

# radio communication

March 1975

## ACHLYSUR MAWR CYMREIG

The installation of the 1975 RSGB President in Cardiff Castle

A report on this "great Welsh occasion" appears on page 184

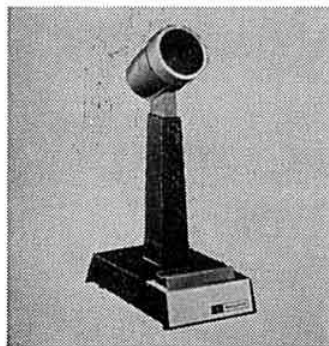


journal of the Radio Society of Great Britain



**SSB-ers:**

## increase talk power, cut "splatter"



Our 444 base station microphone not only gives you increased talk power, but cuts "splatter" (and QRM complaints) to an absolute minimum! It has superbly tailored response, with sharp cutoffs below 300 and above 3,000 Hz and a rising response characteristic for maximum intelligibility. The 444's rugged, reliable Controlled Magnetic element has been proved in safety communications, and other tough professional communications applications. It delivers a clean signal to the transmitter at levels as high as crystal units! (And, unlike crystal and ceramic units, the element is totally immune to the effects of temperature and humidity.) The 444 also features an adjustable height stand that makes for comfortable "ragchewing" sessions, an optional-locking bar for push-to-talk or VOX operation, and a practically indestructible Armo-Dur® case. Write:

Shure Electronics Limited  
Eccleston Road, Maidstone ME15 6AU  
Telephone: Maidstone (0622) 59881



# radio communication

Volume 51 No 3

March 1975

Price 40p

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BARCLAY CARD or ACCESS. Just phone in quoting your number, we despatch the same day if humanly possible by whatever means you wish including Securicor free for most Yaesu second hand equipment and at cost for other items if they are under 5 ft long (maximum weight 45 lbs).

## WHY we think you should buy YAESU from SMC

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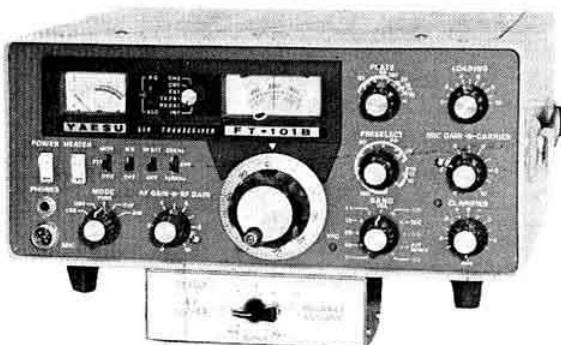
### DELIVERY

Is fast by Securicor for all Yaesu items over £40 and free by post for items over £5.

### COLLECTION

In the unlikely event of you having a fault then we will collect free of charge any work under warranty by Securicor.

## THE DE LUXE MOBILE BASE STATION—THE YAESU FT101B—EX STOCK



FT101B - £330

RF CLIPPER - £45

### THE DE LUXE MOBILE BASE STATION—THE YAESU FT101B

This de-luxe wireless is the descendant of the world famous FT-101 transceiver. Except for the drive and final amplifier stage, the FT-101B features all Solid State circuitry built on reliable and serviceable "computer type" plug in modules. The 101B is contained in a compact 30lb package designed to go anywhere. All that is needed for instant "on the air" operation from 160 through to 10m is either 12V DC or 100-234V AC and of course an antenna.

### 'LLL' RF CLIPPER (for the legal 5dB boost)

The advantages of RF clipping are too well documented to require discussion here and we are pleased to present this famous RF Clipper that can offer up to 4 times the effective transmitter output whilst improving the receiver performance by use of cascade filters. Further data on request (unit available for FT-101 mark 1, mark 11 and B).

FT101B—£330

RF CLIPPER—£45

## ALL YAESU ITEMS SHOWN HERE ARE EX-STOCK IN TOTTON

### MONITOR SCOPE—THE YO100

The YO100 the multi purpose monitor offers you the facilities of monitoring the transmitted signal, through line, from 1.8 to 50MHz on power levels from 10 to 500 watts. The IF of the receiver or transceiver can be monitored (3.18MHz standard, 455kHz or 9MHz options). AF and RF trapezoidal patterns can be displayed, the unit facilitates RTTY tuning and has built in 1.5 and 1.9kHz oscillators suitable for Post Office two tone output measurements.

YO100—£93



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Terms c.w.o. or just phone with credit card number for same day despatch of ex stock items.

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# Communications Ltd



## YAESU MUSEN UK MAIN DISTRIBUTOR

### THE FT224



FT224—£130

An FT620 features full 1kHz resolution VFO coverage across 50-54MHz in 8 ranges, SSB (selectable) AM or CW (build your own FM modulator) 4 crystal controlled channels in each band segment, receiver offset clarifier, noise blanker, built in AC and 12V DC power supplies, mix supplied, optional AM filter and crystal calibrator.

The exceedingly low level of spurious emissions and the 50MHz output makes this unit highly suitable for use as a drive source transverting to 4, 2 or 70cms and/or parametrically converting to 70 or 23.

For use on 70cms we are pleased to announce the Micro-wave Modules transverter is now available for use with a 50MHz I.F. £62.00.

The FT224 is an advanced Solid State transceiver featuring 10 watts output with a 23 channel flexibility (including priority channel) all in one complete package. The FT224 includes a built-in tone burst for repeater actuation. Automatic high VSWR protection of the final transistor and reverse power line polarity protection are included. The wireless comes complete with built in speaker, mobile mounting brackets and dynamic microphone.

S.M.C. models come fitted with 145-00, 145-50 and 145-55MHz as standard.

### THE FT620



50-52MHz £175

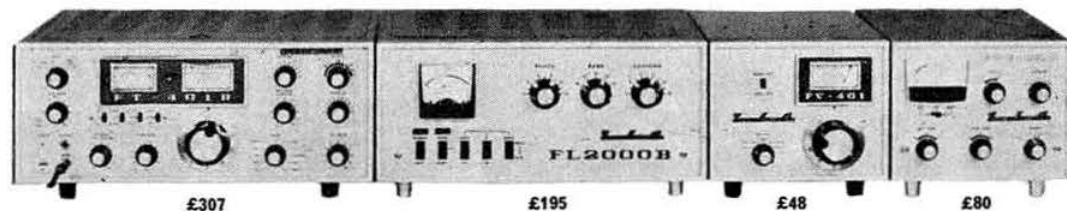
50-54MHz £180

### THE YC355D



YC355—£104; YC355D—£125

The YC355 series counters are available in two models. The basic counts to 35MHz and the "D" to 200 or over. The YC355D outlines the advanced IC techniques and the dual range system provides an accurate 8 digit read out using only the 5 tubes and of course minimum of cost with maximum performance. Built in AC and DC power supplies enable complete portability and double sided epoxy circuit boards ensure reliable and accurate operation for years to come.



The FT401B (An FT401 with AM, but without the CW filter) and its accessories are shown above, and provide an uncompromising approach to the home station. The FT401B itself runs 560 watts P.I.P. but when throttled back to drive the FL2000B and coupled with the FV401

external V.F.O. provides the base station with ultimate DX appeal.

The unit nestling on the end is the FTV650, a 6m transverter which we can provide electrically modified for 70MHz, 100W P.I.P., 50W CW, 40W FM/AM £80.00.

SEE OVERLEAF FOR A SELECTION OF MASTS, ANTENNAS AND ACCESSORIES

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Formerly trading as South Midlands Construction Ltd. and Western Electronics (U.K.) Ltd.

OSBORNE ROAD, TOTTON, SOUTHAMPTON SO4 4DN.

TELEPHONE: TOTTON (04216) 4930 or 2785.

A MEMBER OF THE ARRA

Agent: Brian G3ZUL,

Droitwich (09057 4510).

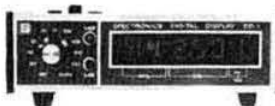
Hours of business: 9-5.30 9-12.30 Sat.

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# South Midlands

## READOUT UNIT FOR FT-101 ETC. DD1



Digital readout to  $\pm 100\text{Hz}$  for your FT-101 (B), FT-401 (B), etc. 21 IC's 76 diodes provide a most worthwhile accessory.

(PROV.) £110 AVAILABLE MID-APRIL

## 9MHz SSB FILTERS YF90/F/S



**EX STOCK** at new low introductory price  
2.4kHz, 6 pole, each individually supplied with  $\pm 6\text{dB}$ , 25dB, 60dB bandwidths, ripple factor and insertion loss.

WITH TWO CRYSTALS £12.50; USB ONLY £11.50, p & p 30p.

**MICROWAVE MODULES** (all 28-30MHz i.f., others to order) p & p 30p  
70MHz Converter .. .. . £15.20 432MHz Converter .. .. . £18.10  
144MHz Converter .. .. . £15.20 1,296MHz Converter .. .. . £24.00  
SHURE (p & p 30p)  
444—Desk Mic. .. .. . £15.30 444T—444 with Amp .. .. . £17.20

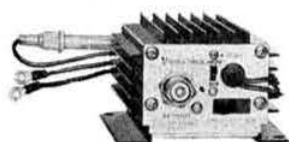
## RF SPEECH PROCESSOR KP12



Audio to audio, via 107MHz, mains powered, illuminated meter, FT-101, FT2 plugs suitable all phone modes superb on FM.

(PROV.) £44 AVAILABLE EARLY MARCH

## 144MHz LINEARS RFL



RF sensing, switchable drop out time SSB, AM, FM, CW, 12VDC. 10W drive, 701-75W out, 801 100W out, 901 150W out.

AVAILABLE FROM APRIL

## THE KP202 SUPER LOW COST 2 METRE WALKIE-TALKIE NEW FROM SMC

▼ Available from March. £70.50 with 2 channels fitted; £75 (we hope) with 6 channels. Charger £7.50; ni cads. £7.50

## NEW LOW-PRICED CRYSTALS IN STOCK (all post paid)

### FT2FB (14MHz Rx 18MHz Tx)

144 { 15, 20, 30, 36, 48, 50, 60,  
80,  
145 { 5, 09, 20, 32, 40, 44, 51,  
80, 84, 90,

All £3.30 pair £1.20 single.

Simplex 145 { 00, 500, 525, 550, 576, 600,

Duplex 145 { 100/700, 125/725, 150/750,

All £3.50 pair £2.00 single.

### FT2F (52MHz Rx 6MHz Tx)

144 { 15, 25, 36, 40, 48, 60, 70,  
80, 96,  
145 { 08, 09, 10, 20, 36, 40, 68,  
80,

All £3.30 pair £1.80 single crystal.

Simplex 145 { 00, 500, 525, 550, 575, 600,

Duplex 145 { 100/700, 125/735, 150/750,

All £3.50 pair £2.00 single.

### Standard C826 and 146

145 { 500, 525, 550, 575, 600,  
15/75

All £3.30 pair no singles.

Specials

100kHz £2.50

1MHz £4.50

CRYSTALS TO ORDER—6/8 weeks delivery

Phone 04216 4930 for best prices

## SECOND-HAND LIST

Phone 04216 4930 for latest

Eddystone  
S870A  
770R  
EP14

Heathkit  
SB102  
OS2  
HW32

Yaesu  
FT501  
FT401, etc.  
FR400

£340  
£275  
£140

Bendix  
BC221 NC

Trio  
TS520  
QR666  
JR310

National  
HRO (M)  
NCX5  
KW

£30  
£165  
£60

Telford  
TCS

Inoue  
IC21, v.f.o.

Securitor

£25  
£135



## NEW LOW PRICE SWR/POWER METER

SWR10 reflectometer 50 ohm  $\pm 5\%$  quoted  
SWR50 power meter  $\pm 15\%$  calibrated for 50 and 75 line reflectometer  $\pm 5\%$

SWR10 .. .. . £6.30 SWR50 .. .. . £11.20

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PLEASE NOTE—THESE PRICES DO NOT INCLUDE VAT (8%)

Terms c.w.o. or just phone with credit card number for same day despatch of ex stock items.

Our HP facilities now include instant clearance for holders of a current (U.K.) callsign.

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# Communications Ltd



## ANTENNAS, TOWERS, MASTS, ROTATORS, COAX

### VERSATOWERS

Carriage paid, England & Wales

Illustrated right. Tiltover Telescopic post mounted ex-stock. The tilting action allows ease of maintenance and changes of antennas. The relatively low weight eases installation problems. From: £172.25

### ALIMASTS

Carriage paid, England & Wales

A/Alloy Telescopic 1.5, 2, 3 metre sections. 6-21 metres from £11.60 for 6m to £38.00 for 21m.

### TELOMASTS

(England and Wales, carriage £1.50)

Galvanised steel Telescopic 10ft. section with or without rigging.  
30ft.—£15.00 40ft.—£20.00 50ft.—£25.00  
With rigging kits:  
30ft.—£29.00 40ft.—£39.00 50ft.—£49.00

### HAMTOWERS

(Carriage extra)

Galvanised lattice 10ft. sections 30ft. height with climbing steps on one face. From: £90.50

### THE COMPLETE RANGE OF JAYBEAM (AND MORE!) (Carriage extra)

#### OMNI-DIRECTIONAL

HO/2M	Halo head only	—3dB	60 ohm	£1.85
HM/2M	Halo with mast	—3dB	60 ohm	£2.20
UGP/2M	Ground plane	0dB	60 ohm	£4.15
XD/2M	Crossed dipoles	—3dB	60 ohm	£5.15

#### CIRCULAR

XD/2M	Crossed dipoles	0dB	60 ohm	£5.75
5XY/2M	5 element crossed	7-8dB	50 or 75 ohm	£8.20
8XY/2M	8 element crossed	10dB	50 or 75 ohm	£10.20
10XY/2M	10 element crossed	13dB	50 or 75 ohm	£14.10

#### 4 METRES

4Y/4M	4 element	7dB	50 ohm	£6.30
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#### BEARINGS

RZ100	Alignment bearing			£7.60
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#### YAGI'S

5Y/2M	5 element Yagi	7-8dB	60 ohm	£4.30
8Y/2M	8 element Yagi	10dB	60 ohm	£5.69
10Y/2M	10 element long Yagi	13dB	50 or 75 ohm	£11.08
14Y/2M	14 element long Yagi	14-5dB	50 or 75 ohm	£14.00

#### SLOT-FED

D5/2M	5 over 5	10-3dB	50 or 75 ohm	£7.92
D8/2M	8 over 8	12-6dB	50 or 75 ohm	£10.50

#### PARABEAM

PBM14/2M	14 element parabeam	15-2dB	50 or 75 ohm	£16.90
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#### 70 CENTIMETRES

D8/70	8 over 8	12-6dB	50 ohm	£9.00
PBM18/70	18 element parabeam	16-5dB	50 ohm	£10.90
MBM46/70	46 element Multibeam	17-3dB	60 ohm	£12.10

### PHASING AND MATCHING HARNESSES AVAILABLE

### ANTENNAS FROM HY GAIN (Carriage paid)

Hy Tower, 10-80m, Self supporting tower	£132.00	TH2 Mk. 3 10-20m, 3 element 600W	£62.00	103BA 10m, 3 element beam	£35.00
18V, 10-80m, Vertical self supporting	£15.50	Hy Quad 10-20m, 2 element 40m	£90.00	LA 1 Lightning arrestor	£17.50
12AVQ, 10-20m, Vertical self supporting	£20.00	DB10-15A 10 and 15m, 3 element beam	£69.00	LA 2 Lightning arrestor	£3.00
14AVQ, 10-40m, Vertical self supporting	£29.50	DB24B, 3 element 20m, 2 element 40m	£129.00	12RMQ Roof mounting kit	£11.00
LC80Q Loading coil for AVQ, 80m	£9.30	402BA, 40m, 2 element	£110.00	14RMQ Roof mounting kit	£13.00
18AVT/WB 10-80m, Vertical	£42.50	204BA 20m, 4 element beam	£96.00	400 Rotor	£139.00
TH6DXX 10-20m, 6 element beam	£117.00	203BA 20m, 3 element beam	£87.00	BN86 Balun	£9.50
TH3 MK3 10-20m 3 element beam	£90.50	153BA 15m, 3 element beam	£44.00	TH3 Jnr 10-20m, 3 element 600W	£62.00

### S.M.C. TRAP DIPOLES (Carriage paid)

Trap dipole 10-80m	£11.55	Type HP (1kW pep)	£18.75	Type P Portable	£19.50
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## ROTATORS: EX-STOCK

## FAST DELIVERY



THE NEW CONTROL UNIT FOR THE CD44 AND HAM 2

Carriage (B.R.S.) Free. Securicor delivery 60p extra

AR30 for Stereo FM, TV and small VHF beams .. .. . £25.00

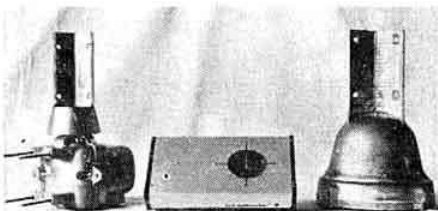
AR40 for Medium VHF arrays, Small HF beams .. .. . £30.00

CD44 Arrays up to 2½ sq. ft. of wind area .. .. . £60.00

Ham II Arrays up to 7½ sq. ft. of wind area .. .. . £90.00

Control Cable 5 core (AR30/40) at 18p/m

Control Cable 8 core (CD44/H2) at 26p/m



THE NEW SILENT CONTROL UNIT WITH AN AR30 and 40

### R.F. CABLES (Carriage up to 20m, 40p; over, 50p; less for lighter cables)

50 ohm RG8U/UR67	32p/m	75 ohm UR39	25p/m	75 ohm Flat twin	TOS	75 ohm BICC 2378	22p/m
75 ohm UR57	32p/m	75 ohm Economy	10p/m	300 ohm Ribbon	60p/m	50 ohm UR43/UR76	15p/m

### MOSLEY TRI BAND (10-15-20m) BEAMS (carriage £1.75)

TA33 Jnr E3 ele 200W RMS	£45.00	TA32 Jnr E2 ele 300W AM	£32.00	Mustang 3 ele 2kW PIP	£69.00	Mustang 2 ele 1kW AM	£48.00
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### BANTEX FIBREGLASS, STAINLESS STEEL VHF/UHF MOBILE ANTENNAS (Carriage 75p. Coils only, 25p)

B5 ½ Wave 144MHz	£5.00	BSU ½ Wave 432MHz	£5.00	Magnetic Base Mount,	£7.50	Note: deduct 50p from price of aerial if standard base not required	
BGA ½ Wave 144MHz	£6.00	70 ½ Wave 70MHz	£3.00	Trunk LIP Mount	£5.10		

### G WHIPS, The British Mobile HF Antennas Range (Carriage 75p)

Tribander—10, 15, 20	£12.30	LF40m, LF80m or LF160m	£4.10	Flexiwhip 10m with base	£9.50	F15, F20, F40, F80 or F160m	£4.25
Multimobile "71", 10, 15, 20	£14.30	MM40, MM30 or MM160	£4.10	Basemounts	£1.85	Telescopic Whips for Coils	£1.10

### COAX PLUGS (p and p extra)

PL259 42p; Reducers 12p;	PL259A 54p;	UHF Angle 90p;	50239 33p;	VHF back to back 66p;	BNC plugs 42p;	N plugs 83p	
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A MEMBER OF THE ARRA

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# LOWE ELECTRONICS



## TRIO FOR HF



### TS900

Top of the line. 300W p.e.p. 0.1µV sensitivity. All modes including RTTY. Vox, mox, PTT. The rig with everything.

£480 (VAT exc)

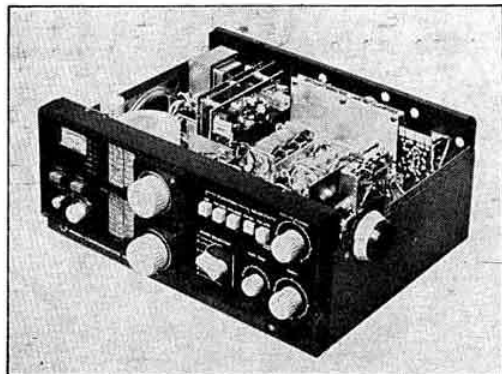
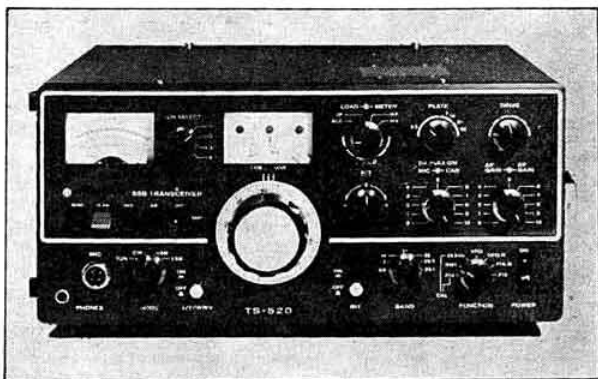
Optional remote VFO 900 available.

### TS520

The go-anywhere rig. AC mains or 12v operation built-in. Speech compression built-in. Marker built-in. Vox built-in. Superb RX performance and unbeatable transmit voice quality.

£290 (VAT exc)

Optional remote VFO 520 and speaker SP 520 available.



### QR666

New general coverage receiver. 3 way power supply, AC mains, 12v external supply or built-in batteries. 170kHz-30MHz coverage. Product detector, 2 position selectivity.

£130 (VAT exc)

Optional broadcast FM unit and marker unit available.

### LOWE 2 METRE MONITOR RECEIVER REC-1420C

Here is a simple, low cost F.M. monitor receiver which monitors up to six channels and has an excellent performance/price ratio. Ideal for mobile use and when fitted with popular F.M. frequencies along with a repeater or two ensures that it is in the midst of any F.M. activity.

No necessity for a bulky and costly tunable I.F.—no fiddling around when driving—just scan the channels and if there is much F.M. activity you are sure of hearing it. Being F.M., ignition etc. suppression is not essential, and thus makes it the ideal mode for mobile. Its diminutive size (4ins.W × 2½ins.H × 8ins.D) and weight (2½lbs) make it a snip for portable. In fact it is the one receiver that is cheap enough for everyone to carry around anywhere.

**R.F. STAGE • REQUIRES 12 to 15V D.C. •  
6 CHANNEL CAPABILITY • 4 I.F. STAGES  
DOUBLE CONVERSION •  
EXCELLENT SQUELCH**

**CRYSTALS** 145-000 Popular 145-725  
145-500 calling 145-750 Repeaters  
145-525 channels 145-775  
145-550

**PRICE** (Less crystals) £19.95 plus VAT **ALL IN PRICE**, fitted 6 channels £31.26 (inc. VAT & postage)

# LOWE ELECTRONICS



## TRIO FOR VHF

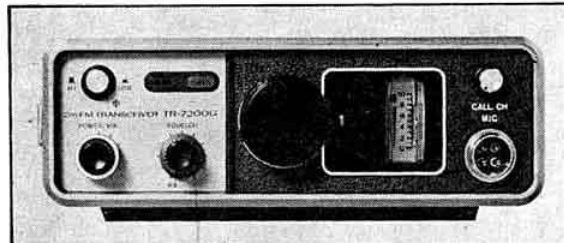
### TS700 Specification

FREQUENCY RANGE	144-146MHz
MODES	usb, lsb, cw, am, fm
VFO COVERAGE	144-145 and 145-146 MHz
CRYSTAL OUTPUT	22 Channel capability
POWER OUTPUT	10W minimum
ANTENNA IMPEDANCE	50 ohms
CARRIER SUPPRESSION	50dB
SIDEBAND SUPPRESSION	Greater than 40dB
SPURIOUS RADIATION	Better than -60dB down in all modes
DEVIATION	± 10KHz or ± 3KHz
REPEATER TONE	1750-Hz Tuning Fork Oscillator
IF	10.7MHz for ssb, am, cw, single Conversion 10.7MHz and 455KHz for fm, double Conversion
SENSITIVITY	0.5µV for 10dB S + N/N
IMAGE REJECTION	Greater than 60dB
IF REJECTION	Greater than 60dB
IF SHAPE FACTOR	Better than 2:1 all modes
AF OUTPUT	Greater than 2W into 8 ohms
STABILITY	Better than 200Hz in any 30 min. period after warm-up
REPEATER SHIFT	Standard 600KHz transmit downshift provided
CALIBRATOR	Built-in 1MHz Calibration points
DIAL READOUT	To better than 1KHz all modes
R.I.T.	4KHz shift of receiver with respect to transmit frequency
NOISE BLANKER	Advanced circuitry noise blanker for noise free mobile or fixed operation
ALC INPUT	Socket provided for ALC input from linear
AUX RELAY	Socket provided for switching external linear



**POWER REQUIREMENTS** 120/240V 50/60Hz ac; 12-15V dc negative earth  
**CONSUMPTION** Receive 45 watts ac; 800 ma dc  
 Transmit 95 watts ac; 4A dc  
**DIMENSIONS (mm)** 278 wide x 124 high x 320 deep  
**WEIGHT** 11kg 24.2 lb

Price £300 (VAT excl)



### TR7200G 2m Mobile Transceiver

22 Switch selected transmitting and receiving frequencies in the 2m FM band between 144MHz and 146MHz, five of which are factory-equipped with TX and RX crystals. Illuminated channel indication.

**Channels Fitted** 145-50 Simplex 145-15/75 Duplex  
 145-525 Simplex 145-175/775 Duplex  
 145-55 Simplex  
 Price £125 (VAT excl)

### TR2200G

The world's most popular 2 metre handy transceiver now comes complete with tuning fork controlled repeater access tone and facilities for 12 channels. With the advent of repeater operation in this country, it is now possible to work long distances with low power equipment and the sudden popularity of portable 2 metre equipment testifies to this fact. The TRIO TR2200G is a high performance transceiver with features not found in other rigs. Supplied with 3 channels fitted:

145-50 Simplex

145-55 Simplex

145-175/775 Duplex

Most other I.A.R.U. channels available.

Price £80 (VAT excl)



**REMEMBER! IC210 STILL AVAILABLE AT £200 (VAT EXC.)**  
 2 METRE FULLY TUNABLE. PHASE LOCK VFO. AC/12V OPERATION

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Soho House, 362-4 Soho Road, Handsworth, Birmingham Tel. 021-554 0708

Alan GW3YSA. 35 Pen-Y-Waun, Efail Isaf, Nr. Pontypridd. Tel. Newton Llantwit 3809

John G3JYG. 16 Harvard Road, Ringmer, Lewes, Sussex. Tel. Ringmer 812071

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**OPENING HOURS: 9-5.30 TUESDAY TO SATURDAY INCLUSIVE**

**73 from BILL G3UBO/VE8DP, ALAN G3MME, JOHN G3PCY/5N2AAC, IAN G3ZYC**

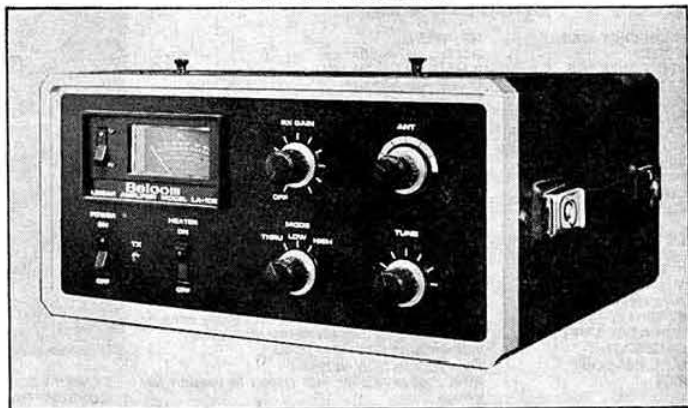
# LOWE ELECTRONICS

## BELCOM LA106 2m linear amplifier

A reasonably priced, compact, high performance linear for 2m SSB/FM CW operation. 10W of drive for more than 200W input gives your signal the extra kick to get it out of the noise. Built-in receive preamplifier with adjustable rf gain and using helical filters for extra selectivity and reduced intermod. from out of band signals. Built-in regulated 13v 2.5A power supply for Liner 2 or any similar drive unit.

MADE SPECIALLY BY NIHON DENGYO  
FOR THEIR LINER 2

Frequency range: 144-146MHz  
Modes: SSB, FM, CW  
Input power: 200W p.e.p.  
Drive power: 10W  
Receiver preamplifier adjustable gain up to 10dB  
Accessory supply: 13v 2.5A regulated  
Power supply: 240v 50Hz  
Dimensions (mms) 315 x 148 x 280  
Weight: 12kgs  
Price: £165 plus v.a.t.



## Nihon Dengyo Co. Ltd.

### SSB 144MHz MOBILE TRANSCIVER

*Liner 2*

The brilliantly conceived and designed Liner 2 has revolutionized 2m sideband and is responsible for the enormous increase in activity. It combines the advantages of switched channels with direct frequency readout (e.g. Channel 20 is 145.20MHz) with the ability to tune between channels with the VXO. In addition the provision of R.I.T. which enables the rx to be tuned a kHz or two either side of the Tx frequency is a useful feature. The VXO gives, as one would expect, crystal stability which, coupled with an extremely effective noise blanker makes mobile operation a delight without detract-



ing from its use (with an A.C. psu) as a base station.

Most important is the surprisingly low level of spurious emissions which sets a new standard. This low level is achieved by very careful design and alignment and owners are most strongly urged not to attempt alignment without a laboratory spectrum analyser.

For the first time, here is a completely solid state, fully tuneable 2m SSB rig with an electronically protected PA at a reasonable price which truly performs with the utmost reliability.



# LOWE ELECTRONICS

## PRICE LIST—MARCH 1975

### ANTENNAS

#### 2m 'J' BEAMS 50 ohms only

	Carriage Paid	Callers Only
5Y/2M. 5 element Yagi with 1" boom	£6.84	£4.64
8Y/2M. 8 element Yagi with 1" boom	£8.25	£5.05
10Y/2M. 10 element Yagi with 1 1/2" boom	£14.08	£11.88
PBM14/2M. 14 element parabeam with 1 1/2" boom	£20.46	£18.26
5XY/2M. 5 el. crossed Yagi with 1 1/2" boom	£11.06	£8.86
8XY/2M. 8 el. crossed Yagi with 1 1/2" boom	£13.22	£11.02
10XY/2M. 10 el. crossed Yagi with 1 1/2" boom	£17.43	£15.23
D5/2M. 5 over 5 slot fed Yagi with 1" boom	£10.75	£8.55
D8/2M. 8 over 8 slot fed Yagi with 1" boom	£13.65	£11.35
PMH/2C*. 2 way phasing harness for circular polarisation*	£3.62*	£3.08
SVMK/2M*. Mounting kit for vertical polarisation for 2 slot fed Yagis*	£2.70*	£2.20
XO/2M. Crossed dipoles	£8.41	£6.21
UGP/2M. Unipole and ground plane	£6.68	£4.48
PMH2/2M*. 2 way phasing harness for 2 aeriels*	£4.78	£4.27
PMH4/2M*. 4 way phasing harness for 4 aeriels*	£10.52	£9.88

#### 70cms 'J' BEAMS

D8/70. 8 over 8 slot fed Yagi with 1 1/2" boom	£11.92	£9.72
MBM46/70. 46 element multibeam	£15.27	£13.07

#### 2M MOBILE WHIPS

'J' BEAM 1/2 vertical swivel mount	£8.64	£6.48
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#### G-WHIPS

Tri-band 20, 15, and 10m	£15.44	£13.28
Multimobile 20, 15, and 10m	£17.60	£15.45
160, 80, or 40m coils for the above, each*	£4.75*	£4.43
Top whip section for the above*	£1.45*	£1.19
Base mount for all G-Whips*	£2.00*	£1.78

#### H.F. BEAMS

Hy-Gain TH3 jnr. 20, 15 and 10m 3 element	£67.20	£65.04
Hy-Gain TH3 Mk.3 20, 15 and 10m 3 element	£97.75	£95.59
Hy-Gain TH6 20, 15 and 10m 6 element	£126.36	£124.20

#### VERTICALS

Hy-Gain 12AVQ 20, 15 and 10m	£22.00	£20.00
Hy-Gain 14AVQ 40, 20, 15, and 10m	£32.00	£30.00
Hy-Gain 18AVT/WB 80, 40, 20, 15 and 10m	£46.00	£44.00
ASAHI Echo 8G 40, 20, 15 and 10m	£22.00	£20.00
Weir 2m Mosfet Converter, 28MHz I.F.	£15.20	£15.00

#### MICROWAVE MODULES EQUIPMENT

MMC144/28 LO	£17.93	£17.80
MMC70/28	£16.72	£16.60
MMC432/28	£19.91	£19.80
MMC432/144	£19.91	£19.80
MMC1296/28	£26.40	£26.25
MMC1296/144	£26.40	£26.25
MMV432	£19.25	£19.10
MMV1296	£27.50	£27.35

#### ROTATORS

CDR AR 22 Light duty for VHF Beams	£30.78	£29.70
AR 40 Solid State Control Box	£33.48	£32.40
TR 44 Heavier Duty Rotator	£55.20	£54.12
CD 44 Improved version of TR 44	£65.88	£64.80
Ham-2 Improved version of rugged Ham-M	£98.28	£97.20

### ANTENNA ACCESSORIES

Please note that the carriage paid price assumes parcel post.

	Carriage Paid	Callers Only
Coaxial cable 50 ohms type UR43 per metre	.16	.15
Coaxial cable 50 ohms type UR67 per metre	.40	.38
Coaxial cable 50 ohms type RG-8/U per metre	.45	.43
Twin feeder either 300 or 75 ohms per metre	.06	.05
Rotator cable 8 core for TR44 or Ham-M per metre	.35	.33
Rotator cable 5 core for AR40 per metre	.20	.19
Rotator cable 4 core heavy duty per metre	.22	.20
Rotator cable 12 core heavy duty per metre	.49	.47
PL259 plugs	.40	.38
SO239 matching sockets	.40	.38
Reducers to screw into PL259 plugs	.15	.14
S.W.R. meter Asahi ME-11B twin meter	£11.00	£10.80
S.W.R. meter Hansen SWR3 single meter	£7.70	£7.50
Hy-Gain dipole centre insulator CI coax. feed	£3.70	£3.25
Hy-Gain Balun BN86	£10.80	£10.45
Diamond Balun BU-5	£4.80	£4.50

### MORSE KEYS

Katsumi Keyers EK105D (DC)	£5.25	£4.95
Katsumi Keyers EK108D (DC)	£15.70	£15.40
Katsumi Keyers EK108A (AC)	£30.00	£29.60
C.W. Practice Oscillators	£33.40	£33.00
Low Impedance Padded Headsets	£2.95	£2.75
Teisco DM501 Hand Mike with P.T.T.	£3.50	£3.30
Trio Dual Impedance Table Mike	£6.00	£5.80
	£19.44	£19.10

### FILTERS

90MHz Crystal filters complete with both carrier crystals.

S.E.I. QC1246AX SSB filter	£20.40	£20.25
SEIWA YF90F SSB filter	£16.50	£16.30

### VALVES

For the very common valves, it pays to shop at one of the large London importers who buy in such enormous quantities that they can sell retail at a lower price than we can buy wholesale. We do, however, maintain stocks of the more unusual valves which are used in the equipment we sell, and which you may find some difficulty in obtaining.

	Carriage Paid	Callers Only
6AH6, 6BZ6, 6CB6A, 6CL6, 6UBA, 6EW6, 6EH7, 6BM8 12BY7A	.70	.66
6GK6	£1.35	£1.30
6JS6C, 6KD6 matched pairs	£4.50	£4.30
6146B, S2001 each	£3.35	£3.25
6LQ6 matched pairs	£5.50	£5.25

### CRYSTALS

Popular channels for Yaesu, Inoue, FDK, Trio and many other FM transceivers. Simplex channels S20, S21, S22, S23 and S24. Repeater channels R3, R4, R5, R6, R7 plus other channels as they come into use. A 'phone call will confirm current stock position. Price £2.50 per crystal, £4.50 per pair.

### THE ABOVE PRICES INCLUDE VAT

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SEND 20p FOR OUR COMPREHENSIVE CATALOGUE



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OF  
THE WORLD'S FINEST RANGE OF AMATEUR  
RADIO EQUIPMENT  
BY

## YAESU MUSEN



It's worth remembering that when you deal with WESTERN ELECTRONICS you have the best after-sales service in the country. We have the best equipped service department in the country in our trade and provide free collection and re-delivery on all warranty work. It's all part of our service!

**PRICE INCREASES ARE ON THE WAY FROM YAESU! BUY NOW!**

### **NEW! TOP VALUE AND PERFORMANCE** **YAESU - YOUR ASSURANCE OF QUALITY - introduce** **THE FT-201 10-80m. AC/DC TRANSCEIVER**



**£290 + VAT (ex-stock)**

#### **FEATURES:**

- ★ Built-in ac/dc psu
- ★ 260W p.e.p.
- ★ 1kHz readout
- ★ Effective noise blanker
- ★ Break-in cw keying with sidetone
- ★  $\pm 5$ kHz receiver clarifier
- ★ Built-in www reception
- ★ All mode operation for am, cw and ssb
- ★ Fast/slow AGC
- ★ Built-in cooling fan
- ★ Complete line of compatible accessories

Full details in our "Communications Equipment" catalogue, 20p.

YAESU now brings you the newest addition to its growing family of solid state transceivers, the FT201. Performance and portability are among the key features of this economical transceiver along with YAESU innovated modules to simplify servicing. The FT201 has features which you would expect to find only in units costing much more.

#### **USED EQUIPMENT (Carr./VAT extra) 3 months guarantee.**

Drake MN4, excellent ..	£38	KW77, good ..	£69	Liner2, v. good ..	£105	Trio TR-2200, v. good ..	£59
Drake R4B/T4XB, superb ..	£370	KW Viceroy 4, good ..	£79	Murphy, 2m 40W liner ..	£30	Trio JR-500, good ..	£49
FDK, Multi 2000, excellent ..	£239	KW 2000B, good ..	£169	Standard, C826MB, exc. ..	£89	Trio TS-510, v. good ..	£155
Heath SB-303 NEW, assembled	£239	KW2000B, superb ..	£229	Standard, CV100 vfo, exc. ..	£19	Yaesu, FT-2F, fine ..	£65

#### **★ BARGAIN CORNER ★**

### **SPECIAL OFFERS!**

**ATLAS 180.** A £30 Credit Note will be given to every purchaser of a '180' at £260 plus VAT. This can be used to purchase any items from us.

**YAESU YC-355 frequency counter** £65 plus VAT.

**ACCESS**

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**BARCLAYCARD**

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**EXPORT - A PLEASURE!**

# Electronics (UK) Ltd

## For your LINER 2 144MHZ SSB Transceiver

Price **£145** (plus VAT)

24 hour SECURICOR DELIVERY

Ex-Stock. Covers 144.10—144.34 for the new band plan

Every Liner 2 is carefully aligned on our Hewlett-Packard spectrum analyser before despatch and you will have the satisfaction when purchasing your "Liner 2" from us of knowing that the job has been done properly by experienced staff.

## THE STANDARD C146A SETS THE STANDARD



- ★ Toneburst built-in and can be switched-off.
- ★ Has the finest range of accessories available... and
- ... it's twice the power!
- ... it's half the weight!
- ... and about one third the size (of its competitors).

### STANDARD

The Standard C146A is a 5 Channel 2 watt unit fitted with adjustable toneburst for 1700 and 1750 Hz repeaters. The CSA Base Charger unit enables the C146A to be used as a main station and re-charges Ni-Cad batteries (set of 10 required).

### Prices (Carriage paid, exc. VAT)

CV100. VFO for C826MB	..	..	..	..	..	..	..	..	..	£27.00
CV110. VFO for C140	..	..	..	..	..	..	..	..	..	£37.00
C140. 2m. Transceiver	..	..	..	..	..	..	..	..	..	£98.00
C146A. 2m Hand Transceiver, 5 channel	..	..	..	..	..	..	..	..	..	£74.00
C826MB 2m. Transceiver	..	..	..	..	..	..	..	..	..	£110.00
SY-200 Synthesizer	..	..	..	..	..	..	..	..	..	£79.00
C430. UHF Transceiver	..	..	..	..	..	..	..	..	..	£129.00
C432 UHF Hand Transceiver 5 channel	..	..	..	..	..	..	..	..	..	£93.00

### ACCESSORIES

C-12/230-5AE AC PSU for all models	..	..	..	..	..	..	..	..	..	£62.00
C-12/230-6E AC CHARGER for C146A and C432	..	..	..	..	..	..	..	..	..	£3.00
Ni-Cad Batteries, set of 10	..	..	..	..	..	..	..	..	..	£10.00
2-205K remote speaker for all models	..	..	..	..	..	..	..	..	..	£8.00
CAD external antenna coupler	..	..	..	..	..	..	..	..	..	£1.95
CSA Base Charger unit for C146	..	..	..	..	..	..	..	..	..	£14.00
CAT08E. Rubber flexible antenna	..	..	..	..	..	..	..	..	..	£2.75
CMP03 External microphone for C146A and C432	..	..	..	..	..	..	..	..	..	£8.00
CPM02 Telephone handset for all models	..	..	..	..	..	..	..	..	..	£23.00
C-12/230-2. AC Charger/Speaker	..	..	..	..	..	..	..	..	..	£66.00

THE **HUSTLER**

2m.  
6 dB GAIN

G6-144A  
COLINEAR

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+ vat



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Tom Chesaley, G1CHP, Norwich, Swainsthorpe 345 (daytime also)  
David Lacey, G8LYP, Solihull, Warks., 021-744 4438  
Hours of business: 9.15-5.15; 9-12.30 (Saturday)

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TELEPHONE: SOUTHAMPTON 27464  
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# Western Electronics (UK) Ltd SOUTHAMPTON

## WOULD YOU LIKE A FREE CDE ROTOR?

... of course you would! So many firms say "Ex-stock" and then come up with a whole host of excuses as to why they can't supply that we decided to make you a special offer until March 31st. Send us your order for one of our CDE Rotors (with money, of course!) and if we can't supply "Ex-stock" then we will give you a free rotor when available. There's a challenge for you! You have nothing to lose!

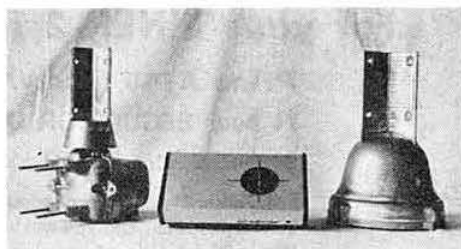
### NEW CDE ROTORS

(Prices carriage paid)

AR30	...	£25
AR40	...	£30
CD44	...	£60
HAM-2	...	£90
SECURICOR DELIVERY £1 EXTRA		



CD44/HAM-2 CONTROL UNIT



AR30 £25

+ VAT

AR40, £30

### ATTENTION H.F. MOBILE OPERATORS!

Fed-up with having to disconnect resonators/whips before garaging?  
Fed-up with having to go slow due to inadequate mounting?  
Then here's the answer... the "HUSTLER."

Hustler and only Hustler gives you 12 years of proven performance, mechanically and electrically superior to all others. You get exceptional reports on every band, lowest SWR and broadest bandwidth. Matching devices are not required. Use any convenient length of 52 ohm feed line. Convenience of fold-over mast for rapid band change or easy garaging, optimized performance on each band and a time proven concept in mobile communications, a concept verified by the overwhelming majority of amateurs, are yours only with the Hustler!

### NEWTRONICS HUSTLER MOBILE ANTENNAS

BMI bumper mount	...	£5.55
MO2 mast	...	£7.50
RM10 10m resonator	...	£5.00
RM15 15m resonator	...	£5.55
RM20 20m resonator	...	£6.05
RM40 40m resonator	...	£7.50
RM80 80m resonator	...	£8.00
C32 ball mount	...	£2.00
SSM3 Stainless steel spring	...	£5.45
RSS2 Resonator spring	...	£2.65
QDI quick dis-connect	...	£6.50

### NEWTRONICS 10-40/80m. VERTICAL 4BT + RM80S IN STOCK

The 4BT is a self-supporting 10-40m. automatic band selecting vertical and covers 10-80m with the RM80S (1kW rated) resonator. Price (carr. paid) 4BT £10. RM80S £15.

### BANTEX FIBREGLASS MOBILE ANTENNAS (Carr. 75p) (Ex-Stock) + VAT

70 1/2" 70 MHz 1/2 wave	...	£3.00	BGA, 144 MHz 1/2 wave	...	£6.60	Magnetic mount	...	£7.80
144 1/2" 144 MHz 1/2 wave	...	£2.85	B5, 144 MHz 1/2 wave	...	£5.20	All aerials complete with base.	...	

### J BEAM (Carr. 75p and VAT extra)

TAS 3/2, pivoting mobile	...	£7.00	PBM14/2m 14 ele Parabeam	...	£16.90	D5/2m. Double 5 slot fed	...	£7.92	HM/2m. Halo/mast	...	£2.20
5Y/2m. 5 ele	...	£4.30	5XY/2m. 5 ele crossed yagi	...	£8.20	D8/2m. double 8 slot fed	...	£10.50	D3/70cm. double 8 slot	...	£9.00
8Y/2m. 8 ele	...	£5.60	8XY/2m. 8 ele crossed yagi	...	£10.20	XD/2m. crossed dipoles	...	£5.75	PBM18/70 18 ele yagi	...	£10.90
10Y/2m. 10 ele	...	£11.00	10XY/2m. 10 ele crossed yagi	...	£14.10	UGP/2m. ground plane	...	£4.15	MBM46/70 46 ele Multibeam	...	£12.10

Braun. SE600 digital AM/FM/SSB 2m. Transceiver. Ex-stock £899.00

Caslon. 222 24hr clock £6.60. 601 day/date clock £13.77.

ECM. Deviation meter 3-500MHz. Portable and reads deviation direct 0-15kHz. A 'Must' for the serious fm operator or group. £44.00.

Frontier. LA2 2m. 350W p.e.p. Linear amplifier £275.00.

Vibratol. 2m SSB/FM 12V DC amplifiers. Type 701A, 75W o/p £49. Type 801A 100W o/p £69.00. Type 901A, 150 W o/p. £89.00.

Valves. (P & p 30p) Minimum order £2. Most valves are of first grade Toshiba manufacture.

572B (Cetron)	...	£11.20	6AW8	...	.60	6CB6	...	.40	6GK6	...	.55	12AU7	...	.50
5763	...	1.55	6BA6	...	.35	6CH6	...	.86	6GW8	...	.72	12AX7	...	.45
6146	...	£4.50	6BE6	...	.40	6CL6	...	.75	6JS5C	...	£1.75	12AT7	...	.52
6146B	...	£4.85	6BM6	...	.50	6EA8	...	.50	6KD6	...	£1.75	12BY7A	...	.50
6AH6	...	£1.05	6BM8	...	.80	6EH7	...	.50	6LQ6	...	£1.75	12DQ6	...	£2.25
6AM6	...	.55	6BN8	...	.45	6EJ7	...	.50	6U8	...	.55	OA2	...	.96
6AN8	...	.55	6BQ5	...	.45	6EW6	...	.40	7360	...	5.00	OB2	...	.60
6AV6	...	.33	6BZ6	...	.40									

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IDEAL FOR SHORT WAVE LISTENING. MAY BE PROGRAMMED TO SUIT YOUR INTERESTS  
—AMATEUR BANDS, MARINE, ETC.

Full Range of Accessories—Matching Speaker, Noise Blanker, Loop Antenna, etc.

### SPECIFICATIONS

**Frequency Coverage** Can be programmed with accessory crystals for 23 ranges (each tuning a 500kHz band) from 0.5 to 30MHz plus 150 to 500kHz.  
Crystals supplied with the receiver allow coverage on these ranges: 150-500kHz, 0.5-1.0MHz, 1.0-1.6MHz\*, 6.0-6.5MHz, 7.0-7.5MHz, 9.5-10MHz, 11.5-12MHz, 15-15.5MHz, 17.5-18MHz, 21.5-22MHz.

**Modes of Operation** AM, CW, LSB, USB, (RTTY with RY-4 accessory installed)

**Selectivity** AM: 4.8kHz @ -6dB, 10kHz @ -60dB  
SSB: 2.4kHz @ -6dB, 7.2kHz @ -60dB  
CW: 0.4kHz @ -6dB, 2.7kHz @ -60dB  
1st IF 5645kHz four pole crystal lattice filter, 2nd IF 50kHz four pole Hi-Q Ferrite LC filter.

**Intermediate Frequencies**

**Frequency Stability** At room temperature, drift for all causes (including  $\pm 10\%$  change in supply voltage) is less than  $\pm 100\text{Hz}$ .

\* Generous overtravel gives additional 50kHz or more off each end of range.

**Sensitivity** SSB and CW: 0.25microvolt for 10dB S + N, AM: 0.5microvolt with 30% modulation for 10dB S + N.

**Calibration** Dial is accurate to better than  $\pm 1\text{kHz}$  when calibrated at nearest 100kHz calibration point.

**Hum and Noise** More than 60dB below rated output.

**Size and Weight**  $5\frac{1}{2}" \text{H} \times 10\frac{1}{2}" \text{W} \times 12\frac{1}{2}" \text{D}$  140mm H  $\times$  274mm W  $\times$  324mm D. 18 lbs (8.2 kg).

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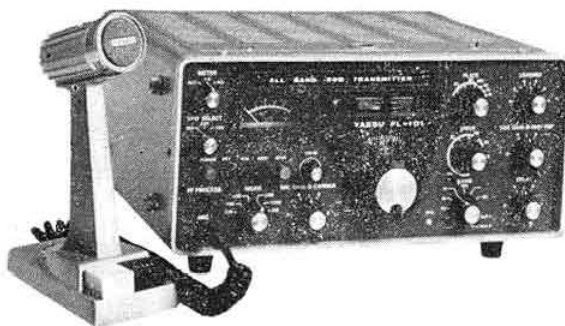
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AMATEUR ELECTRONICS UK**

**The Ultimate Base Station Combination**



**FL-101 Transmitter★**

## ● Solid State 160 thru 10 Metre Transceiver

Here is the ideal companion designed to complement the FR-101S and offer total base station performance and versatility. The latest, solid-state techniques and circuitry are utilized throughout this advanced transmitter. The FL-101 features a new, patented, variable temperature compensated VFO to give unmatched stability with better than 1KHz readout and zero dial backlash on all bands.

### Features

- \* 160 thru 10 Metre coverage with 2 auxiliary bands
- \* All mode operation: SSB, CW, AM and FSK
- \* 240 Watts PEP
- \* Reliable, plug-in circuit boards for service simplicity
- \* Built-in final cooling fan

This flexible transmitter operates on all modes and may be operated in conjunction with the FR-101S in split or transceive operation. An optional RF speech processor may be added for that extra "talk power" needed on today's crowded bands. Match up the FL-101 with the FR-101S and a complete line of compatible accessories, for the ultimate in base station operation and performance.

- \* Built-in AC supply-adjustable from 100 to 234 VAC
- \* Built-in, fully adjustable VOX
- \* Automatic break-in CW operation with sidetone
- \* Indicator light for internal VFO operation
- \* Provision for optional RF speech processor



**FULLY  
TRANCEIVES  
WITH THE  
FR-101**

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**FULL DEMONSTRATION FACILITIES—**

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OR OUR APPROVED STOCKISTS**

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WARRANTY  
SERVICE**



### **FR-101 Receiver**

THREE MODELS AVAILABLE

**FR-101S** STANDARD

**FR-101DL** DELUXE

**FR-101SD** STANDARD WITH DIGITAL  
DISPLAY

- Solid State Receiver with Total Spectrum Coverage 160 thru 2 Metre plus Provision for Major Short Wave Broadcast Bands

The new FR-101  
also gives superb  
Transceiver  
Operation with  
the FT-101B



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# SOLID STATE MODULES

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## MANUFACTURERS OF VHF AND UHF RECEIVE AND TRANSMIT CONVERTERS AND PRE-AMPLIFIERS FOR THE AMATEUR AND PROFESSIONAL

We have established and maintained THE leading VHF/UHF manufacturing position. We have achieved this by providing a first class service. Our after sales service is even better than our before sales service. There is invariably someone here to answer your questions and solve your problems. Our equipment is in use around the world by educational establishments, hospitals, Government Departments and of course amateurs.

