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April 1987

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Journal of the Radio Society of Great Britain

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FRG 9600

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AR 2002 £469

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station accessories

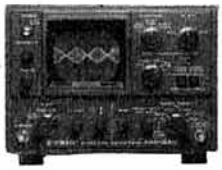
TL922 HF amateur band linear amplifier

The TL922 is a class AB2 grounded grid linear amplifier using two high performance EIMAC 3-500Z tubes. It covers 160 to 10 metres for SSB, CW and RTTY modes of operation. Engineering perfection, those who have seen a TL922 will know what I mean. It is one of the few items of amateur radio equipment which is truly hand built by a specialist engineer.

TL922 inc tubes . . . **£1495.00** inc VAT, carriage £7.00

SM220 station monitor

Based on a wide frequency range oscilloscope, the SM220 station monitor features in combination with a built-in two-tone generator, a wide variety of waveform observing capabilities. The SM220 aids efficient station operation as it monitors transmitted waveforms and it also serves as a sensitive wide frequency range oscilloscope for various adjustments and experiments. When fitted with the optional BS8 panoramic display and connected to one of the following transceivers (TS940, TS830, TS180, TS820 series) signal conditions in the vicinity of the receive frequency can be seen over a 40 or 200KHz range.



SM220 . . . £362.00 inc VAT, carriage £7.00
BS8 . . . £81.22 inc VAT, carriage £1.50

amateur band transceivers

TS830S HF amateur bands transceiver

Needing no description, the KENWOOD TS830S, which uses a pair of 6146B valves in the PA, is well known on the amateur bands (160 to 10 metres) for it superb signal quality. Modes of operation are USB, LSB and CW. Having variable bandwidth tuning, If notch, IF shift and provision for various filters, its receive performance is excellent too.

TS830S . . . £1095.00 inc VAT, carriage £7.00

TS530SP HF amateur bands transceiver

An HF amateur bands (160 to 10 metres) valve transceiver without frills but providing today's amateur with all the necessary facilities for reliable worldwide communications. Modes of operation are USB, LSB and CW.

TS530SP . . . £895.00 inc VAT, carriage £7.00

send for the KENWOOD detailed leaflet

amateur band plus general coverage transceivers

TS940S HF transceiver with general coverage receiver.

Top of the range, the TS940S has every operating feature that the discerning HF operator needs. Amateur bands from 160 to 10 metres plus a general coverage receiver tuning from 150 kHz to 30 MHz. Modes of operation are USB, LSB, CS, AM, FSK and FM. Forty memory channels, each effectively a separate VFO and easy keyboard frequency entry make operation and ownership of the KENWOOD TS940S a pleasure.

TS940S . . . £1995.00 inc VAT, carriage £7.00

TS930S HF transceiver with general coverage receiver

Much has been said and written about the ST930S and it now has a place high in the affection of radio amateurs. Modes of aperation are USB, LSB, CW, AM and FSK. Providing full coverage of the amateur bands from 160 to 10 metres and including a general coverage receiver tuning from 150 kHz to 30 MHz, the KENWOOD TS930S is the ideal rig for today's crowded bands.

TS930S . . . £1750.00 inc VAT, carriage £7.00

TS440S HF transceiver with general coverage receiver

A step forward in compact HF equipment, the TS440S covers the amateur bands from 160 to 10 metres and is also a general coverage receiver tuning from 100 kHz to 30 MHz. It has keyboard frequency entry, full and semi break-in on CW, one hundred memories and provision for fitting an internal ATU. Modes of operation are USB, LSB, AM, FM and AFSK.

TS440S . . . £1195.00 inc VAT, carriage £7.00

TS430S HF transceiver with general coverage receiver

A compact HF transceiver suitable for mobile or portable operation, yet having all the facilities necessary for effective radio communication. The TS430S covers the amateur bands from 160 to 10 metres and is a general coverage receiver tuning from 100 kHz to 30 MHz. Modes of operation are USB, LSB, CW, AM with FM optional.

TS430S . . . £995.00 inc VAT, carriage £7.00

All prices subject to confirmation

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send £1 for complete mail order catalogue.

AR2002 interface.

AR2002

RC PACK

Now available for the AR2002 is an RS232 interface (RC PACK) which consists of an 8 bit CPU with its own ROM and RAM.

Designed to be connected directly to the AR2002 or with an additional adapter to the AR 2001, the RC PACK gives two methods of controlling the receiver.

Using the internal software and with your own computer acting as a dumb terminal, the RC PACK provides 50 memory channels, 10 search bands, selectable up/down steps and adjustable delay times etc. You can also assign station descriptions to each listed memory.

If you wish to write your own programs using the RC PACK as an interface then "the sky's the limit".

For those who own a BBC computer we have designed an additional control system which is available in ROM.

The RS232 settings of the interface are 8 bit, no parity, 1 stop bit and either 2400, 4800 or 9600 baud (internally switchable).

AR2002.....**£487.30** inc VAT carriage £7.00
RC Pack.....**£255.63** inc VAT carriage £7.00
ARPROM (BBC).....**£10.00** inc VAT carriage £1.00

DAIWA meters.

CN410M. . .3.5 to 150 MHz, forward 15/150 W, reflected 5/50 W, SO239 connectors. . .**£61.72 inc vat.** carriage £1.50.

CN460M. . .140 to 450 MHz, forward 15/150 W, reflected 5/50 W, SO239 connectors. . .**£65.40 inc vat.** carriage £1.50.

NS448 with remote head. . .900 to 1300 MHz, forward 5/60 W, reflected 1.6/6.6 W, N type connections. . .**£86.60 inc vat.** carriage £2.50.

CN410M

NS660P

NS660P with switchable meter reading (average, normal PEP and hold PEP) and provision for optional remote head (U66V), 1.8 to 150 MHz, forward 15/150/1500 W, SO239 connectors. . .**£115.00 inc vat.** carriage £2.50.

U66V remote head. 140/525 MHz, max 300 W, N type connectors. . .**£55.27 inc vat.** carriage £1.50.

SC20 extension cable for U66V, approx 20 metres long . . . **£29.21 inc VAT,** carriage £1.50.

CN460M

data communications equipment.

CD600. . .RTTY, CW, ASCII, TOR, AMTOR decoder, output for UHF television, monitor and printer, can also be used as morse tutor. . .**£215.14 inc vat,** carriage £7.00.

CD670. . .A higher specification RTTY, CW, ASCII, TOR, AMTOR decoder complete with liquid crystal dot matrix display, variable RTTY shift, normal/reverse mode switch, outputs for TV, monitor and printer and can also be used as morse tutor. . .**£327.77 inc vat,** carriage £7.00.

CD660. . .Similar to the CD670 but without the built-in display. . .**£264.97 inc vat,** carriage £7.00.

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In Glasgow,
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In Cambridge,
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In Cardiff,
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the address, c/o South Wales Carpets, Clifton Street, Cardiff, 0222 464154.

In London,
the address, 223/225 Field End Road, Eastcote, Middlesex, 01-429 3256.

In Bournemouth,
the shop manager is Colin, G3XAS,
the address, 27 Gillam Road, Northbourne, Bournemouth, 0202 577760.

Although not a shop, there is on the South Coast a source of good advice and equipment, John, G3JYG. His address is Abbotsley, 14 Grovelands Road, Hailsham, East Sussex. An evening or weekend call will put you in touch with him. His telephone number is 0323 848077.

LOWE ELECTRONICS SHOPS are open from 9.00am to 5.30pm Tuesday to Friday and from 9.00am to 5.00pm on Saturday. Shop lunch hours vary and are timed to suit local needs. For exact details, please telephone the shop manager.

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G5RV	Complete antenna ready to go		**15.95**
	Half-size version of above		**13.95**
PCS5000	Superb 2m FM transceiver 25 watts 2 only	299.00	**199.00**
1/4	Quarter wave 2m rubber ant with BNC	15.95	**9.95**
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CT530	500w dummy loads DC-250MHz	79.00	**59.00**
RS3050	Welz 30 amp power supply variable voltage	199.00	**179.00**
RS1150	Welz 11 amp power supply variable voltage	136.00	**97.00**
SP825	Welz 1.8-1300MHz VSWR meter	179.95	**149.95**
AM803	Adonis mic with dual outputs + processing	99.00	**89.00**
FT101AM	AM unit for FT101		**10.00**
FT1	CW filter for FT1		**10.00**
FT901	Memory unit		
CD10	Trio CD10 unit		**29.00**
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COUNT	Freq. counters (As used by DTI) 5Hz-600MHz Made by Black Star 230v AC/12v DC		**169.00**
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D75	Datong RF speech processor	69.00	**49.00**
PA3/70	SEM 70cms board pre-amp	17.00	**5.00**
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M725X	FDK 25 watt FM rig	329.00	**249.00**
SP400	Welz 130-500MHz VSWR/PWR meter "N" socket	89.00	**59.00**
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ICOM IC 751A gen cov tcvr inc AM/FM/Keyer
ICOM IC 745 gen cov tcvr
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YAESU FL 2100Z 160m to 10m
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ICOM IC 2KL/LPS
AMERITRON AL84 160M-10M LINEAR
AMERITRON AL80A 160M-10M LINEAR
AMERITRON AL1200 160M-10M LINEAR
AMERITRON AL1500 160M-10M LINEAR

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YAESU FT 209R with FBA 5 battery case 2.7w
YAESU FT 209R with FNB 3 nicad 2.7w
YAESU FT 209R with FNB 4 nicad 3.7w
YAESU FT 209RH with FBA 5 battery case
YAESU FT 209RH with FNB 3 nicad 3.7w
YAESU FT 209TH with FNB 4 nicad 5w
YAESU FT 209RH with FNB 4 nicad 1.5w 2m
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ICOM IC 4E synthesised 1.5w 70cm
ICOM IC 04E keypad entry lcd display 70cms

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YAESU FT 270R 25w FM
YAESU FT 270RH 45w FM with fan
YAESU FT 2700RH 2m/70cms 25w each band full duplex
YAESU FT 2700RH 25w all mode
ICOM IC 290D 25w FM 9 mem
ICOM IC 27E 25w FM 9 mem
ICOM IC 27H 45w FM all mode 20w
FDK M750XX 2m FM 25w
FDK M725X 2m FM 25w

VHF BASE STATIONS

YAESU FT 726R/2M all 726 options available
ICOM 271E multi mode 25w 32 mem
ICOM IC 271E/H multi mode 100w

UHF BASE STATIONS

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ICOM 471 E 25w multimode 70cms
ICOM 471 H high power multimode (75w) — 70cms
ICOM 1271 E multimode 1240-1300 Mhz

