results by quarter-hour periods. A useful check was the BBC World Service transmission on 25·650MHz, and with a second receiver extensive use was made of this channel which was available from shortly before 0900 to 1615. It provided a daily barometer of general propagation conditions as well as giving an indication of sudden ionospheric disturbances, and on days with worse than average conditions it was heard more frequently than GB3SX.

Monitoring commenced at 0500 daily on the assumption that it was most unlikely that propagation over the UK-Malawi path would take place before this time on 28MHz. Even so, there were several days when GB3SX appeared at 0515 and on one occasion (3 July) the beacon signal was present at good strength at 0500.

At the other end of the day, it was always assumed that once the signal had disappeared after the whole path lay in darkness it would not reappear later. Thus, on occasions a black line was drawn on the chart when the GB3SX channel was not actually being monitored, once the after-dark fade-out time had been recorded.

Measurement of signal strength was not possible, but occasionally comments on the strength were recorded on the chart. In the subsequent analysis, strength of signal was ignored and the results are purely on the basis of presence or absence of the signal, ie whether or not it could be detected above the noise level.

Method of analysis

The results were analysed throughout by quarter-hour periods. For each period the total number of days, the days on which observations were made, and the days on which the GB3SX signal was present were counted. The first two figures were combined to give a percentage frequency of observation, and the last two to give the days when the beacon was present as a percentage of the days on which observations were made. Curves were then drawn with these percentages as the vertical axis and time of day as the horizontal axis. The whole four months of observations were combined firstly into one set of curves to see the general pattern which had been obtained. The charts were then split into 15-day blocks, beginning at midnight on 21/22 June (the summer solstice) and working outwards. The results from pairs of these blocks which corresponded to the same relative position of the sun over the northern tropics were then analysed together. Finally the results were analysed on the basis of calendar months.

Inspection of the plotted data showed the same general pattern throughout and no significant differences could be detected. It was therefore decided that it would be valid to present and discuss the results only in terms of calendar months, with the advantage that this method would allow comparison with propagation forecasts as published in *Radio Communication* and elsewhere.

Results obtained

The results obtained from analysis by calendar months are shown in Fig 1 where four sets of curves are drawn, one for each month of the study. Horizontal lines have been drawn at the 20 per cent and 67 per cent levels. The area above the 67 per cent line corresponds to more than 20 days in a 30-day month and the area below the 20 per cent line to less than 6 days per month, thus relating the results to the propagation prediction charts published monthly in *Radio Communication*.

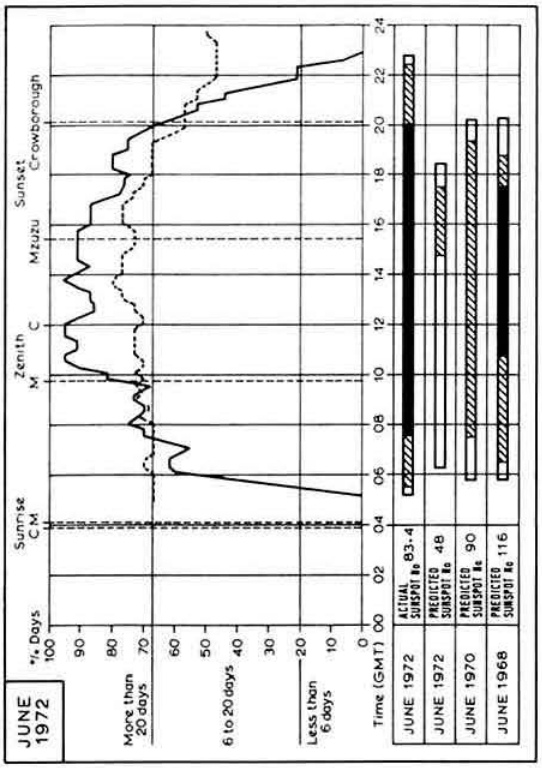
Below each curve there are four such charts, the top one representing the results obtained, the second one showing the prediction for the path from Britain to South Africa for the month in question, and the third showing the prediction for the same month in 1970, a year in which the predicted monthly sunspot number approximated to the actual levels obtaining in 1972. The bottom chart shows the prediction for the same month in 1968 close to the peak of the present sunspot cycle.

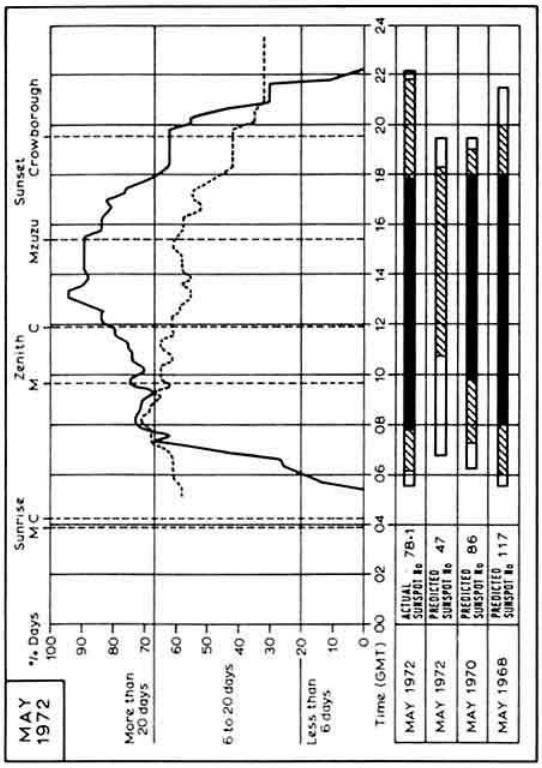
The most outstanding features of these results virtually speak for themselves. Generally, the path was open far more frequently and for much longer periods than even the most optimistic forecasts predicted back in 1968, the year of sunspot maximum during the present cycle. Admittedly, the sunspot activity during the summer of 1972 was higher than predicted, and it was for this reason that the results were compared with the 1970 predictions.

However, it must be remembered that these results are summaries and hence give only an overall picture—in actuality there were no two days alike during the whole period, and it was an early appreciation of this which stimulated interest in a project which when first conceived was thought would soon become rather tedious. Space and time do not allow the presentation of the original results in full and they would perhaps be of only limited value in the present context. Instead, a monthly calendar of highlights has been compiled, and 10m operators may be interested to compare their own logs with the dates and times mentioned.

May 1972

The latest predicted sunspot number for May published in *Radio Communication* was 47 but a more optimistic forecast of 52 appeared in *QUAX*. The provisional smoothed sunspot number for May was 78·1 with the period of greatest activity occurring between 9 and 21 May. The daily number rose to 140 on 17 May. Observations of GB3SX were not begun until 8 May so that the frequency of observation is slightly less than in succeeding months but nevertheless more than 50 per cent for much of the day. The general pattern of results obtained does not appear to differ materially from





Graphs showing summaries of reception of GB3SX by 7Q7LZ for the months May and June, Fig 1a (left) and July and August 1972, Fig 1b, on facing page

The solid curve shows the number of days on which the beacon was heard as a percentage of the number of days on which observations were made and is an estimate of circuit reliability. The dotted curve shows the number of days on which observations were made as a percentage of the total for the month. The first propagation chart is produced by the intersection of the solid curve with the 20 per cent and 67 per cent circuit reliability levels, corresponding roughly to 6 and 20 days in the month. The lower three are taken from the predictions for the G–ZS path on 28MHz previously published in *Radio Communication*. Sunrise, zenith and sunset times shown are the monthly means

Notes on observations for May

1–7	No observations made
8	Regular observations began
9–21	Period of greatest solar activity
10	GB3SX not heard 0500–0930 when observations ended. BBC 25·650MHz not heard 0900–0930
15	No observations made
17	Daily sunspot number 140, highest for month
28	GB3SX noted 0700–0900, absent at 1000 and not heard for the rest of the day. BBC 25·650MHz very weak from 0900 till Dellinger fadeout at 1325 and not heard again. Solar noise storm producing high background noise.
29	Disturbance at 1030 affecting BBC 25·650MHz. GB3SX appeared 1145–1545
30	Brief appearance of GB3SX around 0715. Disturbance at 0930 affecting BBC 25·650MHz. GB3SX appeared later with very weak signals

those obtained in months where more observations were available. No records were taken on 15 May.

The Dellinger fadeout of 28 May was more spectacular than that heard later in August. Conditions were extremely poor for several hours beforehand. The event occurred at 1325 with the usual noise which rapidly built up to tremendous strength, obliterating all but the strongest signals between 14 and 30MHz. Two receivers were in action throughout this period. The station receiver normally used for GB3SX reception remained tuned to the beacon frequency of 28·185MHz, but the TH4 aerial was turned towards the sun, while an HRO-5T normally used as a short-wave broadcast receiver was used to monitor the whole spectrum from 0·5 to 30MHz. The noise level on the station receiver varied both in itself and from that on the HRO when the latter was tuned to frequencies other than around 28MHz, and rapid tuning of the HRO between 14 and 30MHz revealed several noise peaks roughly of the order of 0·5MHz wide and continually shifting in amplitude and frequency.

The impression was gained that these noise peaks were arising out of and subsiding into the general high noise level and brought to mind the analogy of a sea of boiling mud in which bubbles appeared at the surface in a completely random manner, rising above the surface level and then collapsing again, varying in size, moving across the surface, and with a shape which resembled that of the noise peaks.

The noise began to subside after 10min, after which the whole hf and mf spectrum was devoid of signals other than two local medium-wave broadcast stations. Signals began

to return by 1345 within a 1,000-mile radius, and soon afterwards from an easterly direction (and hence over chiefly darkness paths). One such was the BBC Far Eastern Relay Station on 11·750MHz, playing records and making apologetic announcements about the loss of programme from London. The BBC direct transmission on 25·650MHz never returned before close-down at 1615, but the alternative frequency of 21·470MHz was weak but readable at 1430, one hour after the event, and then took a further two hours to creep back up to its normal strength. In short, the classic phenomena of a typical radio blackout. Apparently the noise storm of 28 May spread steadily upwards in frequency to envelop 4m by 1 June [1].

June 1972

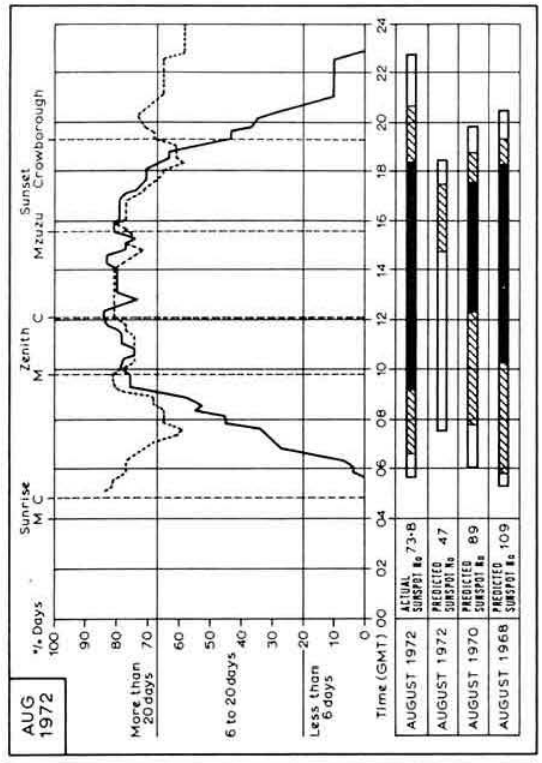
The latest predicted sunspot number for June published in *Radio Communication* was 48 but a more optimistic forecast of 50 appeared in *QUAX*. The provisional smoothed sunspot number for June was 83·4, again much higher than the forecasts, with a reasonably even distribution of activity throughout the month. Daily figures reached a maximum of 132 on 5 June and dropped to a minimum of 43 on 13 June. The frequency of observations was maintained at 67 per cent or more until after 1900.

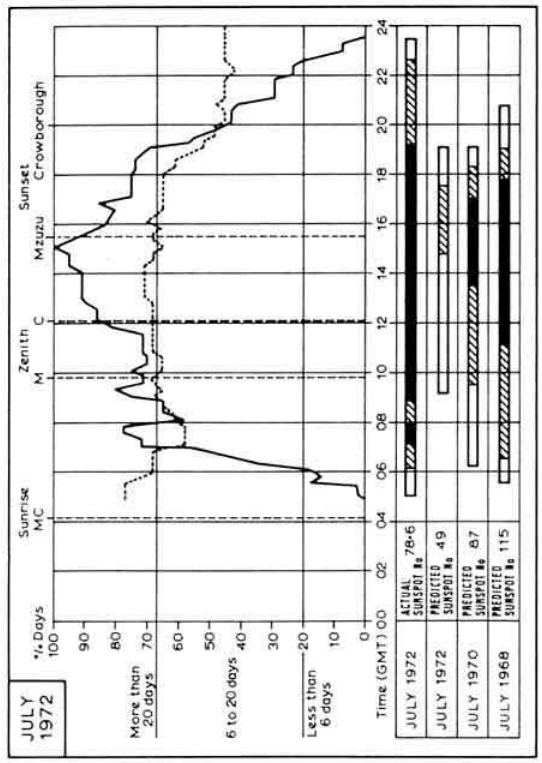
A particularly notable day was 15 June, when after several QSOs between 7Q7LZ and European stations from 2112 onwards, the beacon was observed to be still coming through weakly at 2222. The next CQ call from 7Q7LZ brought a reply from G3DME and reports of RS33 were exchanged on ssb between 2225 and 2237 on a frequency of 28·540MHz. Then followed contacts with DJ0UC, I3CGH and HB9ATX, the latter reporting the 7Q7LZ ssb at RS56 until 2315. The beacon had disappeared by this time, but the night's excitement was not yet over, for VK2ADE in Sydney was then heard at 2330 calling CQ on ssb at RS56. He was answered by an inaudible W6 and checks soon showed that he was indeed being received at 7Q7LZ via the long path over North America. The VK2 faded out at 2345 and a tired 7Q7LZ dropped into bed at nearly 2am local time, nevertheless being sufficiently alert next morning to log the appearance of GB3SX on 16 June at 0545.

Notes on observations for June

5	Daily sunspot number 132, highest for month
8–11	No observations made
13	Daily sunspot number 43, lowest for month
15	Disturbance at 1300, BBC 25·650MHz affected, GB3SX absent 1300–1345, conditions normal by 1500
17	BBC 25·650MHz weak from 0900. No observations 1015–1600. GB3SX not heard
18	No signals from GB3SX or BBC 25·650MHz all day
21	Disturbance between 0915–0930 affected BBC 25·650 MHz, removed GB3SX till 1015
22	Disturbance at 1230 affected BBC 25·650MHz, removed GB3SX till 1300
25	Disturbance at about 1230 affected BBC 25·650MHz, removed GB3SX till 1330

Those who suffer poor conditions at hf may console themselves that simultaneously their vhf colleagues often find conditions much better than usual. The poor conditions of 18 June were apparently associated with an aurora which favoured 2m in Europe [2].





Notes on observations for July

3	Earliest recorded appearance of GB3SX at some time before 0500, fading rapidly to noise level at 0515, re-appearing at 0615
8	BBC 25·650MHz first appeared at 1315 and GB3SX at 1415. GB3SX faded at 1515, BBC weak till 1615 close-down
9	GB3SX off the air due to power failure from 1600. 7Q7LZ worked G3UHT on ssb at 1645
10	GB3SX off the air all day. BBC 25·650MHz strong 0900–1530, slightly weaker 1530–1615
11	GB3SX on the air from 0800 but not heard till 1200
14–15	No observations made
18	GB3SX changed from dipole to ⅝-wave vertical at 1700. Signals disappeared from this time onwards—co-incidence?
19	GB3SX reverted to dipole at 0800, changed again to vertical at 1100. Strong signals noted during monitoring period 1045–1700
21	Disturbance at 1045 affected BBC 25·650MHz, removed GB3SX till 1100
25	BBC 25·650MHz weak 0900–1400, strong 1400–1615. No signals heard from GB3SX
27	Latest recorded disappearance of GB3SX at 2330

July 1972

The latest predicted sunspot number for July published in *Radio Communication* was 49, but a forecast of 59 was made in *QUAX*, replacing an earlier one of 49. The provisional smoothed sunspot number for July was 78·6, with the greatest solar activity in the last week of the month. The frequency of observation of the beacon hardly dropped below 60 per cent for any time of the day until after 1800.

August 1972

The latest prediction for August in *Radio Communication* was for a sunspot number of 47, but a forecast of 57 was made in *QUAX*, replacing an earlier one of 47. The provisional smoothed sunspot number for August was 73·8 with an even distribution of activity throughout the month except for a period of intense activity from 29 to 31 August with the daily figure reaching 147 on 29 August. Frequency of observation of the beacon was hardly below 60 per cent for any time of the day.

Notes on observations for August

4	Dellinger fadeout at 0625. Disturbance at 1115. No signals received from GB3SX. BBC 25·650MHz very weak all day 0900–1615
5	GB3SX not heard before 1000 nor after 1515. Noted very weakly 1300–1430. BBC normal
6	GB3SX noted at 0900, faded by 1015. BBC normal
7	GB3SX noted very weakly at 1200, faded by 1445. Disturbance at 1445 affected BBC 25·650MHz
8	GB3SX appeared at 0845, weak all day, very weak after 1800, still present 2100. BBC normal
9	GB3SX not appeared by 1015. Observed very weakly 1600–1700
10	GB3SX appeared at 1530, extremely weak by 1815, noted absent at 1915. BBC 25·650MHz weak
11	Disturbance at 1230 affected BBC 25·650MHz, removed GB3SX. GB3SX appeared sometime after 1300, noted between 1415–2245

The main event was the disturbance of early August. A flare region on the sun responsible for the disturbance was spotted by Orbiting Solar Observatory 7 on 30 July before that region became visible from the earth due to the sun's rotation. A major disturbance was therefore predicted, albeit at very short notice. The disturbed period officially began at 0400 on 4 August and lasted till 2000 on 11 August. In the diary of events for August, comments are included on the reception of GB3SX and the BBC on 25·650MHz for every day of this period, but there are no other comments of note outside this period.

The beginning of the disturbance was marked in Malawi by a Dellinger fade-out commencing about 0625 on 4 August. The accompanying noise was not so prolonged nor so strong as in the 28 May event and had largely subsided by 0632. The only signal then to be heard throughout the hf spectrum was Radio Brazzaville, on 21·500MHz, which itself disappeared at 0637. Signals began to return by 0648 and Radio Prague on 21·700MHz was heard opening at 0700. At 0705, the BBC Atlantic Relay Station on Ascension Island was heard relaying the BBC World Service on 15·420MHz. This station would have been in darkness at the time of the event. The BBC on 25·650MHz was very weak at 0900, somewhat better after 1045, but a further slight disturbance at 1120 produced a setback and signals remained poor until the close at 1615. Not surprisingly, GB3SX failed to make an appearance at any time.

Once again, while hf operators were shedding tears, vhf operators had a field day on 5 August in the wake of the consequent aurora [3]. The events of early August were also described by BRS15744 [4].

Further comments on the G-7Q7 path

The monthly summaries hide the fact that, as has already been stated, there were no two days alike throughout the whole period and it is therefore impossible to describe a "typical" day. One trend which did show up, however, was that on a considerable number of occasions an early opening was followed by a period when the signal was absent for an hour or so before returning later in the morning. This trend is revealed in Fig 1 in the curve for July but has become obscured in the remaining three because of the considerable variations in the timing and duration of the early opening. Even on days where there was no discontinuity there was a tendency for a reduction in signal strength some time after the initial opening. These early openings were perpetually missed by the vast majority of 10m stations in Europe.

The Mauritius beacon 3B8MS could be heard after dawn before the long skip conditions set in. An early appearance of GB3SX was associated with the early disappearance of 3B8MS, which was then not heard again for the rest of the day. Conversely, on those rare days when there was no opening to Europe, 3B8MS could be heard until at least sunset.

It is fairly well known that stations in the south of England are more favourably placed for working dx on 10m than their northern brethren. This effect has been observed from Trinidad in 1966 on 21MHz and from Malawi on 28MHz over the last six years with regard to Europe as a whole. The more northerly the latitude in Europe, the later does 10m open and the earlier does it close, and indeed there is progressively less chance of it opening at all. Also, some of the best signals from southern Europe, north Africa and the

Middle East have been heard when there is no propagation to northern and western Europe. On many occasions this has been true during the evening following excellent conditions to western Europe when Middle East stations have continued to come through after the European signals have faded.

Validity of the results

The frequency of observation for any quarter-hour period from 0500 to 2330 was well over 50 per cent for much of the time. The fact that the first week of May was not included in the records does not appear to have materially altered the pattern for May in comparison with the other months. Thus, without subjecting the data to tests of statistical significance it would appear that a fairly accurate picture of what actually took place has been obtained. Further evidence is provided by the apparent degree of superiority of actual propagation conditions to predictions being fairly consistent in all four months.

Secondly, even the results obtained slightly underestimate the true situation for two reasons:

(a) To allow comparison between calendar months of differing length it was decided to use percentages rather than days on the vertical axes, so that the lines drawn at the 20 per cent and 67 per cent points represent the 6- and 20-day points only in a 30-day month. As three of the four months were of 31 days the circuit reliability in these cases has been slightly underestimated.

(b) The results obtained in Malawi have been compared with the predictions for the path to South Africa. As the path to Malawi lies to the east of that to South Africa, it would be expected that 28MHz would close to Malawi slightly earlier than to South Africa.

Considering that the GB3SX input power is only 25W, that for much of the time the aerial was a half-wave dipole firing E-W, and that the receiver noise factor and bandwidth at 7Q7LZ could have been improved, it is conceivable that there were occasions when the GB3SX signal was only just below the noise level and a few decibels gain at any of these points in the circuit would have extended the periods during which reception was possible.

To be set against this, however, it must be remembered that it is one thing to detect a very weak signal only just above the noise level and to copy its already-known callsign, and quite another to identify the callsign of an unknown station of similar strength who is calling CQ. For this reason the writers are convinced that the usefulness of the hf beacon network is enhanced by the beacons using only modest power and omni-directional aerials. There may be arguments for using high power and directional aerials for automatic recording over particular circuits, particularly at vhf, but the results from the present study were obtained under typical amateur conditions and herein lies their value.

Even if detailed records had not been kept, the fact that there are only 5½ hours in the day when the GB3SX signal was *not* heard at some time at 7Q7LZ is remarkable in itself.

Conclusions

It seems apparent that conventional multi-hop propagation theory will not satisfactorily explain the results achieved, or else extremely conservative forecasts are being made. Interest in out-of-the-ordinary propagation seems to have been on the increase recently and attention is drawn to recent correspondence from G8JD [5], G3USF [6], 9M2DQ [7] and G6XN [8], and to comments by G3VA [9]. It is not the intention here to theorize but merely to add a piece of evidence to the growing amount already available. Lest it be thought that only an intensive study such as the one described above can make a worthwhile contribution, it must be emphasized that all reports on the reception of hf beacons are useful and will be welcome.

However, the more regular the observations the more value they have. The daily or near daily checks at selected times are the best, short of continuous recording, which is hardly practicable for an amateur station.

In closing, it should be noted that the beacon service has two aims. The first, of most direct interest to amateur operators, is the provision of a signal for a rough assessment of the chances of a contact with a particular area or to check the operation of a receiver or aerial system. The second is the derivation of better data for the improvement of propagation predictions, which, since it will be of assistance to professional radio communication engineers, will reflect to the credit of the amateur radio service.

References from "Radio Communication"

[1] "Four metres and down", July 1972, p 460.
[2] "Four metres and down", August 1972, p 530.
[3] "Four metres and down", September 1972, p 605.
[4] R. A. Ham, "A natural event", September 1972, p 577.
[5] "Your opinion" (letter from F. L. Firth, G8JD), October 1972, p 688.
[6] "Your opinion" (letter from Martin Harrison, G3USF), December 1972, p 828.
[7] "Your opinion" (letter from J. C. Pershouse, 9M2DQ), March 1973, p 202.
[8] "Your opinion" (letter from Leslie Moxon, G6XN), March 1973, p 203.
[9] J. P. Hawker, "Thoughts and facts on chordal hop" (Technical Topics), January 1973, p 35.

The RSGB News Bulletin Service

The RSGB News Bulletin, callsign GB2RS, is broadcast every Sunday morning. This bulletin can be received on either vhf or hf, which gives almost complete coverage of the British Isles. It keeps radio amateurs up-to-date about happenings in the world of amateur radio and gives information on coming events, supplementing and bridging the gap between successive issues of *Radio Communication*.

SCHEDULE

Time	Frequency (MHz)	Location and coverage (hf) or beam heading (vhf) of station
0930	3·6	Bromley, Kent (SE England)
1000	3·6	Cheltenham (SW England)
	145·8	Aberdeen (NNW)
	145·095	Farnham, Surrey (NE)
1015	3·6	Belfast, (N. Ireland)
	145·8	Bangor, Co Down (N)
1030	3·6	Derby (N. Midlands)
	144·337	Weston-super-Mare (NW)
	145·8	Aberdeen (SW)
	145·89	Bishop Auckland (N)
	145·3	Sutton Coldfield (NW)
1045	145·89	Bishop Auckland (E)
	145·095	Farnham, Surrey (SW)
1100	3·6	Bridlington (NE England)
	144·3	Sutton Coldfield (SW)
1130	3·6	Motherwell (S Central Scotland)
	145·5	Bradford (NE)
1200	145·5	Bradford (SE)
	3·6	Aberdeen (NE Scotland)

TECHNICAL TOPICS

by PAT HAWKER, G3VA

SOMETIMES it seems that one of the most common misconceptions and artificial barriers in amateur radio in the UK is that today all real experimentation and progress stem from vhf rather than hf, and that hf has nothing to offer but a rather misguided rat-race or paper-chase with long-standardized systems and circuit techniques. In practice vhf and hf techniques are steadily converging, with much of the initial development at hf, and then spreading gradually up through the spectrum.

One can well understand that 20 to 25 years ago there was an urgent need to encourage many more amateurs to have a go on vhf and this led to a partly conscious, partly subconscious urge to create an elitist image of devoted "metre-men" blazing new trails while their hf colleagues were little more than stick-in-the-mud morons. But that need has gone. Today with Class B licensees contributing a significant proportion of all activity and providing a built-in inducement to operate exclusively on vhf, the position has been virtually turned upside down. Now there is actually a need to convince amateurs that not only vhf (not to mention uhf and microwaves) but also hf still provides excellent opportunities for genuine development work, and that throughout much of the spectrum problems and solutions are closely allied. That, for example, the greater knowledge that has been gained in recent years about long-distance propagation on Top Band is as valuable as the investigations into vhf tropo. Long live experimentation on vhf *and* hf. 30MHz is not the beginning nor the end of amateur radio—either way.

Crystal-stabilized vfo

Not many months ago we included some strong words of warning, backed up by support from Barry Priestley, G3JGO, on the design of over-simple frequency synthesizers. It was then pointed out that some of the techniques being advocated for amateur use ignored the very appreciable dangers of excessive spurii and/or oscillator fm sideband noise and jitter, and could result in the creation of more problems than they solved.

But a recent letter from Dick Rollema, PA0SE, who conducts the *Reflecties* column in *Electron* provides details of a highly interesting and promising form of vfo control recently developed by the ever ingenious Klaus Spaargaren, PA0KSB.

PA0KSB is convinced that too many of the techniques so far described in the amateur journals skip rather too lightly over many aspects of spurious products and fm noise. Nevertheless in the course of recent delving into applications of phase-lock-loops he has come up with a system that seems highly promising for amateur applications. In essence it amounts to a vfo that automatically locks to a multiple of a predetermined small incremental step that can be made as small as 25Hz, so that one ends up with a stable oscillator that can be tuned through steps sufficiently small as to permit tuning an ssb signal.

This system was described in the April issue of *Electron* and Dick Rollema has kindly prepared an English translation of this *Reflecties* item: Fig 1 shows the heart of the unit.

PA0KSB wrote: "The timing signal, derived from a crystal oscillator via a divider chain, opens and closes the gate of an 7400-type device for an exactly predetermined period, which in my case is 0·2s open and 0·25s closed. When the gate is open, the 74191 binary counter counts the incoming signal from the vfo, which in my unit operates around 5MHz. When the gate closes, the final digit remains in the binary counter.

"Next it is checked whether this digit is greater or less than 8. In the case of digits 0 to 7, the 2^3 output (pin number 6) indicates zero volts; but with digits 8 to 15, the output is a logic 1. The result of this check is stored in a 7474 D-type bistable device as follows: when the gate signal goes to zero the first of the 74121 single-shot circuits triggers, followed by the second single-shot which clocks the '1' or the '0' from the counter into the 7474 memory. Immediately afterwards, the third of the single-shot 74121 devices resets the counter. If the 2^3 output was zero, this means that the input frequency can be regarded as 'too low', the '0' goes into the memory, and the Q-output becomes '1'. The voltage across the output capacitor C starts to rise; this affects the varicap tuning diode in the vfo, and the vfo frequency rises.

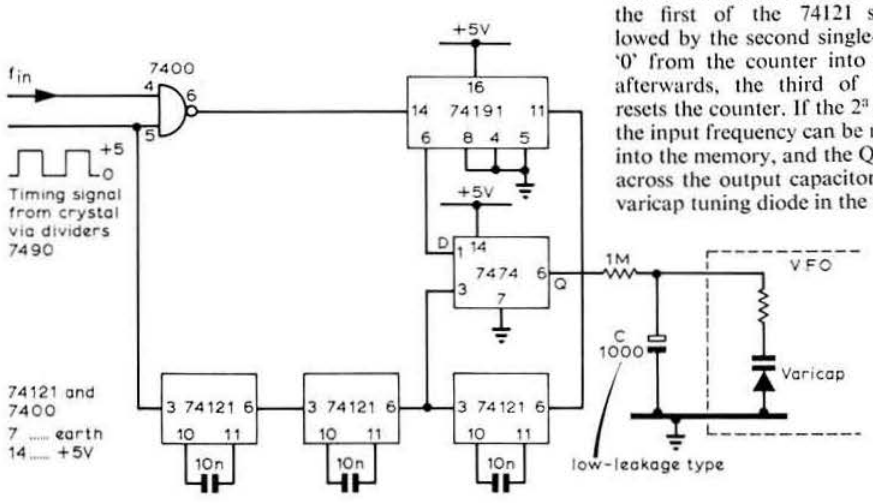


Fig 1. Heart of the circuit developed by PA0KSB that enables the output signal from a vfo (not shown) to be precisely synchronized on frequencies that increase in 50Hz steps by means of crystal-controlled timing signals. The electrolytic capacitor C should be a low leakage type

"On the other hand if after, say, the following timing period, a '1' appears on the 2^3 output of the counter, this will mean that the frequency is now 'too high' and this time the effect of the vfo is to pull down the frequency during the following counting period. So there will be no precisely stable point but the frequency will always keep swinging a few hertz around the value where the counter measures an 8 for the final digit; sometimes this may be 6 or 7, other times 8 or 9.