### RECEIVE CONVERTERS FOR 2 OR 4 METRES

All our 2 metre and 4 metre converters feature noise figures of 2dB, gain 30dB and according to our (and many independent tests) the highest performance you can buy.

### THE SENTINEL DUAL GATE MOSFET CONVERTERS

- ★ 2 metre I.F.s: 28-30MHz, 4-6MHz, 2-4MHz, 9-11MHz, 14-16MHz, 18-20MHz, 24-26MHz, from stock.
- ★ 4 metre I.F.s: 28-28.7MHz—from stock.
- ★ Size:  $2\frac{1}{2}'' \times 3'' \times 1\frac{1}{2}''$  except the 2-4MHz and 4-6MHz which are 4" long because they are double conversion.
- ★ The price is only £16.20. All ex-stock.

### THE SENTINEL 2 METRE CONVERTER KIT, 28-30MHz—Ex stock

Very few "comebacks" on our kit, thus confirming the reliability and stability of the design. The kit is supplied with the printed circuit board drilled and all components mounted to make assembly so simple. All components, metalwork, nuts and bolts, etc., are supplied. Performance data is the same as our Sentinel converters. Price £11.00. If it doesn't work, send it back with £2.00 and we will fix it for you.

### SENTINEL X DUAL GATE MOSFET 2 METRE CONVERTER

A deluxe version of our Sentinel converter, containing a mains power supply or external battery operation. It has front panel R.F. gain control. Technical data is the same as the Sentinel. Size:  $5'' \times 1\frac{1}{2}''$  front panel, 4" deep. Stock I.F.s: 2-4MHz, 4-6MHz, and 28-30MHz. Price: £21.06.

### THE SENTINEL MF DUAL GATE MOSFET 2 METRE TO MEDIUM WAVE CONVERTER—Ex stock

Receives 2 metres on a conventional MW BC receiver, very good used with a car radio. I.F. output of 0.5MHz for 144-5 and 145-6MHz in two switched bands. Size:  $5'' \times 1\frac{1}{2}''$ , front panel 4" deep. Price: £20.25.

### RECEIVE CONVERTERS FOR 70CMS SM 70 FET CONVERTER

- ★ I.F. output of 144-146MHz. Noise figure 3.5dB. Gain 30dB.
- ★ Size:  $2\frac{1}{2}'' \times 3'' \times 1\frac{1}{2}''$ .
- ★ By using the SM 70 with your 2 metres receiver you get excellent 70cms receiving performance for only £16.20. Ex stock

### PRE-AMPLIFIERS FOR 2 METRES AND 70CMS—Ex stock

Some other frequencies ex-stock, e.g. Satellite and marine band. Other frequencies on short delivery.

### SENTINEL LOW NOISE FET PRE-AMPLIFIER—Ex stock

If you want the ultimate in 2 metre sensitivity and selectivity:

- ★ Built in a box which matches our converters.
- ★ Isolated supply lines make it compatible with any existing polarity.
- ★ Low noise figure—1dB. Gain—18dB.
- ★ High selectivity tuned circuits. Price: £7.36.

### THE PA3 DUAL GATE MOSFET PRE-AMPLIFIER—Ex stock

- ★ Small (about one cubic inch) printed circuit board pre-amplifier developed to fit inside transceivers where it can be wired into the receiver aerial lead after the c/o relay.
- ★ Low noise figure—2dB. Gain—18dB. Price: £5.94. Supplied with fitting data.

### SM 71 70CM PRE-AMPLIFIER—Ex stock

- ★ A selected 2 stage FET pre-amplifier.
- ★ Noise figure 3.5dB. Gain 18dB.
- ★ Size:  $2\frac{1}{2}'' \times 4'' \times 1\frac{1}{2}''$ . Price: £9.72.

### EUROPA 70 CM FET RECEIVE CONVERTER

Can be used as a receive converter on its own or in conjunction with our Europa transmit converter for transmit operation as well.

- ★ I.F. output 28-30MHz. Noise figure 3.5dB. Gain 30dB.
- ★ Two FET R.F. amplifiers and FET mixer.
- ★ Oscillator chain uses a 101MHz crystal with oscillator output socket to drive the Europa 70 transmit converter.
- ★ Size:  $2\frac{1}{2}'' \times 4'' \times 1\frac{1}{2}''$ .
- ★ Price of this extremely high performance unit, £20.52.

### EUROPA TRANSVERTERS

#### NOW IN USE IN OVER 50 COUNTRIES

EUROPA B 10 METRE TO 2 METRE (OR 4 METRE OR 6 METRE) RECEIVE AND TRANSMIT CONVERTER—Ex stock



1000s of happy users, why not join them? In response to the RSGB reviewer's comment on the self tap screws holding the case, we are now threading the holes and using chrome plated 4BA instrument screws. The comment on crystal frequency drift had already been attended to in the Europa B by the use of a ten times higher specification crystal—0005% in place of the .005% tolerance used previously.

- ★ The Europa B now includes an aerial change over relay and SO239 aerial socket for ease of fitting third co-ax.
- ★ The answer to reliable VHF communication, tropo or Oscar.
- ★ Any mode fed in comes out, SSTV, RTTY, CW, SSB, AM, etc.

The Europa makes sense! For the cost of the Europa and a 28-30MHz transceiver or transmitter-receiver combination, you get:

- ★ Coverage of the HF gear.
- ★ High 2 metre transmit power. Up to 200W input. Adequate for reliable Oscar 6 or 7 communication.
- ★ Highest receive sensitivity available, 2dB noise figure.
- ★ Extremely high stability and clean output spectrum.
- ★ Very well established and highly reliable design.
- ★ 2 metre or 4 metre version—off the shelf.
- ★ Low price: £88.00 complete, £74.00 less valves—valves required are 2 off 6X4, 1 off 6X5, 1 off 6X6. Additional 12-6V transformer for use with 6-3V AC heater Yaesu equipment (FT401, etc.): £3.24 or in a case to match the Europa: £6.37.

### EUROPA 70CM TRANSMIT CONVERTER

Designed like our Europa 2 metre unit to have sufficient power for satellite communication. 70W input Hybrid design similar to the Europa B. Size:  $6'' \times 6''$  front panel, 12" deep. Price: £43.20.

Other items (please note prices include VAT) Atlas 180 transceivers in stock, £280-80. Part exchanges welcome. DC200, £37.50. Crystals: 15.5MHz, HC6U, £2. 39-1MHz, £2. 38-666MHz, HC18U, £2.

All the prices include VAT (8%) and British Isles delivery. We export goods daily so this is no problem. We can give same day C.O.D. service (£50 limit). All our products carry a 12 month guarantee. If you have any doubts, ring or write for assistance. We carry many popular converters and pre-amps for Satellite band etc, in stock, other frequencies on short delivery. Please do not hesitate to contact us if you think we can help. Paul G3MXG.

# THANET ELECTRONICS

**REPEATERS** To bleep or not to bleep, that is the question. As you know, the Home Office do not approve of access tones being transmitted at the beginning of simplex transmissions and prefer such tones only to be used when working through repeaters. This poses a problem for the mobile operator who has to remember when to switch the tone in. Some rigs have manually operated tones which operate when one presses the "call" button on the front—but is it in the interests of road safety to do this, press the PTT switch on the mike and drive a car at the same time? To overcome these difficulties all the new IC-22s will be fitted with an automatic system whereby the tone bleep is introduced only when the channel selector switch is set to repeater channels. As supplied the tone is introduced on two channels, but modification to give this facility on any number of channels is easy. As we have said before, the IC-22 is an ideal rig for repeater use. Its excellent speech tailoring and clipping provide good readability without over deviation. The receiver sensitivity (0.4µV for 20dB quieting) is up to the standard necessary to ensure that you can hear the repeater when it can hear you! Channels fitted are S0, S20 and S22 and we have crystals for all the proposed UK repeaters at £4.32 per pair including postage and VAT. The IC-22 is still only £109.26 + VAT.

**The IC-225** has all the advantages of the IC-22 but has no less than 80 channels fitted as supplied. These include all the repeater channels and all frequencies from 144.00 to 145.975-MHz in 25kHz steps. We can supply a crystal for 144.48 or any other frequency which does not fit into the 25kHz channel system, one for reverse repeater operation, or even a VFO (if you don't feel like having a go at building one) to operate on both transmit and receive. It costs £195 + VAT but there are no more crystals to buy to give you 80 channel operation.

**The IC-210.** This excellent fully VFO FM transceiver with full repeater facilities is still available at £200 + VAT (which is £60 below the usual price). It has a built-in mains PSU and can be operated on 12V neg earth. Complete with its 50kHz crystal calibrator, centre zero meter and continuously variable output power from 0.5 to 10 watts this makes a perfect home station FM rig at a bargain price.

**The IC-201** will be the all-mode version of the IC-210. It will be similar in appearance and the price will be about £295. They should be available in the late spring. Let us know if you want to be put on our mailing or order list for further details when they are available. Supplies will probably be slow initially and orders will be dealt with in strict rotation.

**The DV-21** is ICOM's new digital VFO which can be used for the IC-21, 20 or 22. You can type in the required Tx and Rx frequencies on the keyboard, and these are displayed on the LED display. It will operate in 5 or 10kHz steps or can be made to scan the band either looking for signals or an empty channel. A very versatile luxury for the man who wants the best at £172 + VAT.

DAVE G8ELP

PAUL G3VJF

**IC-22** All future IC-22s are fitted with the following frequencies: 145.00, 145.500 (S20), and 145.550 (S22). Crystals for other channels, including repeaters, can be supplied at £4.00 + VAT, per pair.



**AMPLIFIERS.** We can supply a 40W Linear Amplifier for £40.00 + VAT to work with any of the above rigs. The version with a built in Rx pre-amp is £44.00 but a pre-amp is not necessary with receivers with the INOUE specification.

All the above are available and can be demonstrated at WHITSTABLE and BARNSELEY.

Don't forget that we also have a range of MICROWAVE MODULES, SSM and Sommerkamp equipment. By the way, one of the cheapest ways of getting credit is to use your ACCESS or BARCLAYCARD. Just phone in your number and have the rig sent by SECURICOR at no extra charge.

**CRYSTALS.** We are sorry that the price has gone up to £4.32 inc VAT per pair but even that is cheaper than many sources and the stock position is getting much better now.

Please write or give us a ring at Whitstable if you would like to know more. Peter Avill is only available evenings and weekends but is very handy for those who live within 50 miles of Sheffield.

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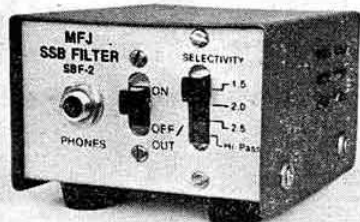
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# WATERS & STANTON ELECTRONICS

**A NEW  
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FOR £14.58!**

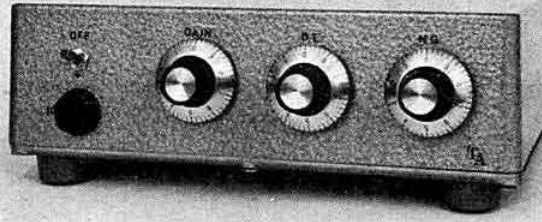
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ADVANCED AUDIO COMPRESSOR**



## MFJ (USA) NEW RECEIVER ACCESSORY SUPER SSB AUDIO FILTER SBF-2B

**TRIO QR666 OWNERS**—this will completely transform your receiver into a really good dx machine!

I think it is now pretty well known that we are able to supply the needs of the amateur in the South East with all his station requirements. You are always welcome to come and visit us at Hockley. Our premises are situated in the main shopping centre and we have a large free car park at the rear of the shop. Being situated only 4 miles from Southend-on-Sea it can make quite a nice trip for the family. Normally we have a rig monitoring 145-00MHz so if you get lost try calling G3OJY/A. If you are not within motoring distance of our premises (or you can't afford the petrol!) then why not take advantage of our fast mail order service. If



## FOR THE MAN WHO TAKES A PRIDE IN HIS SIGNAL—ONLY £22.68

**SPECIAL OFFER!** Compressor plus Shure 444 mic £34.50

you have a Barclaycard or Access card you can simply phone your order to us for same day despatch. Needless to say we have full service facilities for all the equipment we sell so you can buy from us with confidence.

Whether it's a brand new FT101B you wish to purchase or simply a station accessory you will be equally welcome. Do remember, however, that we are closed Wednesday afternoon and that if you are travelling some distance to us it is wise to check the stock position with us by telephone as some items are in short supply. **73's Peter G3OJY**

**YAESU - SWAN - ATLAS - TRIO - MINIPRODUCTS - JAYBEAM - MFJ - SHURE - HY-GAIN**

**SIMPLY PICK UP THE TELEPHONE AND QUOTE YOUR BARCLAYCARD OR ACCESS No.—DESPATCH SAME DAY!**

### MFJ PRODUCTS (USA)

CWF-2BX cw audio filter .. .. .	£13.95
SBF-2BX new ssb audio filter .. .. .	£14.58
CMOS electronic keyer .. .. .	£21.06
CWF-2 module .. .. .	£9.00
100 BX-100/50/25kHz calibrator .. .. .	£11.50
CWF-3 module .. .. .	£5.00
<b>MINI-PRODUCTS "Mini-Beams" (1-5kW)</b>	
HQ-1 hybrid quad 10-15-20 .. .. .	£54.00
B24 2 element yagi .. .. .	£42.12
C4 10-15-20 vertical .. .. .	£24.30
RK3 reflector kit for B24 .. .. .	£27.00

### MICROWAVE MODULES

New! 70cm transverter .. .. .	£67.00
2m converters 2-4/4-6/28-30 .. .. .	£16.42
70cm converters 28-30 .. .. .	£19.55
2m pre amp .. .. .	£9.72
1,296 converter 28-30 .. .. .	£25.92
2m converter 28-30 116MHz o/p .. .. .	£17.60
4m converter 28-28.7 .. .. .	£16.42

### SOLID STATE MODULES

4m or 2m Europa transverter (B) .. .. .	£88.00
Less valves .. .. .	£74.00
2m converters 2-4/4-6/28-30 .. .. .	£16.20
70cm converter 144 IF .. .. .	£16.20
2m pre amp PA3 .. .. .	£5.94
70cm pre amp .. .. .	£9.72

### SHURE MICS (note our low prices!)

201 .. .. .	£6.00
444 .. .. .	£13.95

### SPEECH PROCESSORS

New Technical Associates model .. .. .	£22.68
DX engineering for TR3/TR4 .. .. .	£45.00
Magnum Six (the Rolls-Royce) .. .. .	P.O.A.

### JAYBEAM VHF ANTENNAS

<b>4 metres</b>	
4 element yagi .. .. .	£7.34
<b>2 metres (50 or 75 ohm)</b>	
5Y/2M yagi .. .. .	£4.64
10Y/2M yagi .. .. .	£11.88
8XY/2M .. .. .	£15.23
crossed .. .. .	£11.03
D5/2M slot .. .. .	£8.56
UGP/2M G .. .. .	£4.48
plane .. .. .	£18.25
PBM 14/2M .. .. .	£18.25
<b>70cms</b>	
D8/70cm slot .. .. .	£9.72
MBM46/70cm .. .. .	£13.07
12XY/70cm .. .. .	£18.04

Send S.A.E for full range

### ROTATORS

AR30 .. .. .	£27.00
AR40 .. .. .	£32.40
CD44 .. .. .	£64.80
Stolle 2010 .. .. .	£33.48
Stolle 2030 .. .. .	£37.80
5 core cable 18p per yard .. .. .	

### MOBILE ANTENNAS

G-W/hips tribander 10-15-20 .. .. .	£13.28
Multi-mobile 10-15-20 .. .. .	£15.44
Flexiwhip basic 10m .. .. .	£10.26
Basemount .. .. .	£2.00
Extra coils .. .. .	£4.43
Antenna Specialists vhf antennas:	
4m 1 wave .. .. .	£3.94
2m 1 wave .. .. .	£3.54
Deluxe 2M 1 wave .. .. .	£17.28
Jaybeam 1 wave whip .. .. .	£7.50

S.A.E. WITH ALL ENQUIRIES PLEASE

Carriage extra—we refund any excess

### YAESU (prices ex vat)

FT101 B .. .. .	£330.00
FT201 .. .. .	£290.00
FT200 .. .. .	£170.00
FT224 .. .. .	£130.00
FT2 Auto .. .. .	£155.00
YC35 .. .. .	£104.00
SP101 B .. .. .	£13.00
FR101 S .. .. .	£245.00
SP200 .. .. .	£44.00
FP2 AC .. .. .	£38.00
YO100 .. .. .	£93.00

### TRIO

QR666 receiver 160 to 10m plus general coverage. 230V AC or 12V DC .. .. .	£140.00
ATLAS 180 .. .. .	£275.40

### SWAN (Prices ex-VAT)

700 cw transceiver plus psu .. .. .	£395.00
700cw/ss 16 transceiver plus psu .. .. .	£435.00
Remote vfo .. .. .	£99.00
Vox unit .. .. .	£25.00

### LOWE ELECTRONICS

2 metre FM monitor receiver with six channels .. .. .	£31.26
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### 2m SSB

Liner 2 transceiver .. .. .	£156.00
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### STATION ACCESSORIES

Headphones 8 ohm .. .. .	£2.95
SWR meters 160 to 2m .. .. .	£6.20
SWR meter/power meter, dual meters 160 to 2m .. .. .	£11.50
50 ohm coax 17p yd, 75 ohm UHF 14p yd, 300 ohm feeder 8p yd, insulators 12p, High power Wightraps .. .. .	£4.60 pair, PL259 plugs 42p, Belling Lee 12p
HP3A TV interference filter .. .. .	£2.16
11in ferrite rings .. .. .	23p each

### NI-CAN BATTERIES

HP2 £3.20 HP11 £2.20 HP7 £1.30	
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BARCLAYCARD

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**HOCKLEY AUDIO - SPA ROAD - HOCKLEY - ESSEX**

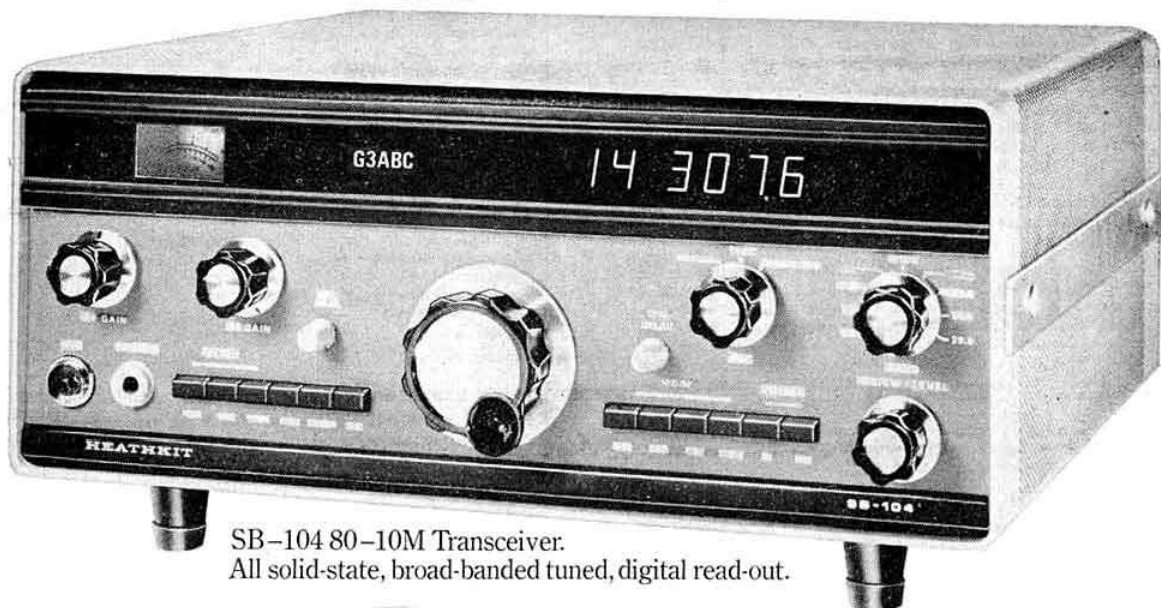
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9-5.30 pm Early closing WEDNESDAY

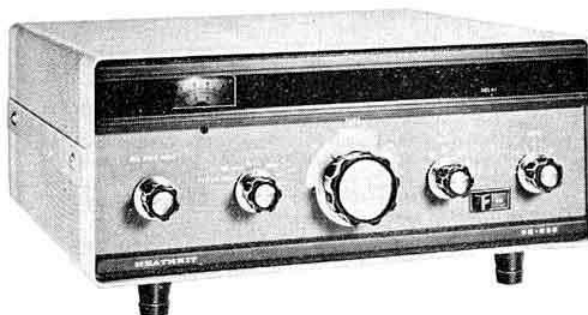
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# Introducing the new Heathkit amateur range. The most advanced approach yet.



SB-104 80-10M Transceiver.  
All solid-state, broad-banded tuned, digital read-out.



SB-230 Conduction Cooled Triode 1kW Linear.



SB-644 Remote VFO.

The new Heathkit amateur range is the culmination of more than three years' development and research.

To give you the most advanced approach yet to amateur radio.

Featuring all solid-state design, digital read-out, very high standard of performance and real operating convenience.

The new Heathkit range is also totally broad-banded. So you can say goodbye to time consuming preselector, load and tune controls.

Write now for a free leaflet and technical specifications.

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Tel: Gloucester (0452) 29451.

HEATH  
Schlumberger

# Reach for the Sky . . .

We believe that this year ahead holds much in store for the V.H.F. and U.H.F. amateur enthusiast. It is our policy to promote interest in the many exciting projects under way to extend the horizons of amateur communication. In particular the OSCAR satellite projects have attracted great attention and have brought together the V.H.F. amateurs of many countries. Our equipment has been used by both the U.K. and U.S.A. AMSAT groups in the trials and played an important part in the communication network set-up to facilitate this initial launch and positioning of OSCAR 7.

As many of you may have seen from our adverts in the American magazines, our equipment is now gaining popularity in what must be one of the most discerning markets in the world. We have supplied equipment to the North American Space Authority and at the present time we are supplying the U.S.A. AMSAT group with communications packages for use with OSCAR 7. These packages are being sent to under-developed countries to establish the viability of emergency communications which might eventually lead to minimising the tragic losses of lives so common in earthquake and cyclone disasters.

Much interesting work is now being done by amateur enthusiasts in the 136MHz satellite band. With modern integrated circuitry and sensitive receiving equipment it is feasible for the amateur to receive the pictures transmitted by both Russian and American weather satellites. We manufacture both preamplifiers and converters for this satellite band and have supplied these to many establishments researching this field. One British University used our equipment in Africa to investigate ionospheric phenomena associated with the total eclipse of the sun last year.

We employ a team of graduate engineers to design and develop our range of equipment and they are constantly investigating new devices and technologies with a view to improving and extending our product range. In this coming year we have exciting plans for the expansion of our company and its capacity and it is our endeavour to establish the supremacy of our British engineering across the world. Our two directors, G3VXK (ex G8AHQ) and G3VYB (ex G8AGG, G6ABM/T) both hold R.S.G.B. Certificates for achievements in the U.H.F. field and much of the success of our business can be attributed to the enthusiasm of the amateurs who work in and around our company.

## 136MHz MOSFET CONVERTER—MMC136/28

With dual protected gate Mosfet RF Amplifier and Mixer stages.

Input frequency	136-138MHz
I.F. output frequency	28-30MHz
Typical gain	30dB
Guaranteed maximum noise figure	2.5dB
Maximum frequency error at 136MHz (zener stabilised oscillator)	3kHz
Typical image rejection	65dB
Power requirements	12 volts DC $\pm$ 25% at 35mA
Price inc. VAT	£16.42
Other I.F. output frequencies available.	

## 136MHz DUAL OUTPUT MOSFET PREAMPLIFIER—MMA136

This two stage mosfet preamplifier has two separate isolated outputs, for feeding two receivers, for example.

Input frequency	136-138MHz
Typical gain	18dB
Guaranteed maximum noise figure	2.5dB
Bandwidth	5MHz at -3dB 8MHz at -10dB
Power requirements	12 volts DC $\pm$ 25% at 25mA
Price inc. VAT	£9.72

## 23 CM CORNER

It is now more than a year since we launched our 1296MHz converter. Despite the many design and production pitfalls that can beset the manufacture of equipment in the upper U.H.F. spectrum we are very happy to announce that our production line has run smoothly for the past year without any major headaches. We have sold several hundred of these converters across the world and hope that we have contributed in some small way to the occupancy of this interesting and exciting band.

## 1296MHz CONVERTER—MMC1296/28—MMC1296/144

A hybrid ring mixer with a matched pair of hot-carrier diodes, driving a dual-gate mosfet I.F. amplifier.

Input frequency	1296-1298MHz
I.F. output frequencies available	28-30MHz, 144-146MHz
Typical gain	25dB
Guaranteed maximum noise figure	3.5dB
Power requirements	12 volts DC $\pm$ 25% at 50mA
Connectors	50 ohm BNC.
Price inc. VAT	£25.92

## 1296MHz VARACTOR TRIPLER—MMV1296

Broadband operation ensures complete stability with high efficiency and low harmonic output.

Input frequency	432-433.3MHz
Output frequency	1296-1300MHz
Typical efficiency	60%
Input power range	0-24 watts
Typical harmonic suppression (relative to output)	Fundamental -30dB 864MHz -50dB Others -40dB
Connectors	50 ohm BNC
Price inc. VAT	£27.00

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## Sefydli'r Llywydd, Caerdydd 1975

The formal part of the 1975 Presidential Installation was not scheduled to commence until 7pm on Friday 17 January but for the Society's first President from the principality, Cyril Parsons, GW8NP, the proceedings began much earlier in the day when an outside broadcast team from BBC Wales arrived. The result was seen shortly after 6pm when the President-elect filled the big screen in full colour. An excellent publicity item and a good beginning to the installation to be held in Cardiff Castle.

For those who have not seen Cardiff Castle it should be mentioned that this is no tottering relic of the past in semi-decay but a full-blooded castle still able to take its part in repelling invaders from across the border. However, as the guests walked across the drawbridge and up to the floodlit buildings all was quiet. After a preliminary joust with some sherry the guests advanced to the banqueting room where David Thomas, GW3RWX, opened the proceedings.

Alun Pritchard, GW3WLN, presented the 1974 President, George Jessop, G6JP, with a salver designed to accommodate a moderate amount of the recipient's favourite beverage. After a suitable reply G6JP invested Cyril Parsons with the chain of office. In thanking the members of Council and the Society for their support, GW8NP mentioned some aspects of amateur radio which tend to be forgotten in the haste of the present day; particularly Cyril drew attention to some very famous past-presidents whose names appear on the chain of office.

Mrs Jean Parsons then presented Mrs Jessop with a framed print as a memento of the occasion and Joe Brooke, GW3GHC, presented the GW5BI Memorial Tankard to Cyril Parsons for their support. In a final flurry of floral magnificence Mrs Celia Thomas presented Mrs Parsons with an attractive bouquet. A letter from the Society's patron, HRH The



Joe Brooke, GW3GHC, area representative, presenting the Vic Bartlett GW5BI Memorial Tankard to Cyril Parsons for outstanding services to the Society by a member of the Cardiff RSGB Group

Prince Philip, Duke of Edinburgh, KG, and several letters of congratulation were read.

In closing the formal proceedings GW3RWX thanked those members from the Cardiff area who had helped with the arrangements for the installation. This marked the beginning of the second part of the evening rather than the conclusion of the occasion.

Among the 150 guests were a number of Council members and it was for them a privilege to be present on such an occasion. The installation set a standard by which others will be judged and provided an excellent start to what will certainly be a testing year for the Society, in which the wisdom and good humour of the new President will be in constant demand.

## CURRENT COMMENT

### Financial setback

The unaudited accounts of the Society for the six months to 31 December 1974 show a loss of £6,900. The three main causes of this are:

- (1) the increased cost of *Radio Communication*—the cost of printing and paper has continued to increase and postage is also a heavy item.
- (2) salary increases—the Society has had to increase salaries of key staff in common with employers throughout the country.
- (3) a fall-off in subscription income, partly due to difficulties in our subscription department which are now being overcome.

These halfway stage figures are bad enough, but what alarms the honorary treasurer is the prospect for the next six months when the full effect of the above and other increases are felt; just consider, for instance, that the cost of posting *Radio Communication* will be approximately £1 per member per annum.

The figures will be considered by Council at its next meeting but members will realize that the Society must take steps to correct a potentially dangerous economic situation.

## QTC

AMATEUR

RADIO NEWS

### Intruder Watch

The continuing work of the Intruder Watch under the guidance of Colin Thomas, G3PSM, rarely receives public mention. It is therefore pleasing to record a recent letter from the Home Office confirming that, following receipt of the monthly reports distributed by the Intruder Watch, approaches have been made to administrations responsible for stations in Pakistan, North Vietnam and the USSR, noted as being intruders in exclusive amateur bands. At the same time previous approaches by the UK administration have been responsible for clearing reported interference from *Radio Budapest* and *Radio Italiana*. The work of the Intruder Watch is not only valuable on a current basis, but the information obtained and collated will afford considerable support for the amateur service at the 1979 WARC. The UK activities are supplemented by the IARU Monitoring System drawing reports from many national societies within the Region 1 organization and now also from Regions 2 and 3.

## QSL Bureau

Members are asked to note the following changes to sub-managers:

G4BAA-BZZ is still handled by G3WBV but G4CAA-CZZ is now the responsibility of Mr T. Cheesley, G4CHP, 2 Willow Close, Upper Tasburgh, Norwich NR15 1NE.

Cards for G4DAA-DZZ are handled by Mr D Buckley, G3VLX, 16 Wood Rise, Pettswood, Orpington, Kent.

BRS and "A" members have a new sub-manager, Mr D. Borne, G4CYW. "Roughways", Chub Tor, Yelverton, Devon PL20 6HY.

Once again it is emphasized that outgoing cards must not be sent to the sub-managers. These MUST be sent only to G2MI.

## Facts and figures

The Home Office advises that the following numbers of amateur licences were in force at 31 December 1974:

Class A	15,304	Class B/M	1,549
Class B	3,966	Television	277
Class A/M	3,424		

The call sign record received from the Home Office dated 24 January 1975 gives the latest call signs issued in the G4 and G8 series as G4DSG and G8JSZ respectively.

At the end of January 1975 RSGB membership totalled 17,847, made up of 15,088 UK corporate, 1,021 UK associate and 1,728 overseas members.

## Are you interested?

The RSGB has an urgent need of a volunteer who is interested in the legal aspects of planning problems relating to aerial installations and associated matters. The work would involve the examination of case histories, analysis of these and the preparation of an index to enable precedents to be found. Any member interested in this activity (possibly having connections with the legal profession) and who would be willing to undertake this valuable service to the Society is asked to contact the general manager.

## Reciprocal licensing

An agreement has been concluded under which UK amateurs holding Amateur (Sound) Licence A will be able to operate in Iceland. Requests for Icelandic licences should be made to the national society, Islenskir Radioamatörar, PO Box 1058, Reykjavik, Iceland. The request should be accompanied by a copy of the applicant's UK licence and details of the equipment to be used in Iceland.

Negotiations are proceeding between the Home Office and the Spanish authorities regarding a reciprocal agreement but a speedy result is not anticipated. Letters have been exchanged over a considerable period and at the moment the onus lies with the Spanish administration.

## Mobile log-keeping

Following a request from the RSGB, the Home Office has agreed that log entries while operating mobile may be limited to the following: date; times of starting and finishing the journey; starting and finishing points of the journey and frequency band(s) used. A journey shall be regarded as finishing at a point where the vehicle remains stationary for 15min or more.

These are the minimum requirements and log entries may be more comprehensive if the operator so wishes. This concession is welcome and will do much to ease the difficulties of keeping a log while operating mobile.

## "Radio Communication" circulation

The audited total average circulation of "Radio Communication" during 1974, as certified by the Audit Bureau of Circulations, was 17,816 copies per issue. This shows an increase of 303 over the 1973 figure, and an increase of 862 over the first ABC audited figure of 16,954 for 1970.

## RSGB 21st National VHF Convention

This will be held at the Winning Post Hotel, Whitton, Twickenham, Middlesex on 10-11 May 1975. A comprehensive programme of lectures and demonstrations will deal with amateur space communications, microwaves, vhf propagation etc. There will also be a large trade show and an exhibition of home-constructed equipment.

The convention starts at 11am on 10 May, the lecture sessions are on Saturday afternoon and Sunday morning, and on Saturday evening there will be a dinner dance.

The whole event costs £3 per person or 75p for lectures and trade show only.

Further details from RSGB, 35 Doughty Street, London WC1N 2AE—mark envelope "VHF Convention".

## ITU

To draw attention to the activities of the International Telecommunication Union, GB2ITU will again be in operation at Tonbridge School during the months of March and May. A3J will be in use on all bands. Special QSL cards will be sent via QSL Bureau to all stations worked.

## Mobile rallies calendar

- 30 March** —White Rose rally, Lawnswood School, Leeds (Junction of A660 and A6120). From 12 noon. Many trade stands, grand raffle, well-stocked canteen, ample free parking, talk-in facilities (to be arranged). Details from G3VTY, QTHR.
- 20 April** —North Midlands rally, Drayton Manor Park, Tamworth. Details from G3ZKQ, QTHR.
- 4 May** —Tulip Time rally, Glead Boys School, Halmer Gardens, Spalding. All the usual attractions. Talk-in on 160 and 2m. Location maps on request. Details from G3VPR, QTHR.
- 18 May** —Northern Mobile Rally, Victoria Hall, Keighley, Yorks.
- 18 May** —Amateur Radio Mobile Society rally. The Clinical Research Centre, Northwick Park Hospital, Watford Road, Harrow, Middx. Exhibition manager W.S. Barwick, 34 Malvern Road, London N8 0LA. Tel 01-888 0636.
- 25 May** —Maidstone trade exhibition and rally, "Y" sportscentre, Melrose Close, off Cripple Street, Loose, Maidstone. GB3YSC talk-in on 160, 80 ssb, and 4 and 2m multimode. Details from G3WXL, QTHR (trade) and G3ORP, QTHR.
- 25 May** —Hull & D ARS rally, East Riding College of Agriculture, Bishop Burton, near Beverley. Organizer G3AGX, QTHR.
- 1 June** —RNARS rally, HMS Mercury, near Petersfield, Hants.
- 8 June** —Elvaston Castle rally. Talk-in on 2 and 160m by G3ZBI/P and G3EEO/P. Details from G4CTZ, QTHR.
- 29 June** —City of Bristol RSGB Group rally, Longleat House, near Warminster.
- 6 July** —Upton rally, organized by Worcester & D ARS. Details from G8ASO, QTHR.
- 20 July** —Cornish RAC rally, Cornwall Technical College, Pool, Camborne. (Provisional.)
- 17 August** —Preston ARS rally. Details later.
- 24 August** —Torbay ARS rally.
- 28 Sept** —Harlow & D ARS rally, Netteswell School, Harlow. (Provisional.)

**NOTE**—The South Shields & DARC is not holding a rally this year.

# Pyramidal horn feeds for paraboloidal dishes

by DAIN EVANS, G3RPE\*

## Introduction

Pyramidal horns have an important advantage over other types of feed for dishes which makes them especially suited for use by amateurs; they offer a virtually perfect match over a wide range of frequencies. Even large dimensional errors need not affect the quality of this match, but only the efficiency of illumination of the dish. By contrast, the frequency of operation of the common dipole/reflector type of feed and, to a lesser degree, that of designs such as the Cutler feed, is critically dependent on their dimensions, and small errors (even hundredths of an inch at the highest frequencies) can lead to quite severe matching problems.

A second advantage of horns is that they can be designed on paper usually with sufficient accuracy to produce optimum illumination of the dish in *both* planes. In the case of dipole feeds there is little control over the beamwidth of the feed, especially in the E-plane, and the overall gain of the aerial usually suffers significantly as a consequence.

The first section of this article presents a straightforward method of designing feeds for dishes of medium and long focal length, and this is followed by examples of practical designs. In later sections two methods are given for designing shaped sub-reflectors which enable horn feeds to be used with dishes of short focal length; this is an alternative approach to the use of dipole and similar feeds with their associated disadvantages.

## Basic design data

The characteristics of a perfect paraboloidal dish can be specified by two factors only. The first is its diameter  $D$ , using the notation of Fig 1, which determines the potential gain of the aerial at a particular frequency. The second is the ratio of its focal length to its diameter,  $f/D$ , which is the fundamental factor determining the design of a suitable feed. This factor is of course related directly to the angle subtended by the rim of the dish at its focus, and therefore also to the beamwidth of the feed necessary to illuminate it efficiently. Two dishes of different diameter but having the same  $f/D$  ratio can employ identical feeds. Dishes having the same diameter but different focal lengths can require quite dissimilar feeds. For a perfect dish,  $f$  is equal to  $D^2/16c$  and  $f/D$  to  $D/16c$  where  $c$  is the depth of the dish at its centre. Practical values for  $f/D$  usually range from 0.25 for a focal plane dish up to 1.0 for one of long focal length.

The dimensions of a pyramidal horn feed as a function of the  $f/D$  of a dish are given in Fig 2. These were derived using the procedure given in an earlier article [1], and are based on an edge illumination of 10dB down on that at the centre, a value appropriate for amateur usage. The relationship between beamwidth and horn dimensions which was necessary in compiling Fig 2 was obtained from [2]. It is

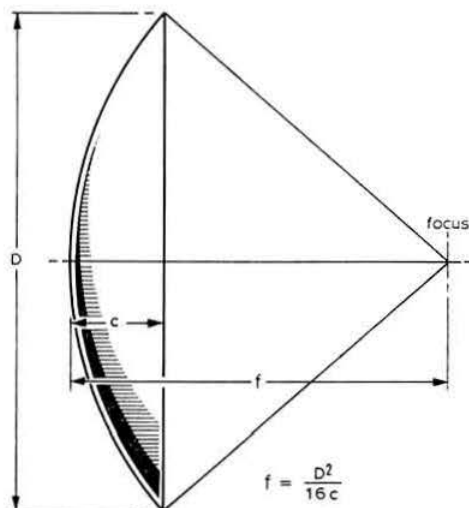


Fig 1. Basic parameters of a paraboloidal dish

believed that this data was determined experimentally: it was noted in the earlier article that when the aperture of a horn is less than  $2\lambda$ , as is usually the case with feeds, then simple design theory breaks down.

The dimensions of the feed are given in terms of wavelength at the frequency of operation, the actual dimensions, of course, being obtained by multiplying the values of  $A/\lambda$  and  $B/\lambda$  by the wavelength in air at the design frequency. The minimum length of the horn  $L$  (as defined in Fig 2) must exceed the value  $A^2/\lambda$ ; normally this presents no problems. Selected values of  $\lambda$  are given in [3].

It can be seen from Fig 2 that as the  $f/D$  ratio of the dish is reduced, so the aperture of the horn decreases. The limit of the present design data is first reached with the  $A$  dimension at a value of  $A/\lambda$  equal to 0.8, which corresponds to a minimum  $f/D$  ratio of 0.48. Although there are various techniques for reducing the effective aperture of the horn, thereby enabling dishes having a smaller  $f/D$  ratio to be properly illuminated, the design of each feed must be determined experimentally, with the added difficulty that the beamwidth becomes very sensitive to small changes in dimensions: for examples see [4] and [5]. A lower limit for the  $f/D$  ratio at 0.48 therefore becomes something of a practical limit for the many microwave enthusiasts who do not have access to the appropriate test equipment. However, as shall be seen in a later section, methods are available for increasing the effective focal length of a dish which enables the advantages of horn feeds to be enjoyed even with dishes of short focal length.

\* 4 Upper Sales, Chaulden, Hemel Hempstead, Herts.



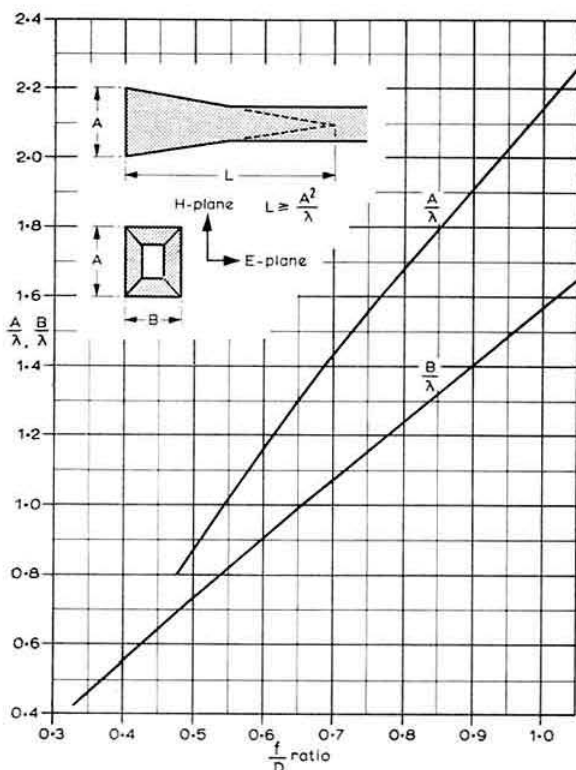


Fig 2. Relationship between horn feed dimensions and focal length/diameter ratio of a dish

### Practical horn designs

A distinction must be drawn between the higher and lower microwave bands. At 24GHz, 10GHz and probably 6GHz, the horn will normally be fed by a waveguide, since the loss of even high-quality coaxial cable is significant. The horn feed will therefore consist of a length of waveguide, almost certainly of a standard size which matches that used in the rest of the system, the open end being flared in one or two dimensions to produce the beamwidth of radiation necessary to illuminate the dish efficiently. On the lower bands, 1,296MHz, 2,304MHz and 3,456MHz, the feed will almost certainly be fed via coaxial cable rather than waveguide. The horn in this case will therefore include a waveguide/coaxial cable transition in its design. The waveguide may be of a standard size (but need not be) and advantage of this may be taken to facilitate the construction of the transition. This will be covered in a later article.

As an example of the design of a horn for a particular dish, take a dish of diameter  $D = 36$ in, of depth  $c = 4.26$ in for use at 10,050MHz for which  $\lambda = 1.174$ in. The focal length  $f$  is given by  $D^2/16c = 19.0$ in and the  $f/D$  ratio is therefore 0.53. From Fig 2 the following values are obtained:

H-plane aperture  $A/\lambda = 0.96$ ;  $A = 0.96 \times 1.174 = 1.127$ in  
E-plane aperture  $B/\lambda = 0.78$ ;  $B = 0.78 \times 1.174 = 0.916$ in  
and  $L \geq A^2/\lambda = 1.08$ in.

At this frequency, a suitable waveguide is No 16, [3]. The

practical configuration of this design of horn is shown in Fig 3. Note that the length of the taper greatly exceeds the minimum value of  $L$  specified above.

By the same process of design, a horn feed for any dish of the same  $f/D$  ratio but for 1,296MHz (for which  $\lambda = 9.10$ in) would have an aperture of 8.74 by 7.10in, tapering to 6.5 by 3.25in if WG6 were used, and one for 24GHz (for which  $\lambda = 0.4918$ in) would have an aperture of 0.472 by 0.384in, tapering to 0.420 by 0.170in (WG20).

There is a special case of horn design in which the  $A$  dimension is made equal to the broad internal width of the waveguide. This means that the horn need be flared only in one direction, which considerably simplifies its manufacture. However, such a horn can only be used with a dish of a particular  $f/D$  ratio. For example, the  $A$  dimension of WG16 is 0.9in, which is equivalent to an  $A/\lambda$  at 10,368MHz of 0.79. Reference to Fig 2 shows this value to correspond to an  $f/D$  ratio of 0.48.

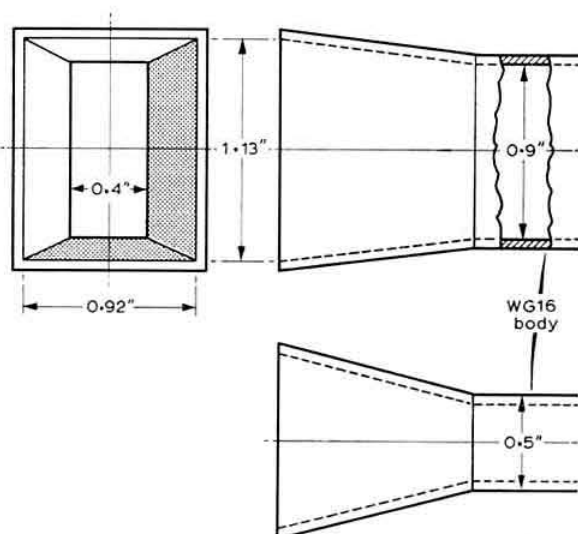


Fig 3. Horn design for use at 10,050MHz with a dish of  $f/D$  ratio of 0.53

### Dish/feed arrangements

#### Direct feed

This common method of feeding a dish is shown schematically in Fig 4. The horn lies along the axis of the dish and points directly at its centre. The only adjustment necessary is the distance from the horn to the dish; the horn is therefore mounted in a bearing which is supported from either the dish or its support structure. A practical version is shown in Photo 1.

If the phase centre of the horn, that is the point source from which radiation is assumed to emanate, were accurately known, then it could be made to coincide precisely with the focus; since it is not, the position of the horn is made adjustable within perhaps  $\pm 5$  per cent of the focal length of the dish. An approximate position of the horn can be obtained by making a scale drawing of the system and by arranging that the end of the horn intercepts lines drawn from the focus to the rim of the dish, as shown in Fig 4.

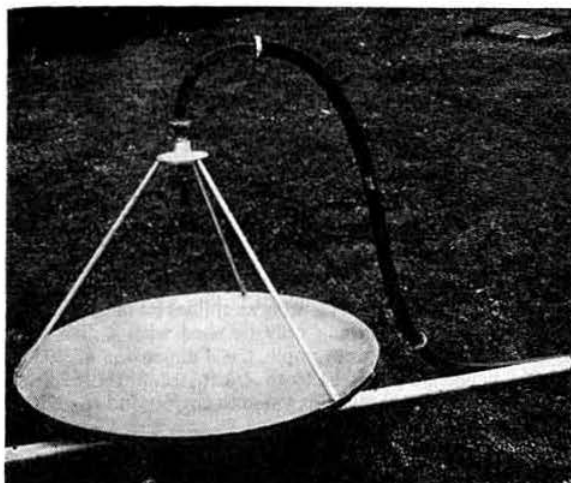


Photo 1. Practical version of direct feed arrangement

The main advantages of this method of mounting the feed are its simplicity in conception and construction, its high efficiency, and also that it leaves the back of the dish clear. Mounting a dish accurately with respect to its support structure is obviously simpler if it is mounted symmetrically, and with high-gain aerials having a beamwidth of perhaps a degree or two this becomes a significant advantage.

The main disadvantage of this method is the bulkiness of the feed support structure with dishes of long focal length. However, if the structure is well engineered it should be possible to demount it and, after transportation, re-assemble it without affecting its alignment. If equipment is to be mounted behind the dish and fed by waveguide, an awkward run is required.

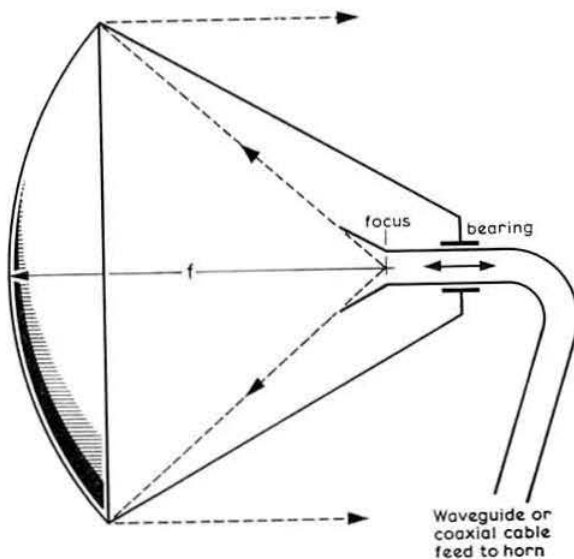


Fig 4. Schematic form of direct feed arrangement

### Rear feed

This method is shown schematically in Fig 5. The horn is mounted from a bearing in the centre of the dish, and radiation is reflected by a sub-reflector back on to the dish. The phase centre of the feed is placed at the virtual focus of the dish, which is the real focus as reflected by the sub-reflector. For dishes of medium and long focal length, which is the case considered in this section, a plane sub-reflector can be used. Under these conditions, the horn "sees" a virtual dish having the same  $f/D$  ratio as the real dish, and therefore the design of the horn feed is done using this ratio as described earlier.

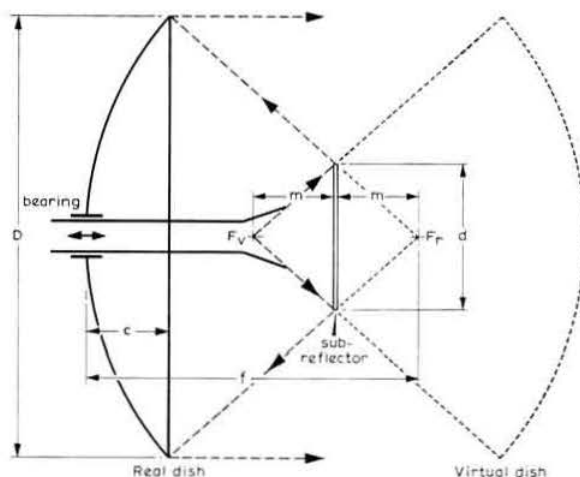


Fig 5. Construction used in designing a rear feed system

The diameter of the sub-reflector should preferably exceed  $5\lambda$  in diameter, at which value the loss in gain due to diffraction around the rim will be less than 0.5dB. However, when small dishes are used at lower frequencies this size may be impractical. Typical diameters used range from a third of the diameter of the dish for small dishes to a tenth for large dishes. If anything, the reflector can be made on the large side as its effect in obscuring the dish is surprisingly small—about 1dB loss for a reflector/dish diameter ratio of 0.3.

Once the diameter of the sub-reflector is fixed, then its position is also fixed; the rim of the reflector must intercept lines drawn from the real focus  $F_r$  to the rim of the dish. Its position can be calculated from the relationship:

$$m = \frac{d}{D} (f - c)$$

using the notation of Fig 5.

The position of the virtual focus  $F_v$  is the same distance in front of the reflector as the real focus is behind.  $F_v$  then defines the position of the phase centre of the horn feed.

The rules given above presume that optical theory is obeyed precisely, which is not quite the case. For reasons given earlier it will be necessary to adjust the position of the horn relative to the reflector. It may also be necessary to move the reflector closer to the dish by up to  $\lambda/4$ , and the diameter of the reflector should preferably be made slightly oversize to ensure that it still intercepts lines drawn from the real focus

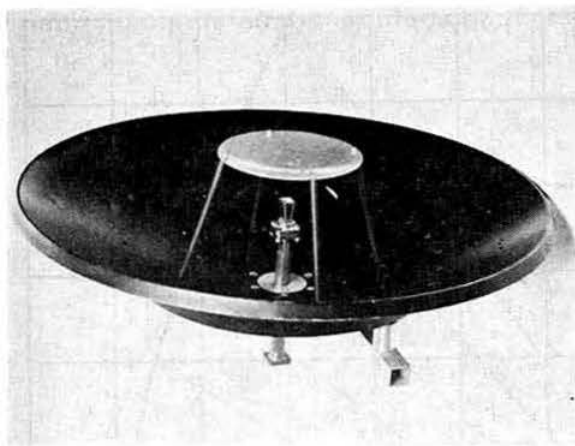


Photo 2. Practical version of rear feed arrangement

to the rim of the dish when in this position. It is well worthwhile making a scale drawing of the proposed aerial system, both to help in the basic design and also to avoid the easily overlooked factors, such as the positioning of flanges, which may affect the range of adjustment of the horn and reflector.

A common method of mounting the reflector is from support rods bolted to the dish. As these rods are in the strong field of the aerial, they should preferably be made from an insulator such as Tufnol. If the support rods are made equal in length, and mounted symmetrically on both reflector and dish, then the assembly is to a large degree self-aligning. An example of this construction is shown in Photo 2. A practical tip is to use four support rods rather than three; if all four fit accurately, then it will be almost certain that the reflector is well aligned.