YAESU

FT 767

FT 757

ICOM

IC 761

IC 735

AMERITRON

AL 84

AR 2002

VHF LINEAR AMPLIFERS

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HL160V 2m 10w in 160w out
HL82V 2m 10w in nom 85w, typ 100w out
HL 110V 2m 10w in 110w out
HL 35 2m Gaasfet preamp .5-5w in 35w out
HL 30V 2m .5-3w in 30w out
HL 20U 70cms .5-3w in 20w out
HL 30U 70cms Gaasfet preamp 2w in 30w out
HL 60U 70cms Gaasfet preamp 1-15w in 60w out
HL120U 70cms Gaasfet preamp 12w in 100w out
HRA 2 2m mast preamp. Gaasfet
HRA 7 70cms mast preamp. Gaasfet

BNOS
LPM 144-1-100 2m c/w preamp 1w for 100w out
LPM 144-10-100 2m c/w preamp 10w for 100w out
LPM 144-3-100 2m c/w preamp 3w for 100w out
LPM 144-25-160 2m c/w preamp 25w for 160w out
LPM 144-3-180 2m c/w preamp 3w for 180w out
LPM 144-10-180 2m c/w preamp 10w for 180w out
LP 144-3-50 2m c/w preamp 3w for 50w out
LP 144-10-50 2m c/w preamp 10w for 50w out
LPM 432-1-50 70cm c/w preamp 1w for 50w out
LPM 432-3-50 70cm c/w preamp 3w for 50w out
LPM 432-10-50 70cm c/w preamp 10w for 50w out
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CAPCO SPC 3000C 3Kw antenna coupler
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TOKYO HC 400 9 band 350w pep with SWR power meter
TOKYO HC 2000 9 band 2Kw pep
WELZ AC 38 3.5-30Mhz 200w
ICOM AT 100 100w auto antenna coupler
ICOM AT 500 500w auto antenna coupler
YAESU FC 757GX auto antenna coupler
YAESU FRT 7700 receiver antenna tuner

HEIL ACCESSORIES

HEIL HC3 Mic element Yaesu/Trio
HEIL HC5 Mic element Icom SM5/6
HEIL HM5 Desk Mic (300Hx-3Khz) cardiod
HEIL MM5 handheld Mic with HC3
HEIL SS2 Speaker special comms spkr
HEIL BM10 lightweight headset/boom mic

POWER SUPPLIES

YAESU FP 757HD 20A
YAESU FP 757 GX 20A
YAESU FP 700 20A
BNOS 12/6amp
BNOS 12/12amp
BNOS 12/25amp
BNOS 12/40amp
BNOS professional range also available on request
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ICOM PS 15 20amp external
ICOM IC PS 55 20amp
ICOM IC PS 25 switch mode
ICOM IC2 KLPS to match IC2KL linear
SMC RS 12 4amp 5 amp peak
DRAE 4 amp
DRAE 6 amp
DRAE 12 amp
DRAE 24 amp

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HK 706 manual
HK 707 manual
HK 708 manual
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HK 803 manual solid brass
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MK 703 twin paddle squeeze heavy base
MK 704 twin lever without base
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AL 84

AL 80 A

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AL 1500

AL 1200

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AL84:
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£599

AL 80 A:
The AL 84's big brother designed to pack that **extra** *'punch' — utilises heavy duty tank circuit plus the economical 3-500Z in the final stage. The new Pi-L output circuit gives* **full band coverage** *and exceptionally smooth tuning.*
The AL 80 A provides a signal output within ½ an 'S' point of the most expensive amplifier on the market at a much lower cost (and weight — which is only 52lbs).

£899

AL 1200:
Another rugged amplifier — precision built, utilising some of the latest techniques in linear design. The final stage uses the renowned 3CX 1200 A7 'high-mu' ceramic metal triode in a Class AB 2 grounded grid configuration. The power supply comprises a commercial service rated 32lb hypersil transformer and heavy-duty rectifiers providing 'no-load' and 'full-load' voltages of 3600V and 3300V respectively. Silver plated tank components provide high efficiency operation and the Pi-L tank circuit also permits full impedance matching on all bands.

£P.O.A.

AL 1500:
This Rolls Royce of linears is designed for total reliability and highest efficiency, giving a very high '30 minute key-down' using 3CX 1500/8877 tube in the final stage via a Pi-L output circuit.

£P.O.A

Among the AL 1500's main features are:
- **Time delay starting** — *protects tubes and components.*
- **Over-current shut-off** — *removes drive if mistuned.*
- **Full rated airflow** — *to maximise tube life.*

On all the above models, power supply components are designed to provide optimum smooth operation at maximum working voltages and currents.

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JUST ARRIVED STOP PRESS

RCS-4 Remote Coax Switch

The Ameritron RCS-4 is a remote controlled coaxial switch that selects one of four outputs by supplying all control voltages through the coax. The elimination of control cables results in a fast, neat and inexpensive installation that uses only one coaxial line for four antennas.
Loss at 30 MHz: less than .05 dB.
VSWR: under 1.1 to 1 from 1.8 to 30 MHz.
Impedance: 50 ohms. **Antenna select time:** 50 ms.
Power Capability: 1500 watts average, 2500 watts PEP maximum.

ATR-15 ANTENNA TUNER

The Ameritron ATR-15 is a 1500 watt 'T' network tuner providing exceptionally efficient performance on all frequencies, achieved by the proper internal placement of variable capacitors and inductors.
Frequency Range: 1.75 to 30 MHz continuous with dedicated amateur band positions.
Input Impedance: 50 ohms.
Input Power: 1500 watts maximum RF envelope all modes. Handles full legal power on all amateur bands.
Outputs: 20 to 800 ohms at full power. Internal balun provides 1:1 or 4:1 ratios (user selectable). Three coaxial, one single wire and balanced outputs from panel selected.
Shielding: Fully shielded.
Metering: Peak reading 0-200 and 0-2000 watt scales. SWR to 3:1. Functions in bypass mode. Requires no power supply or batteries. Illuminated by external 12V supply.
Dimensions: 5 ¼" H. × 13 ½" W. × 13 1/2 D.
Weight: 14 lbs.

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IC-751A.

IC-751A

Features:

- All mode.
- 100kHz-30MHz General Coverage Receiver.
- 100 watts.
- 12v Operation.
- 105dB Dynamic Range.
- 32 Memories.
- Electronic Keyer.
- Full Break In (40wpm).
- 500 Hz CW Filter.
- HM36 Microphone.

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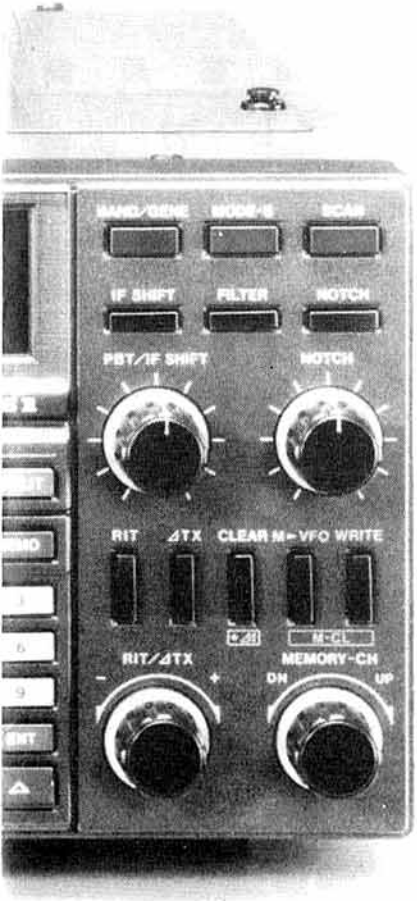
ICOM

IC-761, HF TRANSCEIVER with General coverage receiver.



The new ICOM IC-761 H.F. Transceiver has many features making it probably the best top of the line Amateur transceiver available today. This all mode transceiver features an internal aerial tuning unit and A.C. power supply. The A.T.U. boasts a 3 second band selection and tune up with a VSWR matching of less than 1.3:1.
For the serious operator the 100kHz-30MHz general coverage receiver and 105dB dynamic range make it ideal for DX chasing. Frequency selection is by the main VFO or via the front panel direct access keypad.
And for when reception is difficult, pass band tuning, I.F. shift, notch filter, noise blanker, pre-amp and attenuator should enable you to copy even those weak DX stations whether amateur or broadcast.
The C.W. operator will appreciate the electronic keyer, 500Hz filter and full break in (40wpm) other filter options are available.
The IC-CR64 high stability crystal is standard as is the CI-V communications interface for computer control. Twin VFO's and split mode for cross band contacts the IC-761 features program scanning, memory scan and mode select scan and the 32 memories can store frequency and mode.
The transceivers operating system is held permanently in ROM and is not dependant upon the lithium battery. The cell is used for memory back up only. A new style meter gives P.O., A.L.C., IC, VC, COMP and SWR readings.
This new equipment is fully compatible with existing ICOM accessories such as the IC-2KL 500 watt linear amplifier. Here at THANET we believe the IC-761 will set a new trend that others will surely follow. For more information please contact your nearest ICOM dealer or THANET ELECTRONICS LTD.

Telephone us free-of-charge on:

HELPLINE 0800-521145.

Mon-Fri 09.00-13.00 and 1400-17.30

This is strictly a helpline for obtaining information about or ordering ICOM equipment. We regret this service cannot be used by dealers or for repair enquiries and parts orders. Thank you

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Datapost

IC-735.

IC-735

- Small Compact Size.
- 100kHz-30MHz General Coverage Receiver.
- 100 watts.
- 105dB Dynamic Range.
- FM Standard.
- 12v Operation.
- Large LCD Readout.
- 12 Memories.
- CI-V Communications Interface.
- HM12 Microphone.

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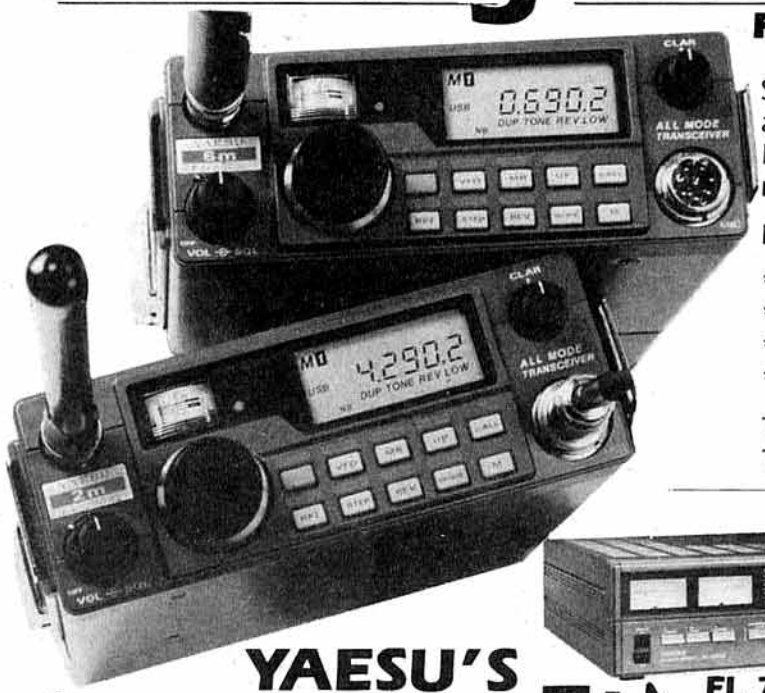

FT 290 R Mk II — 2 metres

See it, try it and really believe it! This amazing and **VERSATILE** multimode. Ideal portable/base, but ESPECIALLY **mobile**. It's a different rig altogether!