"It thus makes no difference what the actual frequency of the vfo may be; the only digit that affects the control loop is the final digit with the cross-over point, so to speak, between the '7' and the '8'. If as a result for instance of temperature changes the frequency is tending to drift a little higher or lower, the control arrangement corrects this tendency and ensures that the last digit in the counter will remain about 8.

"If the measuring periods were exactly one second, then one 'bit' in the counter would correspond to 1Hz; the next locking point would be either 10Hz higher or lower. With 0·2s measuring periods the locking points are spaced every 50Hz."

Clearly it is desirable that the control of the vfo is not so slow that during any one correction period the desired output frequency is overshot too far; on the other hand it must not be too fast to follow slow drift. This "inertia" is the reason that one does not even notice the "correction" control when tuning the vfo manually. It is only when the control knob is released that the frequency creeps towards the nearest "locking"point and then stays there. It is possible, says PA0KSB, to blow into the vfo with an electric heater without observing any frequency drift!

PA0KSB set up a prototype circuit on these lines and it worked straight away. He found that locking points spaced at 50Hz intervals was rather too large a step for precise ssb operation, but that 25Hz steps provided a completely acceptable solution; this can be achieved by making the measuring intervals 0·4s.

It will be appreciated that this form of control will not compensate for fm-hum or sidebands, microphony or any very fast frequency variations due to transients etc in the supply voltage to the oscillator. On the other hand the varicap tuning diode will not be subjected to any high frequencies in the control voltage, so that there should be no extra noise or spurious fm generated (PA0KSB believes that most published amateur designs making use of phase-locked oscillators are prone to excessive spurious fm, but that is another matter).

As a result of his experiments on what is still a prototype, PA0KSB is convinced that this is a practicable technique. The frequency control system is still, he feels, capable of further improvement, for example the correction might be made proportional to the frequency deviation) and the time circuit arrangement of 1MΩ and 1,000μF could be better proportioned.

It is not necessary to derive the gating signal from a 1,000 or 100kHz crystal; in fact any crystal can be used so long as the division factor is chosen to obtain the required timing intervals and hence resolution. The 74191 device operates up to about 30MHz; for higher frequencies (up to about 50MHz) a type 74196 device could be used.

This vfo-stabilizing technique would seem to be along comparable lines to the "Racalator" form of control but with a degree of tolerance that makes it highly suitable for amateur operation. Since one is using a dc control system in conjunction with a fundamental oscillator, there will be clearly none of the problems of spurious mixer products associated with some types of frequency synthesis.

In fact it seems to represent a vfo technique that could be extremely useful for either hf or vhf operation—and we would be interested to hear from anyone who gives the idea a try.

Push-pull with pi-networks

During the era when I first became interested in amateur radio, the ambition and ideal of most of us was to have a push-pull power amplifier (actually since I ran a T20 triode p.a. pre-war it was not until later that I achieved this ambition). The idea of operating two or more valves in parallel was severely frowned upon. It was not until well after the second world war, when the unbalanced pi-network became the accepted system, that parallelled valves once more became respectable and the norm.

To quote from those now far-off days (*The Amateur Radio Handbook*, 1st edn, 1939): "The push-pull circuit is always to be preferred to the single-ended amplifier from the point of view of performance. Neutralizing adjustments are constant with change of frequency and band; the problem of feeding the aerial is simplified because capacitances to various parts of the circuit may be kept balanced. In addition it is easier to keep the circulating rf power within the stage, furthermore harmonic output is considerably less" and so on. It is of course still recognized that a major advantage of the push-pull configuration is that the LC ratio of the tank circuit may be appreciably higher since the valve capacitances are presented in series across the coil. The problem of getting good output at 21 and 28 MHz from multiple line-output tv valves is something still very much with us even today.

So it is interesting to find that Racal have recently adopted for some of their professional communications transmitters an arrangement that enables valves in push-pull to operate into a conventional unbalanced pi-network: see Fig 2. The technique could be described loosely as a 1:1 toroid balun used to replace the conventional rf choke. Clearly the efficiency of the bi-filar choke is important and in these particular transmitters this is wound on two F16 ferrite rings (1in inner diameter by ⅝in), and wound to fill with 22 or 24swg wire. The system works best at low frequencies (below about 7MHz).

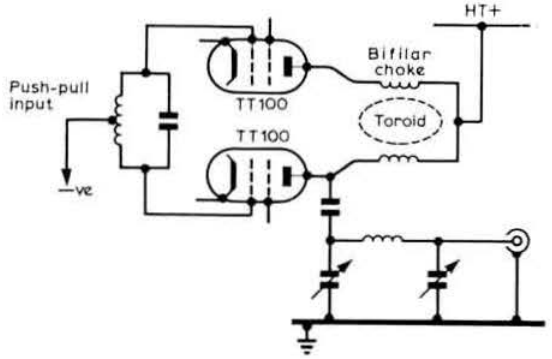


Fig 2. Technique used in some Racal transmitters which allows two valves operating in push-pull to be used in conjunction with a conventional unbalanced pi- or pi-L network

Quadrature-type nbfm crystal discriminator

Following up the recent notes in *TT* (March and May, 1973) on the value of crystal discriminators for nbfm reception, Anthony B. Plant, G3NXC, draws attention to an nbfm discriminator described by National Semiconductors on page 8 of their Application Report AN-26. This shows the use of a crystal as a substitute for the usual LC tuned circuit of a quadrature-type fm discriminator: Fig 3.

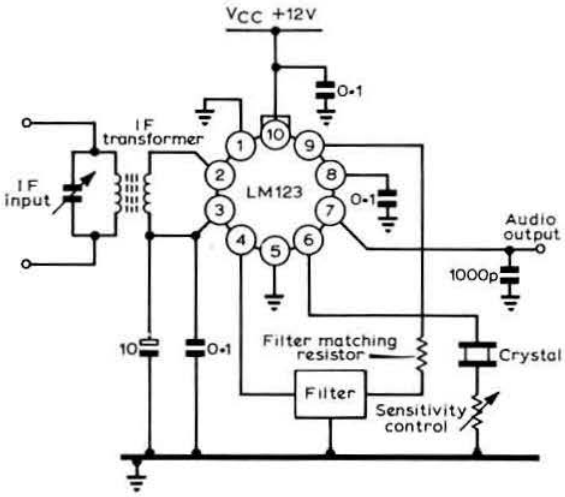


Fig 3. Quadrature-type nbfm discriminator using a quartz crystal allowing good sensitivity to be achieved at 10·7MHz

G3NXC adds: "An interesting feature is the resistor in series with the crystal; the adjustment of this resistor varies the deviation sensitivity. This suggests the idea of a front panel calibrated for 'well adjusted signals' at one end to 'for idiots with the fm deviation turned up much too far' at the other end!"

The application note comments that the crystal must be a fundamental mode device and that best results are obtained with the crystal operated at its series resonant frequency. Some representative performance figures indicate that 300mV peak-to-peak of audio output can be obtained from a deviation of ± 3kHz at an i.f. of 10·7MHz.

Plug-in to tvi

From Peter Clayton, G4ANQ, comes a timely reminder that when chasing tvi problems it is worth remembering that the "rusty-bolt" effect (unintentional and often unsuspected diode harmonic generator) can turn up in curious guises. He has come across one cause of this effect that he believes is quite common but which he has never seen mentioned in print—the crimped rather than soldered tv coaxial feeder plug.

He writes: "The amateur investigating a case of tvi should, as a matter of course, cut off an existing Belling Lee plug from the aerial feeder and fit a new component. In practice, unfortunately many of us rely on the 'swift tug' test and then check the continuity of aerial and feeder with a meter. As an efficiency test this simply is not good enough since many plugs stand up to this test and yet can still be the cause of the tvi. In fact the diagnostic process is actually misleading since pulling out the feeder clears the problem and yet, all too often, the subsequent fitting of high pass filters and braid-breakers fails to correct it. In the circumstances the situation may be written off as incurable tvi and the amateur goes silent; all for the sake of a 'two-bob' plug.

"The problem is caused because many so-called tv aerial erectors and installers have found that the centre core of uhf low-loss coaxial very nearly fits the spigot of a Belling Lee plug. So what could be simpler than crimping the plug with side cutters to 'complete' the connection? This process, may mean that it subsequently requires a pull of several pounds to remove the core of the coaxial, but the diode formed by the poor electrical connection after some months in use can generate harmonics well up into the uhf region, while completely bypassing the high-pass filters."

G4ANQ feels that this malpractice should be brought to the attention of aerial installers in the hope that the number of unwanted diodes might be reduced. In practice this is a difficult section of the television trade to get through to since many aerials are installed on a sub-contract basis by individuals who may be good at coping with ladders and heights but often have only the vaguest idea of the electronics!

Amidon high-frequency toroids

On a number of occasions (for example, "The Mountaineer" ultra-portable cw transmitter, March 1973) we have noted the use in American designs of Amidon toroids. A note from J. H. Jones, GW3TMF, provides the useful information that his recently established firm—T.M.P. (Electronic Supplies)—holds this range in stock, including such items as T-30-2, T-50-2, T-106-2 and the large (1·3in od) T-130-2. Details from T.M.P. (Electronic Supplies), 3 Bryn Clyd, Leeswood, Mold, Flintshire CH7 4RU, North Wales.

The T.M.P. data sheet includes some useful coil winding notes applicable to small coils and bifilars, as follows:

(1) You cannot tap part of a turn on a toroid form. Any time the wire goes through the hole, that is effectively *one* turn.

(2) Try to wind turns just tight enough to keep them sliding around, but not too tight. Coils will have a higher figure of merit if wound loosely; also avoid crossovers.

(3) Avoid the use of epoxies and cements to hold windings on small coils; they increase distributed capacitance, decreasing the number of turns you can use, and causing the coil to have a lower figure of merit. Tight windings and crossovers have the same effect, but to a lesser degree. Nylon screws are the best mounting medium and will hold turns in place.

(4) Low impedance link turns can be wound over any other windings; space link winding evenly around core for optimum results.

Feeding quad and loop elements

Two variations on the basic theme of matching coaxial feeders to loop and quad elements have been noted recently. Fig 4(a) shows the "X-ray delta match" of N. J. Sandbergen, PA0XD, as published in *Electron* (April 1972) and is interesting in that it appears to eliminate the need for the series capacitor of the usual gamma match system. The line is spaced about 5cm from the element wire and point P is respectively 110cm, 160cm and 220cm from the insulator on 28, 21 and 14MHz. For 28MHz he uses 60Ω coaxial, for the other bands 70Ω. It is claimed that an swr of virtually 1:1 can be achieved.

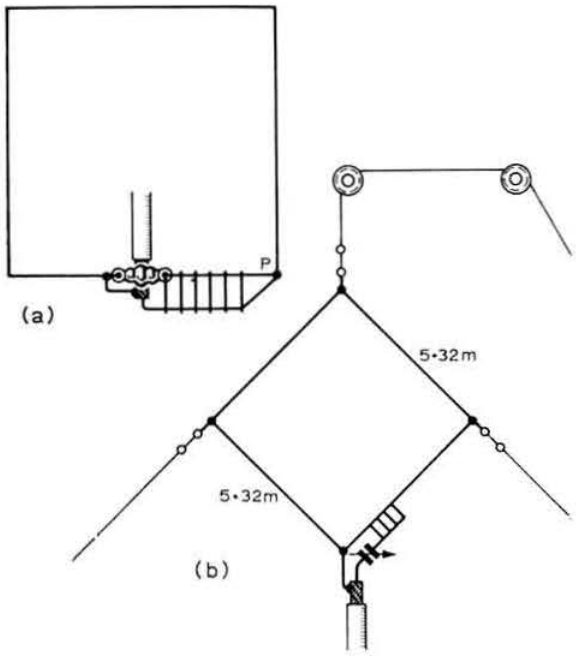


Fig 4. (a) X-ray delta match for loop or quad element described by PA0XD; (b) Gamma match arrangement from the Belgian journal *CQ/QSO*

Fig 4(b) shows an arrangement described in the Belgian journal *CQ/QSO* (May 1973) using the more orthodox gamma match. The element sides are given as 5·32m, 3·52m and 2·72m for 14, 21 and 28MHz respectively. The length of the gamma section (spaced off 10cm) and the capacitance is given as 1·30m (200pF), 1·10m (150pF) and 0·90m (100pF).

Tuning quad reflectors

In *Amateur Radio* (February 1973) S. E. Molen, VK2SG, writes a detailed article on "Tuning the quad—the easy way". He emphasizes that the reflector should be the first element to be tuned and outlines his method of doing this as follows; noting that it is not sufficiently accurate just to assume that this should be five per cent longer than the driven element:

"We set about tuning the reflector with a few very simple tools. If you take a lead from the S-meter of your receiver so that you can take the meter to the quad, you can tune the reflector on your own. The tools needed will be the extended S-meter, a long-shank screwdriver and a soldering iron—that is all. Of course you also need an external signal which must not be too strong as this could be misleading. It was found that a 12AT7 crystal oscillator with the second half as doubler, tripler or quadrupler, 120V ht, about 300ft from the reflector provided an adequate signal. Too much signal may give a false indication, for example two dips with a rise above normal between them. Keep the signal about 30dB above receiver noise, typically S7.

"Now to tune the reflector. Turn the back of the quad (reflector) on to the incoming signal, grasp the bottom of the stub in your hand and with the long shank screwdriver short out the stub at the top. Now watching your S-meter slide the screwdriver down the stub maintaining the short-circuit until the S-meter dips: see Fig 5. Carefully checking this point for minimum signal, put a wire link across the point, check it again to make sure you have the exact point, and solder it. Do the same for the other bands . . . it's as easy as that."

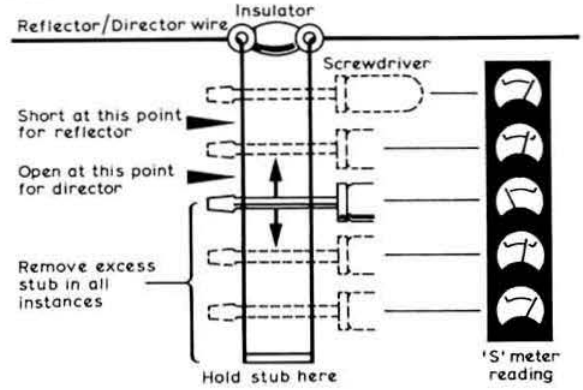


Fig 5. VK2SG's method of tuning quad reflector and director elements

It will be noted that this method assumes that maximum rejection of the signal will coincide with the required maximum forward gain—some might not agree that this will always be true.

Later in his article, VK2SG gives a useful rule of thumb for tuning quads when near the ground. He says allow 75kHz for the first 30ft rise and 25kHz for every 20ft above this—ie if tuning for 14,200kHz operational, tune for about 14,100kHz if the aerial is to be lifted to about 40–50ft.

Remote tuning quad reflectors

An ingenious alternative procedure to that outlined above has been brought to our notice by Pat King, G3PVA. It stems from an article by Peter Lovelock, W6AJZ, "Remote quad tuning" which appeared in *CQ Magazine* (November 1970).

W6AJZ points out that the adjustment of a quad reflector is quite critical if optimum performance is to be achieved; he suggests that a $\frac{1}{2}$in adjustment to a shorting bar as used above can "make the difference between a directional quad and a bi-directional stacked dipole".

He notes that the three basic methods of tuning quad reflectors are those shown in Fig 6. His own remote tuning technique is an adaptation of the arrangement of Fig 6(b) and consists, in effect, of adding to the stub additional half-wavelength resonant stubs. He points out that the addition of a $\frac{1}{2}\lambda$ stub means that the inductive reactance across its far end will exactly reflect the inductive reactance across the near end. This means that the tuning capacitor can simply be transferred to the far end of the now long stub: Fig 7. By adding one or more half-wavelengths of transmission line, the capacitor can be brought into the operating shack, making it simple to set up or check the setting at any time, using the receiver S-meter. While ideally this stub would be open-wire transmission line, he points out that the standard American tv-type 300Ω flat line or tubular

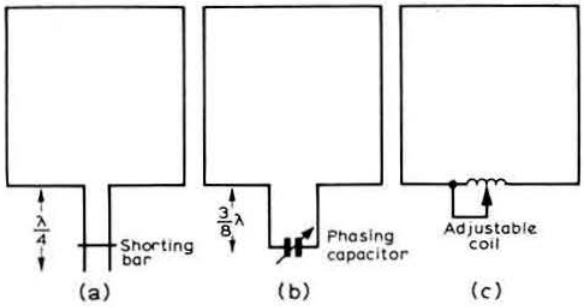


Fig 6. Basic methods of tuning quad reflectors

feeder will work almost as well provided the velocity factor is taken into account when calculating the electrical half-wavelengths (open wire about 0·975, flat or tubular 300Ω feeder about 0·82).

With the tuning capacitors mounted in a box at the operating position, it is claimed to be quite simple to tune up the reflector for maximum gain on any suitable ground-wave signal. In this case it is assumed that the driven element has already been adjusted for resonance.

G3PVA reports that he has tried the system and adds, "Believe me it works and works very well indeed. When the object is maximum front/back ratio it is fascinating to hear signals disappear off the back when the optimum tune-point is reached. When the driven element is optimized for minimum swr with the reflector tuned for maximum f/b ratio, the swr is somewhat degraded when the reflector is tuned for optimum forward gain by this method—but this seems to be of no practical consequence."

G3PVA, after six years use of a two-element 14MHz quad, is hoping to replace this with a delta-loop arrangement. He has carried out many tests with VE1YY and VE1AEL, both of whom use the delta configuration, and he has been very impressed by the results; this he feels may be in part because of its unique construction that provides an extra 13ft or so of aerial height without an increase of mast height, providing additional low-angle radiation potential. He reports that Harry Habig, K8ANV, now suggests that the driven element of a triangular loop should be based on the formula $975/f$ feet rather than $1005/f$ as this has proven to be more accurate in practice.

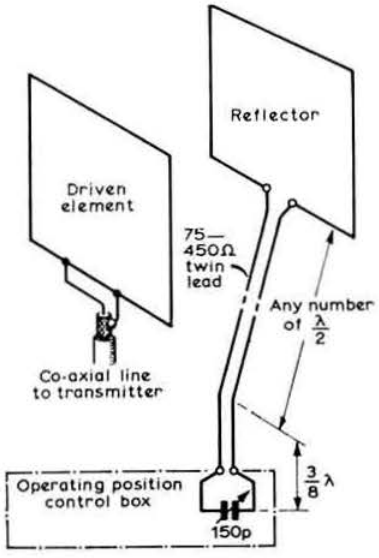


Fig 7. The W6AJZ technique for remote tuning of quad reflector allowing adjustment to be carried out from the shack

Galvanized wire in earthing systems

The recent item on aluminium earthing systems (*TT* April 1973) has encouraged M. R. Brooks, G3XGB, to suggest an even cheaper alternative: common or garden galvanized iron wire. His earthing system consists of various metal objects buried or driven into the front and back gardens, all connected to the shack using heavy gauge galvanized iron wire. The resistance of this system (measured on an Avo against mains earth) is usually between 2 and 4Ω: the only copper wire in the system is for lightning protection.

G3XGB considers that the advantages of GI wire are its toughness, ease of soldering and, of course, its cheapness; he has also found it reasonably durable. He has also used aluminium garden wire for an aerial, with no significant difference noted on 3·5 or 1·8MHz.

I should perhaps have added in my original reference to the work of All-India Radio that although their prime task was to investigate aluminium wire, the experiments also included some investigation of galvanized iron radials. Although the earth resistances obtained tended to be a little higher than with either aluminium or copper, the published results bear out G3XGB's belief that very acceptable results can be obtained with this material. There is in fact very little doubt that very effective earthing systems can be made from copper, aluminium or galvanized iron wires.

Circular polarization for 144MHz?

Most amateurs tend to associate circular polarization—that is an electromagnetic wave with a continuously rotating electrical field vector—either with helical aerials or with space communications. Admittedly it has proved most important in space applications since it is virtually essential for the reception of signals from spin-stabilized satellites.

But a few years ago there was a flurry of excitement among broadcasting engineers when American vhf/fm stations began adopting circular polarization for normal domestic broadcasting. The main reason for this innovation was the wish to provide signals which, while remaining suitable for reception on the conventional horizontally polarized roof-top aerials, would provide better results for those listening on car radios usually dependent on vertical whip aerials, or with the portable receivers with pull-out telescopic aerials, again usually vertically polarized—in this case the effect is more noticeable out of doors, since vhf signals seldom retain precisely their original plane of polarization when penetrating indoors.

A considerable number of papers have been published as a result of tests carried out with broadcast reception in the USA. For example, one was presented by John Ryan of the Jampro Antenna Company at the 1968 International Broadcasting Convention in London. This paper claimed very impressive improvement over linear polarized signals; by adding an equal amount of vertically polarized radiation it was found that car radios benefited to the extent of 15·6 to 16·8dB; domestic sets using short lengths of wire or foil on the back of the cabinets

("pig-tails") by about 7·3 to 8·6dB; and so on down to about 3·8 to 5dB improvement with outdoor aerials (it will be noted that these figures do not take into account the 3dB loss that applies when the transmitted signal is power limited since it assumes an additional vertical component).

But even allowing for the wish to present figures as favourable as possible to circular polarization, there is little doubt that the technique is now fully accepted as providing worthwhile improvement. The BBC has adopted slant polarization at some of its local radio stations (it would be difficult for the Corporation to change the polarization of the transmissions from the main vhf/fm transmitter network since these are based largely on slotted cylinder aerials forming part of combined radio and television installations). The IBA, in planning its new vhf/fm stations for independent local radio, has adopted circular polarization for all sites where a new aerial has to be installed. This means that virtually all of these stations will be using circular polarization from the outset; in fact the first aerial of this type has recently been installed at the top of the Band III television transmitter mast at Croydon, although tests have not yet started.

It will be appreciated that the adoption of circular polarization is not intended to extend the service area of such stations, but to provide more consistent reception within the area, and to encourage the use in the UK of vhf/fm car radios, which at present represent only a tiny percentage of car broadcast receivers.

We have already in *TT* referred on several occasions to work on dual-polarized hf aerials, which are almost certainly effective in reducing fading. In vhf there has been available for some time the J-Beam "Moonbouncer" aerial using crossed-Yagi aerials. But recently, in *VHF Communications* (Vol 5, Nr 2, May 1973), there has been a double blast intended to underline the advantages of circular polarization for conventional terrestrial operation on vhf and uhf.

A. Hock, DC0MT, writes on "Theory, advantages and types of antennas for circular polarization at uhf", and Terry Bittan, G3JVQ/DJ0BQ on "Circular polarization on two metres". G3JVQ points out that the majority of vhf signals, other than those truly line-of-sight, are seldom received at their original polarization but with some intermediate polarization between the vertical and horizontal plane; further, some signals show a slow circular polarization caused by non-constant diffraction characteristics. Similarly, DC0MT notes that on a model 10cm microwave test bench and using damp matches to represent a forest it has been found that in such conditions a vertically polarized wave may be attenuated by as much as 40dB whereas a circularly polarized wave by only 3dB.

G3JVQ reports that, in practice, on 144MHz, the use of circular polarization provided a more homogenous coverage and the signals were able to penetrate into distant valleys and screened areas much better, possibly because multiple reflections may change polarization. As might be expected, he found a very considerable advantage when working to mobile stations having vertically polarized aerials, finding it possible to make contact "over far greater distances than would be possible over the local repeater".

So one way and another a fairly strong case is building up in favour of more use and/or investigation of circular and slant polarization for amateur operation. The helical aerial is one way in which this can be achieved, but much of the present interest is based on crossed dipoles fed in quadrature—that is to say with a 90° transmission line phasing section inserted between the two arrays (a rather different technique is used in the "Moonbouncer"). A feed system, including baluns, is described by G3JVQ, see Fig 8. His article also shows a flexible arrangement by which an array can be switched to provide: (1) vertical linear polarization; (2) horizontal linear polarization; (3) circular polarization (clockwise); and (4) circular polarization (anti-clockwise).

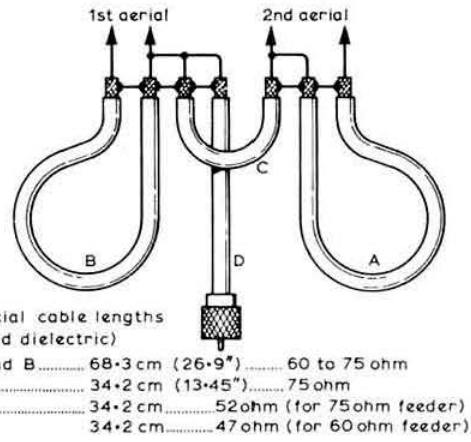


Fig 8. The arrangement used by G3JVQ/DJ0BQ to feed two crossed Yagi arrays to provide circular polarization. Both driven elements are folded dipoles

Ferrite-rod hint for "hot" transmitters

R. W. Bailey, G2QB, recently experienced some difficulties when using his SB102 on 14MHz. Normally with this rig, grid drive for cw operation is less than 0·5mA, and anode current dip at resonance can be obtained with grid drive barely discernable on the grid current meter. For several months the SB102 transceiver worked satisfactorily, and then it was found that the anode current failed to dip unless the grid drive meter reading was increased to full scale (1mA plus); at the same time the tone oscillator used as keying monitor acquired a rough note.

He found that none of these troubles occurred when the rig was operated into a non-inductive load, but re-appeared whenever it was used with a long-wire/aerial tuning unit combination. The chassis indicated a lot of rf when touched with the finger, and it was clear that the trouble was due to rf feed-back from the aerial into the transceiver. No ready cure appeared until the connecting lead between the power pack and the transceiver was wound on a ferrite rod about 6in long—this has completely cured the trouble and the rig is now perfectly docile.

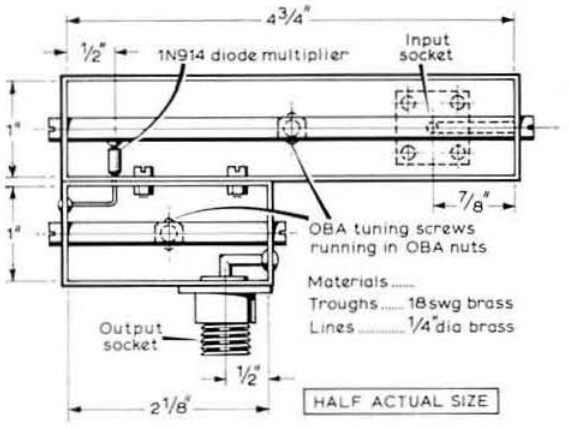
This seems a useful dodge, although it is perhaps worth reminding readers that another solution to this type of problem was offered by G3EIW in *TT* of December 1971 (also in *ART4*) which is to connect a quarter-wave counterpoise to the tuner unit on any band in which a long-wire tends to become "hot". From personal experience this is a very effective technique.

MICROWAVES—1,000MHz and up

by DAIN EVANS, G3RPE*

A simple 13cm doubler

G3ZEZ (Clacton-on-Sea) has supplied details of a doubler to 13cm which could not be much simpler. As is shown in the figure, it consists of two troughs 1in wide and 1in deep bolted together, one being tuned to 1,152MHz and the other to 2,304MHz. The $\lambda/2$ lines are set centrally in the troughs and are tuned by 0BA screws running through nuts soldered to the bottom of the troughs. The multiplier diode is a single 1N914 (1S44) which passes through a small hole drilled through the common wall of the troughs. "Surplus" diodes cost a few pence only. The doubler is driven by a QQV02-6 amplifier at 384MHz followed by a BXY35C tripler to 1,152MHz. Using a 4ft dish fed via 40ft of UR67 cable (which will have a loss of several decibels), signals have been received by G3PQR five miles away at S9 plus.



A simple 1,152/2,304MHz doubler circuit using a 1N914 diode

Simple though the device is, it should cope with any line-of-sight path easily, and could well work over paths with minor obstructions. The device is obviously capable of further development: using techniques such as developed by G8AZM in his 23cm tripler described in this column in September 1972, power outputs in the region of 1W could well be obtained. A useful addition would be the fitting of a filter between the unit and the aerial to further attenuate other harmonics of 1,152MHz. For this, a scaled version of the G8AZM 23cm filter could be used.

E-M-E listening tests

As part of the commemoration of their 50th anniversary, the Naval Research Laboratory in Washington DC took part in the e-m-e listening test using a dish 150ft in diameter. During tests on 20–21 January 11 stations were heard. In the more recent test, during 31 March-1 April, a total of 20 stations were heard. Of these eight were on 1,296MHz with signals ranging in strength from S4-S9. The strongest European was OZ3FYN at 587. PA0SSB's sideband signal was detected but was not intelligible.

On 432MHz, nine stations were heard at strengths from S5-S8, and speech was copied from VE7BBG and W6FZJ. Four 144MHz stations also were heard. PA0JMV's sideband signal, although detected, was too weak to copy.

For the record, the gain of the 150ft dish used in the tests was 53·5, 44·1 and 35dB respectively on 1,296, 432 and 144MHz, which makes amateur aerials look a little skinny. The noise factor of the 1,296MHz receiver was 2·6dB.

Wide-band operation on 3cm

The request to readers to comment on the possibility of moving wide-band operation up in frequency to that used for narrow-band operation brought in a bigger post than any previous item in the column. All said that they would be embarrassed by such a move as they were using klystrons of the 723A/B type, which generally will not tune above 10,100MHz. This information is valuable and those who wrote are thanked. It indicates clearly that we must be prepared to operate at the low end of the band for some time, as well as at the top end. There is not so much activity on the band that we can let *any* possible contact slip by omission.

Information relevant to this topic from G3WDG and G3KSU is that klystrons of the KS9-20 type, and some type 2K25, can generally be retuned to the top end of the band, in some cases to 10,500MHz. As both types are replacements for the 723A/B they are obviously worth looking out for.

Narrow-band operation on 3cm

Several people are currently experimenting with narrow-band equipment on 3cm, which precipitates the question of how wide the band is to be. The lower end is already fixed at 10,368MHz (72 × 144MHz), and clearly operation below this frequency should not be planned. The first choice could well be 2MHz, that is 10,368 to 10,370MHz, which would enable standard vhf/uhf tunable IFs already widely available to be used. And 2MHz is still a long way to tune with a narrow-band receiver, whether on 10GHz or 144MHz. This bandwidth implies that the crystal frequency be specified within ±1 part in 10,000: as this corresponds to ±13kHz at 144MHz, it should not present many problems. Actually, this range is well within the satisfactory frequency pulling range of crystals, which could simplify receiver construction by eliminating the need for tuning the second i.f.

Specifying a band wider than 2MHz does seem to raise a number of problems, and does not appear to offer any major advantages. If there are any, they would be worth knowing.