With the above method, the position of the reflector is fixed and independent of adjustments to the feed. A second method is to mount the reflector from a sliding bearing on the waveguide run to the horn. In this case the position of the reflector will have to be adjusted as the feed is moved in and out in order to maintain its position correctly with respect to the dish. This process becomes less critical if the reflector is made slightly larger than strictly necessary.

The main advantage of this method is that the support structure is less bulky than when the direct feed is used, and that the rear feed is more convenient if waveguide equipment is to be fitted behind the dish. If the reflector is removed, then the horn itself may be used as a low-gain broad-beamwidth aerial. The disadvantages of the rear-feed arrangement are that the dish support structure must be designed to avoid the feed, and an extra component—the sub-reflector—needs to be aligned accurately, which complicates construction and setting up.

### Horn feeds for short focal length dishes

The methods given above for the design of simple aerial systems are limited to dishes having an  $f/D$  ratio exceeding 0.48, for the mundane reason that systematic design data for the beamwidth of very small horns are apparently not available. A method of avoiding this limitation, at the expense of some complication, is described below.

It was pointed out in the previous section describing the rear feed method that the horn "sees" a virtual dish which, because the reflector is plane, has the same  $f/D$  ratio as the real dish. If, however, the reflector is suitably shaped, the virtual dish the horn "sees" can be made to have a focal length either greater or smaller than the real dish. In the Cassegrain system, the reflector is a hyperboloid, and in the Gregorian system, elliptically shaped. In this article only the Cassegrain system will be considered as the Gregorian appears to offer no special advantages.

Two methods are given below for determining the precise shape of the reflector required. The first is an elegant graphical method due to G3HWR, which is a recommended first step even if the second method is preferred, that of calculating the profile of the reflector directly. The second method produces results in a form specially suited for machining the reflector from solid material. Both methods will be described as a series of steps using a worked example as a guide. If a calculator is used, par time for both methods is about 30min.

### Graphical method

The notation to be used is given in Fig 6. Suffices of  $r$  or  $v$  are used to distinguish parameters associated with the real and virtual dishes respectively. The completed construction, actually for an 18in dish intended for 24GHz operation, is shown in Fig 7.

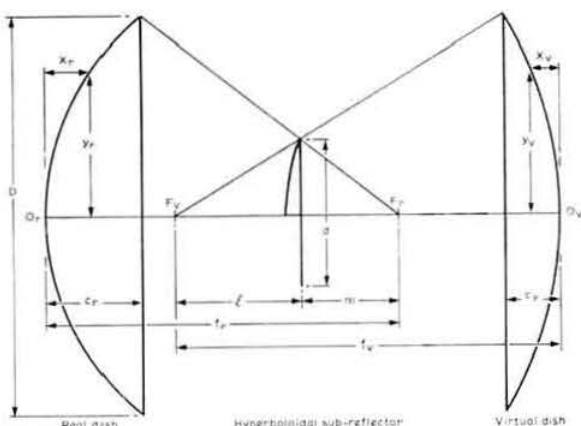


Fig 6. Notation used in the construction of hyperbolic sub-reflectors

(1). Measure the diameter of the dish  $D = 18$ in, and its depth  $c_r = 3.673$ in.

Then  $f_r = D^2/16c_r = 5.513$ in and  $f_r/D = 0.3063$ , ie well below the minimum value 0.48 for direct feeding by a horn.

(2). Calculate the profile of the dish for a reasonably large number of values from:

$$x_r = y_r^2/4f_r = 0.04535y_r^2$$

$\pm y_r(\text{in})$	$x_r(\text{in})$	$\pm y_r(\text{in})$	$x_r(\text{in})$
0	0	5	1.13
1	0.04	6	1.63
2	0.18	7	2.22
3	0.41	8	2.90
4	0.73	9	3.67

The value of  $x_r$  corresponding to  $y_r = 9$ in should, of course, equal  $c_r$ . Plot the profile on squared paper, as shown in Fig 7.

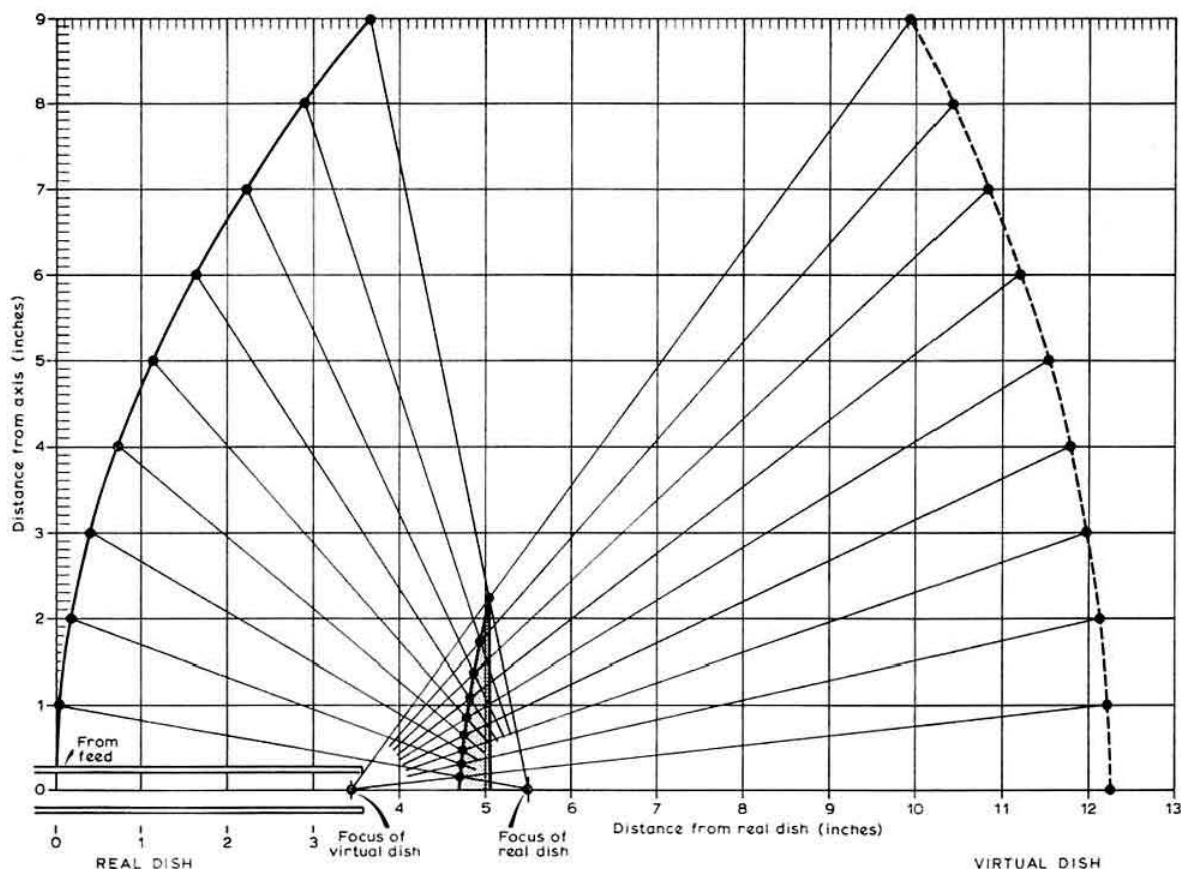


Fig 7. Example of graphical construction of hyperbolic sub-reflector

This profile may be transferred to card and used to check the accuracy of the dish, as well as the measurements and calculations.

(3). Select the ratio  $f_v/D$  for the virtual dish, the diameter of the reflector  $d$  and the position of the horn feed within the limits:

- The ratio  $f_v/D$  must exceed 0.48. Consider using preferred values corresponding to horns flared only in one dimension. No obvious upper limit.
- Diameter of reflector  $d$ : not critical, typical values of  $d/D$  being 0.1 for large dishes, up to 0.3 for small dishes.
- Position of feed: again not critical. The feed may even be fitted behind the dish, firing through a suitable hole, if more convenient. Allowance must be made for its adjustment.

When two of these three parameters are specified, then the third is defined.

In this example a horn feed for 24GHz based on WG20, and taking advantage of the special case where the horn is flared in the  $B$  dimension only, will be designed. Thus the  $A$  dimension of the horn will be the internal width of the waveguide, 0.420in, and  $A/\lambda = 0.420/0.4918 = 0.85$ . The  $f/D$  ratio corresponding to this value is obtained from Fig 2: 0.49. As the virtual dish has the same diameter as the real dish,

$$\text{then } f_v = 0.49 \times 18.00 = 8.820\text{in,} \\ \text{and } c_v = D^2/16f_v = 2.296\text{in.}$$

A reflector diameter  $d$  equal to 4.5in, which corresponds to a  $d/D$  ratio of 0.25, is selected. Then, in the notation of Fig 6,

$$m = \frac{d}{D} (f_r - c_r) = 0.460\text{in} \\ \text{and } l = \frac{d}{D} (f_v - c_v) = 1.631\text{in}$$

which values define the position of the reflector and feed point with respect to the real focus  $F_r$ .

(4). The origin of the virtual dish  $O_v$  with respect to the real dish  $O_r$  is given by  $f_r + f_v - l - m = 12.24\text{in}$ .

(5). Using the same values of  $y$  as in (2), calculate the profile of the virtual dish from the equation

$$x_v = y_v^2/4f_v = 0.02834y_v^2.$$

Plotting the curve is easier if the values of  $x_v$  are subtracted from the value for  $O_v$  determined in (4):

$\pm y_v(\text{in})$	$x_v(\text{in})$	$12.24 - x_v(\text{in})$	$\pm y_v(\text{in})$	$x_v(\text{in})$	$12.24 - x_v(\text{in})$
0	0	12.24	5	0.71	11.53
1	0.03	12.21	6	1.02	11.22
2	0.11	12.13	7	1.39	10.85
3	0.26	11.98	8	1.81	10.43
4	0.45	11.79	9	2.30	9.94



The value of  $x_v$  corresponding to  $y_v = 9$  should, of course, equal  $c_v$ .

(6). Join each of the plotted points for both dishes to their respective foci. The points of intersection of lines corresponding to the same values of  $y_r$  and  $y_v$  then define the required hyperbola.

(7). Calculate the dimensions of the horn from the  $A/\lambda$  and  $B/\lambda$  values given in Fig 2 corresponding to the ratio  $f_v/D$  of the virtual dish. In the example the  $A$  dimension was originally specified as 0.420in; the  $B$  dimension =  $0.72 \times 0.4918 = 0.354$ in. The position of the horn can be determined approximately by drawing it as in Fig 7, so that the end of the horn intercepts the line drawn from the focus  $F_v$  to the rim of the virtual dish.

It is to be noted that while the construction given above refers to a particular set of parameters, it is rather more general in application than at first sight. First, if all the linear dimensions are scaled by a constant factor, then the geometry obviously remains unchanged; the construction is identical in form to all others having the same  $f_r/D$ ,  $f_v/D$  and  $d/D$  ratios. Second, the same construction also applies to any feed for any other frequency which is suitable for illuminating a virtual dish having the  $f/D$  ratio specified.

Not quite so obvious is that this particular construction holds for a range of related values of  $f_r/D$ ,  $f_v/D$  and  $d/D$ . If, for example, the parts of the construction corresponding to  $y_r$ ,  $y_v = 9$  are ignored, the same hyperbola will be generated, although smaller in size. It may be practical, therefore, to generate quite general design information rather more simply than one first supposes.

#### Mathematical method

This uses the notation given in Fig 6.

(1). Select or calculate values of  $f_r$ ,  $f_v$ ,  $d$ ,  $l$  and  $m$  as described above in steps (1) and (3).

(2). The equation of a hyperbola is

$$x^2 = a^2 + y^2/(e^2 - 1)$$

where  $x$  is measured from the midpoint between the real and virtual foci, and

$$a = \frac{(l+m)(f_v - f_r)}{2(f_v + f_r)} = 0.2412\text{in},$$

$$\text{and } e = \frac{(l+m)}{2a} = 4.334.$$

The equation of the hyperbola required is therefore:

$$x^2 = 0.05819 + 0.05623y^2$$

from which the following values may be calculated:

$\pm y(\text{in})$	$x(\text{in})$	$x - 0.241(\text{in})$	$\pm y(\text{in})$	$x(\text{in})$	$x - 0.241(\text{in})$
0	0.241	0	1.250	0.382	0.141
0.250	0.248	0.007	1.500	0.430	0.189
0.500	0.269	0.028	1.750	0.480	0.239
0.750	0.300	0.059	2.000	0.532	0.291
1.000	0.338	0.097	2.250	0.586	0.345

By subtracting the "zero" value 0.241 from each of the values of  $x$ , the  $x$  and  $y$  co-ordinates are in a form more suitable for plotting profiles for checking potential reflectors, or for machining a reflector from solid.

#### Practical reflectors

Both the graphical and mathematical methods for determining the shape of the reflector give data which are very precise in terms of a wavelength at amateur operating frequencies. Reflectors machined to these dimensions can readily be made accurate to within a few thousandths of an inch, which represents a maximum error in the region of  $\lambda/100$  even at the highest frequencies at present available. Clearly, such an error can be ignored, and the opportunity of having at least one part of the equipment virtually perfect should not be missed.

The question arises of how close the shape of the reflector must be to that of a perfect hyperboloid. A general rule applicable to dishes is that the peak error should be less than  $\lambda/10$  at the operating frequency. Perhaps a good guess for sub-reflectors is to reduce this value by the ratio of the real and virtual dishes,  $f_v/f_r$ , which factor may range from about 1.5 to 4. On this basis, if two curves are drawn parallel to the hyperbola as developed and spaced by this fraction of a wavelength, then any reflector having a profile which fits between these curves will be suitable. Obviously there will be a greater freedom of choice at lower frequencies.

The material used to construct the reflector need not be solid. Wire mesh can be used provided that the maximum dimension of the holes is less than  $\lambda/10$ . Alternatively, the reflector can be built up from wires bent to the correct shape, provided that the gap between them is again less than  $\lambda/10$ . Note that the shape of the wires remains the same even if positioned away from the axis of the reflector: only one former to shape the wires is required.

#### References

- [1] *Radio Communication* April 1972, p229.
- [2] *Reference data for engineers* 5th ed, 1972, pp25, 37.
- [3] *Radio Communication* December 1973, p858.
- [4] *Radio Communication* July 1971, p467.
- [5] *MIT Radiation Laboratory Series*, Vol 12, p381.

## NEW BOOK

#### "Electronics", by L. W. Owers, CEng, MIERE

Sub-titled *An elementary introduction for beginners*, this book is intended to provide an introduction to basic electronics for those meeting the subject for the first time. The approach is essentially non-mathematical and diagrams are extensively employed. Where formulae and units are introduced, SI units are employed. The book provides an explanation of many basic items including atoms, energy, waves, insulators, semiconductors, types of components and their applications. Valves and semiconductors and their applications to radio and television are also covered.

The book contains 120 pages (8½ by 5½in), and has more than 100 illustrations and photographs. It is perfect bound in a durable linen finish of paperback style. Copies are obtainable from Publication Mailing Services, PO Box 6, Crawley, Sussex RH10 6LH, price £1.45 (including postage and packing).

In the reviewer's opinion this book would be worthwhile supplementary reading for those attempting the Radio Amateurs' Examination for the first time.

# Use of amateur transmitting equipment by blind people

by T. ROBINSON, BSc, G3WUX\*

*Mr Robinson is the first totally blind person to obtain a BSc(Hons) degree in electronics in this country and he is also an active radio amateur. He is therefore one of the few people who not only know the problems of being a blind radio amateur from first-hand experience, but who are also formally qualified to offer some practical solutions to them.*

## Introduction

The proper use of amateur transmitting equipment under the terms of the licence may be considered from the following viewpoints: given that it is in good working order, it must be operated within the correct bands and power limitations; and it should be adjusted so as to realize its intended function efficiently, that is, it must provide a certain rf output for a given dc input power and generate a clean signal in the process.

It is the author's intention to describe devices which will assist the blind operator in carrying out these functions. These devices are relatively simple to design and build, and, where possible, are based upon the kind of test equipment which would normally be employed in an amateur transmitting station. In principle, the only difference is that the read-out must of necessity be of either a tactile or audio nature. Since the construction of robust, and yet highly sensitive, mechanical instruments tends to be difficult, the latter form of read-out is preferred.

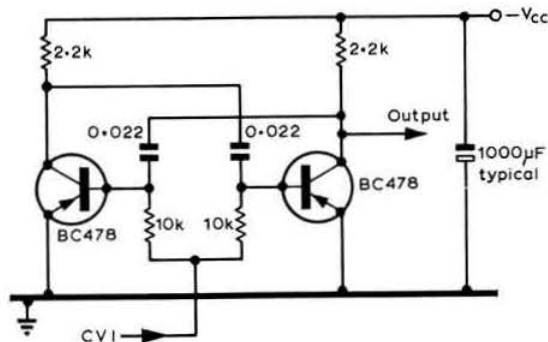


Fig 1. Circuit of vco with logarithmic frequency/voltage characteristic

The human ear is remarkably sensitive to changes in frequency of an audio tone, and this is utilized in the following way. The basic instrument produces a dc voltage which corresponds to the instantaneous magnitude of the parameter being measured. This voltage is then applied to the control voltage input (cvi) of a voltage-controlled oscillator (vco), the frequency of which varies according to the magnitude of the applied voltage. Many vco circuits exist, but two of the simplest are shown in Figs 1 and 2. Each circuit has advantages in particular circumstances, some of which will be outlined below.

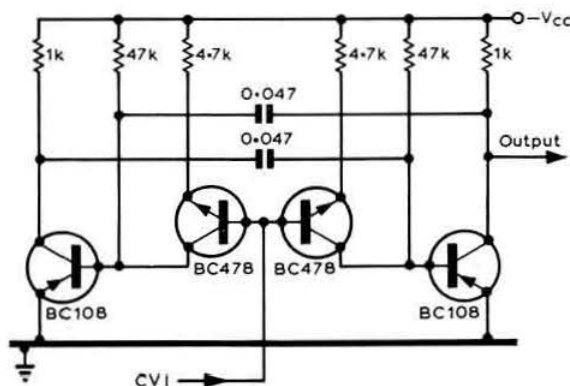


Fig 2. Circuit of vco with linear frequency/voltage characteristic

## Meeting licence requirements

The procedure for frequency measurement requires little elaboration here; the most convenient method in this case entailing the use of a crystal calibrator. This may most usefully be based on a 1MHz crystal, which may subsequently be divided by 1, 2 and possibly even 3 decades if so desired. This should be adequate for most purposes. It should also be possible to remove the protective cover from the frequency scale of conventional receivers and transmitters in order to modify the scale to provide a straightforward tactile read-out, though this is unlikely to have sufficient advantages over the calibrator method to make this rather tedious process worthwhile. One must, of course, be capable of checking the frequency content of the transmitter output with an absorption wavemeter and the relatively simple instrument recommended for this purpose is described later.

Measurement of dc input power should be very simple in principle, as we may assume the relevant ht voltage to be substantially constant. The pa anode current is therefore the only variable, and the measurement of this quantity is discussed in detail in the following section.

## Transmitter adjustment and tuning up

Before this is satisfactorily achieved, the following five questions must be answered:

1. What is the dc power or anode current to the pa?
2. For this input, is the correct rf output being generated?
3. Of which frequency or frequencies does this output consist?
4. Is a clean signal being radiated?
5. Is the drive to the pa sufficient to sustain efficient operation?

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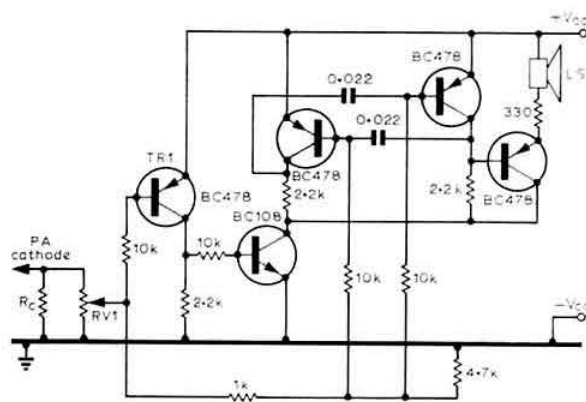


Fig 3. Circuit of pa cathode current meter

The answer to question 5 may be deduced directly from the other four. For this reason, although it is a consideration of fundamental importance, it has been left to the last.

### 1. DC input power

Fig 3 shows the circuit diagram of an instrument very similar to that currently in use in the author's station. Since all amateur transmitters operating in the hf bands are tuned up with considerable attention being paid to anode current, it is felt that an instrument of this nature should be employed by every blind radio amateur who operates on such bands. The value of the cathode resistor  $R_c$  must be such that a sufficiently high voltage is produced when the desired anode (cathode) current is being drawn, about 4.3V in this case. In practice one should ensure that it is slightly greater than this value to give the desired result.  $R_c$  should consist of at least four resistors to ensure against fracture, since were the cathode to become open-circuit the anode potential would be applied to the instrument. Care must be taken, however, to ensure that the voltage drop across  $R_c$  is not sufficient to disturb the bias conditions of the final stage. Voltages of the order of 4.5-5.0V should be adequate for most cases, but if this is found to create difficulties, then a lower voltage must be generated at the cathode and subsequently amplified to a

useful value. This principle may also be applied to solid-state equipment where the bias conditions are far more critical.  $R_c$  must be non-inductive and be capable of dissipating 2W. It must also be well decoupled, both at the cathode and instrument end of the meter lead, to ensure the correct operation of the pa and also to prevent rf interfering with the meter reading.

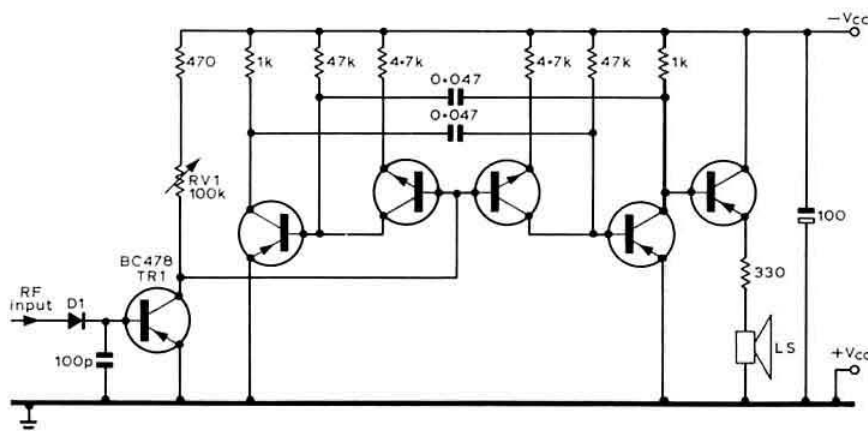
The vco frequency falls with increasing pa current in this case and it will be noticed that the vco of Fig 1 is used, since this gives a logarithmic frequency/voltage characteristic. The advantage of this arrangement is that the instrument is most sensitive near cut-off. If one prefers to have increasing vco frequency with increasing pa current, a simple substitution of npn as opposed to pnp transistors in the vco would achieve this. The possibilities are many and this circuit has proved to be more sensitive than (and can therefore be adjusted to be as accurate as) the meter on the front panel of the transmitter (within two per cent). It is considered that this is adequate for all amateur purposes.

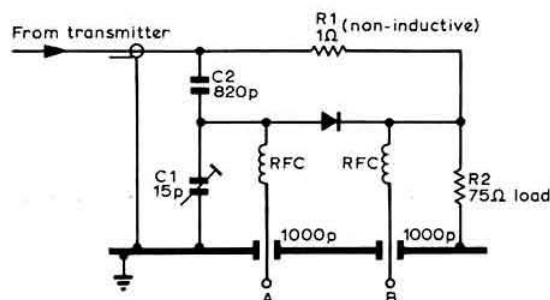
### 2. RF output power

Measurement of rf output power may prove technically difficult. Indication of rf field strength is, however, very easily accomplished by means of the circuit shown in Fig 4, although the tuning up of a transmitter using the information supplied by this indication alone has certain well-known drawbacks (which also arise in the answer to question 3). It is not only necessary to supply an indication of the presence of an rf field but also to know where this field is coming from before the information conveyed by such an indication is of any value. In other words, it must be ascertained how much rf is present outside and not inside the shack. Either the instrument as a whole, or possibly just the rf detector, must be placed as near to the aerial as is conveniently possible. Providing the information obtained from this is reliable, then the condition of optimum match of aerial to transmitter should be inferred directly from the rf field strength, though the author, along with many others, has little confidence in this approach.

Some means of either measuring the vswr present on the aerial feeders directly or ascertaining the condition of minimum vswr must be found. The latter aim should prove technically easier to realize. This is a topic on which little work has been done hitherto, but it is suggested that the

Fig 4. Circuit of rf field strength indicator





**Fig 5. Circuit of proposed swr indicator. Points A and B are connected to the vco through a sensitivity control and differential amplifier**

circuit shown in Fig 5 may be of interest. The bridge circuit consisting of R1, R2, C1 and C2 is arranged so that it is balanced when R2 represents the aerial or dummy load. Any mismatch results in a potential difference between A and B, this potential difference being always of the same sign, owing to the presence of the diode. The conditions of minimum vswr should become obvious on application of this voltage to the cvt of a vco.

Obviously, problems would be encountered concerning the measurement of vswr but the author is sure that the condition representing a *minimum* vswr can be discerned over a wide range of rf output power and circuit conditions. Of course, if the aerial in use has been previously found to be of the correct impedance, and conditions are kept constant, ie no ATUS etc are used, then the correct loading conditions should be produced as a direct result of the normal tuning-up procedure. Any faults which may have arisen should become apparent whilst this operation is in progress.

### 3. RF output frequency

The simple rf field strength indicator of Fig 4 may be modified as shown in Fig 6. This instrument should perform all the functions of the normal absorption wavemeter, from the alignment of low-power multiplier stages of vhf transmitters to checking the frequency content of the output from the pa. Although in principle this device could replace that of Fig 4 entirely, the necessary changing of coils when changing

bands may prove rather tedious if the pick-up loop of the instrument is to be placed near to the aerial. It therefore seems likely that the roles of the two devices should be complementary. It will be noticed here that the vco of Fig 2 is employed. This is done to provide a high input impedance to the vco by the use of the emitter-follower stages, this being in the interest of increased instrument sensitivity when RV1 is at its maximum value. Some provision must also be made to overcome the forward voltage drops of the base-emitter junction of TR1 and the diode D1. Note that this is not catered for in the circuit of Fig 4 where much higher field strengths should be involved.

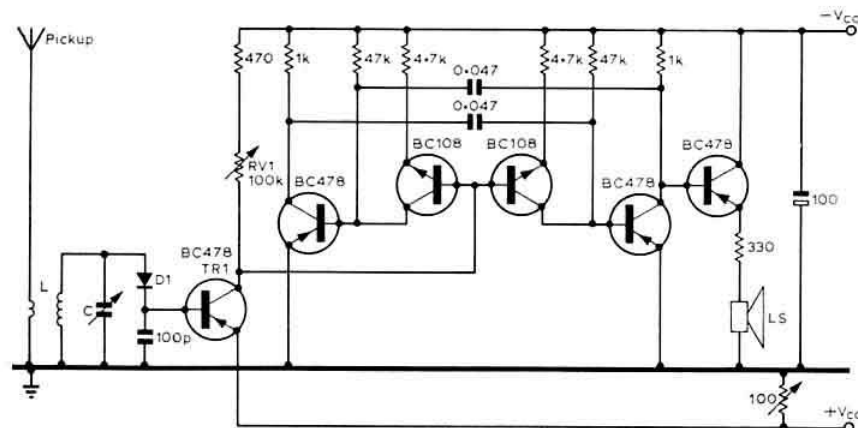
### 4. Quality of signal radiated

The author is almost exclusively a cw operator and his experience in this field with regard to sssb, which he very rarely uses, is therefore somewhat limited. It appears that there are two possibilities: either monitor the radiated signal on the receiver if possible, or collect critical reports and take whatever action seems appropriate. Of course, the best way of all is to observe the behaviour of the signal waveform on an oscilloscope. Although the author is currently designing an oscilloscope which provides an audio read-out, this work is not yet complete enough to attempt to apply to amateur radio the seemingly encouraging results already obtained.

### 5. Drive to the pa

When dealing with Class C stages, sufficient grid drive must be supplied to derive the recommended rf output. In the author's experience the conditions for optimum operation may be deduced from the behaviour of both the anode current and rf output indicators. The rule-of-thumb which is adopted is to increase the grid drive just past the point where both the anode current and rf output are substantially constant for any small changes of grid drive. This is perfectly satisfactory for cw and a.m., but when dealing with sssb linear amplifiers some refinement would be desirable. Fortunately, as mentioned previously, the correct drive level may be established during the tuning-up procedure according to the behaviour of the transmitter while this is in progress.

The "peaking up" of the earlier stages of a transmitter may frequently be achieved with reasonable result by monitoring the rf output on the appropriate indicator or simply listening to the netting signal on the receiver. This approach has been



**Fig 6. Circuit of absorption wavemeter with vco indication**



found quite useful when tuning up vhf equipment. Alternatively, the grid drive may be measured in a manner similar to that described for anode current, though some relatively simple modifications to the circuit would be required. It will prove far more convenient, when dealing with vhf transmitters, for instance, to connect all the necessary test points to a rotary switch, the wiper of which can then be connected directly to the control voltage input of a vco. This latter approach is technically more correct since it does not rely on the initial presence of an rf signal.

## Conclusion

This article has attempted to outline some of the problems encountered by blind radio amateurs while using transmitters and to offer some solutions, most of which have been tried with reliable results. The author would, of course, be very interested in any constructive suggestions which anyone else might make concerning this matter, with a view to making full information on the most promising solutions readily available to any blind radio amateur who may require assistance in this respect. □

# Learning about logic

by P. J. HORWOOD, G3FRB\*

WHEN the author was young, the RCA receiving and transmitting valve manuals were virtually compulsory reading and many older members can probably still recall the salient features of a 59 or an 808 without much effort. Transistors are now accepted devices but the types available are so numerous that no-one could be expected to learn the handbooks by heart as was certainly possible with valves. On the other hand, a younger generation exists to whom the SN74 ttl integrated circuit range is as familiar as UX and octal-based valves were to their seniors 35 years ago.

Consider the price differential: a hard-earned 6/- for a Triad 6L6 and a mere 15p for an SN7400! Of course the functions are not the same, but at recent prices what experimentally-minded amateur can afford to deny himself access to modern technology because he lacks the necessary knowledge?

Many RAE courses are organized nationwide but very few follow-on classes are arranged; for, unlike the USA, we have only one technical grade of licence. Normal City and Guilds technicians' courses are not particularly suitable for the radio amateur seeking to expand his more practical knowledge. The need is obviously great, and the author would be pleased to hear from members seeking such a course or contemplating organizing one. Possibly a syllabus more advanced than the RAE could be agreed nationally.

For a number of years the author has been responsible for training overseas technicians in servicing modern advanced radio communication equipment. Often this requires instruction in ssb and related modes, semiconductors from diodes to ics, and, to allow full understanding of the latter, binary maths, binary logic and Boolean algebra etc. Only after all this can a divide-by-N frequency synthesizer be comprehended.

The technicians of today must really understand how circuits operate; the days of fingers on grid caps are long gone. How can one become familiar with gates and flip-flops? The devices are cheap enough, and a sheet of 0-1in matrix Veroboard provides convenient connection, but there is something final about soldering in an ic. Sockets are available, but interconnections must still be soldered; Cambion make excellent plug boards, much used by design engineers

for experimental work, but the resultant circuit is too small for classroom demonstration.

The author has solved the latter problem by employing Logic Tutors, manufactured by Limrose Electronics Ltd of Altrincham, Cheshire. These come in two sizes, the smaller more suitable for individual student experiment, and the larger excellent for demonstration to classes of twelve or more. A sturdy aluminium extrusion and sheet case carries a mimic diagram socketed with inputs and outputs connected to a large pcb to which are soldered normal dual-in-line ics.

The Combinational Logic Tutor is fitted with 18 gates: ANDs and ORs, NANDs and NORs, and NOTs. Sockets for logic 0 and 1 are provided, as are lamp drivers and lamps to illustrate logic conditions. Supplies can be mains powered but the author prefers the greater portability of the internal battery versions. Switches allow input levels to be 0 or 1. Operation of the different types of gates is rapidly learnt by actual demonstration and, of course, combinations of gates can be interconnected to make adders, flip-flops, exclusive-OR gates and even a master-slave JK flip-flop. When fully connected, the latter is quite a rat's nest!

More ambitious experiments can be carried out with the Sequential Logic Tutor, which contains four master-slave JK flip-flops with set and clear; six three-input NAND gates, a bounce-free hand pulsing button and an internal clock running at 4Hz. Each flip-flop has a logic state lamp connected to the Q output, and if more logic state indicators are needed those on the Combinational Logic Tutor can be readily interconnected.

Many types of counters can be constructed, from simple ripple-through binary to programmable synchronous types. For the ambitious, a counter may be designed from next-state tables and Karnaugh maps and made to work by appropriate interconnections.

Excellent as these tutors are, they are not for the individual to purchase, as they cost about £35 for the smaller sizes and £75 for the classroom versions. They are, however, highly recommended to go-ahead clubs who have a training programme and they are essential to any advanced amateur radio course. They are fascinating devices and learned engineers have been known to play with them for hours. If JK action, for example, is not really understood it certainly will be after five minutes with a Limrose Tutor. □

\* 14 Main Road, Hextable, Swanley, Kent.



# Room for improvement

by B. PRIESTLEY, G3JGO\*

## Introduction

SSB equipment for the amateur market is, like most consumer electronics, a compromise between price and what the average customer is prepared to accept. Often the performance can be much improved for a particular application by a trivial modification. On the other hand, some pieces of equipment are not designed with the UK amateur in mind. This article contains some pointers for the discriminating amateur. If the manufacturers "read, mark, learn and inwardly digest", so much the better.

## Neutralizing

Most hf transmitters use the form of capacitance bridge neutralizing shown in Fig 1. This must work reasonably effectively over the range 1.8 or 3.5 to 29.7MHz, and so the capacitors must be sensibly free of inductance, otherwise the bridge balance is frequency dependent. A practical value of C2 is 680pF, which will series resonate with  $\frac{1}{2}$ in wires at about 55MHz. At a third of this frequency the effective capacitance will be 10% above its low-frequency value, ie at 18.33MHz, so that at 21 and 28MHz the neutralizing will be falling off in effectiveness. This will show up as a "liveliness", particularly if the load swr is not perfect, and also as distortion on (and around!) the transmission. If, however, C2 is not a wire-ended capacitor, but a feed-through bypass capacitor, strategically located, its resonant frequency can be raised to 90MHz or so, which will considerably improve the situation.

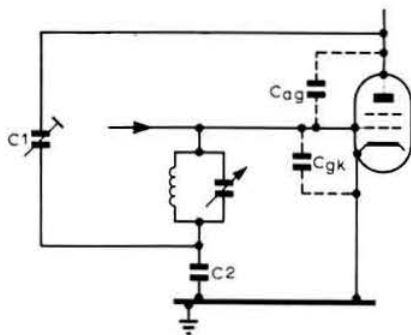


Fig 1. Capacitance bridge neutralizing circuit

## Crystals

Reasonably-priced quartz crystals have an accuracy of 0.05%, ie  $\pm 500\text{Hz/MHz}$ , and even expensive ones are no better than  $\pm 50\text{Hz/MHz}$ . In frequency conversion crystals this order of error can be taken out by shifting the vfo, but

in the case of carrier crystals the result can be a serious shift of the transmitted audio spectrum. This sort of error can be detected on a transceiver by tuning to a quiet spot, say on 28MHz, increasing the af gain for a sensible noise output from the loudspeaker and then changing sidebands. If the pitch of the noise changes appreciably at least one crystal frequency is wrong. If this is the case, the addition of a 25pF trimmer across the crystal (in a transistor circuit 40pF in series) will permit the error to be trimmed out. If possible, a frequency counter should be begged or borrowed and the frequencies trimmed to their specified values. If this is not possible, or as an additional check, tests should be made with a local amateur and both sidebands trimmed until they give a reasonably faithful voice reproduction. It should be ascertained whether his sideband crystals are correct or not first! (Note that 455kHz mechanical filters are a special case as the centre frequency and hence carrier frequencies can vary. See chapter 10, *Radio Communication Handbook*).

## Spurious outputs

According to many textbooks, the output of a mixer when fed with frequencies  $f_1$  and  $f_2$  is  $f_1, f_2, f_1 + f_2$  and  $f_1 - f_2$  and nothing else. Unfortunately, this is not the whole truth, for in addition to the above there are outputs of type  $3f_1 - 2f_2, 4f_1 + f_2$  at lower levels than the desired output. As an example of the importance of this, suppose it is required to transvert from 3.7MHz ssb to 1.9MHz. By simple arithmetic a crystal at either 1.8 or 5.6MHz is needed and the latter would probably be chosen to avoid 1.8MHz accompanying the 1.9MHz output. However,  $2 \times 3.7 - 5.6 = 1.8\text{MHz}$ ! This would be highly distorted since the level of this spurious output is proportional to the square of the 3.7MHz ssb and is about 30dB down, depending on the "goodness" of the mixer.

This is by no means an academic example, as such a device can be found in the *ARRL SSB Handbook*. (It should be interesting explaining to the Home Office that CQ was not really being called on 2,182kHz!) It does, however, give an idea of the difficulties of designing a transmitter with spurious outputs generally within the CCIR specification as required by the licence, and much further reduced where they can cause trouble.

As a second example, the Sommerkamp FL200 and FL500 will be considered, with the frequency line-up shown in Fig 2. Fairly obviously, on the 21MHz band there is a spurious output in the first mixer at  $2 \times 17.4 - 9 = 25.8\text{MHz}$ , only 600kHz away from the desired 26.4MHz. This is difficult to attenuate by filters. However, at 28MHz the second mixer's unwanted outputs are particularly unpleasant in the UK. As well as the desired 28MHz, fairly strong outputs will occur at 33.4 and 38.8MHz. The standard 625 line tv i.f. band is 33-41MHz with the sound carrier at 33.5MHz and vision carrier at 39.5MHz! A worse way of generating 28MHz near the local tv set's unscreened i.f. amplifier would be hard to find. In Japan, of course, the tv i.f. band is much lower, so the problem did not arise.

These are particularly serious examples of trouble which can (and does) arise due to spurious mixer outputs: there are others. What can be done about them? The first and most obvious is to choose equipment designed with these points in mind. If the input frequencies to a mixer are in a simple ratio or thereabouts, there will be spurious outputs very close to the desired frequency, as in the two examples given, where the input frequencies are 3.7 and 5.6MHz (nearly 2:3) and

\* 43 Raymond Road, Slough, Berks SL3 8LN.

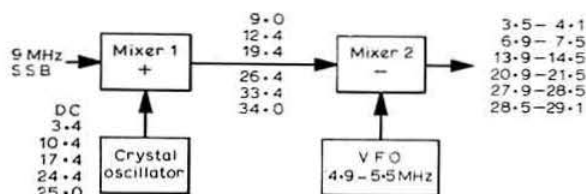


Fig 2. Frequency-conversion system in the FL200/FL500

17.4 and 9MHz (close to 2:1). Changing the first to 5.6 and 7.5MHz gives a ratio of about 3:4, still a fairly simple ratio but sufficient to reduce the spurious output near 1.9MHz by 20dB or so. Assuming that the starting point must be an amateur band, 28 and 29.9MHz gives the best ratio of 16:17, which would give negligible spurs in the 160m band.

The "goodness" of the mixer is not completely under the operator's control, but it is very important that the mixer supply and drive voltage are correctly set up—and this does not mean maximum available drive!

External filters can be used to reduce remaining spurious outputs well away from the working frequency. It would be well-nigh impossible to heavily attenuate the 33.4MHz output without some effect at 29.7MHz, but the same level of 33.4MHz output would present much less of a problem on the 21MHz band.

## Screening

The level of screening and lead filtering on transmitters varies from good to terrible. This may or may not matter to the reader, since it depends upon what is being received and its strength in the area. It is fashionable to blame all tv on badly designed tv sets and it is true that possibly 80 per cent is due to this cause. Of the remaining 20 per cent, however, a goodly proportion is caused by amateurs who do not realize that a flimsy metal cabinet with only the minimum number of screws to stop it falling to pieces and all the joints insulated with paint is almost useless as a screen, however beautifully it is painted. Another case of *caveat emptor*!

## VOX

A rather doubtful area of some transmitters is the voice control (vox) section. The delay is obtained by the discharge of a capacitor through a resistor in the grid of the relay valve. Sometimes the value of this resistor is as high as 10MΩ. This is almost certain to lead to trouble in the long

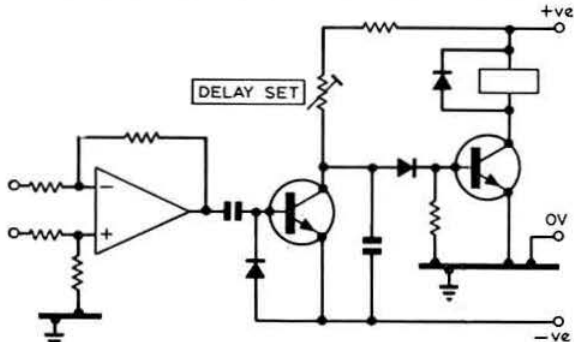


Fig 3. Transistorized vox rectifier and delay circuit

run, due to grid emission in the relay valve, which is probably rated for 1MΩ maximum!

The effect of grid emission current is a voltage drop across the grid resistor, which increases the anode current, which warms up the grid, which increases the grid emission, which increases the anode current... and so on. The result is that the vox relay becomes increasingly reluctant to open and eventually sticks firmly closed. A partial cure is to increase the value of coupling capacitor and reduce the resistor. A good low-leakage paper or plastic dielectric device of five to ten times the original capacitance should be used.

However, if one could start from scratch, the system shown in Fig 3 is better and, in these days of transistors, quite practical as an add-on unit. The important points are (a) the microphone and anti-vox voltages are subtracted before rectification, so that it is not necessary to shut down the receiver output to trip the relay and (b) the rectifier is a limiting amplifier, so the delay is independent of loudness.

## Transverter socket

Having started on the blue skies department there are several "if only"s. The first and most common lack is a means of extracting a few milliwatts of power to drive a transverter. All that is required is a socket coupled to the grid by a 5pF capacitor and some means of disabling the output amplifier, say a slide switch to disconnect the screen voltage. The socket could be matched to coaxial cable with an external coupling box (Fig 4). In W3PYW's article [1] this gave adequate drive for a 144MHz transverter through thirty feet of coaxial cable. While transverting to 144MHz, a facility for A3 would be useful (of course ssb is a better mode, but not when the other station does not have a bfo!). Screen modulating the output amplifier is possible, but it is useless if the amplifier is shut down. However, if the transmitter has alc, this is a possible way of modulating one stage in the drive chain. Audio can simply be fed in place of the alc feedback and grid modulation is obtained, at least sufficient to ask the other station if he has a bfo.

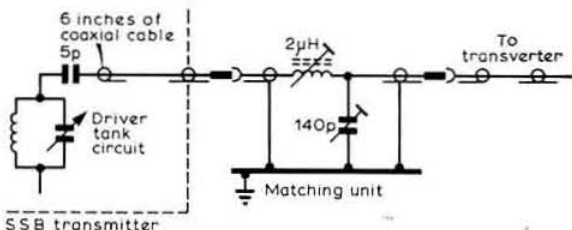


Fig 4. W3PYW's transverter coupling system

## Conclusion

The author is constantly amazed by amateurs who will apparently pay considerable sums of money for equipment without taking a look at what is inside the box. While most equipment is reasonable value for money, there is no reason to accept mutely what comes if it is unsatisfactory or unsuitable. If enough people ask for an improvement it will happen. Radio amateurs do know what they want. It is up to them to make it plain.

## Reference

- [1] "Mixing for two-metre vfo and ssb", W3PYW, *Single sideband for the radio amateur*, 3rd ed, ARRL. □

# The squashed multibander

by J. J. PHILLIPS, G3KSK\*

## Introduction

The configurations described below represent perhaps the shortest multiband  $\lambda/2$  dipole aerial design yet achieved. Several familiar ideas are brought together in a new way, these being as follows:

- (a) More than one  $\lambda/2$  dipole fed at a common point.
  - (b) The bending back of  $\lambda/2$  aerials up to  $\lambda/8$  from each high-impedance/high-voltage end [1].
  - (c)  $\lambda/2$  dipoles slung in parallel and with minimal spacing [2].
  - (d) The  $\lambda/4$  feed line-matching transformer.
  - (e) The pi-net range of impedance matching.
- To these, two new ideas are added:
- (f) Each end of the multiband  $\lambda/2$  dipole is guyed to a single point.
  - (g) No internal guying other than aerial lengths and terminating insulators is used.

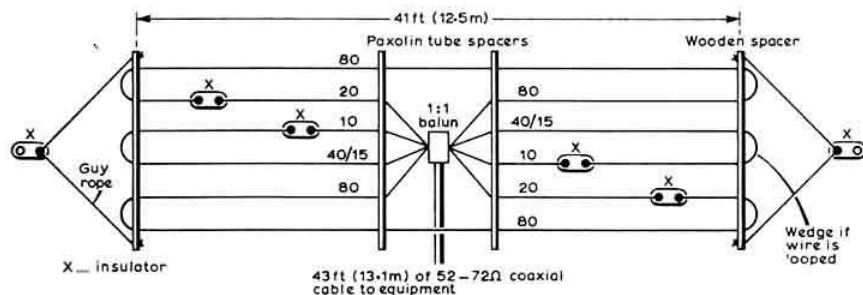
These seven ideas are brought together in Figs 1-3 and Table 1.

**Table 1. Values of  $\lambda/4$  for the five bands. Note that some adjustment of length may be necessary on 80m and 40m due to the effect of bending back on the resonance**

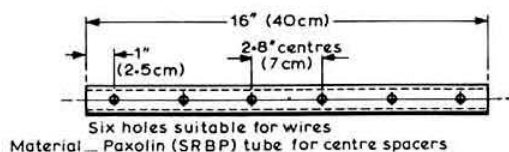
Band (m)	$\lambda/4$ (ft)	$\lambda/4$ (m)
80	66	20
40 and 15	33	10
20	16.5	5
10	8.25	2.5

## Construction

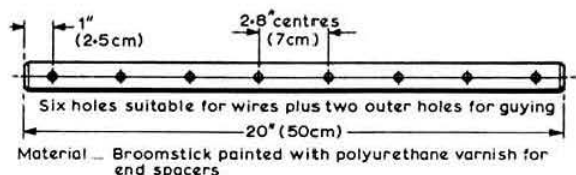
The construction can be both interesting and frustrating. It is desirable to divide the strain equally between each of the six wires, and therefore careful adjustment is necessary, even to the extent of leaving wire loops protruding from the end spacers.



**Fig 1. Five-band version of the aerial**



**Fig 2. Centre spacers**



**Fig 3. End spacers**

## Operation

Operational trials did not fully prove the feasibility of the above configuration because the positioning of the aerial was not ideal at G3KSK. In position, it sloped from 23ft (7m) to 9ft (2.75m). The higher  $\lambda/4$  section ran close to the roof of a steel-framed house. The recommended 43ft (13.1m), or odd multiples thereof, was not tried; it was an afterthought to help correct the 80m mismatch found in any horizontal  $\lambda/2$  dipole less than  $\lambda/4$  above electrical ground. However, contacts were made on all five bands (although only 20m exhibited a near 1:1 swr), including dx on 15m. A mechanically simpler, yet wider-than-minimally-spaced, version of the aerial for three-band operation was later constructed (Fig 4). This was made to prove the feasibility of a simpler design. Many other versions based on these ideas will come to the mind of the reader, the overall length of these aeralis varying from the 41ft (12.5m) of Fig 1, depending upon the band combinations. Usually a two-band combination will be more useful if it includes 40m, because 15m will thus be covered as well, and three-band coverage will be obtained in the space for two. The version shown in Fig 4 permitted contacts on the three bands with 5W input, including some dx on 20m. Fig 5 shows a single-band version.

## Recommendations

In order to improve on the results obtained at G3KSK with the above configurations, the following points should be incorporated:

\* 13 Yeatmans Close, Shaftesbury, Dorset SP7 8LU.

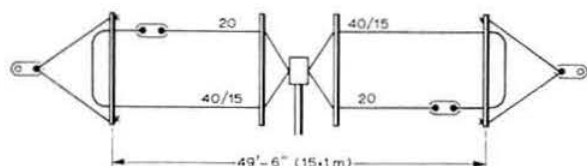


Fig 4. Three-band version of the aerial. Alternatively, the  $\lambda/2$  dipoles may be sited in the same plane

1. The aerial should be raised to at least 33ft (10m) above electrical ground. The average pi-net should then accomplish all the transformation presented to it from 40m to 10m.

2. By using 43ft ( $\lambda/4 \times 0.66$ ) of 52-72 $\Omega$  of coaxial cable, or odd multiples thereof, the impedance mismatch on 80m present at usual aerial heights may be transformed so that it falls within the limits of most pi-nets, while other bands remain relatively unaffected. At around 66ft high, no transformation should, however, be required, being  $\lambda/4$  (80m),  $\lambda/2$  (40m),  $\lambda/2$  (20m),  $3\lambda/2$  (15m) and  $2\lambda$  (10m).

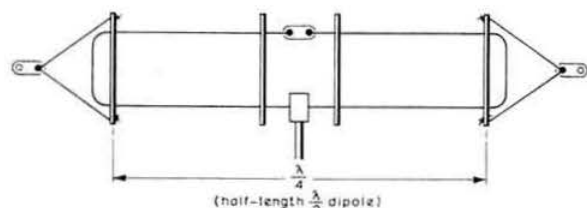


Fig 5. Single-band version of the aerial (two-band if it covers 40m)

### Miscellaneous points

Ideally, a balun (1:1) is preferable but it is only worthwhile if the SWR is near to 1:1 on all bands. The actual contacts made with the above configurations were almost incidental because the design as a whole is obviously feasible. The construction was therefore carried out to test the feasibility of the mechanical construction. It was considered more important to make the design freely available as soon as possible, rather than to amass predictable contacts.

### Conclusion

The above aerial configurations were not well sited. However, they did work, and will work more efficiently if the recommendations given above are carried out. The advantages of the described designs are as follows:

- (i) They can be used where space is insufficient to erect other types of compact multibands.
- (ii) They have no trap losses.
- (iii) There is the possibility of covering small-range impedance variations via the pi-net only.
- (iv) There is no wasted space within the aerial due to internal guying ropes.

The author will be pleased to receive comments and/or results regarding any of the above ideas.

### References

- [1] "Compact and multiband aeriels", O. J. Russell, BSc, G3BHJ, *Practical Wireless*, January 1957, pages 769-70.
- [2] "The F7FE all-band dipole", *Radio Communication Handbook*, 4th ed, p13.55.

## 2ND FM CONVENTION

Brooklands Technical College, Heath Road,  
Weybridge, Surrey

**Saturday 15 March 1975**

**Doors open noon**

Convention opened at 2.30pm by Geoff Stone, G3FZL

**Lectures** on Oscar, vhf/uhf tv and radio broadcast aeriels

**Discussion** by UK repeater groups on "Repeater facilities"

**Limited trade show**

**Bring and buy sale**

**Afternoon tea**

**Buffet supper from 7pm**

**Tickets:** convention only ... 50p, convention and buffet ... £2.50; available from G8FNF, QTHR; cheques to be made payable to "UK FM Group (London)".

**Talk-in** on S20 (145.5), R7 via GB3LO and 433.2MHz; callsign G8GFM/A.

## Northern Radio Societies Association Annual Convention

Belle Vue, Manchester

**Sunday, 27 April 1975**

**Commencing at 11am**

**Trade stands**

**Club display stands**

**Inter-club quiz**

**Grand raffle**

**Construction contest**

**Club stand trophy**

**The entrance to the exhibition is at the rear of Belle Vue, opposite the main car park (off Hyde Road, A57).**

### ATTENTION ALL RADIO AMATEURS

If you have won trophies, awards, contests, written articles, carried out special experiments, preserved old gear, constructed something special, or given help to others, during the past 10-12 years, this should be recorded in the RSGB's history book, along with any spare photographs you have on the subject.