Latest features:

* Optional 25 W p.a.
* Speaker mike
* Noise blanker
* Scanning

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FL 7000 £1600.00 Qsk Linear 1.2kW

FRG 8800 All mode Gen. Cov. RX

FT 727 R Dual Band

YAESU			YAESU			YAESU		
FT 757 GX	H.F. TCVR gen cov. all mode	**969.00**	**FT 726 R**	Multimode transceiver 2m fitted	**999.00**	**CSC 1A**	Case	**6.50**
FP 757 AT	Automatic antenna tuner	**349.00**				**YM 49**	Spkr mic	**22.00**
FP 757 GX	Switched mode PSU—50% duty	**199.00**	**21/22/28**	HF module	**269.00**	**MH 12A2B**	Spkr mic	**20.00**
			50/726	6m module	**249.00**	**FVS 1**	Voice synthesiser module	**27.50**
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FRG 8800	Gen. Cov. RX 150kHz–30MHz All mode	**639.00**				**FVS 1**	Voice synthesiser 270R/ 270RH	**27.50**
			MMB 11	Mobile mount	**37.50**			
FRG 9600	650–950MHz Scanner	**550.00**	**NC11C**	Charger	**10.50**	**FT 727 R**	Dual Band Handie	**390.00**
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TM411E	25W 70cms Mobile with DCS	298.00	(5.00)
TR2600E	2·5W 2M Handheld with DCS	199.00	(4.00)
TH21E	2m Mini Handhelds	199.00	(3.00)
TH41E	70cm Mini Handhelds	240.00	(3.00)
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PS50	Heavy Duty PSU for TS440S	234.63	(7.00)
AT440	Auto ATU for TS440S	152.75	(3.00)
TS940S	9 Band TX General Cov RX	1595.00	(7.00)
TS930S	9 Band TX General Cov RX	1750.00	(7.00)
TS830S	160-10m Transceiver 9 Bands	1095.00	(7.00)
AT230	All Band ATU/Power Meter	220.05	(5.00)
SP230	External Speaker Unit	70.12	(4.00)
TS530SP	160m-10m Transceiver	895.00	(7.00)
TS430S	160m-10m Transceiver	995.00	(7.00)
PS430	Matching Power Supply	183.26	(5.00)
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MC35S	Fist Microphone 50K ohm IMP	22.91	(1.50)
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MC40S	Up-Down Hand Mic 6-Pin 500 Ohm	19.07	(1.50)
MC60A	Desk Mic with built-in Pre-amp	93.02	(2.50)
TM201A	2M 25W mobile	358.00	(4.00)
HMC1	Headset with vox for TH21E/41E/2600/3600	34.71	(2.00)
SC8	Case for TH21E/41E	12.50	(1.50
DC21	DC/DC converter for TH21E/41E	26.38	(2.00)
TS711E	2M Base Stations	991.29	(7.00)
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TR751E	2M Multimode with DCL (mobile)	649.00	(5.00)
MU1	DCL option for TR751E	32.63	(1.00)

NEW

TH205E	2M Handheld Transceiver	218.00	(4.00)
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LPM 144-10-100	2m, 10W in, 100W out, preamp	205.00	(3.00)
LPM 144-25-160	2m, 25W in, 160W out, preamp	305.00	(3.00)
LPM 144-10-180	2m, 10W in, 180W out, preamp	355.00	(3.00)
LP 144-3-50	2m 3W in, 50W out, preamp	145.00	(3.00)
LP 144-10-50	2m 10W in, preamp	145.00	(3.00)
LPM 432-1-50	70cm, 1W in, 50W out, preamp	255.00	(3.00)
LPM 432-3-50	70cm, 3W in, 50W out, preamp	255.00	(3.00)
LPM 432-10-50	70cm, 10W in, 50W out, preamp	215.00	(3.00)
LPM 432-10-100	70cm, 10W in 100W out, preamp	395.00	(3.00)
HEATHERLITE			
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	(Both amplifiers have built-in PSU)		

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NC11	Charger	10.50	(1.00)
CSC1A	Carrying Case	6.50	(1.00)
FT209RH	NEW 2m H/Held/CW/FNB4	309.00	(—)
FT709RH	70cm H/Held	319.00	(—)
MMB10	Mobile Bracket FT209/709	10.00	(1.00)
NC9C	Charger	10.50	(1.00)
PA3	Car Adaptor/Charger	20.50	(1.50)
MH1B8	Hand 600 8-pin mic	20.00	(1.00)
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YH77	Lightweight phones	19.50	(1.00)
YH55	Padded phones	19.95	(1.00)
YH1	L/weight Mobile H/set-Boom mic	19.00	(1.00)
YH2	L/weight Mobile H/set-Boom mic	19.00	(1.00)
SB1	PTT switch Box 208/708	21.00	(1.00)
SB2	PTT switch Box 290/790	18.00	(1.00)
SB10	PTT switch Box 270/2700	21.00	(1.00)
NEW			
FT767GX	HF Gen Coverage trans with optional VHF/UHF/6M modules	1550.00	(—)
FL7000	Solid State linear with built-in auto ATU	1600.00	(—)
FT727R	Dual Band handheld transceiver 144-146MHz, 430-440MHz up to 5W on each band	425.00	(3.00)
FT290RMK II	2M Multimode portable/mobile/base	429.00	(3.00)
FT23R/FNB10	2M mini-handheld with LCD display 5W	249.00	(2.00)

Royal Blue

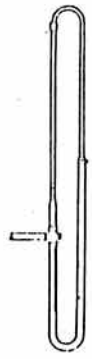

Photo Acoustics have pleasure in presenting the ROYAL BLUE—a Short Wave Listeners folded dipole antenna that covers 2-30MHz. Its neat and compact design (just 6' tall) makes it ideal for unobstrusive outdoor or indoor use. It will work quite happily on your roof or stood in the corner of your shack. It is a truly versatile antenna that will pull in the DX and which works exceptionally well with modern receivers such as the Yaesu FRG8800, Icom R71, Trio R2000 and so on.

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Yaesu (cont)

FT73R/FNB10	70cms mini-handheld with LCD display 5W	269.00	(2.00)
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NC26	Charger for FT290RMKII	11.00	(2.00)
FEX767-2	2m module for FT767	169.00	(3.00)
FEX767-6	6m module for FT767	169.00	(3.00)
FEX767-70	70cms module for FT767	215.00	(3.00)
FNB9	7.2V 200mAh nicad pack for FT23/73	23.00	(2.00)
FNB10	7.2V 600mAh nicad pack for FT23/73	25.50	(2.00)
FNB11	12V 600mAh nicad pack for FT23/73	42.00	(2.00)
FBA9	Dry cell battery case for 6 AAA-size cells	8.00	(1.50)
FBA10	Dry cell battery case for 6 AA-size cells	8.00	(1.50)
NC28C	Charger for FNB10	11.00	(2.00)
NC29	Desktop Quick charger for FNB9/10/11	49.00	(3.00)
PA6	Mobile DC adapter/charger for FNB9/10	14.50	(2.00)

Icom

IC751A	HF Transceiver	1465.00	(—)
IC735	New HF Transceiver	949.00	(—)
PS15	P.S. Unit	158.00	(4.00)
PS30	Systems p.s.u. 25A	343.85	(—)
SM6	Base microphone for 751/745	45.00	(1.00)
IC290D	2M 25W M/Mode	542.00	(—)
IC490E	70cms 10W Multimode	617.00	(5.00)
IC02E	2M H/Held	299.00	(—)
IC04F	70cm handheld	299.00	(—)
BC35	Base Charger	70.15	(1.00)
HM9	Speaker mic	21.85	(1.00)
BP3	Std Battery Pack	29.90	(1.00)
BP5	High Power Battery Pack	50.95	(1.00)
BP4	Empty battery pack	9.20	(1.50)
CP1	Car Charging Lead	6.90	(1.00)
DC1	12V Adaptor	17.25	(1.00)
IC3200	2M/70cm Mobile Transceiver	556.00	(—)
NEW			
IC761	HF General Coverage Transceiver with built-in PSU and Auto ATU	1999.00	(7.00)
IC48E	10W 70cms FM Mobile	449.00	(3.00)
IC28E	24W FM mobile (Tiny)	359.00	(3.00)
IC28H	45W FM mobile (Tiny)	399.00	(3.00)
IC-Micro	2 mini hand portable LCD display 1W	259.00	(2.00)
IC275E	25W 2M Multimode Base	1039.00	(7.00)

Switches

Sigma	2 way SO239	17.50	(1.00)
Sigma	2 way 'n' Skts	22.95	(1.00)
Welz CH20A	2 way SO239	30.75	(1.00)
Welz CH20N	2 way 'n' Skts	54.00	(1.00)
Drae	3 way SO239	15.40	(1.00)
Drae	3 way 'n' Skts	19.90	(1.00)

Power Supplies

DRAE			BNOS		
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DAIWA MR750E	Heavy duty rotator. Can have up to 4 motors	254.10	(4.00)
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KR500	6 core Elevation	149.95	(4.00)
KR400RC	5 core Medium Duty	169.00	(4.00)
KR600RC	6 core Heavy Duty	219.00	(4.00)
KC038	Lower mast clamps	17.45	(2.00)
KS065	Rotary Bearing	26.00	(2.50)
AR1002	Lightweight VHF Rotator	52.95	(3.50)