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SWL NEWS

by BOB TREACHER, BRS32525*

QSL techniques

THE subject of QSLing by SWLs seems to promote much correspondence from both licensed amateurs and from listeners themselves. Many listeners spend a great deal of time and money on obtaining printed QSL cards and sending them either direct, or in the majority of cases, via one of the bureaux which handle listener cards in the British Isles. Each listener seems to have his own idea of the details he should report on and to whom cards should be sent, but one golden rule must be remembered; the report should contain as much useful data regarding conditions, relative signal strengths, interference and fading as can be given. It is also worthwhile to listen carefully to QSOs to ascertain whether the station who is to receive the card does in fact QSL—remember a number of amateurs do not believe in pasteboards and wallpaper!

When QSLing stations on the 80m band, care must be taken not to send worthless "59 plus" reports to stations who are local as they are well aware that their signal is travelling, say, 100 miles. It has also been pointed out that a number of G stations interested in working 80m dx have received a large number of G listener cards reporting on their signals while they have been working dx stations between 3,775 and 3,800—the portion of 80m reserved for inter-continental working. They know that they are being heard in G-land and in Europe because they have taken the trouble to improve their aerials—most have inverted-V dipoles or verticals—in an attempt to work the many dx stations outside Europe which appear on 80m and thus obtain the best from this very lively band. Listener stations should be a little more selective in their reporting habits. It will save money and it will undoubtedly result in a higher rate of return on their cards.

Still on the subject of QSLs, Mark Schlüter, A7951, writes asking how to QSL the Hungarian stations which are using HA25 and HA100 prefixes during 1973. All the stations using these special prefixes are located in Budapest (HA5). To identify the station simply substitute HA5 for the special prefix—for example, HA25KHE is HA5KHE. QSL via the bureau is probably the simplest way of obtaining a card from these stations.

Points from the post

Despite being rather inactive lately, John Fitzgerald, BRS33823, did manage to hear WB6VGI/VQ9 on Chagos Is for a new country on 10m. On the lf bands OB3SGA on 160m ssb proved his best catch. As the hf bands were patchy during May because of the irregular solar activity, John concentrated his efforts on his quest for the FMD Receiving Award. He now has four countries and 21 counties confirmed towards the 5 + 30 needed.

David Mappin, A7700, advises that the Scarborough RS, G4BP, is now active every Friday evening between 1800 and 1930 on 80m. Listener reports would be appreciated.

Douglas Mellor, A7784, uses an AR88D and a Collins TCS12 receiver with a mosfet converter for 2m. This set-up is only temporary, as he will be moving to a smaller QTH in August with little or no room for aerials. However, Doug managed to hear some useful stations during May and he is obviously enjoying his radio.

Irwin Brown, BRS33211, listens to Oscar 6 regularly and has so far managed to hear 13 countries through it this year. He also reports hearing stations using special ZD8O (Ascension Is) and OK5O (to celebrate 50 years of amateur radio in Czechoslovakia) prefixes. Irwin also mentions WS3SKY which was operating from one of the Skylab flight centres.

Les Poole and Chris Henderson are having a real battle over first place in the 1973 heard table. Les has cured the interference which was plaguing him when he wrote last time. The offender was his next door neighbour's gas heating system. A 14AVQ vertical plus 80m loading coil has been purchased and Les was looking for some fine weather and some willing volunteers to help put the aerial skywards.

Chris comments on the innumerable special prefixes which were aired during May. In particular he comments on the IT57 stations which were active from Sicilly. The prefix was used to commemorate the Targa Florio road race. Chris heard 15 stations using the special prefix and has claimed the award which was run in conjunction with the prefix.

Miscellany

The Cray Valley RS rules for their fifth SWL Contest, which will take place during the weekend of 15-16 September, appear in *Contest News* in this issue.

With the increased hours of daylight and the growing static level on 40 and 80m, dx appears at unreasonable hours such as 0300. However, around midnight ZS1MH, ZS3GH, ZD7FT and TU2DO have been reported as heard on 80m which proves the usefulness of the band even during the summer months.

All updated scores for the 1973 Countries table and news and comment for inclusion in the September *SWL News* should reach the writer by 30 July 1973.

1973 COUNTRIES TABLE

	10	15	20	40	80	160	Total	Mode
BRS33358	88	170	185	80	86	4	613	ssb
A7460	71	155	205	70	104	7	612	ssb/cw
BRS33823	61	119	144	54	93	8	479	ssb
BRS33211	45	96	138	53	115	—	447	ssb
BRS6604	46	101	132	91	63	12	445	cw
BRS33364	40	113	155	49	80	6	443	ssb
BRS25429	20	87	122	68	107	6	410	
A7784	44	83	120	58	60	5	370	ssb
A8094	43	80	111	33	53	6	326	
BRS32286	14	64	87	21	80	—	266	
BRS32524	3	51	88	13	78	3	236	ssb
A8037	38	50	89	17	37	1	232	ssb
A8320	—	46	67	62	56	—	231	
A7139	5	30	28	25	41	5	134	
A8065	17	21	25	18	35	3	119	
A7951	8	16	54	8	29	3	118	ssb
A7700	8	26	42	18	20	1	115	ssb
A7511	—	16	38	8	45	4	111	

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FOUR METRES AND DOWN

by JACK HUM, G5UM*

The plan for 70cm

When the VHF Committee mulled over the G8AZU proposals for the 70cm calling procedure (*FMD* May p336) and found them good, it had in mind that they should be implemented on 1 August if no serious objections to them were raised by the membership. None have been.

Let 433·2MHz, then, be added to the list of calling frequencies to be memorized for the continued orderly use of the vhf/uhf spectrum, with the proviso that the thing to do is to get off it once contact has been established, in order to leave it clear for others. It will be remembered from what was said here in May that the plan envisages QSY to a series of nominated channels lower down the band.

Support for the plan comes from the London FM Group, with the added suggestion that Stage 3 of the 'AZU suggestion could usefully be implemented straightaway, ie call on 433·2 and move to 433·15, 433·1 or 433·05MHz at 50kHz channel spacing. Later, Stage 4 would envisage 25kHz channel spacing.

On the other hand, G8BSX of Whitton feels that the proposals are slanted towards users of "goon boxes", and that there should be less talk of "channels" when it is frequency allocations which are being discussed. He offers the timely reminder that in a space of 25kHz there is room for *five* amateur signals.

In general, over-the-air comment has it that a fixed calling frequency on 70cm is an excellent provision, but that to assign only a small part of the band as a QSY area may suggest that the radio amateur can afford to dispense with the rest. And that is far from being true.

From next month, then, try 433·2 as your calling channel, and report results and reactions to *FMD*.

The incommunicado trend

Accumulating comment on this page these last several months about mode segregation on 2m ("... fmers never ever tune to a.m." and like observations) has prompted G3CGQ of Luton to set down on paper his views on the state of play on the band today. These so aptly crystallize the present situation and will, we believe, be so widely shared that we are going to quote Bill Tyler verbatim:

"In the early days of 2m everybody hooked up with everybody else, if not on phone then on cw, and the band became a close-knit company. With changing modes of modulation people no longer communicate with other people. We are split into completely separate tribes of cw, a.m., ssb, Oscar, fm, fm mobile and fm-through-repeater. Each group maintains its separate identity and in most cases cannot contact another one, mainly because receivers cannot cope with the demodulation necessary, not to mention the separate channels used by each mode.

"I am not saying this is wrong, but I feel some bringing together of the tribes is desirable; for after all, 2m is common ground. How this reconversion is to be achieved I am at a loss to suggest, especially as there are many who *want* to remain apart, particularly those on ssb".

In all, an intensely topical subject that deserves serious review at meetings of clubs and vhf groups, maybe taking as their starting point the ninth item in the Code of Practice: "Equip yourself for receiving as many modes as possible, and bear in mind that there is no 'best' mode".

What is perfectly clear is that fractionating the gross total of 2m operators into penny packets reduces the available amount of intercommunication. And communication is what amateur radio is all about.

Oscar currencies

Excessive power by certain Continentals chops up Oscar no end, opines G6CJ: "I have actually read cw callsigns on the avc flap," he reports. He achieves best results on orbits that track well to the north, out of reach of much of Europe. Unlike commentators who have dubbed Oscar 6 a "non-event", G6CJ relishes the challenge it offers to the individual's operating technique to keep track of the satellite and to chase the Doppler shift—and this can be different at each end of the QSO. A "gotaway" was 8P6DR on Barbados: the hand calculator at G6CJ has come in useful to measure the precise moment when the island should be workable.

Another Satellite 1000 Award for Britain: G6RH has just secured No 86 from ARRL. He notched the needed 1,000 points with only five QSLs from three continents.

Another possible Oscar sheepskin, the "Worked All Canadian Call Areas via Amateur Satellite", requires stations outside Canada to work only two VE call areas via Oscar, effective after 1 January 1973. Send QSLs and 25 cents irc to VE6SF, PO Box 52, Barrhead, Alberta.

Mirabel talks

From one translator (Oscar) to another (Mirabel): the French balloon experiment with its 432MHz up frequency translated out into 2m could almost be regarded as a preview of Oscar 7, if the 70-to-2 facility is fitted to the next satellite, as seems probable.

The biggest surprise sprung by Mirabel during the 20 May launch from Nancy Airport was the appearance of OE3-XUA, successfully worked by G3LQR. Another Austrian, OE2OML, was identified by G8CCH at Basingstoke; Andrew Blockley heard a host of German, Dutch and French stations besides, nearly all on sideband at great strength. "The quickest way of contacting six countries on 70cm!" as he puts it. He triggered the Mirabel translator with 8W of rf on 432·1 and received the returns on 145·6 on a 2m six-over-six.

The 31 May Anjou III launch was equally successful, adds G8CCH. No fewer than eight F-men, an ON and a DC6, all using ssb on 70cm, were heard coming out on the down frequency of 145·6, plus several a.m. and cw and one fm. Andrew Blockley recommends looking for further launches on 4 and 29 July, 26 August and 23 September (possibly 22

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October) from 0750gmt on. To work through the balloon call on 432·4 and listen on 145·6. Check the balloon-beacon on 145·9MHz.

During the same 31 May levitation G8CFZ at St Leonards pumped 70cm skywards to such effect that he made 18 contacts with the French.

" . . . and let live"

To most of its adherents the metre-wave spectrum is the exemplar of courtesy allied to a self-regulating operating ethic that makes it a constant pleasure to use (some go so far as to say that it is the last refuge of civilized behaviour). It is all the more disturbing to learn, therefore, from a well-known London operator of many years' keying that he has been, in effect, warned off the Oscar part of 2m by a group choosing to operate a local net on 145·93, bang in the Oscar frequency area and out of zone anyway, so that even in non-Oscar periods (and that is for most of the time) it jams weak dx percolating down from Zone D.

Threatening and abusive language on the landline, says our correspondent, included promises to come on to the Oscar 10m downlink and clobber any signals received from the satellite: from which it will be inferred that these demonstrations of a sick mind have been made by Class A people and not by Class B men, who do not use 10m.

Without delving into the pros and cons of the case further, we would simply say that observance of the Code of Practice would have put it completely out of court. And our own 2m code could well be supported by "the first commandment" of The Amateur's Code which always appears at the front of the *ARRL Handbook*. Yes, *you* know what it is, and you will not thank us for repeating it, but at the risk of appearing old fashioned we will: *The Amateur is Gentlemanly . . . He never knowingly uses the air for his own amusement in such a way as to lessen the pleasure of others.* Need one say more?

"Spor on four"

Talking point of the month on 4m has been the appearance, against earlier reports of its demise, of the ZB2VHF beacon on 70·26MHz in the last days of May.

Surrey's G4BEG heard it as early as 10 May. Both he and G3ZRH at Brentwood detected intense fm broadcast activity from eastern Europe that day onwards. Thereafter the ZB2VHF reports came flooding in, including many anomalies, eg an S9 signal at one location and nil-signal at another only three dozen miles away. Then in reverse a fade-out at the first site and a build-up at the second.

"This directivity was evident on some of the east European broadcasting in the 70MHz band," says G3ZRH. Adds Tony Stokes: "On 3 May between 1635 and 1650gmt all the Czech fm stations in south-west OK-land were booming in but no others. All were intensely noise modulated at frequencies up to 30kHz." Heavy QRN, also directional, was observed on the same path.

All reporters upon the ZB2VHF signal remark that clues to "spor on four" derive from big broadcast bursts on the band but do not necessarily mean that the beacon will be there, remembering the above-mentioned "localized signal source" effect. Nevertheless, it is still worth turning beams south-west just in case.

Reports on ZB2VHF welcomed by ZB2BL, PO Box 292, Gibraltar.

Sporadic-E, common on 4m, hits 2m but rarely. A remarkable contact-in-season on 25 May on 144MHz was between PA0MOT and LZ2FA at low signal level but solid copy (a QSO is not a QSO unless reports are exchanged both ways).

Operating procedures

A fixed station on 145MHz can frequently link mobiles who are unable to hear one another. But if he stays there he will clobber them with his much stronger signal—and anyway, remembering the advice given in para 6 of the Code of Practice (*FMD* May, p337) he will wish to move off the calling channel as soon as possible. At that point any mobiles who are "fixed frequency receive" will lose him; at once the potential net will be reduced to a few mobiles within range of one another. Yes, the answer is obvious—have optional channels available *on receive* as well as transmit. If you cannot go to full auto band-scanning, a simple varicap frequency-slider may be the answer. Maximize your tuning rate and multiply your QSO rate when mobile.

Higher up 2m on the sideband calling frequency people tend to congregate on 145·41MHz, ". . . as if it were a local natter channel," as GW3ZTH puts it. "You would think they were rockbound or afraid to use their VFO/VXOs," adds Joe Ludlow. He finds it more productive to call CQ at the odd 5kHz segments offset from 145·41MHz.

* * *

Some new telegraphists tend to spell everything out when using the key. This is unnecessary. Use of the accepted abbreviations can speed up any cw contact. What are they? A few hours' solid listening at the cw end of 80m will quickly show you. After a bit of practice you will find A1 to be comparable with phone in its speed of information-transfer. For example: when GW5HD/P were roaming Wales in May they had a sked with G3DAO to give him DB, MG, CA, CR and BR, and help him towards his 2m Senior Award, telegraphy only. At each sked-time Les Hawkyard at the GW end blipped the key with "TEST TEST de GW5HD/P" once only, and there was G3DAO right back.

Difficult? Not a bit. Just a case of keeping in practice, and not, after passing the morse test, with a sigh forgetting it all.

* * *

Your callsign is unique to you. Do not be ashamed to announce it over the air *more often* than is required by the licence terms (you owe it, anyway, to others who may be listening). Note in this context the item at the top of p 388 col 2, last month.

Contest commentary

How good is your operating technique, and how efficient is your vhf station? You will be able to find out this coming weekend when the four-band Diamond Jubilee VHF/UHF Contest bursts upon the metre-wave arena—and you will be able to assess yourself against your locals, for you will be competing with others in your RSGB Zone. A busy time is in prospect for the VHF Contests Committee in adjudicating winners and runners-up in each zone, and for the VHF Certs-man in issuing the appropriate parchments in due course.

There was a hint in the published rules that this multi-bander for single-station entry could be a precursor for others similar. It might modify the dislike of two-banders

which is at present prevalent. Or it might confirm it by throwing up a poor entry for the more "difficult" bands of 4m, 70cm and 23cm. Only the results will tell.

On which subject GD2HDZ, a member not given to forcible expression of opinions, feels constrained to echo the views of G2WS, G3NHE and others on the subject of running 2m and 70cm contests concurrently. "I am quite unable to follow the reasoning of the VHF Contests Committee in making such decisions," remarks Arthur Breese, "and like Bill Scarr I shall certainly not enter any further contests run on these lines."

* * *

The always popular Region 1 VHF Contest will this year be a Diamond Jubilee event, 0900–1800gmt on 5 August. Copy of rules from G2CUZ if you send him an sae at 34 Sandbrook Road, Ainsdale, Southport PR8 3JE.

For the record (again)

It was remarked last month, regarding the British 144MHz distance record, that possibly an unuttered claim might be lurking around somewhere in Wales, particularly in connection with the events of 4 July, 1965. Now GD2HDZ reminds us that an expedition to the Isle of Man that weekend (a portable contest was on at the time) worked at least one YU. Arthur Breese did not then live on the island, has no first hand info about this contact and adds that it was not reported in the literature. If it could be substantiated it would approach in QRB the EI2W-YU1EXY European record of 1,394 miles, and might well be the UK one.

And apropos European records (even though it was UK ones that sparked off the discussion) we have it from G3ZRH that last October there was a super-tropo contact on 432MHz between OH2BEW of Helsinki and OK1KIR in Prague at 1,354km, almost certainly a new "high" for 70cm in this continent.

Expeditionaries

To the Isle of Man by the North Bucks Club. Callsign GD4AFN/P. Dates 22 July (for the 70cm contest) until 3 August. Operations: on 2m from 1830–2200gmt Monday, Tuesday, Thursday and Fridays. On 70cm 1830–2200gmt Wednesdays. Weekends as time and conditions permit. Schedules: via G8FIK with sae. QSLs via bureau or direct if sae sent. QRG: 145·45 and 432·68.

To the Border counties by G(GM)3FDW/P as follows: 31 July–1 August in ND; 1–2 August BW; 2–3 August EL; 3–4 August RH; 4–5 August DF; 7–8 August KB; 8–9 August WG and 9–10 August AY. On 12 August at an unannounced QTH for the contest. *Frequency*: 70·1MHz cw/a.m./ssb, plus co-channel transceive. *Times*: 1900–2000gmt for schedules (send sae to Mike Gibbings, 14 Howbeck Lane, Clarborough, Retford, Notts), 2000gmt onwards calling CQ. 0630–0700 skeds for people in tvi-prone areas, then 0700 onwards CQ, all with 25W and gainy aerial on gainy sites.

To Welsh counties with GW8ACB/GW3ZUL/P on 17 July in MG; 18 July CA; 19 July PK; 20 July CR; 21 July MH and 22 July BR at 1830–2030gmt on 432·36MHz but transfer to 145·46 a.m. and ssb if QSOs give out on 70cm; 2030–2100 70cm only; 2100gmt on 70cm but transfer to 2m if 70cm dries up. Possibly 1,297·08MHz on request. Sked—sae to Brian Kennedy, G3ZUL, 10 Pilgrim Rd, Droitwich, Worcs WR9 8QA.

Although G3FEC/LX/P made 125 contacts in their "Luxpedition" they worked only 10 UK stations. They would like to hear from any G-men who called them without response. Check your log and send relevant info to G8FNT.

No QSL?—then say so

"Time taken to make QSOs: 24 hours, time taken to collect QSLs for them: 2½ years". Thus G8BNJ (now G4BEZ) in submitting his claim for an FMD certificate for operations by GW8BNJ/P during VHF NFD 1970. Similarly GW8COP/P: "Requisite cards collected from 14 hours' operation in VHF NFD 1972; 47 cards with sae sent out, 34 returned."

Next, a comment from GW8DUP, one of many (like 'BNJ above) who lament others' tardiness where QSLing is concerned: "Checking my records," says Ron Harris, "I find I have over 200 cards outstanding, including 15 SAEs! This in spite of writing to some operators for the third time." His experience in seeking returns after April's auroral opening on 2m is equally depressing: only two replies out of six, all of whom wanted his own card for Glamorgan. His suggestion of pillorying in print the notable laggards is hardly acceptable on grounds of libel, although it would find much favour among many members to whom the coveted FMD Certificate (maybe even a Senior certificate) is just out of reach through others' thoughtlessness or indolence.

To the minority to whom the QSL ritual is an anathema, two simple courses of action are open. Say "No QSL" during the actual contact; or, if an sae turns up, scribble the date, time, frequency, your callsign and your signature, and send it back to the suppliant. At least he will then have a "receipt" for the QSO, and justice will be done on both sides.

Tech corner

From G6RH (Bob Holmes, Bexley, Kent)

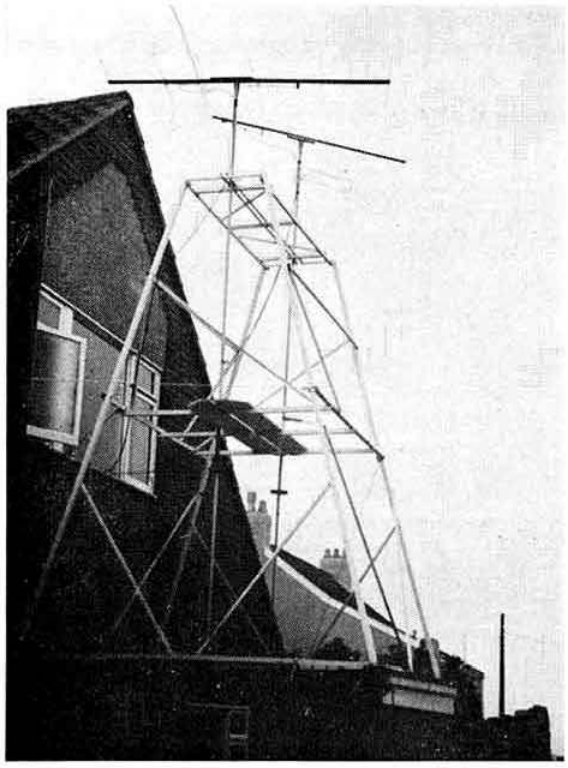
Further to the block diagram of the receiver i.f. strip shown on page 339 in May, herewith some more information.

The rf and mixer tuned circuits are ganged as an "rf peaking" control. I use a 2-gang midget 70pF to tune 30-14MHz and a 2-position switch to change to 7-3·5MHz.

The main tuning dial is an Eddystone which tunes the oscillators alone, four of these in 30–28MHz, then 21, 14, 7 and 3·5MHz with two positions spare. The receiver seems very stable, giving good results for through-Oscar contacts.

From G2WS (Bill Scarr, Weston-super-Mare)

The aerial support system shown in the illustration was engineered to withstand severe wind conditions. The base, occupying the whole roof area of the carport, is 7ft by 8ft, and the structure tapers to 5ft by 1½ft at the top, being firmly fixed and well guyed. One of the masts carries the 144MHz aerial and the other the aerials for 432 and 1,296MHz. Each mast is swung into position from outside the structure and is secured in the long horizontal clamp which may be seen at the top. Also visible are the pulley wheels which are cord-driven from indoors to rotate the masts. The central platform is reached by a small portable ladder to enable one to make adjustments to the aerials or to secure the masts within the clamp.



This sturdy mast structure was devised by G2WS to withstand the westerly gales that hit Weston-super-Mare from the Bristol Channel. The base occupies the whole area of the carport. For full description see "Tech Corner"

What they say

"Try to persuade people to operate below 433·5MHz. Some of my locals are above the GB3SC beacon and complaining of no contacts" —G3JHM.

"The Conway Stewart label marker pen is very good for making printed circuit boards. Can be had for 14½p"—G4BYV (ex-8BYV) of Dereham, Norfolk.

"If a B-licensee wishes to stay on 2m-and-down without cw that is entirely up to him. Isn't it supposed to be a hobby with freedom of choice? The amount of activity in cw-only contests is no encouragement: 1972 cw 70MHz contest winner had 21 contacts: 1972 144/432 cw event, 15 entries." —G4BBR.

"One reads in *QST* of many Es openings on 50MHz which the 'box' stops us from enjoying over here"—G3AHB.

"Some people working through Oscar are counting UA, UW, UT and such like as separate countries. But country status is governed by the *figure* in the Russian callsign, eg UA3, UW3 are the same"—G6RH.

Here and there

The Sussex Coast net is active on 432MHz every Friday from 8pm clock time. At least six stations in the Worthing area are already 70cm-equipped. Sometimes they are joined by the Normandy 70cm group across the water.

Interested in long haul m-s work on 70MHz? Then drop a line to G3ZTH: already he skeds two GM-men. Reminder: the Perseids are due end-July to mid-August, with a potentially high return rate.

When using nbfm restrict peak deviation to ±3kHz at a modulation index of one. More than this earns a bad name for a good mode.

About 150,000 mobile radiotelephones are in use in the UK, shared among 9,000 licensed users: the annual rate of increase in mobile users is 20 per cent (statement by Mr Warren Tayler, chairman of the Mobile Radio Users' Association).

Do not send QSLs to G3DAM of Evesham: he does not work 2m so cannot reply to many QSLs received. If it is not somebody bootlegging the call, then it is another case of mistaken identity—and the way some people gabble their callsigns on 2m makes this possible.

Look for the PA sideband net on 145·475MHz nightly. The Dutch say they will welcome any UK checkers-in.

Welcome to the new Glamorgan VHF/UHF Group, formed on 7 June as a result of a meeting called by GW3ZTH (available on Kenfig Hill 740561). Future meetings on third Tuesday of each month (next one, 24 July) at NCB Staff Members' Club, Tondu, Bridgend. Objects: to proselytize vhf/uhf in all its aspects. Secretary is GW3ZTH.

Too busy with professional duties to get on the air, Arnold Mynett, G3HBW, one of the leaders of vhf development in the UK until his translation to South Africa, manages to meet many ZS men, including several at his place of work. He can be reached at Room 228, Maxim Hotel, 559, Pretorius St, Arcadia, Pretoria. When his alternative callsign ZS6BMS will be heard from that locale is conjectural.

It was an ht fault that put GB3SX off the 4m air . . . should be back by now. Reception reports would be valuable (either to G3JHM or G5UM).

Further to GB3SX, the following spare valves are needed: 2E29, 829, 6V6 and 5R4 or 5U4. If you can contribute, deliver them to RSGB HQ marked for G3JHM. And that invaluable GB3SC needs 3/20s; consign to G3BA.

Slow-scan tv via repeater? Could be. G3WW and G8DXC have achieved their first sstv contact across the Fens at 10 miles, believe it could be done at quiet periods via GB3PI. At hf, G3WW has worked 30 countries two-way sstv.

Book now the date of 22 September for the Scottish VHF Convention and Region 13 ORM, to be held at Edinburgh University (Pollock Halls of Residence). Bring some home-built vhf equipment for the exhibition. Full info later.

25 YEARS BACK

". . . members are reminded that the Desmond Trophies will be awarded to the two British Isles stations who first succeed in establishing two-way communicationon 420Mc/s over a distance of 25 miles".

RSGB Bulletin, July 1948

THE MONTH ON THE AIR

by JOHN ALLAWAY, G3FKM*

HOW many of us take the trouble to always give our callsigns clearly at the correct time, and using intelligent phonetics? A point which is quite frequently mentioned in letters to your scribe (especially those from listeners) is the difficulty which is sometimes experienced in the identification of stations because their callsign is either given too quickly or because unsuitable phonetics are used. The terms of the licence are quite clear about the use of the latter, which must "not be of a facetious or objectionable character", and the same document suggests that the 1959 Geneva ITU phonetic be used. The writer feels that the latter is not always too satisfactory when talking to others whose understanding of the English language is limited, but adequate alternatives are to be found in the names of countries or cities, or in the ARRL alphabet which uses proper names.

Please note that applications for the Diploma Guglielmo Marconi Award (described in March issue) should be sent to ARI, Via Domenico Scarlatti 31—20124 Milan, and *not* to I1LCF.

News from overseas

W2LVR, in a letter to G2MI, says that WB2JSM is a special station located at the Hall of Science on the site of the World Fair at Flushing Meadow Park. It has been in operation about six months and is a regular science exhibit similar to GB3SM and about 20 other museum stations throughout the world.

Ernest Edwards, G3FYG, emigrated to Canada last December and was granted permission to operate G3FYG/VE7 within two hours of landing at Vancouver! He became VE7DAR at the end of April and is often to be found on 14,180 or 21,180kHz at 1700, 1800, 1900 and 2000, looking for his old friends.

DX news

Les, G3HZG, (formerly VR2FT) is in Brunei and has the callsign VS5LH. He will be there for two years, has KW equipment, and promises to QSL all contacts—direct if IRCs are sent, otherwise via the bureaux. He intends to check into SEANET and PACDXNET regularly.

C21TL (who also signs as C29ED) leaves Nauru on 20 June and will later be going to China where he will be interested in trying to obtain permission to operate. Outstanding QSLs should be sent to VK3TL.

CR3AB left Portuguese Guinea in May and returned to his CT2BA home location. His equipment (which is supplied by CT2AZ) will be sent to a new operator in CR5. CR3KD is now the only amateur in CR3 and will be there until July 1974. CR5AJ has received the Tempo SSB-One supplied by INDXA and is reported often to be on 21MHz ssb around 1300.

9F3USA/P1 operated from the Dahlak Is in the Red Sea in mid-May. It is believed that the islands count as Ethiopia for DXCC purposes. VS9DX was 9H5D who was active from the Maldive Is from 12 to 20 May.

Alan Shawsmith, VK4SS, an amateur for over 35 years, of 35 Whynot street, West End, Brisbane, Qld, 4101, Australia, collects morse keys—any type, age or condition. Hand, bug, novelty etc. He is pictured here with a section of his collection and holding a miniature 2in by 1in which is not a toy but a complete key. His collection dates back 100 years. There are vintage overland telegraph "pumps", an assortment of "bugs", one or two novelties and a variety of keys used in the military services. He is keen to add to his collection and will swap or buy anything in keys—ancient or modern, home-brew or commercial

West Coast DX Bulletin reports that enquiries from interested parties as to the possibility of permission being granted for a visit to Clipperton Is have been received with disfavour by the French authorities and attention from the Surete.

Tom Cheesley, A6XF, leaves for the UK on 6 July—A6XF QSL requests may still be directed to G3SUW, but all MP4TEE cards will be sent out from Tom's G8FOC address (see *QTH Corner*).

Strange prefixes noted this month include DF8SAR who will be on the air until 31 December. This is a special station commemorating 50 years of amateur radio activity in the Saar.

West Coast DX Bulletin mentions that some JAL operators are looking into the possibility of putting a station on the air from China, although it is felt that the loosening of restrictions would probably see a Chinese national first on the air. The same source also says that the JA DX Association is investigating the possible addition of Parce Vela (west of Guam) to the DXCC country list. Readers will remember that the operation by W9WNV as KG61D from the island some years ago did not qualify but political changes have occurred in the area since that time.

The Japanese "expedition" to Ogasawara planned for August is now expected to consist of some 450 amateurs!

The Jacques Bonet Memorial Plaque will be awarded to the person who works the largest number of them; details are not yet available of how to apply.

Special amateur stations will be on the air from the USA National Scout Jamboree sites at Farragut State Park, Idaho, and Moraine State Park, Pa, the first being KJ7BSA (which will be on from 28 July to 9 August) and the other KJ3BSA (on from 30 July to 11 August).

1972 JOTA

This seems to have been a most successful event in spite of poor radio conditions. In the UK about 300 stations took part, and they were in contact with nearly 500 overseas Scout stations in 64 countries. It is estimated that in the UK some 15,000 Scouts and Guides took an interest in the proceedings. The organizers criticize the use of special GB callsigns by UK Scout stations—some 80 were in use during the 1972 event resulting in considerable confusion as some had been used by different groups in earlier years! The 1973 (16th) JOTA will take place over the weekend of 20–21 October and an even bigger participation is expected.