Please send details, as soon as possible, to Ron Ham, Faraday, Greyfriars, Storrington, Sussex.

## SPECIAL EVENT STATION

**Wallington Hobbies Exhibition, 12-14 March**

GB3WRC will be operational at the Wallington Rotary Club Hobbies Exhibition from 12 to 14 March at the Public Hall, Stafford Road, Wallington, Surrey. The station will be organized and operated by Sutton & Cheam RS.

# Building blocks for the novice

by SVEN WEBER, G8ACC\*

## Diodes, diodes and diodes — and some experiments with them

### (Part 12)

#### Variable capacitance diodes

Diodes not only have a high resistance to current flow when reverse biased but also have an inherent capacitance, which is either a nuisance or a considerable advantage, depending on circumstances. A small silicon diode frequently has a reverse resistance (up to the turn-over voltage) of up to and beyond 1,000M $\Omega$ , which is often better than, say, a ceramic capacitor. The series resistance is quite small, resulting in a high  $Q$  component (Fig 85).

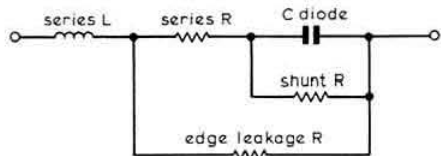


Fig 85. Approximate equivalent ac circuit of a diode when reverse biased

At high frequencies the edge leakage increases and the  $Q$  goes down until it is unity at the frequency at which the reactance of the capacitor is of the same value as the series resistance. With specially designed diodes, however, this happens only at a frequency of 1-10GHz or even higher. With other diodes, self-resonant effects occur at lower frequencies, making them less useful, although this occurs just as much with other types of capacitor.

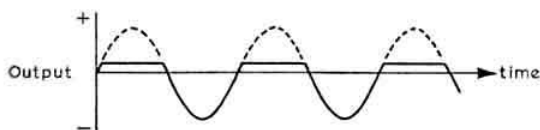


Fig 86. Measuring diode capacity with an ac bridge would cut off part of the input cycle

Incidentally, why should diodes be used as capacitors: surely there are easier ways of doing things? The answer to this question can be stated very simply: a diode can be made very, very small so that inductance is less of a problem and, far more important, the diode capacitance changes with the voltage across it. Why this happens is unfortunately outside the scope of this article but, because of this effect,

diode capacitance cannot easily be measured by the normal sort of ac bridge. Another factor which does not make measurement any the easier is that the diode may conduct over part of the applied ac voltage swing, producing a distorted output and making measured values inaccurate (Fig 86).

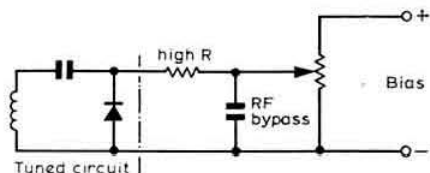


Fig 87. Reverse-biased diode in a tuned circuit

There is, however, one easy (in essence) way of measuring diode capacitance, and that is to place the diode as an element in an oscillating tuned circuit and measure the output frequency at various reverse voltages (Fig 87). Of course, for part of the rf cycle the diode may conduct, but even so this method can be used to give quite accurate results. With two diodes in opposition, as in Fig 88, there is less loading on the tuned circuit because the only through path to dc is the diodes' reverse resistance. Experiments to prove this can easily be tried but, to start with, a few values will be given for different types of diode so that a range of frequencies can be decided upon.

Small silicon signal diode	0.5-3pF
Small silicon power diode	3-10pF
"Variable capacitance" diode	2-100pF
Large silicon diodes	10-1,000pF
Zener diodes	50-10,000pF

The capacitances mentioned are the approximate ranges at -1V.

Any oscillator circuit can be used to measure capacitance values. However, in Figs 89 and 90 two suggested configurations are given. These have no particular advantage over any

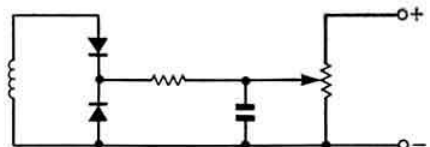
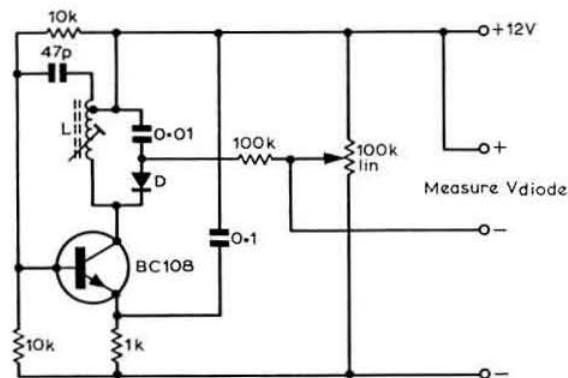


Fig 88. Two diodes in opposition in a tuned circuit load the circuit less than a single diode

\* 132 Murray Road, Rugby, Warwickshire.

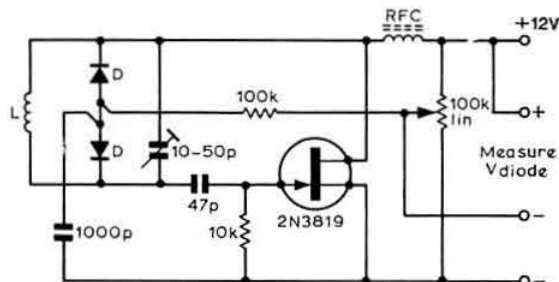




**Fig 89. Low-frequency oscillator (500kHz to 1MHz).** L: Transistor i.f. transformer coil—large size with no ferrite housing. RF earth is at the low tap; D: Zener diode or large power diode

other, apart from being easy to build. The output frequencies can be measured at various reverse diode voltages (0, 0.25, 0.5, 0.75, 1, 1.5, 2, 2.5, 4, 3, 5...) by a receiver (or frequency counter) that is accurate to within 2kHz at 500kHz and 50kHz around 30MHz. To get some idea of the relative values of the diode capacitances, an accurately known ( $\pm 1$  per cent) low-inductance capacitor should be substituted for the diodes (and any parallel capacitors) and the frequency measured as accurately as possible. This might be 300pF for Fig 89 and 39 or 47pF in Fig 90. Rearrangement of the standard formula

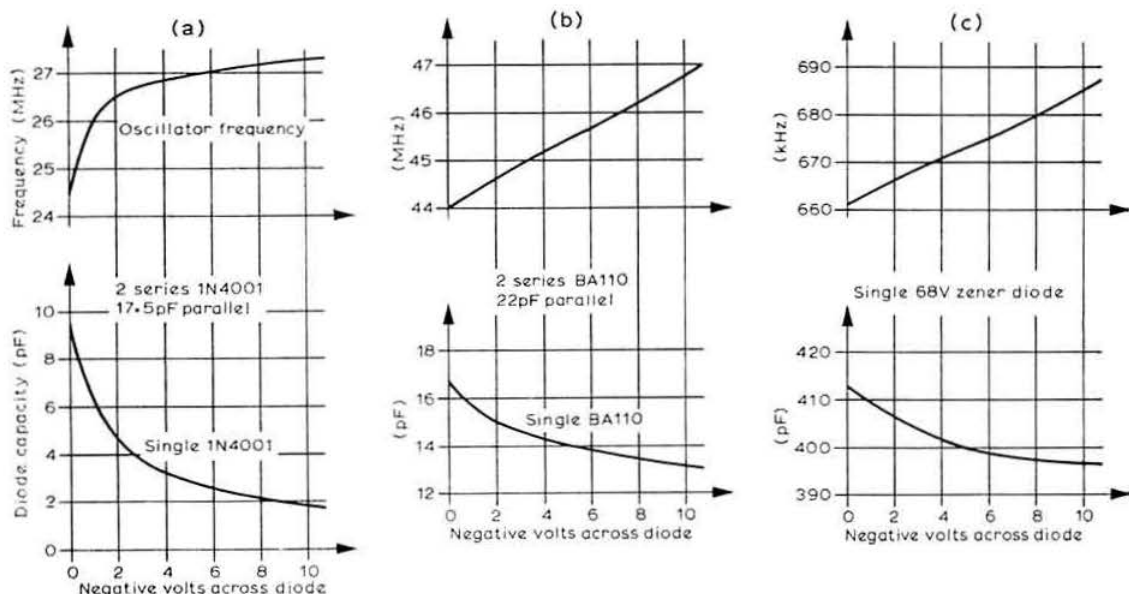
$$f = \frac{1}{2\pi\sqrt{LC}}$$



**Fig 90. High-frequency oscillator (20-50MHz).** L: 10-15 turns,  $\frac{1}{8}$ in diam, 1-1 $\frac{1}{2}$ in long, 16swg self-supporting; D: low-capacitance diode; RFC: approximately 30 turns close-wound 27swg on  $\frac{1}{8}$ in ferrite former

with a bit of adjustment gives  $f_1^2 C_1 / f_2^2 = C_2$  and, if  $f_1$  and  $C_1$  are the values with the substituted capacitor, then  $C_2$  (diode capacitance) can be obtained by dividing  $f_1^2 \times C_1$  by  $f_2^2$  ( $f_2$  is the new frequency at various diode voltages).

The results of doing this with various randomly selected diodes are given in Figs 91(a), (b) and (c) with 1N4001, BA110 and 68V zener diodes respectively. This property of capacitance variation with voltage can be of great use with tuned circuits in that it does away with mechanically moving parts associated with rf, and also that the frequency variation can be carried out at some distance from the frequency-determining components. It is ideal for automatic frequency control (afc) and phase-locked loops (see Part 11). There is, however, another property inherent in the non-linear variation in capacitance which is most important: frequency multiplying and signal amplification, and this will be dealt with in Part 13. □



**Fig 91. Frequency and capacitance curves for various diodes against voltage:** (a) 2  $\times$  1N4001 plus 17.5pF in parallel; (b) 2  $\times$  BA110 plus 22pF in parallel; (c) single 68V zener diode

# TECHNICAL TOPICS

by PAT HAWKER, G3VA

IN opening *TT* last month we mentioned two instances of amateurs making their mark on the history of radio. A reference to a rather better-known example crops up in the recently-published volume *Wireless Telegraphy* in The Royal Institution Library of Science series, in which there are reprints of the famous Friday evening discourses of The Royal Institution. In April 1926 a lecture entitled "Wireless in the Empire" by Dr W. H. Eccles (the noted scientist and a former president of the Wireless Society of London) included slides (reproduced in the book) of equipment used by Marcuse (2NM) and Simmonds (2OD) in the early days of dx. The comment by Dr Eccles was: "During the past two or three years wireless amateurs have succeeded in transmitting signals and even speech across vast distances with tiny apparatus... the plant is so small that it could be installed in a drawing room. If only we could rely upon plant of this size getting through for days instead of hours then there would be no need for high-power stations. Even so it is easy to imagine how such glimpses of inter-communication might be made use of in the elaboration of Empire wireless".

Certainly, over the years compact hf equipment has played a notable part in radio communication; Dr Eccles would have been surprised to see how the size has shrunk to present-day transceiver standards. Despite all progress, we are still confined to "hours rather than days"—such are the laws of hf propagation—and that is why in the end we may gradually re-inherit the "short waves" as professional communication moves increasingly to satellites and microwaves.

## Receiving GBR on vlf

The query posed by XE1RV (*TT*, November 1974), concerning the lack of success in receiving GBR in Mexico, has brought a response which indicates that vlf is by no means a forgotten spectrum for some amateurs. R. A. Ledgerton, G2ABC, points out that GBR continues to be extremely active on 16kHz, including continuous service as a standard frequency transmission. Time indicator signals commence at six minutes before 0300, 0900, 1500 and 2100 and are regularly heard near Truro, Cornwall. The call sign is sent at minute 54, there is then a gap, and then "second-blips" are sent for five minutes. The final dash gives the exact hour indication.

G2ABC uses an experimental transistorized synchrodyne receiver, made by his friend G3RVV, covering 12kHz to about 230kHz in three bands. It is usually left tuned to MSF on 60kHz, which can be heard at any time of the day or night provided that the station clock is fairly accurate, since MSF on 60kHz sends a call sign only once an hour, unlike the 2.5MHz or 5MHz services, where call sign and time indication are available every ten minutes. As aerial he uses about 6ft of wire, with 6in twisted round the outside of an insulated loop round the shack; using anything more ambitious swamps the synchrodyne receiver. He wonders whether XE1RV is aware of the limited activity of GBR with a readily identifiable signal.

Another amateur in Truro, Lionel Sear, G3PPT, also has

an interest in vlf reception and has investigated the use of a number of simple receivers for this purpose. He finds that by far the simplest and best solution is the very simple converter shown in Fig 1.

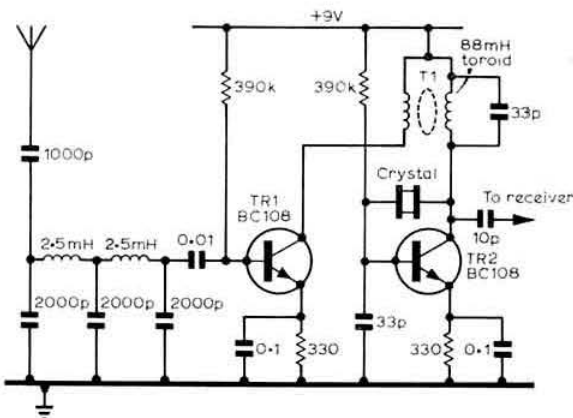


Fig 1. G3PPT's untuned converter for vlf/lf reception. TR1,2 BC108; T1 88mH toroid

The incoming signals pass through a simple low-pass filter, which cuts off in the "low hundreds" of kHz, and they are then amplified by TR1. The transformer T1 is essentially an 88mH toroid, and this acts as a wide-range modulation transformer so that the signals from TR1 modulate the Pierce crystal oscillator TR2. This means that the vlf spectrum now appears as two sidebands stretching out on either side of the crystal frequency. How low it can be tuned depends on how close one can tune to the crystal frequency on the main receiver. With his SB101 and using a 3720kHz crystal, G3PPT can tune down to 5kHz; further away from the crystal frequency the long-wave broadcast stations (eg Droitwich on 200kHz) pound in—a factor of possible interest to those with general coverage receivers such as the AR88D and many others which do not include a "long-wave" band. He finds GBR and MSF very loud, and other stations such as navigational beacons can be heard down to about 12kHz. Almost any available hf crystal could be used.

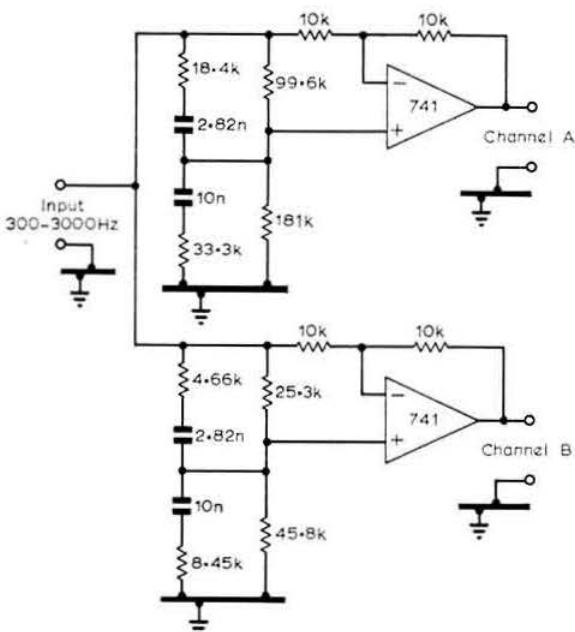
G3PPT finds that television time-base interference can be rather fierce at the low frequencies; on the other hand he has had no problems from i.f. breakthrough of signals around 3.7MHz.

G3PPT mentions that most of the ideas that he has ever had prove in the end to have been thought of before (how one knows the feeling!), but hopes that perhaps this time this may not be the case. As he says, it is a technique which should certainly prove useful to anyone wishing to explore these very fascinating low frequencies without having to wind any coils the size of toilet rolls! As a final thought, he adds: "Why not an amateur band at say 8kHz?" This is an idea for those

thinking about the next frequency allocation conference, if one can overcome interference to hi-fi amplifiers!

### Low-cost phasing-type ssb exciters

Richard J. Harris, G3OTK, has been following with great interest the recent *TT* items on simple and inexpensive ssb generation using digital techniques in conjunction with the "third method". He has recently been investigating the design of phasing-type ssb generators with digital rf phase shifting, with a view to building an exciter with the minimum of preset controls. While the exciter project is still not complete, a number of circuit ideas have already been tried out, including a quadrature wideband network using 741 operational amplifiers and reasonably available component values. He writes:



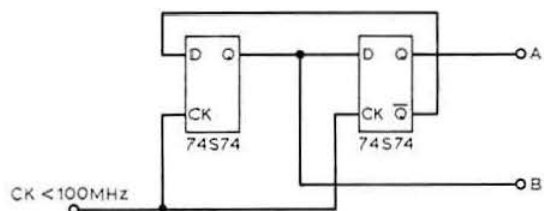
**Fig 2.** The wideband quadrature network used by G3OTK as the heart of a phasing-type ssb generator. Channel A lags B by 90° with a theoretical phase tolerance of  $\pm 1.08^\circ$ . Insertion loss is 10.78dB

"The commonly known 90° phase-shift networks, such as the Dome and the 'SSB Jr', are usually shown with transformer drive, and need to be followed by very high input-impedance stages. This is easy with valves but not with ic mixers. While ic operational amplifier inverter stages could replace the transformer, and non-inverting buffers used to isolate stages, it is much neater if this can all be done in one go: Fig 2. I calculated the component values, based on a 0.01μF base value, and fortunately the resistor values proved reasonable. I used polystyrene 2½% tolerance capacitors (although 1% would be preferable) and Mullard MR25 metal-film resistors (which are usually 1%), simply using preferred values in parallel arrangements rather than attempting careful measurement and selection. The theoretical maximum phase deviation is 1.08°, which could theoretically give an unwanted sideband suppression of 40dB. My

measurements (which are fairly crude) indicate that my network is within  $\pm 1.5^\circ$  for phase and  $\pm 0.5$ dB on amplitude, and this should give a worst-case sideband suppression of better than 30dB. While this is perhaps not in quite the same class as a £25 crystal ssb filter, it would not cost £25! The frequency range of the phase-shift network is 300 to 3000Hz."

G3OTK has also taken a brief look at the problems of digital 90° networks at input frequencies comparable with the maximum toggle rate of the flip-flops. He writes:

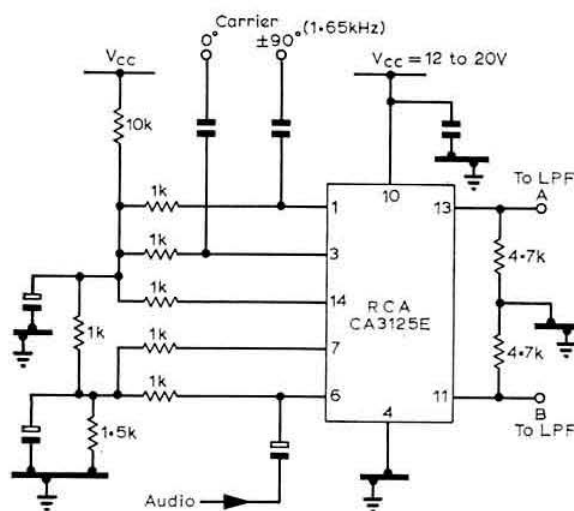
"Initially I was concerned about the possibility of additional phase shifts due to the different low-to-high and high-to-low propagation delays, but there in fact does not appear to be a problem from the viewpoint of carrier suppression. However, signal balance in a double-balanced mixer definitely does suffer. The 7474 'D' type flip-flops exhibit typically 6ns difference between the propagation delays; for a 20MHz clock (ie 5MHz carrier generation) the signal balance would be of the order of 20dB or less, even assuming a perfect double-balanced mixer. Fortunately, this is unlikely to pose problems, since signal balance is generally not important except for the first mixers of a third-method exciter (about 1.65kHz). The 7474s should toggle at higher frequencies than the usual 7473 circuit. By going to Schottky-clamped logic, with for example a 74S74 device, a clock frequency of up to 100MHz could be used, making it possible to achieve direct ssb generation at 21MHz: Fig 3.



**Fig 3.** Digital high-speed 90° phase shift using Schottky ttl logic, capable of use with 100MHz input to produce 25MHz output

"One of the problems associated with the phase-shift and third-method ssb generation systems is the need to maintain amplitude balance as well as phase balance. The use of separate mixer ic devices poses the problem of conversion-gain drift; consequently frequent balance checks are necessary. On the other hand, if dual double-balanced mixers were available, drift would cancel because of the excellent on-chip thermal matching. With this idea in mind, I have been looking out for dual mixer devices, but until very recently the only ones that I had found were colour demodulator ics for television receivers. Regrettably, these normally include the luminance-colour matrixing at the mixer outputs. However, I now find that RCA have recently introduced a chroma demodulator arrangement which looks very promising: it is type number CA3125E—a monolithic silicon linear integrated circuit intended as a chroma demodulator, having three separate demodulators and independent phase control.

"The red and blue demodulators should have closely matched conversion gains and drift rates, bringing the possibility of inexpensive ssb generation (or demodulation) one stage nearer. Fig 4 is a suggested circuit, not yet tried, of a dual mixer arrangement, which could be used for a direct-conversion (homodyne) phasing demodulator or for the first



**Fig 4. G3OTK's suggested (not yet tried) twin double-balanced mixers for third-method ssb generation or phasing-type direct-conversion receiver based on the RCA CA3125E integrated circuit**

mixer (1.65kHz) of a third-method system. Because the mixers in this device have a common input, it can be used only when one input is frequency-changed into two channels."

### ICs and the digital ssb generator

Two other suggestions have come along in connection with the choice of integrated circuits for the digital ssb generator by A. de Muijnck (*TT*, October 1974, January 1975).

Harry Bradshaw, G3VTJ, notes that the limiting factor on output frequency appears to be the operating speed of the SN7473 divided by four, thus representing an upper limit in the region of 2.5MHz. He wonders whether it would be possible to raise this to 30MHz (or alternatively to the upper limit of the TBA120) by using a combination of the 300MHz divide-by-two integrated circuits that have been used for pre-scalers in order to extend the range of digital frequency counters to 144MHz. Such devices, apparently basically similar to the Plessey SP604, are usually available from J. Birkett of Lincoln at a cost of about 80p. The firm also offers a divide-by-four 180MHz device at £1.10. Whether any special interfacing would be needed with these devices is questionable, but the idea may be worth investigating, although the earlier notes on Schottky ttl seem more certain.

John R. Hey, G3TDZ, is rather worried about the relatively high power consumption of the TBA120A devices; at four times 18mA these would require some 72mA just for the balanced modulators. As a devotee of  $\mu$ P operation, G3TDZ finds this a bit daunting. On the other hand, he notes that Siemens make an ic intended for portable fm receivers which is electrically and mechanically identical to the TB120A, but which consumes only about 5.5mA; its type number is S-041-P.

G3TDZ also notes another Siemens device: the S-042-P. He writes: "This is a double-balanced mixer, containing its own bias chain and similar to the Plessey range, although useful to 200MHz. As the tail resistor is actually two separate paths to separate tags, these may have a tuned circuit or

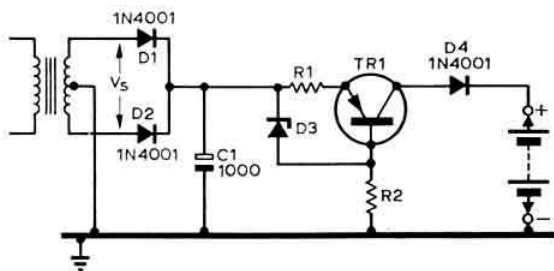
crystal connected between them and, with suitable choice of coupling capacitors, may become their own oscillators. The mixer could thus have its own oscillator and balanced drive.

"Both these devices appear in the Siemens consumer handbook and should presumably be at consumer prices. It would seem that with no demand, however, the dealers are reluctant to import these devices; yet if no-one knows of them, there can be no demand: perhaps *TT* will be a starting point. The S-042-P consumes only 1.9mA."

### Constant-current charger

Ni-cad (nickel-cadmium) cells, especially those required to deliver appreciable current, are fairly expensive but form a very convenient power supply for portable operation. With sealed units there is no loss of water by evaporation or electrolysis and no creepage of electrolyte; no maintenance is needed and the cell may be mounted in any position. If correctly treated, they will withstand a very large number of charging cycles and thus the total cost may in fact be quite economical. It is most important, however, that *constant-current* or *current-limited* chargers are used. Apart from considerations of long life, serious overcharging of sealed cells must be avoided or otherwise internal pressure will build up; with larger ni-cad cells having a pressure-release valve, ventilation is required while the cell is on charge since the fumes are explosive.

Ken Basterfield, G4BXP, has recently pointed out that for optimum life ni-cad cells should be charged at one-tenth of their one-hour capacity current (eg a 0.45Ah cell should be charged at 45mA). He provides circuit details (Fig 5) of a constant-current charger that he finds effective; by choosing suitable values of R1 and D3 the correct and constant value of charging current is produced.



**Fig 5. Constant-current battery charger used by G4BXP for re-charging ni-cad cells**

In his case, he uses the charger for ten 0.45Ah cells which give him 12V for a portable transmitter. The transformer is 18-0-18V secondary, R1 is 56 $\Omega$ ,  $\frac{1}{2}$ W, D3 is a 3.6V zener diode, TR1 a TIP30 and R2 1.5k $\Omega$ ,  $\frac{1}{2}$ W. This gives him a suitable charging current of around 50mA and is short-circuit proof. D4 prevents the battery discharging through the collector/base, R2 circuit. An npn transistor could be used for TR1 simply by inverting all polarity-sensitive components.

By switching in different values of R1 the charging current can be changed; in the G4BXP unit to 200mA when R1 is 15 $\Omega$ , for use with 2Ah cells.

The unit is simple and cheap to build, often from junk-box components, but overcomes the problem that charging ni-cad



cells from a constant-voltage (low-impedance) source soon destroys them.

### Pleasant shack acoustics

Wes Miller, HB9AOY/W9LAB, who is Director of the Baptist Communications Centre in Switzerland, was glad to note the item on shack acoustics in the November *TT* but feels there is another important aspect of shack acoustics which was not mentioned. This concerns the effect that shack acoustics have on the amateur himself, and applies to both receiving and transmitting. He writes:

"Designing and building radio and recording studios for religious and missionary organizations for the last 20 years, I quickly came to realize that a studio which is too 'dead' (too absorbent to the sounds in the room) causes a speaker or singer to tire much more quickly than one which has a little 'liveliness'. Conversely, one which is too 'live' (bouncing sounds around inside too much) can cause the person to become confused or actually disoriented.

"I feel, therefore, that an operating shack with the proper amount of moderate absorption for sounds will be a more pleasant place in which to operate, for listening as well as transmitting."

### Cathode interface impedance and Class C

The recent item on electronic bias switching (*TT*, January) has prompted Chris H. Foulkes, G3UFZ, to utter a word of warning. He believes that one potential disadvantage of the system that has been overlooked is the build-up of "interface impedance" between cathode core and cathode coating that can occur when a valve is run under completely cut-off conditions. He writes:

"Like many other amateurs, I find that only a very small amount of my station operating time is taken up with transmission, and consequently my transmitter runs with two 6146s at cut-off most of the time. The life of these valves under conditions of cut-off is measured in a few hundred hours instead of several thousands of hours if run with a cathode current of, say, 50-100mA per square centimetre of cathode area.

"My practice now is to run the transmitter key down with no drive for half-an-hour or so before working the station. Under these conditions, the output valves take 20mA each and this keeps the cathode coating active. It seems to be little known that running oxide-coated valve cathodes under cut-off conditions shortens the life, not increases it, unless the cathode core is made of platinum."

I must admit that I am surprised at the very marked difference in valve life reported by G3UFZ. *Radio Communication Handbook* does draw attention to this problem, as follows:

"When a valve is operated for long periods, particularly with low cathode current or at complete cut-off, the mutual conductance steadily falls and so also does the available peak emission. This effect is due to the growth of a film between the metallic cathode and its emissive coating. This film possesses an impedance—the cathode interface impedance—which may be represented by a resistance with capacitive shunt connected in series with the cathode and acting as an automatic bias resistor. The falling performance is sometimes called *sleepy sickness*. The rate of growth of interface resistance is considerably affected by the material of the cathode and is accelerated by high temperatures resulting

from excessive heater voltage. Since the cathode-interface resistance is normally of the order of a few hundred ohms it has a most serious effect on valves having a high slope and a short grid base because the normal cathode resistor is likely to be comparable with this value. The effect of the parallel capacitance is to make the drop in performance less noticeable as the frequency is increased."

I must frankly admit that I have always regarded this warning as having a low order of priority with transmitters operated under normal intermittent amateur service conditions. Certainly, many of the older transmitters used true Class C and yet achieved long valve life, but possibly modern high-perveance cathodes and high-slope valves are more prone to interface-impedance build-up when transmitters are left on for appreciable periods without occasional transmission. In practice, the advantages of electronic bias switching in avoiding wideband noise generation could be retained by incorporating a switch to take the electronic switch out of circuit except during activity periods, though this nullifies some of the advantages claimed for the system. It may be of course that the heater voltage of the 6146s in G3UFZ's rig is on the high side—it would be interesting to know if other amateurs have found such a marked difference in valve life when using true cut-off bias in power amplifiers.

### Voltage regulation

Last month details were included of an ingenious type of voltage regulator arrangement, which minimizes the loss of power involved in conventional series regulators. Before the February issue was published some notes were received from R. J. Harrison, G3TMQ, on voltage regulators which can be used where a moderate drop of 2V can be tolerated. He points out that in order to obtain the correct zener diode in

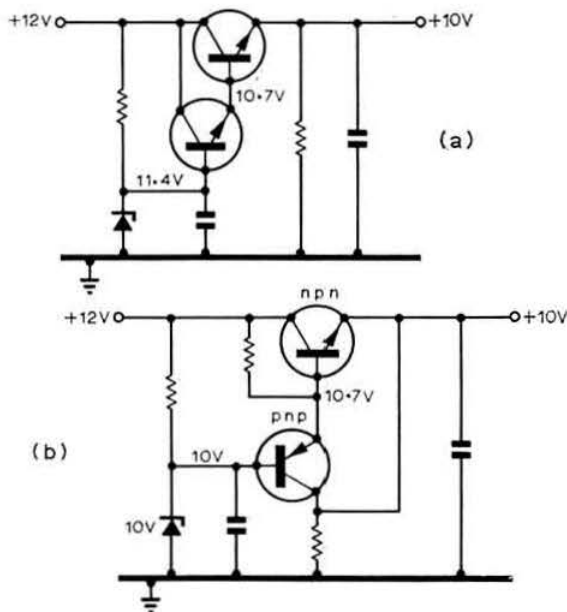


Fig 6. (a) Conventional series regulator in which the output voltage differs from the working voltage of the zener diode; (b) modified arrangement in which output voltage is the same as the zener diode voltage, as used by G3TMQ



he normal arrangement of Fig 6(a), where either minimum voltage drop is required or where a known voltage output is required, a calculation of approximately twice  $U_{be}$  has to be added to the output voltage required.

However, with the arrangement favoured by G3TMQ, Fig 6(b), and provided that the two transistors are both silicon or both germanium, the  $U_{be}$  calculation is eliminated. He reports that the circuit has been evaluated and found to perform very successfully. It is also fully comparable with the normal regulator circuit. Suitable transistors are given in the table below.

Current	NPN type	PNP type
Under 50mA	BC107	BCY70
Under 300mA	2N3053	2N1132
Under 2A	2N3054	2N2907

### Minimizing cross-over distortion

The inclusion in *TT* (January) of the cross-over bias regulation arrangement (Fig 8, p30) described by Dale Hileman in *Electronics* (28 November 1974) has prompted John Haydon, G3BLP, to mention that this circuit has been used quite frequently for several years. Patrick Crowe also takes up this point, noting that the basic configuration has been described several times in Texas Instrument circuits. He adds, however, that as it stands, the circuit has a serious disadvantage in that if the slider of the potentiometer ever leaves the track (a very likely happening with amateur-grade pots), TR3 will turn off and TR1 and TR2 will turn hard on and may destroy themselves. He considers that the modified arrangement shown in Fig 7 is to be preferred; this only involves one extra resistor and eliminates the risk.

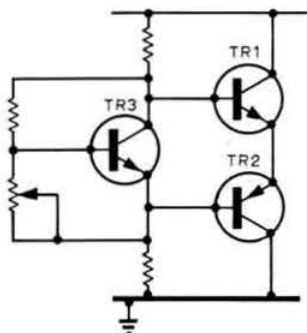


Fig 7. Modified form of bias regulator to minimize crossover distortion without the risk of destroying the output transistors by a faulty potentiometer

Patrick Crowe is rather critical of certain aspects of *TT* and of amateur journals and handbooks in general. He feels that amateurs should do more work from first principles and believes that practical work should always be based on solid theory and analysis. He considers that the authors of much of what is published are satisfied with presenting a purely practical guide to what to do, rather than asking or providing the reasons *why*. As an example, he quotes the conventional practice of shorting out turns on a pi tank coil when band-changing hf power amplifiers, when this would be the last thing one would do with a normal transformer winding. He feels the whole business is based on too many rules-of-thumb or "because that's the way it's always done".

One can certainly appreciate his point. Theory is important

and it is vitally important that myths based on misunderstood theory be corrected. Surely, however, the emphasis on how to do, how to make and how it worked is the essential difference between amateur experimentation and formal learning exercises and professional design. I hope it does not offend Patrick Crowe too much if I comment that this is the way it has always been. I suspect that not too many readers would want solid slabs of theory. I know full well that if they do it will not be from my typewriter!

### Ignition noise and super-noisy vehicles

For a long time it has been recognized that ignition interference from some vehicles is very much more vicious than from others, though little attempt has been made in the past to measure the differences, and there remains a considerable amount of work to be done in determining just why these differences arise. Some idea of the complexity of the individual noise characteristics of different vehicles is indicated in a paper by R. A. Shepherd of Stanford Research Institute, entitled "Measurement of amplitude probability distributions and power of automobile ignition noise at hf", *IEEE Trans on Vehicular Technology*, Vol VT23, No 3, August 1974. The paper is based on a large number of measurements made alongside a busy freeway (motorway) and shows that most of the ignition noise between 24 and 30MHz is contributed by a small number of vehicles radiating strong interference. It was found that there is a great difference in the noise characteristics of individual cars, particularly different models.

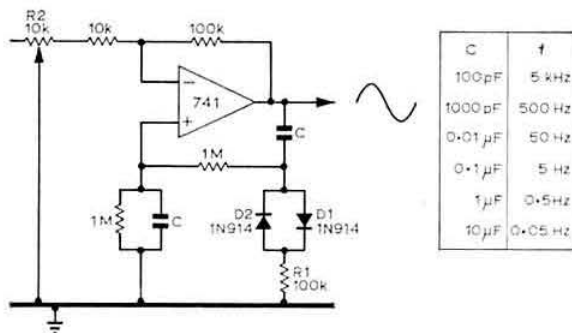
It was found that an engine is a complex noise source and does not radiate a pulse of the same amplitude for each successive firing of the spark plugs; the pulses can vary by up to 30dB in amplitude, and even successive pulses from the same cylinder vary appreciably. On some vehicles there are two rf pulses associated with each spark-plug firing, the second following the first after an interval of about 1ms, it being usually about 10dB lower. It is still not clear whether this double pulse results from the abrupt cessation of current flow across the spark-plug gap or from the closure of the breaker points.

Generally, the more cylinders there are in a vehicle, the more ignition noise is produced; again, the average noise power increases monotonically with engine speed.

During the investigations a vehicle was deliberately made as noisy as possible (for instance by using copper ignition wire), yet it was found not to be the noisiest vehicle on the road. The super-noisy cars have average powers of 40dB or more above "quiet" cars, and some parallel investigations in Spain showed noisy vehicles exceeding the median vehicle by 35dB.

### Diodes to stabilize Wien oscillator

Another item from Dale Hileman turns up in *Electronics* (9 January 1975), in the form of the use of back-to-back silicon diodes in the feedback path of a Wien-bridge oscillator in order to stabilize the feedback without hunting or distortion. Normally a thermistor or pilot lamp is often used for this purpose, but there may well be occasions when only diodes are at hand: Fig 8. Dale Hileman suggests that the best way to change the frequency of this circuit is to change the two capacitors, which must be closely matched. If this is done, the output amplitude remains the same on all frequencies. He also notes that diodes, unlike thermistors or lamps,



**Fig 8. Wien bridge oscillator with front-to-back silicon diodes in feedback path to act as a stabilizer without causing hunting or distortion. The potentiometer controls amplitude and also affects frequency**

do not have the thermal inertia that may introduce hunting when the power is switched on or the frequency changed; while zener diode stabilization is likely to distort the waveform. Resistor R1 softens the effect of the knee of the forward conduction characteristics of the diodes, which might otherwise introduce distortion akin to that of zener diodes.

## Here and there

RCA have recently introduced a new "sweep tube" (colour tv line-output valve) which is a direct replacement for the 6LQ6 and 6JE6, with a 12-pin Novar base and integral envelope top cap; it has a temporary 200W rating up to 40s and has relatively low input and output impedances (25pF and 9pF respectively), so that improved performance at 21 and 28MHz is possible. The cathode is designed to stand currents of 1,200mA peak, 350mA average. Type No is 6MJ6.

Several comments have been received on the question of swr and its importance, or non-importance, in transmitting aerials, and we hope to refer to these another time.

J. W. Paddon, G2IS, points out that if you are worried about the change in swr due to the change in characteristics of 75 and 300Ω balanced twin feeder when drenched with rain, this effect can be greatly reduced by spraying the feeder with "Ignition Sealant". This is available in aerosol cans from most garages and is normally used to waterproof vehicle ignition harnesses. When the feeder is sprayed, the sealant builds up a heavy film of non-wettable silicone, resulting in the water gathering in dispersed droplets rather than forming the continuous film of water on the surface of the feeder that is the cause of the change in characteristics. He says that a single can of sealant is enough to spray all the feeders the average amateur is likely to use in decades.

## NEW PRODUCTS

### Essex Telecoms

This company, formed at the beginning of 1973, announce their first radiotelephone equipment, the ET702 (FM) and ET752(AM). These units are locally-controlled base stations operating from either 12V or ac mains power which can be equipped with up to 10 crystal-controlled channels. The channel spacing is either 12.5 or 25kHz and the power output is 6.7W (a.m.) or 10/12W (fm). Further information is available from Essex Telecommunications Ltd, Unit 8, Co-ordinated Industrial Estate, Claydons Lane, Rayleigh, Essex SS7 7UP.



### Electronic engineers slide rule

Key Electronics have produced a 12in slide rule designed for general and electronics applications. Functions available are: multiplication and division, squares and square roots, log-log scales in four variations, reciprocal scale, decibel scale and L/C calculator scales. The rule is strongly made, the scale markings are clear and it is contained in a plastic case. The accompanying instruction book is helpful and does not assume previous knowledge of slide rule mechanics.

The price of the rule is £2.50 plus VAT but inclusive of postage in the UK and Eire. However, there is a special offer to RSGB members of £2.22 plus VAT providing a callsign or BRS/A number is quoted on the order. Information concerning this and other Key Electronics products can be obtained from PO Box 7, Bournemouth, Hants BH7 7BS.

## Catalogue received

Two catalogues have been recently published by SCS Components as part of a service designed to list semiconductor products of interest to the professional tv service sector and to the amateur radio market. The catalogues contain a representative sample of the large range of semiconductors offered by SCS Components at manufacturers' list prices. The only additional charge is 20p for post and packing. Data sheets are free on request. The range includes all discrete and integrated semiconductors from Mullard, Motorola, Signetics, General Instrument, Ferranti, RCA, Monsanto and Mostek. Copies of the catalogues are available, without charge, from SCS Components, 5c Northfield Industrial Estate, Beresford Avenue, Wembley, Middlesex HA0 1SD.

# MICROWAVES

by DAIN EVANS, G3RPE\*

## 1,296MHz preamplifiers

Good reports have been received from a number of people regarding the "2GHz stripline npn transistor" currently advertised by Birkett's. It has been used in some cases as a direct (and cheaper) replacement for the BFR90 specified in the G4BEL preamplifier described in the June 1974 column. G4ALN reports a gain of 10 to 12dB and a noise factor of about 4dB. G3WJG has also used the transistor in a stripline circuit and obtains a gain of about 16dB.

## 10GHz east of London

A note from PA0KKZ (Zaandam) reports that he, PA0ACM, PA0LED and PA0DBQ already have some equipment for 10GHz. ON5FF also operates on this band: apparently an attempted contact last summer with G3ZEZ and G3PQR was unsuccessful. Both ON and PA0 are well within the range of existing equipment if the weather conditions are suitable for super-refraction. Naturally, we would like to hear from other Continentals having an interest in this sort of operation.

## A 1,296MHz power amplifier

Figs 1 and 2 show the circuitry and layout of a 2C39A amplifier which has a gain of about 10dB and an output of up to 50W. It was developed by G3JVL from the well-known stripline tripler described in the *Radio Communication Handbook* (p 7.49) and in the *VHF-UHF Manual* (p 6.63) to which reference should be made. The main change is in the cathode circuitry, and this is described in detail. The same circuitry may be used to convert other similar triplers to amplifiers.

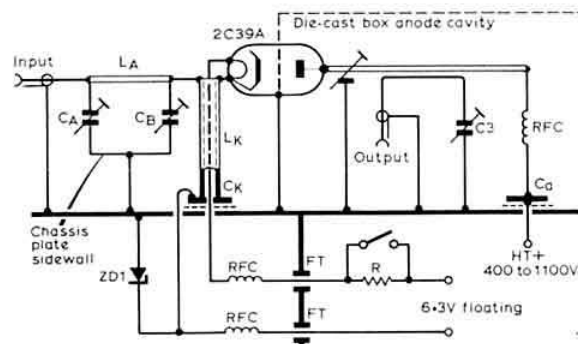


Fig 1. Circuit of a 1,296MHz amplifier

- LA: 1in length of copper wire, diameter up to  $\frac{1}{16}$ in
- LK:  $\frac{1}{4}$  cathode line  $1\frac{1}{2}$ in long  $\frac{1}{16}$ in diameter brass or copper tube
- CA, CB: 2-8pF tubular ceramic trimmer
- CK: approximately 20pF,  $\frac{1}{4}$ in square plate with 0.002in insulation clamped to chassis with a nylon screw, or a 22pF ceramic chip capacitor
- Z1: high power zener diode, voltage 5-14V, selected to give anode current of 5-10mA with ht applied but no drive
- RFC: 7 turns  $\frac{1}{16}$ in diameter 22swg enamelled copper wire

\* 4 Upper Sales, Chaulden, Hemel Hempstead, Herts.

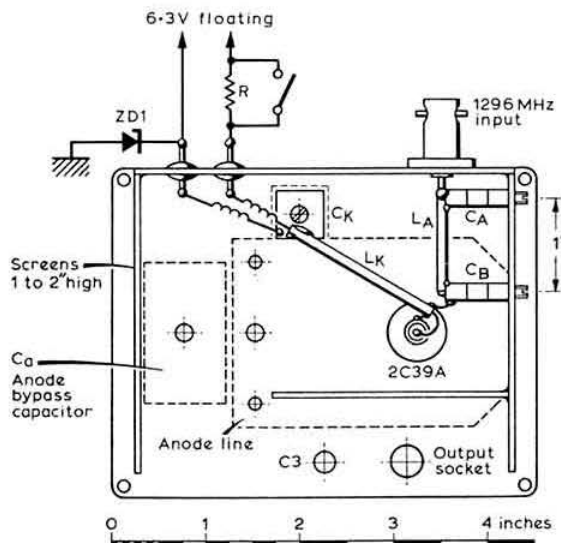


Fig 2. Layout of cathode circuitry

The modifications involved are as follows:

- (a) The anode circuitry remains essentially unchanged except that the thickness of the mica or other insulation of the decoupling capacitor  $C_A$  should be increased to 0.008 to 0.012in if the higher ht voltages are used.
- (b) The grid is connected directly to the chassis via fingering soldered to the inside of an  $\frac{1}{16}$ in hole drilled in the chassis plate. This arrangement results in much increased gain compared with when the grid is decoupled by a capacitor, and G3JVL suggests that the tripler configuration also may benefit by this change.
- (c) The input circuitry consists of a pi-network, the inductance  $L_A$  of which is optimized by changing the thickness of wire used to produce the maximum anode current for a given level of drive.  $L_K$  is a  $\frac{1}{4}$  choke, one end of which is joined both to the heater/cathode connection of the valve and to  $C_B/L_A$ , and the other end is decoupled by  $C_K$ . The wire to the heater connection runs through the tube comprising  $L_K$ . A consequence of earthing the grid is that a "floating" heater supply is necessary. Note that the inner of the input coaxial connector is "live" at the bias voltage of the cathode, and a suitable isolating capacitor may be necessary with some drivers. The resistor in the heater line should reduce the voltage to 5.5V when the ht is applied.

## Microwave repeaters/beacons

A summary of a recent discussion by the microwave sub-committee on the future of beacons and repeaters in the microwave bands is given on page 220. □

# SWL NEWS

by BOB TREACHER, BRS32525\*

## Our new QSL sub-manager

David Borne, G4CYW, is the new QSL sub-manager for BRS and A members, and he is very keen to provide a first-class service to listeners. In an effort to do this, David submits the following seven points for listeners to follow:

1. Send not more than five self-addressed envelopes, ensuring they are numbered in the top left-hand corner from 1 to 5. Ensure, furthermore, that the fifth is also marked "last".

2. The optimum size for envelopes is about 7½ in by 5 in. This is an easy size to handle and ensures that all but the most outrageous cards are forwarded without being folded.

3. Mark all envelopes with your listener's number in the top left-hand corner.

4. Give clear indications of when cards are to be sent, ie "Wait 6" or "As they come". No instruction given is taken to mean they are to be sent when the maximum permitted weight is reached. As a guide, the present 3½p (2oz) second-class letter can hold about 15 cards.

5. Unless cards are not required more than once or twice a year, use the minimum postage. (Some envelopes are stamped sufficient for ½lb or more of QSLs).

6. It would help if any change of address or listener's number was notified to the sub-manager.

7. Last, but at the moment probably the most important, is the increase in postal rates due soon. All listeners with envelopes at the bureau are asked to send stamps to update their envelopes as soon as the new rates are known. It is preferable to send too many as the surplus can be returned.

Your scribe would like to add that the above applies only to incoming cards. Outgoing QSLs should be sent in the normal manner to G2MI, QTHR.

## QRP

A very interesting letter received this month comes from G3RJV, who is the secretary of the G-QRP Club. This organization is devoted to low-power (under 5W) transmission and they are keen to obtain the help of interested swls. They have many members working on 80 and 160m who run less than 1W and they would welcome QSL reports from listeners. This is a facet of short-wave listening that has not occurred to many listeners, and any who are interested can receive fuller details of how he or she could become involved in this aspect of amateur radio by sending an sae to G. C. Dodds, G3RJV, 61 Park Street, Cleethorpes.

## Another slp

Members will remember the set listening period organized very successfully by Dave Whitaker, BRS25429, last year. Another 10m activity day has therefore been organized by Dave; on Sunday 16 March between 0800 and 2000gmt. Details appear in *Month on the Air* this issue. SWL reports will be very welcome as the exercise will be a study of propagation conditions at the trough end of the sunspot cycle.

## LF dx conditions

Many listeners have commented upon the exceptional dx traffic heard on 40, 80 and 160m during January and the early part of February. Two listeners report hearing over 100 countries on 80m during January. One of those reached the magical three-figure mark on 26 January. Conditions on 80m to the Pacific have not been as good as they were last season but conditions to the Far East can be described as nothing short of brilliant. Stations have been heard from AP2, HS, JT, S2, UM8, VS6, VU, XU1, XV5, YB0 and 9M2. These openings occur around 1500-1800 or 2200-2400 and gave many listeners a few very rare countries on 80m.

According to several listeners 40m has also been very lively. Activity to the Near and Far East was mainly condensed into a three-hour spell between 1600-1900, and on several days stations in the Seychelles Is (VQ9) were S9 in the UK.

Furthermore, 160m has apparently been very fruitful on cw during darkness hours, especially to the USA, and one swl reports hearing 25 Ws in one two-hour listening period. Stations from EP2, KZ5, PY, ST2 and YV were also heard in the UK. Dave Sharred, A8312, reports hearing 33 countries on 160m during 1974. Late additions were 9G1, 4S7, OJ0 and CT3. Already this year he has heard 24 countries, mainly due to the very fine conditions during the CQ 160m WW Contest. Dave is anxious to listen during the trans-equatorial tests scheduled for this year to winkle out even more. Quote of the year to date is when Dave says, "I will have to get another box of matches to keep my eyelids open!"

## Miscellany

K. M. Brown, BRS34540, considers 10 and 160m as the bands which give him most satisfaction for hearing dx. He also puts 80m as the band with the least satisfaction attached for dx working. There is a bold statement! Your scribe would agree wholeheartedly with regard to 160m, as this requires skill and diligence to winkle out the rare, weak dx in the bottom 50kHz, but would also suggest that when 10m is open, which admittedly it is not at the present time, it is certainly the easiest band on which to hear the dx. It is very

(Continued on page 213)

1974 HF Countries Table

Station	10	15	20	40	80	160	Total	Mode
A8482	113	196	228	139	155	—	831	ssb
BRS25429	90	135	202	123	147	17	714	ssb
BRS25901	48	142	247	102	120	5	664	ssb
A7460	103	137	151	115	117	19	642	ssb/cw
A8606	75	159	207	88	107	4	680	ssb
A8312	60	149	178	103	114	33	637	ssb/cw
BRS33211	60	114	191	100	110	9	584	ssb
A8313	39	116	135	71	84	24	469	ssb/cw
A8431	39	73	149	53	93	12	419	ssb
A8538	4	61	157	82	110	4	418	ssb
BRS34658	42	77	112	58	75	8	372	ssb
A8428	25	68	142	41	85	4	365	ssb
A7317	9	86	136	45	67	6	349	ssb
A8320	0	56	122	59	70	6	313	ssb
A8187	21	52	124	9	40	1	247	ssb
A8358	2	32	141	10	16	8	209	ssb
A8203	13	26	73	14	41	3	170	ssb

\* 392 Rochester Way, Eltham, London SE9 6LH.



# FOUR-TWO-SEVENTY

by MARTIN DANN, G3NHE\*

It is pleasant to be able to record some lifting of the gloom which has pervaded the reporting of the state of the vhf/uhf bands over the past few months. Conditions appear to have taken a turn for the better, if only temporarily, and by happy coincidence the weekend of the 432MHz Open Contest on 2 February produced above-average propagation. Continentals were to be worked in abundance on 2m, and a few were also available on 70cm. Earlier, on 10 January, a localized opening occurred with good signals from Germany being heard: G8BCL in Halifax worked into QRA locator squares EI, EJ and FH, including one station just 80m from the Czechoslovakian border.

As the high-pressure system which gave us the good conditions for the 432MHz contest remained more or less stationary, the following week also produced some good dx, and by Thursday 6 February propagation was superb right up to 1,296MHz.

While considering conditions, how often must a lift on 70cm be missed due to the lack of activity? Even trying repeated CQ calls will not necessarily produce results, unless one is lucky enough to be beaming in the right direction, at the right time for someone who also happens to be looking the right way. But opportunities are missed unnecessarily; G3BHW is one who has noticed considerable activity while listening at the bottom end of 70cm during an Oscar 7 pass, but he has been unable to attract any attention when the pass is over. Even if it were not incumbent on us to check our own frequency after using Oscar, to comply with licence requirements, it would still make good sense to do so, with the possible bonus of an unexpected dx contact direct on 70cm.

## Meteor scatter

After some months with very little to report on this interesting mode of communication, probably due to the low activity of the meteor showers compared with 1973, we now have quite a healthy inflow of information.