CW/RTTY/Equipment

			P&P
BENCHER			
BY1	Squeeze Key, Black base	67.42	(2.00)
BY2	Squeeze Key, Chrome base	76.97	(2.00)
HI-MOUND MORSE KEYS			
HK708	Straight Key	21.50	(2.50)
HK702	Deluxe version of above on Marble Base	42.50	(3.00)
HK706	Straight key	23.00	(2.50)
HK707	Straight key	22.25	(2.50)
MK704	Squeeze paddle	20.00	(2.50)
MK705	Squeeze paddle on Marble Base	32.20	(3.00)
NEW			
RTTY-EQUIPMENT			
PK-232	Packet, Amtor, RTTY, CW, ASCII transceive in one unit. Works with any computer equipped with an RS232 interface. 12V operated	269.95	(3.50)
FAX-1	NEW HF Fax receiver. Obtain weather maps, press photographs and satellite cloud cover detail on any Epson FX-80 compatible printer. 12V operated	269.95	(3.50)
AMT-2	Terminal Unit RTTY/AMTOR/ASCII/CW	245.00	(3.00)
AMT-2/CBM64	Software for the above for the Commodore 64	51.75	(2.50)
AMT-2/VIC20	Software for the above for the Commodore VIC 20	51.75	(2.50)
AMT-2/BBC B	Software for the above for the BBC B	44.85	(2.50)
KEYERS & ACCESSORIES			
Star Master Key	Electronic Keyer	54.70	(3.00)
NEW Star	Masterkey electronics CMOS Memory keyer	95.00	(3.00)
TRX3	Morse Oscillator	13.65	(1.50)
Datong	D70 Morse Tutor	56.50	(2.50)

Receivers

NEW			
HF125	General coverage receiver, British made, 30Khz to 30Mhz continuous coverage receiver, AM, USB, LSB, and CW FM and Synchronous AM (option)	375.00	(5.00)
NEW			
Trio R5000	General coverage receiver, 100Khz to 30MHz plus 108-174Mhz with optional VC20 VHF converter	895.00	(5.00)
Trio R2000	General coverage receiver	637.00	(—)
Yaesu FRG8800	General coverage receiver	639.00	(5.00)
Yaesu FRV8800	VHF converter for FRG8800 118-175MHz	100.00	(3.00)
Icom ICR71E	General coverage receiver	825.00	(5.00)
Icom ICR7000	Scanner 25-2000MHz all modes	957.00	(5.00)
Yaesu FRG9600	Scanner 60-950MHz	525.00	(5.00)
AR2002	Scanner 25-550Mhz and 800-1300Mhz AM and FM	487.00	(5.00)

Aerials

JAYBEAM			
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LR1/2M	Omnidirectional vertical colinear	35.71	(4.00)
LW5/2M	5 element folded dipole yagi	17.31	(4.00)
LW8/2M	8 element folded dipole yagi	21.85	(4.00)
LW10/2M	10 element folded dipole yagi	28.23	(5.00)
LW16/2M	16 element folded dipole yagi	42.45	(7.50)
PBM14/2M	14 element Parabeam	68.08	(7.50)
5XY/2M	Crossed 5 element yagi	33.41	(7.50)
8XY/2M	Crossed 8 element yagi	43.01	(7.50)
10XY/2M	Crossed 10 element yagi	53.95	(11.00)
70cms antennas			
MBM28/70cm	28 element Multibeam yagi	25.70	(4.00)
MBM48/70cm	48 element Multibeam yagi	42.44	(5.00)
MBM88/70cm	88 element Multibeam yagi	57.96	(7.50)
PBM24/70cm	24 element Parabeam long yagi	51.41	(7.50)
	12 element ZL special for 2M	25.00	(3.00)
G5RV	Full size 102'	16.75	(2.50)
G5RV	Half size 51'	14.25	(2.50)
HB9CV	2 metres	3.95	(3.00)
HB9CV	70cms	3.95	(2.50)
2 metre	Slim Jim	8.95	(3.00)
1-1 & 4-1	Baluns	12.95	(2.00)
3.7 and 7.1MHz	Traps (pair)	9.50	(2.00)
Dipole	Centrepieces	2.25	(0.50)
Copper wire	50M rolls hard drawn	7.95	(2.50)
G-WHIP	Tribander helical mobile HF antenna 10/15/20 metres	37.55	(3.00)
	Coils for above for 40/80/160M	8.75	(1.50)
	Telescopic whip for above coils	6.10	(1.50)
	Basemount single hole fixing with 5M of coax	8.75	(2.00)
	Flexiwhip 10M antenna mobile	28.50	(3.00)
	Coils for above for 15/20/40/80/160M	8.75	(1.50)
	Multiselect 86 10/15/20M mobile auto selecting antenna	39.85	(3.00)
	Coils for above for 40/80/160M	8.75	(1.50)
	Telescopic whip for above coils	6.10	(1.50)
	Extendarod for fixed use with above aerials, improves LF band performance	15.40	(2.00)
	PL259 base loaded single band mobile aerials for 10/15/20/40	19.00	(2.00)
	PL259 base loaded single band mobile aerials for 80/160M (Above PL259 aerials will fit on normal SO239 mag mounts or SO239 gutter mounts)	20.20	(2.00)
BOOKS	Confidential Frequency List (NEW Edition)	5.95	(0.75)
	Air Traffic Radio	2.25	(0.75)
	VHF/UHF airband frequency list	3.95	(0.75)
	The Complete guide to VHF/UHF frequencies 25-2000MHz (NEW)	4.95	(0.75)
	World RTTY HF Frequency list	3.95	(0.75)
	The International VHF FM guide	2.00	(0.75)
	Guide to Facsimile Stations	9.95	(0.75)
	Towards the RAE	4.25	(0.75)
	Logbooks	3.50	(0.75)

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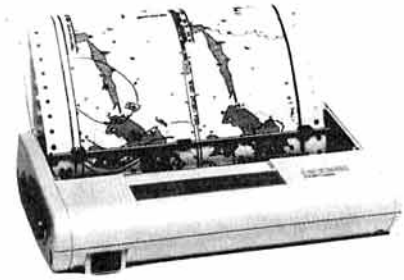

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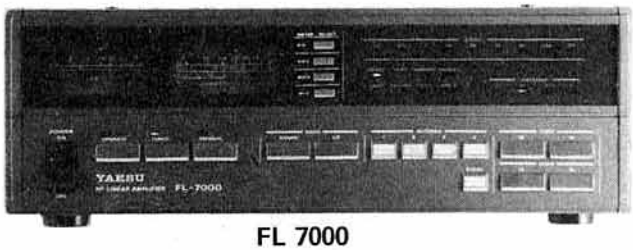

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A BREAKTHROUGH

Thanks to the Society's EMC Committee, the next step in the RSGB's emc 11-point-plan has now materialized. Bound into this month's issue is our new *Breakthrough* leaflet. The Society has taken the unusual step, and gone to the expense, of circulating a copy of this new leaflet to every member. We believe that its contents are important and that what is said represents good common sense. Please remember that the Society does not have the facilities to get "stick-in" to each and every case of emc; but we can, and do, advise you on how best to start tackling problems if they arise. Keep the leaflet in the shack; and should you need further advice write to the chairman of the RSGB EMC Committee at RSGB HQ

EARLY WARNING—FREQUENCIES ON THE LINE

How many members remember WARC79?—the 1979 World Administrative Radio Conference held by the ITU in Geneva at which all amateur bands were on the line. How many members remember that of the 150+ countries in the world only eight had a delegate to represent the amateur service? Yes, of that eight the RSGB was one national society that was able to supply a full-time member as part of the UK national delegation. How many members remember the successes and near failures for amateur radio at that conference?

It is very much "on the cards" that in 1992 there will be another major conference in Geneva to look at all the spectrum below 3GHz. There is pressure throughout the spectrum for more space. On hf the main threat appears to be from the broadcasting service, as many emerging nations look for a larger slice of the already overcrowded broadcasting bands for internal broadcasting. Above 30MHz there remains pressure from the mobile service, which is expanding rapidly.

If amateur radio is to maintain or expand its status, two things must be done. First, each of the 124 national societies must maintain a close liaison with the frequency management side of its respective government. Second, the International Amateur Radio Union must co-ordinate a global frequency policy for amateur radio. This work has already commenced, and at the Region 1 IARU Conference in the Netherlands this month frequency policy will be further discussed and developed. The RSGB Council has already met to determine the RSGB position, and this has already been discussed with the Department of Trade & Industry.

In the past there has been little mileage in telling amateurs about the work of the national society in this area—most seem to take this work for granted. You will hear more about this conference and its likely effect on amateur radio as the date firms up. Above all, remember that each national society must apply a considerable effort to protect the long-term interests of the amateur service, for no bands equals no amateur radio.

David Evans, G3OUF

PRESENTATIONS AT THE 1986 RSGB ANNUAL MEETING

Some of the 170 members who attended the meeting at the IEE

Newly-elected vice-President Ken Ellis, G5KW, receives his certificate from RSGB President Willy McClintock, G3VPK

Robin Robertson, the then managing director of Marconi Communication Systems Ltd, (l) presenting the Marconi Medal and premium to Simon Freeman, G3LQR

RSGB President Willy McClintock, G3VPK, presents the Founders Trophy to J J Yeend, G3CGD (l); the Calcutta Key to John Allaway, G3FKM; and the G5RV Trophy to Neil Brinkworth, G3UFB

The Ostermeyer Trophy to J R Mathews, G3WZT, (l); the Norman Keith Adams Prize to V C Lear, G3TKN; and the Courtney-Price Trophy to Ian White, G3SEK

RSGB PRESIDENTIAL INSTALLATION 1987

Immediate past-President Willy McClintock, G3VPK, installs Joan Heathershaw as the 1987 President of the Society at the Post House Hotel, York, on 31 January before a gathering of over 150 members and guests

The newly-installed President presents Council members badges to re-elected Basil O'Brien, G2AMV, and newly-elected Neil Brinkworth, G3UFB

Members' Mailbag

THE EDITOR,
RADIO COMMUNICATION,
LAMBDA HOUSE,
CRANBORNE ROAD,
POTTERS BAR, EN6 3JE

The views expressed in published correspondence are not necessarily those of the RSGB, and readers are urged to verify independently any factual statements on which they may wish to rely as it cannot be guaranteed that such statements are correct.

WITHOLDING PARTICULARS

Sir—If you look in the *Callbook* you will not find my address. This is because, a few years ago, I had just settled down to watch a serial I was following on the dreaded box, the telephone rang. The conversation, as I recall, went something like:

"Hello, is that Mr Jones?"

"Yes, speaking."

"You don't know me, but we have an interest in common, I am G— — — —."

At that time I was well into Raynet and other activities of interest mainly to radio amateurs, so I pricked up my ears and mentally forgave him for disturbing my evening—but his next question caught me unawares:

"Tell me—are you satisfied with your personal insurance?"

He then proceeded to try and sell me insurance over the telephone, and would not be shaken off until I hung up! This was the first of several such telephone calls from other similar persons, all apparently using amateur radio as an entry and presumably using the *Callbook* as a database!

As I only operate mobile, the inclusion of my address would not assist from a radio location point of view, but I suppose I would not object to information being published which indicated a general area, if this could be arranged.