Top band news

The May issue of W1BB's *160 Metre DX Bulletin* summarizes the 1972/73 "season" as being highly successful with 12 new WACs being completed, compared with the previous 29 which had taken since 1953 to be claimed. Stew again raises the question of whether the Transatlantic DX Tests should be continued and invites comment (36 Pleasant St, Winthrop, Mass, 02152). Very poor conditions for dx were observed between early March and the first week in May, this was as observed last year. A most sensible request is made for those who have contacted a dx station to refrain from making further contacts every night so as to give others the chance of working it.

The first VE5/Europe contact was made between VE5XU and GM3YCB on 3 January. The latter station also made the first W6/GM exchange on the band four days later. W5RTQ kindly volunteers to send anyone who is interested in the Beverage aerial a detailed copy of the relevant information. Please send an sae with five IRCs to Earl Cunningham, 846 Buoy Rd, Houston, Texas, 77058.

GM3IAA heard PY1DVG around 2300 on 3 June and contacted ZB2A at about the same time on the following day.

Before leaving St Lucia for the UK, VP2LI operated from this delightful set-up. He used an FTDX400, FV400 and Drake 2B receiver. His aerials were a TA33Jr at 30ft and a 3·5MHz dipole

Ron, VK0WW, and Phil, VK0PF, pictured at Casey, Antarctica, in October 1971

Contests

The Venezuelan Air Force World Wide CW Contest

0000 28 July to 2400 29 July.

CW only, 3·5 to 28MHz. Single operator/single or multi-band, and multi-operator/single and multi-transmitter sections. Exchange RST plus a progressive QSO number of four digits starting from 0001. Contacts with YV count two points, with other countries (other than own which does not count) one point. Multiplier is DXCC countries, YV call areas (YV1-YV9), and USA call areas (1-0) worked on each band. Trophies will go to continental leaders, and world winner will be awarded a free trip to Venezuela to collect. A special diploma will be given to all who work five YV and stations in five other countries. Entries should be posted before 30 September to Commandancia General de la Aviacion, Concurso 53 Aniversario Aviacion Militar Venezolana, Aeropuerto La Carlota, Caracas, Venzuela.

Colombian Independence Day Contest

0001 21 July to 2359 22 July.

Phone and cw, 3·5 to 28MHz. Exchange report and serial QSO number (from 001). Contacts with HK count five points, other countries two, and own country one. Multiplier is the number of different countries worked and final score is points on each band multiplied by countries on each band added together. Submit separate logs for each band and a summary sheet listing all scoring information. Post before 30 September to LRCA, Concurso Independencia, c/o HK3AFB, Apartado Postal 584, Bogota, Colombia. Only one QSO per band with the same station, and no cross mode QSOs permitted.

The QRP Summer Contest of DL-AGCW

1800 7 July to 1500 8 July.

Only 15 hours' operation allowed and the six-hour pause must be taken in not more than two parts. PA input must be less than 10W, with operation on 3·5, 7 and 14MHz. Exchange RST, serial QSO number and input power, add

"x" if crystal control is being used. Contacts with own country are worth one point, others in own continent two points, and the rest three points. (DM counts as separate country from DL). Three additional points are scored if contacts are with another QRP station and both operators double their points if they were both using less than 3W or crystal control. The multiplier is the number of countries contacted in own continent plus two for each other country worked. Send separate logs for each band, and summary sheet, to reach DJ7ST, D-3201 Derneburg, Am Walde 83, Germany, by 31 July. In the 1973 winter event DJ7HZ was top scorer with 6,303 points, UK entrants were G3TZQ (2,618), G3JKY (1,340), G3VDW (1,332) and G8PG (825).

In the **1972 Alexander Volta RTTY Contest** world top scorer was WA3IKK with 152,810 points. UK scores were as follows: **G3MWY** (68,770), G3LDI (21,866), G3RQI (6,321), G3RDG (4,608) and GB2SM (1,062). In the listener section swl Reynolds scored 11,648, and BRS27239 6,020 points.

In the **5th Giant RTTY "Flash" Contest** held earlier this year **G3OZF** (35,598), G3RDG (1,884) and G3RQY (1,770) represented the UK entry.

Award

The San Fernando Valley Award

Issued by the San Fernando Valley DX Club for contacts with stations in the San Fernando Valley as follows: (1) The SFVDX-10—for proof of contacts with stations in 10 different communities. (2) The SPVDX-20 (sticker)—for 10 additional communities. (3) Worked All San Fernando Valley—this endorsement is awarded for proof of contact with each of the following locations: Arleta, Burbank, Calabasas, Canoga Park, Chatsworth, Encino, Granada Hills, Hidden Hills, Lake View Terrace, Mission Hills Northridge, N Hollywood, Panorama City, Pacoima, Reseda, San Fernando, Sepulveda, Sherman Oaks, Studio City, Sunland, Sun Valley, Sylmar, Tarzana, Toluca Lake, Tujunga, Van Nuys, Winnetka and Woodland Hills. Contacts must have been made since 1 January 1969 and QSLs should be sent to PO Box 1373, Reseda, Cal, 91335, USA. There is no charge.

USSR callsigns (Part 3)

The location of stations using the UK6 series of prefixes may be identified as follows: Azerbaijan—UK6C, D and K; Georgia—UK6F, O, Q and V; Armenia—UK6G. All others are in UA6.

Readers may be interested to know that an excellent list giving USSR callsigns, location, and oblast number as well as UA9/UA0 zones may be obtained (price one irc or 5p for *DX News Sheet* subscribers, non-subscribers are asked to send an sae or extra irc) from 62 Belmore Road, Norwich, NOR 72T. A detailed ITU Countries List is available for the same price.

Italian prefixes

The two-year experimental period with Italian numeral prefixes, which began in 1971, is now completed and will remain valid with the following modifications. The provinces of Valle d'Aosta, Piemonte and Liguria will use I1 and not IP1. The province of Novara is included in I4, Mantova is included in I2, Rovigo in I3, and Piacenza in I4. Portable stations will adopt the suffix of the area in which they are located—eg I4SN operating from Elba will be I4SN/IA5, or if operating in Tuscany I4SN/5. It has been decided that the islands of Lampedusa and Lampione are located in "CQ" zone 15.

QTH Corner

A2CCY	PO Box 298, Francistown, Botswana.
C21TL	via VK3TL, J. Matchett, Smiths Rd, Templestowe, 3106, Vic, Australia.
DA2YR	via G3YBT, RSARS, Kingswood House, Kingswood Rd, Gunnislake, Cornwall.
EI0DMF	via EI2I, W. Scully, Ard Easmuinn, 48 Woodland Dr, Dundalk, Eire.
FY0AV	BP 508, Cayenne, Fr Guyana.
HW3UIT	(*France*) via F90E, 4 Av H de la Touche, 92 Chatenay Malabry, France.
IT5TARI	PO Box 420, Palermo, Sicily, Italy.
JY3BZ	PO Box 1352, Amman, Jordan.
KG6SZ	via KH6IJ, 4207 Huanui St, Honolulu, Hawaii, 96816.
KJ3BSA **KJ7BSA**	via ARRL, 225 Main St, Newington, Ct, 06111, USA.
MP4BJP	PO Box 116, Manama, Bahrain.
MP4BJS	via K2HVN, 860 Atlantic St, Lindenhurst, NY, 11757, USA.
PY0DVG **PY0ZAA**	PY1DVG, R. Rasp, PO Box 51-ZC-00, Rio de Janeiro, Brazil.
VE7DAR	E. W. Edwards, Johnstone Rd, RR1, Parksville, BC, Canada.
VP2LI	R. J. McClements, Sandystones School Hse, Jedburgh, Roxburghshire, TD8 6UP.
VP7BA	via G3AMR, Bures House, Bures St Mary's, Suffolk.
VP7DS	via WA4UZI, 330 NE 121st Terrace, North Miami, Fla, 33161, USA.
VS5LH	L. Hickingbotham, PO Box 91, Kuala Belait, Brunei.
VS9DX	via G3PRS, 32 Plough Hill, Cuffley, Herts.
WS3SKY	Box 86, Greenbelt, Md, 20770, USA.
XW8FH	BP 345, Vientiane, Laos.
5Z4KL	A. Saunders, West Coolie Croft, Udny, Aberdeenshire.
7Q7AC	G4BQC, 83 Chestnut Av, West Wickam, Kent, BR4 9EU.
7W3ITU	(*Algeria*) via ARA, BP 2, Algiers, Algeria.
9F3USA/P1	via WA5TKC, 238 Barbuda Dr, San Antonio, Texas, 78227, USA.
9M2BH	Lim Phang Choo, 187 Jalan 68, Kepong Baru, Selangor, Malaysia.
9M8SDA	via WB6BGQ, 127 Rio del Mar, Vallejo, Calif, 94590, USA.
9V1QR	G3XEY, 36 Listers Hill, Ilminster, Somerset, TA19 0EL.

RSGB QSL Bureau, Bromley, Kent, BR2 7NH.

Expeditions

The Chester & District RS will be visiting the Orkney Is from 1 to 10 July inclusive and will be on the air as GM3GIZ/P. The members of the party will be G3ATZ, GW3TOW (who will provide the Drake equipment), G4BTW, G8ALA and listener Ted Whitfield. They will have inverted-vee aerials and hope to be on all bands 1·8 to 21MHz, ssb and cw, especially in the evenings.

F6BLQ, F6BLU, F6CMS, DK5XW and an swl will operate from the Isle of Sark with the call GC5--/P/Sark from 11 to 28 July (actual callsign not yet received). Main QRG 3,780, 7,080, 14,230, 21,250kHz and 144MHz. Equipment: FT250, FTDX505 and HW32A. Inverted-V on 3·5, ground plane on 7, 2-el cubical quad on 14, 21 and 28MHz, 9-el beam on 144MHz.

Odds and ends

GC3WIY reports that his callsign is being pirated, mostly on 7MHz cw. He has been off the air for about 18 months but is now becoming active again—on ssb only.

Readers with long memories may recall AC4RF who operated from Tibet some 20 years ago. According to a recent copy of the *Daily Telegraph*, Robert Ford is now British Consul-General in Luanda, Angola, and setting up travel records for a Foreign Office official—over 32,000 miles each year in the past two years.

G3EPU, whose callsign was mentioned a few months ago on account of its use by a pirate, has a KW2000E and may be

on the bands himself by now. He expects to use ssb on 1·8 and 28MHz, and cw on 7MHz.

G2MI would appreciate knowledge of the present whereabouts of Frank Dickenson, who operated as VP8KD a few years ago. It is believed that he went to Zambia. His former QSL manager, G3LDA, is unable to help those still needing cards as Frank took his VP8 logs with him.

Band reports

Most of this month's correspondents complain of poor conditions on all bands, but in the case of 28MHz it seems possible that openings *are* present when there is no activity on the band. This is borne out by the loggings of the Cyprus and Mauritius beacon stations which have been heard for many hours on some days. W8ZOK's sunspot count in the *West Coast DX Bulletin* reported that two large and six small spots appeared on 2 May, these grew in intensity until the 6th and then diminished. One large and four small appeared on the 16th and increased until the 18th; they were due to have disappeared by the end of the month.

Very many thanks to the following for the items listed below: G2BJY, G2HKU, G3HB, G5JL, G6GH, G3GVV, G3RFG, G3RZI, G3URX, G3ZDF, GW4BLE, BRS17567, BRS31301, A7056 and A7511.

Stations listed in italics were on cw, the rest on ssb.

3·5MHz. 0400 *9L1GC*. **0500** VP9GD, W2AL. **0600** HW6UIT. **2200** A2CJP, ZD7FT, ZP5AS. **2300** G3SKR/KP4, PYs, ZS1MH, 9G1HE.

7MHz. 0000 *EA9EW*. **0100** *KP4DJE, YVs*. **0400** *KZ5VV, TI2AAC*. **0600** CM3HG, *HK4CP, OA6NCS*, PYs, *XE1FFY*, ZL2BT. **2200** TU2DO, ZS1MH, *7Q7LA*. **2300** *UG6, UL7, UI8*.

14MHz. 0000 VP2VS. **0400** YN1BE. **0500** 9N1MM. **0600** FO8DO, KH6HDT, VK9VF, ZM2BIB/MM (nr FO8 location of proposed French nuclear test), 9Y4KR. **0700** JY6HHF (YL), KH6s, KL7s, *UK0SAL*, YS1AG, ZK1CD. **0900** KX6BU, ZS5OV. **1000** JX9TM, ZD7FT, ZD9GC. **1400** AP2AD. **1500** *9V1RF*. **1600** CT2AO, *KG6AAY*. **1800** DU1OR, *KH6SC*, WB6VGI/VQ9 (Chagos), VS6GA. **1900** CR3AB, VP8KF, ZD8KO. **2000** KH6BB, SU1MA, 7W3ITU (Algeria). **2100** VKs, 5X5FS, 9F3USA/P1, 9K2AU. **2200** JY1, *ZF1JA, 6Y5AR*. **2300** VK6CT, VP1BH.

21MHz. 0800 *F6CKQ/FC*. **0900** ZE1CU/A2C, 5Y4XIP, 9N1MM. **1000** A2CCY, A4XFE, *UA0YT* (Zone 23), VK9KE, VU2DK, ZD7FT, 5U7DA. **1200** M1C, YB1KW. **1300** *CR3KD, FR7AL, HS4AGN, OH0MAS* (Market Reef), TR8AF, *ZD8OM*. **1400** *FL8BZ, VQ9M, 5R8AG*. **1500** *FR7AI*, TL8AA, *TU2DQ*, XW8ED, *7P8AB*. **1600** DU8BA, *OA6NCT*, VS9DX, ZD9GC, 3B6CF, 7P8AZ. **1700** *KG6AAY, VQ9RK, WS5MSC* (Johnson Space Centre, Houston), XT2AJ. **1800** *LU9EGB*, WB6VGI/VQ9. **1900** *TR8PB*, W6/W7s, YA1ED. **2000** XG1J. **2200** CE6HM, HC2YL. **2300** KZ5OD (5 watts).

28MHz. 0700 Europeans and *ZC4CY*. **0900** *9H1R*. **1000** 9J2DT. **1200** A2CCY, *CR6QE, CR7IZ*, EL9A, ZE3JO, ZSs, *3B8MS*. **1400** A4XFE, A6XB (Ras al Khaima), LU9AP, VU2CDG, 9V1QZ. **1600** *CR6AL, LU5HFI, UK9SAY*, 5B4ES, 5X5NK, 5Y4XLW, *7Q7DW, 9G1HE*. **1700** *EL2NS*, ET3DS, HV3SJ, 4Z25MQ. **1900** ZP5AZ. **2000** CE3ED, 5U7BA.

Many thanks to all correspondents, and specially to the following for information obtained from their publications: **DX'press** (*PA0INA/PA0TO*), **DX News Sheet** (*Geoff Watts*), the **29 DX Club Newsletter** (*George Allen*), **QUAX** (*G3DME*), the **DX'ers Magazine** (*W4BPD*), **NARS Newsletter** (*5N2ABG*), **Long Skip** (*Nick Sawchuk*), the **West Coast DX Bulletin** (*WA6AUD*), and the **Ex-G Radio Club Bulletin** (*W3HQO*).

Please send all items for the **August** issue **to reach G3FKM** no later than **4 July,** and for **September** issue by **5 August.**

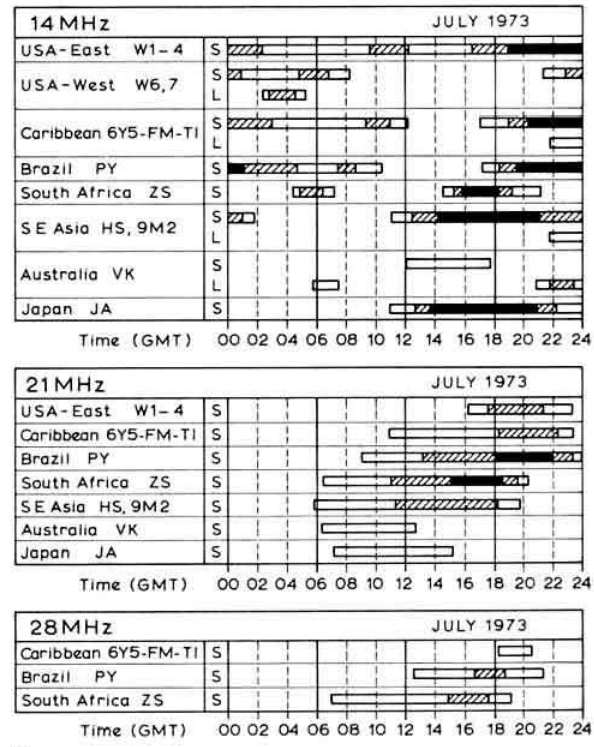
Propagation Predictions

The propagation predictions this month are by and large the same as for the previous month. DX conditions on the hf bands are still not favourable. A small compensation will be more frequent short-skip conditions over a distance of about 500-2,000km, caused by sporadic-E transmission.

14MHz will remain the main carrier of dx traffic, especially during night time. The possibility of dx traffic via the indirect path is once again pointed out. As it is now winter in the southern hemisphere, traffic with South Africa will cease early. Central African stations, such as those in Zambia and Rhodesia, will be heard longer than those in South Africa. The same applies to corresponding conditions on **21MHz.** There will be no noticeable change on **7** and **3·5MHz** compared to last month.

Readers of Propagation Predictions will without doubt have noticed repeatedly that stations in the area indicated are not audible. This is especially the case when the time given does not correspond to the main working period of the dx countries. Contacts will be at their best if the time given in the prediction coincides with the main operating time of overseas stations. This particularly concerns countries with few amateurs.

The provisional sunspot number for May 1973 from the Swiss Federal Observatory was 41·5 with the daily number varying from 92 on 4 May to 7 on 14 May. The latter half of the month showed the greatest solar activity. Predicted smoothed sunspot numbers for September, October and November are 34, 32 and 30 respectively.



Oscar 6 operations summary at 25 May 1973

by P. I. KLEIN, K3JTE, Radio Amateur Satellite Corporation

OSCAR 6, first in the series of AMSAT-Oscar-B missions, continues to operate satisfactorily after seven months in orbit. During the first week in May, the operating schedule was modified making the translator available for communications on Thursdays, Saturdays and Mondays, gmt, and OFF on other days. The purpose of this change was to subject the nickel-cadmium battery to shorter, more frequent charge-discharge cycles. This procedure appears to be working well, and may well extend the useful lifetime of the spacecraft.

The temperature of the battery, which had risen to as high as 47°C (117°F) in early February and had been a cause for concern, has now dropped to a more comfortable value. There is now no reason to believe that it will not achieve the one-year planned lifetime, and possibly even exceed it, although AMSAT may find it necessary to further modify the operating schedule from time to time in an attempt to extend Oscar's operating life to the maximum possible.

As many of the users of Oscar 6 have noticed, AMSAT has initiated official bulletin transmissions through the satellite translator, and these are generally given on the reference orbits (the first orbit of each Greenwich day, the same orbit during which the satellite is turned on briefly for telemetry recording on the OFF days). VE2BYG, K1HTV, W3TMZ and K7BBO have been serving as AMSAT official bulletin stations for these transmissions, which include reports of special experiments and any changes in the operating schedule.

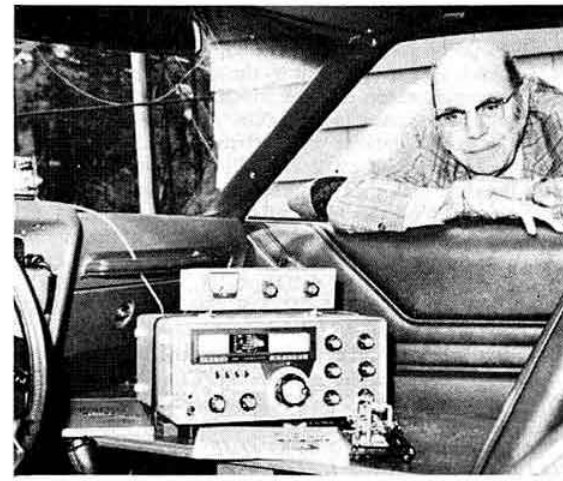
AMSAT can now identify the calls of some 1,100 stations which have made one or more contacts via Oscar 6, very nearly half of these stations being outside the USA. These include stations from 59 countries, including CT2, DL, DU, EA, EI, F, FC, FP8, G, GI, GM, GW, HA, HB, HG, HK, I, JA, KP4, KX6, LA, LX, LU, LZ, OE, OH, OH0, OK, ON, OX, OZ, PA, PY, SM, SP, SV, TF, UA1, UB5, UC2, UG6, UJ8, UR2, UW6, VE, VK, VK0, VP2V, VP9, VU, W, XE, YU, ZE, ZL, ZS, 4X, 6Y and 8P.

In the USA, all 50 states except Louisiana and Nebraska have been on at one time or another. The number of stations on from each of the USA call areas is W1, 38; W2, 64; W3, 47; W4, 64; W5, 34; W6, 91; W7, 53; W8, 30; W9, 61; W0, 52; KH6, 2; KL7, 5. There is one report of operation from VE8, and activity in Africa, South America and the Far East also seems to be very sparse. Amateurs in these regions are urged to equip for satellite operation during the coming months.

The operator apparently leading with the most reported satellite contacts is K7BBO with over 3,300 QSOs (averaging about 500 satellite QSOs a month).

The first reported aeronautical mobile communication via Oscar 6 was by W6OAL, who reported working K7BBO on 27 April on Orbit 2,431 over a distance of approximately 5,000 miles. The transmitter aboard the aircraft was a Gonset Sidewinder operating on ssb with less than 5W p.e.p to a simple whip aerial.

Oscar mobiling is the speciality of Fred J. Merry,W2GN. By choosing good and electrically quiet locations he has made a number of QSOs through Oscar 6 using a base-loaded 5/8λ 144MHz whip for the uplink path and a 28MHz whip for receiving the satellite translator. For one demonstration W2GN made three contacts while in the car park adjoining ARRL headquarters.



Fred J. Merry, W2GN, with his mobile Oscar 6 equipment

AMSAT is encouraging more mobile terminal operation with Oscar 6. In particular, operation from small private aircraft, small boats and automobiles (especially on ssb) would provide a very effective demonstration of the usefulness of amateur satellites for small-terminal communication. In addition, operation using totally hand-held equipment or operation from a bicycle or motorcycle would be impressive "firsts". If possible, make tape recordings of some of the mobile contacts and send them to AMSAT, PO Box 27, Washington DC, 20044, USA.

HF BEACON STATIONS

Callsign	Frequency (MHz)	Location	Reports to
DL0IGI	28·195 and 28·2 switches to 28·2 MHz between 00-05 and 30-35 min past each hour	Mt Predigtstuhl near Salzburg	DJ5DT, Kollwitzweg 1, D 6100 Darmstadt, FR of Germany
GB3SX	28·185	Crowborough, Sussex	G3DME
VE3TEN	28·175	Ottawa, Canada	G3DME
VP9BA	28·165	St Catherines	PO Box 73, Devonshire, Bermuda
ZC4CY	28·180	Limassol	Box 216, Famagusta, Cyprus
3B8MS	28·190	Signal Mount, Mauritius	G3DME (Beacon keeper: 3B8DG)

IARU

(International Amateur Radio Union)

Region 1 calling

by R. F. STEVENS, G2BVN

A meeting of the Executive Committee of the Region 1 division was recently held in Warsaw. The committee consists of F3FA (vice-chairman), G2BVN (secretary), OH5NW (treasurer), EL2BA, SM5ZD, SP5FM and YU3AA (members). The chairman of the vhf working group, PA0QC, was also present. This was the first meeting of the committee since the 1972 Scheveningen conference where PA0DD was elected chairman but died in September 1972. SM5ZD was elected chairman of the meeting.

Financial matters

The purpose of the Region 1 division is to take the actions necessary to safeguard amateur service frequency allocations and also activities associated with this aim. A proportion of the income of the region is set aside to provide a fund from which the expenses of representatives at ITU conferences can be paid. The balance is used to finance the running costs of the region, including the secretariat and publications, with further amounts available to support activities beneficial to the amateur service. Among the activities receiving Region 1 support are AMSAT (construction of future Oscars), International Beacon Project (28MHz beacons), IARU Monitoring System (intruder watch) and the solar observatory of R. A. Ham, BRS15744.

The present annual contribution to the Region 1 organization from each national society is 60 Swiss centimes (about 6p) per licensed member. The present membership of the division is 41 societies comprising all the major organizations in Region 1.

International projects

In addition to the IARU Monitoring System, co-ordinated by G3PSM, and the International Beacon Project, the chairman of which is G3DME, an EMC working group has been established to provide international liaison in interference matters. The RSGB representative on this group is G3JIP.

The VHF Working Group, as implied by its title, deals with a variety of matters affecting operation in this portion of the rf spectrum. Repeater standards and channelling, beacon station frequencies and band plans are some of the items currently under consideration. It is anticipated that a meeting of all Region 1 vhf managers will be held during the autumn of 1974.

International Telecommunication Union

The conferences of the ITU determine the pattern of frequency allocation. The ITU consists of 145 member nations and its headquarters are at Geneva. The last conference held in 1971 dealt with Space Communication, and in 1974 there will be a Maritime Mobile conference. Although these conferences deal primarily with services mentioned it is vital that the IARU maintains a close watch on all conference matters which could possibly affect the amateur service.

It is probable that towards the end of the 1970s there will be a World Administrative Radio Conference which will consider the frequency of *all* services, including amateur. The representatives of the amateur service must be adequately prepared and equipped with information, proposals and finance to meet the demands of such a conference. The Region 1 division established a fund for such events in 1950 and annual allocations are made.

Although it is not anticipated that matters vital to the amateur service will be raised at the 1974 Maritime Mobile conference it was decided that at least two members of the executive committee should attend at least part of the conference as members of the IARU observer team. The expenditure involved is considered to be a worthwhile insurance. It should be noted that the IARU is an organization invited by the ITU to its conference and entitled to receive conference services without payment, in a similar way to organisations such as CIRM, ICAO and URSI. This follows from a decision of the Administrative Council of the ITU and is a privilege of great benefit.

During the Warsaw meeting the executive committee considered other steps necessary to safeguard amateur allocations. Participation in the work of the International Radio Consultative Committee is one way in which this aim may be achieved. Scientific papers originated by national societies and sent to the CCIR through telecommunications administrations reflect credit on the amateur service and give support to its scientific background. IARU Region 1 continually urges all its members to establish and maintain good working relations with their respective PTT authorities. Guidance to all societies in conference matters is provided by the IARU regional organizations.

Region 1 conferences

It is essential that the representatives of the national societies should meet at regular intervals and this is achieved by the holding of conferences every three years, the last occasion being at Scheveningen (Holland) in 1972. At this time it was provisionally agreed that the next conference would be held in Vienna in 1975. However, after considering the cost of accommodation and meeting rooms in Austria the Executive Committee reluctantly decided that it could not accept the invitation of the national society. Subject to the agreement of the Council of PZK, the Polish national society, the 1975 conference will be held in Warsaw. In making this change the executive committee were aware of past criticisms concerning expensive hotels which had limited the number of delegates attending from the smaller societies of the region.

The working meeting of the committee lasted two days and during their stay in Warsaw every hospitality was offered by PZK. The next meeting of the committee will be held in the Netherlands in 1974.

Bristol '73 and GB2GB

An interim report on the events in Bristol organized by the Bristol Group of the RSGB in the 600th Anniversary Charter year of the City & County of Bristol.

So far the following have received Bristol Activity Award Certificates: GW8FHW, G2BAR, G8AQZ, G2IK, G5KT, G8BKR, G8GLQ, G4BKY and G3PFD. The award is a continuing event, but it is as well to remember that the contest ends at the end of August, see December 1972 *Month on the Air*. There are three sections to the contest and entering for it is a most enjoyable way of trying to get a case of sherry for Christmas.

The setting up of GB2GB on the ss *Great Britain* is now occupying the time of the group. Bovis have agreed to supply a builder's type office for "ham shack", which will be located on the top deck of the vessel. KW Electronics are providing the main equipment and Harveys of Bristol the QSL cards and contest prizes. Thanks are due to all, and in particular to the project officer of the vessel, Commander Joe Blake.

Receiving tests carried out on the vessel have been encouraging, and work is going ahead on the aerial/earth system. The licence has been agreed in principle with the MPT and will be the same as the ordinary Amateur (Sound) Licence except that the Ministry is prepared to authorize persons who hold current Amateur (Sound) Licences A to act as additional operators in the absence of the licensee. In order to cater for B licensees there will be an agreed list of nominated additional operators who will supervise and also answer relevant questions of the general public. Any amateur visiting the vessel during the month of August should carry some positive means of identification which will be helpful to the supervising operators.

It should be noted that the vessel is open to the public from 1000 to 1800 daily, but it will be closed to the public on 9 August. Whether the Bristol Group will be able to keep the station going for a month, time alone will tell, but it is suggested that in order to avoid disappointment intending visitors advise G3GKA of times and dates, in advance, so as to help the planning of operating schedules.

The question may be asked why anyone bothers about conventions and special events as the hobby is personal and individual. An answer could be that while we only are privileged to fully enjoy the hobby, sharing some of the aspects with the general public may whet their appetite to take up the hobby themselves, or at least obtain their goodwill, which cannot be bad in a day and age when the silent minority has little chance for survival.

If that sounds too much like a public relations exercise, then that is what it is all about. Of course, some think that a unique callsign, QTH, licence and technical problems are enough excuse to have a go.

Bristol Convention '73

This event was organized to celebrate the Diamond Jubilee of the RSGB and the 600th Anniversary of the granting of the royal charter making Bristol a county borough. It was attended by G. R. Jessop, G6JP, Executive Vice-President of the RSGB, and his wife; W. F. McGonigle, GI3GXP, Council member; C. H. Parsons, GW8NP, Council member, and his wife; W. A. Scarr, G2WS, Council member; H. W. Leonard, G4UZ, Region 9 Representative, and his wife; and about 70 others. The venue, the Royal Hotel, Bristol, was ideal for the purpose and the hotel management proved very co-operative in making facilities available during the proceedings.

The Bristol RSGB Group callsign G6YB/A was used throughout the day on the exhibition station and several amateurs operated the equipment. A very good display of vintage radio apparatus was put on, together with a wide variety of home-brew equipment both new and of some years' standing.

An interesting programme ran through the day including items of general interest such as Ship-to-Shore Radio; The ss *Great Britain* Renovation Project, and The RSGB Past, Present and Future. Other items of a more specialized nature were Solar Radio Astronomy; Oscar 6; Solar Eclipse Experiments in June; and Weather Satellites. In particular, an inspiring call for support for the RSGB was given by the Region 9 Representative—it was worth all the effort of the organizers to hear this alone.