Although skeds with DL7QY, YU3ZV and LX1DB during the October Orionids proved unsuccessful for GW3ZTH, the December Geminids produced a QSO with SQ2DX in Gdansk, the exchanges taking two hours to complete. Unfortunately tests with LA1K and FC6ABP during the same shower did not result in contacts, although call signs were copied from the latter. On the same day, 14 December, SM7AED was heard completing a QSO with EI5BH, and in the small hours of the following morning, after several previous attempts, GC3YIZ on Guernsey also made it with SM7AED.

The January Quadrantids peaked, as they have for the past few years, on 3 January, despite the 4th being quoted by most astronomical handbooks. This short, sharp shower produced several useful contacts, not least that between G3WZT and OH2AXH, in QRA MU46c, the culmination

of a year's effort by both stations. The QRB is 1,900km, and the contact took two hours to complete. John Matthews almost worked LZ1AB on the same evening, only the vital Rx being missing.

Keith Fisher, G3WSN, also heard many bursts from OH2AXH during the Finnish station's contact with G3WZT, having previously managed a QSO of his own with SM7FJE in QRA locator GQ56b.

GW3ZTH was smitten by an attack of influenza during the Quadrantids, but Joe Ludlow was able to work DM2DQO in Berlin. Joe reports that GW3LEW, also of Bridgend, had better success, working SM3BYA, SM4ARQ and DL7QY. Also from GW3ZTH comes news of several weekly meteor scatter skeds currently taking place. On Fridays, Joe himself runs tests with DL7QY from 2330 to 0100gmt, on 144-025MHz. With the same German station, and on the same frequency, GW3NJW has tests each Saturday night, 2330gmt to midnight. From 2100 to 2300gmt on Monday nights, G3CCH has skeds with SM7AED, the frequency being 144-015MHz.

## North of the border

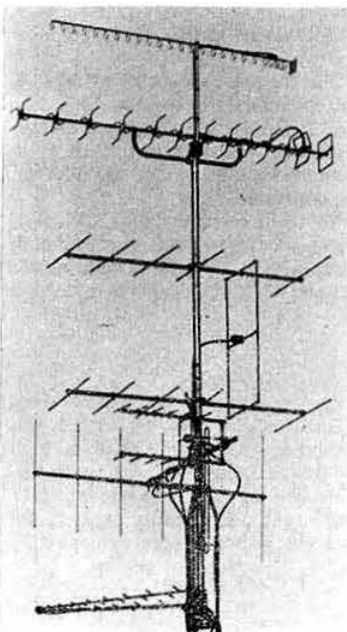
GM4DGT found things hard going during the January 144MHz cw contest—only two stations worked, and they were locals. He appreciates that there is a tendency to beam towards centres of activity, but wishes that more G stations would remember to beam north now and again. Bill had the misfortune to lose his 40ft mast recently, and the even greater misfortune to be half-way up it at the time! Bruised, battered, but unbowed, GM4DGT is back on 2m using a 25ft mast, but hopes shortly to have beams for 4m, 2m and 70cm up at around 60ft.

Welcome news from Alex Allen, GM3ZBE, that he is adding 23cm to his existing facilities for the 4-2-70 bands. He found 4m particularly fruitful during 1974, working some 28 counties and four countries, helped by some auroral activity and the use of full power cw and ssb; this compares with a previous all-time total of three contacts. On the other hand 70cm has proved disappointing from GM3ZBE's Aberdeenshire location, nothing new having been worked since April 1974. Alex is hopeful that the new commercial equipment for 432MHz, now appearing on the market, might have the same effect on activity as those ubiquitous "black boxes" did on 2m.

Alex is joined by GM3SYD, also in Aberdeenshire, in expressing some concern about the current trend towards repeaters. Syd is mainly concerned about the misuse and abuse of these devices, such as their use by fixed stations. He feels that ground-based repeaters should be reserved exclusively for mobile users, unlike satellite-borne repeaters which are for all amateur users, whether they be fixed, mobile or portable. GM3SYD is also worried by the lack of discipline he has noticed when listening to repeater traffic; the breakdown of procedures reminds him of the citizen's band in the USA.

\* 49 Windermere Court, North Anston, Sheffield S31 7GJ.





The impressive aerial array of Paul Gaskin, G8AYY, (Birmingham). Top to bottom: 23cm quad loop Yagi; 46-el 70cm multi-beam; 6.6 2m slot; 6-el 2m vertical; log-periodic tv aerial

GM3ZBE remarks that there are many, like himself, who, although they would not stoop to the level of some of the "spoilers", claim the right to the honestly-held opinion that repeaters will ultimately prove to be a bad thing for amateur radio, and he feels obliged to oppose them in any reasonable manner. Similar views are expressed by a station a long way south of the border; G3WZT wishes to register his personal disapproval of repeaters on 2m, although he sees a use for them on the less-used 70cm band.

### Across the water

Anent the report by G13WUO of 70cm activity from GI, G18AYZ issues a dire warning that the MAFIA (Mid-Antrim Federation of Independent Amateurs, of course) will be taking an interest in 432MHz this year. In response to many entreaties—Ian has had at least one letter—G18AYZ/P will be back at his old stand, 6km west of Larne (XO11a), with an all solid-state a.m./fm transmitter for 70cm. He hopes to be active during all contests, and will also give a sympathetic hearing to requests for skeds. Ian hopes to add 70cm sideband before too long, and 23cm fm is a distinct possibility in the foreseeable future. The MAFIA will also be taking part in 4m contests, using the Ballymena Radio Club call of G13FFF.

G18AYZ tells us that there are 15 club calls extant in Northern Ireland, and a move is afoot to activate as many of these as possible on all bands, 160m to 70cm, over the Easter period. G13FFF/P and G16YM/P will be on from Co Antrim, and, with luck, counties Londonderry and Down will be represented by G13XRQ and G14DBB. If conditions are good, a trip to Co Tyrone is on the cards, but Ian points out that the exercise is primarily a social event and invites anyone interested to contact him, QTHR.

If anyone is awaiting a QSL card from G18AYZ for contacts in 1973-4 the reason why they have not received one could be that they have worked a pirate. Ian reports that

the bogus G18AYZ was accurate right down to the "whiskey throat" accent, and is also known to have pirated the G13FFF call.

### Four metres

It looks as though 4m activity from Scotland may be looking up at last. News from GM3MXN and GM3HBT, both of Larkhill in Lanarkshire, suggests that the county is now well represented on the band. GM3MXN and GM3NRP are active every Sunday evening from 2230gmt, beaming south, and GM3HBT will be putting out calls most evenings, as well as at weekends. Tom Hall would welcome skeds, and anyone interested should write to GM3HBT, QTHR.

Dale Harvey, G3XBY, endorses comments in last month's *Four-Two-Seventy* about the worth of the /P operators. Of the 60 counties worked for his recent 70MHz Senior award, 35 were portables, and he pays special tribute to G3WOS, G3FDW and G3VPS for their fine efforts.

G3XBY finds that the move to ssb on 4m, despite its slow start, is now gathering pace. Activity is well spread out and, were he not prepared to swing the beam from the popular NW/SE axis, many contacts would be missed.

Ken Easty's total number of different stations worked on 4m during 1974 was 174, and your scribe was interested to note that his own total was within three of this, despite being some 140 miles north-west of G3LVP's Essex QTH. It would seem that activity is very well spread over the country, although stations are very few and far between north of West Yorkshire. Ken bemoans the fact that the 1975 contests calendar shows a reduction of around 30 hours in the time allocated to 4m contests. He is happy to see the cumulatives go, but would have liked a sideband contest included in the list. G3LVP also finds it strange that the only vhf/uhf band which shows an increase in the number of contest hours for 1975 is 2m, while the bands which most need encouraging, 4m and 70cm, both show a reduction.

### Contest happenings

Despite conditions which were, to say the least, less than exciting, activity during both of the January cw contests was quite good. If anything, propagation was better on the morning of 19 January during the 4m event, but the deep QSB still presented problems. G3LVP thought the level of activity much better than in previous 4m cw contests, and heard or worked about 40 different stations from his Benfleet QTH. Let us hope that the entry is good enough to encourage the VHF Contests Committee to keep this event in the calendar.

As already mentioned, the 432MHz Open Contest coincided with a useful lift in conditions, resulting in an excellent turn-out. Pressure was high and the weather in most parts of the country was good, although one portable station up in the Berkshire hills complained of being in the clouds. In the north, a peak seemed to occur between 1200 and 1300 gmt, with the appearance of ON5FF, ON5GF and F1AVG, although some of the well-sited portables were hearing more from the Continent.

It was most noticeable that ssb has become the major contest mode on 70cm, as it has been for some time on 2m, with more than half the contacts made by several stations with whom notes were compared being with sidebanders. This applied not only to stations using ssb themselves, for a.m./fm stations now rely increasingly on cross-mode contacts with A3j users to accumulate contest points.

Further to remarks in last month's column about the possibility of a non-sideband contest, G8FBF, writing as chairman of the Cambridge & DARC, would like to see a separate telephony contest for a.m./fm users only. He makes the point that there are many stations who do not yet have ssb facilities, due either to financial considerations or to lack of time for constructional activities, but many of these are, nevertheless, keen vhf operators. Such stations can, in theory, enter any open contest, but in practice they stand little chance against the sidebanders, and often do not bother to enter.

### Awards

This month's FMD award list from the vhf awards manager starts with 70MHz transmitting certificate No 113 to Peter Hart of Addington, Croydon, who collected the necessary cards by operating G (GM, GW)3SJX/P at various sites throughout the UK.

The reward for many years of patient effort from his outpost at Whitehaven in Cumbria, is 144MHz Senior certificate No 70 for Bill Hodgson, G3BW.

Four 144MHz standard awards: No 420 to G4BKG; No 421 to G(GM)8CXX/P; No 422 to G18HXV; and G8HGP gains certificate No 423.

### Those calling channels again

Joe Ludlow, GW3ZTH, adds his weight to the argument against a calling channel at the top end of the cw segment of the 2m band. Being a keen meteor scatter enthusiast, he is concerned by the possibility of too much activity close to the ms calling frequency. Joe makes the point that the Europeans use 144-050MHz, and suggests that Liner 2 owners fit the one extra crystal necessary to cover this frequency. Joe does, however, agree with the idea of an a.m. calling channel on 145-4MHz proposed by GM8BRM.

G4DML and G4CDN, writing from the University of Essex, make the point that in the 144.1 to 144.15MHz segment there are several dx beacons used by many stations in the UK for monitoring conditions. They specifically mention PA0DSW (144.143MHz), DL0PR (144.14MHz), GB3CTC (144.13MHz) and HB9HB (144.125MHz). Stations have already been heard on both cw and ssb conducting QSOs on beacon frequencies, and G4DML and G4CDN feel that encouraging the use of cw in this area would only serve to exacerbate the situation.

Another suggested calling area, this time from the German amateurs, is that of 144.45 to 144.5MHz for ssb ms work, an idea which is receiving support from other European operators.

### Technical tips

Alan Gordon, G3XOI, suggests a means for FR500 owners to improve the selectivity of this receiver on fm. In the 25kHz position he has fitted an 8kHz-wide Toko ceramic filter which, although designed for use with transistors, works well in a valve line-up. Alan has found the reduction in bandwidths of great value.

A final word on keying the Liner 2: GM3ZBE found the audio oscillator method poor, even with a clean 800Hz sine wave, due to the ease with which harmonics can be produced. He keys in parallel with the test switch contacts, using an internal reed relay. He will willingly supply details on receipt of an sae.

### Old — but not ancient

Reading of the unusual FMD award to G3JZG for contacts all made in 1961, G3BLP was reminded of his 2m activity during the 'fifties and of his Wallman cascode 6AK5/EC91 converter. John Haydon attempted to build a transistor converter to better it—and failed. He later bought a highly-advertised commercial converter, with a claimed 2dB noise factor, and could hear no more on that than he could on the by then 20-year-old valve converter.

John took exception to the inference that 120W to a QYV06-40 was "quite high power for those days", reminding us that the '6-40 was introduced in 1950-51. Also available in those days were the 826 and 829B, both capable of dishing out the power.

### Expedition news

News of a most interesting proposed expedition comes from G5HD who, with G3WDG, will be heading for the hills from Bristol to the Scottish border with 4m, 70cm and high power 23cm. Modes used will be cw and ssb, with the exception of 4m where cw only will be used. The trip will take place between 25 May and 1 June, and requests for skeds and suggestions for counties to be visited will be welcomed by G5HD, QTHR.

### Where are you?

"Please, please," begs G8HUU of Thame, "will new licence holders give their QTH when calling 'CQ'." This seems to be one of the most regular complaints about operating procedure on the vhf/uhf bands, but is not confined to the newly licensed. If one's location has not yet appeared in the call book, it is no more than common sense to let the other end of a potential contact know which way to beam; but even if one is QTHR, should it be left to the listener to thumb frantically through his call book, for the sake of the caller taking the trouble to mention his location?

While on the subject of locations, it might not be a bad idea for those of us whose county status has changed to make sure we let the other chap know; he may not have a new county map yet.

### FM channel

A must for the diaries of fm enthusiasts is the 2nd FM Convention to be held on Saturday 15 March at Brooklands Technical College, Heath Road, Weybridge, Surrey. Several interesting lectures have been arranged, together with a limited trade show, and a bring-and-buy sale. Doors open at 1200gmt and tickets are 50p. Talk-in will be available on S20 (145.5), R7 via GB3LO and 433.2MHz.

Kris Partridge, G8AUU, is in favour of the concept of channelization, not only for fm but also for a.m. Kris feels that one only has to consider the phenomenal growth of co-channel fm in the past few years to appreciate the advantage to be gained from having nationally and internationally agreed common channels. He agrees that for a.m. there would be no need to adopt the wide channel spacing of 25kHz; 10kHz might be adequate.

G8AUU reports that he will be operating from Poland from late March to mid-April, on fm and ssb, using the call G8AUU/SP6 or /SQ6, and from a site not far from the Czech linear repeater OK0A.

## The things they say

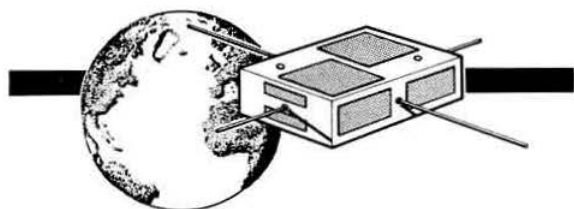
An old-timer who has contributed extensively to these pages over the years has been ruminating around the subject of operating habits. He wonders whether this journal gives newcomers enough guidance about how to operate when they get their shiny new transmitting licence, or whether it is simply taken for granted that they will spring into action fully armed.

By and large, the vast majority of new vhf men show a good deal of enthusiastic aplomb in their operating techniques: the fatuities when they are perpetrated stand out all the more prominently. Three of these that our old-timer takes exception to are: that "further down the log" cliché; insistence on "the handle" instead of "name" (the handle here is... chromium-plated?); and thirdly, the over-use of the word "there", useful no doubt as a punctuation point giving time to think, but sounding particularly pointless when the speaker means "here", as for example, "My transmitter runs 25W input, there..." *et seq.*

Addressing a microphone induces a peculiar form of self-consciousness not apparent in normal conversation; hence the clichés. But because specialized interests like amateur radio (or angling or aviation or whatever) generate their own terminology, there is always room for the admission of phrases such as "QTH" or "... had a QSO" into radio speech; the border line between specialized language and cliché is a narrow one.

Duplex and/or cross-band operation is the most effective begetter of natural sounding conversation, but not everybody is equipped for such operation. The alternative is to consider whether what one says over the air is as natural sounding as the things one says in face-to-face conversation. It is also worth bearing in mind that what one says might well be used by some listeners as a guide to their future operating habits when they get their tickets.

Finally, the deadline for the April issue is immediate, please, and for the May issue all items to reach G3NHE by 9 April.



## Oscar 6

Due to prolonged exposure to sunlight the batteries in Oscar 6 are in danger of becoming overcharged and therefore the repeater in the satellite may be used on descending passes on every morning until further notice. Ascending passes (afternoon and evening) should be used on Mondays, Thursdays and Saturdays only. Only the minimum power necessary to effect communication should be used.

The command station established at the University of Surrey will shortly be operational and should ensure that the repeater in the satellite is on during the appropriate passes.

## Oscar 7

AMSAT requires telemetry copied from Oscar 7, and data should be sent to PO Box 27, Washington DC 20044, USA. Ensure that precise details of orbit number and time are included. The annual subscription to AMSAT, now \$5, is being doubled wef 1 July 1975. The fee for life membership, at present \$50 minimum, is also being doubled. Membership at the present rate is a worthwhile investment.

Details of the UK *Oscar News* can be obtained from G3WPO, QTHR, (see please) and reference orbits are given on the weekly GB2RS news bulletins.

## Oscar 6 and 7 orbital data calendar

In co-operation with AMSAT, Skip Reymann, W6PAJ, has published an orbital data calendar containing all orbits for 1975 for both Oscar 6 and Oscar 7. Designed so that it may be hung on the wall, the calendar includes information on the operating schedules and frequencies for both spacecraft, and also the telemetry decoding equations. Also included is step-by-step information on how to determine times of passage of the satellites.

The orbital data calendar is available postpaid for US \$3 or 20 IRCs. Overseas orders will be shipped via airmail.

Payment should be made to: Skip Reymann, W6PAJ, PO Box 374, San Dimas, California 91773 USA. All excess receipts over costs will be donated to the space programme.

## SWL NEWS

(Continued from page 209)

difficult to attach a dx rating to any of the amateur bands because they are all capable of providing exceptional dx conditions when everything is right. I would suggest, however, that the lower-frequency bands provide most dx satisfaction, as to succeed on these bands requires a very good aerial installation, a sensitive receiver and the ability to be listening when the dx appears. It would be interesting to hear other listeners' views on this subject.

Keith Kerr, last year's A leader in the Countries Table, is about to become a BRS and will no doubt be chasing the top BRS position this year. Keith is still receiver-less in Edinburgh but during the first week of 1975 amassed 216 at his home QTH to gain a useful lead in this year's table. Keith's New Year resolution is to get onto 160m.

## Do not forget...

That is all for another issue. Please keep the news, comment and ideas coming. For inclusion in the May issue, copy (including 1975 country scores) should reach your scribe not later than 25 March. Furthermore your scribe is a member of a dxpedition going to France for CQ WPX at the end of March and this piece has to reach RSGB HQ before Easter!

## VHF BEACON STATIONS

Callsign	Location	Nominal frequency	Emission	Aerial direction
GB3ANG	Angus	145.95MHz	A1	SSE
GB3CTC	Redruth, Cornwall	144.13MHz	A1	ENE
GB3DD	Dunstable Downs	1,296.05MHz	F1	N
GB3DM	Burnhope, Co Durham	145.975MHz	F1	N/S
GB3GI	Bangor	145.99MHz	A1	NE/SE
GB3GW	Swansea	144.25MHz	A1	ENE
GB3GM	Thurso	145.995MHz	A1	S
GB3LDN	S. London	1,297.950MHz	F1	E/NW
GB3SC	Sutton Coldfield	432.025MHz	F1	N/S
GB3SU	Sheffield	70.695MHz	A1/F1*	Omni
(temporary location)				
GB3SX	Crowborough	70.699MHz	A1	N
GB3VHF	Wrotham, Kent	144.15MHz	F1	NW

\* Callsign on F1 continuously, on A1 once a minute. When on A1, F1 is suppressed.



# THE MONTH ON THE AIR.....

.....by JOHN ALLAWAY, G3FKM\*

**R**EADERS who read the introductory remarks in January *MOTA* will perhaps have noted that reference was made to BBC transmissions to Region 2 on frequencies between 7,100 and 7,300kHz. In a letter to your scribe, Mr B. J. Bale, G2ACN, head of the BBC Schedule Unit, has pointed out that the BBC does not, in fact, broadcast to Region 2 on any frequency in this section of the band and has not done so during the past several years. The transmissions which are heard in Region 2 and which cause interference to the amateur service in that region are those directed to Australasia and the Pacific Islands.

Mr R. C. Richards, W6MHK, (PO Box "U", Ventura, Calif 93001, USA) is anxious to establish whether anyone has confirmed contact with 100 or more countries using only a single indoor aerial? If so, he would appreciate details of the date of completion of the feat.

## DX news

Those who contacted the Polish mountaineering expedition stations SP9PT/KL7 or SP9PT/VE8 a few months ago will be interested to know that the radio operators made more than 1,000 contacts, 470 of which were with Europe. Unfortunately the team leader, Henruk Furmanik, and another member, Krzysztof Tomaszewski, lost their lives in an avalanche in the Yukon. QSLs for either callsign may be sent to SP9RU or to PZK.

Colin McRae, GM3WRN, points out to those needing AC3PT QSLs that W1FLS acted as QSL manager for that station a few years ago. It is not known whether this arrangement is still in effect. *West Coast DX Bulletin* says that W1JFL has now received logs from A51PN for the period up to 16 September 1974 and that QSLs have been sent out. W1HAA notes that although it is now about two years since the SY1MA expedition to Mt Athos there are still many who have not applied for confirmation of their contacts.

The Channel Contest Group, G4DAA, will be in Guernsey during the weekend of the CQ WPX Contest and hope to be using the callsign GD4DAA for their multi-operator single-transmitter entry. The group will arrive on the island on 26 March and should be on the air the next day on cw. More cw operation will follow the contest until their departure on 1 April. QSLs should be sent to G3ZQW.

It is believed that a permanent automatic weather station has been installed on Bouvet Is. This will be serviced by a South African ship when on the round trip to Tristan da Cunha and ZS1ANT.

3Y3CC and 3Y5DQ are located in the Norwegian zone of Antarctica and have been heard around 14,040kHz on cw.

BV2A has been worked on 14,025 and 14,040kHz, and BV2B on 14,218 and 14,250kHz mostly on Fridays between 1100 and 1500, and on Sundays from 0100 to 0400. He is said to look for European contacts at 0800 on Sundays, and that EA8CR sometimes supervises proceedings.

TJ1EZ has been noted regularly on Mondays, Wednesdays and Fridays at 1715 on 7,050kHz. He has also been heard on 7,004kHz at 2100. 7P8AT hopes to be active on 3,590 and 7,080kHz at week-ends between 1800 and 2200. QSLs may be sent via JA2KLT (see *QTH Corner*) or direct to PO Box 1098, Maseru, Lesotho. Yoland Hoarau, FR7AI, who is at the time of writing on Tromelin Is as FR7AI/T, expects to be on Glorioso Is later in the year as FR7AI/G. He will probably operate on cw only.

VK9RA often operates the club station VK9XI on Christmas Is on Wednesdays from 1430 to 1530, looking specially for British stations; 14,240kHz seems to be a favourite frequency. Another station on the island is VK9XW who also uses 14MHz ssb. He requests QSLs via VK6RU. Anyone still needing a QSL for a contact with VK9ZB who was on Willis Is a few years ago should apply to the operator VK3MK at his new address (see *QTH Corner*).

A list giving the key to the location of Argentinian stations in the Antarctic appeared in a recent copy of *DX News Sheet*. It is as follows: LU-ZA, ZG and ZM = South Orkney Is; LU-ZB, ZD, ZF, ZH, ZJ, ZK, ZL, ZN, ZP, ZQ, ZR, ZU, ZV, ZW and ZX = Antarctica; LU-ZY = South Sandwich Is; LU-ZC, ZI, ZO, ZS and ZT = South Shetland Is.

The Bahamas have been allocated the C6A-C6Z callsign block by the ITU, and VP7DF has been heard using his new C6ADF call.

Stations in Calgary will be using the CY6 prefix during 1975 to celebrate the centenary of the founding of their city. The **Calgary Centennial Award** will be given to amateurs outside the USA and Canada who acquire 10 points by working Calgary stations—each may be contacted once only and contacts with club stations CY6AO and CY6NQ count two points. Send log data to CC Award, Box 592, Calgary, Alberta, T2P 2J2, Canada.

Another special Canadian prefix will be used by stations in Listowel, Ontario, during 1975. VE3s GCO, HH, HLL, LSS and others will use the CG3 prefix and intend to be active around 3,530, 3,790, 7,030, 7,190, 14,190, 21,030, 21,290 and 28,590kHz. A special award will be sent to those who contact two CG3 stations and who submit a certified log extract and five IRCs to VE3GCO or VE3LSS. This fee covers despatch by air-mail.

LU5WS listens particularly for UK contacts between 0830 and 0930 on Saturdays and Sundays in the area between 14,150 and 14,200kHz, and around 1500 between 21,150 and 21,200kHz. He is an English/Welsh/Spanish-speaking Argentinian located at Chubut.

## News from overseas

G4DGR (Eric Lomax, formerly 5N2ABG) who is now living in Accrington, has written to say that there appear to be three active Nigerian stations at present—5N2ESH, Eric, in Lagos; 5N2AAE, Nick, in Ibadan; and 5N2AAJ, Joe, in Lagos. 5N2NAS, the Nigerian Army Signals call, has been heard in the RAS net. There is no news of Bob Osbourn,

\* 10 Knightlow Road, Birmingham B17 8QB





Don Radley, 9G1GE (see text)

5N2AAS, who was trying to get his licence back, and 5N2ABB, Fokke Mulder, is in Trinidad. David Wilcox, 5N2FKS, who used to be at the polytechnic in Kaduna, is in Athens but not on the air. In conclusion Eric says that Angus Murray-Stone, 5N2AMS/9G1GG etc, has left Ghana and is now with the Flying Angel Mission in Fremantle, West Australia.

Don Radley, G4ABI, has been on the air from Ghana since October 1974 as 9G1GE, operating mainly cw on 14MHz. The station consists of an FT101 and Johnson Ranger coupled to a dipole through an atu (see picture). Don was previously in Zambia as 9J2GE for five years following an earlier stint in Ghana as 9G1GE.

### 10m activity day

A repetition of the special activity day organized by BRS25429 last autumn will take place on Sunday 16 March. The special period will run from 0800 to 2000, and everyone who is able to transmit or listen on 28MHz is invited to take part in the experiment which is designed to find out the capabilities of the 28MHz band at this low point in the sunspot cycle. Please send reports of activity to David Whitaker, BRS25429, "Hillcourt", 57 Green Lane, Harrogate, North Yorkshire, or to your scribe who will forward them. The results will be of considerable interest, overseas news sheets have been alerted and widespread participation is hoped for.

### Dxpeditons

Permission has been given to a group of European amateurs, headed by Aldo Diener, HB9AQM, and including others from West Germany, Switzerland and Monaco, together with some Costa Rican licence holders, to visit Cocos Is (TI9) during the period between 1 April and 1 May. The prime reason for the visit is scientific research, and financial help would be welcome.

ZLIBKL, ZLIAMN and ZLIAJI, who visited Chatham Is last autumn, have received permission to visit the Kermadec Is and should be there this month.

There are rumours that an operator from ZSIANT, together with VP8HZ, may visit Bouvet Is during March. Transport is alleged to be the problem.

W5NOP, W5UDK, W5WQI, K5FVA, K5YMY, WA5AWF and KP4EAJ will be in Antigua between 27 February and 3 March and have three complete 1kW Drake stations in operation. Monoband beams for 14, 21 and 28MHz, dipoles for 3.5 and 7MHz, and a long wire for 1.8MHz will be used. The callsign will be VP2A and QSLs should be sent to W5NOP.

Six German operators under the co-ordination of DL7RT will be in Tunisia from 27 March to 3 April. Operation is only permitted on 7, 14 and 28MHz under normal circumstances, but permission for 3.5 and 21MHz has been applied for. Frequencies to be used may include 3,795, 7,055, 14,250, 21,200 and 28,550kHz on ssb, and the lowest five kilohertz of each band on cw. QSLs go to DARC or direct to DL7RT, 1 Berlin 37, Postbox 344, W Germany. Please send sae and IRCs for direct QSOs—other cards will be sent via the bureaux. The party will include DL2OM, DJ2EC, DK7KB, DK9FE, DL7SP and DL7RT.

Late contact with VS5MC confirmed that his visit to Spratly Is may not take place until late March.

### G1 Easter activity

Several G1 clubs will operate from the Ballymena Radio Club (G13FFF) over Easter week-end. All bands 1.8 to 144MHz will be covered and ssb, cw, and a.m. used. G12BX, G16YM and others will be heard (further details on GB2RS). Schedules may be arranged with G14CRQ or G18AYZ. This will help those working for the Marconi Kemp Award (see June 1974 MOTA)—the closing date for valid contacts is now 31 May 1975.

### Amsterdam 700 Years

The municipal council of Amsterdam is celebrating the city's 700th anniversary in 1975. During the year amateurs living in the city and the rest of Holland will be allowed to operate a special station, PA700ASD, which will be on the air most days. Every contact will be confirmed by a special QSL card which will be sent via VRZA, PO Box 400, Rotterdam. All listener reports will be answered.



Top scoring UK entrant in the 1974 CQ WPX Contest, John Forward, G3HTA, operates this impressive array of equipment from his home in Exeter

## QTH Corner

<b>C31DV</b>	via G3ZKX, D. R. Powell, 54 Colburn Av, Hatch End, Pinner, Middlesex.
<b>C31HO</b>	via G3NWL, A. D. Lock, 5 Bradley Peak, Tegdown, Winchester, Hants.
<b>C31IH</b>	via K6BR, 485 Pullman Rd, Hillsborough, Calif, 94010, USA.
<b>C31IL</b>	via WA9INK, 545 Chicago Av, Downers Grove, Ill, 60635, USA.
<b>FG7XT</b>	via F68FH, 21 Rue de la Republique, 76420 Bihorel, France.
<b>FG8KZ</b>	via F68BJ, 11 Rue Roland Champenier, 58 Nevers, France.
<b>FL0EP</b>	BP 246, Djibouti, Territory of the Afars and Issas.
<b>FL0JN</b>	via I8JN, G. Mauro, Via S Brigida 72, 80132 Napoli, Italy.
<b>GC4DA</b>	via G3ZQW, 59 Beatty Av, Coldean, Brighton, Sussex, BN1 9EP.
<b>HH2V</b>	V. M. Lemoine, PO Box 428, Port-au-Prince, Haiti.
<b>KS5FF</b>	via W6KLJ, H. T. Barnard, RFD 3-Box 830-35, Sonoma, Cal, 95370, USA.
<b>KX6NB</b>	Ricky Ioshia, Rita, Majuro, Marshall Is, 96960.
<b>LUIZR</b>	via LU2AFH, C. Correo 100, Suc 28, Buenos Aires, Argentina.
<b>VK9ZB</b>	Brett Bailey, 116 Lyons Street, S. Ballarat, Vic, 3350, Australia.
<b>VP2A</b>	via W5NOL, 1511 Live Oak Av, Metairie, La, 70005, USA.
<b>VP2AYC</b>	Hyacinth Matthew, Box 550, Antigua.
<b>VP2KJ</b>	via WB2TSC, K. W. Jarvis, 210-15 89th Avenue, Bellaire Gardens, NY, 11427, USA.
<b>VP2LA</b>	via VE3TL, 67 Tavistock Rd, Downsview, Ont, M3M 2N8, Canada.
<b>VP2VZ</b>	via WASQYR, RFD 3-Box 591, Lonohe, La, 72086, USA.
<b>W4SHNQ, VQ9</b>	12362 Pentagon St, Garden Grove, Calif, 92641, USA.
<b>SH3KG</b>	via I1IMC, Vis S. Francisco d'Assisi 10, Collegno, To, Italy.
<b>7P8AT</b>	via JA2KLT, 204 Gonaka, Shinokawa, Kozaki, Hoigun, Aichi 441-01, Japan.
<b>9G1GD</b>	PO Box 3247, Kumasi, Ghana.
<b>9G1GE</b>	PO Box 2085, Accra, Ghana (QSL via G3USE).
<b>9G1LZ</b>	via G3LZZ, Misty Lea, Green Lane, Stour Rd, Shaftesbury, Dorset.

RSGB QSL Bureau, G2MI, Bromley, Kent, BR2 7NH

Amateurs living within the city limits will use the prefix PA7 all through 1975 and will use special QSLs. The Amsterdam 700 Years Award will be given to European amateurs who acquire 10 points—contacts with stations using the PA0 prefix who live in Amsterdam count one, with PA7 stations two, and with PA700ASD four points. Only one contact with each station is allowed but there are no band/mode limitations; however, band or mode endorsements will be issued if requested. Send a certified log extract and four IRCs before 1 March 1976 to: VRZA Award Manager, PO Box 190, Groningen, Netherlands.

## Contests

### The CQ WW WPX Contest

0000 29 March to 2400 30 March.

All bands 1-8 to 28MHz—ssb only. Stations exchange reports and serial numbers (from 001). Contacts with own continent count one point, with other continents three points. One's own country may only be worked for multiplier credits. Contacts on 1-8, 3-5 and 7MHz count double points. Final score is total QSO points multiplied by the number of different prefixes worked—note that each counts once only. Categories are single- and multi-band single-operator, and multi-operator single- and multi-transmitter. The last mentioned may only radiate one signal at a time on any one band. Single-operator entrants must only operate for a total of 30 hours and must indicate their rest periods (up to five) in their logs. Multi-transmitter stations must use separate serial numbers on each band. Separate log sheets must be used for each band, and entries must be posted before 14 May to CQ WPX SSB Contest Committee, 14 Vanderventer Av, Port Washington, LI, NY 11050, USA. Summary sheets (but no log sheets) may be available from G3FKM.

### The Polish Contest

1500 5 April to 2400 6 April.

CW only. 3-5 to 28MHz. Single-operator single- or multi-band and multi-operator. Contact as many SP stations as possible and send RST and serial QSO number (from 001).

Polish stations also indicate their powiat code. Each contact counts three points and the multiplier is the number of powiaty worked (each counts once only). Use separate logs for each band and enclose separate summary sheet and signed declaration. Post before 1 May to PZK Contest Committee, PO Box 320, Warszawa 1, Poland. Contest contacts may be used for credit when applying for the PZK 100 Powiat Award in lieu of QSLs provided that they are verified in the logs of the SP stations claimed. In this case applications should be made at the same time as the contest log is submitted, and seven IRCs enclosed.

Detailed scores of the 1974 Bermuda Amateur Radio Contest have been received. Top three UK stations in the phone section were G3LNS (25,020), G4ANT (23,976) and G3WJN (15,774 points). In the cw section G3HCT (23,364), G3DLH (6,165) and G3LHJ (5,247 points) headed the list.

Results of the 1974 CQ WW WPX Contest are as follows:

<b>G3HTA</b>	(All band) 306,138 points
<b>GM5BCV</b>	(All band) 191,967 points
<b>G4AYA</b>	(All band) 87,291 points
<b>G4CLA</b>	(All band) 66,220 points
<b>G3YBH</b>	(All band) 60,047 points
<b>G8YF</b>	(All band) 46,482 points
<b>G2AJB</b>	(All band) 23,280 points
<b>G3NRQ</b>	(All band) 1,239 points
<b>G4AYL/A</b>	(14MHz) 397,544 points
<b>GW4AES</b>	(14MHz) 62,424 points
<b>G4CKL</b>	(14MHz) 54,806 points
<b>GW4BLE</b>	(7MHz) 114,608 points
<b>G4ACQ</b>	(7MHz) 55,454 points
<b>G3JUL</b>	(3-5MHz) 33,578 points

In the multi-operator single-transmitter section, G4DAA was European third with 1,063,535 points, and G3RCV (580,350) and G4BUE (228,437) were also listed.

### The WAB Contests

HF phone—16 March, HF cw—6 April.

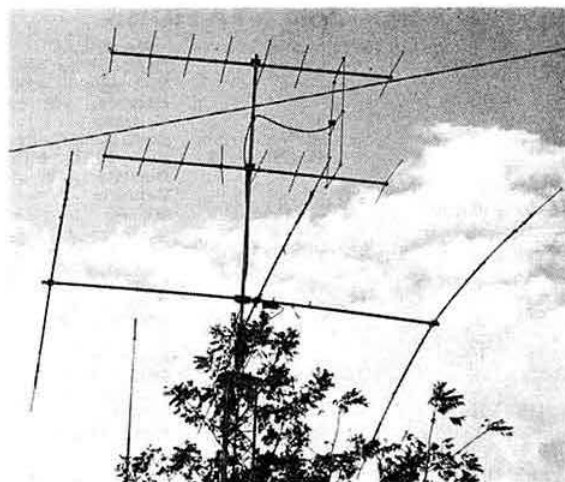
LF phone—11 May, LF cw—1 June.

VHF—20 July.

The duration of each contest is 12 hours—0900 to 2100, and all licensed amateurs and listeners may enter. Categories are single- and multi-operator, single- or multi-band (only one transmitter to be used at any given time). Exchanges consist of RS/T, serial QSO number (from 001), WAB book (if applicable), WAB area, and county. Each completed contact counts five points, and listeners earn five points for each station logged who is in the contest. Multipliers consist (for UK stations) of the total of WAB areas and DXCC countries worked (all G prefixes count as one). Overseas stations use the total of WAB areas only. The hf contests cover 14, 21 and 28MHz, and the lf contests 1-8, 3-5 and 7MHz. Logs must show title of contest, class of entry, name and full QTH, time of contact, band reports exchanged, points and multipliers claimed. They should reach the WAB Contest Manager, R. L. Senter, G4BFY, 10 Toll Bar Avenue, Bottesford, Nottingham NG13 0BB, by 5 May (HF phone), 26 May (HF cw), 30 June (LF phone), 22 July (LF cw), and 8 September (VHF). Certificates of merit will go to the leading entry in each class and the leading entry from each country. Second and third place certificates may be awarded if participation justifies this. Provided that there are at least 25 single-operator entries in the lf sections from the UK, a special trophy, to be held for one year, will be awarded.



**5B4AP**, Totos Theodossiou, vice-president of the Cyprus Amateur Radio Society, and his xyl. Equipment (l to r): 2m fm gear, FT200 for the hf bands, and at the rear AR88 and 160m home-brew transmitter. Photo: CARS



The aerials at 5B4AP: 8 over for 2m, TA33jnr for the hf bands and a 14AVT vertical. There are also long-wire aerials for 40, 80 and 160m not visible in the photograph. Photo: CARS

## Awards

G5GH advises that when applying for the **R6K**, **W-100-O** and **R-150-S** awards from the USSR it is no longer necessary to send QSL cards to Box 88. A list giving full details of the contacts should be certified by the awards manager of a national society (G5GH acts in this capacity for RSGB) and may be submitted in their place.

### The WAZ Award

Note that the islands of Lampedusa, Lampione and Pantelaria have been added to CQ zone 33 for this award. This is most helpful to those who have been waiting patiently for activity from Libya—an event which seems highly unlikely under that country's present administration.

### The Ex-G Radio Club Award

The Ex-G Radio Club will award a certificate to any licensed amateur or listener who provides proof of contact or confirmed reports from 15 of its members. Any bands and modes may be used and among the 15 there must not be more than five with the same prefix. QSLs or log extracts (confirmed by two licensed amateurs or a radio club secretary) and five IRCs should be sent to the award secretary, Lt Cmdr H. G. Cunningham, G8FG, 235 Station Road, West Moors, Wimborne, Dorset.

### The Sheffield Award

For contacts with stations located within Sheffield city boundary after 1 January 1975. UK applicants require 20, other Europeans 10, and all other five. Any band/s and mode/s may be used. Licensed amateurs and listeners may apply.

### The South Yorkshire Award

For contacts with stations located within the county of South Yorkshire after 1 January 1975. UK applicants require 30, other Europeans 20, and all others 10. Licensed amateurs and listeners may apply, and applications for this and the previous certificate should consist of a copy of log

entries certified as correct by another licensed amateur of the same country. Each costs 15p or three IRCs. The award manager is ASARC secretary Peter Day, G3PHO, 39 St Albans Rd, Sheffield 10, S Yorks.

### The Worked All States Award

This is one of the older awards but one which it is possible to work for during the current poor propagation conditions on the hf and lf bands. It is available to all licensed amateurs who have confirmed contact with each of the 50 United States—those made with Alaska must have been after 2 January 1959, and with Hawaii after 20 August 1959. QSLs and sufficient return postage should be sent together with a list of contacts (preferably on the special form obtainable from ARRL in exchange for an IRC and a large sae) to: ARRL Communications Dept, 225 Main St, Newington, Conn 06111, USA. There is a special five-band WAS available to those who have confirmed 50 states on each of five bands. A standard application form is available from ARRL price \$10—this covers the cost of providing the plaque and return of QSL cards by registered mail. Only QSL cards for contacts after 1 January 1970 are valid for this award.

### 30th Anniversary of the Liberation of Czechoslovakia Competition

0000 1 January to 2400 9 May.

During this period Czechoslovakian stations will use special OK30 and OL30 prefixes and the object of the contest is to contact as many as possible. All bands and modes of operation are allowed. Awards will be made to European stations who contact at least 50 OK30/OL30 stations, and to others outside Europe who contact at least 20. VHF stations need 20 contacts. The station from each continent with the highest number of different stations worked will be awarded a crystal cup. To qualify for this the entrant's log must arrive at: CRCC, PO Box 60, 113 27 Praha 1, Czechoslovakia, before 15 June 1975. For the ordinary awards applications should arrive before 31 December 1975.

## HF BEACON STATIONS

Call sign	Frequency (MHz)	Location	Reports to
DL0AR	29-000	Hiddesen	DL6TC, Paul Nipkow Weg 5, 4930 Detmold, FR of Germany
DL0IGI	28-195	Mt Predigtstuhl near Salzburg	DJ5DT, Kollwitzweg 1, D 6100 Darmstadt, FR of Germany
GB3SX	28-185	Crowborough, Sussex	G3DME
VE3TEN	28-175	Ottawa, Canada	VE3QB, 59 Westfield Crescent, Ottawa 5, Ontario, Canada K2G 0T6
VP9BA	28-165	St Catherines	VP9BY, PO Box 73, Devonshire, Bermuda
5B4CY	28-180	Limassol	5B4AP Box 1267, Limassol, Cyprus
3B8MS	28-190	Signal Mount, Mauritius	3B8DG, PO Box 44, Port Louis, Mauritius

Reports for any of the above may be sent to RSGB HQ (Attn IBP). At present only DL0IGI switches to 28-200 at 00-05 and 30-35min past each hour.

## DIPLÔME DES 100



The International Telecommunication Union awards this diploma to

\_\_\_\_\_ in recognition of his achievement in communicating by amateur radio with other licensed radio amateurs located in the territory of 100 or more member Administrations of the Union.

International Amateur Radio Club  
Award Manager

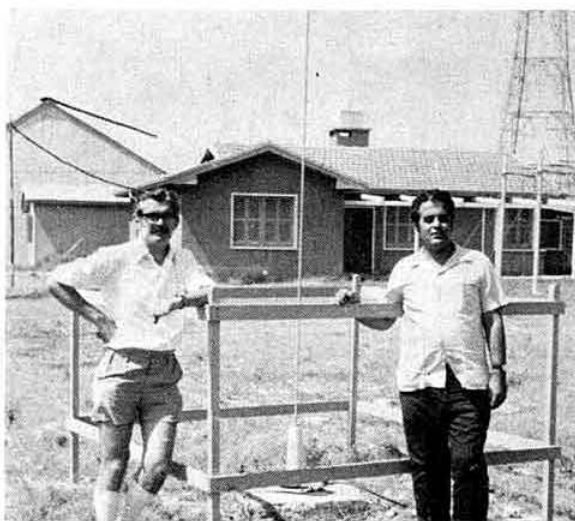
International Telecommunications Union  
Secretary General



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The Diplôme des 100 may be claimed by operators effecting two-way communication with stations located in the territory of 100 or more member administrations of the ITU. There is a similar award for listeners logging 100 or more such stations. Claims should be sent to L. M. Rundlett, K4ZA, 206 E Amhurst St, Sterling Park, 22170 VA, USA



Ground plane aerial system at the Cyprus Beacon (5B4CY), located at Zyl 25 miles east of Limassol on the south coast. Les Rawlings, 5B4LR (G3FET), left, and, Andreas Panayiotou, 5B4BM.

### The Amsterdam DX Certificate

For confirmed contact since 1 January 1957 with 10 members of the Radio Club Amsterdam on any mode. Members include PA0s ACG, ACM, AKA, AL, AMC, AML, ANH, AOB, ASD, AWJ, BDR, BEA, BGO, BPN, CEA, CHN, CLO, CWS, DOG, ELD, END, FCM, FL, GAR, GBJ, GE, GHB, GPA, GPT, HAL, HIL, HGD, HLJ, HOR, HPO, IF, JAC, JEL, JEM, JHV, JPC, JWA, KAP, KHR, KJN, KST, LGR, LRK, LVA, MEB, MFC, MIR, MOR, MOT, MPH, NIC, NIR, NLC, NMM, NNO, OI, PAN, PAU, PBA, PDR, PEP, PER, PJE, PMC, POB, PRF, PRY, PRZ, PSO, PST, QK, RCA, RMA, RSA, SPL, TAP, TBK, TBN, TKS, UW, VDW, VIC, WAP, WEV, WFS, WIK, WIL, WKL, XYL, ZV, ZWO, and PIIZKA. Send application with four IRCs to PA0OI, Boerhaaveplein 14, Amsterdam, Netherlands.

### The DBDX

Issued for confirmed contacts with a minimum of 20 different countries (including Brazil) on the 1f bands (1.8, 3.5 and 7MHz). No cross band/mode contacts are permitted and there are two categories of certificate—phone only and mixed. Stickers will be issued for each 10 countries in excess of the initial 20. All contacts must have been made since 15 November 1945 and QSLs submitted as received with minimum reports of RS 33 or RST 339. Send applications with 10 IRCs to LABRE Awards Manager, DBDX, PO Box 07-0004, Brasilia, DF, Brazil 70000.

### Band reports

Not a very good month on the hf bands but, as some reporters note, 14MHz is often open into South America for an hour around 2200. A few signals have been heard on 28MHz—many more have been recorded by the Intruder Watch.



Callsigns listed in italics were of stations using cw, the rest were ssb signals.

**1.8MHz.** 0000 *KV4FZ*. 0500 *K1BPW*, *K3JJO*, *WB8APH*, *YV4AGP*. 0600 *PY1RO*, *W1*, *W2*, *W3*, *W4*, *W9*. 0700 *K2ANR*. 0800 *KV4FZ*, *W5RTQ*. 1700 *OH3XZ/0*. 2000 *VO1KE*. 2200 *OJ0MA*, *VE1MX*, *W2BP*, *4X4NJ*, *9H1CG*. 2300 *EP2BQ*, *4U1TU*.

**3.5MHz.** 0000 *HS2AIG*, *TR8DG*, *XUIDX*, *ZE6JL*, *ZS4ZF*, *7X0EEG*. 0100 *W5BE*, *K6MFC*, *K7KVV*. 0600 *PZ5FB*, *YV4AGP*, *VP2VZ*. 0700 *CT2BN*, *FY0BHI* (QSL via *F5QQ* not *F2QQ*), *HK0BKX*, *HR6SWA*, *PJ2RR*, *VP1FF*, *YV1AD*, *K6OMI*, *6W8's*. 0800 *W6NLZ*, *ZL's*. 0900 *KV4FZ*. 1000 *WA8ZDF*. 1400 *EP2FR*, *9K2DC*. 1700 *9M2's* *BU*, *DQ*. 1800 *OX3OO*, *VK2AVA*. 1900 *AP2KS*, *JY9GR*, *UA0ABR*. 2000 *HZ1AB*, *OJ0MA*, *YB0AAG*, *OE5CA/YK*. 2100 *A4XVF*, *FL8DN*, *OD5's* *IH*, *IO*, *VQ9M*, *ZC4EB*, *6W8DY*. 2200 *EP2VJ*, *TA3MB*, *TR8DG*, *TU2FD*, *VP5BT*, *W1's*, *W2's*, *9G1DY*, *9X5PT*. 2300 *FL0JN*, *FP8DH*, *HH2JT*, *TJ1EZ*, *VP1FF*, *VP5's* *AA*, *BT*, *VS5MC*, *VS6DO*, *YB0ABV*, *ZD7FT*, *ZS5LB*, *5U7AH*, *9M2's* *DQ*, *PV*. (UA9VH/JT1 each Wednesday at 2300 on approximately 3,607kHz. UA9CBO often MC).

**7MHz.** 0000 *A2CCY*, *ET3USA*, *KP4TIN*, *PJ2VD*, *TU2EF*, *YN9JMP*, *YS1GWE*, 0600 *PY8AKL*. 0700 *FY0BHI*, *LU's*, *ZL's*. 0800 *HP1IW*, *VK's*. 1600 *XUIDX*. 1800 *CR6IK*, *OE5CA/YK*. 2000 *JH1OTZ*, *VK3MR*, *3B8DO*. 2100 *AP2KU*, *CR6UE*, *FG7's* *AM*, *XE*, *HC2TV*, *H18MFP*, *KV4CI*, *PY's*, *4K1D*, *9G1LZ*. 2200 *CE3AVB*, *FM7AB*, *HK0BKX*, *JA5PL*, *VK6HD*, *VP1FF*, *ZD7FT*, *9X5PT*. 2300 *CR6's*, *CR7's*, *FG7XZ*, *HI's*, *HK's*, *TJ1AX*, *VP2's* *GFA*, *LAW*, *SAH*, *XE1XQ*, *ZD7's* *PS*, *FT*, *3D6AX*.

**14MHz.** 0000 *LU's*, *PY's*, *ZP's*. 0700 *KX6BU*, *TT8HT*, *ZB2A*. 0800 *FK8AC*, *HL9KT*, *JH3DPB/PI* (Harumi Is), *KG6LBE*, *ZL's*. 0900 *JT1KAA*, *M1D*, *P29MO*, *VK's*, *VK2BZM/VK9* (Norfolk Is), *VP8HZ*, *VR4BS*, *ZL's*, *9K2DR*. 1000 *CE3ADW*, *OA4WBW*, *ON4AXA/MM* (at end of voyage). 1100 *JA's*, *PA0IWH/S2*, *VP2ME*. 1200 *HR6SWA*. 1300 *A9XO*, *C5AG*, *VE3CUD/SU*, *WA6HNQ/VQ9* (Chagos Is), *XV5DA*. 1400 *FR7's* *AG*, *ZW*, *HZ3TYQ*, *VK6's*, *VK9X1*, *VU2GW*, *OE5CA/YK*, *ZL2WC*, *5T5CJ*. 1500 *W6's*, *W7's*, *XE1FR*, *XP1AA*. 1600 *FL8PE*, *FO8EG*, *FR7AR*, *SU1MA*, *VE7's*, *VK8DB*, *4W1GM*. 1700 *C6ABC*, *FP8BR*, *VQ9BP*, *8Q6AC*. 1800 *TN8BK*, *ZS1ANT*. 1900 *W2BJI/VP2A*, *VP5GT*, *VP8NP*. 2000 *VP2DE*, *ZD7's* *PS*, *SD*, *ZD8TM*, *9G1LZ*. 2100 *FY7AM*, *HR8AA*, *TU2EB*, *VP8JC*, *3Y3CC*. 2200 *KV4CZ*. 2300 *CE's*, *CX's*, *FG7AO*, *LU's*, *OA's*, *PY's*.

**21MHz.** 0800 *5N2ESH*. 0900 *FR7AT*, *VS5MC*, *ZS's*, *ZS6BHW/3D6*, *9J2's*, *9V1SN*. 1000 *JY9CR*, *ZD7FT*. 1200 *FY0BHI*, *ZS's*. 1300 *CR7's*, *OA7AS*, *VP1MT*, *VQ9HCS*, *9G1LZ*, *9J2's*. 1400 *AP2AD*, *VP8LP*. 1500 *HC2YL*, *TJ1AD*, *WB2POJ/VQ9* (Chagos Is), *ZD9BP*. 1600 *ZD9BT*.

**28MHz.** 1000 *ZD7FL*, *ZS3XQ*. 1100 *A2CCY*.

Many thanks to G2CL, G2HKU, G4RZ, G5JL, G6GH, G8MY, G3GVV, G4DFN, BR5s 17567, 17991, 31301 and 35608, and As 8312, 8428, 8713 and 8752, for the information used in compiling the above, and also to the authors of the following for items obtained from their publications: the DX'ers Magazine (*W4BPD*), Long Skip (*Nick Sawchuk*), the West Coast DX Bulletin (*WA6AUD*), DX'press (*PA0TO*), the Ex-G Radio Club Bulletin (*W3HQO*), DX News Sheet (*Geoff Watts*), and World Radio News.