K A Jones

Sir—Having followed this correspondence from its first appearance in the amateur radio press, may I please be permitted to reply to the letter from G4PEL and others expressing the view that minimum details or even the full address be published for all amateurs.

First, I believe that criminals who know what they are after will certainly seek to acquire amateurs' addresses if they feel so inclined; this knowledge plus a 144MHz receiver on the local repeater will give a ready source of probably-empty addresses.

Second, I happen to regard my address details as private and confidential: I supplied them to the DTI for the purpose of amateur licence issue only; not for everyone to read and use for unsolicited correspondence or even impromptu visits. I do not QSL, preferring to communicate by radio rather than through the post. Should I cause interference, the proper approach is via the competent authorities and not via an angry pounding on the door, especially when a local thermostat or 1kW 27MHz cb operator is far more likely to be the cause. There is precious little privacy left to the individual these days; may we at least respect the rights of those who wish to keep their location to themselves?

Andrew Marshall, G8BUR

It seems that there are almost as many opinions on this topic as there are "particulars withheld" entries in the Callbook*! The Society would prefer to publish even a minimum of information if it can, as opposed to the bare "Particulars withheld" entry, and it still seems to us that a name and either a post town or perhaps the first part of the postcode (ie J Bloggs, Potters Bar, or J Bloggs, EN6) should not pose any threat to privacy, personal security or the security of the nation. We ask members and others whose particulars are withheld to consider whether perhaps some amplification of the bare* Callbook *entry is permissible. We would also stress that the RALU and/or the DTI will assume that if you haven't positively given permission for your particulars to be published, they are to be withheld. They are obliged to do so under the terms of the Data Protection Act.*

SLOW MORSE BROADCASTS

Sir—The letter from G1GYW (in your January issue) is acknowledged and appreciated.

Those of us who make regular morse practice broadcasts for the benefit of learners do so because we enjoy sending morse, and the greatest reward we can have, is when someone calls us up, or writes, to say "I have taken the morse test and passed!"

However, the job would be made a great deal easier and enjoyable if there was more publicity about the frequencies used for slow morse and the times of transmissions so that other operators would know when to avoid these channels—particularly 145·250MHz, S10 which is listed as "used for slow morse".

Unfortunately, the information is no longer included in *Radio Communication*—it used to be published every three months. What a pity! This had a much better circulation than the computer printed news-sheets now issued, which do not get around to all members. Also, when printed in the magazine, there was always a fair chance that non-members might see the information.

E J Fox, G3AVJ

Point taken—we'll make sure the service receives more publicity.

AMSTRAD SOFTWARE

Sir—Like Mr Pritchard, G8AYM, (*Members Mailbag* January) I too own one of the Amstrad range of computers (6128), and suffer identical problems regarding the procurement of technically based software. During the two years that I've had the machine, and after extensive searching, I've found barely any commercially available software that can be used for amateur radio purposes, or for the broader field of electronics, maths, physics etc. There is a large software base for the Amstrad machines, but it is predominantly geared towards the games players and small business user; any application that could be seen as remotely "technical" seems to be avoided like the plague by the software suppliers. Like Mr Pritchard, I also have to write my own programs, and I find it near heartbreaking to spend weeks writing a prog', knowing that an off-the-shelf equivalent is available for the Spectrum or Beeb, for a few pounds.

May I suggest that there is no solution to our present predicament, as relative to the number of Amstrad owners as a whole, the (perhaps) few thousands of us using our machines for technical applications represent only a small minority of that number. Hence our voice is but small.

A machine such as the BBC has an extensive user base among the schools, colleges and universities, where it was originally bought for its speed and flexibiity in running "technical" programs; the ability to "crunch" numbers being paramount, games etc being of secondary importance. Hence the software suppliers and magazine publishers reflect this need with quite a range of technical software. The Beeb was around before the home computer boom, and due to this solid "real" user base will be around a long time after.

The Amstrad machine, although in many aspects being technically superior to the Beeb, has (as yet) been unable to find this kind of solid technical user base; hence no software, and in all probability our Amstrads will follow the path of the Commodore 16 and ZX81 as the next crop of super duper games machines become available to the mass games playing market.

Of course, our own case is not helped one iota by the editorial policy of the magazines supposedly representing the interests of the Amstrad computer user; who openly state that they are not interested in any programs with a "technical" content. Or by computer journalists who, in describing the functions contained within an Amstrad, Basic, can define the function COS() as . . . "yawn", prefering instead to describe the colour and styling of the keytops.

PS: Does anyone know of an assembler for the Amstrad other than the Hisoft product?

J Jardine

Sir—The problem that G8AYM has with the Amstrad range of computers is similar to that I have encountered in obtaining software for this range. My computer is the PCW8512, an extremely versatile computer, not machine—a machine has gears and levers and works on mechanical principles, a little more advanced than the Babbage job—and the only software available is for commercial and games purposes. The only use in this category is the word processor, by which means I can type a reasonable letter to, say, this magazine.

The Beeb and the Spectrum are well catered for, but Amstrad computers are now getting very popular and very good value for money. I chose this equipment since I consider it has more potential that other popular computers. Again, I am also not very familiar with computer programming since I have just retired after a lifetime in electronics, and computer programming is a new subject to me.

To understand computer programming I have altered existing programs to this computer with quite a large measure of success. I am not terribly impressed by the *Amateur Radio Software* manual; it assumes that the reader is well versed in the art of computing, and only after a great deal of poking and hoping have I managed to get them working. There is still one that I am having some trouble with.

From among the ranks of the very knowledgeable members of this illustrious organization—with its talent for scientific write-ups that the average radio operator (**note**—not *ham*) does not understand, which, fortunately, I do—some software and some basic tuition which we could digest for our pleasure and recreation would be a great help to people like G8AYM and myself.

If G8AYM or anyone else cares to send me a 3in disk, CF2D, I will format either 40 or 80 track and return to them with about 23 working programs ranging from "loading vertical antennas" to "transistor output stages". Please enclose the postage as well.

L R Beeson, G3IVB,
5 Shepreth Road,
Barrington Cambs CB2 5SB

PROGRAM REQUIRED

Sir—I read with interest the article in your December issue about the Maplin TU1000, as I have the same problem regarding the software.

I have built the TU1000 and the RS232 interface to go with my Spectrum computer, but I am unable to get the rtty software to go with it. If anybody has such a program I would be very pleased to hear from them.

D Lewis, GW1PQE

WELSH—A secret code for radio communication?

Sir—I wonder if any of your readers know of attempts to use the Welsh language for secret purposes during the second world war? Three former RAF wireless operators have told us of such plans, but we have failed to find any reference to them in books about the war.

In the autumn of 1942, two Welsh-speakers from North Wales travelled from the Signals Training School to London where they and five or six other wireless operators from different parts of Wales were interviewed.

A wireless operator from South Wales who does not speak Welsh has also reported being interviewed, in 1942, about the extent of his knowledge of the old language. This man has also told of a rumour circulating in South-East Asia that Welsh was being used by Welsh-speaking operators to send instructions to Welsh-speaking pilots there, it being thought

unlikely that the Japanese would understand any intercepted messages.

The American Indian language Navajo was, in fact, used in a similar way. We are keen to discover more about this attempt to use Welsh as a sort of secret code 45 years ago. Could any of your readers perhaps, help with further information?

J Adrian Oates, G4MOU, QTHR, and Hilary S Chapman

OPERATING MALPRACTICE

Sir—May I please be allowed, as a mere swl awaiting the December RAE results, to comment on the remarks made by Neil Martin, GU4XGU, on operating malpractice, in the January issue.

I have no wish to sound like a know-it-all, but shouldn't **all** prospective amateurs spend a period first as swls. I am sure the answer to correct or incorrect operating on the amateur bands lies, at least partly, in proper preparation beforehand. The other reason for poor standards of operating could be simply the influence of cb. Before anyone shouts, I am not running down cb, I am a cber myself, very occasionally these days, but among some good operating there are some dreadful ways too! Many new licensees come from cb.

I am all too aware that passing the RAE does not make one a good amateur in itself. Like the driving test, it is only the beginning, and the learning process should continue. However, the RAE is only the theory and licence part of things, with some procedure thrown in, but not nearly enough.

There could be two answers to the problem: make proof of a period as an swl mandatory and include more on procedure in the RAE syllabus. I was surprised at how few questions there were on procedure in my own RAE and how easy they were. If I were not an swl already and QRX on cw to prepare for my morse test at the end of the month, I could go on 7MHz once licensed and make a right hash of things on cw. The morse test requirements only test your capability on the morse code, not your knowledge of correct procedures on cw. Not only is the RAE deficient in procedure training, but the whole structure of the UK system seems to assume that we all want to rush out and buy a 144MHz rig as soon as licensed.

Just as important as knowing how not to electrocute oneself, how not to cause interference and what makes a rig "tick", is how to use the rig correctly so as to give least offence and maximum pleasure to one's fellow operators. Nothing at all on mic technique from a technical or "how to use it" viewpoint and I dread to think of the reactions of new licensees who have never used cb or keyed a mic in their life. Not only mic-shyness but, worse still, maybe keying out the contact while he is still talking, from ignorance, from not knowing it is not the telephone and you cannot just jump in when you like unless working split-QRG. I know, because this often happens on cb with new breakers.

This is where the swl comes in, because if one were to spend time as an swl, one would observe that carriers drop before someone else speaks. If there is still such a person as a new licensee who has never used cb or been on swl —and I did meet one such candidate at the RAE centre—then I feel sorry for them.

The RAE needs to be much more operator-procedure orientated, even at the expense of a longer paper, and the morse test to contain a questionnaire on procedures, plus a short test consisting of a mock "CQ DX" call and following QSO. Again, if swl were mandatory all this would be unnecessary, and I understand that at one time **all** would-be amateurs spent some time as swells. I can honestly say that not only am I finding my own Swling on the hf bands, ssb and cw, instructive, but immensely enjoyable, with contesting and award hunting very much to the fore. At least I won't feel a stranger when I get my licence and go on there to transmit, and many of the amateurs I listen to regularly are like dear friends. And at least I will know what band to work and when and what to look for in the way of dx.

I sincerely hope, Neil, that I will not be guilty of bringing bad operating habits on to the amateur bands and, in fact, the points you make about "breaking" are those I have been using on cb for many years anyway. Thank you, Neil, for bringing up the subject.

One final point on the subject, I seem to remember something from the RAE syllabus to the effect that amateur radio concerns the self-training of the licensee, and therefore it follows that amateur radio is not just a way of getting a "black box" to talk across the town, like cb, but an exciting world of discovery and experiment where give and take, with the emphasis on give, is the order of the day. I hope I can make some sort of small contribution, even if only log extracts for propagation studies etc, and I look forward to working you when licensed, especially "on the key".