The convention was followed by a dinner/dance at the same venue. The event was honoured by the attendance of the newly elected Lord Mayor of Bristol, the Lady Mayoress and all the Society representatives mentioned above. A most delightful evening was enjoyed by some 55 members, friends and guests. The Lady Mayoress was presented with a copy of the 1973 *RSGB Amateur Radio Call Book* when it was found that she was a swl.

We in Bristol count ourselves very fortunate in that we have such excellent and well-established links with the past, such firm friends in the public sector, and such selfless and dedicated organizers as Gordon and Brian. Gentlemen, I salute you!

E. C. Halliday, G3JMY, chairman,
Bristol RSGB Group

NRSA Annual Convention

There was an involuntary change this year in the venue for the Northern Radio Societies Association Convention which had to be switched at short notice from its usual home at Belle Vue Zoo Park, Manchester. The organizers were fortunate to find an excellent substitute in the Forum Halls at Wythenshawe, Manchester, which are the property of the City of Manchester.

The event followed its usual form with club stands competing for the G8AYD Trophy, and with excellent support from the trade. Talk-in stations were operating on 2m (Dial House Radio Club), 4m (Raynet) and Top Band (Bury and Rossendale), while the main station, operating the hf bands, was organized and manned this year by the East Lancs Radio Club. All stations used the special call sign GB2NRS.

Closed circuit tv was demonstrated again this year by members of BATC and a feature of their stand was the "creepy-peepy" of G3SXC. Other stands in evidence were Air Force Cadets with a fine display and operational stations on their own frequencies and using their own call sign; Raynet with their mobile caravan; the RSGB bookstall manned by G2CVV, and Leyland Hundred ARC with a bring-and-buy stand.

Newcomers this year to the Club Stand Competition were the Otley Radio Club, who no doubt made the return journey over the Pennines highly delighted with their effort after carrying off the trophy at their very first attempt. Other clubs competing for the G8AYD Trophy were Bury & Rossendale, Eccles, Manchester & District, South Manchester and Stockport.

In the Home-brew Competition the Otley Club were also successful in having one of their juniors, Michael Collinson, carry off the Junior Trophy with a very sensitive metal locator. The Senior Trophy was won by Dave Holland, G3WFT, of the South Manchester Club, with a 160m ssb transceiver which got very high praise from the judges, who also commended a 2m transverter built by G4HZ.

The organizers would like to thank Lowe Electronics, Heathkit, and Stephens-James Ltd for stepping in at short notice to form the judging panel for both competitions.

The thanks of the organizers are also due to the traders for their excellent support, to the clubs for the hard work put into their stands and to the ladies for their efforts with the sale of raffle tickets.

The move to the Wythenshawe Forum Halls appears to have met with a very favourable reaction from all quarters and the organizers will now be giving very serious consideration to the question of next year's venue, which will be announced in due course.

Congratulations again to Otley Radio Society on their fine effort. One or two more clubs competing from Region 2 could spark off an amateur radio "Roses" contest. How about it, Yorkshire?

G3YKJ, Chairman, NRSA

OBITUARIES

Mr W. E. Bartlett, GW8WQ
Bill Bartlett died in May. He had lived in the Whitland area since the war, and although not active in recent years through ill health, was well known as a top band enthusiast.

Mr S. Granfield, G5BQ
Stan Granfield died on 23 May. He will be remembered by many throughout Region 5, for which he was Regional Representative until 1972, for his help, friendship and advice given over many years. He had been a pillar of strength in the Cambridge Club since its formation.

Mr J. J. Hollington, G4GA
Joe Hollington, of Great Clacton, Essex, died on 4 June. A driving force in Chingford RS between 1940 and 1970, he was one-time chairman of the East London RSGB Group, and a former member of the RSGB Mobile Committee.

Mr W. Lucas, G2OI
William Lucas died on 30 April in Llandudno Hospital, at the age of 70. A keen amateur for many years, he had not been active for the last three years following a heart attack.

Mr A. T. Martin, G2LB
Tom Martin died at his home on 25 May. A dedicated cw man since gaining his licence in 1932, he was awarded the ROTAB Trophy, and had been winner of BERU and other contests.

Mr W. H. Morris, G3JCQ
Mr Morris, of Barrow-in-Furness, Lancs, died suddenly on 19 May. He was a regular member of a small country-wide 80m net around 0600 daily.

Mr F. B. Travis, G3BCA
Frank Travis died recently at Lincoln. A founder member of the Lincoln Short Wave Club, he ran many RAE courses, and in the early days was always involved in Hamfests and Field Days.

Mr C. C. Usher, G2CCD
Charlie Usher, of Dartford, Kent, died on 12 May. He had been a QSL sub-manager for some years, though not recently, and was well known as an aerial designer (both in professional and amateur spheres) and dx man.

YOUR OPINION

The Editor,
Radio Communication
Sir—I read with interest the comments of John Allaway on the phasing out of a.m. on 1·8 and 3·5MHz, based on the decision that coastal stations shall use ssb on these frequencies. For the life of me I fail to see the connection between coastal ssb and amateur a.m. transmissions. To say that similar action by the world's amateurs can only be looked upon as most desirable is, to say the least, faintly comical. After all, it has taken the commercials a quarter of a century to catch up with the amateur fraternity.

A casual saunter round 80m in the evening reveals a bedlam of idling carriers, noises, commercial cw of execrable quality and, should it be said, certain amateur ssb transmissions churning out the full legal wattage and occupying just as much space as the old a.m. What impact if any, amateur a.m. has among this cacophony is debatable. International regulations and RSGB efforts should be concerned with these aspects rather than the elimination of a.m. In the long run the demise of a.m. may prove to be one of the worst things to befall amateur radio.

Judging by recent advertisements the price factor will have a more decisive effect in phasing out amateur radio than any legislation; £150 for a ten-year-old transceiver, £350 for a complete station, £50 for a thirty-year-old receiver—amateurs must either be completely mad or just plain gullible.

H. Webster, G3XTF

PS. As a logical conclusion why not phase out ssb, leaving the bands free for cw?

G3FKM replies:
My comments in May *MOTA* should be read in conjunction with *Current Comment* on page 244 of April *Radio Communication*. The existence of poor signals from commercial sources should not excuse us from doing our best to co-operate with the other legitimate users of shared bands.

The Editor,
Radio Communication
Sir—Regarding the behaviour of some amateur radio gear suppliers, I quote the following. Two years ago I ordered a complete set of replacement tubes for my Swan 500C. To date I have received one of them, but fortunately I had a number of spares.

In November I sent a cheque for a piece of gear to another British company, this time a large one. I was promised delivery at varying intervals, and finally had to threaten legal action to recover my money several months later.

Finally a request for details of aerial systems (beams) made two months ago has not even been acknowledged.

Each company advertises in your excellent magazine.

I do not attribute any bad motives to these companies, just sheer and absolute confusion and inefficiency.

Charles Ekberg, G3YRR

The Editor
Radio Communication
Sir—I feel that readers ought to be aware of a situation that may arise when aerial masts are purchased. I recently bought a 60ft telescopic tiltover mast, the price of which was shown as being inclusive of carriage. I naturally assumed that this price included unloading and delivery to my home address.

In due course the mast arrived at my home during mid-week and the carrier's driver informed my wife that he could not unload the mast himself but that he could probably find some local labourers to unload it; however, we would have to pay for the unloading. Alternatively, he would take the mast back to the central depot and we would then incur double delivery charges in due course. As a result I had little choice but to pay for the cost of unloading and I have not been able to obtain any refund from the suppliers, who were most unhelpful. I received a letter which contained the statement "we can hardly be responsible for the unloading of the masts. Business in this country would come to a halt if every customer charged for unloading".

Perhaps readers should bear this experience in mind when ordering masts and other large items of equipment. In the eyes of some suppliers "carriage paid" clearly does not include unloading and delivery to site.

E. N. Cheadle, G3NUG

The Editor,
Radio Communication
Sir—Having built the Mark 2 version of the G2DAF transmitter, I feel the following information will prove useful to builders of the Mark 3.

1. The Class A amplifiers V4 and V12 using EF80 or EF85 valves show *no* internal screening in these valves. In fact internal screening is connected to pin 6 and should be earthed. This caused me no end of trouble until the real source of the problem was established.
2. When fitting valve holders, screening etc, some improvement in the stability of the driver should be possible by mounting screening across the valve holder so that the anode circuitry cannot "see" the grid circuitry.
3. I fitted grid stoppers to the 6146s in the pa and everything worked correctly apart from some loss of drive on 10m. Some time after building the transmitter I removed these stoppers and, hey presto, plenty of drive on 10m as well.

John Reed, G3SIB

The Editor,
Radio Communication
Sir—Having read through pages of advertisements in *Radio Communication* I find it strange that nowhere do I see any advertisement for transmitting type variable capacitors or suitable switches for use in construction of equipment for the hf bands.

With the prices of commercial equipment now rising even higher, out of reach of many licensed amateurs both newcomers and established, I feel the Society should endeavour to find suppliers who will advertise such necessary parts in *Radio Communication*. Circuits appear in RSGB publications but where does one get the parts?

P. G. Taylor, G3HKL

The Editor,
Radio Communication
Sir—I note that some of your advertisers appear not to be interested in small orders, by the way their adverts read, with minimum order charges. This is due to economics no doubt but I also note that in addition some are charging VAT on their so-called carriage charges—I say so-called because most of the items are small enough to go into an envelope with a 3p stamp.

Although they are correct to charge VAT on carriage charges, provided they are shown on the invoice as a separate item, do you not agree that most of the suppliers of components such as transistors and diodes can post them for 3p or 5p, and they have a minimum so-called carriage charge of 15p and some want 10 per cent added to this!

S. Beauchamp, GM3SYD

MOBILE RALLY NEWS

Anglian Mobile Rally, 22 July
The Suffolk Showground will once again be the venue for this rally which features trade stands, rtty demonstration, bring and buy sale, plus stands for the XYLs. Talk-in will be available on 2, 4 and 160m, with the callsign GB3AMR. Other entertainments include a country and western group, donkey rides, punch and judy etc. Free car parking.

Wessex Mobile Rally, 29 July
Note the correct date and place of this rally. Not as given in June Radio Communication.
The Wessex rally is now to be held at the Royal School of Signals, Blandford Camp, Blandford, Dorset. The organizers are the Wessex ARG, who announce that talk-in will be on 160, 80, 4 and 2m, and the rally will feature trade stands, junk sale, and refreshments etc.

Plymouth Mobile Picnic, 5 August
The club picnic will be held at the Scenic Car Park, Yelverton Down, near Plymouth, with talk-in available on 2 and 160m. Members of the Plymouth Radio Controlled Model Aircraft club will be giving a show, refreshment facilities will be available, and a draw is planned, with prizes mainly for the ladies. Further details from G3UVS QTHR.

Bromsgrove Mobile Picnic, 19 August
This event is to be held at the Avoncroft Museum of Buildings, with talk-in on 160 and 2m. Further details from J. K. Harvey, 22 Elm Grove, Bromsgrove.

Town and Country Festival, 25-27 August
A mobile rally is being held at this festival as part of the attractions which include steam engines, vintage vehicles, farm units, zoo, and a full ring programme. The festival takes place at the Royal Showground, Kenilworth, Warwickshire. GB3TCF will provide talk-in on 160 and 2m (a.m. and fm), and at the rally itself will be an exhibition station, swl display, and trade section. G6 - - - amateurs desiring skeds should contact G3YQC, for 2m rtty skeds contact G3NUE. Further details from G3RPJ.

Dunstable Downs RC Exhibition, 28-29 July

On 28-29 July the Dunstable Downs Radio Club will be holding a demonstration and exhibition of amateur radio to celebrate the Diamond Jubilee of the RSGB. The exhibition will be open to the public each afternoon and will be located on the top of the Dunstable Downs.

Club stations G4ARD/P (on the hf bands) and G8DDC/P (on 2m) will be active and the club tv station G6AIX/T will be demonstrating amateur tv. The club would therefore appreciate any contacts. There will also be a contest for teams of club members to set up a radio station from scratch (including aerials and generators) in the quickest possible time.

While this event will be in no way a mobile rally all amateurs in the locality will be very welcome.

At the Northern Mobile Rally in May, G8BZY, centre, greets G4JW, RSGB Zonal Manager, watched by G3WVD, rally secretary. This annual event was organized this year by the Otley Radio & Electronics Society and was a success despite the inclement weather. The Northern Heights ARC put on a good display enjoyed by some 600 visitors. (*Photo: Chris Cooper*

Two well-known amateurs in conversation at the RAIBC Picnic in May: Sir Evan Y. Nepean, Bt, G5YN, and W. Ken Alford, G2DX. (*Photo: W. Hill*)

Mobileers are also invited to attend the following events, which are not necessarily mainly mobile events. For further details see *Special Event Stations*.

Willenhall Comprehensive School Garden Fete, 7 July, with talk-in on 160 and 2m.

Dagenham Town Show, 7 and 8 July, talk-in facilities on 145MHz.

Peterborough Ham Festival, 30 September, with talk-in on 160 and 2m (one of which will be G3DQW).

Lytchett Matravers Steam Rally and Old Time Fair, 7 and 8 July, near Poole, Dorset. Talk-in will be on 70·26 (a.m. /fm), 144·48 (fm) and 145·00 (a.m.), from 11am to 7pm both days.

Looking ahead

3 August—RSGB Dinner Club, Royal Westminster Hotel, Buckingham Palace Road, Victoria, London.

21 September—RSGB Diamond Jubilee Dinner (Manchester Area), Post House Hotel, Northenden, Manchester.

22 September—Region 10 ORM and dinner, University College, Park Place, Cardiff.

22 September—Region 13 ORM and Scottish VHF Convention.

6 October—Region 7 ORM, "Winning Post", Whitton, Middlesex.

25-27 October—Amateur Radio Retailers Association Exhibition, Granby Halls, Leicester.

SPECIAL EVENT STATIONS

Whitton Secondary School, 4 July
G8FMZ and G8AWB will be operating from the school as part of the Open Day activities, from 7pm onwards. G8FRE QTHR will provide further details, and requests the loan of halo aerials.

Bedford School Charity Fete, 7 July
GB2BS will be on the air from 1400 to 1800, operated by members of the school radio club, using 160 and 2m. Special QSL cards will be issued on receipt of an sae.

Willenhall Comprehensive School Garden Fete, 7 July
GB3WCS will be on the air, operated by members of the Willenhall and DARS, from midday onwards. Three stations will use all bands 160-2m. The event is also being run as a mobile rally, the location is Stafford Street, Willenhall. Further details from G4AHK QTHR.

Dagenham Town Show, 7-8 July
The Barking Radio Electronics Society will be putting GB2DTS on the air during the show, using all bands 160-2m. Mobile talk-in will be available on 145MHz, further details from G8BXC QTHR.

Shefford and District Radio Society, 13 and 14 July
GB2FJE will be put on the air by Shefford and DRS to commemorate the 25th anniversary of the forming of the club. Activity will be on all bands 160-2m, and possibly on 70cm also, from 2200 Friday to 1700 Saturday. Special QSL cards will be used.

Frogmore Junior School Fete, 14 July
GB2FS will be in operation from the fete, using 80m and the hf bands. Organized by the Farnborough and DRS.

Robin Hood Vintage Car Rally, 14-15 July
The ARC of Nottingham will be putting GB2RHR on the air from the rally site, Wifford Lane Sports Ground, Nottingham. Operation will be on ssb 80-10m, and a.m. 2m, all contacts will be confirmed by a special QSL card sent via the bureau.

Horsham Festival, 20-21 July
The Horsham ARC will be operating GB3HF for a 24-hour period from Friday evening onwards, using 160-10, and 2m. Contacts will be QSLd via the bureau, all visitors will be welcome. Further details from G3NPF, tel Horsham 66290.

Bishopthorpe Palace Garden Party, 21 July
The York ARS will be operating G3HWW/A from the grounds of the Archbishop's Palace, Bishopthorpe. All hf bands will be used, on ssb, further details from G3WVO.

Leisure Time Activities Exhibition, 1-31 August
GB2YEO will be on the air from the library of Yeovil Technical College, operated by the Yeovil ARC, as part of an exhibition which is open to the public on 11 and 13-18 August. All bands 3·5-28MHz will be used, plus 144MHz, and simultaneous transmission on the vhf and hf bands for 9-18 August. Further details from G3NOF QTHR.

Uncle's Southend "Do", 19 August
First meeting at 12 noon, second at 3.15pm, at the Westcliff Pavilion, on the sea front. Then from 4pm at the Church Hall, St John's Road, Westcliff.

Wycombe Show, 1 September
G3CAR will be operated by the Chiltern ARC from the show site, The Rye, High Wycombe, Bucks, on all bands 80-10m, cw and ssb. It is hoped to have rtty equipment available, skeds would be welcome. All contacts will be confirmed with a special QSL card via the bureau, visitors to the site will be welcome. Further details from G3FSN QTHR, tel 0494 24835.

Peterborough Ham Festival, 30 September
This festival is to be held at Walton School, Mountsteven Avenue, about four miles north of Peterborough town centre. Talk-in will be available on 160 and 2m, the event opens at 11am and is scheduled to finish at 5pm.

RAYNET

by S. W. LAW, G3PAZ*

Many years ago we started this column with a reference to the great usefulness of brickbats as building material. We like to think that we were right in our comment at the time to the effect that a worthy edifice might well arise from this figurative use of abuse as a kind of yardstick of our progress. And it has been so; we have learned a great deal from this democratic procedure and have indeed progressed.

Surprisingly, however, despite the universal dislike of the so-called development of slab-like blocks of no apparent architectural merit, due to the depressing sameness of the materials employed, we find we are also suffering from a like difficulty in a sense. Despite the great progress made by Raynet over the years, we are amazed to find that there are still some of the dreary old canards appearing once again; regimentation, the annexation of frequencies and a lofty disregard of repeated calls from non-Raynet stations.

At this point in time it should surely not be necessary to point out that without systematic procedures comparable to those employed by professional systems combined with an acceptable degree of discipline our services would be useless when it came to the crunch. As to frequencies, even the ubiquitous club nets decide on (and all adhere to) a given and agreed spot and time; and rightly so indeed. Finally, have the complainants never heard of crystal-controlled receivers? On what frequency do they call these so-called snooty Raynet stations who are alleged to ignore their repeated calls?

Perhaps it would be as well if even more were known of the aims of Raynet. We are certainly not a closed shop, but surely it is only common politeness to allow us to conduct our exercises for the little time we take up without interruption? Also we would go so far as to say without fear of contradiction that any amateur who would dream of butting in and floundering about during any genuine disaster procedure can only be termed a menace to society.

Strong words, perhaps? We offer a service to the public and put in many hours of voluntary work to try to be as efficient as possible. Let us get on with it, and in our off time you will find us just ordinary amateurs enjoying our hobby in the normal way.

Anyway, why not join us? That is, if you are not afraid of a little unpaid responsibility. The hon registrations secretary, address in panel below, will gladly send any information you may require.

Newsletter
All controllers should by now have received Raynet Newsletter No 11 and also the new list of frequencies, issue 25 dated 22 May.

There is nothing we can add to the Newsletter save to point out that things move so fast that controllers should take particular note of the amendments therein to the latest issue of the list of controllers. One item might well be generally noted, however. Since the last issue of the Newsletter there have been some 64 new registrations and no less than 160 re-registrations, which would seem to prove that this column is widely read.

The latest frequency list is a mine of information, showing not only that our groups are now operating from top band to the 430MHz ranges but that fm and ssb are now widely used and there is even provision for rtty in several areas. The new issue also gives an extremely useful list of addresses to serve as information sources in areas all over the country. The compiler, G3GJW, has done a really grand job and we trust that any fresh information will be promptly fed to him at the address given on the list for speedy updating.

Honorary registrations secretary: **Mrs Jane Balestrini, "Merrivale", Willow Walk, Culverstone, Gravesend, Kent DA13 0QS.**

* 130 Alexandra Road, Croydon, Surrey, CR0 6EW

CONTEST NEWS

Affiliated Societies Contest 1973 results

The HF Contests Committee regrets the delay in publication of these results. This has been due to exhaustive and very trying investigations into irregularities that appeared in the log submitted by a leading station. These investigations finally left the committee no alternative but to disqualify the club concerned and bar any contest entry from them for 12 months. It must be pointed out that this does *not* apply to the clubs listed at the foot of the results table for breaches in rules.

The Cambridge University Wireless Society, G6UW, are to be congratulated on their fine effort in the contest. Despite the common complaint of lack of operators and the contest being out of University term-time, they rounded up enough points to beat Crawley ARC "B", G3TR, by 35 points, although before checking they were six points behind.

Comments were few and generally confined to the lack of activity at the latter end of each period, although the Surrey Radio Contact Club "complained" about their aerial being stolen between times and having to arrange an emergency one from pieces of wire.

The standard of log-keeping was a little below par with a lot of entries, no club retaining their original claimed score. AFS and non-AFS caused confusion with some, there being several suggestions put forward as to how this could be avoided. These will be considered by the committee for next year. A final point—please ensure your entry is posted with stamps affixed—two were received without—an expensive habit for the committee!

Check logs are gratefully acknowledged from G4ATH/A, GM3ZXH/A, OK1DCW, OL1AOH and OL1API.

Posn	Station	Callsign	Points	Points Claimed
1	Cambridge University WS	G6UW	1,696	1,719
2	Crawley ARC "B"	G3TR	1,661	1,725
3	Addiscombe ARC	G4ALE/A	1,586	1,661
4	Hereford ARS	G3YDD/A	1,573	1,642
5	Wheatsheaf ARS (Grimsby)	G3PDL	1,566	1,656
6	University College of N Wales ARS	GW3UCB	1,551	1,625
7	Swindon & District ARC	G3FEC/A	1,547	1,718
8	Leyland Hundred "A"	G3GGS	1,535	1,546
9	Verulam ARC	G3VER	1,531	1,639
10	Thames Valley ATS	G3TVS	1,487	1,612
11	Fareham & District ARC "A"	G3VEF/A	1,463	1,594
12	Surrey RCC	G3SRC	1,459	1,555
13	Standard RC Harlow	G3NIS	1,454	1,560
14	Horsham ARC	G3TNO	1,435	1,512
15	Crawley ARC "A"	G3WSC	1,422	1,401
16	Fareham & District ARC "B"	G3VXM	1,386	1,521
17	Sutton & Cheam RS "A"	G2DMR	1,379	1,464
18	Edgware & District RS	G3ASR/A	1,334	1,525
19	Speedbird Club	G3NAF	1,329	1,460
20	Crystal Palace & District RC	G3VCP	1,322	1,471
21	Maidstone YMCA ARS	G3TRF	1,301	1,579
22	Echelford ARS	G3UES/A	1,284	1,450
23	Chiltern ARC	G3CAR	1,275	1,380
24	Cardiff RSGB Group	GW3GHC	1,253	1,414
	City of Leicester Polytechnic ARS	G3SDC/A	1,253	1,381
26	Kingston & District ARS	G3KIN	1,222	1,452
27	Southgate RC	G3SFG/P	1,179	1,268
28	Clifton ARS	G3GHN	1,174	1,195
29	Sutton & Cheam RS "B"	G4ADM	1,169	1,271
30	University of Keele ARS	G3UOK	1,145	1,406
31	Acton, Brentford & Chiswick RC	G3IIU	1,067	1,207
32	Swansea ARS	GW3ZGK	978	1,148
33	Reigate ATS "A"	G3REI/A	975	1,020
34	Oxford & District ARS	G3JLE	968	1,067
35	George Kent ARS	G4AGK/A	961	1,051
36	Leyland Hundred "B"	G3WYY	915	1,040
37	NE Essex Technical College ARS	G3OCQ/A	843	1,096
38	Sully & District SWC	GW3ZIT	841	1,006
39	Reigate ATS "B"	G3ZRF	839	1,156
40	Nottingham ARC	G3EKW	823	1,112
41	Glenrothes RC	GM3PFQ/A	811	1,132
42	Grimsby ARC	G3LMT/A	685	695

Entries from the following were disallowed:
Royal Naval ARS—General Rules 5b(ii) and (iii)
Conway Valley ARS—General Rules 5b(ii) and (iii)
Mid-Sussex ARS—General Rules 5b(ii) and (iii)
East Kent RS—General Rule 5b(ii)

April 1973 Portable 70MHz Contest results

Twenty-six participants submitted an entry for this contest. Although activity was fairly high conditions were average, but some very strong workable dx was heard on the band. The band winner used a five-element quad, which by the score they made (almost 200 points ahead of the runners-up) gave a very good account of itself. Certificates will go to both stations.

Posn	Station/P	QSOs	Score	County	Best dx	Dist km
1	GW3OBD	85	591	BR	GM4BYF/P	394
2	GW4ABR	50	416	MG	GM4BYF/P	325
3	GW4BGG	51	344	BR	GM4BYF/P	380
4	G3FDW	50	329	NM	G3VPF/P	318
5	GM4BYF	31	301	PB	G3VPK	495
6	G3WMR	62	286	WR	GM4BYF/P	390
7	G3HCW	36	266	YS	G3VPF/P	390
8	GW3WOS	44	256	MH	G3HCW/P	300+
9	G3VPF	48	248	DT	G3HCW/P	383
10	G3JEQ	70	245	SY	GW4ABR/P	270
11	G3TDM	56	234	BS	GM4BYF/P	438
12	G5HD	51	231	WE	G3NQV/P	325
13	G3VER	58	224	BS	GM4BYF/P	450+
14	G3LVP	45	215	NR	G3VPF/P	210
15	G4ALE	35	159	DY	GM4BYF/P	289
16	G3XIG	47	157	SX	G3HCW/P	320
17	G3ZLQ	48	146	OX	GW4ABR/P	205
18	G3KIN	40	131	SY	G3HCW/P	310
19	G3VFD	30	126	HF	G3VPF/P	230
20	G4BZD	24	86	YS	GM4BYF/P	245
21	GW3USS	13	59	MH	G3KIN/P	190
22	G3WYT	12	58	HE	G3FDW/P	280
23	G3CDG	17	57	GR	G3VPF/P	145
24	G5UM	16	54	SF	GW4ABR/P	268
25	G3BKR	19	53	KT	GW4BGG/P	250+

Check Log from G4BEZ acknowledged.

Rugby DF Qualifying Event results

Excellent weather contributed to an enjoyable afternoon for the 19 teams assembled in a layby just north of Whittlebury for the first RSGB DF Qualifying Event of 1973.

At the start strong signals were heard from both stations, leaving competitors in some doubt as to how far away the transmitters were. Station "A" was located near Great Linford by a canal in an old stone quarry, 9½ miles north-east of the start; station "B" was near Calvert, 12 miles to the south.

Despite the distance, a very long aerial and an intervening canal, six teams managed to find station "A" before 1430. Station "B" was hidden near a disused railway track behind a large area of very thorny bushes. At 1433 Bob Vickers found a way in with little apparent effort, but soon the shouts of frustration from competitors trying to get in the "hard way" were a tribute to the difficulties of the site. Despite this and the 14 miles between stations, Mike Hawkins arrived at transmitter "B" at 1510, having already found transmitter "A" at 1427. Eleven of the 19 starters found both stations before the conclusion of the contest.

Thanks are due to Brian Mahoney who operated "A", to Derrick Newman who organized the contest as well as operating station "B", Mrs Mollart and her helpers who provided tea, and to the many others whose efforts contributed to a very popular and successful event.

Posn	Name	Club	Time of arrival Station "A"	Station "B"
1	M. P. Hawkins	Colchester	1427	1510
2	P. Tyler	Oxford	1414	1515
3	B. Bristow	Oxford	1427½	1518
4	E. L. Mollart	Oxford	1428½	1521
5	R. J. Vickers	Stratford	1523½	1433
6	R. J. Pearce Boby	Oxford	1438	1530
7	T. Gage	Oxford	1431	1531
8	A. Butcher	Chelmsford	1439	1532
9	I. Butson	Colchester	1437	1532½
10	W. North	Chiltern	1428	1534
11	G. Whenham	Coventry	1627	1520
12	P. H. Lisle	Oxford	—	1512
13	D. Holland	S. Manchester	1535	—
14	B. A. Reid	S. Manchester	1555	—
15	P. Moore	Banbury	—	1610
16	G. T. Peck	Chiltern	—	1629

Three teams did not find either transmitter.
M. Hawkins and B. Bristow qualify for the final, as does P. Tyler, last year's winner.

IARU Region 1 VHF/UHF/SHF Contests 1972

Contestants requiring a copy of the complete results should send an A5 size (10in by 7in) sae to G5HD, 100 Shirley High Street, Southampton.

70MHz Contest rules

Date: 12 August 1973.
Times: 0900-1700gmt.
All entries and checklogs to: VHF Contests Committee, c/o 59 Harewood Road, Chelmsford, Essex CM1 3DH.

The following General Rules, published in January 1973 *Radio Communication*, will apply: 1, 2, 3, 4a, 5a, 6a, 7a, 8a, 9a, 10a, 11-24.

144MHz SSB Contest rules

Date: 19 August 1973.
Times: 9000-1700gmt.
All entries and checklogs to: VHF Contests Committee, c/o 94 Hermon Hill, South Woodford, London, E18.
The following General Rules, published in January 1973 *Radio Communication*, will apply: 1, 2, 3. 4b, 5a, 6a, 7a, 8b, 9c, 10a, 11-24.

Mid-Severn Valley 1973 Teleprinter Contest results

Activity this year was in two areas, the South-East (on 45 bauds) and the Midlands on 50 bauds. Rule 9 caused much comment from the South-East. One station wondered if it was time to put away afsk in favour of fsk. One log was received from a swl. Stations also active during the contest: G3LZN, G3UMV, G3WGM, G3WPO, G4BLQ, G8BEJ, G8CXV, G8DWA, G8EFP, G8FEX, G8FHS.