## Propagation Predictions

At the time of the equinox in March the MUFs are almost equal north and south of the Equator, so that conditions in both hemispheres are similar; conditions for the southern hemisphere will be much improved compared to the winter months. The sunspot activity at this phase of the sunspot cycle (shortly before the minimum) will be so little that 28MHz will be of little importance for dx traffic. Contact with Africa might just be possible between 0900 and 1630gmt, and most improbably between 1400 and 1600gmt with South America. As summer approaches traffic on 28MHz will increase through sporadic short-skip contacts over distances of about 700 to 1,800km.

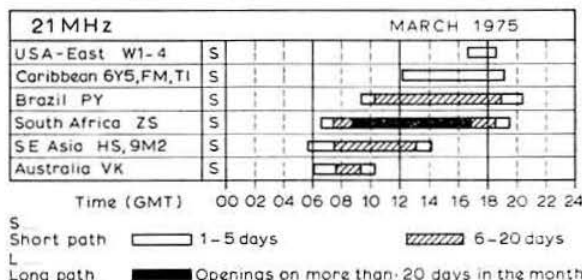
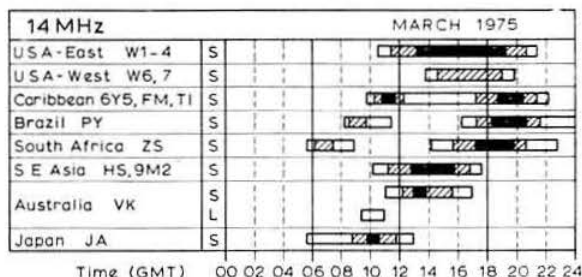
The low sunspot activity and approaching summer mean relatively poor conditions on 21MHz. This will be very noticeable in traffic with North America: the east coast (W1-4) will only be heard during late afternoons of days with above average F2 MUFs; the west coast as well as Hawaii and Alaska will not be heard. Only traffic with Africa is certain on this band.

Conditions on 14MHz will improve as nights shorten and the band remains open longer in the evenings. QSOs will be possible with all continents, but chances of dx via the indirect path will be very small at the time of the equinox. On days with above-average F2 MUFs there will be possibilities of dx with Hawaii between 1640 and 1830gmt, and with Alaska between 1530 and 1830gmt.

DX will be possible during March on 7MHz when the longer part of the path lies in darkness. Traffic with South America, Australia and South Africa will improve. QRM permitting, eastern North America will be heard from about 2100gmt. During the latter half of the night there will be interruptions as frequencies fall to low. The F2 MUFs at present are below 7MHz, so this band will often be interrupted during daytime by the dead zone.

The 3.5MHz band will see a slight worsening of dx traffic compared to the previous months as atmospheric will increase slowly this month and continue throughout the summer months. During the latter half of the night (sometimes even sooner) local traffic will be interrupted by the dead zone.

The provisional sunspot number for January 1975 from the Swiss Federal Observatory was 18.7. The last week of the month produced very little solar activity. The current solar cycle continues towards its minimum and the solar activity indices issued by the Telecommunications Services Center at Boulder show a decline from 24 in January to 11 in December 1975.



Please send all items for April issue to reach G3FKM no later than 4 March and for May issue by 9 April.

# COUNCIL PROCEEDINGS

A brief report of the Council meeting held on 18 November 1974

**Present:** Mr G. R. Jessop (*President, in the chair*), Messrs P. Balestrini, J. O. Brown, R. W. Fisher, W. J. Green, W. F. McGonigle, L. E. Newnham, C. H. Parsons, J. R. Petty, W. A. Scarr, A. W. Smith, R. F. Stevens, G. M. C. Stone, F. C. Ward (*members of Council*), D. A. Findlay (*general manager*) and A. W. Hutchinson (*editor*).

Apologies for absence had been received from Dr J. A. Saxton, Dr E. J. Allaway and Mr D. Byrne. A subsequent apology was received from Mr R. J. Baker who was unavoidably detained on business.

## Repeaters

Mr Stone reported that a service area survey produced by the Martlesham Heath Repeater Committee had been submitted to the Home Office. A survey had also been carried out independently by the Home Office and it appeared that there were some discrepancies which would have to be resolved before agreement could be reached with the Home Office.

A proposal for a repeater to be situated at Turners Hill, Birmingham, had been received by the Society and submitted to the Home Office. The service area of this repeater appeared to overlap the service areas of other repeaters, but an explanation of the geographical problems had been given to the Home Office.

## 35 Doughty Street

The Honorary Treasurer reported that there had been a meeting of the "ad hoc" committee on 14 November and the feasibility of maintaining one floor only as a reception area and letting the remaining parts of the building to other tenants had been considered. The administration and editorial functions would be moved to a location outside London.

Mr Brown was considering the financial aspects of the proposal and would report back to the committee.

## IARU Working Group

Council accepted the suggestion that Messrs R. J. Hughes, G. M. C. Stone, R. J. Baker and D. Andrews should form the RSGB delegation to the IARU Region 1 Conference to be held in Warsaw in April 1975. Mr D. Thom would be available as reserve in case of need.

## Vice-Presidents

A ballot was held for the members proposed as Vice-Presidents of the Society. The President announced that Messrs W. Browning, G2AOX; J. Hum, G5UM; and P. A. Thorogood, G4KD, had been successful in the ballot.

## Membership and affiliation

It was resolved:

- to approve the applications for membership, transfer and reinstatement and accordingly elect 192 new members;
- to accept reduced subscriptions from two members;
- to waive the subscriptions of 15 members on the grounds of blindness or other disability.

## Items from committee minutes

### Scientific Studies Committee, 23 September 1974

The President asked if there was any likelihood of study projects in which more members of the Society could participate. The response to a request from Mr A. Taylor, G3DME, for observation of the hf beacons had been very poor and the President felt that more publicity should be given in *Radio Communication* to hf observation projects.

### Mobile & Exhibition Committee, 15 October 1974

It was reported that at the ARRA Exhibition at Leicester the cash turnover at the Society bookstall had been approximately £3,000 but the surplus could not be given until the expenses were known.

Mr Brown proposed that a vote of thanks be given to the members of the committee who had done so much to make the bookstall a success.

## IARU Working Group, 17 October 1974

Council accepted the recommendation that Mr D. Thom, G3NKS, be invited to serve as a member of the working group.

Mr Stevens pointed out that the papers submitted by RSGB committees for consideration at the IARU Region 1 Conference in Warsaw were of a very high standard and Council agreed that papers should be published in *Radio Communication* after the conference.

## Honorary Treasurer

Council appointed Mr J. O. Brown, G3DVB, retiring Honorary Treasurer, to serve as Honorary Treasurer for a period of three years from 1 January 1975.

## Council

The President stated that this was the last Council meeting of his Presidential year and thanked the members for the advice and assistance that he had received during his term of office.

Mr Stone said that on behalf of the members of Council he wished to thank the President for his efforts on behalf of the Society during 1974.

# VHF Committee report

## Microwave beacons and repeaters

The microwave sub-committee recently discussed the technical and operational aspects of repeaters and beacons on the microwave bands. The main conclusions drawn were that such beacons could be expected to be as valuable as those at lower frequencies, and that repeaters (or repeater/beacons) would be a worthwhile development in their own right. No clear arguments against them were uncovered. Most of the discussion concerned repeaters, and this is summarized below.

## General points

(a) It was felt that there might be significant interest in repeaters because of their greater utility. Although their range on the higher microwave frequencies would perhaps be limited to optical and near-optical paths (an area to be studied), a well-sited repeater could nevertheless cover many hundreds of amateur stations.

(b) Repeaters offer a practical method, and perhaps the only method, for networking on the microwave bands in an urban environment. Directing a fixed aerial on to a well-sited repeater usually would be much less of a problem than providing a satisfactory mounting for the rotatable aerial (probably of much higher gain) necessary for direct working.

(c) It was felt that the mere existence of repeaters at these frequencies would have an influence on many amateurs. Their main function would be to stimulate activity rather than to provide an additional service to a large number of existing amateur stations. Because most microwave equipment must be home-made, there necessarily will be much more participation by the user than there generally is with vhf repeaters.

(d) The establishment of microwave repeaters may have a valuable impact on professionals: they would represent a significant advance over commercial practice, and there already exists much interest in the propagation of gigahertz signals in urban environments.

(e) Repeaters which acted as beacons when not accessed have obvious advantages. There appear to be no technical problems in doing this: the repeater receiver would simply have to be able to respond to an input while its corresponding transmitter was on.

(f) It seems to be a good principle that the repeater output should fall within the sub-band specified for narrow-band working. In this case the repeater output could be received by anyone with "standard" equipment, and the onus would be on the person who wished to access the input to build the special transmitter and transmitter frequency monitoring equipment required.

(g) It appears desirable that the repeaters be crystal-controlled, and to be able to accept wide-band fm signals as well as narrow-band signals.

## In-band repeaters

There appear to be no advantages in limiting the input/output frequency spacing to the value of approximately 0.5 per cent

standardized for vhf and uhf repeaters, since this spacing ranges from 6–120MHz and is therefore well beyond the tuning range of most tunable I.F.s.

A more satisfactory approach seems to use spacings based either on "standard" tunable I.F.s, eg 28MHz, 144MHz or twice these values.

One of a number of possible schemes is given below.

Band	Input frequency (MHz)	Output frequency (MHz)	Difference (MHz)	Notes
23cm	1,238.3	1,297.7	$2 \times 29.7$	1,2
13cm	2,365.1	2,305.7	$2 \times 29.7$	2,3
9cm	3,400–3,401.7	3,457.7	$2 \times 28-28.85$	2,4
6cm	5,702.3	5,761.7	$2 \times 29.7$	2
3cm	10,078.3	10,369.7	$2 \times 145.7$	2,5
12mm	24,048.0	24,193.7	145.7	6

#### Notes:

- (1) Fits in with the French 23cm allocation.
- (2) Receiver local oscillator can be set midway between input and output channels so that both input and output channels can be monitored by a single receiver.
- (3) On this band only, the repeater input is at the higher frequency.
- (4) Not quite standard, but fits in with the use of 28MHz as a preferred i.f. for the "coaxial" bands and 145MHz for the "waveguide" bands.
- (5) Chosen to put input into the bottom 100MHz of the allocation.
- (6) Input in internationally allocated band.

#### Cross-band repeaters

There does not seem to be an obvious case either for or against microwave band—microwave band repeaters, eg 1.3GHz to 10GHz.

A more interesting possibility is that of vhf or uhf—microwave repeaters. The most suitable lower frequency would appear to be within the 70cm band, 2m being less suitable because of the density of its population, and 70MHz because it is a limited allocation. Clearly the relative power of the transmitter and the sensitivity of the receiver must be set to balance the ranges obtained at the two frequencies.

The main advantage of a cross-band repeater is that it can significantly reduce the amount of microwave equipment initially required to achieve some activity on the bands. Thus, repeaters could be used to stimulate 9cm and 6cm activity which otherwise may well take some time to build up.

The two cases to be considered are as follows:

#### (a) 70cm input—microwave band output

The transmitter and transmitter monitors are widely available, and only a microwave aerial and receiver need be built to take advantage of a repeater of this type. One such repeater, actually with 144MHz input and 2,300MHz output, exists in the USA, and is reported to have been most successful in encouraging a start on 2,300MHz equipment in that area. The main disadvantage of this type is that deliberate jamming of the input channel will produce an output at a microwave frequency which will not be monitored by most amateurs. The risk of this occurring can be reduced by the setting of the 70cm receiver input sensitivity so that it responds only to signals directed at the repeater from distances within the range of the output. Alternatively, an input frequency just below 432MHz could be specified.

#### (b) Microwave input—70cm output

The advantage of this type is that microwave activity can be monitored by anyone with a 70cm receiver.

There seems little risk of jamming this type. The main disadvantage is that the potential of the repeater to be used as a microwave beacon is lost. There is also the risk of only the transmitters necessary to access the repeater being built, and not the associated transmitter frequency monitoring equipment.

G3RPE

## Education Committee report

### The Christmas lecture

A record number of young people attended the 1½-hour demonstration lecture "The world of amateur radio" given on 4 January at the National Science Museum. One of the highlights of the demonstration was a hold-in-the-hand transistor cw transmitter in conjunction with a miniature receiver; both of which could be made at minimum



David Pratt, G3KEP, RSGB Council member and chairman of the Education Committee, giving the demonstration

cost by any newcomer to amateur radio. The transmitter circuit appeared in "Technical Topics" in the July 1974 issue of *Radio Communication*.

The Education Committee is convinced that this demonstration points the way for beginners to find real enjoyment in their hobby. With a simple home-built cw transmitter which can encompass the world, what a sense of achievement it can bring especially for an expenditure of only a few pounds. As the cost of phone equipment—home constructed as well as commercial—continues to escalate, it may well be that the key to the world will once more be the morse key.

The committee is indebted to Mr John van Riemsdijk and the Science Museum staff for their co-operation, the use of the lecture theatre and for putting GB2SM on the air after each lecture.

## YOUR OPINION

#### The Editor

#### Radio Communication

Sir—A good many modern inventions seem, on reflection, to have showered the dazzled public with more tribulations than blessings.

Who could doubt that... as the authors of *1066 And All That* would have said... cars and aircraft are "Bad Things"? Readers will of course have their own "Bad Things" lists. Mine would be headed by QSL managers.

Those of us who go in for the quaint, faintly ridiculous, but harmless hobby of QSL collecting are coming near to being priced out of the market. How much cheaper and easier it would be if we all returned to the once universal "QSL via bureau only".

Admittedly the occasional station on a volcanic island which has just appeared in the *Serpentine* and has been declared a new country, may work a thousand stations a day and have no postal service; he may need a little help. But perfectly normal stations in large industrialized countries do not need and should not use QSL managers. We are getting to the stage where Fred across the road is my QSL manager and I am his.

Down with the lot of them!

J. J. Maling, G5JL

#### The Editor

#### Radio Communication

Sir—Unlike recent correspondents I can see no real need to alter either the call sign system or the QSL Bureau allocations.

G(W) 8PG's remark about two sub-managers suggests a solution to the problem of misdirected cards. If you are going to operate out of your own call area, why not send envelopes to the appropriate sub-manager before you go? Even the most enthusiastic tourist could cover all eventualities for the price of a gallon of petrol!

J. Phillipson, G4BEZ

## The Editor

### Radio Communication

Sir—Have just received the November 1974 issue and feel a vote of thanks is due to G3PTN for his article on home-made balun transformers.

Commercial baluns are NOT cheap and one USA model (not the one he mentioned) caused me nothing but trouble with a three-band trap beam.

I tried to get cores locally and was quoted a very stiff price from Singapore. I did, some months ago, consider the possibility myself of using ordinary ferrite rods but was side-tracked by advice from a highly qualified electronics engineer out here who said they could not possibly be used with any appreciable power above 20MHz.

Would Mr Chowanec, if he has the test equipment facilities, be able to give figures on how good is the balanced output on each leg, please?

May I take this opportunity of sending best wishes for 1975 to the very many UK amateurs I work, and tell them that out here we are permitted on 80m up to 3.9MHz, so if they hear me below 3.8MHz it is better to ask me to go "split" for me to transmit on a frequency, above 3.8, which they FIRST check to be clear in G.

J. C. Pershouse, 9M2DQ

## The Editor

### Radio Communication

Sir—With regard to the changeover from the old counties to the new districts, I feel that we GMS have suffered a huge loss in "areas

to be worked". This is surely going to seriously reduce the interest in working GM stations, particularly on the vhf/uhf bands, which is likely to cause beams to be turned towards GM-land even less than at present.

This reduction in GM areas to be worked is also likely to discourage intending vhf/uhf expeditions to visit GM, thus reducing interest in GM even further.

I realise that there would be difficulties in reorganizing claimable areas but feel that strong support would be forthcoming, both from GM-land itself and outside it, to look into the situation.

Two tentative solutions I would like to put forward are:

- (a) Counting districts rather than regions in Scotland (A vote at the Dundee VHF Convention brought a majority in favour of counting districts).
- (b) Dividing each Scottish region into four parts, eg NE Borders, SE Borders, SW Borders, and NW Borders in place of "Border Region". Each region could be divided along suitable longitude and latitude lines or some other divider identifiable on a standard map.

D. Dance, GM4CXP

## The Editor

### Radio Communication

Sir—Having read *The Bull* since 1939 I am only too pleased to be a seconder to Mr Kendall's remarks. Top marks to the people who work behind the scenes, without them there would be no society. To radio amateurs who are not members I say, "Join your 'union', no Society—no amateur radio".

G. S. Rose, G2DRT

# RSGB PRESIDENTS, VICE-PRESIDENTS, HONORARY VICE-PRESIDENTS AND HONORARY MEMBERS

## Presidents

1913-20	Alan A. Campbell Swinton, FRSE.
1921	Major John Erskine Murray, DSc.
1922	Admiral of the Fleet Sir Henry Jackson, GCB, KVCO.
1923-4	Professor W. H. Eccles, FRSE, DSc.
1925	Sir Oliver Lodge, FRSE, DSc, LL.D.
1926-7	Brigadier General Sir Capel Holden, KCB, FRSE.
1928	Captain Ian Fraser, CH, G5SU.
1929-30	Gerald Marcuse, G2NM.
1931-3	Henry Bevan Swift, G2TL.
1934-6	Arthur Egerton Watts, G6UN.
1937	Ernest Dawson Ostermeyer, G5AR.
1938-40	Arthur Egerton Watts, G6UN.
1941-3	Alfred Duncan Gay, G6NF.
1944-6	Ernest Lett Gardiner, BSc, G6GR.
1947	Stanley Karl Lewer, BSc, G6LJ.
1948-9	Victor Michael Desmond, G5VM.
1950-1	William Arthur Scarr, MA, G2WS.
1952	Frederick John Henry Charman, BEM, G6CJ.
1953	Leslie Cooper, G5LC.
1954	Arthur Oswald Milne, G2MI.
1955	Herbert Arthur Bartlett, G5QA.
1956	Reginald Harry Hammons, G2IG.
1957	Douglas Alexander Findlay, DFC, G3BZG.
1958	Leonard Eugene Newnham, BSc, G6NZ.
1959	Reginald Leslie Smith-Rose, CBE, DSc, PhD, FCGI.
1960	William Radcliffe Metcalfe, G3DQ.
1961	Major-General Eric Cole, CB, CBE, G2EC.
1962	Edward George Ingram, GM6IZ.
1963	Norman Caws, G3BVG.
1964	Geoffrey Malcolm Cecil Stone, G3FZL.
1965	Eric William Yeomanson, G3IR.
1966	Roy Frederick Stevens, G2BVN.
1967	Alexander Davidson Patterson, G13KYP.
1968	John Graham, G3TR.
1969	John Walter Swinnerton, BSc(Econ) Hons AIL, G2YS.
1970	John A. Saxton, DSc, PhD, CEng, FIEE, FInstP.
1971	Frederick Charles Ward, G2CVV.
1972	Robert James Hughes, TD, DLG, G3GVV.
1973	John A. Saxton, CBE, DSc, PhD, CEng, FIEE, FInstP.
1974	George R. Jessop, CEng, MIERE, G6JP.
1975	Cyril H. Parsons, GW8NP.

## Vice-Presidents

1930	Maurice Child.
	Colonel M. J. Dennis, CB.
	P. P. Eckersley, MIEE.

	Commander R. J. B. Hippisley, OBE.
	Rene Klein, FRSA, MIRE.
	Commander F. C. Loring, MIEE.
	Leslie McMichael, MIEE, FInstRE, G2FG.
	J. H. Reeves, MA, MBE.
	E. J. Symonds.
	J. Wyllie.
1938	George Courtney Price, TD, GW2OP.
1947	Walter Butt Sydenham, BSc, G5SY.
1951	David Nisbet Corfield, DLG (Hons), FIEE, G5CD.
1951	James William Mathews, G6LL.
1952	Alec John Henry Watson, FCA, ex G2YD.
1959	William Herbert Allen, MBE, G2UJ.
1961	Frederick George Lambeth, G2AIW.
1964	Arthur Oswald Milne, G2MI.
1973	William Ernest Frederick Corsham, G2UV.
1974	Jack Hum, G5UM.
1974	Willoughby Browning, G2AOX.
1974	Phillip A. Thorogood, G4KD.

## Honorary Vice-Presidents

	Professor Sir Ambrose Fleming, MA, DSc, FRSE, MIEE.
	E. H. Rayner, DSc, MIEE.
	G. F. Gregory, MIEE, MICE.
	E. H. Shaughnessy, MIEE.
1972	Lt Col Per-Anders Kinnmann, SM5ZD.

## Honorary members

1914	Sir William Crookes, OM, FRSE.
1914	Sir Oliver Lodge, FRSE, DSc, LL.D.
1920	Senatore Guglielmo Marconi, GCVO, DSc, LL.D.
1938	Ernest Dawson Ostermeyer, G5AR.
1938	Henry Bevan Swift, G2TL.
1941	Arthur Egerton Watts, G6UN.
1942	Reginald Leslie Smith-Rose, CBE, DSc, PhD, FCGI.
1944	Alfred Duncan Gay, G6NF.
1945	Leslie McMichael, G2FG.
1946	Gerald Marcuse, G2NM.
1947	Ernest Lett Gardiner, BSc, G6GR.
1951	Stanley Karl Lewer, BSc, G6LJ.
1952	Victor Michael Desmond, G5VM.
1953	William Arthur Scarr, MA, G2WS.
1954	Frederick John Henry Charman, BEM, G6CJ.
1954	Rene Klein, G8NK.
1963	John Clarricoats, CBE, G6CL.
1970	Norman Caws, G3BVG.
1972	Professor Sir Martin Ryle, FRSE, G3CY.



# Dxpedition to Desroches

by Diane Cardell, VQ9DC\*

HOW many yl operators have the chance to go on an expedition to a remote desert isle with three handsome American bachelors? Do not give up hope, girls, it can and did happen to me!

VQ9-ers-BP, D and M gave me this fabulous opportunity to join them on a trip to Desroches last year, and having tried field days and camping out in the wilds of Kenya as a radio control station with om John on several East African Safari rallies, there is nothing to compare with 14 days on a dxpedition with the promise of a dx break in propagation.

After much planning, buying and borrowing, we finally set off from Beau Vallon Bay on the racing yacht *Stormy*—winner of the Cape to Rio Race two years ago—with gear consisting of four rigs, three generators, a variety of aeriels, three drums of petrol and sufficient food to stand a siege. It was an all-night journey with rough seas, a strong wind and rain, but we made eight knots. Daylight brought calmer weather and by 0040gmt we were overjoyed to see a speck of land—unbelievable Desroches.

The island manager, Monsieur Loiseau, and his crew came out in a large pirogue (a canoe type boat) both to welcome and help us ashore with our gear. This was carried out with the utmost efficiency, our only breathtaking moment being when lowering the second drum of petrol into the pirogue and almost capsizing it. Once ashore, we were able to appreciate the beauty of the surroundings: a coral atoll 8ft above sea level, about 800 acres of, mainly, coconut trees but with areas of cedar and mangroves, the latter inhabited by hundreds of tiny Red Cardinals. I also glimpsed my first Boobys and Sooty Terns, not seen on Mahé Island. The population consists of about 24 Seychellois workers who tend and harvest the coconut plantations for the copra, which is exported, and we were all impressed by the lay-out and tidiness of the island which is a credit to M Loiseau.

It seemed peaceful compared to our home island: a Morris pick-up being the only vehicle, which did a fine job in transporting us to the quarters we were to occupy for the next two weeks. The accommodation was spacious and pleasant: a large porch which served as a store for everything but the kitchen sink, plus operating space for Bill and Ron; a large bedroom at each end of the building, and a smaller room in the centre which we made into a utility room—midnight snacks for starving ops and operating positions for Dick and Diane. Two cold showers—an unexpected, albeit primitive luxury, and plenty of drinking water too. We utilized the manager's outdoor kitchen, a very dark smokey wooden building some distance away from our rooms, with wood fires burning under mesh grilles, and we had some excellent meals—compared to our Kenya safaris, extreme luxury.

The lads soon got to work on the aeriels. We had two beams, two verticals, dipoles and a long wire, and having erected the first one, my KW2000E was fired up and I was given the honour of making the first contact with the outside world. This was 5Z4NH and he was as pleased as we were.

Next morning the beams were assembled and a highlight was trying to avert a minor tragedy as the TH3 toppled over with a resounding crunch, hitting the side of the copra shed and making a beautiful right angle bend in one element, but it worked, nevertheless. We were set up ready to take on all comers, and with excellent conditions until contest weekend were able to give and receive many contacts and first VQ9/Ds. Conditions deteriorated during our second week, but we struggled on, taking advantage of every minute of band opening. I logged about 50 countries in 150 contacts before my transmitter broke down, but with all three lads offering me their rigs as second operator I increased my score to 75 countries. We were impressed by the operating of the calling stations: all stations standing by when requested, most courteously and often hanging around for ages in long pile-ups, which was appreciated by us all.

Here I would like to record my especial thanks to Sandy, GM3DZB, and Jerry, G3KTJ, who helped out with the pile-ups and messages, and did so much to cheer us along in the dull condition periods. There were many others who made the dxpedition a success, but

lack of space prevents a personal mention. I was more than delighted to be able to get into the YLISB system and to find Mary-Ann, WA3HUP, as she proceeded to get through as many W/Ks in as short a time as possible while good conditions prevailed.

I feel sure there must have been some doubts about having an xyl along on a trip like this, but for my part it was a tremendous success and I could not have wished for more compatible companions.

All good things come to an end and soon we sighted the *Stormy* arriving to take us back. What a return trip! After very rough, high seas we were all pleased to disembark on Saturday 21 September after 15 hours hard going, all bleary eyed, wet, and weary but thrilled to have done it and ready for the next one.

My story would not be complete without credits to all our amateur friends on Mahé; especially Carl, VQ9R, who kept us in touch with John, VQ9MI, through his spare Swan 500c, and for loaning me lots of other gear so useful on the trip. The trip would not have been possible for me without the tremendous backing from my many amateur friends. Thanks for the party!

## CQ XYL

by Jill Bazley (xyl, G3HCT)

If you are an xyl, do not despair; I too have cried, "Oh, not another contest!", with the thought of another weekend when the om speaks to the whole wide world but not a single word to the xyl, or David, Judy or whatever the children are called. All that effort. Days erecting new aeriels, testing them, tearing them down and erecting another lot—all looking just the same to the uninitiated—a conglomeration of wires. I stand corrected—a thing of beauty, but then beauty is in the eye of the beholder!

But to what end? Months after the contest, when it is all forgotten, five letters in a magazine to show the final placing. Still more months pass and a certificate arrives, always on the very day of course when you plan to rise late—but the postman cannot get the wretched thing through the letterbox, so you awake to the incessant ringing of the door bell at 7.30am and the enthusiast is bursting with pride.

"You remember," he explains, "it's for the 'PQR' Contest in 197...". At least 18 months before.

"Oh!" exclaims the xyl, "the one when five lots of neighbours complained about the tv or the one when I blew the fuses and you got so cross?"

Wrong again, neither were right. But, then, does it matter so long afterwards?

But at last there is one that really *does* matter. The Bermuda Contest. A certificate? Yes! A tankard as well, but also, and even better, a visit to Bermuda. Yes, really! The winner goes to Bermuda for a week to collect his certificate and tankard. Air fare and hotel paid for! I for one am quite prepared to keep the children quiet, fight off the neighbours, not use the vacuum cleaner and put up with the other trials of being an xyl of a radio amateur for a visit to Bermuda.

I defy any amateur to venture on such a holiday without his wife if he wins *this* contest. Surely it is little enough reward for one who has stood the rigours of being married to a radio amateur.

I have just returned from such a trip. "A holiday of a lifetime," I said before we left England. What an understatement! What hospitality and genuine friendship was shown to amateurs and wives alike. Despite arriving 5½ hours late and at 10pm Bermuda time we were greeted by a welcoming party at the airport and very quickly whisked off to a first-class hotel. Note: the wife's hotel expenses are also met for a week, so only the airfare and spending money have to be found.

The welcoming party brought along a folder full of information including invitations to cocktail parties, the annual banquet and the Annual General Meeting of the Radio Society of Bermuda—wives included even to that, and made most welcome.

The occasion is Radio Week in Bermuda and there are many regular visitors to the island from Canada, America and Europe. The climate is superb, temperatures around 80°F during the day and 70°F during the night. The sea so warm to swim in, with all hotels seeming to have their own pools.

XYLs, it really is a contest to enter—no cries of anguish but do not forget one condition. If he wins, you go as well and have your holiday of a lifetime.

\*PO Box 188, Mahé, Seychelles Islands.

# CONTEST NEWS

## Rules for VHF NFD 1975

The rules for this year's VHF NFD are almost unchanged from those of the 1974 event.

Fixed stations wishing to have their 144MHz scores checked and entered for the IARU Contest please see Rules 19 and 20.

1. **Duration**  
From 1600gmt 6 September to 1600gmt 7 September.
2. **Bands**  
The 70MHz, 144MHz, 432MHz and 1,296MHz bands only will be used.
3. **Eligible entrants**  
Any RSGB member or group of members operating within the British Isles may take part.
4. **Operators**
  - (a) Operators of stations taking part in the contest must each hold a current British Isles amateur (sound) licence and must be fully paid-up corporate members of the RSGB at the time of the contest.
  - (b) Points may not be claimed for contacts with stations operated by, or using the call signs of, operators of the competing station or group of stations.
5. **Power supplies**  
Stations may not use public supply mains. Power for all equipment must be derived from an on-site portable generator or battery.
6. **Stations**  
Each competing group will be permitted a maximum of four stations, each using a different callsign. Only one station may score points on a given band. There is no restriction on the way in which the bands are divided between the stations (eg 70MHz and 432MHz on one station, 144MHz on another, to form a two-station entry). Special event call signs (eg GB) may not be used.
7. **Sites**  
All the stations forming one entry must operate from within a circle of 1km radius centred on the operating position of any of the stations. *Proof of permission to use a site may be required.*
8. **Groups**  
Any two groups may combine their score to form one entry, subject to the requirements of Rules 6 and 7.
9. **Setting-up time**  
All equipment, including aerials, must be installed on the site (as defined in Rule 7) during the 24 hours preceding the contest or during the contest. The site may not be used for any transmitting activities by the group or member during the five days before this time.
10. **Concurrent working**  
A station may not engage in more than one contact concurrently.
11. **Scoring**
  - (a) On the 70, 144 and 432MHz bands, contacts will be scored as follows:

km	points	km	points
0-50	1	200-250	9
50-100	3	250-300	11
100-150	5	300-350	13
150-200	7	and pro rata	
  - (b) Contacts on boundaries between scoring rings score low.
  - (c) Band multipliers will be as follows: 70MHz-2, 144MHz-1, 432MHz-6.
  - (d) On 1,296MHz scoring will be one point per kilometre.
12. **Contest exchanges**
  - (a) Contestants must exchange RS or RST reports followed by a serial number. Serial numbers start at 001 on each band and advance by one for each contact.
  - (b) Contestants must send and log both QTH and QTH Locator. The QTH must be a point which is identifiable on the Ordnance Survey 10-mile or 1:625,000 maps, or a distance in kilometres and a bearing from such a point. The distance must not exceed 25km and should be given to the nearest kilometre. The QTH Locator is the standard location fixing system.

- (c) The QTH given on 1,296MHz must differ in form from that given on the other bands, eg a location given as "10km north of Marlborough" on 432MHz could be given as "8km south-east of Swindon" on 1,296MHz.
13. **Contacts**
  - (a) Only one contact may be made with a given station (ie call signs that are fixed, /P, /A or /M, or the same set of equipment used under a different callsign, all count as one station). If a station that has moved location is contacted a second time, only the higher scoring contact may be claimed.
  - (b) Repeat contacts must be clearly marked as such and the points column left blank.
  - (c) The 1,296MHz station may operate on any other band for the purposes of arranging a contact, but the exchange of contest information must take place on 1,296MHz only and may not be interrupted by recourse to another band.
  - (d) Contacts made by eme reflection, man-made satellites (active or passive) or any relaying device will not count for points.
  - (e) Contacts made with unlicensed stations will not count for points.
14. **Calling CQ**  
Contestants are asked to indicate on which band they are calling CQ and are strongly urged to state their tuning intentions, and to call CQ in the correct frequency zone. 1,296MHz stations operating on another band (Rule 13c) should call "CQ for 23cm only".
15. **CW segments**  
Any station operating on modes other than A1 or F1 in the segments 70-025-70.1, 144-144.15, 432-432.15 or 1,296-1,296.15 MHz, or transmitting on beacon frequencies, is liable to be disqualified.
16. **Defective signals**  
Stations that persistently overmodulate, radiate key clicks or poor quality signals, or transmit excessive harmonics, or otherwise contravene the code of practice for vhf/uhf contest operation, are liable to disqualification. Monitoring stations will be in operation.
17. **Proof of contacts**  
Proof of contacts may be required.
18. **Disputes**  
The decision of the Council of the RSGB is final in any cases of dispute.
19. **Logs**
  - (a) Logs must be submitted on RSGB VHF/UHF Contest Log Sheets. Separate logs must be submitted for each band. Groups wishing to have their 144MHz logs forwarded to the IARU Region 1 VHF Contest should enter the distance in kilometres in the points column and the score as Rule 11 on the rear of the sheet.
  - (b) Entrants must keep their own log records in accordance with the licence requirements.
20. **Entries**
  - (a) Entries must be postmarked not later than 22 September 1975.
  - (b) Entries must be marked VHF NFD in the top left-hand corner of the envelope and addressed to: The Chairman, VHF Contests Committee, 20 Harcourt Road, Wantage, Berks.
  - (c) A cover sheet (Form 427) must be made out for each band and must show the call signs of all operators.
  - (d) In addition to Form 427, a special summary sheet must be forwarded, even by single-band entries. The declaration must be signed by one member of the group, who will be considered responsible for the entry.
21. **Awards**  
The Surrey Trophy will be awarded to the overall winners, and Certificates of Merit will be awarded to the overall runner-up, the leading entry from each country and the highest scoring station on each band.

## VHF NFD, 1974 results, errata

The following entries were posted or delivered too late to be adjudicated: Nunsfield House CA ARG, Bedford ARC UHF Group, and G3UHN, G3SHK, G3TAL Group.

### Addiscombe

Position should be 13—total score 2,968.

### Wessex ARC

Position 35—omitted from table.

## 1,296MHz Cumulative Contest results

From the comments received, the cumulative style contest to promote activity (which was mainly southern except for the group in Yorkshire—G3NHE nearly made it with G3UUL) was right, but most contestants said the timing should coincide with the evening propagation period, preferably not over the weekend, and a longer gap between activity. No notable dx was worked except the regular G3JVL-G3LQR path.

Direct QSOs on 23cm are a contest possibility but some stations might have difficulty in obtaining contacts if not using a 70cm set-up. The use of landlines to arrange a single contact to the advantage of one station only is considered not to be in the spirit of the contest.

SSB was used by G3KAC and G8ADP; the quality and stability being commented on as good. The aerial system used in each case is included in the table as this indicates the drift away from the dish. RF stages are evident as BFR90 or 91, mixers as single diode with ring diode mixers coming to the fore.

### G8ACJ

Posn	Callsign	Points	QSOs	Cnty	Best dx	Km	Aerial
1	G3JVL	796	10	HE	G3LQR	235	4 x 2 LQ
2	G3XM	415	6	WE	G3JXN	103	31ft dish
3	G3JXN	363	7	LD	G3KAC	156	34 EY
4	G8BGO	354	9	HF	G3JVL	103	4ft dish
5	G3KAC	282	6	GR	G3JVL	137	4 x 25 LQ
6	G2RD	210	7	SY	G3COJ	56	3ft dish
7	G8ANZ/P	196	5	GR	G3KAC	47	5ft dish
8	G3COJ	186	8	BS	G3JVL	60	8 1/2
9	G5HD	175	4	WE	G3JVL	60	24 LQ
10	G3FYX	121	5	GR	G6XM	55	27 EY
11	G8HND	119	5	HE	G5HD	50	25 LQ
12	G3RQZ	102	6	LD	G3WFM	31	LQ
13	G8FMK	100	3	OX	G4CPE/P	40	14 EY
14	G8ADP	87	3	GR	G6XM	57	25 LQ
15	G8EOP	78	2	YS	G3NHE	48	34 EY
16	G3HCW	70	2	YS	G3NHE	40	25 EY
17	G3NHE	70	2	YS	G8EOP	40	CNR
18	G8DIC	49	3	HE	G8DEK	33	6 x 18 EY

## 7MHz Contest results

Our congratulations go to the leaders in the various sections, many of whom will by now have received their certificates. The standard of log keeping created problems and one or two logs had to be completely re-scored. The HF Contests Committee appreciated the many constructive comments and letters included with logs, which will be taken into consideration before formulating the rules for later this year. Our sincere thanks to those participants who kindly submitted a check log.

### Equipment used by leading stations

**G6CJ.** Long wire and ground plane aerials, an FLDX400 and FR400. **Multiplexers:** CT, DJ, DM, EA, EI, EP, F, FG7, HA, HB, HV, I, JA, W1, W3, W4, KP4, LA, LZ, OE, OK, OH, ON, OZ, PA, PY, SM, SP, UA, UA2, UB5, UC2, UL7, UP2, UQ2, UR2, YU, VE, VK2, VK3, VU, ZL1, ZL3, ZD7, ZC4, ZP.

**GM3TSL.** Two 3-element Yagis at 60ft, one fixed east, one west, and an FT101 and SB220.

**Multiplexers:** CT, CT3, CN8, DL, DM, EP, EI, EA, F, FP8, FY0, HB9, HA, I, LA, LZ, LX, ON, OH, OZ, OE, OK, PA0, PJ2, PY, SP, SM, UB5, UP2, UA, UA9, UF6, UC2, UQ2, UR2, YU, YO, YV, ZP, ZL, 4U1. The outstanding aerials belonged to: VK3MR—rhombic, and UK9AAN—4-element wide-spaced rotary.

### SSB transmitting section

Posn	Callsign	Points	Posn	Callsign	Points	Posn	Callsign	Points
1	GM3TSL	2,875	21	GC3YI	660	40	{OH3XT}	375
2	G4BUE	2,805	22	LA3UQ	620	41	{OZ4HW}	350
3	G4ACQ	2,045	23	SO6PAZ	595	42	OZ901	350
4	G3MCA	1,820	24	EI2CL	590	43	UV3DN	345
5	G2QT	1,745	25	HA5KKB	565	44	{DL1YA}	305
6	G3VLX	1,730	26	DL7LV	560	45	{LA2AD}	295
7	G3JVV	1,445	27	DJ8OB	550	46	{SM0BDS}	295
8	G4APL	1,330	28	OK1AGN	540	47	{UA3AAU}	285
9	{G3UAS}	1,175	29	OZ9V0	530	48	LA1RN	285
10	{UK9AAN}	1,175	30	SP5PWK	515	49	YO3JU	265
11	G8VF	1,030	31	{DK4ZY}	505	50	LZ2RF	260
12	HBNR	905	32	{HB9DX}	505	51	YU1GMN	250
13	DJ6OZ	885	33	ON5WL	485	52	OK1KCI	210
14	G4AWM	795	34	OH7OK	480	53	OZ8KU	190
15	G3YBH	755	35	SP5CQJ	460	54	UB5IDL	165
16	EP2TW	700	36	UC2BF	455	55	UA3XAW	130
17	DK5GX	695	37	OZ4TA	425	56	{OJ0MA}	125
18	{DJ6QT/CT3}	690	38	LA5QK	420	57	{SM0Y}	125
19	UP2ER	690	39	OZ3KE	390	58	EA2JJ	55
20	G3SEM	665						

### SSB receiving section

Posn	Station	Points	Posn	Station	Points
1	A7460	4,265	20	{IT9-20590}	645
2	A8597	2,765	21	{I1-14976}	605
3	A8606	2,710	22	I2-20092	580
4	A8482	2,300	23	OZ-DR1704	560
5	BRS32525	2,285	24	HA5-097	550
6	BRS26431	2,080	25	UA3-142198	505
7	BRS18461	1,905	26	14-14707	470
8	BRS28198	1,885	27	OK1-15835	455
9	BRS35417	1,785	28	I1-21171	430
10	A8531	1,760	29	{I055048}	415
11	BRS34032	1,660	30	OK1-15689	390
12	A8312	1,525	31	I5-51017	355
13	BRS34348	1,360	32	IS-51017	335
14	A8712	1,135	33	SP51554	325
15	A8524	1,050	34	I054651	325
16	BRS28005	970	35	I1-21003	325
17	BRS28201	855	36	I5-57718	125
18	A8088	850	37	I1523/RB	110
19	OK2-19354	680			

SSB check logs received from PA0XWA, UF6HK, UA3VAQ, PA0MVD.

### CW receiving section

Posn	Station	Points	Posn	Callsign	Points
1	A7460	2,915	3	OK1-11861	460
2	BRS18461	2,225	4	UA3-142198	275

CW check logs received from UA6LKC, SP9AMH, EI5F, PA0HRM, SM0GBB, G3WP, DL8YT, G3XNG, SP9AGS, LA6U, SP2AVE, Y08GV, UA9TS, YU2CBV\*, UL7NAA\*, G3BRK\*. Asterisks indicate multi-operator entries.

### CW transmitting section

Posn	Callsign	Points	Posn	Callsign	Points	Posn	Callsign	Points
1	G6CJ	2,705	37	OK2BEC	620	73	{OH7NW}	330
2	G3SSO	2,675	38	DL7LV	615	74	UB5TQ	325
3	G3MXJ	2,565	39	G4DDL	610	75	{YU1OCV}	325
4	G4BUE	2,100	40	{G3IMK}	600	76	SP6CZ	315
5	G3PDL	2,060	41	G8DI	600	77	YU1SF	315
6	G3ORH	2,045	42	SM5BNX	595	78	OK1KZ	315
7	G3YCT	1,960	43	OZ7JZ	590	79	UC2WAM	320
8	G3TLK	1,715	44	{SM0CCE}	565	80	OK1MSP	305
9	G3LHJ	1,700	45	SP5GH	565	81	UA4HEJ	305
10	G3JVV	1,660	46	OZ4HW	555	82	OK1QH	305
11	VK3MR	1,600	47	PI1PT	550	83	UQ2GDN	300
12	G8PB	1,565	48	DL1YA	540	84	ZL18HQ	290
13	G3RTE	1,475	49	HA1SB	525	85	UA3ADO	285
14	G3RWL	1,470	50	SQ9ABE	485	86	OK1MKU	280
15	G3SXW	1,315	51	YU3NP	475	87	UA9CDU	275
16	G3XWZ	1,295	52	{OK1KPU}	470	88	UP2OU	270
17	G2QT	1,285	53	{UP2BAR}	470	89	{OK2BGH}	265
18	G3NKS	1,135	54	G8KU	465	90	IBFY	265
19	ZC4SB	1,100	55	DK5RY	465	91	{SQ8GSC}	260
20	G4ALG	1,020	56	OK2ZLS	455	92	HA1ZD	260
21	G3TFF	920	57	{OK1MPP/P}	450	93	{UJ8AS}	250
22	G3VDL	880	58	{UL7AAJ}	435	94	UB5AB	225
23	G3VDW	850	59	UT5RF	435	95	UK9HAC	225
24	OZ1W	830	60	OZ901	430	96	DL0LL	200
25	DJ7ST	825	61	PA0VB	400	97	OK2B/C/P	185
26	EP2TW	800	62	{G8QZ}	395	98	OK2PAW	180
27	G8VF	790	63	{DK8EZ}	395	99	UA6AJO	155
28	G3JZG	725	64	UR2DQ	390	100	JA1DUH	150
29	ON8KO	710	65	{OK3EE}	375	101	{EA2JJ}	135
30	OK2PDL	705	66	{SP6GBU}	370	102	{SQ6PAZ}	120
31	OK1TW	685	67	SM0BDS	370	103	UB5VK	120
32	DJ0YZ	675	68	EA5PS	365	104	{UA3XAW}	100
33	OK1DWA	665	69	{UB5ZBB}	360	105	{UC2WAS}	100
34	OH7OK	660	70	{OK1DAV}	360	106	LZ2RF	80
35	G3TPJ	650	71	{G4ACQ}	345	107	JE1HJ	75
36	EA5BS	630		{SQ7PBC}				

## 80m Low Power Contest 1975 rules

- The general rules for RSGB hf contests, published in the January 1975 issue of *Radio Communication*, will apply.
- When. 0900gmt to 1600gmt on Sunday 13 April 1975.
- Eligible entrants. Single-operator stations only.
- Contacts. CW (A1) only in the 3.5-3.6MHz band. The location, or WAB area code, must be sent.
- Scoring. Max power 0.5 1 2 3 4 5 watts  
Points 100 50 25 15 10 5
- Logs. Column (5) must be headed "Location as received", and column (6) "My power".
- Entries. To RSGB HF Contests Committee, c/o D. S. Booty, G3KKQ, 139 Petersfield Avenue, Staines, Middx.
- Awards. The 1930 Committee Cup will be awarded to the winner, and certificates will be sent to all allowable entrants.

## Autumn 1974 432MHz Cumulative Contest results

In spite of an encouraging level of activity during the earlier sessions, only 11 stations submitted entries for the 432MHz Autumn Cumulative Contest. Almost as many others, known to have been active in at least three sessions, might have returned very good scores had they sent in their logs. Quite a number of regular participants in these events were also absent, so that the overall response cannot be described as anything but disappointing. Perhaps the three 70cm cumulative contests held during 1974 was excessive and fewer events of this type would be appreciated.

Session 2 provided the best propagation conditions with many contacts over the 300km radius. No QSOs with Continental stations were recorded in any of the sessions.

The first place is shared by GD2HDZ and G3NHE, both of whom receive certificates of merit for their excellent entries.

### G2HIF

Posn	Callsign	Score	QSOs	Best dx	Km	Cnty	Sessions
1	GD2HDZ	341	37	G8FJG	420	IM	2,3,5
2	G3NHE	341	63	G3OBD	287	YSS	1,2,3
3	G3ZYC	259	84	G3OBD	258	DY	3,4,5
4	GW8ACG/P	256	47	G8FUF	325	FT	2,3,5
5	G4ALN	226	56	GD2HDZ	420	EX	2,3,5
6	G3KAC	206	44	G8EOP	253	GR	2,3,5
7	G4BFT	154	48	GD2HDZ	248	WR	2,3,5
8	G3EOP	133	29	G3OBD	400	YS	2,3,4
9	G8AVX	93	35	GD2HDZ	262	WK	2,3,5
10	G5HD	56	20	G3KMS	310	WE	2,4,5
11	G5UM	55	25	G6XM	—	LR	2,5,6

## Autumn 1974 70MHz Cumulative Contest results

Four metres is alive and well, according to the results of this contest. Although many of the call signs listed below are familiar landmarks on the band, there is a sprinkling of newcomers, attracted perhaps by the prospect of a band which is not yet overcrowded. The leading station was G3NHE, an old 4m hand; but the runner-up, G3UKV/P, was making his first appearance on the band.

There was a time when the backs of 4m 427s were conspicuously blank: but no longer. Most entrants made some comments, usually on the increased activity these days and accompanied on occasion by constructive criticism. The latter was tempered in one instance by an injunction not to take it personally, and in another by a Christmas card! Apologies for the clash between the last session and the 144MHz fixed event, which was unnecessary, and condolences to the sleepless GD4BEG who enters top band contests too.

### G3SEK

Posn	Callsign	Points	QRA	Sessions
1	G3NHE	468	ZN54	1,2,4
2	G3UKV/P	418	YM38	3,6,7
3	G3XBY	416	ZM52	5,6,7
4	GD2HDZ	382	XO68	5,6,7
5	G3JYP	331	YO38	1,6,7
6	GD4BEG	280	XO58	3,6,7
7	G3LCH/P	251	ZL59	2,3,4
8	G4BOX/P	249	ZL59	1,5,6
9	G3OHC	230	ZM31	4,6,7
10	G4AIR	229	YN60	4,6,7
11	G3NPI	189	ZL46	1,2,3
12	G3RDO	174	ZL26	1,2,5
13	G3LVP	148	AL33	1,2,6
14	G5UM	140	ZM35	1,2,3
15	G3VVT	140	YO57	2,3,6
16	G3TWG	133	ZL27	1,3,4
17	G3USE	93	ZL09	1,3,4
18	G4ALG	56	ZL46	1,3,6
19	G4APG	24	ZL49	1,3,5
20	G3PGN	11	AL22	3,4,6

Thanks to G3VPS/P, G5HD and G3RAF for check logs.

## 70MHz Open and SWL Contest rules

1600gmt 5 April to 1600gmt 6 April

All entries and checklogs to: VHF Contests Committee, c/o G3VPK, "Maple Leaf", Great Braxted, Witham, Essex CM8 3EJ.

The following general rules, published in the January issue of *Radio Communication*, will apply: 1, 2, 3, 4a, 5a, 6a, 7a, 8a, 9a, 10a, 11-22. Listeners: rules 1-6.

The VHF Manager's Trophy will be awarded to the leading station.

## SSB Field Day 1975 rules

Please note that the scoring system has been changed.

1. The general rules for RSGB hf contests, published in the January 1975 issue of *Radio Communication*, will apply.

2. When. From 1700gmt on Saturday 12 July to 1700gmt on Sunday 13 July 1975.

3. Eligible entrants. All clubs, affiliated societies, and RSGB groups within the prefix zones G, GC, GD, GI, GM and GW. This is a multi-operator contest (see General Rule 5b).

4. Stations. Each entrant must operate one portable station only.

5. Contacts. SSB (A3A or A3J) only, in the 3-5, 7, 14, 21, and 28MHz bands.

6. Scoring. For each completed contact, 5 points for a station in Europe (including the British Isles), and 15 points for a station outside of Europe. Final score is the total points multiplied by the number of different countries worked irrespective of band. The RSGB Countries List must be used.

7. Logs must be accompanied by a check list showing the countries worked.

8. Entries. To RSGB HF Contests Committee c/o M. Harrington, BR520249, 123 Clensham Lane, Sutton, Surrey SM1 2ND.

9. Awards. Certificates will be awarded to all allowable entries, and to all check logs. Overseas stations please note!

## 1,296MHz Open Contest rules

0900-1700gmt 27 April

All entries and checklogs to: VHF Contests Committee, c/o G4CUT, 59 Harewood Road, Chelmsford, Essex CM1 3DH.

The following general rules, published in the January issue of *Radio Communication*, will apply: 1, 2, 3, 4b, 5b, 6a, 7b, 8b, 9a, 10a, 11-22.

## RSGB Direction Finding Contests

The dates for the eight qualifying events and the final are given in the Contests Calendar in this issue. No changes in the rules are visualized for 1975, and details of the starting point for the first two qualifying events follow.

### DF qualifying round—Derby

Date: 13 April 1975.

Map: OS sheet 128, Derby and Burton-on-Trent, 1: 50,000 series.

Assembly: 1300bst for start at 1320bst.

Location: car park off Darley Park Drive at entrance to Darley Abbey Park NGR 349381.

This event is being organized by the Derby & District ARS and intending competitors are asked to notify Mr R. I. Buckby, G3VGV, 23 Hazel Drive, Spondon, Derby DE2 7DS, as soon as possible of the number in their party requiring tea.

### DF Qualifying Round—Rugby

Date: 27 April 1975.

Map: OS Sheet 152 New 1: 50,000 Series (Northampton and Milton Keynes).

Assembly: 1300bst for start at 1320bst.

Location: Bucknell Wood NGR 650448 approximately three miles south west of Towcester.

This event is being organized by members of the Rugby ARC, and intending competitors are asked to notify Mr D. E. Newman, Haynes House, 78 High Street, Whittlebury, Towcester, Northants, tel 0327-857350, of the numbers in their parties requiring tea, as soon as possible and, in any case, not later than 13 April.

## First South Yorkshire Contest

This contest, open to all transmitting amateurs and SWLs, is in two sections: 80m on 27 April 1975, and 2m on 20 April 1975. Contestants may enter one or both sections. Attractive certificates (the South Yorkshire Award and the Sheffield Award) are available for the many categories within the contest.