I would like to endorse the comments made by Bev West, GW1SSQ, also in your January issue. I am more than satisfied with the excellent service given by the Bureau and I realise that there will be a time lapse before return QSLs are obtained; this does not worry me at all. In fact my own first QSL cards arrived after about five months from sending them to the Bureau and have found both Ted Allen, G3DRN, and my own sub-manager for the swl members, more than helpful to a newcomer. Thank you Ted and thank you Dave Borne, G4CYW, for your consideration and service. Taken together, the Bureau and *Radio Communication* are worth every penny of the RSGB subscription.

Angela Sitton, BRS88639

QSL BUREAU

Sir—May I through the columns of *Radio Communication* request that those G0Ds who have not yet sent in saes for their incoming QSLs please do so. I hold a number of exotic dx QSLs which need to find their owners.

Les Bober, G4NOZ,
sub-manager G0Ds,
115 Shrub End Road,
Colchester CO3 4RB

Sir—A little over a year ago I took over as the QSL sub-manager for GB callsigns on behalf of the RSGB. Although this information was published in *Radio Communication* and subsequently printed in the 1986 Callbook, envelopes are still being sent to the address of my predecessor, the late Mr Newman, and occasionally to **his** predecessor too. Mrs Newman has now moved. While temporary arrangements have been made to forward any mail to me, this arrangement cannot continue indefinitely.

I would be grateful if I could use your letters column to make the following points to your readers in respect of GB QSLs:

1. All envelopes for the collection of cards for GB stations should be sent to me, **G4RVV.** I am **QTHR** in the 1985 and subsequent *Callbooks.*

2. Send envelopes as soon as possible after the event when you have some idea how many cards there will be to collect. A 5 by 7·5in envelope at 13p will hold about 20 cards.

3. Send in cards for GB stations as soon as possible. **Do not wait** until your card arrives from the GB station. Cards arriving with me a year after the event may well not be collected if it was a "one off" event.

4. Cards are to be sent to the main bureau, G3DRN. Cards for GB stations **only** may be sent direct to me.

5. GB station managers please note that I can only hold uncollected cards for the statutory three months. They are then destroyed.

Good QSLing.

M W Stoneham

PLANNING ASSISTANCE

Sir—May we use this page to voice publicly our sincere gratitude to, and admiration for, the RSGB Planning Committee.

It has taken over two years to gain permission for our 60ft tower, and the Planning Committee has been closely involved throughout for most of that time. We are certain that without the advice, support and dedication of the committee members, the permission we sought would not have been granted.

Thank you, gentlemen, and well done!

John & Sandra Wayman, G4DRS/G4JQL

The RSGB's Planning Panel does an excellent job, but it could do with more members. If you are professionally connected with planning in some form and feel that you could assist the Society, please write to: The Secretary (Planning) at RSGB HQ, enclosing a brief note of your experience and indicating whether you would be willing to assist members at appeals. We appreciate that some who could offer advice might not be able to go to appeals because of restrictions imposed by their employers. A member with knowledge of Scottish law and practice would be especially welcome.

BRICKBATS AND BOUQUETS

Sir—Too often one reads in various magazines of the trials and tribulations of the amateur fraternity and our Society, of which I have been a member for some five years or so, both in the capacity of listener and a Class B licensee. Prior to joining the Society I was a member of an alternative listener's organization but, owing to disorganization, I was persuaded to try the RSGB.

No matter what organization one decides to join, 100 per cent satisfaction will never be enough for certain members, especially among some of the younger ones. The learning of tolerance and patience, which a good amateur requires, seems harder to accept than the technical and physical forms of learning which are easier to obtain than they were a few years ago.

I was severely war-disabled and discharged from the RAF after serving 25 years aloft, and in my later years contracted a terminal disease. However, wanting to resume a hobby which I started at the age of nine years, I resorted to the listener fraternity to while away the very long days. I was then persuaded to take the RAE in view of my knowledge obtained during Service life, and I achieved my "B" licence at the first attempt. Unfortunately, the world I lived in was not as wide as that over which I had flown and, wanting the "A" licence, I had virtually re-achieved my wartime speed when the change-over of morse tests happened.

Mrs Cathy Clark of the RAIBC put me in touch with RSGB chief executive David Evans, who advised me that as soon as the facility for examining the disabled was formulated he would inform me. When it was announced on the GB2RS news bulletin that the facility was now available I was forwarded the necessary paperwork and was then contacted by telephone by Neville Ianson (chief examiner). Within a few days of returning the paperwork, an examiner arrived and I took the test in my home shack.

A pass was achieved, and I now await my new G0 callsign.

Agreed, I waited a few months for the system to be operational, but once that was achieved the whole arrangements took less than 28 days, including those lost due to seasonal mail. Rome wasn't built in a day, and I take this opportunity of thanking HQ staff, the examiners, the RAIBC and the other unsung workers within our organization.

(Name and callsign supplied)

SCARE 'EM OFF!

Sir—One cure for the bird-droppings beneath G4SNR's antennas is to mount a plastic model of a predator at the top of his mast. Following a hint in *CQ* magazine I tried a plastic model of a Little Owl, obtained from a local garden centre. It works! Wally the Wall-eyed Owl has kept almost all the starlings off my antennas throughout the summer, and their droppings no longer decorate our favourite place for a barbecue.

My 432MHz Yagi used to be the best (ie safest) perch in the area, because it's high and in the clear. I've often counted a couple of dozen starlings sitting on the boom! Now, the vast majority of incoming birds veer off when they notice Wally, and perch on nearby chimneys instead. It would probably help if the bird-scarer could be mounted so that it moves about in the breeze, to prevent the birds becoming used to it. For the same reason, I take Wally down when the barbecue season is over—but he'll be up there again this year,for sure.

Ian White, G3SEK

PS—Can anyone please advise me what to do about flocks of curious ornithologists?

HIGH-PERFORMANCE LONG YAGIS

IAN F WHITE, G3SEK*

IF YOU ARE INTERESTED in vhf/uhf dx, you're also interested in high-performance Yagi antennas. This article describes the good features to look for when assessing a long Yagi, and how these features have been optimized in modern designs.

What are we looking for in a high-performance long Yagi? Forward gain is the most important single aspect of Yagi performance, so I'll begin with that. But keep in mind that gain isn't everything. What we really want is good performance in all respects.

Gain and boom length

Antenna gain should be proportional to the size of the antenna. If a bigger antenna doesn't out-perform a smaller one, there's something wrong with it. Increasing the gain of an antenna means increasing the size by using more Yagis, longer Yagis, or a bigger horn or dish on the higher-frequency bands. Doubling the antenna size will increase the gain by typically 2–2·5dB; in other words it won't quite double the gain. The reasons for failing to achieve the idealized increase of 3·0dB will depend on the type of antenna and the frequency.

A gain increase of 2–2·5dB makes a significant difference to dx performance. It won't be noticeable in strong-signal QSOs, but the essence of vhf/uhf dxing is that you're always prepared to work with weak signals at the very limits of propagation, where even 1dB can make all the difference. Even with stronger signals, more antenna gain will gradually pay off, in terms of more replies to CQ calls, less time spent cluttering up the frequency in large pile-ups, and more points in contests. We'll also see that more antenna gain can mean less interference to local stations. If you start from small beginnings, then doubling the size of your antenna won't be too difficult. For example you could replace a Yagi of 2m boom length by one that's 4m long. But the next step means going to two 4m Yagis, or one with an 8m boom. And each further step means re-doubling the size of the array! Even so, many amateurs (and an increasing number in the UK, I'm pleased to say) are prepared to do just that.

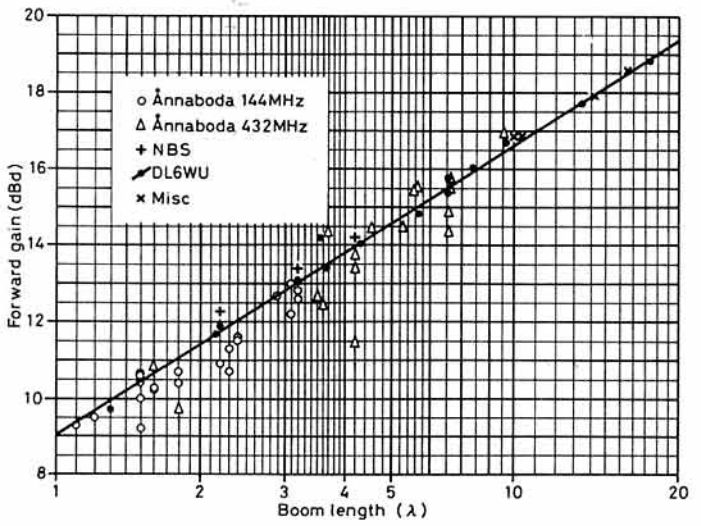


Fig 1. Forward gain is proportional to boom length

I've already implied that the gain of a long Yagi should be proportional to boom length. Although doubling the length may not quite achieve the idealized gain increase of 3·0dB, the shortfall should be small, and each successive doubling of the length should produce a similar gain increase with no sign of flattening out. This is a reliable test of the 'goodness' of long Yagi designs. If a whole family of long Yagis can be created by simply extending the boom length and following consistent design rules for the element lengths and spacings along the boom, and the gains increase consistently in the right way, then every Yagi in that family should be a good one. At least one such family of modern long Yagis exists.

Fig 1 is part of my continuing collection of claimed and measured gain figures for 144MHz, 432MHz and 1·3GHz long Yagis, plotted against boom length in wavelengths. All gains in this article are expressed in dBd, ie decibels above a half-wave dipole [1]. With one or two honourable exceptions, the gains claimed by the antenna manufacturers lie far above the independent measurements of the same Yagis, and have not been included. Several conclusions emerge from detailed analysis of the data summarized in Fig 1:

1. Gain *is* proportional to boom length. The solid points and the straight line are from one consistent series of measurements, and verify the proportionality to almost 20λ. Variations between measurements from different sources obscure the trend but do not negate it.

2. Quads, loop-Yagis, "quagis", "parrot-perches" and "motleybeams" are all represented, but they do not stand out from the ordinary Yagis.

3. For a given boom length, the difference in gain between a good Yagi and a mediocre one is only a decibel or two.

4. The same gain can be achieved with various numbers of elements on the same overall boom length. The number of elements does affect many other characteristics of the antenna, and I'll say more about this later.