Posn	Callsign	Cnty	QSOs	Score	Best dx	Km
1	GW4AYK/P	BR	15	67	G3WPO	225
2	G8FCD	SX	7	17	G8CDL/P	105
3	G3PWJ	SD	10	14	GW4AYK/P	85
4	G8CDL/P	BD	5	13	G8FCD	105
5	G3YKB	LD	7	11	G3WPO	60
6	G8FRA	WK	4	10	GW4AYK/P	100
7	G3OLM	SY	6	8	G8CDL/P	80
8	G8GAG	WK	3	5	GW4AYK/P	90
9	G8GOJ	SY	5	5	G8BEJ	45
Receiving Section						
1	BRS30628	HD	5	13	G3PWJ	60

Cray Valley RS 5th SWL Contest rules

1. From 1800gmt on 15 September to 1800gmt on 16 September. Up to 18 hours logging may be done during this period and the rest period must be clearly shown. Multi-operator stations may log during the entire contest.
2. The contest is open to anyone in the world and there will be two categories: single-operator and multi-operator. The second category is open to two or more listeners or to clubs, and more than one receiver can be used.
3. The 3·5, 7, 14, 21 & 28MHz bands may be used.
4. Stations may be logged using any mode.
5. The practice of logging a series of contacts made by one station is deprecated. Log entries must not include the same callsign in the "station worked" column more than 20 times on each band.
6. The object of the contest is to log as many stations in as many countries as possible. Scores should be compiled as follows: one point for each station heard on each band *multiplied* by the number of different countries heard on each band added together. A list of countries heard must be furnished and a separate log must be submitted for each band. In addition a bonus of up to 100 points will be awarded for neatness. Illegible logs will not be accepted.
7. The call areas of the USA, Canada and Australia will each count as a separate country, ie W1234567890 V01 V02 VE12345678 and VK12345678. All other countries will be determined by the official RSGB Countries list.
8. No CQ or QRZ or similar call will be allowed to count for points. AM or MM stations are not to be included in entries.
9. Log sheets are available from Bob Treacher who must be sent a large sae at the address below. It is desirable that entrants use official log sheets but entries on home-made log sheets will be accepted as long as the following information is given: date, time (gmt), band, station heard, station being worked, report at swl's QTH. Points may only be claimed for stations actually heard and the callsign must be shown in full. If points are claimed for both stations the callsign of each must appear in the "station heard" column.
10. Entries should be addressed to the contest manager, Mr R. A. Treacher, 392 Rochester Way, Eltham, London SE9 6LH, England, *to arrive not later than 5 November 1973.*
11. Certificates of Merit will be awarded to the overall winner and runner-up of each section and to the first contestant in each country placed among the top 25 entries.
12. The decision of the committee of the Cray Valley Radio Society will be final.

Contests calendar

7-8 July	—Jubilee VHF/UHF (Rules in April issue)
14-15 July	—SSB FD (Rules in March issue)
15 July	—DF Qualifying, Coventry (Rules in June issue)
22 July	—432MHz Portable (Rules in June issue)
4-5 August	—YO DX CW/Phone
5 August	—DF Qualifying, Slade
5 August	—RSGB Region 1 VHF
11-13 August	—WAE DX CW
12 August	—70MHz Fixed and Portable (Rules in this issue)
18 August	—144MHz QRP (Rules in June issue)
19 August	—144MHz SSB Open (Rules in this issue)
1-2 September	—LZ DX CW/Phone
1-2 September	—VHF NFD (Rules in March issue)
1-2 September	—IARU 144MHz (Rules in May issue)
9 September	—80m FD
9 September	—DF Qualifying, Dartford Heath
8-9 September	—WAE DX Phone
15-16 September	—SAC CW
15-16 September	—Cray Valley RS 5th SWL (Rules in this issue)
22-23 September	—SAC Phone
23 September	—DF Final, to be organized by Stratford Group
6-7 October	—VK-ZL-Oceania Phone
6-7 October	—UHF NFD
6-7 October	—IARU 423/1,296MHz (Rules in May issue)
13-14 October	—VK-ZL-Oceania CW
13-14 October	—21/28MHz (Rules in May issue)
20-21 October	—WADM CW
20-21 October	—7MHz CW } (Rules in June issue)
3-4 November	—7MHz Phone } (Rules in June issue)
3-4 November	—144/432MHz CW
10-11 November	—OK DX CW/Phone
10-11 November	—2nd 1·8MHz
11 November	—70MHz Cumulative
9 December	—144MHz Fixed

Mobile Rallies Calendar

1 July	South Shields and DARC, at Redwell School, Prince Edward Road, South Shields.
7 July	There will not now be a rally at Hanworth Carnival. See March issue p203 for details of Special Event Station.
8 July	Cornish, Treviglas County Secondary School, Newquay, Cornwall.
8 July	Upton Hill Secondary School, Tunnel Hill, Upton-on-Severn.
15 July	Scarborough ARS, Burniston Road Barracks, Scarborough.
22 July	Anglian, Suffolk Showground, Bucklesham Road, Ipswich.
22 July	Southdown, Polegate, Wilmington.
29 July	Wessex ARG, Royal School of Signals, Blandford Camp, Blandford, Dorset.
5 August	RSGB Woburn Abbey Rally.
5 August	Plymouth Mobile Picnic, Scenic Car Park, Yelverton Down, near Plymouth.
12 August	Torbay ARS, Newton Abbot Rugby Ground, Newton Abbot, Devon.
12 August	Derby, Rykneld School, Bedford Street, Derby.
19 August	Bristol Mobile Picnic, Ashton Court, Bristol.
19 August	Preston ARS, Kimberley Barracks, Deepdale Road, Preston, Lancs. (New date).
19 August	Bromsgrove Mobile Picnic, Avoncroft Museum of Buildings.
25-27 Aug	Town and Country Festival, the Royal Showground, Kenilworth, Warwickshire.
23 Sept	Harlow & District, Netteswell Comprehensive School, Harlow.

CLUB NEWS

RSGB Affiliated Societies are invited to submit items for inclusion in this section to their Regional Representatives (not direct to the editor), whose addresses appear on page 451 of this issue, for inclusion in the appropriate regional section.

Items of news and dates of forthcoming events should reach RRs by the following dates:

3 August for September issue
5 October for November issue
26 November for January issue

Advance notice

RSGB Diamond Jubilee Dinner (Manchester area)

Friday 21 September 1973

Post House Hotel, Northenden, Manchester

Details later

REGION 1 — RR B. O'Brien, G2AMV

Ainsdale (ARC)—Members should contact N. Horrocks, G2CUZ, for details of meetings.

Blackburn (ELARC)—First Thursday each month. 7.30pm, Edinburgh House, Shearbank Road, Blackburn. Secretary—W. E. Baxendale, G8FDG, "Juverna", Westland Avenue, Darwen, Lancs.

Blackpool (B & DARS)—Mondays, 8pm, Pontins Holiday Camp, Squares Gate, morse tuition 7.30pm.

Bolton (B & DARS)—White Lion Hotel, Moor Lane, 8pm, on the 3rd Tuesday in each month, top band net 1200gmt on Sundays. Secretary—S. Macdonald, G4AQB, 8 Archer Avenue, Bolton.

Bury (B & RRS)—Second Tuesday each month, 8pm, George Hotel, Market Street, Bury. Secretary—J. D. Clifford, G4BVE, 10 Arlby Avenue, Bury, Lancs.

Carlisle (C & DARS)—Mondays, 7.30pm, Currock House, Lediard avenue, Currock. Secretary—G8GSE, 6 Carlton Gardens, Stanwix, Carlisle GA3 9NP.

Cheshire (Mid-Cheshire ARC)—Wednesdays, 7pm, Technical Activities Centre, Winsford Verdin Comprehensive School, Grange Lane, Winsford. Nets on 160m, 7pm, Mondays; on 2m 7pm, Tuesdays. RAE classes and slow morse transmissions are available on Tuesdays. Please see secretary for details (G3SIQ). Chairman is G3JWK.

Chester (C & DARS)—Tuesdays at 8pm, YMCA, Chester, except the 1st Tuesday in each month which is a net night on 145·08MHz and 433·15MHz. Further details from G8AYW or G6AHC/T QTHR.

Douglas IOM (DARS)—Secretary, GD3YUM, will be pleased to hear from any member who intends to visit the island.

Eccles (E & DARC)—Tuesdays, 8pm, Bridgwater School, Worsley, Manchester. Club 2m net 11am on Sundays on 145·65MHz. All visitors and prospective members welcome, secretary G4AEQ QTHR.

Lancaster University (UOLARS)—Every Wednesday, 7pm, Furness College, together with RAE and morse classes. The society is active on the hf bands and 2m, using G3ZBY and G8DOU. The rtty gear is also operational on these bands. Skeds and visits welcomed, enquiries please to Colin Pegrum, Department of Physics.

Leyland Hundred (ARG)—Second Monday each month, 7.30pm, Rose & Crown, Ulnes Walton, Leyland. Net night Saturdays 2000gmt on 145·8MHz. Details from F. Harrison, G3XII, 78 Lancaster Lane, Leyland, Lancs.

Liverpool (L & DARS)—Tuesdays, 8pm, Conservative Association Rooms, Church Road, Wavertree; secretary—G3WCS.

Liverpool (NLRC)—Tuesdays, 8.30pm, informal meeting at the "Nags Head", Thornton, Crosby, Liverpool 23, visitors welcome. Secretary Alan L. Hart, G4BLI, 50 Strawberry Road, Liverpool, L11 7AD.

Liverpool University (LUARS)—Meets every lunchtime in the Radio Room, Students' Union. Please arrange visits with the secretary, Nigel Pope, G4AXA, c/o Students' Union, 2 Bedford Street North, Liverpool 7.

Manchester (M & DARS)—Wednesdays, 7.30pm, all meetings include morse classes. 203 Droylesden Road, Newton Heath, Manchester 10. Secretary—G3IOA.

Manchester (SMRC)—Fridays, 8pm, Sale Moor Community Centre, Norris Road, Sale, Cheshire. The vhf lads meet on Mondays, 8pm at the club shack, "Greeba", Shady Lane, Manchester 23, with operation of G3UHF on 2m and 70cm.

At the agm the following people were elected to the committee:—chairman—Mr B. L. Scott, vice chairman—Mr G. Clark, secretary—Mr D. C. Holland, treasurer—Mr R. N. Barker, senior committee members—Messrs W. M. Furness, J. McBurney, S. Potter, W. L. Seddon Junior, S. Kershaw. Visitors welcome both Mondays and Fridays.

6 July (Visit to Madewel Products Ltd), 13 July ("RF noise bridge and experiments with aerials" by M. Ware. G4BJT), 20 July (Club meets at the Special Event Station—Manchester Flower Show—Platt Fields, Manchester), 27 July ("VHF contests, preparation and operation" by J. P. Fletcher, G8DMJ), 3 August (Discussion on Aerials), 10 August ("The history of radio up to 1922" by P. Stewart), 17 August ("A 160m transistor transmitter/receiver" by D. C. Holland, G3WFT), 24 August (Rag Chew), 31 August (Radio Clinic, fault diagnosis). On 19 August the club is holding a triple df event, the start is 1pm for 1.20 at The Romper ph, NGR 808 848, OS MAP 101. G3WFT QTHR has full details.

Manchester University (ARS)—The amateur radio room is situated on the top floor of the Students' Union. Any prospective members are invited to contact the secretary, G8EPS, (G. T. Phelan) at the University Union, Oxford Road, Manchester, or G4AOS QTHR.

Preston (PARS)—5 & 19 July; 2, 16 & 30 August, 7.30pm, Windsor Castle (Private room), St Paul's Square, Preston. Secretary—G. Earnshaw, G3ZXC. Morse practice 7.30pm, main feature 8pm.

Stockport (SRS)—Second & 4th Wednesdays each month, 8pm, Blossoms Hotel, Buxton Road, Stockport. Secretary—G. R. Phillips, G3FYE, 6 Ross Avenue, Davenport, Stockport.

Thornton Cleveleys (ARS)—First & 3rd Wednesdays, 8pm, St John Ambulance Brigade HQ, off Fleetwood Road North (behind Police Station), Thornton, Lancs. Project group meets on Tuesdays, 7.15—9pm, at the Project Laboratory, Rossall School, Fleetwood. Work in hand includes 160 and 2m transmitters and receivers. Please note acting secretary is J. Duddington, G4BFH, The Grove, Thornton Cleveleys, Blackpool.

Warrington (W & DARS)—Tuesdays at Thames Board Mills Social Club, Alford Hall, Manchester Road, Warrington. Secretary—G3ZRN. Alternate meetings are devoted to beginners.

Wirral (WARS)—First & 3rd Wednesdays each month, 7.45pm, Sports & Recreation Centre (Old Drill Hall), Grange Road West, Claughton, Birkenhead. Secretary—G3WSD.

Wirral (Wirral DX Association)—Last Thursday each month at members' homes. Visitors are welcome—please inform secretary beforehand. Secretary—G4AHC, T. O'Neill, 41 Willoughby road, Wallasey.

Merseyside members meet for lunch on the 1st Monday of every month at the Strand Hotel, Brunswick Street, Liverpool. It is essential to book beforehand, through either G3VQT or G2AMV.

REGION 2 — RR J. E. Agar, G8AZA

Barnsley (B & DARC)—Details from hon pro, P. Ackley, G3LRP QTHR, or hon sec, P. Carbutt, G2AFV QTHR.

Bradford (BRS)—Meets at hq, 10 Southbrook Tce, Great Horton Road, Bradford 7. 19 June, 3 July, 17 July (Natter night), BRS will also take part in NFD, 2/3 June. Details from pro, Brian Ackroyd, G8GOV, 16 Highfield Tce, Shipley, Yorks BD18 4EE.

Denby Dale (DD & DARS)—Last Wednesday each month at Denby Dale Pie Hall, Denby Dale. Details from hon sec, J. Clegg, G3FQH QTHR.

Doncaster (DCTARC)—Monday evenings, 7pm, (during term time) at Doncaster College of Technology (Refectory). Club call sign G3UER, details from hon sec, G4AWT QTHR.
Easington (EAR & EC)—7.30pm Tuesdays & Thursdays at the Easington Village Workmens Club, Easington, Peterlee. nightly net on 28·750MHz at 1930, anyone interested in a chat or report please break in. Details from hon sec, G3VSS QTHR.
Fulford (York) (FARS)—Tuesdays, 7.30pm, at Scout HQ, 31 George Street, York. Details from hon sec, G5KC QTHR.
Halifax (NHARS)—4 July (Ragchew), 18 July (Quiz night). At the agm the following were elected: chairman, G3UGF, sec/treasurer G3MDW, minute sec G3UI, committee: G8BMI, G3TFF, G3USH, G8CHN, G8BCI. Also at the agm, Mr H. H. Crewe, G8CB, was made the first British hon member of the Northern Heights Amateur Radio Society for services to the society. Club meetings are held at the Peat Pitts Inn, Ogden, Halifax at 7.30pm, details from G3MDW QTHR.
Harrogate (H & KRS)—The Scriven Womens Institute on the 2nd & 3rd Mondays of each month. Details from hon sec, G8CRH/G4AZJ QTHR.
Hull (H & DARS)—Fridays, 7.30pm, club hq, 592 Hessle Road, Hull. Details from hon sec, G8GDD QTHR.
Northumberland Morpeth (NRC)—3 Wheatsheaf Yard, Morpeth, every Thursday at 7pm. Details from hon sec, G4AVO QTHR.
Otley (ORS)—Every Tuesday at 7.30pm, club hq. Details from hon sec, G8BZY QTHR.
Post Office (Middlesbrough) (POARC)—Every Thursday, 7.30pm, at 200 Marton Road, Middlesbrough. Also on the air Sundays at 1900 on 145·8. Club calls: G4BAY and G8GPO. Details from hon sec, G. Gaunt, G8CDP QTHR, or phone Middlesbrough 38237.
Scarborough (SARS)—7.30pm at Technical College, Scalby Road, Scarboro', every Friday. Details from hon sec, G3VAN QTHR or ar G8KU QTHR.
Spen Valley (SVARS)—5 July (AGM), hq, Grammar School, High St, Heckmondwike. Details from hon sec, G8DSB QTHR.
Sunderland (SARS)—Sunderland Polytechnic. Details hon sec G3XID QTHR.
Tyneside (TARS)—Mondays, 7.30pm, Community Centre, Vine St, Wallsend on Tyne. Details from hon sec, G. Lowden, 21 Winefred Gardens, Wallsend, NE28 6EF Tel Wallsend 627878.
Wakefield (WRS)—Alternate Tuesdays, 7.30pm, at youth Centre, Ings Road, Wakefield. Details from hon sec, G3XVU QTHR.
York (YARS)—Meets Thursdays, 7.30pm, at club hq, 61 Micklegate, York. Visitors always welcome. Details from G3WVO QTHR.
Several standing entries have not yet been confirmed. G8AZA, QTH: 291 Overdale, Southwold, Cayton, Scarborough. Tel 883200.

REGION 3 — RR B. Kennedy, G3ZUL

Birmingham (MARS)—17 July ("Chassis bashing" by R. Palmer, G5PP, 7.45pm). The Birmingham and Midland Institute, Margaret St. *G3ZMT*.
(Slade)—No information. Church House, High Street, Erdington. *G4BRT*.
(South)—First Wednesday of each month, 8pm, Hampstead House, Fairfax Rd, Birmingham 31. Informal meetings in the club shack every Friday at 8pm. visitors welcome. *G3OHM*.
Bromsgrove (BDARC)—No information. Second Friday of each month at Royal Oak, Barley Mow Lane, Catshill. *G3VGG*.
Coventry (CARS)—6 July (Night on the air), 13 July (Visit to Coventry Swimming Bath), 20, 27 July (Night on the air), 3 August (Proposed visit to Coventry Police HQ), 10 August (Night on the air), 17 August ("University Challenge" type quiz), 24 August (Night on the air), 31 August (VHF NFD preparation). Baden Powell House, St Nicholas St, Radford Rd, Coventry. *G3TFA*.
Cannock (CCARS)—No information. Bridgtown Social Club. *G8EHY*.
Dudley (DARC)—10, 24 July and 7, 21 August, 8pm, Central library, St james's St, Dudley. *G3PWJ*.
Hereford (HARS)—First and third Friday of each month, Civil Defence HQ, Gaol St, Hereford. *BRS30628*.
Litchfield (LARS)—1 July (DF Competition), 2 July ("Test Instruments in the shack", by G3WPB), 17 July (Junk sale), 6 August ("2-metre linears" by G3NAS), 21 August (VHF NFD arrangements). *G3NLY*.
Mid-Warwickshire—No information. Club meets at 28 Hamilton Terrace, Leamington Spa. *G6UDN*.
Nuneaton (NARS)—No information. Club meets first Tuesday of the month, 7.30pm, at Nuneaton Technical College, Hinckley Rd, Nuneaton. *G4AEH*.
Rugby (RDAR & EC)—Informal meetings are held on the last Tuesday of the month at the Lawrence Sherriff Arms, just off the town centre, 8pm. *G3YQC*.

Redditch (RRC)—No information. Club meets at the Old Peoples Centre, Park Rd, Redditch. *G3EVT*.
Shrewsbury (SARS)—Every Thursday at Harlescott Youth Centre, Sundorne Rd, 7.30pm. *G3VZG*.
Solihull (SARS)—No information. Club meets at the Manor House, High St, Solihull. *G4ABV*.
North Staffs (NSARS)—Every Monday at the Harold Clowes Community Centre, off Dawlish Drive Bentilee, Stoke. *G4BEM*.
Stoke on Trent (SoTARS)—No information. Club meets at 2a, Race Course Rd, Oakhill, Stoke on Trent.
Stourbridge (STARS)—Club meets on the third Monday of the month at Longlands School, Stourbridge. Informal meetings at the Shrubbery Cottage, Heath Lane, on the first Tuesday of the month. *B. Powell, BRS32183*.
Stratford on Avon—No information. *G8GAG*.
Sutton Coldfield (SCRS)—Second and fourth Mondays in the month at the Central Youth HQ, Clifton Rd, Sutton Coldfield. *G8ALO*.
Wolverhampton (WARS)—No information. club meets at Neachells Cottage, Stockwell End, Tettenhall. Morse classes every Friday. *G3UBX*.
Worcester (W & DARC)—Upton Mobile Rally, 8 July. Club meets at the Old Pheasant, New St. *G8ASO*.
Wrekin (WARS)—4 July (Portable: group mobile recce), 11 July Club project . . . transistor tester unit), 18 July (Outside speaker), 25 July (The AR88 inside out), 1 August (Club portable evening). Club meets at Ketley Bank Youth Centre, near Oakengates. *G3UKV*.

REGION 4 — RR T. Darn, G3FGY

Derby (DADARS)—11 July ("Mobile operation" by Tom Darn, G3FGY), 18 July ("DF practice night" No 4), 25 July ("Dxpedition to Mellish Reef in the Coral Sea" by Keith, VK4KS, tape and slides), 1 August (Auction sale of surplus gear), 8 August (Preparation for Radio Rally at Rykneld School), 12 August (Derby Radio Rally at Rykneld School), 15 August (DF practice night No 5), 22 August (Film Show), 29 August (Family night and barbecue at Drum Hill, Little Eaton). Additions and alterations to the society's programme will be announced on Radio Derby, 96·5MHz, and on the club notice board. All meetings are held at 119 Green Lane, Derby and commence at 7.30pm. Visitors and prospective members are always welcome.
Kettering (KADARC)—Second Wednesday of each month at the Youth Centre, School Lane, Kettering. More frequent meetings are projected when the club can find more suitable premises in which to inaugurate a shack to operate the club's transmitter under the call G5KN. There will also be constructional and social evenings. Visitors are very welcome and meetings commence at 8pm. *I. L. Holmes*.
Lincoln (LSWC)—4 July ("SSB Field Day" discussion), 11 July (Treasure hunt), 18 July (Talk), 25 July (Films), 1 and 8 August (Closed for summer holidays), 15 August (Open night), 22 August (Treasure hunt), 29 August (VHF/NFD discussion). The club meets and will welcome visitors at the Lecture Room of the Lincoln Astronomical Society, Westcliffe St, off Burton Rd, Lincoln.
Nottingham (ARCON)—At the recent AGM the following officers were elected: president—Andrew Veitch, G8FRB, chairman—Ken Viles G2FUB, vice-chairman—Geoff Dover G4AFJ, treasurer—Mike Harris G3VUI and secretary—Frank Charringburn. G3VUI has also been given the job of ASR. Meetings are held on Thursday evenings, 7.30pm, at the Sherwood Community Centre, Mansfield Rd, Nottingham. At 9pm each Thursday there is a morse class which usually starts at basics at the beginning of September and runs through to March. On 14 and 15 July the club will operate GB2RHR at the Robin Hood Vintage Car Rally.
Derby (NHCAARG)—6, 7, 8 July (Preparation and participation in RSGB UHF/VHF Contest), 13 July ("Engineering in power stations" by J. Wilson), 20 July (Bring and buy sale), 27 July (Film

Show), 3 August (Call my Bluff), 5 August (DF practice run), 10 August ("Novelty demonstration" by G3VKH), 17 August (DF practice walk), 24 August (Night on the air). Meetings take place at the Nunsfield House Community Centre, Boulton Lane, Derby, commencing at 7.30pm.

REGION 5 — RR P. J. Simpson, G3GGK

Bedford (B & DARC)—5 July ("History of mobile radio" by G3GGK), 7, 8 July (Diamond Jubilee VHF Contest), 12 July (WAB-G3ONT/G4ABQ), 14, 15 July (SSB Field Day), 19 July ("Necessary test equipment for the G8" by G2CLP), 26 July ("Radio control for models" by G5AGU), 2 August (Crystals), 9 August (Technical discussion), 16 August (Informal), 23 August (G3WTP on the air), 26 August (Holiday Net, 3·675MHz at 10.30am), 30 August (Slides-competition for best set). Meetings 7.30pm, "The Dolphin", the Broadway, Bedford. Hon sec—Eric Hawkins, 8 Arrow Leys, Putnoe, Bedford.

Cambridge (C & DARC)—6 July ("Oscillators and counters" by G8AVR), 3 August (Display devices). Both meetings 7.30pm at Civil Service Sports Club in Brooklands Ave, Cambridge. Every other Friday at club hq is informal. Hon sec—Sam Stimpson, G5BBP, 2 Burns Way, St Ives, Huntingdon.

Dunstable Downs (DDRC)—6 July (Final arrangements for Jubilee VHF/UHF Contest), 13 July (Between week), 20 July (AT/V demonstration), 27 July (Erection of marquee on the downs for exhibition), 3 August ("Most ICs" by Dick Joyce, G3WLM), 10 August (Between week), 17 August (Annual bring and buy junk sale), 24 August (Between week), 31 August (VHF/NFD final arrangements), 8pm, at Chews House, 77 High St, South Dunstable Beds. Hon sec—C. G. Powell, G8BPK, 1 Wenwell Close, Aston Clinton, Aylesbury Bucks.

Shefford (S & DRC)—5 July (VHF/NFD planning), 12 July ("History of the Space Age" by Jenny, xyl of G3TAZ), 12 July (Club seminar on tvi and bci), 26 July (DF hunt), 2, 23 August (No meetings), 30 August (Final VHF/NFD planning). 7.30pm at Church Hall, Ampthill Rd, Shefford, Beds. Hon sec—Chris Davies, G8DUY, 17 Brigham Gardens, Biggleswade, Beds.

Stevenage (S & DARS)—First and 3rd Thursdays of the month, 8pm, Staff Canteen, Hawker Siddeley Dynamics, Gunnels Wood Road. 5 July ("Getting started on microwaves" by G3RPE), 19 July (Jumble sale). Visitors are welcome and should not be put off by the fact that the club meets in a factory. Slow morse transmissions every Tuesday at 8pm on 1,980kHz, with either G3KSS or G3OVT on the key. RAE classes will be held at the Stevenage College of Further Education—details from the college.

REGION 6 — RR L. W. Lewis, G8ML

Cheltenham (RSGB Group)—First Thursday in each month, 8pm, at Royal Crescent Hotel, Clarence Street, Cheltenham. *G2FWA.*

Gloucester (ARS)—First Thursday of each month at the Oddfellows Club, Barton Street, Gloucester, 7.30pm, also each remaining Thursday of the month at the Drill Hall, Education and Leisure Centre, Chequers Rd, Gloucester. *G3MA.*

North Bucks (ARS)—8 July (On the air night, preparation of gear for IOM dxpedition), 21 July, 4 August (IOM dxpedition), 13 August (Natter night). All club meetings at Wolverton Youth Club, second Monday in each month. *G8AAT.*

South Bucks (VHF) Club—First Tuesday in each month at Bassetbury Manor, High Wycombe. July (Surplus equipment junk sale). August (Informal meeting). *G8DDM.*

REGION 7 — RR R. S. Hewes, G3TDR

Acton, Brentwood & Chiswick (ABCRC)—17 July (RAE exam paper-discussion), 21 August ("G3CCD/F0UT in France"), 7.30pm, Chiswick Trades and Social Club, 66 High Road, Chiswick W4. Hon sec—W. G. Dyer, G3GEH.

Addiscombe (AARC)—Every Tuesday from 9pm, "Prince George", High street, Thornton Heath. Hon sec—S. V. Knowles, G3UFY QTHR.

Ashford, Middlesex (Echelford ARS)—9 July (Being arranged), 26 July (Alec Ward G3HSP talking on "Marine operation"), 13, 30 August (Being arranged). 7.30 for 8pm, all visitors welcome, hon sec—Vic Higgs, G3WVJ QTHR.

Barking (BR & ES)—Every Thursday in each month (Club night), 8pm. Slow morse classes on Tuesdays at 7.30pm. Westbury Recreation Centre, Ripple Road, Barking, Essex. Hon sec—R. Clark, G8BXC QTHR.

Bexley Heath (North Kent RS)—Second and fourth Thursdays in each month, 7.30 for 8pm, Congregational Church Hall, Bexley Heath, Kent. Hon sec—Rainald Wells, G4ARQ QTHR.

Burnham Beeches (BBARC)—First and third Mondays in each month, 8pm, Hedgerley Scout Hut, Hedgerley, Nr Slough, Bucks. All visitors welcome.

Cheshunt (CDRC)—First Friday in each month, 8pm, Methodist Church Hall, opposite Theobalds station. Hon sec—Richard Ludwell, G3ZZQ QTHR.

Chingford (Silverthorn RC)—Every Friday, 7.30pm, Friday Hill House, Simmonds Lane, Chingford E4. Hon sec—M. Higgins, G8BUF QTHR.

Cray Valley (CVRS)—First & third Thursdays in each month, 8pm, United Reformed Church Hall, Court Road, Eltham SE9. Hon sec—P. F. Vella, G3WVP QTHR.

Croydon (Surrey Radio Contact Club)—Third Tuesday in each month, 8pm, "Swan & Sugarloaf", Brighton Road, South Croydon. Hon sec—Sid Morley, G3FWR QTHR. 1973/74 committee: G8TB—chairman, G3IAS—vice-chairman, G3EUE—treasurer, G3FWR—secretary, G3GHI—pro, G3ZPB, G8GGX, G8FZF.

Crystal Palace (CP & DRC)—21 July ("Varicap and touch tuning" by G3TDR), 18 August (Being arranged), 8pm, Emmanuel Church Hall, Barry Road, SE22. Hon sec—Geoff Stone, G3FZC QTHR, tel 699 6940.

Dartford Heath (DF Club)—6 July (Clubnight, hq), 15 July (RSGB Qualifying Event, Coventry), 3 August (Club night, hq), 5 August (RSGB Qualifying Event, Slade), 19 August (Club hunt, two-station event). Club hq, the Scout House, Broomhill Road, Dartford. Hon sec—Maureen Worby, G3XVC QTHR.

Dorking (DR & DRS)—Second and fourth Tuesdays in the month, 8pm, "Surrey Yeoman", Dorking. Hon sec—P. B. Gilbey, 6 Hawkwood Rise, Gt Bookham, Surrey.

Ealing (E & DRS)—Every Tuesday, 7.30pm, North Fields Community Centre, Northcroft Road, Ealing W13. Details from hon sec—J. E. Alban, G3JEA QTHR.

East London RSGB Group—Next meeting third Sunday in September and then every third Sunday until May 1974. Hon sec—Ron Broadbent, G3AAC QTHR.

Edgware (E & DRS)—12 July (Junk sale), 26 July (Informal), 23 August (Preparations for VHF/NFD). No meeting on 9 August. 8pm, Watling Community Association, 145 Orange Hill Road, Edgware. Hon sec—Alan Masson, G3PSP QTHR.

Gravesend (GRS)—Every Monday, 7.30pm, "Windmill Tavern", Shrubbery Road, Gravesend, Kent. Area representative—P. F. Jobson, G3HLF QTHR.

Guildford (G & DRS)—Second and fourth Fridays in each month, 8pm, Model Engineering HQ, Stoke Park, Guildford, Surrey. Further details from hon sec—Dave Coltart, G3SYM.

Hampton Court (Thames Valley ARTS)—First Thursday in each month, 8pm, King Georges Hall, Esher, Surrey. PRO—Rob Muir, G3LHN QTHR.

Harlow (DRS)—Every Tuesday, 8pm, Mark Hall Barn, First Avenue, Harlow, Essex. Details from hon sec—Vic Heard, 106 Vicarage Wood, Harlow.

Harrow (RSH)—Every Friday, 8pm, Harrow Sea Cadets HQ, Woodlands Road, Harrow, Middlesex. Refreshments available during evening. Further details from hon sec—Les Light, G3KDC QTHR.

Havering (H & DARC)—11 July (160m DF Competition), 25 July (Business meeting and junk sale), 8 August (Visit to North Weald Radio Station), 22 August (2nd 160m DF Competition), 8pm, British Legion House, Western Road, Romford. Hon sec—Sam Hobday, G3SKV QTHR.

Holloway (Grafton ARS)—Every Friday, 7.30pm, Archway School Annexe, Whittington School, Highgate Hill N19. Hon sec—H. D. Ashcroft, G8AYU QTHR.