Full copies of the rules are available from the Association of Sheffield Amateur Radio Clubs' secretary: P. E. H. Day, G3PHO, 39 St Albans Road, Sheffield, South Yorkshire S10 4DN.



## G2AAN Grafton Top Band Contest 1975 rules

Competitors to enter TWO sections only (CW and one phone section a.m. or ssb).

The contest will be open to all UK licensed amateurs (individuals—club entries not accepted) and will be run in the 1.8MHz band in three sections.

- |                     |           |          |
|---------------------|-----------|----------|
| (a) phone a.m. only | 2130-2400 | 22 March |
| (b) cw only         | 2130-2400 | 29 March |
| (c) ssb only        | 2130-2400 | 5 April  |

Certificates of merit will be awarded to the stations placed first and second, with further certificates to the individual winners of each of the three sections. Logs postmarked no later than 20 April 1975.

Further information from B. C. Bond, G3ZKE, 86 Agar Grove Camden Town, London NW1.

## GARC 160m Contest rules

1000gmt-1300gmt 23 March 1975. Open to any station with current licence. Any permitted mode may be used in the 1.8MHz band only.

Exchange RS(T) + three-figure serial (commencing 001) + county as at 1 January 1975. One point per station worked; final score = number of points × number of different counties worked. Logs to include: date, time(gmt), station worked, report + serial sent, report + serial + county received.

SWL section: logs to include date, time(gmt), station heard, report + serial + county sent by station heard. Only one receiver to be used for entire contest. Certificates to leading club and non-club entries in both transmitting and swl sections.

All logs to: P. Russell, 13 New Road, Botter End, High Wycombe HP14 3NA.

## Contests calendar

- |               |   |
|---------------|---|
| 8-9 March     | —BERU (Rules in December issue)             |
| 15-16 March   | —ARRL DX CW                                 |
| 29-30 March   | —CQ WPX                                     |
| 5-6 April     | —70MHz Open and SWL (Rules in March issue)  |
| 12-13 April   | —EEC DX                                     |
| 13 April      | —80m Low Power (Rules in March issue)       |
| 13 April      | —DF Qualifying—Derby (Rules in March issue) |
| 27 April      | —1,296MHz Open (Rules in March issue)       |
| 27 April      | —DF qualifying—Rugby (Rules in March issue) |
| 4 May         | —432MHz Open and SWL                        |
| 18 May        | —DF qualifying—South Manchester             |
| 31 May-1 June | —144MHz Portable                            |
| 1 June        | —DF qualifying—Stratford on Avon            |
| 7-8 June      | —HF NFD (Rules in February issue)           |
| 22 June       | —Microwave                                  |
| 22 June       | —DF qualifying—High Wycombe                 |
| 28-29 June    | —Summer 1.8MHz                              |
| 5-6 July      | —RSGB VHF Open and SWL (Jubilee)            |
| 12-13 July    | —SSB Field Day (Rules in March issue)       |
| 13 July       | —DF qualifying                              |
| 27 July       | —144MHz QRP                                 |
| 3 August      | —DF qualifying—Dartford Heath               |
| 9 August      | —70MHz Portable                             |
| 31 August     | —DF qualifying—Coventry                     |
| 6-7 September | —VHF NFD and SWL (Rules in March issue)     |
| 14 September  | —80m Field Day                              |
| 21 September  | —DF final—Slade                             |
| 4-5 October   | —RSGB UHF Open and SWL                      |
| 11-12 October | —21-28MHz                                   |
| 18-19 October | —7MHz CW                                    |
| 1-2 November  | —144MHz Open                                |
| 1-2 November  | —7MHz Phone                                 |
| 8-9 November  | —2nd 1.8MHz                                 |
| 16 November   | —432MHz Open                                |
| 7 December    | —144MHz Fixed                               |

## Looking ahead

- 15 March—2nd FM Convention, Brooklands Technical College, Weybridge, Surrey.
- 27 April—NRSA Convention, Belle Vue, Manchester.
- 10-11 May—21st VHF Convention Winning Post, Whitton, Middlesex.

# RAYNET

by S. W. LAW, G3PAZ\*

AS members will have deduced from last month's column by the Raynet Committee chairman, all committee members were re-elected and a new member, G8CAC, introduced. Also the current controllers appointments were re-affirmed: controllers are asked to ensure that all group members' cards are in date and attend to any that may require renewal.

A letter has been sent to all controllers explaining that the Home Office have agreed in principle to extend the scope of Raynet activities to cover participation at county shows and similar functions where the three user services are on duty. There will be safeguards against misuse of the concession and prior application must be made via user service to controller, to committee chairman, to HQ for each and every case, naming Raynet group members taking part and frequencies to be used. Messages must be initiated by the user services and must be confined to matters relating to the threat of human life.

### 80m controllers net

Trials of the proposed monthly net on 80m have shown that although this Monday evening net at 2000gmt is quite feasible, the QRM during the hours of darkness renders the net rather less than comfortable for the friendly exchange of information (as distinct from exercise or emergency operation). The Committee therefore proposes that this net be changed to the third Sunday of the month at 1200gmt (mid-day) on a frequency of 3.700MHz commencing Sunday 16 March. Comment to chairman G3BPT on this subject will be gratefully received and brought to the attention of the committee in due course.

### Press cuttings

We thank those who have passed on press cuttings from the local papers on the subject of radio amateurs in general and Raynet in particular. It is most gratifying to note that these reports are becoming more serious in general format and a great deal better informed technically than has been the tendency in the past. Thanks for this improvement to the image must go to the amateurs who not only provide the information but ensure that the reportage is accurate in every respect, insofar as it is possible having regard to the editorial policies of the publications concerned.

### Group news

The Anglia group will be holding its rally at Barford on Sunday 15 June and informs us that G3HPR has resigned from the Eastern area and the previous deputy, G3OEP, has now taken over. The Notts group now has 15 members, and under the leadership of G3YUT covers an area comprising Mansfield, Retford, Worksop and Newark. The 2m a.m. frequency employed by this group is 145.8MHz. In Kent a very informative lecture was held at the "Y" Centre, Maidstone, on 26 January when the general flood picture in the south was discussed. (We wonder how many people realize that, under extreme flood conditions double-decker buses could be completely submerged at the "Elephant and Castle" in South London?) There was much to interest the audience and we hope to hear a repeat in due course.

The Isle of Man/Cumbria link-up appears to have achieved an excellent liaison with the user services and it is officially confirmed that the police will alert Raynet in this area as and when the need arises. With the new administrative areas now in being we are not too sure of the present coverage of the Yorkshire (W. Yorkshire?) group, but we may rest assured that there is no lack of activity on 145.26MHz and 70.375MHz on Thursday nights at 2000z under the watchful ear of their controller Colin Weston, G3VAP. Incidentally, G3VAP is by way of being an expert in the collation of information and it has been suggested that he might well be willing to instigate an amateur radio information service as a technical information officer for Raynet. It has been tentatively suggested that any information on file could be available for (say) a "search fee" of 10p plus 5p per A4 sheet of photo-copy and 5p postage and packing. Comments and suggestions to the Raynet Committee will be welcome on this topic.

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

# CLUB NEWS

**RSGB Affiliated Societies and Clubs, and RSGB Groups, are invited to submit items for inclusion in this section to their Regional Representatives (not direct to the editor), whose addresses appear on page 183 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: 26 March, 24 May.**

## REGION 1

**RR B. O'Brien, G2AMV**

**Ainsdale (ARC)**—Thursdays fortnightly, 8.15pm. 13 and 27 March, 10, 24 April. Ainsdale Scout Headquarters. Further details from N. Horrocks, G2CUZ, QTHR.

**Blackburn (ELARC)**—First Thursday in each month, 7.30pm, YMCA, Shearbank Road, Blackburn. Visitors always welcome. Sec W. E. Baxendale, G8FDG, "Juvena", Westland Ave, Darwen, Lancs.

**Blackpool (B & DARS)**—Mondays, 8pm. Pontins Holiday Camp, Squires Gate. Morse tuition 7.30pm.

**Bolton (B & DARS)**—3rd Wednesday in each month, 8pm. Clarence Hotel, Bradshawgate. Sec S. Macdonald, G4AQB, 8 Archer Avenue, Bolton.

**Bury (B & RRS)**—Second Tuesday in each month, RAE and Morse classes as well as an informal get-together every other Tuesday; Mosses Community Centre, Cecil Street, Bury, 11 March ("Marine mobile" by G3UGF). Sec Mike Howarth, G8ECM, 11 Worthington Avenue, Heywood, Lancs. Tel Heywood 65911.

**Carlisle (C & DARS)**—Mondays, 7.30pm. Currock House, Lediard Avenue, Currock, Carlisle. A very full programme of lectures and demonstrations has been arranged for the coming months. Full details from G8DVD, QTHR.

**Cheshire (M-C ARC)**—Wednesdays, 7pm. Technical Activities Centre, Winsford Verdin Comprehensive School, Grange Lane Winsford. Nets on 160m, 7pm Mondays; on 2m, 7pm Tuesdays; on 10m, 7.30pm Thursdays. On Tuesdays RAE classes and slow Morse transmissions are available. Please see sec G3SIQ for details. Chairman is G3JWK.

**Chester (C & DARS)**—Tuesdays, 8pm; except first Tuesday in each month, which is a net night. YMCA, Chester. Further details from GW8DMR, QTHR.

**Douglas IoM (D & DARS)**—Sec GD3YUM will be pleased to hear from any member who intends to visit the island.

**Eccles (E & DARC)**—Tuesdays, 8pm. Bridgewater School, Worsley, Manchester. Club 2m net, 11am Sundays on 145-66MHz. All visitors and prospective members welcome. Sec G4AEQ, QTHR.

**Lancaster University (UoLARS)**—Wednesdays, 7pm. Furness College. RAE and Morse classes. The society is active on the hf bands and 2m using G3ZBY and G8DOU. Skeds and visits welcomed; enquiries please to Colin Pegrum, Department of Physics.

**Leyland Hundred ARG**—2nd Monday in each month, 7.30pm. Rose & Crown, Ulmes Walton, Leyland. Net night Saturdays 2000 gmt on 145-8MHz. Details from F. Harrison, G3XII, 78 Lancaster Lane, Leyland, Lancs.

**Liverpool (L & DARS)**—Tuesdays, 8pm. Conservative Association Rooms, Church Road, Watertree. Sec G3WCS.

**Liverpool (NLRC)**—Tuesdays, 8.30pm. Informal meetings. "Nags Head", Thornton, Crosby, Liverpool 23. Visitors welcome. Sec R. B. Porter, 11 Cranmore Avenue, Crosby, Liverpool L23 0QD.

**Liverpool University (UoLARS)**—Details of meetings from J. M. Pagett, G8IAV, c/o The Students Union.

**Manchester (M & DARS)**—Wednesdays, 7.30pm. All meetings include Morse classes. 203 Droylesden Road, Newton Heath, Manchester 10. Sec G3IOA.

**Manchester (SMRC)**—Fridays, 8pm. Sale Moor Community Centre, Norris Road, Sale, Cheshire. VHF and df lads meet on Mondays, 8pm, at the club shack, "Greeba", Shady Lane, Manchester 23. Visitors always welcome. Morse practice 8pm prompt Friday nights. Hon sec G3WFT. 7 March (Mystery Lecture), 14 March (Report on progress of club project, TAD100 receiver, 21 March (Visit of Bill Lowe, G3UBO, non-members most welcome), 28 March (Natter nite—a good old-fashioned rag chew), 4 April ("A transverter for 160m" by Rod Davis, G3TNQ), 11 April (Club quiz), 18 April ("Oscar"

by Stan Aspinall, G3VSA), 25 April (Night on the air—club gear on the air at HQ). It is also hoped that a number of df practice contests can be arranged during the summer; anyone interested in competing or organizing contact G3WFT, QTHR.

**Manchester University (ARS)**—Details of meetings from sec G. T. Phelan, G8EPS, c/o The University Union.

**University of Manchester (UoM-IoS & TARS)**—G3CXX is active on all hf bands and G8FOT on 2m and perhaps 23cm. Items for club magazine/newsletter or letters from intending members gratefully received by G8GOS, 66 Howard Road, Kings Heath, Birmingham B14 7PQ.

**Preston (PARS)**—7.30pm. Windsor Castle (private room), St Paul's Square, Preston. Morse practice 7.30pm, main feature 8pm. 13, 27 March, 10, 24 April.

**Salford (DHRS)**—Wednesdays 5pm. Dial House, Chapel Street, Salford. Members assemble in canteen and proceed to club room on roof. Sec G3WFW, QTHR.

**Stockport (SRS)**—2nd and 4th Wednesdays in each month, 8pm. Blossoms Hotel, Buxton Road, Stockport. Sec G. R. Phillips G3FYE, 6 Ross Avenue, Davenport, Stockport.

**Thornton Cleveleys (ARS)**—1st and 3rd Wednesdays in each month, 8pm, Morse practice from 7.30pm. St John Ambulance Hall, Fleetwood Road North (next to Gardener's Arms), Thornton. Details from F. Hill, G3YWH, 45 Preston Old Road, Blackpool, FY3 9PR.

**Warrington (W & DARS)**—Tuesdays, 7.45pm. New meeting place: Grappenhall Community Centre, Bellhouse Lane, Grappenhall, Sec J. Weaver, c/o Grappenhall Community Centre.

**Wigan (W & DARS)**—1st and 3rd Wednesdays, 2nd and 4th Tuesdays in each month. Poolstock Cricket Club, Keats Avenue, Poolstock, Wigan. Sec G. J. Bell, G8FTF, 157 Preston Road, Coppall, Nr Chorley, Lancs.

**Wirral (WARS)**—1st and 3rd Wednesdays in each month, 7.45pm. Sports & Recreation Centre, Grange Road West, Cloughton, Birkenhead. Sec G3DLF, QTHR.

**Wirral (WDXA)**—Last Tuesday in each month at members' homes. Visitors are welcome. Please inform sec G3XJZ, QTHR beforehand.

**Merseyside members** meet for lunch on first Monday in each month. It is essential to book beforehand and obtain details of the venue from either G3VQT or G2AMV.

**Manchester Area Luncheon Club.** There was a small but enthusiastic attendance at the first meeting. It is hoped to hold future meetings at the "Beef and Barley", Oxford Street, Manchester, at 1pm on the first Friday in each month. The meetings are purely informal and everyone is welcome.

**Belle Vue Convention, Manchester,** will be held this year on Sunday 27 April.

## REGION 2

**RR J. E. Agar, G8AZA**

**Hull (HUR & ES)**—Meetings held as notified in *INFO* and personally to members' pigeon holes. More frequent meetings will be held when new premises are acquired next year. Regular expeditions to the Yorkshire wolds; activity nights for newly-licensed members, and local visits. Prospective members within the university and from affiliated colleges in Hull contact Jon Hind, G8EDS, The Students Union, The University, Cottingham Road, Hull.

## REGION 3

**RR B. Kennedy, G3ZUL, G6AGT/T**

**Birmingham (MARS)**—18 March, 15 April. The Birmingham and Midland Institute, Margaret Street, Birmingham. G8GOC.

**(Slade)**—Alternate Fridays, 8pm. The Committee Room, Church House, Erdington. G4BRT.

**(South)**—First Wednesday in each month. Hampstead House, Fairfax Road, West Heath, Birmingham 31. G8GDZ.

**Bromsgrove (BDARC)**—14 March (AGM), 11 April. Avoncroft Museum of Buildings, Avoncroft Art Centre, Bromsgrove. J. Harvey, 22 Elm Grove, Bromsgrove.

**Cannock (CCARS)**—Thursdays. Bridgetown Working Men's Club, Cannock. G4CFR.

**Dudley (DARC)**—Alternate Tuesdays, 7.45pm. Central Library, Dudley. Visitors welcome. G8HHK.

**Hereford (HARS)**—First and third Fridays in the month. 7 March, ("Local electricity supplies" by Mr Bull of the MEB). Civil Defence HQ, Gaol Street, Hereford. G4CNY.

**Lichfield (LARS)**—Wednesdays fortnightly. Lichfield Fire Station, Birmingham Road, Lichfield. G8FBL.

**Rugby (RDAR & EC)**—Last Tuesday in each month, 8pm. Lawrence Sherriff Arms in the town centre. G3YQC.

## Radio link with twin city

On 23 November 1974 White Rose Radio Society club station G3XEP linked the twin cities of Leeds and Dortmund. A one-day amateur radio exhibition was being held in Dortmund, visited by representatives of the city's burgomaster.

At a few hours notice a schedule was arranged with DL0DO/P, the exhibition station, and the Lord Mayor of Leeds, Mrs Joan de Carteret, visited the White Rose headquarters in time for the link-up. Alternative bands had been arranged but 7MHz proved good for this lunch-time contact, and signals were S9+ both ways. The club KW2000A and long wire were used at G3XEP.



G3FCW, operating G3XEP, and Mrs J. De Carteret, Lord Mayor of Leeds, during the Leeds-Dortmund link-up

Messages of greeting were exchanged, being relayed over the public address system to the visitors to the Dortmund exhibition. Thanks are due to the many stations who avoided the frequency during this 45min contact.

**Solihull (SARS)**—18 March ("The electron microscope and its applications" by Mike Webb, G3OOQ, 15 April (Surplus sale), 7.30pm. The Manor House, High Street, Solihull. G4AEJ.

**Stourbridge (STARS)**—4 March (Informal), 17 March (AGM), 8 April (Informal). Third Monday in each month, 7.45pm. Longlands School, Brook Street, Stourbridge. Informal meetings at the Shrubbery Cottage, Heath Lane, Stourbridge. G3ZVK.

**Telford (T & DARS)**—12 March ("QM70 products" by G8EPC and G3ZUL). Wednesdays, 7.30pm. Phoenix School, Manor Road, Dawley, except first Wednesday of month when at Walker Technical College near Wellington. G4AXZ.

**Wolverhampton (WARS)**—3 March ("Electronic automobile ignition systems" by G6GR). Neachells Cottage, Stockwell End, Tettenhall. G8GCV.

Members of the Amateur Radio Club of Nottingham in contact with Mike Harris, VP8NO, a club member, now in Antarctica



**Worcester (W & DARC)**—3 March ("Digital frequency synthesis" by Roger Allan, G3TQZ), 15 March. The Old Pheasant, New Street, Worcester. G8ASO. Tel Worc 351565.

## REGION 4

**Derby (DADARS)**—9 Mar ("Microwaves" by C. Burton), 16 Mar (Film show), 23 Mar (AGM), 30 Mar (Junior night), 2 April (Surplus sale), 9 April ("Repeaters" by H. Bates, G8AMD), 16 April (Film show), 23 April (DF Event No 1 1975), 30 April (Junior night), 7 May (Surplus sale). 7.30pm. 119 Green Lane, Derby. Everyone welcome. G2CVV.

**Derby (NHCAARC)**—7 Mar (Technical film show), 14 Mar (To be announced), 21 Mar (Night on the air), 28 Mar (Contest preparation), 29/30 Mar (CQ WW DX Contest), 4 April (Rally discussion), 6 April (2nd DF Event), 11 April (Technical film show), 18 April ("A history of radio", RSGB lecture), 25 April (Constructional project: audio oscillator). 7.45pm. Nunsfield House, Boulton Lane, Alvaston, Derby. G4CTZ.

**Leicester (LARS)**—Mondays, 7.30pm. Gilcross Estate Cottage, Groby Road, Leicester. G3TQF.

**Lincoln (LSWC)**—Wednesdays, 7.30pm. Lincoln Astronomical Society, Westcliffe Street, off Burton Road, Lincoln.

**Mansfield (MARS)**—First Friday in each month. The New Inn, Westgate, Mansfield.

**Melton Mowbray (MMARS)**—21 Mar ("Solid state devices", by H. Miles), 18 April (Visit to Nottingham Caves, courtesy of B. Little). 7.30pm. St John Ambulance Hall, Asford Hill, Melton Mowbray. G3NVK.

**Nottingham (ARCON)**—Thursdays. Woodthorpe House, Mansfield Road, Nottingham. 16 April (Technical film show by G3FGY).

**Scunthorpe (SARC)**—Tuesdays and Thursdays. The Shack, Grange Farm Centre, Scunthorpe.

**Spalding (SADARS)**—7 Mar ("Mobile operating") 7.30pm at Teachers Centre, Knight Street, Pinchbeck. 4 April (Construction contest) at the "Ship Albion", Spalding. This year's mobile rally is being held on Sunday 4 May at a new location: The Glead Boy's School, Halmer Gardens, Spalding, with all the usual attractions. G3VPR.

## REGION 5

**Cambridge (C & DARC)**—4 March (Informal), 7 March (AGM at Brooklands Avenue), 14 March (Informal). 7.30pm. Hon sec John Fellows, G3YRZ, 8 North Street, Burwell, Cambs.

**Stevenage (S & DARS)**—6 March (to be arranged), 20 March (AGM), 3 and 17 April (to be arranged). 8pm. Staff Canteen, Hawker Siddeley Dynamics, Gunners Wood Road, Stevenage. Hon sec Cliff Barber, G4BGP. 473 Canterbury Way, Stevenage, Herts.

## REGION 6

**Banbury (BARS)**—Fridays, 7.30pm. 43 North Bar, Banbury. New members and visitors very welcome. Details from secretary G3LTN, QTHR. Tel Banbury 710623.

**Cheltenham (CARS)**—Wednesdays, 8pm. St Marks and Hesters Way Community Centre, Brooklyn Road, Cheltenham. G8DVA.



**Cheltenham RSGB Group**—First Thursday in each month, 8pm. Royal Crescent Hotel, Clarence Street, Cheltenham. G3KIL.

**Gloucester (GARS)**—First Thursday in each month, 8pm. Odd-fellows Club, Barton Street, Gloucester. Other Thursdays, 7.30pm. Leisure Centre (Drill Hall), Painswick Road, Gloucester. The club will be holding its annual dinner followed by a social evening on 21 March at the Civil Service Club, Estcourt Road, Gloucester. Details from G3MA.

**Milton Keynes (MK & DRS)**—Lovat Hall, Silver Street, Newport Pagnell, Bucks. Details from G8HUH.

**REGION 7** **RR R. S. Hewes, G3TDR**  
**Acton, Brentford & Chiswick (ABCRC)**—18 March ("Hints and kinks—circa 1937/45"—discussion), 15 April ("Digital frequency meter—Part 1" by G3CCD). 7.30pm. Chiswick Trades and Social Club, 66 High Road, Chiswick W4. Hon sec W. G. Dyer, G3GEH, QTHR.

**Addiscombe (AARC)**—Tuesdays, 9pm. "Prince George". High Street, Thornton Heath. Hon sec S. F. Knowles, G3UZY, QTHR.

**Ashford, Middlesex (Echelford ARS)**—10 March ("CW contest operating" by Dennis Booty, G3KKQ), 27 March (AGM), 14 April (Surplus equipment sale), 24 April ("Opto-electronics" by Steve Haslett of Hewlett Packard). 7.30 for 8pm. St Martin's Court, Kingston Crescent, Ashford. Visitors very welcome. Hon sec Alan Wenham, G3XZA, QTHR. Tel Sunbury-on-Thames 86440.

**Barking (BR & ES)**—Mondays 7.30pm (constructional), Tuesdays 7.30pm (morse classes), Thursdays 7.30pm (Informal and constructional). Visitors very welcome. Westbury Recreation Centre, Westbury School, Ripple Road, Barking, Essex. Further details from hon sec R. E. Clark, G4DDP, QTHR.

**Bexley (North Kent RS)**—Second and fourth Thursdays in each month. St Mary's Institute, 2 North Cray Road. 13 March ("Crime prevention", by Mr Calvin), 27 March (Top band club station on the air). Sec R. Wells, G4ARQ, QTHR.

**Burnham Beeches (BBARC)**—First Monday in each month. Hedgerley Scout Hut, Hedgerley, near Slough, Bucks. Hon sec E. Brown, 20 Balmoral Close, Chippenham, Slough.

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

**Chingford (Silverthorn RC)**—Fridays, 7.30pm. Friday Hill House, Simmonds Lane, Chingford E4. Visitors very welcome. Hon sec C. J. Hoare, G4AJA, QTHR. Tel 01-529 2282.

**Cray Valley (CVRS)**—6 March, 3 April (To be announced), 20 March (Natter Nite), 18 April (Natter nite), 8pm. Eltham United Reformed Church Hall, 1 Court Road, SE9. Hon sec Peter Vella, G3WVP, QTHR.

**Croydon (Surrey Radio Contact Club)**—Third Tuesday in each month, 8pm. "The Ship", 47 High Street, Croydon. Further details from hon sec Sid Morley, G3FWR, QTHR. Tel 01-657 3258.

**Crystal Palace (CP & DRC)**—15 March ("Logic circuitry—Part 2" by Bob Fairburn, G8HAX), 19 April (To be announced), 8pm. Emmanuel Church Hall, Barry Road, SE22. Hon sec Geoff Stone, G3FZL, QTHR. Tel 01-699 6940.

**Dartford Heath (DF Club)**—First and third Fridays in each month (club nights). Club hunts—details later. 8pm. Broomhill Road, Dartford. Hon sec Alan Burroughs, G4BWV, QTHR.

**East London RSGB Group**—16 March ("HF power measurement and swr" by G3ZKE), 20 April (Business meeting), 3pm. Wanstead House, The Green, Wanstead E11. Buses 10, 20, 66, 101, 167. Underground Wanstead Central Line. Refreshments available. All SWLs, transmitting amateurs and friends welcome. Hon sec Peter Hull, G4DCP, QTHR. Tel 01-432 6122.

**Edgware (E & DRS)**—6 March, 3 April (To be announced); 20 March, 17 April (Informal). 8pm. Watling Community Association, 145 Orange Hill Road, Edgware. Hon sec Alan Masson, G3PSP, QTHR. Tel 01-950 6827.

**Esher (Thames Valley ARS)**—First Wednesday in each month, 8pm. King George's Hall, Esher, (next door to fire station). Hon sec Rod Blasdel. Tel 01-432 2343.

**Farnborough (Bromley RC)**—Third Monday in each month. Rear of Farnborough (Kent) Village Hall (opposite "The Woodman" public house). Details from Derek Morgan, 59, Bassetts Way, Farnborough, Kent.

**Gravesend RSGB Group**—Mondays, 7.30pm. "Windmill Tavern", Shrubbery Road, Gravesend, Kent. Area representative P. F. Jobson, G3HFL, QTHR.

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

**Harlow (DRS)**—Tuesdays, 8pm. Mark Hall Barn, First Avenue, Harlow, Essex. Hon sec Vic Heard, 106, Vicarage Wood, Harlow, Essex.

**Harrow (RSH)**—Fridays, 8 pm. Sea Cadets HQ, Woodlands Road, Harrow. Hon sec Les Light, G3KDL, QTHR. Tel 01-902 2750.

**Havering (H & DARC)**—12 March ("FM operation" by London FM Group), 26 March ("IT techniques" by Alan, BRS 405625), 9 April (Business meetings—arrangements for autumn programme), 23 April (Raynet forum-discussion led by G8GGU). 8pm. British Legion House, Western Road, Romford. Hon sec C. W. Cousins, G4DEL, QTHR.

**Holloway (Grafton ARS)**—Fridays, 7.30pm. Archway School Annexe, Whitlington School, Highgate Hill, N19. Hon sec H. D. Ashcroft, G4CCM, QTHR.

**Ilford RSGB Group**—Thursdays, 8pm, Mortlake Road (Off Ilford Lane), Ilford, Essex. Hon sec Derek Sopsworth, G3YMW, QTHR.

**Kingston (K & DARS)**—Second Wednesday in each month, 12 March ("Repeaters" by Mike Bues, G8AAI), 9 April ("Frequency standards and synthesizers" by J. R. Mortimer, G3JZV). 8.15pm. Tolworth Scout Hut, Stirling Walk, Raeburn Avenue, Surbiton, Surrey. PRO Alex Piper, G8HUW, QTHR.

**London (UK FM Group)**—Second Tuesday in each month, 8pm, Abbey Hotel, North Circular Road (between Western Avenue and Abbey Dale Road), PRO Kris Partridge, G8AUU, Apartment 10, 74, Woodlands, Wimbledon, SW19. Tel 01-946 7843.

**Loughton (L & DRS)**—Second and fourth Fridays in each month, 8pm. Loughton Hall, near Debden Station. Hon sec P. J. Lawler, G4CMD, QTHR.

**New Cross (Clifton ARS)**—Fridays, 8pm. 224 New Cross Road, London SE19. Details from hon sec R. A. Hinton, 48 Camilla Road, Bermondsey SE16.

**Northolt (British Airways European Division ARS)**—First Monday in each month. Trident Club, Western Avenue, Northolt, Middlesex. This club is open to non-BA employees by invitation. Contact David Evans, G3OUF. Tel Amersham 21573 for details. Civil Aviation Sunday net at 1100-1200gmt on 3-68MHz, listen for G3NAF or G3BEA.

**Purley (P & DRS)**—First and third Fridays in each month, 8pm, Lansdowne Road, Purley, Surrey. Hon sec N. A. Marshall, 122, Goodenough Way, Old Coulsdon, Surrey.

**Reigate (RATS)**—4 March, 1 April (Natter nights), "Marquis of Granby", Hooley Lane, Redhill, 8.30pm. 25 March ("RSGB publications" by G3TDR), 29 April (AGM), 8pm. St Mark's Church Hall, Alma Road, Reigate. F. H. Mundy, G3XSZ, QTHR. Tel Reigate 43130.

**St Albans (Verulam RC)**—Third Wednesday in each month, 19 March (Demonstration and talk on Marconi Instruments Ltd test equipment for communications purposes by Mr Rudkin), 16 April ("More uses for ICs in communications equipment" by J. M. Bryant, G4CLF, of Plessey Semiconductors). 7.30 for 8pm. Market Hall, St Albans. Visitors very welcome. Hon sec Hugh Young G3YHY, QTHR. Tel Watford 25633.

**Southgate (SRC)**—Second Thursday in each month, 8pm. The Green, Winchmore Hill, N21. Hon sec Brian Oughton, G4AEZ, QTHR. Tel 01-336 7166.

**South Kensington (Baden Powell House Scout ARG)**—Third Tuesday in each month, 8pm. Baden Powell House, Queensgate, South Kensington.

**Sutton & Cheam (SCRS)**—18 March ("A 144MHz tx" by G4CHV), 15 April (AGM). 7.30pm. The Library, Cheam, Surrey. Hon sec Alan Keech, G4BOX, QTHR.

**Welwyn (Mid-Herts ARS)**—Third Monday in each month, 8pm, 20 Jan., 17 Feb. Welwyn Civic Centre, Prospect Place, Old Welwyn. Visitors very welcome. Further details from hon sec J. U. Burke, G3HEA, QTHR. Tel Stevenage 4251.

**Wimbledon (W & DRS)**—Second and fourth Fridays in each month, 8pm, St John Ambulance HQ, 124 Kingston Road, Wimbledon, SW19. Hon sec F. W. Hill, G3WDO, QTHR.

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

**Canterbury (EKRS)**—6 March ("Consumer electronics" by Alan Ball, G3UQW), 20 March (Informal, devoted mainly to the constructor and beginner), 3 April (hf-vhf, discussion by G3MDO).

**West Kent (WKARS)**—7 March ("The beacon service" by Geoff Stone, G3FZL), 21 March ("IARU", by Tim Hughes, G3GVV), 18 April (AGM). Further details of activities from G4CCQ, QTHR. Tel Lamberhurst 393.

**Maidstone (MYMCAARS)**—7 March (Beginners class), 14 March, "Efficient cw contest operating" by G3ORP (Beginners class by G3XUN), 21 March (Beginners class by G3XUN), 28 March (No meeting but shack will be available), 4 April ("St Dunstan's provision for the blind operator" by George Taylor, G4BNL).



**Horsham (HARC)**—First Wednesday in the month. Civil Defence HQ, Moons Lane, Brighton. Further details from G3NPF.  
**Medway (MARTS)**—Fridays, 7.30pm. "Aurora Hotel", Gillingham. Details of meetings from T. R. Blackmur, G8FHN, QTHR.  
**Mid-Sussex (MSARS)**—Marle Place, Leylands Road, Burgess Hill. Details of future events from G3RXJ, QTHR.  
**Eastbourne (SARS)**—First Monday in each month at Victoria Hotel, Eastbourne. Further details of meetings from PRO G3JFM.  
**Crawley (CARC)**—Fourth Wednesday in the month at United Reform Church Hall, Ifield, Crawley. Further details of future meetings from G3MGL, QTHR.  
**Brighton (BTCARC)**—Room B7, Richmond Terrace Building. Details of meetings from J. McKernan, A8291, 37 Balsdean Road, Woodingdean, Brighton.

#### REGION 9

**RR H. W. Leonard, G4UZ**

**Bath (B & DRG)**—Mondays, 8.30pm. Church of the Ascension, Claude Avenue, Oldfield Park, Bath. Further information from John Noden, Flat 4, 30 Paragon, Bath BA1 5LY.  
**Bristol RSGB Group**—24 March ("PCM techniques" by Tom Boucher, G3OLB), 28 April ("East Africa" by Major Jarvis, G2BPC). 7pm. Becket Hall, St Thomas Street, Bristol 1. G3ULJ.  
**Bristol (BARC)**—Tuesdays, 7.45pm. 24 Bright Street, Barton Hill, Bristol 5. G4BZZ.  
**Bristol (Shirehampton ARC)**—Fridays, 7.30pm. Twyford House, Shirehampton. New members most welcome. G4BOL.  
**Bristol (University ARS)**—Most Saturdays during term time, 2.30pm. Dept of Physics, Royal Fort, Tyndall Avenue, Bristol 8. Full details from G3WDG.  
**Cornish (CRAC)**—6 March (Films and extended natter session), 3 April (AGM followed by RAE questions and answers). 7.30pm. SWEB Clubroom, Pool, Camborne.  
**West Cornwall (CRAC)**—Alternate Wednesdays, 7.30pm. The Guildhall, Penzance. Full details of Cornish and West Cornwall Clubs from G3NKE, QTHR. Tel Camborne 2419.  
**Exeter (EARS)**—Second Monday in each month, 10 March ("Air-craft & marine radio" by V. Tomkin). 7.45pm. ATC Hut, Colleton Hill, The Quay, Exeter. Details from Jack Bawden, 232 Exwick Road, Exeter EX4 2BA.  
**Newquay (N & DARS)**—Alternate Wednesdays, 7.45pm. Treviglas School. Full details from G8GOR, QTHR.  
**North Devon (NDRC)**—Second and fourth Fridays in each month. For details and QTH of meetings apply G4CG, QTHR.  
**Plymouth (PRC)**—First and third Tuesdays in each month, 7.30pm. Virginia House, Bretonside, Plymouth. Visitors most welcome. Hon sec S. E. Croft, 2 Crozier Way, Mutley, Plymouth.  
**Saltash (S & DARC)**—First and third Fridays in each month, 7 March (RSGB tape/slide lecture "Radio aurora"), Tuesday 18 March (Visit to PO exchange), 21 March (No meeting), 4 April ("The RSGB" by RR G4UZ), 17 April (Visit to Plymouth Planetarium 19.45gmt), 18 April (No meeting). G4DHA.  
**South Dorset (SDRS)**—First Tuesday in each month, 4 March (Constructor's contest), 8 April (AGM), 6 May (Open meeting preceded by a publicity drive). 7.30pm. Lecture Hall, South Dorset Technical College, Newstead Road, Weymouth. G3WAO.  
**Taunton (T & DARS)**—Fridays, 7.30pm. Jelalaband Barracks, The Mount, Taunton. Hon sec G. Swetman, "Little Copse", Monkton Heathfield, Taunton. Tel West Monkton 298.  
**Torbay (TARS)**—Tuesdays with special meeting on last Saturday in each month, 8 March (Annual dinner at Templestowe Hotel), 29 March ("Being an apirist" by G3UXN), 26 April (AGM). Visitors always welcome. 7.30pm. Rear of 94 Belgrave Road, Torquay. G3UIQ.  
**West Dorset (WDARG)**—First Friday in each month, 8pm. British Legion Club Hall, Dorchester. Hon sec L. A. Barnes, G8GHU, Flat 1, 107 The Esplanade, Weymouth. G8GHU.  
**Weston-super-Mare (WsmRS)**—Second Friday in each month, 7.30pm. Room Lewis M2, Worle School, New Bristol Road, Worle. G3PQE.  
**Yeovil (YARS)**—Thursdays, 7.30pm. The Youth Centre, 31 The Park, Yeovil. G3NOF.

#### REGION 10

**RR R. G. Barrett, GW8HEZ**

**Barry ARS**—Thursdays, 8pm. Barry Rugby Football Club, Reservoir Road, Barry. Details from sec GW3VPB, QTHR.  
**Blackwood (BARS)**—Fridays, 7pm. Oakdale Community Centre, Blackwood. Details from GW3KYA.  
**Cardiff RSGB Group**—Mondays 10 March and 14 April, 7.30pm. BBC Club, Newport Road, Cardiff. Details from GW3GHC.

**Glamorgan VHF/UHF Group**—Tuesdays 18 March and 15 April, 7.30pm. NCB Social Club, Tonddu, Nr Bridgend. Details from GW3ZTH.  
**Merthyr (MARC)**—Mondays, 7pm. Hoover Social Club, Pentrebach, Merthyr. Details from GW3RNC.  
**Pembroke RSGB Group**—Last Friday in each month. Defensible Barracks, Pembroke Dock. Details from GW3AKO.  
**Pontypool RSGB Group**—Tuesdays, 7pm. Educational Settlement, Park Hill Road, Pontypool. Details from GW3JBH.  
**Porth (Rhondda ARS)**—Every other Thursday, 7.30pm. Transport Employers Club, Porth. Details from GW3PHH.  
**Port Talbot (PTARS)**—Thursdays, 7pm. 3 April (Annual social). BSC Sports & Social Club, Margam. Tickets and details from GW3ACF.  
**Sully (S & DSWC)**—Tuesdays, 7pm. Sully Bowls & Social Club, 59 South Road, Sully. Details from GW4CJC.  
**Swansea (SARC)**—Tuesdays fortnightly, 7.30pm. The Commercial Inn, Killay, Swansea. Details from GW4BIQ.

#### REGION 11

**RR P. Hudson, GW3IEQ**

**Bangor (UCoNWARS)**—6 March (Presidential address by Prof I. M. Stephens). Thursdays, 5.30pm. Small lecture theatre, School of Engineering Science, Visitors welcomed.  
**Rhyl (R & D ARC)**—2nd Tuesday in each month. Meetings take place in the lecture room of the Ambulance Station, Coast Road, Rhyl.  
**Conway Valley (CVARC)**—Second Thursday in each month, 7.30pm. The Quarries, Llandulas, Colwyn Bay.

#### REGION 12

**RR A. J. Oliphant, GM3SFH**

**Dundee (Kingsway TCSAARC)**—Wednesdays, 6.30pm. Visitors always welcome. Details from J. M. Kelly, GM4AQM, QTHR. Tel Dundee 730265.  
**Elgin (Moray Firth ARS)**—Wednesdays, 7pm. The society, GM3TKV, is now in its new premises at Elgin Technical College, Moray Street, Elgin. The move has entailed the erection of a new aerial system and reports from other stations are requested. GM3TKV is on the air every Wednesday from 7pm on the 80, 40 and 20m bands. Any person interested in joining the MFARS should contact Mr A. J. Wills, 1 Police Houses, Moray Street, Elgin. Tel 3103 extn 45. New members are made very welcome.

#### REGION 13

**RR V. W. Stewart, GM3OWU**

**Berwick (BARS)**—Last Sunday in each month, 3pm. Tweed View Hotel. Further details from G. Shankie, GM3WIG, 8 Ettrick Terrace, Hawick, Roxburghshire.  
**Dunfermline (DRS)**—Second Wednesday in each month, 7pm. CCTV Studios, Pittencrieff School, Maitland Street, Dunfermline. Further details from D. G. L. Anderson, GM8HEY, 10 Cairneyhill Road, Crossford.  
**Edinburgh (Ferranti, Edinburgh AR Section)**—Second and fourth Wednesdays in each month, 7pm. Recreation Club, Stewart Terrace, Edinburgh. Non-Ferranti employers can attend by arrangement with the society. Further details from N. F. MacLeod, GM4DHN, 54 Drumbrae South, Edinburgh.  
**Edinburgh (LRS)**—Second and fourth Thursdays in each month, 7.30pm. Adult Education Centre, Riddles Court, High Street. Hon sec GM8GEC.  
**Glenrothes (G & DARC)**—First Sunday in each month, 7.30pm. Old Nursery Building, Leslie, Fife. Special meeting for project groups every Wednesday, 2 March (Films), 6 April (No details), 4 May (No details). Further details from GM3YOR, QTHR.  
**St Andrews (USTAARS)**—Details from R. Marchant, GM3ZCQ, Dept of Physics, North Haugh, St. Andrews.

#### REGION 14

**RR M. A. Comrie, GM3YRK**

**Ardeer (ARCARS)**—Thursdays, 7.30pm. Ardeer Recreation Club, Stevenston, Ayrshire.  
**Ayrshire (ARG)**—Every second Sunday. YMCA, Howard Street, Kilmarnock. Further details from hon sec R. D. Harkness, GM3THI, 55 Woodend Road, Alloway, Ayrshire.  
**Falkirk & D RSGB Group**—Temperance Cafe, Lint Riggs, Falkirk. Further details from J. Ramsay, GM3OQI, 78 Wheatlands Avenue, Bonnybridge, Stirlingshire.

**Greenock (G & DARC)**—GM3ZRC. Tuesdays and Fridays, 7.30pm. Watt Library, Union Street, Greenock. Enquiries to hon sec N. C. Henderson, GM3LYI, QTHR.

**Glasgow (GURC)**—George Service House, University Gardens, Glasgow. Details from hon sec, c/o Dept of Engineering.

**Mid-Lanark RSGB Group**—Main meetings recommence 10 January and thereafter fortnightly, with alternate Friday meetings informal. RAE classes held at 7pm every Wednesday, new enrolments for the advanced section of the course are welcome. Details from GM3KMG. Tel Hamilton 28759.

**West of Scotland (ARS)**—Fridays. 81 Virginia Street, Glasgow. Details from sec GM3RHR, QTHR.

**REGION 15 Deputy RR H. J. Campbell, G18FOK Bangor (B & DARS)**—First Friday in each month, 8pm. Redcliff Hotel, Seacly Road, Bangor. Always something interesting going on. Everyone welcome. Hon sec N. S. Newell, G13YMY, QTHR.

**Belfast RSGB Group**—Third Wednesday in each month, 8pm. 90 Belmont Road, Belfast. New members and guests made most welcome. Lectures on a wide variety of subjects. For further information contact H. J. Campbell, G18FOK, QTHR.

**Belfast (CoB YMCARC)**—Saturday afternoons, 2.30pm. Please note new QTH. Brunswick House, 7 Brunswick Street, Belfast. Hon sec S. Ruff, G18EWM, QTHR.

**Belfast (QUORC)**—Tuesdays 8pm. Queen's University Radio Club, 37 Fitzwilliam Street, Belfast. All welcome.

**Mid-Ulster RSGB Group**—First Sunday in each month, 3pm at G14BAC, QTHR. Everyone welcome. Details from V. I. Gracey, G13WEM, QTHR.

**North Antrim RSGB Group**—Advance notice of rally to be held in the Castle Grounds, Antrim, on 21 September 1975. Make a note in your diary, full particulars will be issued later.

In connection with the **Ballymena Radio Club (G13FFF)** it is hoped to have a club activity week-end at Easter when it is hoped that every club call sign in GI will be activated on all bands possible. Further information from G18AYZ (AR), QTHR.

**REGION 16 RR E. T. Jacobs, BRS32513 Chelmsford (CARS)**—First Tuesday in each month, 7.30pm. Barconi College, Arbour Lane, Chelmsford. Details from B. G. Tew, G3WFF, 334 Gloucester Avenue, Chelmsford.

**Colchester (CRA)**—Most Wednesdays, 7.30pm. Stanway School, Colchester. Details from E. York, G8HOR, 22 Owen Ward Close, Shrub End, Colchester.

**Colchester (UoEARS)**—Details from J. Masterton, G8FUL, Eddington 6.

**Great Yarmouth (GYRS)**—Last Thursday in each month, 6.30 Southdown Road, Great Yarmouth. Details from A. D. Besford, G3NHU.

**Ipswich (IRC)**—30 April (Lecture by P. Best, G8BLS). Meets every other week. Handford House, Ranelagh, Road, Ipswich. Details from P. Hubert, G3YWM.

**Lowestoft (L & DARC)**—Twice weekly, 7.30pm. YMCA, Park Road, Lowestoft. Details from R. P. Finch, G4AJQ.

**Martlesham (MRS)**—Details from G. Murchie, G8AXU. Post Office Research Centre, Martlesham.

**Norwich (Norfolk ARS)**—Weekly, 7.45pm. Crome Community Centre, Telegraph Lane, East Norwich, Norfolk NOR 36T. Details from J. M. Draper, G8BLD.

**Norwich (UoEAR & EC)**—Details from P. Gowen, G3IOR.

**Stowmarket (S & DARS)**—Details from hon sec K. J. Bertrand, 35 Curwen Road, Stowmarket.

**Vange (VARS)**—Thursdays, 8pm. Youth Hall, Barstable Community Centre, South Riding, Basildon. Details from Mrs D. Thompson, 10 Feering Row, Basildon.

**REGION 17 RR L. Hawkyard, G5HD Basingstoke (BARC)**—First and third Saturdays in each month. Chineham House, Popley, Basingstoke. 7.30pm. Sec R. H. Oakley, G8FKT.

**Basingstoke (UK FM Group (Southern))**—First Wednesday in each month, 8pm. Chineham House, Popley, Basingstoke. Sec G3ZRM. Details from G8HWO, QTHR.

**Bournemouth (Wessex ARG)**—First Friday in each month and the Monday 17 days later, 8pm. Cricketers Arms, Windham Road. Hon sec G8BBN.

**Bracknell (BARC)**—Mondays, 7.30pm. Cooper's Hill Community Centre, G3YMC.

**Fareham (F & DARC)**—Wednesdays, 7.30pm. Porchester Community Centre, Room 9. Details from G8FFI, QTHR.

**Farnborough (F & DRS)**—Second and fourth Wednesdays in each month, 7.30pm. 8th Air Scout's Hut, Rectory Road, Farnborough. Sec G8ECO or PRO G8ATK, both QTHR.

**Jersey (JARS)**—Sundays, 8.30pm, and Fridays, 8pm. Le Hocq Tower, St Clement, Jersey. Hon sec Mary McTaggart, 19 Parade Road, St Helier.

**Harwell (AERERC)**—Third Tuesday in each month, 7.30pm. Also informal meetings every Friday lunchtime. Social Club, AERE, Harwell, G3NNG.

**Maidenhead (M & DARC)**—6 March ("IC 80m transceiver" by B. Boden, G4CDZ, and B. Mepharm, G4CDL), 18 March (AGM), 3 April ("Simple receivers and converters" by W. Omer, G3DOJ), 15 April ("Operating procedures"). 7.30pm. British Red Cross Hall, The Crescent, Maidenhead. G3FVC.

**Portsmouth (P & DRC)**—Wednesdays, 7.30pm. Portsmouth Community Centre, Malins Road, Buckland, Portsmouth. G3NCO, QTHR.

**Reading (RARC)**—First and third Tuesdays in each month, 8pm. "White Horse", Emmer Green. G4BLT.

**Salisbury (SR & ES)**—Tuesdays. Salisbury Activity Centre, Wilton Road. Hon sec G2FIX, QTHR.

**Southampton (SUARC)**—Tuesday evenings, also informal meetings every lunchtime during term in the clubroom, Old Union Building. Hon sec I. Mercer, G3ZER.

**Southampton RSGB Group**—Second Saturday in each month at the Lanchester Building, Southampton University, also Wednesdays at the clubroom, Kent Road. Both at 7.30pm. G4AEU.

**Swindon (SDARC)**—Wednesdays, 7.30pm. Penhill Junior School, Swindon. G3YKC, QTHR.

## OBITUARIES

*The Society records with regret the deaths of the following radio amateurs:*

**Mr E. R. Boothroyd, G3GYH**

Roy Boothroyd died on 17 January. He was very active in the mid-'fifties on 20m, working many VKs and ZLs, and was still operating on 80m up to the time of his death. An operator of G3KJO at Huddersfield Polytechnic, he prepared many students for the RAE.

**Mr F. W. Dordard, G6UD**

Freddy Dordard died on 16 January at the age of 74. He was a keen dx man on the hf bands and was one of the most active amateurs in the Sunderland area.

**Mr F. Elton-Bott, ex-G5VB**

Frank Elton-Bott died on 28 March 1974 aged 65. In the late 'twenties he was BRS72, and only relinquished his G5VB licence a few years ago. He built all his own equipment and was a first-class cw operator with a fine dx record, being a pioneer of 10m operation and in later years having worked 150 countries on 80m cw.

**Lord Fraser of Lonsdale, CH, CBE, ex G5SU**

The Society lost one of its most illustrious Past-Presidents with the death of Lord Lonsdale on 19 December 1974 at the age of 77. Blinded in the first world war, he then Capt Ian Fraser joined the Society in 1922 and became President in 1928. He played a leading role in the transmitting movement, being prominent in the "T & R" days.

In public life he was best known as an MP and for his work with St Dunstan's. He was the recipient of many honours, culminating in a life peerage in 1958. He was guest of honour at the RAOTA reunion in 1964, when he was elected an honorary member of the association.

**Mr R. Garner, BRS32289**

Reg Garner died on 10 October 1974. He became interested in amateur radio in his retirement and had been an active member of the Yeovil ARC for five years before his death.

**Mr R. Lamb, G3IDD**

Reg Lamb, formerly of Egham, Surrey has died. Although not very active on the dx bands, he was a very keen constructor, and his electronic skill and ingenuity was put to good use in his profession of teaching the deaf.