5. The Yagis represented by the solid points will be worth a closer look.

Radiation patterns

When assessing a Yagi design, you can get far more information from a critical study of the directional radiation pattern than you can from simple tables of claimed gain and front/back ratio. Fig 2 shows a typical pattern, calibrated 360° around the compass, and inwards in decibels. Maximum power is radiated at the peak of the main lobe; this point is always plotted at the top of the diagram (0°, 0dB). Radiated powers in other directions can be plotted down to typically 40dB below the peak of the main lobe. Although usually called a radiation pattern, Fig 2 could equally well be called a reception pattern, for antennas behave the same in receive and transmit modes.

For vhf/uhf dx working, the antenna should be horizontally polarized —not from mere convention, but because horizontal works better for dx. Thus the most important radiation pattern—the one you observe when you turn the rotator—is the pattern in the same plane as the Yagi. This is called the E-plane. The pattern in the H-plane (the vertical plane for a horizontally polarized Yagi) is very similar to the E-plane pattern. The longer the Yagi, the more alike the E-plane and H-plane patterns become, the main differences being that the E-plane pattern always has nulls at ±90° [2], and the H-plane pattern always has a slightly broader main lobe and higher sidelobe levels.

Fig 2 also summarizes the points to look for in a good radiation pattern. The main lobe is distinct, and the pattern is generally 'clean' with good suppression of minor lobes. The pattern should be symmetrical and there should be clean, deep nulls at ±90° in the E-plane—if not, there's something wrong with either the Yagi or the measurements [2].

* 52 Abingdon Road, Drayton, Abingdon, Oxon OX14 4HP.

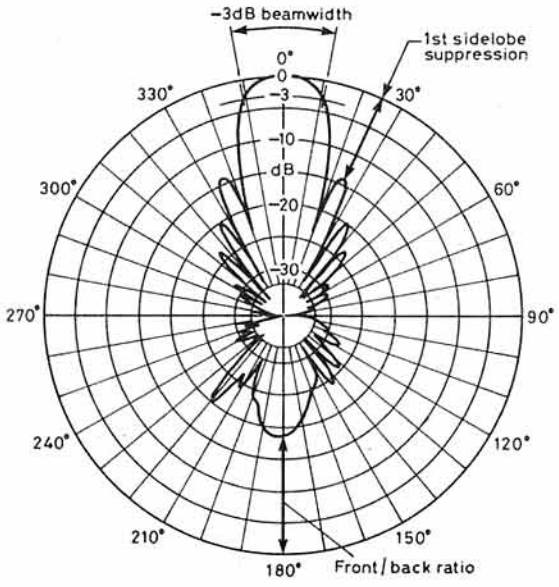


Fig 2. E-plane pattern of a good long Yagi. Note the general symmetry and the deep nulls at ±90°

Low levels of minor lobes in the polar pattern are almost as important as gain. In fact the two features are closely related, since any beam works by concentrating rf energy into the wanted direction at the expense of radiation in unwanted directions. On receive, good suppression of the minor lobes means a stronger signal from the wanted direction, and less interference from stations in other directions. You can't judge the minor-lobe suppression by simple 'magic numbers' like front/back ratio. The problem with front/back ratio is that it's too easy to optimize that one aspect of performance while letting the other sidelobe levels run wild. A better general indicator of minor-lobe suppression is the level of the first sidelobes on either side of the main lobe. These 'rabbit ears' are present in all long Yagis, though in a good design they would be suppressed to about −15dB. But even first-sidelobe suppression is open to abuse. One well-known US manufacturer regularly claims "sidelobe" suppressions of 60dB, when what they really mean is front/side ratio. We've already seen that front/side ratio ought to be infinite [2], so "60dB" is nothing more than advertising hype.

A further word of warning when you look at the patterns of different Yagis: don't trust your first impressions. The whole appearance of the pattern can be altered by the calibration of the radial rings. Since there is no fixed convention, you *always* need to check how the rings are labelled down the 0° axis. In this article I have used a linear decibel scale going down to −40dB at the centre, on the grounds that a decibel scale reflects the response of our receivers and our ears, and measurements below −40dB are probably meaningless. This scale, or something very like it, is the type used by professional suppliers of antenna-range equipment. ARRL publications use a non-linear decibel scale which contracts towards the centre and tends to de-emphasize the minor lobes. Above all, beware of the linear power scale. Typically calibrated from 10 at the top to 0 at the centre (in plain numbers, not decibels), this scale compresses all the minor lobes into the centre and produces a sharp-looking main lobe. The linear power scale always flatters to deceive; so be warned.

Gain and beamwidth

The higher the gain of a beam, the harder it becomes to aim it in the right direction. The reason is very simple: higher gain is achieved radiating more energy in the forward direction, and that means radiating less energy in the unwanted directions—including the edges of the main beam. Beamwidth is conventionally quoted as the total angle between the −3dB points of the main lobe (Fig 2). As gain is increased, beamwidth *must* decrease [3]. You can't get away from this, but you can considerably ease your aiming problems by choosing a Yagi design which gives a well-shaped main lobe.

Fantasizing, the ideal would be the fan-shaped main lobe shown in Fig 3a, with maximum gain across the whole beamwidth for ease of aiming, and no sidelobes at all. Such perfection is not even attainable in theory; we have to accept that the edges of the main beam will always be rounded, and sidelobes will always be present.

Even so, there is no reason to accept a main lobe like the one in Fig 3b, which is sharply pointed and has less than 10dB of sidelobe suppression. If a Yagi has a pattern like that, there's something fundamentally wrong with

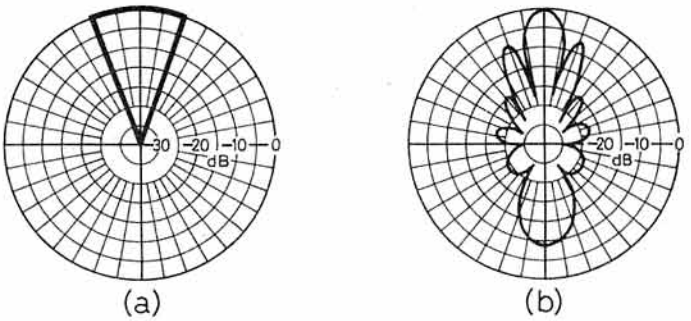


Fig 3. (a) Idealized radiation pattern, with flat-nosed main lobe and no sidelobes at all. (b) Unacceptable radiation pattern, with pointed main lobe and excessive side and back lobes

it, no matter how high the maximum gain may be. It isn't just a matter of aesthetics; a beam with a pointed main lobe is a real pain to use. It's too difficult to peak a station right on the point of the main lobe, and too easy to peak on a sidelobe by mistake. The best achievable shape for the main lobe is shown in Fig 2; there is no doubt about finding the main lobe, yet its fairly flat nose makes peaking the signal quite uncritical.

Optimized long Yagis

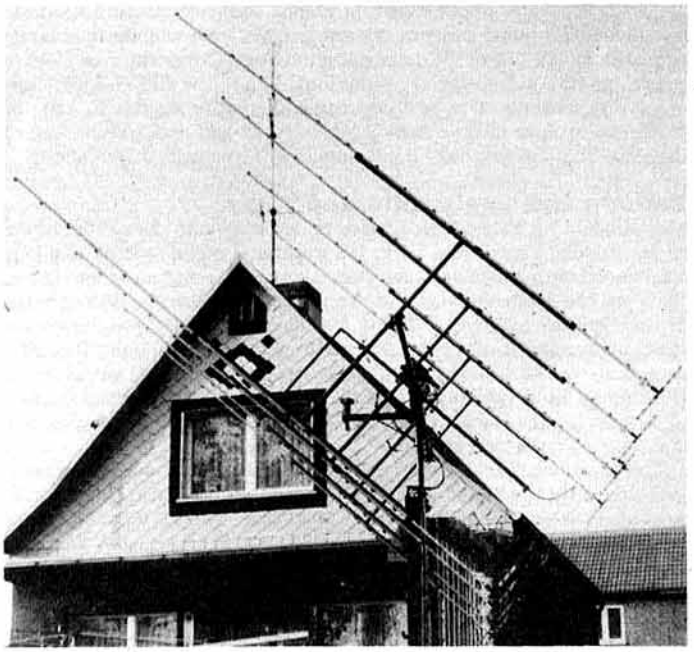
To sum up all the desirable aspects of antenna performance, an optimized Yagi will have:

- high forward gain, for its boom length;
- a generally clean polar pattern (in particular, first sidelobes at about −15dB);
- a well-shaped main lobe which causes no undue problems in aiming.

There are no fundamental conflicts between good performance in all of these areas, provided we don't go blindly chasing the maximum possible gain. In a modern optimized long Yagi, all the above objectives can be achieved together.

Modern long Yagi designs have evolved through a long process of trial and error—mostly error! Designs for shorter Yagis have been adapted and extended, in the hope of producing workable longer Yagis with higher gain. The early work on long Yagis was done in the 'fifties and 'sixties by investigators who seemed largely unaware of each other's activities and pursued different but parallel paths. This tangled history can be straightened out into some kind of logical progression which forms a starting point for further development. The most successful modern Yagi designers have done this, and have built upon the work of their predecessors rather than starting yet again from scratch. Thus there has evolved a definite "mainstream" of long Yagi design.

The mechanical dimensions required for optimum performance are usually found by experiment. Countless thousands of man-hours and tons



DL9KR has developed a successful variant of the DL6WU Yagis, shown here in the moonbounce array at Y23TI

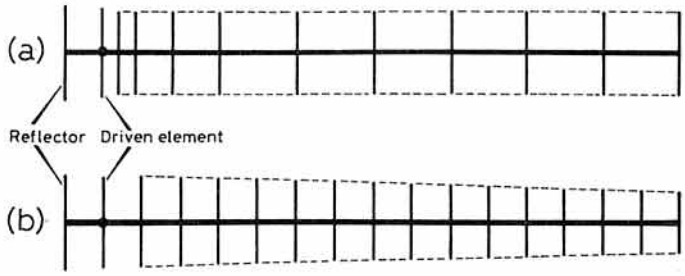


Fig 4. Single-optimization schemes. (a) Optimize tapering of director spacings, keeping all lengths the same (eg W2NLY/W6QKI). (b) Optimize tapering of director lengths (exaggerated), keeping all spacings the same (eg NBS)

of aluminium have gone into the optimization of high-performance long Yagis. Computer analysis is increasingly used to assess potential improvements, and can save a great deal of experimental effort, but successful computer optimization is a lot harder than it might seem [4]. Yagi design still begins with ideas in someone's head, and ends with measurements on real antennas.

It's remarkably easy to build a Yagi which behaves something like a beam, but incredibly difficult to measure the difference between a good beam and a poor one. And I do mean 'incredibly'; until you've tried your hand at gain and pattern measurement, you cannot believe how difficult it is! For measurements on practical vhf/uhf Yagis, even the highest available professional standards are only just good enough. Unless your own measurements are as good as that, you're wasting your time. You will require access to a large, uncluttered test range for considerable period. For amateurs, this implies either weekend access to an existing professional range, or a major co-operative effort such as the regular measurement sessions at US vhf conventions, or the epic weekend at the 1980 convention at Ånnaboda in Sweden [5].