Ilford RSGB Group—Every Thursday in each month, 8pm, Mortlake Rd, (off Ilford Lane) Ilford. Hon sec—Derek Sapsworth, G3YAW QTHR.

Kingston (K & DARS)—11 July (Natter nite and NFD post mortem), 8 August ("RF power transistors at vhf and uhf" by Terry Gibes, G4CDY). Morse classes every Wednesday except club night, contact G4APG QTHR. 8pm, the Scout HQ, Stirling Walk, Raeburn Avenue, Surbiton (Rear of Surbiton Lagoon). Hon sec—Dick Babbs, G3GVU QTHR.

Robin Hewes, G3TDR, lectured on varicap diodes to the Thames Valley ARTS in April and is here seen holding a 160m receiver using varicap diode tuning. With him are Larry Seaman, G3ATF, secretary (l) and Alan Mears, G8SM, chairman

Loughton (L & DRS)—First and third Fridays in each month, 8pm, Loughton Hall, Nr Debden Station. Hon sec—David Bowers, 12 Theydon Park Road, Theydon Bois, Epping, Essex.
New Cross (Clifton ARS)—Every Friday, 8pm, 225 New Cross Road, London SE14. Details from hon sec—R. A. Hinton, 58 Camilla Road, Bermondsey SE16.
Northolt (BEAARS)—First Thursday in each month, 8pm, BEA Trident Club, Western Avenue, Northolt, Middlesex. (This club is open to non-BEA employers by invitation. Contact Dain Evans, G3OUF, tel Amersham 21573, for details).
Paddington (P & DRS)—First Thursday in each month, 8pm, Beauchamp Lodge, Warwick Crescent, W2. Further details from hon sec—Mike Powley, G8AWV QTHR.
Purley (P & DRS)—First and third Friday in each month, 8pm, Lansdowne Hall, Lansdowne Road, Purley, Surrey. Hon sec—Alan Frost, G3FTQ QTHR.
Reigate (RATS)—17 July ("Top band techniques" by G3JMJ), 21 August (Members evening), 8pm, St Marks Hall, Alma Road, Reigate. 3 July, 7 August (Natter nites), 8.30pm, Marquis of Granby, Hooley Lane, Redhill. AGM results: chairman—G3NKS, vice-chairman—G3JDN, secretary—G3XSZ, treasurer—G8AMU, committee members—G3RIN, G3UUS, G3ZYX, G3XSZ QTHR.
Scouts (Baden Powell House ARG)—Third Thursday in each month, 8pm, Baden Powell House, Queensgate, S Kensington, SW7. Further details from hon sec—Alf Watts, G3FXC QTHR.
Southgate (SRC)—Second Thursday in each month, 8pm, Civil Defence Hut, Bowes Rd, N11 (Nr Arnos Grove underground station). All visitors welcome, hon sec—John Bachelor, G3XMV QTHR.
St Albans (Verulam) ARC)—18 July ("Systems engineering" by G. G. Gibbs, G3AAZ), 15 August (Being arranged), 7.30 for 8pm, Market Hall, St Albans. All visitors welcome, hon sec—Hugh Young, G3YHY QTHR.
Sutton & Cheam (SCRS)—17 July ("Marine operation" by G3HSP) 21 August (VHF/NFD Arrangements), 8pm, "The Harrow", Cheam, Surrey. Hon sec—A. Keech, G4BOX QTHR.
UK FM Group (London)—Second Tuesday in each month, 8pm, Scout Hut, Hayes Rd, Southall, Middx. Further details from hon sec—Mike Tooley, G8CKT QTHR.
Welwyn (Mid Herts ARS)—12 July (Planning for VHF NFD), 9 August (Being arranged), 8pm, Welwyn Civic Centre, Welwyn, Herts. Hon sec— Andrew Marshall, G8BUR QTHR.
Wembley (GECARS)—Every Thursday, 7pm, Sports Club, Preston Rd, North Wembley. (This club is open to non-GEC employees by invitation. Tel Dain Evans, G3RPE, at 01-904 1262 during business hours, for details).
Wimbledon (W & DRS)—Second and fourth Fridays in each month, 8pm, St John Ambulance HQ, 124 Kingston Rd, Wimbledon, SW19. Further details from hon sec—F. W. Hill, G3WDO QTHR.

REGION 8 — RR D. N. T. Williams, G3MDO

Canterbury (EKRS)—19 July (Junk sale). There are no meetings in August, but a mobile picnic is hoped to be organized. Further details of meetings from hon sec—D. N. T. Williams, G3MDO QTHR.
Medway (MARTS)—Every Friday, 2000, at the "Aurora Hotel" Gillingham, Kent. RAE classes now being run for prospective amateurs. Further details of meetings from hon sec—H. E. Willis, 111 Laburnum Road, Rochester, Kent ME2 2BL.
Canterbury University (UKC)—Details of club meetings from K. Beesley, G3UXE, Eliot College, University of Kent at Canterbury.
Brighton (BTCRC)—2 July. Details of meetings and activities from hon sec—R. T. Henley, G2CMH, c/o 35 Wilmington Way, Brighton BN1 8JH.
Mid Sussex (M SARS)—Meetings held at Marle Place, Leylands Road, Burgess Hill, further details from G3RXJ, 87 Meadow Lane, Burgess Hill.
West Kent (WKARS)—13 July (Visiting speaker), 27 July (VHF Field Day followed by "Any questions on vhf"). Meetings held alternate Fridays at Adult Education Centre, Monson Road, Tunbridge Wells. Further details from hon sec—S. Emlyn Jones, G4BKG, 36a London Road, Southborough, Kent.
Adur Contest Group (ACG)—Reformation of the Adur Contest Group has taken place, and plans for participation in hf and vhf contests have been arranged. Meetings are held on the first Tuesday in the month at the QTH of G8FAY, Carisbrooke Nursing Home, Goring Road, Steyning. Further details from A. J. Slater G3FXB, 86 Cross Road, Southwick, Sussex.
Chichester (CRC)—A growing active club is operating in Chichester with construction of 2m converters and other projects, those interested please contact D. W. Hughes, G3TYD, 133 East Beech Road, Selsey, Sussex.
Worthing (W & DARC)—Every Tuesday, 8pm, at Rose Wilmot Youth Centre, Littlehampton Road, Worthing. Further details from G8ETL, 12 Bramble Crescent, Worthing.
Maidstone (MYMCAARS)—Meetings held at Y sports centre, first and third Fridays devoted primarily to the beginners.
Eastbourne (SARS)—Meetings held first Monday in the month at Victoria Hotel, Latimer Road, Eastbourne. PRO—G3JFM.
Horsham (HARC)—Formal Meetings held at Guide Headquarters, Denne Road, Horsham. Informal meetings held at the Star Roffey. Further details of meetings from T. Wadsworth, G3NPF, 39 Church Road, Broadbridge Heath, Sussex.
Crawley (CARS)—Fourth Wednesday in the month at United Reform Church Hall, Ifield, Crawley. Further details of future meetings from G3MGL, 41 Gainsborough Road, Tilgate, Crawley.

REGION 9 — RR H. W. Leonard, G4UZ

Bristol (City & County RSGB Group)—23 July (Home constructed equipment evening), 1, 31 August (GB2GB on SS *Great Britain*), 19 August (Mobile picnic), 20 August ("Those were the days—again" by G6GU and G5KT), 7pm, Becket Hall, St Thomas Street, Bristol 1. G3ULJ.
Bristol (BARC)—10th Birthday celebrations coming soon. Details from G3XEI, every Tuesday, 7.45pm, 24 Bright Street, Bristol 5. *G3XE1*.
Bristol (Shirehampton)—Every Friday, 7.30pm, Twyford House, Shirehampton, Bristol. *G5AQZ*.
Bristol (University ARS)—New Officers: president—G3WDG, secretary—Peter Bligh, treasurer—C. J. Pye. Will ex-members who would like to receive the newlsetter please contact G3WDG. It is hoped to set up a station at the next Freshers' Squash, so if you are coming to Bristol University write to G3WDG for details. Meetings most Saturdays in term time at 2.30pm. Dept of Physics, Royal Fort, Tyndall Ave, Bristol BS8 ITL. G8CVS will be leaving in June so all enquiries to G3WDG.
Cornish (CRAC)—5 July (Q & A session and "Fluid logic" by G3XTE), 8 July (Mobile rally at Treviglas School, Newquay), 2 August (Natter session and "Station inspection demonstration" by G3VWK and G3NKE), 6 September ("Stage lighting and sound effects" by G3XFL), 7.30pm, SWEB Social Centre, Pool, Camborne. *G3XTF*.
Newquay Group (CRAC)—This group closes for the summer but will open again on 19 Sept. *G3THT*.
West Cornwall Radio Group (CRAC)—Second Tuesday and fourth Thursday of each month, 7.30pm, Western Hotel, Penzance. Full details of cornish and associated groups from G3NKE, pro, Camborne 2419.
Exeter (EARS)—Second and 4th Tuesdays, 7.30pm, Community Centre, St Davids Hill, Exeter. Sec: Jack Bawden, 232 Exwick Rd, Exeter EX4 2BA.

North Devon (NDRC)—11 July (Talk by a sea-going Radio Op), 25 July (Ragchew), 8 August (Talk), 22 August (No meeting). It is proposed to hold an RAE course at North Devon College, 1973/1974. Interested? Please contact G4CG soon. Meetings 7.30pm, "Crinnis", High Wall, Barnstaple. *G4CG*.
Plymouth (PRC)—New Officers: chairman—G3OIQ, sec—G3UVS, treas—G3SYV. Meetings first and third Tuesdays, 5 August (Picnic at Scenic Car Park, Yelverton Down, 160 and 2m talk-in, refreshments, junk sale, draw and dem by Plymouth Radio Controlled Model Aircraft Club). 7.30pm, Virginia House, Bretonside, Plymouth. Club will be on 145MHz every Sunday at 1100. *G3UVS*.
Saltash (S & DARS)—First and third Fridays, 7.30pm, Burraton Toc H Hall, Saltash. *G3ZHM*.
South Dorset (SDRS)—First Friday of month, 7.30pm, Alma Road section of Weymouth Technical College. *G3VPF*.
Taunton (T & DARS)—Every Friday, 7.30pm, Jelalabad Barracks, The Mount, Taunton. Sec—G. Swetman, "Little Copse", Monkton Heathfield, Taunton. Tel West Monkton 298.
Torbay (TARS)—Every Tuesday, special meetings on last Saturday of month. 28 July ("NFD inquest"), 25 August ("Rally natters"), 7.30pm, rear of 94 Belgrave Road, Torquay. Visitors most welcome. *G3UIQ*.
Yeovil (YARS)—New officers: chairman—G8AFA, sec—G3NOF, Treas—G3XFW. 1—31 August (GB3YEO will be in operation from Yeovil Tech College on all bands, to celebrate RSGB Diamond Jubilee). Every Thursday, 7.30pm, the Youth Centre, 31 The Park, Yeovil. *G3NOF*.

REGION 10 **RR D. M. Thomas, GW3RWX**

Blackwood (ARC)—Fridays, 7pm, Oakdale Community Centre, Oakdale, Mon. *GW3KAY*.
Barry College of Further Education (ARS)—Thursdays, 7pm during term time, at the College of Further Education, Colcot Rd, Barry, Glam. The Marconi Commemoration stations set up on Flat Holm and at Barry Rugby Club were extremely active, and the associated social on 19 May was well attended. *GW3VKL*.
Cardiff (RSGB Group)—Monday 9 June, 7.30pm, at the new venue which is the BBC Social Club, Newport Rd, Cardiff. The Mobile Picnic on 20 May at Porthkerry Country Park was for once attended by good weather, and was in consequence a very successful event. *GW3GHC*.
Haverfordwest (ARS)—Tuesdays, 7.30pm, hq, Rosemary Lane, Haverfordwest, Pembs. *GW3YBB*.
Hoover (ARC)—Mondays. 7.30pm, Hoover Social Club, Hoover Works, Pentrebach, nr Merthyr, Glam. *GW3RNC*.
Pembroke & District (RSGB Group)—Last Friday of each month at the Defensible Barracks, Pembroke Dock. *GW3LXI*.
Pontypool (RSGB Group)—Tuesdays, 7pm during school terms, at the Educational Settlement, Rockhill Rd, Pontypool, Mon. *GW3JBH*.
Port Talbot (ARS)—Second Tuesday of each month, 7.30pm, at the Rail & Transport Club, Station Rd, Port Talbot. *GW4BIQ*.
Sully & District Short Wave Club—Tuesdays, 7pm, at the Annexe, Sully Bowls & Social Club, 59 Port Rd, Sully, Glam. *GW4AMV*.
Rhondda (ARS)—Meets at Rhondda Transport Employees Club & Institute, Porth, Rhondda, Glam. *GW3PHH*.
Swansea Radio Society—First and third Tuesday of each month, 7.30pm, at the Commercial Hotel, Killay, Swansea, Glam. *GW3OGG*.
South-East Wales Raynet Group—Details from GW3ZFG, Tel Cardiff 62411. Information for members interested in Raynet in the Britton Ferry area available from Alan Glassford, GW4ACF. tel Britton Ferry 812475.
University College of Wales, Cardiff (ARS)—Details from secretary, c/o Students' Union, Dumfries Place, Cardiff.
University College of Wales, Aberystwyth Radio & Electronics Society—Details from the secretary, c/o Students' Union, University College of Wales, Aberystwyth.

REGION 13 **RR V. W. Stewart, GM3OWU**

Berwick (BARS)—Last Sunday in each month, 3pm, Tweed View Hotel. No further meetings until 26 August. Further details from C. H. Crook, G3YOG, 19 Hatters Lane, Berwick-upon-Tweed or from the AR, G. Shankie, GM3WIG, 8 Ettrick Terrace, Hawick, Roxburghshire.
Dunfermline (DRS)—Second Wednesday in each month, 7pm, CCTV Studios, Queen Anne School, Dunfermline. Further details from G. Martin, GM3NVQ, 42 Rose Street, Dunfermline.
Edinburgh (LRS)—Second and fourth Thursdays, 7.30pm, 66 Hanover Street, Edinburgh. No further meetings until second Tuesday in September. New sec, Brian Howie, GM8DIJ. New venue being sought, present property to be demolished.
Glenrothes (GDARC)—7.30pm, Old Nursery Buildings, Leslie, Fife. Details from A. B. Givens, GM3YOR, 41 Veronica Crescent, Kircaldy, Fife.
St Andrews (UStAARS)—5pm, Dept of Physics, North Haugh, St Andrews. No further meetings until next term.

REGION 14 **RR M. A. Comrie, GM3YRK**

Ayrshire (AARG)—1 July, 26 August, 7.30pm, YMCA, Howard St, Kilmarnock. Further details from hon sec—R. D. Harkness, GM3THI, 55 Woodend Rd, Alloway.
Ardeer (ARCARS)—Thursdays at 7.30pm, Ardeer recreation Club, Stevenston, Ayrshire.
Falkirk and District (RSGB)—Temperance Cafe, Lint Riggs, Falkirk. Date and time from J. Ramsay, 78 Wheatlands Avenue, Bonnybridge, Stirlingshire.
Greenock & District (ARC)—Tuesdays and Fridays, 7.30pm, Watt library, Union St, Greenock, visitors welcome. Enquiries to N. C. Henderson, GM3LYI, club callsign—GM3ZRC.
Glasgow University Radio Club (GURC)—George Service House, University Gardens, Glasgow. Details from hon sec, c/o Dept of Eng.
West of Scotland Amateur Radio Society (WoSARS)—Wednesdays and Fridays at 8pm, 81 Virginia St, Glasgow. Meetings conducted by chairman, Mr Hughes, GM3EDZ. Further details from hon sec—Mike Parks, GM8HBU, 6 Stamperland Hill, Clarkston, Glasgow. Club callsign is GM4AGG.

Graham Bleakley, A8212, of Cunmernauld New Town has been a keen SWL for three years, He is a member of West of Scotland ARS, of which he is QSL manager, and is 15 years of age

REGION 17 **RR L. N. G. Hawkyard, G5HD**

Reading (RARC)—Meetings at the White Horse Public House, Kidmore End Road, Emmer Green, Reading, on 3, 17 & 31 July, and 14 & 28 August. All welcome.
Farnborough & District Radio Society—10 July (Constructional contest, contact G8FWE, QTHR or ring Camberley 22887 for details).
Basingstoke ARC—7 July (Plans for VHF/UHF Field Day), 21 July ("UHF measurements" by F. L. A. Robins, G3GVM). No meetings in August. 15 September (AGM). All meetings at 7.30pm. at Chineham House, Popley, Basingstoke.
Newbury (NADARS)—August (Visit planned, contact G8FNS QTHR), 10 September (Meetings at the South Berks College of Further Education, Newbury, all welcome). *D. J. Williams, G8FNS*.
Southampton (RSGB Group)—6 and 7 July (Exhibition stations at the Southampton Show, Southampton Common, talk-in stations on hf bands, 2m and 4m). *L. Hawkyard, G5HD*.
Bracknell (BARC)—Meetings 9 and 23 July, 6 and 20 August. 23 July (Talk by Geoff Stone, G3FZL, at the Coopers Hill Centre, Bracknell, at 8pm). Sec— S. Jewell.

RSGB SLOW MORSE PRACTICE TRANSMISSIONS

These slow morse practice transmissions are sponsored by the RSGB. Alterations and additions to this list should be sent to the honorary organizer, Mr M. A. C. MacBrayne, G3KGU, 25 Purlieu Way, Theydon Bois, Essex.

Clock time	Callsign	MHz	Town
Sundays			
0900	G3KEP	1·910	Bingley, Yorks
0930	G3YZZ	3·590	Maidenhead, Berks
0930	G3HZL	1·930	Isleworth, Middlesex
0945	G3YRO	1.860	Fareham, Hants
0945	G3USK	1·975	Mablethorpe, Lincs
1000	G2FXA	437·000 to north	Stockton-on-Tees
1015	G3CGD	1·875	Cheltenham
1030	G2FXA	437·000 to south	Stockton-on-Tees
1030	G3NPB	1·875	St Ives, Cornwall
1030	G3LR	1·810	Accrington, Lancs
1030	G3ZNW	144·520 to east	West Molesey, Surrey
1100	G2FXA	1·900	Stockton-on-Tees
1100	GW3UMB	1·880	Colwyn Bay
1115	G3ZNW	144·520 to north	West Molesey
1200	G3HVI	144·100 omni-directional	Stoke-on-Trent
1330	G3FWW	1·880	Burnham-on-Sea, Soms
1330	G3XDV	1·190	Canterbury, Kent
1400	G3XWQ	1·975	Canterbury Kent
1400	G3XGJ	1·830	Huddersfield, Yorks
1930	G3YFO	144·19 to south	Burnham, Bucks
Mondays			
1800	G3SWR	1·980	Birmingham
1830	G3NCZ	145·800	Blackburn, Lancs
1830	G3VBI	1·910 omni-directional	Goole, Yorks.
1830	G3RXH	1·910	Skipton, Yorks
1845	G4AIV	1·860	Kettering, Northants.
1900	G3WGU	1·880	Bispham, Lancs
1900	GC2FMV	3·600	Jersey, CI
1900	G3YJA	1·920	Coventry, Warks
1900	G3YEI	1·850	Fleetwood, Lancs
1900 †Alternately	G3YED / G3YEE	145·640	Leeds, Yorks / Bradford, Yorks
1930	G3RAF	1·910 / 3·590 / 144·050	Locking, Somerset
2000	G3XWZ	1·910	Mansfield, Notts
2000	G3KAN	1·990	Northampton
2000	G3IBJ	1·910	Southampton, Hants
2000	G3BLP	144·645 to south west	Dunstable, Beds
2015	G3HZL	1·845	Isleworth, Middlesex
2030	G3JHM	70·050	Worthing, Sussex
2130	G3LQI	1·980	Lancing, Sussex
2200 †Alternately	GM4AJH	144·900 to north-west	Aberdeen
Tuesdays			
1100	G3EBU	1·952	South Woodham, Essex
1800	G3XDV	1·910	Canterbury, Kent
1900 †Alternately	G3UFO / G3XAM	1·980	Wirral, Cheshire
1900	G3XWQ	1·975	Canterbury, Kent
1930	G3SWP	1·850	Doncaster, Yorks
1930	G3WGU	433·500 to south-east	Bispham, Lancs
1930 †Alternately	G3XUD / G3YEE	1·910	Leeds, Yorks / Bradford. Yorks
1930	G3RAF	1·910 / 3·590 / 144·050	Locking, Somerset
2000	G3ZFE	144·896 omni-directional	Hailsham, Sussex
2000	G3TUW	145·200 to south-east	Banbury, Oxon
2000	G3UPA	1·850	Meriden, Warks
2000 †Alternately	G3TIK / G3KSS / G3OVT	1·980	Stevenage, Herts
2000	G3FWW	1·880	Burnham-on-Sea, Soms
2000	G3WGD	1·860	Leicester
2000	GM3PIP	3·590	Mintlaw, Aberdeen
2030	G3ROE	1·915	Harlow, Essex
2030	G3RB	1·975	Whitley Bay, Nth'land
2045	GM2CRY	3·590	St Andrews, Fife
2200	G3HZM	1·925	Manchester
2200 †Alternately	GM4AJH	144·900 to north-west	Aberdeen

Clock time	Callsign	MHz	Town
Wednesdays			
1830	G3FXA	1·900	Stockton-on-Tees
1900	G3YPZ	28·700	Harlow, Essex
1930	G3WGU	433·500 to south-east	Bispham, Lancs
1930	G3YFO	144·19 to north	Burnham, Bucks
2000 †Alternately	G3AJX / G3TWP / G3YSK	1·925	Winchester, Hants
1930	G3RAF	1·91(/ 3·590 / 144·050	Locking, Somerset
2000	G8QU	1·970	London, N22
2000	G3JHM	70·050	Worthing, Sussex
2000 †Alternately	G3VCV / G4BEL	145·020 to north-west	Wyton, Hunts. / Haddenham, Cambs
2015	G3WVJ	1·845	Staines, Middlesex
2030	G3KGU	1·915	Theydon Bois Essex
2100	G3HVI	144·100 omni-directional	Stoke-on-Trent
†Alternately			
Thursdays			
1800	G3SWR	1·980	Birmingham
1830	GW3VBP	3·590	Barry, Glam
1830	GW3UMB	1·880	Colwyn Bay
1830	G3NC	1·968	Swindon, Wilts
1845	G4AIV	1·860	Kettering, Northants.
1900 †Alternately	G3ZBO / G3WFY / G3YEI	1·850	Preston, Lancs. / Thornton Cleveleys / Fleetwood, Lancs
1900	G3WGU	1·880	Bispham, Lancs
1915	G3ZNW	144·520 to north	West Molesey, Surrey
1930	G3RAF	1·910 / 3.590 / 144·050	Locking, Somerset
2030 †Alternately	G3SJE / G3GC	1·875	Harrow, Middlesex
2030	G3YMJ	1·915	Harlow, Essex
2100	GW3XNI	1·930	Crosskeys, Mon
2130	G3LQI	1·380	Lancing, Sussex
2200 †Alternately	GM4AJH	144·900 to north-west	Aberdeen
Fridays			
1800	G3XDV	1·910	Canterbury, Kent
1830	G3NCZ	145·800 omni-directional	Blackburn, Lancs
1900	G3IQF	1·980	Marlow, Bucks
1900	G3NPB	1·875	St Ives, Cornwall
1900	G3ZOD	145·510 to north	Stockport, Cheshire
1930	G3PQF	1·825	Farnborough, Hants
1930	G3RAF	1·910 / 3·590 / 144·050	Locking, Somerset
2000	G3EEL	1·980	Peterborough
2000	G3WGD	1·860	Leicester
2000	G3ZOD	1·928	Stockport, Cheshire
2015	G3SAZ	1·845	Ashford, Middlesex
2030	G3JHM	70·050	Worthing, Sussex
Saturdays			
0930	G2FNK	1·930	Staines, Middlesex
1000	G3PLE	1·820	Stourbridge, Worcs
1100 †Alternately	G3ZOQ / G3ZRE	28·350	Leyland, Lancs
1300	G2FXA	1·900	Stockton-on-Tees
1400	GC2FMV	3·600	Jersey, CI
1600	G3ZOD	1·925	Stockport- Cheshire
1730	G3TNF	1·980	Gateshead
2000 †Alternately	G3KPO	1·980	Peterborough

G3BZU morse proficiency transmissions at 20, 25, 30, 35 and 40wpm are made at 1900 **gmt on the first Tuesday of each month on a frequency of 3·520MHz. For 100 per cent** copy at 20wpm a certificate is awarded. and endorsement stickers are available for 100 per cent copy at the higher speeds. A charge of 10p or two IRCs is made for the basic certificate, and 2½p or one IRC for each endorsement sticker claimed. All claims should be sent to—The QRQ Manager, RNARS, HMS *Mercury*, Leydene, Petersfield, Hants.

MEMBERS' ADS

These low-cost flat-rate advertisements are accepted as a service to members of RSGB. They must be submitted on the Members' Ads order form printed on the last page of each issue of *Radio Communication*, or on a postcard similarly laid out. Each **must** be accompanied by a **recent** *Radio Communication* wrapper addressed to the advertiser, as proof of membership, and a remittance by postal order or cheque for 25p (stamps not accepted). They will not be acknowledged. Those not clearly worded or punctuated will be returned. No other correspondence concerning this service can be entered into.

The closing date for each issue is the 4th of the preceding month but no guarantee of inclusion in a specific issue can be given. Valid advertisements not published in the issue following receipt will be held over until the next issue.

Trade or business advertisements, even from members, will not be accepted for Members' Ads but should be submitted as classified or display advertisements in the usual way. The RSGB reserves the right to refuse advertisements, and accepts no responsibility for errors or omissions or for the quality of goods offered for sale.

Members are advised to enclose a stamped addressed envelope when replying to advertisements.

See the current order form on the last page for further details.

Post to : MEMBER'S ADS, "RADIO COMMUNICATION", 35 DOUGHTY STREET, LONDON WC1N 2AE

FOR SALE

Pye 4m base stn, 4m AM25B, both wkg but AM25B needs slight rx alignment. G3ADZ, QTHR. Tel Liss 3314.

FTdx401, unwanted gift, in maker's carton, £225; Collins 75A4, immac, offers; Hallicrafters HT37 and companion HT41 1kW Linear with auto-trnsfrmr £200. G3JNY, QTHR. Tel Garforth 3058.

HW32A with mic, vgc, £40. G3OQJ, QTHR. Tel Northampton 255769.

BRT400D rx £45; RCA CR91 ship version of AR88 £45; Solartron psu type SRS151AN, 500V reg, 450mA, £20, buyer coll. **Wanted** pair A2521s. G5DF, QTHR. Tel Reading 27876.

National HRO500 rx, lf prslctr, 5kHz-30MHz, sensible offers, all letters answered. G4AXS, QTHR. Tel Barham 362.

Pye Vanguard AM25T 6-chann, tuned for 2m, complete except battery cables, xtals, aerial and hndbk. Pref buyer coll. GM3EOJ, C. F. Sherrit, 17 Inchbrae Drive, Aberdeen AB1 7AB. Tel 0224 321406.

Eagle Star SR550 dble cnvrsn comm rx, covers 1·8-50MHz, gc, also PM1, £25 the two. Buyer to arr coll. G3RRM, QTHR. Tel Penketh 2315.

Trio 9R59DE rx, gd cond, with volt stab and hndbk, £30. G3YSE, QTHR. Tel 061-224 8560.

McElroy deluxe bug key £5; cowl gill motor £4, both nearly new. G2IJ, QTHR. Tel Portsmouth 65053.

B40C rx, rsnble wkg order, looks good, useful mods, accept first sensible offer. **Wanted** AR22R or sim rotator. Julian Pedley, Romily, High Oakham Road, Mansfield, Notts. Tel Mansfield 23801.

SR550 dble superhet amateur bnds rx, mint cond, all bands 1·8-30MHz, £19.50 inc carr by Securicor and hndbk. Albert Sutton, 3 Crossfield Road, Wardle, Rochdale.

AR88D with S-mtr £25 ono; two HRO coils 3·7-7·3m and 14-30m, £2; Class D wvmtr £5; Marconi No 2 valve vmtr £3; 43ft sectional steel tower, 1ft triang, with guys, £10. G8BIM, QTHR. Tel Wickford 61806.

Pye Cambridge, dash mntg, with cradle, tunable 2m, switched tx, spare rf board, hndbk, £35; Pye Vanguard, 6-chann, contr box, cable, ccts tuned for 2m, £30. M. J. L. Fadil, 26 Kingsley Place, London N6. Tel 668 2176 day, 348 4252 evng.

DX100U with manual £30 ono; 160m ssb G2DAF tx £15. G3ZOD, QTHR. 22 Naples Road. Tel 061-480 0251.

Pye Vanguard AM25B, 2m, with tray, contr box, spkr, aerial base and tx xtal for 145, gd cond, £18. G3XGZ. Tel Wantage 4004.

30ft galv 2-sect triang mast, bolted constrctn, portable, £10; APR4Y rx, 30-1,000MHz, a.m./fm, 46 band, switched tuner, hndbk, £50, would exch for quality sig gen. G3VXZ, QTHR. Tel Maidenhead 27350.

Lafayette HA700 rx, exc cond, £30; HT40 tx, 20 xtals, £25; BK unit for HT40 £5; Green and Davies 2m Nuvistor cnvrtr £5; Class D Mk II (240V) £6; Solartron CT316, scope & trolly, £20; 100W atu (W3EDP) £5. G3KPP, QTHR. Tel Shrewsbury 3545.

NCX5 (MkII), dig readout, NCX/A psu, £175; Swan 500C with vox and late type sep VFO508 £225. GM3CRY, QTHR. Tel 033-485 219.

Newnes *Radio & TV Servicing* 1956-1967 incl £10; *SWM* 1965-1970 £3; RSGB mags 1965-1973 £3; bound vols RSGB mag 1964-65 £1, *SWM* 1962-65 £2; large amount other radio books, cheap as one lot. G3SNH, QTHR. Tel Blackpool 64394.

4m base rx (BCC) £4; Avo C/L bridge, 50Hz-20MHz, £2.50; 3-38μF 2kV paper cpctrs, offers; Taylor 65B gnrtr £3.50; push-button 625 trnsstr tuner £3.50. G8DDM, QTHR. Tel Penn 4483.

Taylor valve tester type 45C, exc order, hndbk, offers. GM3VRR, 15 The Glebe, Aberdour, Fife, Scotland.

CR100 rx, muting, noise limiter, S-mtr, £22; cctv trnsstr camera, psu, contr box, less lens, £11; incomplete ssb exciter, usb/lsb fltrs, 10-turn pot/counter, £5; Pye 2m base tx £16. G3WTA, QTHR. Tel 0670 2541, 9am-10am.