We have also been advised of the death of:

**Mr J. E. Allen, G3NRE**, on 19 January.

# 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	Mode	Town
<b>Sundays</b>				
1000	G3HZL	144-160 to south-west	A1/A3J	Isleworth, Middlesex
1000	G3LEQ	1-815 to north 144-250 to north 145-550 to north	A2/A3 A1/A3J F2/F3	Knutsford, Cheshire
1015	G3CGD	1-875	A1/A3	Cheltenham, Glos
1030	G3NPB	1-875	A1	St Ives, Cornwall
1030	G3LR	1-810	A1	Accrington, Lancs
1030	G3ZNV	144-520 to east	A2/A3	West Molesey, Surrey
1030	G4DKK	1-970	A2/A3	Caterham, Surrey
1100	G2FXA	1-900	A1/A3	Stockton-on-Tees
1115	G3ZNV	144-520 to north	A2/A3	West Molesey, Surrey
1200	G3HVI	144-100 omni-directional	A2/A3	Stoke-on-Trent, Staffs
1815	G3VTY	1-915	A1/A3J	Leeds, Yorks
1815	G3YEE	1-910	A1/A3J	Bradford, Yorks
1830	G3NCZ	1-920	A1/A3	Blackburn, Lancs

<b>Mondays</b>				
1800	G3YEE	145-510	F2/F3	Bradford, Yorks
1800	G3SWR	1-980	A1/A3	Birmingham
1830	G3VBI	1-910	A1/A3	Goole, Yorks
1930	G3RAF	1-910 to north 3-590 to north 144-024 to north	A1	Locking, Soms
1930	G13SXG	3-575	A1/A3J	Newtownards, Co Down
2000	G3IBJ	1-910	A1/A3	Southampton, Hants
2000	G3XWZ	1-910	A1/A3J	Mansfield, Notts
2000	G3YJL	1-845	A1/A3	Walton-on-Thames, Surrey
2030	G3YJB	1-845	A1/A3	East Molesey, Surrey
2030	G3ASR/A	1-875	A2/A3	Harrow, Middlesex
2030	G3KGU	1-915	A1/A3	Theydon Bois, Essex
2130	G3LQI	145-300	F2/F3	Lancing, Sussex
2230	G3HZL	144-160 to south-west	A1/A3J	Isleworth, Middlesex

<b>Tuesdays</b>				
1100	G3EBU	1-952	A2/A3J	South Woodham, Essex
1800	G3SWR	1-940	A1/A3	Birmingham
1830	G4BNA	3-590	A1	Swindon, Wilts
1900	G4CLN	1-915	A1/A3J	Packington, Leics
1930	G3RAF	1-910 to north 3-590 to north 144-024 to north	A1	Locking, Soms
2000	GM3UWX	145-890 omni-directional	F2	Bishopston, Renfrewshire
2000	G4AEU	1-910 to north 1-815 to north 144-250 to north	A1/A3 A2/A3 A1/A3J	Southampton, Hants
2000	G3LEQ	145-550 to north 145-550 to north	F2/F3	Knutsford, Cheshire
2045	GM3CRY	3-550	A1/A3J	St Andrews, Fife
2130	GM3UAG	145-800 to south		Ellon, Aberdeenshire

<b>Wednesdays</b>				
1930	G3RAF	1-910 to north 3-590 to north 144-024 to north	A1	Locking, Soms
2000	G8QU	1-970	A1	London N22
2000	G3BPE	1-975	A1/A3	Bexley, Kent
2000	G3SWP	1-920	A2/A3J	Doncaster, Yorks
2015	G3WVJ	1-845	A1/A3	Staines, Middlesex
2100	G3HVI	144-100 omni-directional	A2/A3	Stoke-on-Trent, Staffs
2230	G3HZL	144-160 to south-west	A1/A3J	Isleworth, Middlesex

† Alternately

Clock time	Callsign	MHz	Mode	Town
<b>Thursdays</b>				
1800	G3SWR	1-980	A1/A3	Birmingham
1830	G4BNA	3-590	A1	Swindon, Wilts
1830	G3NC	1-968	A1	Swindon, Wilts
1900	G3YEI	1-850	A1	Fleetwood, Lancs
1915	G3ZNV	144-520 to north	A2/A3	West Molesey, Surrey
1930	G3RAF	1-910 to north 3-590 to north 144-024 to north	A1	Locking, Soms
2130	GM4CAU	145-800 to north		Aberdeen
2130	G3LQI	145-300 to north	F2/F3	Lancing, Sussex

<b>Fridays</b>				
1800	G3SWR	1-940	A1/A3	Birmingham
1900	G3NPB	1-875	A1	St Ives, Cornwall
1900	G4CLN	1-915	A1/A3J	Packington, Leics
1930	G3PQF	144-360 to north-east	F2/F3	Farnborough, Hants
1930	G3RAF	1-910 to north 3-590 to north 144-024 to north	A1	Locking, Soms
2000	G3LEQ	1-815 to north 144-250 to north 145-550 to north	A2/A3 A1/A3J F2/F3	Knutsford, Cheshire
2015	G3SAZ	1-845	A1/A3	Ashford, Middlesex

<b>Saturdays</b>				
0930	G2FNK	1-930	A1/A3J	Staines, Middlesex
1000	G3HZL	144-160 to south-west	A1/A3J	Isleworth, Middlesex
1115	G3HZL	144-160 to north-west	A1/A3J	Isleworth, Middlesex

G3BZU morse proficiency transmissions at 15, 20, 25, 30, 35 and 40wpm are made at 2000 clock time on the first Tuesday of each month on a frequency of 3-520MHz. For 100 per cent copy at 15wpm a certificate is awarded, and endorsement stickers are available for 100 per cent copy at the higher speeds. A charge of 15p or three IRCs is made for the basic certificate, and 5p or one IRC for each endorsement sticker claimed. All claims should be sent to—The QRQ Manager, RNARS, HMS Mercury, Leydene, Petersfield, Hants.

## INTERFERENCE PROBLEMS

Members accused of causing interference or who suffer interference from external sources are invited to seek the assistance of the Interference Committee in solving their problems.

Enquiries should be addressed to: The Chairman, Interference Committee, RSGB, 35 Doughty Street, London WC1N 2AE.

# MEMBERS' ADS

These subsidized flat-rate advertisements are accepted as a service to members of RSGB. They must be submitted on the Members' Ads order form printed in 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 40p (stamps not accepted). They will not be acknowledged. Those not clearly worded or punctuated will be returned. No correspondence concerning this service can be entered into.

The closing date for each issue is the 1st of the preceding month, but no guarantee of inclusion in a specific issue can be given.

Post to: MEMBERS' ADS, "RADIO COMMUNICATION", 35 DOUGHTY STREET, LONDON WC1N 2AE

## FOR SALE

**KW Viceroy mk3**, vgc, with quick netting facilities fitted, £60 ono. GW4AZW, QTHR. For details Tel Abermule 673 (Mont).

**American mostly boxed valves**: 6AH6, 6CB6, 6AG5, 6U8A, 6AJ5, 6C4W, 6CL6, 6BH6, 6DT6, 2D21W, 403B, 5687. Several 5763, 5R4GY, QV04-7, 7C7, 1625, others, reasonable offers. Edwards, 244 Ballards Lane, London N12. Tel 01-445 4321.

**3cm waveguide components**, guide, mixers, valves, attenuators, flanges, circulators, bands, detectors, wavemeters, rx front end. Send for list. G4DCU, QTHR.

**6 miles north Cornwall coast** 400ft asl, secluded 1923 4-bed semi-bungalow, 1/2 acre, oil central htg plus usual facilities, £16,250. Also records and hi-fi business in Bude, £24,000 turnover, £5,500 plus sav agents. Details on request. G3UCS, QTHR. Tel Bridgerule 209.

**4m Microwave Modules 5W a.m.** tx modified by makers for 70MHz, xtals 70-26, 70-50 and Microwave Modules 70MHz converter i.f. 18-0-18-7, £38 for both. G2RY, QTHR.

**Pye Base and Cambridge** both 2m a.m. tunable receivers. Pocket-one 70cm. Two gen cov receivers. TV camera, other equipment and spares. SAE for list. G8AFJ, QTHR. Tel 51734 after 6pm.

**Heathkit bargains**: SB102 tx/rx £135. SB600 case, spkr and ac psu, almost new, £20. HP13 dc psu, £20. SB620 spectrum analyser, 2 months old, £75. SB200 1kW linear, £100. All exc cond. G3XCB, QTHR. Tel 01-699 8350 after 7 pm.

**2m rx Pye AM 10F** all-transistor with internal mains psu, varicap tuned, plus pre-set channel facility, S-meter, re-designed front panel, £25 ono. For details phone or write D. S. Marshall, "Shelwyn" Nut Orchard, Twynning, Tewkesbury, Glos GL20 6DR. Tel Tewkesbury 294082.

**Codar CR70A** rx, fb cond and order, £15. Yaeu hand mic YD846, £3.50. G3OAZ, QTHR. Tel Basingstoke (0256) 65126.

**Liner 2-2m tx/rx** plus pre-amp, £120. G8BWH, QTHR.

**AR88D** vgc, £35. Various high-voltage transformers, smoothing chokes and capacitors, mA meters etc, offers. GW5XN, QTHR. Tel 0222 701146 or sae.

**Trio 9R-59D** communication rx. 500kHz calibrator, stabilizer, matching spkr etc, good cond, £32. Carriage extra. G3PNI, 17 Durban Road, Margate, Kent CT9 2SS.

**HW100** with mic and ac psu, plus spkr cabinet, fitted cw xtal, £110. G3UQZ, QTHR. Tel 021-373 8806.

**FT2F xtals** 144-400, 144-600, 144-800, 145-800, £2.50 pair. Wanted: microwave components why, G8FGD, QTHR. Tel 0272 562984.

**Medium power 2m linear**, 1kW input, pair Eimac 4X150A fitted, separate heavy-duty psu, offers. 2m 30W transistor Class C amp, £6. TTL xtal standard, £6. Further details, sae. G8CEX, QTHR.

**Valves**, various types, new, sae. List transformers UM1, £2. SCR522 mod, £1. Driver 60p. Various PSUs, commercial, 240V ac input, various outputs. Transformers, ht, Parmeko, Woden, sae. Inverters, FL8 filter. Complete 2m tx, QV06-40 modulator, psu, 19in rack, £15. G3LHA, QTHR.

**FT200**, mint, hb, ac pu, dc 200 psu, swr meter, £180. Microwave Modules 5W a.m. tx matching rx with fm adaptor, £40. G3MCL, QTHR. Tel 881060.

**FM10D** with matching external vfo, exc cond with transmit xtals, 145-0, 145-125, 145-15, 145-175, 145-55, £49 ono. Storno r/t manuals, £1.80 each. CQF661 series, CQL611 series, CQM611 series, CQL611F

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. Advertisements may be edited or abbreviated as necessary.

Members are advised to enclose a stamped addressed envelope when replying to advertisements.

series, CQM631 series, CQL631 series. Heath 202E professionally built and tested with xtals 145-0 R5 and R6, £97 ono. Jaybeam 8XY/2m as new with separate 60ft coaxial feeds, £12 ono. AR22 as new with 60ft control cable, £24 ono. G. Ketley, G8FQX. Tel Cranleigh (Surrey) 4681 evenings.

**Yaeu FRDSX400**, £140. 18AUT/WB, £30. Stolle rotator auto, £25. Wall/bkts. Mast, 2m 4m antennas. Frequency meter BC-221M, psu. Yaeu spkr, books, RAE course, Radiomobile Stereo 8 home deck, unused, £18. 7 Blenheim Close, Poynton, Cheshire.

**HW12A** and home-brew psu, GM3IVZ, QTHR. Tel Kirkcaldy 62605.

**Components for QRO linear** including cabinet, chassis, valves and holders, Varivac condensers etc, £35. TS509/UR field strength meter, 90-400MHz, £10. Antennascope per *Beam antenna handbook*, £7.50. SWR meter, £7.50. G2MF, QTHR. Tel Sheffield 360210.

**KW107** atu, £50. G4CQA, QTHR. Tel 0296 84051 evenings except Tuesdays.

**Mohican Heathkit**, £40. Heathkit RF1U generator, £15. Avo 8, £35. Avomitor, £9. Heathkit 1U-17U tube checker 1-177, £8. 70W spkr, £15. Valves, transistors, cr tubes. VR138, £1.50. 3BP1, £3. 5BP1, £4. DG7/31, £8. Transformer MT107, £5. Spkr EMI, £2 each. Lennox Longe, 28 Lake Avenue, Slough, Bucks SL1 3BZ.

**Tent**, 14 by 14 by 7ft, heavy duty, ideal for portable field days, easily carried as poles in 4ft sections, £20. Carriage, £2. Offers? G3OJE, QTHR. Tel 01-660 5717.

**R107** plus phones, suit beginner, fully wkg order, £20. Buyer collects. J. Donnithorne, Little Homestead, Hackenden Lane, East Grinstead, Sussex. Tel 26366 evenings.

**HW17A** with dual gate mosfet i.f. amplifier, good modulation, spares including new valves, £60. Microwave Modules 2m converter 28-30MHz, vgc, £10. G8ENZ, QTHR. Tel Egham (07843) 5737.

**Pye PTC 2012 a.m. Handi-Ranger** radio-telephone, low band, with service manual and xtals to convert to 70-26 MHz operation, £20. M. T. Knights, G3TQY, Chalk Road, Ifold, Billingshurst, Sussex. Tel Loxwood 752933.

**Trio JR500SE** ham bands rx, used but OK, offers? GM8IID, QTHR. Tel 041-959 6009.

**BC221** practically brand new with manual, spare valves and stabilized psu, £25. Frequency counter, 30MHz, almost finished, needs preamp, includes preset and multiplier facilities, xtal oven, eight-digit readout, offers over £30. G3TGF, QTHR.

**Lafayette communications rx**, gen cov, a.m./ssb/cw, good cond, £25. 2m converter xtal 46-1667MHz (5-5 to 7-5 i.f.), £1. Houghton, 12 Upper Park Street, Worcester, Worcs. Tel Worcester 354679.

**HW100** and psu, also Z-match and low-pass filter, £120 ono. G3XYD, QTHR. Tel Watford 43516.

**FT501** digital 500W tx/rx, cw filter, all xtals. FP501 ps/spkr, manual, spare tubes, perfect cond, original packing, £330. G3HHD, QTHR. Tel 099-289 2037.

**Liner 2** with PA3 preamp, £115. G8BHW, QTHR. Tel Aldridge 54166.

**KW2000A** with ac psu. Shure mic, exc cond, £145 ono. TA32 Jnr 2-el beam, AR40 rotator, brand new, still in original cartons, £40 ono. 21m heavy-duty 50Ω coaxial cable, new, £4. 100m polypropylene rope, 600lb, new, £3. G3YYG, QTHR. Tel Hemel Hempstead 57547 after 6 pm.

**Trio 9R59D** little-used, exc cond, handbook, original packing, headset, spkr, buyer collects, £42. Strivens, 17 Orchard Way, Kemsing, Sevenoaks. Tel 0832 61747.



**Eddystone 680X**, £60. 888A, £65. Trio JR310, £55. Teleton TF182FB 8-band, £30. Sanyo Super 7-band export model, £35. All exc cond. **Wanted**: SX42, SX122, HQ180A or similar. Andrews, 12 Malton Way, Shipton Road, York YO3 6SG. Tel 0903 59035.

**Collins 75S-3B**, 32S-3, 516F2, £650. 30L-1, £200. Drake MN2000, £50. Heathkit SB610, £55. All mint, less than 3 years old. G6OP, QTHR. Tel 43516 after 4.30pm.

**Heathkit RG1** gen cov rx 550kHz to 30MHz, mint cond, with manual. G3JBU, QTHR. Tel 0604 43020.

**Trio TS510** and psu, £140 ono. Also transverter 14/2 200p.e.p. QQV0-640, £60 ono. Won RSGB construction contest. Buyer collect. Stan Ford, 3 Hill View, Milton, Stoke-on-Trent ST2 7AR.

**Liner 2** with preamp and Bantex 11 whip, still under guarantee, 6 months old, £125; KW2000 plus ac psu with new 6146B pa giving 120W p.e.p., £110 ono. Can del approx 100 miles. G3OHC, QTHR. Tel 021-308 2512.

**Unmarked 400mW zener diodes** similar to BZY88, 60p for 50 (tested) or 40p for 100 (untested) including postage and packing. Money returned if not satisfied. **Wanted**: good Pocketfone PF1 nicad batteries, state price. G8GPO/G3BAY, QTHR.

**Beam and tower** advt December 1974 issue. First reasonable offer secures. G2YS, QTHR. Tel 76864.

**Used coaxial relays**, "Londex type", 13-18V, N type uhf sockets, with plugs, £2.50. New boxed Marconi 100kHz xtal, £1.25; 60-75MHz, 75p. Four 150A's, 75p. QQZ06-40 as new, £2.50. New miniature enclosed 10W 50Ω dummy load, bnc plug, £1. All carriage extra. G8ENI, QTHR. Tel Cheslyn Hay 415374.

**Clearing out useful units**, some wkg, some for components. Scope units, PSUs, transformers, i.f. strips, radiotelephone, sig gens, cases, all cheap, inspect and collect. **Wanted**: Cambridge dash mount chassis and case or u/s set. Tel Cobham (Surrey) 3117.

**Panda Explorer tx**, 150W a.m. cw. Offers. G3GIC, QTHR. Tel 01-567 6389.

**KVG XF-9B**, ssb filter with usb and lsb xtals, £18 ono. Eddystone 898 dial, unmarked scale, £5. Various tuning capacitors. Harrison, 46 Rush Green Road, Romford, RM7 0PS or tel Romford 60325 after 5.30pm or weekends.

**Liner 2** with preamp and Liner psu, £120. KW2000 dc psu, £13. **Wanted**: Modulation meter, Airmec 210 or similar, also modern highband fm radio. Tel Titchfield 43894.

**Hy-gain 18AVT/WB**, used 2 months only, £30. Heathkit V7A/UK valve voltmeter, £10. EK9X electronic keyer and EKM-1 monitor, £10. All with manuals. G5WP, QTHR.

**Disposal gear late G3MVT**: QRO ssb transmitter 80m-10m consisting third method generator, linear, topband transverter, psu, needs oscillators or Heath rx. Heavy-duty aerial rotator with great circle indicator, £10. Heath voltmeter. Transmitter psu. Details, prices from G3YZO, QTHR.

**200 250µF 25V caps**, 120 500µF 50V caps. 100 2000µF 16V caps. 70 red mes Bulgin bulb holders. 80 BTG valve holders. 200 BTG valve holders with cans. 60 telescopic radio aerials. Offers please. G3NJD, QTHR.

**10 AMD Cambridge tunable rx**, £25 ono. Heathkit HW30, £12 ono. Echelon 10W 2m tx and psu, slight fault, £10 ono. Heathkit S33-M stereo amp (valve), £8 ono. Buyer collect or arrange carriage. G8EHU, QTHR or tel Burton-on-Trent (0283) 790454.

**Gen cov rx Eddystone 730/4** and spkr, mint cond, £80. Tx bureau cabinet, £10. Goodmans hi-fi spkr, Axiom, Middax, Trebax, cross-over etc in cabinet, £25. Quad fm tuner, £12. G4BCN, QTHR.

**P60 galvanized Versatower** less ground post, otherwise comp, exc cond, cannot erect at new QTH. First reasonable offer accepted. G3TOW, "The Roosters", Heron Court, Parkgate, Wirral, Merseyside. Tel 051-336 4649.

**R1475 2-20MHz rx**, ideal 2m i.f. strip, £16. 2m converter 2-4MHz i.f. £6. Cossor 1049 db scope, £20. Valve voltmeter, £5. RF sig gen, £5. Sutton, G3ZAJ, QTHR. Tel Challock 441 evenings.

**"Radio Constructor"**, "Short Wave Magazine", "Radio Communication", the lot, £3. Labgear LG50 tx, £25. Codar T28, 160 tx, 12V psu, £14. 53 Rusthall Avenue, Chiswick. Tel 01-995 1728.

**Table-top steel cabinet**, UM2 modulation transformer, heater transformers, valves, moving coil mics, xtals, meters, Mullard 5-10 amplifier, relays trans, coil turret, ac to dc 200mA units, books, magazines, small motors, spkrs, early components, other goods. G3DFS, QTHR.

**2m tx part-Cambridge** plus transistor modulator and 12V inverter, £10, four 150D valves, £1. Garex 60W inverter, £3.50. Garex 70cm converter, £4. 9ft lengths aluminium mast 1 1/2in diam, 90p. Collect or carriage extra. G8CJO, QTHR. Tel 0272 772435.

**Heath HW12A** 80m tx/rx with HP13B dc psu, 100kHz xtal and mic, all vgc, offers. G4CJJ, QTHR. Tel 01-898 3728 evenings.

**Eddystone EC10**, £35. Lafayette HE40, £20. Both mint cond. Tel Bury St Edmunds 2965.

**Eddystone 840C**, mint, £45. Codar AT5, mains psu, mobile psu, control box, £25. Tavasu mobile vhp, 160, 80m resonators, £5. **Wanted**: FL1000 or FL2000 linear. G3VIN, QTHR.

**Jaybeam 2m 8-over-8 slot** fed with 7ft 6in stub mast. Joystick and Joymatch, both cheap. Prefer buyers to collect. G8JDV, 147A Wigton Lane, Leeds LS17 8SM. Tel 0532 684781.

**Avo electronic testmeter mk4 (VTVM)**, handbook, £12. Avo rf testset accessory for this unused handbook, £6. G73 wavemeter 100kHz to 25MHz xtal check calibrated 1µV to 100mV, attenuator, charts, £10. Grampian DP4 mic, hi-Z, unused, £3. G3XJJ, QTHR. 625-line tv camera less lens, £30. G8CQE, QTHR.

**Liner 2** 7 months old, preamp, £100 ono. Collins mech filter F455F05, £12. ICs 7490, 7441, 40p each. 2W walkie-talkies, one on 28-5MHz Deacs, chrgers, £15 ono. 741 op amps, 20p. G3UEQ, QTHR.

**DX40U and VF1U**, £25. KW 1pf 75Ω, £7. KW 75Ω dummy load, £7. Vanguard control box, £1. Murray Rover on 145-8MHz, £15. Tel Belfast 644688.

**AR40 rotator**, brand new, £23 ono. Mosley TA32 Jnr beam, new, never erected, £24 ono. 16ft ally scaffold poles, £3 pair. 100m polypropylene, 600lb, new, £2.50. 21yds 50Ω, hd coax, new, £3.50. 30MHz counter, LED read-out, 100kHz, xtal, 4-digit, £18 ono. G3YYG. Tel Hemel Hempstead 57547 after 6pm.

**Test equipment**: scopes (Cossor/Solartron), vhf signal generator (Marconi), pulse generator, VVMs TF1041B/C, DVMs (Solartron), scope CRTs, handbooks, valves and components. Sae for list. G3NPZ/G3ZOE, QTHR. Tel Wickham 832173.

**432MHz Microwave Modules converter**, 28-30MHz, £16. 432MHz Sorno 10W tx, £14. 432MHz 46-el aerial with 40ft l/l coax, £9, or all 3, £35. Hallicrafter 2m hand-held rx, £18. **Wanted**: circuit for STC T4188 tx pa unit. G8/4DDF. Tel 0922 51017.

**Pye U10B uhf Cambridge** with control box, cable and cradle, xtal on 433-2MHz, £35. Pye bantam, high-band fm with rechargeable battery, £35. Pye FM10D low-band fm Cambridge, £14. G4BLH, QTHR. Tel Nelson 691771.

**Cossor Commandos** fm high-band transceivers, all transistor except pa and driver which are quickheat, 25W rf, 6-channel, xtal on 145-0MHz, £40 each. G4BLH, QTHR. Tel Nelson 691771.

**HF/CW tx with Gelofo vfo**, cabinet, psu needs completing. Heath OS1 scope plus all contents of shack, £20. Buyer collects. G3UBL. Tel Fareham 89867 after 15 March.

**Trio 2200** with mic etc, exc cond, fitted with 3 Japanese channels plus 145-0MHz, £70. G3OQT, 7 Willow Brook, Bunbury, Cheshire. Tel Bunbury 260708.

**KW2000A** with acu psu and manual in 1st class cond, unmodified, mint appearance, £160. G4CZS, QTHR. Tel 061-428 8594, after 6pm.

**Yaesu FTD400 tx/rx**, £170. Marconi 1475 hf rx with 144MHz converter, £32.50. Collins F455Z mechanical filter with xtal, £14. HQ1 hybrid quad 10, 15, 20m, £25. HF power transistors type 5708 100W diss, £7. 1MHz glass xtal, £2. Tel Partridge Green 710565.

**Yaesu FT101 tx/rx** mint cond, very little use, with all plugs and cables, in orig packing, £225, carriage extra. Mark mobile HW3 triband helical, £8. Evershed and Vignoles megger, £12. G3UML, QTHR. Tel 01-550 0882.

**New KW202**, £170 or will swap for mint EA12. G3ENB, QTHR. Tel 0723 65093.

**Creed 7E** with silence cover, £16. Creed 7TR, £10, both mains motors. Pye F27AM 4m base station, £30. Heathkit SSU-1 spkrs, £15 pair. Stereo amp, preamp, £12. KW2000A, ac psu, £150. G3OZF, QTHR. Tel Stone (09674) 354.

**KW2000A**, good cond with handbook and ac psu, just revalued, £130 incl carriage and insurance. GC3LYC, QTHR. Tel 0481 64482 evenings.

**Sommerskamp 747 tx/rx** (as 560), as new, no mods, perfect in orig box with all gen, first £165. Infra-red electro ign (not home brew!), £4.00. **Wanted**: Gen on Class D wavemeter No 1 mk2. G3ZLH. Tel 0691 5730 (Oswestry).

**Two Lafayette MA800s**, one with fm i.f., £40. Inoue IC2F, freqs 144-48, 144-60, 145-00 incl homebrew vfo for tx, £65. Honda E300E generator, approx 100 hrs use, £90. BC221 with charts, £18. GW8HDH, QTHR. Tel 0792 22287 after 6pm.

**TT21** pa valves, unused. Four only, £2.75 each or £10 the lot. G3VNI, QTHR.

**Meters**: 22in, 100, 150, 200, 500mA. 22in sq 5mA, electrostatic 2000V, 3000V. Transformers, Woden DT1, DTF22 (5V, 10A twice). Premier 2-5V, 10A. Choke, Woden 20H, 60mA. Qser BC453A, ARR-15 100kHz harmonic calibrator. BC221AJ with pu, offers. G6ZH, QTHR.

**Xtals** 38666-6kHz in HC18/U, brand new and guaranteed, £2.60 post paid. P. Smith, 49 Hucknall Avenue, Ashgate, Chesterfield, Derbyshire, S40 4BZ.

**HRO**, rough, full coils, wkg, low gain, £10. TF428 valve voltmeter, £5. Federal signal gen, precision instrument, £7. Testgear signal gen, £2. 1035 oscilloscope, fault on deflection, £10. Prefer buyer collects. G3MBK, QTHR. Tel Brookwood (Surrey) 5906.

**R216** 19/157MHz, a.m./fm/cw with psu manual. £55. Metvic vtm, 40-range, ohms, current, volts, £10. Wayne Kerr 1cr bridge, £20. Leak TL12 amp, Murphy vhf wavemeter, 20-plus-20W stereo amp, with preamp, Taylor signal gen 65B. G8HBO, QTHR. Tel 01-399 8196.

**Telford TC9** 2m a.m./fm/cw tx, 10W output, xtal, mixer, vfo, one xtal channel, two xtals 145-80 and 144-10MHz, £60 ono. G3LCZ, QTHR. Tel Stockton-on-Tees 582738 after 6.30pm.

**SB101** including ac psu, 4 spare output valves, ptt mic, latest mods. Faultless cond and performance, £220. G5NN, QTHR. Tel Winslow 2498.

**FT200** and **FP200** psu, mint cond, £120. G3PZP, QTHR.

**Codar T28 rx**, offers. G3XMV, QTHR. Tel 01-360 6537.

**Telford TC9** tx with mixer vfo, 144-146MHz fm/a.m./cw comp with mic, £55. G3ZJF, QTHR. Tel Windsor 68364.

**FR50B** plus xtal calibrator, good cond, £45. Solartron CD1400 db scope, £35. Heathkit GR84 mains hf band rx, £13. Buyers inspect, offer, collect. Hickson, Tel 0234 (Bedford) 781494.

**Xtals**, 10X 8008, 8020, 8021-42, 8040, 8763; 10XJ 5890, 6010, 8035-38, 8790; FT243 8000-5; HC6U 8004-16, 7090, 9701, 9983, 9187, 9600, 9619, 12-634, 10-821, 37-9375, 39-740, 43-2291, 43-2875, 52-4333, 53-1583; B7G 0-8972, 1-0093, 8-6120, 14-429, 22-6050, 50p each. G3WFM, QTHR. Tel 77-51532.

**2m tx 50W a.m.**, £30. 4m ditto, £30. 160m Command rx/tx, mobile psu, £10. Hetrodyne calibrator, £5. AR88LF, £30. Teletype 8-hole reper, alpha-numeric keyboards, offers. Very low ripple PSUs 48V 4A, 24V 5A, £10. G3MNV, QTHR. Tel 021-353 3012.

**Eddystone 888A** vgc, £78. G3TDZ rx near comp, £8. FM Vanguard working well 2m, £35. Burns tone burst gen, £5.50. *Wanted*: Pye Westminster, FT2F B Auto, IC20. G4AFY, 37 Cairnduff Drive, Kidderminster, Worcs. Tel 63358.

**New**: pair 6LQ6, £2.25. Three 6GE5, £3.25. KW pi-coil, ceramic switch, £2.25. KW pi-Choke, £1.25. Used TW 4m Nuvisor converter, 2MHz i.f., £4.25, post paid. KW2000B, £160 plus carriage. G3GVV, QTHR. Tel Tonbridge 3360.

**FR50B rx** modified for 160m and 10m, with 100kHz calibrator, good cond, one year old, £60. Would consider exchange for EC10 and cash. A. Palfrey, 29 Rydal Avenue, Redcar, Cleveland TS10 1HZ. Tel Redcar 73756.

**18AVT/WB** bought January 1975, boxed. Xtals HC18/U, 75-000, 74-500, 71-200, 70-050, 70-700MHz. Sell/exchange, cash either way for Heath 80m single bander, KW77, E-Zee match, roller coaster MF455-10AZ filter. Pearson, 8 Bridge Street East, Penshaw, Houghton, Tyne and Wear.

**R209 mk2**, continuously tunable 1.0-21MHz cw, a.m., fm, ssb (using bfo), built in spkr, phones, leads, manual, spare valves plus Hartley 2m converter mk2, £25 the lot. Buyer collects. BR35571, 8 Whittington Road, Worcester WR5 2JU. Tel 0905-354378.

**CR100** with manual, in wkg order but case incomplete, £5. Junk box containing various transmitting coils and capacitors, offers. *Wanted*: AC/DC hf transceiver, FT101 or similar in good cond with cw filter and mobile aerial. G4BKZ, QTHR. Tel 061-740 4065.

**Heath OS-2** scope, £20. Heath solid-state testmeter IM-17, £10. Unused Amperex 4X150A plus base, £6. Pair used 4X150A, good cond, £5. Double-conv solid-state rx for 10m Oscar 6/7, £12. All items ono, post extra. G8CEX, QTHR.

**Trio JR500**, fitted calibrator, Hamgear preselector, 14AVQ 40-10m trap vertical, Microwave 2m converter i.f. 28-30, ideal 2m spread with above rx, £70 the lot ono. Buyer collects and inspects. G8ICM, QTHR. Tel Bourne End (Bucks) 26377.

**Trio JR500SE** amateur bands rx, £40, good cond with handbook. G8EQT/G4DUE, 18A Spencer Close, Potton, Beds. Tel 0767-260552.

**HC6U** xtals up to 57-27MHz, 25 for £1 (my choice). TF144G 85kHz-25MHz sig gen, £18. Hybrid 2m tx/rx, £20. SAE please. G8AVH, 30 Bedford Drive, Sutton Coldfield. Tel 021-329 2305.

**Liner2** with psu and preamp, £115. Eddystone 840A rx gen coverage, £12. Trio 9R59DS, stabilizer fitted, no other mods, fb rx, £42. G8CZH, QTHR.

**LM13** freq meter (no charts) plus psu, £15 ono. 4m tx QQV06-40 final, xtals for 26/365/4 screen mod mic; £20 ono. 2m tx QQV06-40 final, phase mod, £20 ono. Freq meter is suitable for use as vfo with above. G3ZRM, QTHR. Tel 0252 26108.

**Heathkit HW-202** mobile rig, comp with 4-frequency tone generator and xtals for 3 channels, incl G83PI, also HA-202 40W amplifier, well built and 100 per cent wkg, will demonstrate, £130 ono. Also Hudson mobile rig, £12. G8GGL, QTHR. Tel Leighton Buzzard 66134.

**KW2000A** with ac psu, mic, vgc, £130. G3AEZ, Eastfield, Beare Green, Dorking, Surrey. Tel Newdigate 236.

**Codar AT5**, handbook, no power pack, £11 post paid. *Wanted*: B7A valve holders. GW3JL.

**20m dipole**, approx 50ft coax (PL259 plugs), £3. HZP balun (SO239), £2. New unused 80/40m mini dipole (52ft top), £6. New unused KW balun, £2. New unused Labgear wideband multiplier unit, 80-10m, £2. G3JFC, QTHR. Tel Crayford 22489.

**Selectest super 50 multimeter**, 50µA-10A, 2.5V-1kV, 2.5kV ac and dc Ω, £12.50. G3HSC morse records, offers. G3OWI, QTHR. Tel 031-667 5842 evenings after 6pm.

**Trio JR500SE**, good cond with manual, phones, two spkrs, £50 ono. *Wanted*: Heathkit HW7, morse key, aerial, will swap for above. P. Kelly, 30B Roughdale Avenue, Southdene, Kirkby, Merseyside L32 7QW.

**Class D wavemeter**, Trio 9R59DE rx, Pye Cambridge FM10B, Storno CQM 33C, Paco wideband scope model S-55, BC221 frequency meter and charts. Enquiries gratefully received and all reasonable offers accepted. Call Gerry or Dave on 048-67 3481.

**HW32** complete with dc psu 14MHz, good cond and wkg order, £75 ono. G3SGH, 28 Mardol Road, Kennington, Ashford, Kent. Tel Ashford (Kent) 0233 21158.

**High-voltage psu**, 1150V 500mA, 300V 250mA and lt, £10. Collins Dynamotor psu and all cables, 12V in, 400V and 225V output, £10. G3MJK, The Butts, Bratton, Wilts. Tel 038-083 246.

**Murphy MR960/D** 2m, £10. R1155 internal psu, £7. Pye base 2m 3/20A tx, £12. FM adaptor to plug in above less xtal, £6. G3ZTR, QTHR. Tel Bridlington 4337.

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**Liner 2's**, one with preamp at £120, one without at £115, both professionally aligned for 144-10-144-33 coverage. FT101 mk1, mint cond, £210, no offers. EC10 with mains psu, £35. GW3XJQ, QTHR, or phone Manorbier 319, strictly weekends only.

**Lafayette HA350** amateur bands rx, 2-2kHz mech filter, product detector, good cond, carriage by arrangement, £40. Solid State Modules 2m converter 14-16MHz i.f., £10. C. J. Pye, 20 Meridian Place, Clifton, Bristol BS8.

**Trio 9R59DS** gen cov rx, 0.5-30MHz, bandsread on 80, 40, 20, 15, 10m, fitted with OAZ voltage stabilizer and 1MHz xtal calibrator, mint cond, orig packing, £45 ono. Buyer collects. Biart, 36 Stewart Road, Harpenden, Herts. Tel Harpenden 5042.

**Barlow Wadley XCR30 mk2**, one year old, unmodded, comp, £85. Also Comdel CSP11 speech processor, £45 ono. G3ZYN, QTHR. Tel Waltham Cross 29327 or Lea Valley 71874.

**Lafayette HA600A** gen cov rx, as new, £35. Telford TC7 mk2 tunable i.f. with fitted 2m conv, as new, £30. Codar PR30 preselector with internal psu, £5. G8IMI, QTHR. Tel Haverhill 2852 evenings.

**Eagle 4-input sound mixer**, £5. Marconi CR100 rx needs attention, offers. Reslo CR2 mic with gooseneck and switch, £8. Light-sensitive photo-transistors with lens, 10 for £2. G8AEV 2m converter faulty but comp, £5. G8MCJW, QTHR. Tel (0324) 26367.

**KW Valiant** tx (a.m.), 160-10, clean, robust psu, full break-in cw, front panel c/o control, net/rx/tx, also suitable mobile, £32.50. Hamgear preselector PMT1, also clean, mains driven, all bands, £6. GW2FBG, QTHR. Tel Swansea 25352.

**SB34** tx/rx solid-state up to pa, with mic, 80-15 mains/mobile psu built in (like FT101), £105. AM-912/TRC 500W 2m pa fitted 4CX350, £25. HF linear, two 4X250 with drivers, I/P 100mW O/P 350W, with psu. All buyers collect. G3LBA, Tel Cobham (Surrey) 2628.

**Eimac 4-65A (2)** and bases boxed, pair, £8. 813 (4), boxed, £3 each. 6L6 (4), £1 each. All unused. Woden UM1, UM3, £2/£4, used. Heath aerial impedance meter, £4. Xtals 10X base 500kHz (2), 5MHz, (2) £1 each. Post extra. G2BPC, QTHR.

## WANTED

**For Rascal RA 1218 rx**, counter and display unit type MDA.75209/A, or counter which with mods would suit. G3KDA, QTHR. Tel Bidford-on-Avon 2232.

**KW E-Z match**, OS-2 or KW107, Shure 444, Liner 2, HW7 rotator, tape recorder KW108. G13A0B, 44 Toome Road, Ballymena, Co Antrim, Northern Ireland.

**BC221** with or without psu. Also large roller coaster inductor. Life, 78 Elmstead Gardens, Worcester Park, Surrey. Tel 01-337 2025.

**Help!** One Yaesu English manual for FR101 de luxe rx, for BRS ham to buy or borrow to get started, and one manual for an ex-WD tx/rx No 88. Mr M. E. Lee, 38 Topcroft Road, Erdington, Birmingham. Tel 021-350 4035.

**Drake TR4**, T4XB also KW204. G2UZ, QTHR. Tel Leeds 784074.

**KW77** or 707 or similar rx, must be good wkg order, cash, will collect 150m Bristol. G2FST, QTHR.

**Workshop service manual**, or comp photostat copy, reqd for 1974 Honda model CD175A motor cycle. Please state price. All letters answered. H. McAllister, 111 George Lane, Bredbury, Stockport SK6 1DH.

**Transceiver:** KW2000A, FT200, FT101, TS515, HW101, etc. Perfect mechanical cond essential. Details and price in writing to G. R. Kelman, 2 Baillieswells Crescent, Bieldside, Aberdeen.

**Information** or circuit diagram for Taylor 65B signal generator. G4CIN, QTHR. Tel Bilton (0902) 45862.

**Solid-state rty terminal unit** and psu in good cond for 7EDC. Also interested in electronic keyer and sstv monitor, reasonable prices please. G3KOQ, QTHR.

**Bird 43 Thru-line wavemeter**. Also needed, plug-in elements, state power and frequency available. Rx BC342, BC348 or similar. G3VHL, QTHR.

**E-Z match**, reasonable CQ mags, any issues. BRS33179, 49 Widney Avenue, Selly Oak, Birmingham B29 6QE. Tel 042 4678.

**Field telephone cable**, light or heavy duty, please state asking price. R. Pine, 29 Sunnyside Gardens, Mill Hill, London NW7 3PD. Tel 01-959 5916.

**AR88LF service manual** to photocopy and return. O/P transfer RCA part 901611-501 S-meter. 30-40ft sectional mast/tower. Hind, 4 Thornyville Villas, Oreston, Plymouth PL9 7LA. Tel (0752) 41511.

**Yaesu FR50B**, FR400SDX, Trio 310, 599 or similar rx reqd must be in mint cond. Baxter, 251 Harrogate Road, Eccleshill, Bradford, Yorkshire. Tel 0274 639823.

**Heath mobile psu HP13** or similar, also SB620 and SB640. G3GEJ, QTHR.

**Hammarlund HX50A**, tx, only one in mint cond, unmodified with orig manual acceptable. Copy of American Robinson's manual of radio telegraphy published in early 'twenties. G6RF, QTHR. Tel Perranporth (Cornwall) 2149.

**Linear**, FL2000B. G4GJ, QTHR. Tel Bingley 2965.

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**B40D rx** in excellent and orig cond, no mods, B40D only. Derek Sheen, 3 Foxearth Spur, Selsdon, South Croydon, Surrey. Tel 01-651 1410.

**KW108 monitor 'scope** and KW1000 linear, 2m converter 4-6MHz i.f., QV06-40A pa valve, 60ft 5-core rotator cable. For sale: Creed 7B Teleprinter, comp, £5. G4DIC, 47 Dean Road, Hinkley, Leics. Tel 0455 36811.

**Trio TR2200** or **TR2200G**, or standard C146A. Details and price req. GM4DHJ, 8 Somerled Avenue, Paisley PA3 4JT, Scotland.

**YL1000** and **YL1020** (QQZ03-20) quick-heat valves. Also components from No 19 set vhf "B" set. G8IGZ, 10 Grove Crescent, Bromyard Road, Worcester. Tel Worcester 421708.

**Avo mk4 valve characteristic test set** required urgently, cond not important. Buyer will collect any distance. Brackenbury, 5 Castle View Road, Strood, Rochester, Kent ME2 3PP. Tel Medway 76282.

**MSK 5 keyer**, must be 100%. 72MHz xtals for Microwave Modules tx. Shure 444 mic. G3HQH, QTHR. Tel New Mills 44087.

**Tunable 2m rx**, must be transistorized, in wkg order, will exchange Unica UR1A gen cov rx, also need rotator control box, cheap portable 2m tx/rx wkg. G8IJV. Tel 01-886 3646 after 6pm.

**Heathkit SB220 linear**, Eddystone 888A rx, KW Vespa mk2 or 204 equipment, must be in good cond. G3YBG, QTHR. Tel Exeter 74607.

**FT150** or **FT101** and manual. G3TFN, QTHR. Tel 061-761 2952.

**Urgent:** manual with circuit details for Trio 9R59DS, to buy. Details please to J. F. Friend, 52 Beresford Road, River, Dover, Kent. Tel Kearsney 4296.

**Electroniques rf and i.f. units**. 455kHz or 1.6MHz i.f. valves or transistor, must be in wkg cond. M. Green, 12A West Road, Weaverham, Northwich, Cheshire CW8 3HQ.

**RSGB "Bulletins"** to comp post-war library, Vol 20, issue 9, Vol 31, issues 8, 9, 10, 12, Vol 32, issues 3, 9, Vol 35, issues 3, 4, 5. Comp vols containing above considered. G8BQX, QTHR. Tel 0424 429965.

**AR88D** in good cond, preferably with spares and manual, required by keen schoolboy swi. Will collect. J. B. Corben, 14 Wicklemarsh Road, Blackheath, London SE3 0NF. Tel 01-856 4595.

**TDARS require rotator** with control box suitable 8-el Yagi. G4AUZ, QTHR. Tel 095274 235.

**9R59DS** rx or similar gen cov rx, also good gdo and psu for HRO. G3NJP, QTHR. Phone Sissinghurst 482.

## 50th anniversary of the first G-ZL radio contact

Saturday 19 October 1974 marked the 50th anniversary of the first radio contact between the UK and New Zealand when in 1924, a QSO took place between Cecil Goyder, a London schoolboy at Mill Hill School, G2SZ, and Frank Bell, Z4AA, in Palmerston, New Zealand.

To mark the occasion, GB2SZ was activated by the Cray Valley Radio Society on behalf of the RSGB from the station of G2MI in Bromley. A great deal of assistance was given by G8PO, G6XN, G6DW, G3XRX, VK3AD (ex G6TM) and ZL4BX.

Members of the Otago Branch of the NZART assisted Frank Bell in putting ZL4AA on the air and contacts were made with GB2SZ on both 80 and 20m. GB2SZ also made contact on 20m ssb with ZL4AV, ZL4BX, ZL3GS, ZL3RB, VK3AD and VK4JS. VK3AD was a friend of Goyder's in 1924 and often operated the same station.

Thanks are also due to Paul Atkins, WB2OZW who personally contacted Cecil Goyder, who now lives in New Jersey, and who brought the following message: "Warmest greetings and best wishes to Frank Bell on the 50th anniversary of our first QSO, England to New Zealand. I am sure that you join me in greeting and appreciation of the amateur fraternity who have recalled this memorable occasion—Cecil Goyder, ex-G2SZ".

GB2SZ was active during the week-end 19-21 October and a number of contacts were made with stations throughout the world. A number of British stations also worked ZL4AA, and it is understood that Frank Bell still has some of his original Z4AA QSL cards which he will use to acknowledge these contacts so far as the supply allows.

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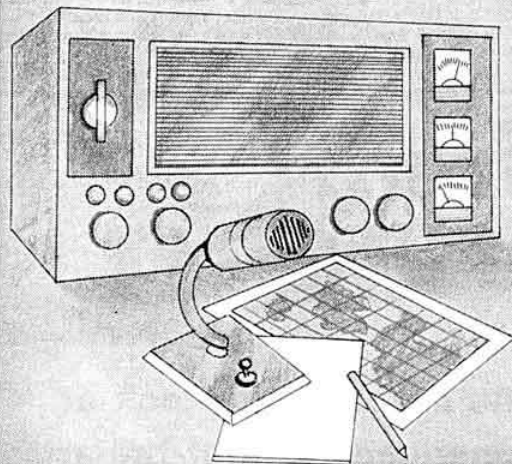
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## CATRONICS PRODUCTS

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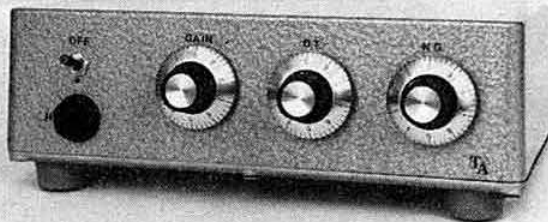
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(Patents applied for)

THAT REVOLUTIONARY NEW TRIBAND ANTENNA THAT WAS INTRODUCED IN OCTOBER 1974 AND NOW ACCLAIMED AS ONE OF TODAY'S BETTER-VALUE ANTENNA SYSTEMS

(Production has been increased to meet the growing demand, so that the DB-3 is still AVAILABLE FROM STGCC)

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- ★ Simply connect in series with your microphone lead. Needs no internal connections to your transmitter. Push-to-talk facilities are retained.
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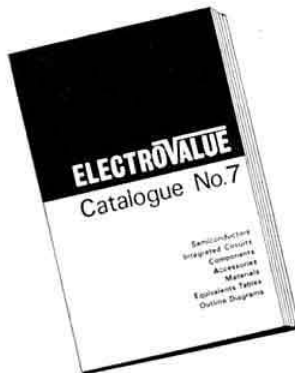
**£45 + VAT**

See August Rad. Comm. for a review of this equipment

#### JAPANESE MICROPHONE SOCKETS

The Datong Clipper is now also available fitted with a Japanese 4 pin screw-locking type of input connector, in place of the normal stereo jack. This allows, for example, FT101 or TS700 microphones to plug straight in. Since connection details vary, please specify the actual connections required when placing your order. Price: £47 plus VAT, or, if ordered complete with output lead fitted with matching connector (i.e. lead type RFCJAP 4 pin), £48.50 plus VAT for the pair. Add 40p plus VAT for registered first class delivery.

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# GAREX (G3ZVI)

## THE GAREX Mk II TWOMOBILE FM/AM Tx-Rx

### Brief technical details:

**Tx Rx and PSU** for 12V DC input contained in one unit 12 x 4½ x 8" deep.  
**Tx** Transistorised crystal oscillator (8MHz), multipliers and modulator, quick-heat tetrodes YL1000 driver and PA. No standby current. 6 switched crystal positions (new feature). First mic. with press-to-talk. Switched AM or FM. Tone-burst generator—2 tones + off switch (new feature).  
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 35 transistors, 3 i.c.s, 15 diodes. Floating supply for pos. or neg. earth.  
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**Printed circuit boards** from Pye R/T equipment, with circuits. All transistor, all in good used condition, unless otherwise stated.

**FM AF board** provides audio for FMTx also Rx audio preamp, suitable valve or transistor Tx. New £1.95. Good used £1.00

**10.7MHz I.F. board** £1.85

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25kHz chann. spacing, high impedance 70p

12½kHz chann. spacing—details & prices on application

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**Squelch boards** (ex Cambridge) **FM 85p** **AM 35p**

(ex AM25T) 45p

(ex AM25B) Type A or B, 15p 2 for 25p

**Mic. amplifier board** ex AM25B 85p

ex AM25T 85p

**Mod. output board** ex AM25B or T 45p

**Rx Audio board** ex AM25B 45p

ex AM25B, soiled 25p

ex AM25T 45p

**Mic. preamp board**, 2 transistor, emitter follower output 60p

**NOTE**—Apart from providing spares for the specific equipment, all the above boards are an ideal basis for home-brew equipment.

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p.p. NKT404/OC28/OC35 to QVO3-10 £1.20 Driver to suit 40p

Single EL84 to QVO3-10 £1.05

p.p. EL91 to QVO3-10, + 3J2 LS & 15J2 pub. address £1.05

p.p. EL84 to QVO3-20a ex-Murphy £2.16

**Camera video board** (Lynx) new £3.85

**Rectifier** plug in valve replacement stack of silicon diodes, full wave 2-6kV

p.i.v. at 400ma. Int. oct. base, wired as SU4, easily moded. 75p

**Circuit breakers**, panel mounted, 0.3, 0.5, 1 and 2 amp (new) 45p

**Reed switch** S.P.C.O. 33mm x 5mm dia. (75mm over leads) 10VA rating 35p

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**Painton (min. Jones) connectors**, chassis mtg. 18 way male or female 30p

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**Crystals** HC6U: 12-700MHz B7G: 2-400MHz 30p

**Valves** (New or tested ex. equip.) EB91, EC91, ECC91, ECF80, ECH83,

ECH34, 6AT6, 6BH6, 6BJ6, 6CB6, EZ81 15p each, any 4 for 50p

**Transistors** (tested, with mtg. kits) NKT404 15p each, 4 for 50p

**Integrated circuits** (new, full spec.)

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SN7660 FM quadrature detector £1.25

CD4001 AE quad. 2-input NOR gate for tone-burst gen. 70p

NE555 Timer for tone-burst gen. or time-out indicator 85p

**Relays** 12V 2 pole c.o. 6A contacts, ex-Cambridge 20p

Miniature 12V plastic cover 2PCO 30p; 4PCO 35p

25 AMP 6V single make 6V double make 12V d/make, 12V s/make 35p

Type 2400 ex AM25, please specify coil/contacts required 25p

**Mains transformers** multitap prim. unless stated otherwise

HT Transf. 5 windings: 35V 0-2A, 75/115V 0-15A, 50V 0-5A, 150V 0-3A,

170/220V 0-3A (13lbs) £5.70

(For quick heat QVO3-60 Tx) 7 windings 232V, 276V (300mA); 60V, 50V

(50ma) 2-1V 8A; 17-5V 1A; 12-6V 4A (11-5lb) £4.55

170-0-170V 90ma, 50V 50ma, 6-3V 3-3a, 5V 2A (5-5lb) £1.55

0-146-232V 160ma, 26-5V 1A, 13-9V 5A, 50V 50ma (10-5lb) £3.20

6-3V 4A (2-2lb) 85p

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Auto 20-10-0-100-190-230V 200VA £2.75

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6-5-0-6-5V 2-3A, 6-5-0-6-5V 2-9A, 6-5-0-6-5V 4-25A, 6-5V 2-7A, 37V

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Charger transf. 240V in, 17-5V 1A out 80p

**HT chokes** 5H 80ma, 4H 240ma, 1H 240ma, 1-25H 350ma, 1-8H 125ma

Top grade types: 9H 250ma 107£ £1.95, 10H 20ma 100£ £1.15

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**N.B.** P.O.F. = Potted, oil-filled.

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265V at 150mA (Cambridge) 2-25" x 2" x 1-6" £1.70

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(NB: both on same winding—so cannot be added to give 650V)

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**Tefter trimmers** 2-10p, multiturn, O.K. for U.H.F. 60p

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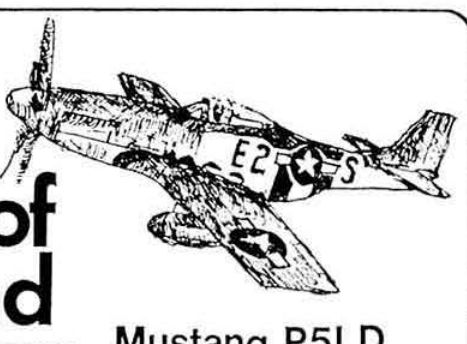
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C426AR	10V	16 MFD	9
C426AR	40V	4 MFD	7
C426AR	40V	8 MFD	4
C426AR	2.5V	160 MFD	4
C426AR	2.5V	500 MFD	3
C426AR	4V	125 MFD	10
C426AR	4V	400 MFD	2
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C437AR	10V	640 MFD	18
C437AR	10V	1600 MFD	15
C437AR	16V	250 MFD	10
C437AR	16V	400 MFD	16
C437AR	16V	640 MFD	20
C437AR	25V	160 MFD	20
C437AR	64V	64 MFD	16
C437AR	64V	160 MFD	2
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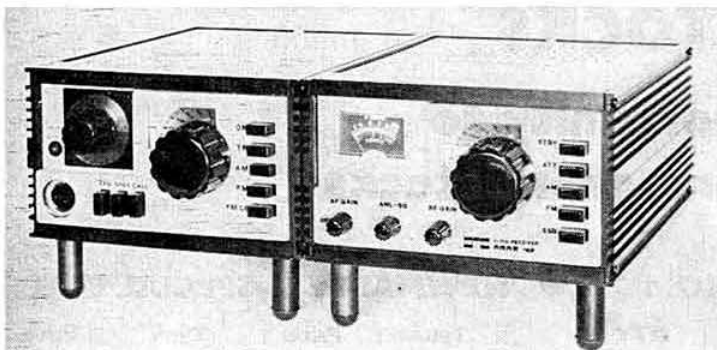
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- Do not forget 40p remittance plus wrapper.
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