Eagle RX60N and Codar PR30, both clean cond, suit beginner, needs slight attn, offers. S. Smith, Ardvaros, Main Street, Polmont, Falkirk, Stirlingshire. Tel Polmont 2669.

Pye base stn, 2m, 640A pa, £22; Fantavox HE50 comm rx, 550kHz-30MHz, £8; DG7-5 crt £3; 25 ECC33s £4 or 20p ea. All ono and buyers coll. G8CEV, QTHR. Tel 0602 269635.

TF144G £12; BC221 with inbuilt psu £18; TF428B vtvm £5; TF885 sine/sq video osc, 25Hz-5MHz, £19; TF948 20-80MHz a.m./fm sig gen £12; TF675E pulse gen £10; Sullivan CT13 LCR bridge £6. G8AYN, 32 Iron Mill Lane, Crayford, Kent DA1 4RR. Tel Crayford 24625.

Murphy MR900 high band base stn, mic and ccts, vgc, partially re-aligned 2m, buyer coll, £20 ono. Mitchell, 4 Ely Road, Worthing, Sussex.

FT101, latest model, 160-10m, 12V dc or 240V ac, fan, mic, 2 mnths old, £260 dlvrd rsnble dist. G3JBU, QTHR. Tel 0604 43020 (Northampton).

Minimitter /m tx, 160-40m, 25W, with 12V trnsstr psu and contr unit, ptt mic, 160m 3FIF coil cct etc, gd cond, £20 ono. G3SNH, QTHR. Tel Blackpool 64394.

Video eqpt: Pye Lynx trnsstr tv camera, 625-line, £25; var monitors from £5; SPGs; CCUs; Marconi picture & wvform monitor, £15; Elliott 6in paper chart rcrdr £10; KW Vanguard £25; Pye Scalamp £10. B. S. Homer, 32 Iron Mill Lane, Crayford, Kent DA1 4RR. Tel Crayford 24625.

GR 289 MkII, fair cond, (12V), £18; GR289 MkIII, exc cond, complete and wkg, £40 ono. G4AYG, QTHR.

Collins mech fltr, F455 Y21, Electroniques front end, Hamband trnsstr 1·6MHz ssb i.f. strip, 898 dial, offers please. GM3UTQ, QTHR. Tel Eaglesham 2369.

Lafayette HA600A gen cov rx, 6 mnths old, £30, del locally. Tel 01-679 1378.

Top band stn, 10W homebrew tx, CR100, £15; components for 1·5kV psu; trnsfrmr, choke, 125mA, 2 × 8 × 3kV capacitors, valves, isltng trnsfrmrs, £3. G3PEV, QTHR

Pye Vanguard AM25B high band, unmodded, cables, contr unit, mount and hndbk, £20; Pye base rx, high band, £6; Codar CR70A rx, gd cond, £18, with cct. R. A. Burn, 14 Bearsden Cresc, Hinckley, Leics LE10 0SQ. Tel Hinckley 36045.

Panda PR120 £15; Eddystone 750 £25; Mini mdltr 120W £10; Mini pa 150W £10; 100/1,000Hz calbrtr £1.50, all exc cond, buyer coll, other gear. **Wanted** 18AVQ or Minibeam with rotor. GM3GJB, QTHR. Tel 0324 23608.

Trio 9R59DE rx, vnc needs attn, 2 pots, £32 ono; Codar prslctr £7.50. Lumb, 01-253 0329/2856.

McCoy Silver Sentinel xtal fltr, 9MHz, usb/lsb xtals, new, £14; Collins TCS rx, 1·5-12MHz, built-in mains psu, wkg, used cond, £7.50 plus carr. G3NJE, QTHR.

Minimitter top 2-7 tx £10; Class D wvmtr and trnsfrmr £2; both wkg order, buyer to insp and coll. Roth, 49 Stanchester Way, Curry Rivel, Nr Langport, Somerset.

Class D wvmtr, mains, £4 ono; Marconi tv monitor £10 ono; KTW61s 50p ea; QQVO6/40A £1; Vanguard high band, suit 2m, £14 inc controls; 6V6s 30p ea; buyers coll. **Wanted** 70cm beam. G8CVI, QTHR.

Wvmtr W1646, ac powered; old pattern 3in scope tube VCR138. **Wanted** dummy load resistor, about 200Ω, for 150W rf, bfo coil from old Sky Champion rx S20R. G3KH, 133 Station Road, Cropston, Leicester LE7 7HH.

Eddystone EC10, batt/mains PSUs, JXK 2m trnsstr cnvrtr, gd cond, £40 carr paid. **Wanted** Heath SB640 vfo, 2m trnsvrtr, GEC 989 stereo tuner, good S750 rx. Taylor, 8 Heythrop Drive, Middlesbrough.

HW32A with homebrew psu, £47, buyer coll or del 50 miles; mags: *RC* (73), *PE* etc from 35p per vol, sae lists. G3SAA, 47 Canterbury Road, Newton Hall, Durham. Tel 66535.

KW Vanguard, 160-10m, a.m./cw, £22; 13A scope, *WW* mods, new crt, £25; Marconi TF937 high qual sig gen £70; TF885 video osc, 25Hz-5MHz sine/square, £25. A. Jackson, 38 Haslemere Road, Thornton Heath, Surrey. Tel 01-689 2727.

Tiger 200 hf tx, 150W a.m./cw, 80/10m, QY365 pa, £35 ono; Hammarlund HQ170A amateur band triple cnvrsn rx £75. G3SCW, QTHR. Tel Tavistock 2876.

Automatic fm tx/rx, as new, £100; latest KW 2000E, 20hrs' use, only £200; swr bridge £5. Tel 01-592 7800.

SB10U £20; 100W mdltr £5; PSUs: 750V 400mA, 350V 150mA, heaters, bias, £5; 750V 500mA, 100V 100mA £5; wvmtr, N1191A £2; 650-0-650 200mA £2; rotary psu £1; vib psu £1; chokes, spkrs. **Wanted** 815 bases, tape rcrdr. G4AOS, QTHR. Tel 061-766 3013.

G2DAF MkII rx, also tx, 4X250B pa, psu, both good, Pye Vanguard AM25B, 145·8MHz, Heathkit OS1, 3kV scope, eht unit. **Wanted** Heath SB200 and SB640, details. G3GEJ, QTHR. Tel York 66453.

KW2000A/B, dc power supply, neg earth, conn cable, £21. G2HJV, QTHR. Tel Leamington Spa 25395.

Vespa II, ac psu, as new, extra 21MHz xtal and spare pa valves, Shure mic, and other items. Buyer arr collctn. G3FVD, QTHR. Tel Bodmin 2487.

G2DAF 80 10m lin amp, QY3 125 pa valves, grid mtr missing, otherwise perf, spare pa valves, £25; trnsstr rx, 2-4MHz, as *Handbook* (pp 16.15, 16.16), with 144MHz mosfet cnvrtr. G4ADF, QTHR.

Not taking RAE, selling KW Atlanta; AR88D, gd cond, with mint PRC Panadapter; Pye Cambridge AM10 on 2m, with xtals. Would swop for fb hf rx. Pref buyer insp and coll. Hounslow, "Lindfield", 445 Wellingborough Road, Northampton NN1 4EZ. Tel 31362.

Coutant Electronics reg and smoothed psu, type D200/24, 240V ac to 2 × 24V dc 2A total, line reg 0·01% for ±10% line voltage, load reg 0·1% with literature, as new, £5.50, carr extra. J. H. Lepper, 'The Beeches", 128 Sheephousehill, Fauldhouse, West Lothian EH47 9EL. Tel Fauldhouse 433 evngs.

14AVQ, LC80Q, instrctns, good cond, £15 ono, pref exch for rotator, cash adjstmnt. **Wanted** rotator (AR22 or bigger). G3RDT QTHR. Tel Bagshot 73577.

Trio TS 510 with psu, ext vfo, cw fltr, xtal calbrtr, ideal for use with trnsvrtr, £150. Gibson-Daw, 479 Wellingborough Road, Northampton. Tel 37944.

30MHz fltr ±7·5kHz, for fm use, offers. **Wanted** amateur band coilpack trnsstr type pref but accept valve type, cond not too important; Eddystone 898 dial assy. G3YJC, 10 Buckingham Way, Wallington, Surrey. Tel 01-647 3134.

Murphy base stn, high band, £23; HW17A plus ac/dc PSUs and rx pre-amp, exc wkg cond, £55, buyers coll. P. J. Roberts, 269 Uxbridge Road, Hampton Hill, Middx. Tel 01-941 1128.

KW Atlanta, psu, remote vfo, Shure 202 mic, all first class cond £160 ono. G3BII, QTHR. Tel Beaconsfield 5528.

Trio TS500 tx/rx with PS500 and remote VFO5 dyn mic in exc cond, £90. GW3RXD, 33 Awelfryn, Amlwch, Anglesey.

Trio JR310 cal and narrow fltr £60 ono. W. A. Telfer Brunton, 4/13 Orchard Brae Ave, Edinburgh EH4 2HW. Tel 332 5566.

Codar T28 rx 160-80m, £12. G3ZSQ, 10 Fyfe Cresc, Baildon, Shipley, Yorks. Tel Shipley 58433.

HW100 with HP13 dc psu, hndbk, £110 ono, del 100 miles. Partridge, 2 York Cresc, Torquay. Tel 0803 34904.

600ft asl, gd QTH with 60ft Strumec Versatower, on Berkshire Downs between Wantage and Newbury, attractive mod det bung, 3 bdrm, dble grge, enclosed garden, £15,000. G3YFM, QTHR. Tel Chaddleworth 418.

No 19 set £5; No 19 psu (rx only) £1.50; Delco rotary trnsfrmr £1. O. Walker, 63 Harbridge Ave, SW15. Tel 01-789 0706.

Heathkit /m psu for HW17A tx/rx, unused, £12; Heathkit HW30 2m tx/rx £18; BC221 freq mtr with power unit £18; Collaro studio tape deck £5, buyers coll or carr extra. G8CJM, QTHR. Tel Medway 47280.

Xtal clbrtr No 10 £4; pair 88 sets, brand new, less hdphns, £10; pair army A40 fm tx/rx Manpack £12; vvmtr £2; pair 6GE5s (pa for HW32 etc) £3, new. G3OQT, QTHR. Tel Medway 361567.

Yaesu FT75, FP75, DC75, 2 hndbks (UK & JA), extra xtals, 3740, 3750, 14,075, 14,170, gd cond, only 5 months old, £120 the lot, del 100 miles. Partridge, 2 York Cresc, Torquay. Tel 0803 34904.

AR22R rotor plus 50yd 4-core cable £17; TA32 jr £15; 572B pa valve, new, boxed, £7.50; mint KW2000 & ac psu, offers; Heathkit 2XMA12 plus USC-1 stereo contr unit, FM4U fm tuner in cab, offers. G3VMY, QTHR. Tel Ascot 24295 weekends.

Minimitter rotary 33ft telescopic 10/15m £20; Joystick Joymatch £10; Avo gen £5; Nombrex bridge £5; Eagle gen £7; cnvrtr 24-26MHz £6; asstd trnsfrmrs, spkrs, wvmtr tuners, 400– valves, offers. Manley, 85 London Road, Kearsney, Dover. Tel Kearsney 2014.

Microwave Mods 2m tx with cw skt, 4 xtals, £33; Telford TC7 MkII, 28-30MHz, tunable i.f., with Telford 2m cnvrtr built-in, £45; 6-el J Beam £2, all as new. TX/RX 12V neg earth. G4LA, QTHR. Tel Hexham 2734.

Storno Viscount, vhf high band, QQVO3/10 pa, 12V trnsstr psu, phase mod, mic, contr box, hndbk, unmodded, ideal /m, £12.50. G8EVP, QTHR.

Inoue IC20 2m 12-chann fm transceiver, with 6 sets xtals, £85 ono. G8BPK, QTHR. Tel Aylesbury 630600.

Cossor 1035 dble beam scope, fully up to spec, revalved but one, £17.50 ono, buyer coll. M. J. Topham, 1200 Gt Horton Road, Bradford, Yorkshire. Tel Bradford 72371.

Vibroplex J36 (lightning bug) £3; HRO tuner, gears and dial, unused, £3; 250V PSUs, stab, 50mA, 2 × 6·3V, perf cond, £3, coll or carr extra. G4ADN, QTHR. Tel Bolton 55051.

High band AM10D Pye Cambridge, dash mount, clean but unmodded, £22; Philips N4414 tape rcrdr, 5 months old, cost £120, mint cond, £95. W. Tee, 16 Priory Walk, Niton, IOW. Tel Niton 730 583.

DJ6ZR 2m tx, ssb, £30; Cambridge on 2m £40; 70cm varactor tripler £5; Heathkit GD1U, inc lf ift coils, £12; Airmec 830 scope £10 (callers); BC454 rx, 3-6MHz, vgc, £8; QRO mdltr, vg value, £8 (callers). G3ZYC, QTHR. Tel Ripley 3883.

EC10 MkII £55 ono. G3JKS, QTHR. Tel Doncaster 841786.

Cambridge AM10D 4m, tunable rx, £15; Sentinel mf 2m cnvrtr, i.f. 0·5-2MHz, £10; G whips, 160/10MHz, £12; Peak stereo amp, s/state, 12W/ch, £10. G3TFN, QTHR. Tel 061-761 2952.

Ranger low band 2007 £8; 2m cnvrtr, 4-6MHz, 3HBW, £7; 160/80 G whip, duo band, £5; 240/110V trnsfrmr £50. GW3ACF, QTHR. Tel Briton Ferry 812475.

Unused boxed QVO3-10 75p; E88CC 40p; 6AQ5 (5) 12AT7 (3) N78 20p ea; Raymart Bandchecker £1; SCR522 mdltr and driver trnsfrmrs 75p; 5mA mtr, 1½in, 75p; *RC* vol 48 75p plus pp. G3KZC, QTHR. 0272 673026.

Xtals, ¾in, 3520, 3580, £1.25; Wight dipole with balun £3 (less feeder); 5RV dipole, ribbon feeder, £1.30; Medco high pass fltr, unused, £1.60; FL8 fltr with data £1.25 post paid. GM2HFV, QTHR.

WANTED

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BFO coil for G2DAF rx, 85kHz. David Sewell, Bournemouth 46185, or 38136 (8-11pm).

Avo electronic testmtr; gdo; Lafayette "Precon" prslectr/cnvrtr; radio servicing manuals by Gordon J. King. Mogford, 27 Ynysmaerdy Road, Briton Ferry, Neath, Glamorgan.

Batt operated electronic keyer, wld swop Codar T28 rx. G3WBO, QTHR.

LG300 tx, rf & mod, in wkg order, £25 offered plus half carr. G6HQ, QTHR. Tel 051-336 2033.

Eddystone 940 rx, pref mint cond, with spkr, plinth, all replies answered. G4BCN, QTHR.

WG16 w/guide switch, 5cm wvmtr. C. G. Elliott, Eastleigh Orchard, Dawlish Road, Teignmouth, Devon.

Info on noise gen CT82; vvmtr CT38; graph scope 303C. Can copy and return quickly, expenses paid. G8DDM, QTHR. Tel Penn 4483.

To complete vols: *SWM* June and July 1968, *RC* Jan Feb Mar April 1971. All postage paid, write with price and cond to G8COG, QTHR.

Urgently reqd, 1·6MHz i.f. fltr, bandwidth around 6-12kHz, to complete vhf/uhf rx project; also any high power 70cm gear. G.Shirville, 2 Orchard Close, Toddington, Beds. Tel 2470.

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HRO bndsprd coils for 40, 20, 15 and 10m bands. Nick Wainwright, 83 Lakeside Road, Palmers Green, London N13 4PS. Tel 01-882 0789.

B2 tx and/or rx. G8AEN, QTHR.

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Bendix RA18B, can be not wkg, less valves, but must have xtals, i.f. coils, can coll by arrngmnt. G8DDM, QTHR. Tel Penn 4483.

Sig gen, Marconi TF144G, Advance B4 or sim, also 75Ω attntrs. G3EBE, QTHR. Tel 01-660 6448.

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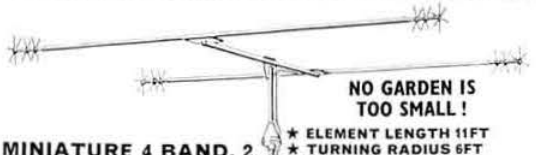

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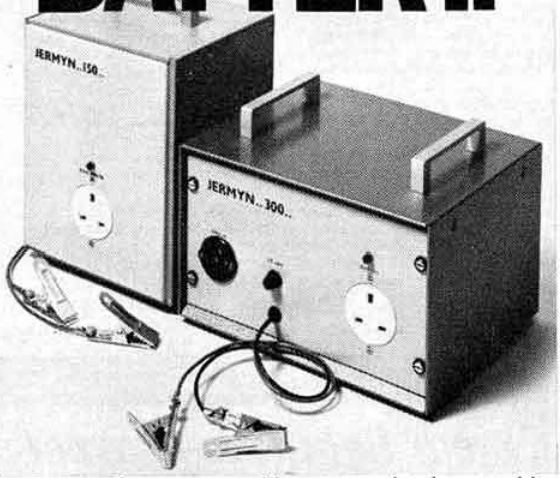

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.01μf 50v.w. **DISC CERAMICS** @ 15p doz.

ALL PRICES INCLUDE VAT

BURNS ELECTRONICS

TONE BURST GENERATOR TBG-1

Featured in July 72 RADCOM (p. 422) this unit provides a keyed AF tone for modulating an FM Tx to gain access to a repeater system. Kit includes all components, fibre-glass PC board with layout ident and an instruction manual.

Kit **£4.70** *Assembled and tested* **£5.70**

MOSFET CONVERTER FS2/FS4 144/70 MHz

New design converter with MOSFET RF stage and Schottky Barrier diode mixer provides low noise figure and good strong signal handling performance. Noise figure typically 3/5dB and gain 15dB. DC supply is 9-12v DC and is internally isolated from converter case. *Price* **£18.00**

MULTIVERTER MC3

A package of VHF/UHF converters with a common IF output for 432/144/70MHz or HF bands as required. 1-3 converters may be fitted. Direct "thro" facility fitted as standard. Basic unit is for 9-12v DC operation but an optional internal mains PSU is available.

Price Basic frame is **£6.50** plus "less case" cost of each converter. Mains PSU **£3.00** extra.

Plus of course our well established range of test equipment and communications modules:

Crystal Calibrator CC-10 Mk III	**£25.30**
Wavemeter TC-101	**£18.30**
Frequency Standard SD-11	**£78.00**
FET Converter FC2/FC4	**£16.20**
FET Converter FC70 (432 MHz)	**£18.50**
Low Pass Filter FL2/FL4	**£6.20**
Test Oscillator TO-701	**£10.00**
FM Detector FMD-1	Kit **£6.70**
	Made and tested **£8.20**

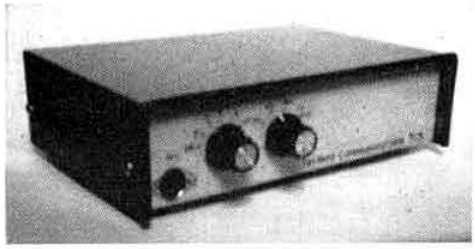
PRICES EXCLUDE VAT, AND 10% MUST BE ADDED TO ALL ORDERS.

For further details on these equipments and our comprehensive component catalogue send 15p or cash with order to:

THE COTTAGE, 35 BEULAH HILL, LONDON, SE19 3LR

TELFORD COMMUNICATIONS

We are pleased to announce Two new compatible Units, particularly suitable for Mobile use, the TC5 2 Metre TRANSMITTER and the TC6 SYNTHESISER V.F.O. Both are fully solid state operating from a nominal 12 Volt D.C. NEGATIVE Earth. The Units are 8.75" × 2.5" × 6" deep and are finished in our standard Dark Grey stove enamel with off-white front panels, black lettering and Knobs. They are supplied complete with leads and connectors and carry our usual 6 Month Guarantee on Materials and Labour.



The Transmitter has 5 Crystal controlled channels plus external VFO, Channel One being fitted for 145MHz Mobile calling Channel. Additional Crystals in the 48MHz Range to order.

R.F. output 1.5 to 2 Watts over whole 2MHz. Complete with Press/Talk Microphone. Aerial C/O Relay, converter electronic muting and Sockets to accept TC6 VFO. **Price £38.50**

The Synthesiser V.F.O. provides 48MHz drive, using a 53.9MHz crystal oscillator combined in a double balanced Mixer with the VFO. This is followed by a Two stage 48MHz Band pass amplifier reducing unwanted mixer products to an extremely low level.

The 3" scale has flywheel Main Tuning and Fine Tuning is provided for ease of co-channel working. **Price £33**

We can at present offer from our existing Range the following Units ex-stock

TC7 Mk II Tunable I.F.	**£44**
Bandsearcher Module	**£4.40**
2 Metre Converter (G8AEV Mk II) 28-30 I.F.	**£13.20**
Other I.F. Frequencies approx 2-3 Weeks	
2 Metre Aerial Filter	**£5.50**
Delivery of our TC9 Transmitter Mk II with Mixer VFO approx 5-6 weeks..	**£85.80**

Securicor Delivery of TC7 and TC9 £3.30. Hire Purchase Available. Terms: Cash or 10% Deposit, Balance Pro-forma Invoice. Further details of all Units and current delivery on request. (SAE please)

ALL PRICES INCLUDE V.A.T.

TELFORD COMMUNICATIONS

78b High Street, BRIDGNORTH, Shropshire, WV16 4DS

Telephone 074 62 4082

COMPONENTS

RETURN POST SERVICE
(WHERE POSSIBLE)

Our latest components catalogue (Issue 3, April 73) contains 32 pages of general and specialist application items. Many new components are included and by careful choice and purchasing we have been able to reduce some prices by up to 15% and add many more quantity discounts. We are now approved stockists of limited ranges of components from the following manufacturers:

HEWLETT PACKARD LTD	Schottky, PIN and Light Emitting Diodes
JACKSON BROS. (London) LTD	Tuning Capacitors, Trimmers and Drives
McMURDO INSTRUMENT CO. LTD	Valveholders, Crystal Sockets
MOLEX INCORPORATED	Transistor and IC Connectors
MULTICORE SOLDERS LTD	Savbit and Standard Solders
PLASTIC & RUBBER MOULDINGS (Grommets) LTD	Grommets
SIGMA PRODUCTS (Northampton) LTD	Miniature RF Chokes

Where possible, our service is return of post. Terms of business are **50p** minimum component order with a carriage charge of **15p** (free over **£5.00**). **PRICES EXCLUDE VAT** which must be added to the total order value *including carriage charges.* Send **15p** and our current equipment and component catalogues will be sent by return.

BURNS ELECTRONICS

THE COTTAGE, 35 BEULAH HILL, LONDON, SE19 3LR

AMATEUR RADIO BULK BUYING GROUP

This month we are using our advertising space to sell ourselves instead of components.

It is our intention to supply mainly the sort of items which are not readily available to Radio Amateurs. We carry a stock of certain items as detailed in our price lists, but will endeavour to obtain almost any component requested. We also welcome export orders.

Our basic aim is to help the construction side of the hobby. In this direction we can produce printed circuit boards for designs published in *Radio Communication* subject to the relevant author's consent. All our P.C.Bs are $\frac{1}{16}$" fibre-glass board, pre-tinned and ready-drilled. We also hope to produce a few designs of our own and to supply kits of parts. The first projects will probably include plug-in speech compressor, FM detector module, digital frequency meter, 2m converter and solid state linear amplifier.

Our prices depend largely on the quantity we buy, but are usually considerably below either manufacturer's list price or the normal advertised price. Except for our Surplus Section (which sells components at ridiculously low prices) all our regular items are brand new manufacturer's stock and carry the manufacturer's full warranty.

We can now supply all components previously advertised for G2DAF ssb tx and G3TDZ 2m tx/rx (PCB-RX, 90p; tx, 60p; 3 gang, 95p; TAD100, £1.55; 10 NiCads, £17; In soon—ceramic trimmers for rx and tx), semiconductors from Motorola, Mullard, Plessey, R.C.A, National (LM380 audio i.c., £1.40) and Signetics (NE561 phase lock loop i.c., £3) etc; Toko filters (CFT455C, 50p), car interference suppressors (screened plug suppressors, 50p) and surplus components (B.N.C. Plugs, 8p; trimmers, 1½p & 2½p; feedthrus, 1p to 2½p; disc ceramics, 1p to 2p; polystyrene caps, 1½p). See last month's Rad. Com. advertisement for full details.

Prices include V.A.T. Post and packing—5p for orders under £1—FREE for orders over £1.

73s from G3ZPB, G8AAE and G8CYK.

S.A.E. for full price lists.

New Items:
P. L. A. BURTON, G3ZPB,
20, THORNTON CRESCENT,
OLD COULSDON, SURREY.

Surplus Section:
D. G. PHILLIPS, G8AAE,
16, BACK LANE, STOCK,
INGATESTONE, ESSEX, CM4 9DG

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RATES: Display: £4 single column inch.
Private advertisements: 5p per word, minimum charge £1.
Trade advertisements: 10p per word, minimum charge £1.
Box number fee 15p extra. Please write clearly.
No responsibility can be accepted for errors.
Last date for acceptance - 10th of preceding month.

FOR SALE

RECEIVER MODULE RM-A. A small circuit-board, wired, tested and aligned, requiring only addition of tuning capacitor, coils and controls (not included) to make a complete AM/CW/SSB superhet RX for up to 30MHz. Headphone output. 6-15V operation. Contains 45 components including RCA 1C (equiv. 14 transistors), FET local osc., BFO and 2 doubled-tuned IFT's. Instructions and circuits. Stable reception ofDX on CW/SSB. Already logged W1BB on 1.8MHz, ZL4BO on 3.5MHz and SSB DX to 28. Good. IF. for converters.—£7.85 post paid. Also protected aual-gate MOSFET RF Amp Module to add or use as low-cost preselector.—£2.15. SAE details. **P. R. GOLLEDGE G3EDW Glen Tor, Torrington, Devon. (Tel. 08-052 2411).**

THE INTERNATIONAL TRANSISTOR DATA MANUAL 1973 EDITION IS NOW READY. £5.25 plus 35p post and packing in the UK. Brochure available. Special 10% discount for personal copies to members of RSGB. Order direct from SEMICON INDEXES Ltd, Freepost, Workingham, Berks. RG11 2AY.

QSL CARDS, GPO approved logbooks. 4p sae, Atkinson Bros, Looe, Cornwall. PL13 1JT.

YOUR CALL SIGN ENGRAVED white letters, black plate, 6 × 12 inch 31p. 2 × 2 inch Badge pin, 23p. C.W.O. price covers V.A.T. and Postage. Workshops for the Disabled, Northern Road, Cosham Portsmouth PO6 3EP.

COMPLETE STATION, K.W. 2000B with EZEE match and tuner. £180. Womack, 85 London Road, River, Dover, Kent.

WANTED

WANTED: Yaesu FR or Collins 5 line receiver, also interested in companion transmitter. Write B. J. Kirkwood, ZL1BN, c/o ANZ Bank Grafton St., London.

MISCELLANEOUS

PATENTS and TRADE MARKS.—Booklet on request. Kings Patent Agency Ltd (B. T. King, Mem RSGB, Reg Pat Agent).—146A Queen Victoria Street, London, EC4. Tel 01-248 7161. Telex.: 883805. 60 yaers' refs.

PROTOTYPE or short run turning/milling etc., and sheet metal work capacity available.—C. G. James Electronics (G3VVB)' Staines Road, Feltham, Middx. 01-570 3127.

WISHING TO IMPROVE HIS SPANISH, G3JJJ would like to contact any other person also interested. QTHR; Windermere 2240.

RICHARD SELLERS

MILL RD, EASTRINGTON, GOOLE, YORKS 04305-254

PYE VANGUARDS 20 watt R/T, units only, good cond. complete, all carr. £1.

AM25B valve TX, hybrid RX, hi band £10.50, low band £10.

AM25T valve TX, transistor RX, low band £14.50.

PYE CAMBRIDGE dash mount hi band £24.50, low band, £22.50. p.& p. 75p.

HANDI CAMBRIDGE AM10PV hi band portable, all transistor except quick heat PA & driver. Complete with mic. etc. less batteries £24, carr. £1.

BOOT MOUNT CAMBRIDGE AM10B. Hi band units £13.25, carr. £1, control box £1 extra when available (only with unit) complete with all accessories hi & low band £22.50.

MURPHY MR960 6 channel 12V dash units, valve TX, hybrid RX, complete with mic. etc, £8.75, carr. 75p.

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G8CKN ANTEC **G8DGR**

BASE & MOBILE ANTENNAS

4db 2m ⅝ whip ..... £4.00 inc. V.A.T.
4db 2m ⅝ ground plane ..... £7.75 inc. V.A.T.

ANTEC

74 Upper Sherbourne Road, Basingstoke, Hants.
Telephone—Basingstoke 27527

C.W.O.—P & P 50p—S.A.E. for catalogue

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Our unique self-test instructional tapes will guarantee you rapid and painless mastery of morse. Send now for full details of our efficient and inexpensive programme, or begin immediately by including £1.45 (which will be instantly refunded if you are not delighted) and obtain our introductory lessons by return of post.

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PO BOX 99, BLETCHLEY, MILTON KEYNES MK3 5BR.

—— 2m JFET CONVERTERS ——

FET cascode rf stage, front end bandpass filter, diecast case, reverse polarity protected, 28-30MHz i.f., 9-15V. Other i.f.s over 10MHz, and 4m version to order. **Price £7.85.**

—— 20w INPUT VARACTOR TRIPLERS ——

70cm **£9.85** . 23cm **£12**

Limited quantity triplers available after mid-July. SAE details.

P. W. Howey, G8DBW, G4BBP, 4 Weir Bridge Close, Barnwood, Gloucester GL4 7LD.

CRYSTAL CALIBRATOR No. 10 crystal controlled heterodyne wave-meter covering 500KHz-10MHz (harmonics up to 30MHz) power required 300V. DC. 15mA. 12V. 0·3A DC. Test equipment for 62T M/RC. **£2·50 each.**

(Second hand equipment)

post paid in **GREAT BRITAIN**

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Looking for a business opportunity with potential? One requiring hard work and a willingness to experiment, not money? Expanding into Europe. Great Britain first. Searching for a few ambitious people to form a nucleus for building. Start part-time. Work and profit together. Lets discuss over tea in September. Jim Herndon, K6SXA, 4209 Burrell, Sacramento, California 95825 USA.

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- **Do not forget 25p remittance plus wrapper.**
- **Please write in block capitals, or type.**

Licensed members are asked to use their callsign and QTHR, meaning that their address in the current callbook is correct. BRS and A members will, of course, have to provide their name and address. The wording will be edited to conform to a set style, and any ads which are not clear will be returned.

I enclose cheque/PO for 25p to cover the cost of this ad.

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