Throughout the whole history of amateur-band antennas, there have been frequent claims of 'miracle' beams which break the gain/size barrier. Electrically small (eg two-element) beams can beat the odds to a small extent, but the reasons for this are clearly understood, and they do not apply to long Yagis. Unfortunately, since accurate gain measurements are so difficult, it's all too easy for people to obtain results which they proclaim with fervour and total sincerity, but which are in fact wrong. Sure enough, you'll never be happy with an antenna unless you have faith in it; but faith alone won't get you the dx!

Far more is known about Yagis using simple rod-type dipole elements than about other types of Yagi using loops or more elaborate element shapes. The latter may offer slightly higher theoretical gain, but even in theory this advantage dwindles away as the Yagi gets longer. The existing body of knowledge about conventional elements can provide only hints about the behaviour of other element shapes, so the designer who chooses to use unconventional elements is starting again from scratch. In accurate comparisons [5], few of the more elaborate Yagis have come even close to competing with well-designed conventional Yagis. The G3JVL loop Yagis are a rare example of a well-developed alternative approach, and the performance of the later versions is running neck-and-neck with the best of the plain Yagi designs; but I don't think they've actually drawn ahead.

Uniform and singly-optimized Yagis

Mainstream long Yagi design is based on some definite ideas about how a successful long Yagi should work. It's sometimes useful to think of a long Yagi launching a travelling wave along its structure and away into space. Thus you can divide the Yagi into two parts: a 'launcher' consisting of the driven element, reflector and first few directors; and a travelling-wave structure consisting of all the rest of the directors. Although that isn't necessarily the best all-purpose description of how a Yagi works [6], it eliminates a lot of random cut-and-try by focusing on those combinations of element lengths and positions that show the most promise of launching and propagating a travelling wave.

This straightened-out, shortened and simplified story of mainstream long Yagi design starts with the work of Ehrenspeck and Poehler [7], who made a major investigation of "uniform" long Yagis with all directors of the same length and equally spaced along the boom. Short uniform Yagis can work very well, but they fail to achieve the expected increase in gain with boom length. In other words, uniform long Yagis are an evolutionary dead end.

The next step forward came from investigations of the effects of tapering. In the language of long Yagi design, "tapering" has two meanings. Tapering the element spacings means that successive directors are spaced further and further apart, going forwards along the boom (Fig 4a). Tapering the element lengths means that each director is shorter than the one before (Fig 4b). The two kinds of tapering should have very similar effects on a travelling wave. So, to keep the experimental work within manageable bounds, it seemed sensible to optimize either director spacing or director length, leaving the other one constant at some initially chosen value. This generation of long Yagis has since been called "singly-optimized".

Most experimenters have agreed that tapering should be quite pronounced in the launcher section, close to the driven element. Directors further along the boom need not be so strongly tapered. Tapering of spacings was investigated by W2NLY and W6QKI, who developed some quite successful Yagis in which all directors were the same length, and the director spacing initially increased and then became constant. The optimum value for this constant spacing seemed uncritical between $0{\cdot}3\lambda$ and $0{\cdot}4\lambda$, though the wider spacings obviously involve fewer elements and less windload [8].

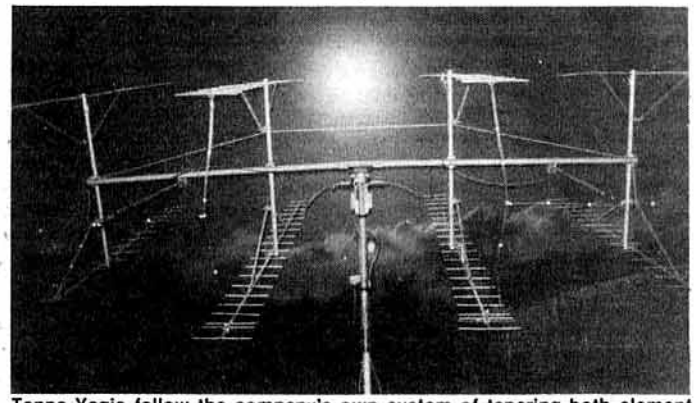
Tapering of director lengths, with the spacings held constant, is the basis of the well-known "NBS" Yagis, derived from the work of Peter Viezbicke of the US National Bureau of Standards in the 'fifties [9]. This mammoth effort included full investigations of length-tapering schemes and of the effects of different element diameters and mounting methods. It culminated in a set of designs including long Yagis with boom lengths of $3{\cdot}2\lambda$ and $4{\cdot}2\lambda$. Joe Reisert, W1JR and others have explained how to design NBS beams from Viezbicke's charts [10]. NBS long Yagis are good, but they cannot be extended; and much has happened in the three decades since they were developed.

The two single-optimization techniques produced the best long Yagis available at the time, and these designs have been enshrined in the amateur literature ever since. But single optimization failed to produce Yagis which can be extended satisfactorily to meet today's requirements for longer Yagis with higher gain. So the next step was to combine the experience from tapering either the lengths or the spacings, and to taper them both. W2NLY and W6QKI found some improvement in bandwidth from length-tapering their spacing-optimized designs. At about the same time as the single-optimization work was going on, Carl Greenblum independently investigated double-tapering and produced his own general guidelines on element lengths and spacings. Together, all these experiments formed the basis of some classic amateur Yagi designs of the 'sixties and 'seventies [11].

Double optimization

The most promising of the modern-day long Yagi designs come from Günter Hoch, DL6WU. He has thought carefully about ways of improving earlier designs, and his extensive experimental results have been obtained using professional test facilities. DL6WU considered first the director-spacing aspect of tapering. W2NLY and W6QKI showed that this is important in the launcher section, but can be stopped once the spacing has been gradually increased to about $0{\cdot}4\lambda$. Further increases in spacing in the travelling wave part of the Yagi are counter-productive. This spacing scheme seemed close enough to optimum, so DL6WU turned his attention towards optimizing the element-length tapering as well. The result was to be a highly successful family of "doubly-optimized" long Yagis [12].

The simplest form of director length tapering would be to make each director shorter than its predecessor by a constant amount. This works if the Yagi is not extended too far, but eventually the forward gain bleeds away into increased levels of minor lobes. If you extend the Yagi far enough, subtracting a constant amount from each successive director, you eventually arrive at a director length of zero—a dead end, if ever



Tonna Yagis follow the company's own system of tapering both element lengths and spacings. This array of eight 21-elements has been converted for open-wire feed

there was one! DL6WU's answer to that problem is one of those brilliant ideas which seem so obvious in hindsight; taper each successive director length by a constant fraction. This logarithmic tapering makes the director lengths decrease quite sharply in the launcher section, but less markedly further along the array. No matter how far the Yagi is extended, the director lengths can never reach zero, and the logarithmic tapering seems to confer some degree of frequency-independence. Various people have come close to this approach in the past, but to my knowledge only DL6WU has spelt it out as a design rule, and then followed it through to develop a whole family of successful long Yagis.

The shortest in the DL6WU family of long Yagis consists of only the launcher section with its gradually increasing director spacings. Longer Yagis can then be designed simply by adding more directors at a constant spacing of 0·4λ, with the appropriate logarithmic tapering of element lengths. The performance of the DL6WU Yagis is a tribute to Günter Hoch's clear thinking about the problem. Without any further optimization, all the Yagis built from DL6WU's design charts have clean patterns and well-shaped main lobes, and therefore their forward gains are as high as their chosen boom lengths will allow. These are the long Yagis represented by the solid points in Fig 1, and the straight line shows every promise of extending beyond 20dBd—that is, if you care to build a Yagi 24 wavelengths long! Perhaps the most remarkable feature of the whole family of DL6WU Yagis is the way that the patterns remain so consistent as the Yagis are extended. Naturally the main lobes become narrower as the Yagis become longer, but the patterns remain clean and the suppression of the first sidelobes remains consistently good at about 15-20dB. In short, DL6WU long Yagis show every sign of working properly.

Goodbye to all that

The success of the DL6WU Yagis has demolished several cherished myths and moans.

"Long Yagis can't be extended." Sure they can, if you do it right!

"Ordinary Yagis don't work on microwaves." Oh yes, they do! The longest Yagis on Fig 1 were all developed on 1·3GHz. I'm not suggesting that Yagis are the best antennas for the higher microwave bands, but there's absolutely no reason why they shouldn't work if scaled properly to the wavelength.

"Element dimensions for long Yagis are extremely critical." If some people were to be believed, the element lengths of the 1·3GHz Yagis would each need to be accurate to 0·1mm. In fact the logarithmic director taper appears to be very forgiving of constructional errors.[13].

"Bandwidths of long Yagis are extremely narrow." With logarithmic tapering, the Yagi itself is quite wideband [13]; the frequency-conscious part is usually the method of matching the feedline to the driven element.

"You can't feed a long Yagi with a simple dipole." Yes we can, and we don't need help from quad-loops, log-periodics or ZL-specials either!

Why not try one?

If you are interested in building some DL6WU Yagis, I strongly recommend you read Günter Hoch's 1982 article [12]. It contains a set of simple design charts of element lengths and spacings along the boom. Element diameter is also important, because it affects the electrical lengths of the elements, and so too does the way the element is mounted on the boom. DL6WU covers all these points, and casts many valuable sidelights on the practical aspects of building long Yagis. A microcomputer program for the design of DL6WU Yagis is obtainable via the RSGB's *VHF/UHF Newsletter* [14]. Yagis based on the work of DL6WU are now appearing worldwide, both from individual amateurs and from professional manufacturers. I recommend them highly.

What next?

Günter Hoch has eliminated most of the faults of the earlier singly-optimized Yagi designs, to produce a family of excellent all-round performers. I don't suppose the DL6WU designs are the ultimate long Yagis, any more than their predecessors were, but they are the definitive starting point for anybody working in the main stream of long Yagi development today.

There are two ways forward from here; we can optimize the general design methods for long Yagis, or we can intensively optimize individual Yagis for specific purposes. That isn't an either/or choice. Eventually, we need to do both. Intensive optimization will certainly be a source of good designs, and already some very promising computer-optimized Yagis based on DL6WU's work are being built and evaluated in the USA [15]. But intensive optimization imposes its own strict terms: you must either take the whole design and copy it exactly, or leave it alone. If you try to adapt the design to suit your own requirements, you've actually made a different Yagi and have "broken the spell" of the optimization. In my view, our ultimate goal should still be to optimize the design method itself. That way, we can obtain optimum performance from any long Yagi we choose to design.

Notes and references

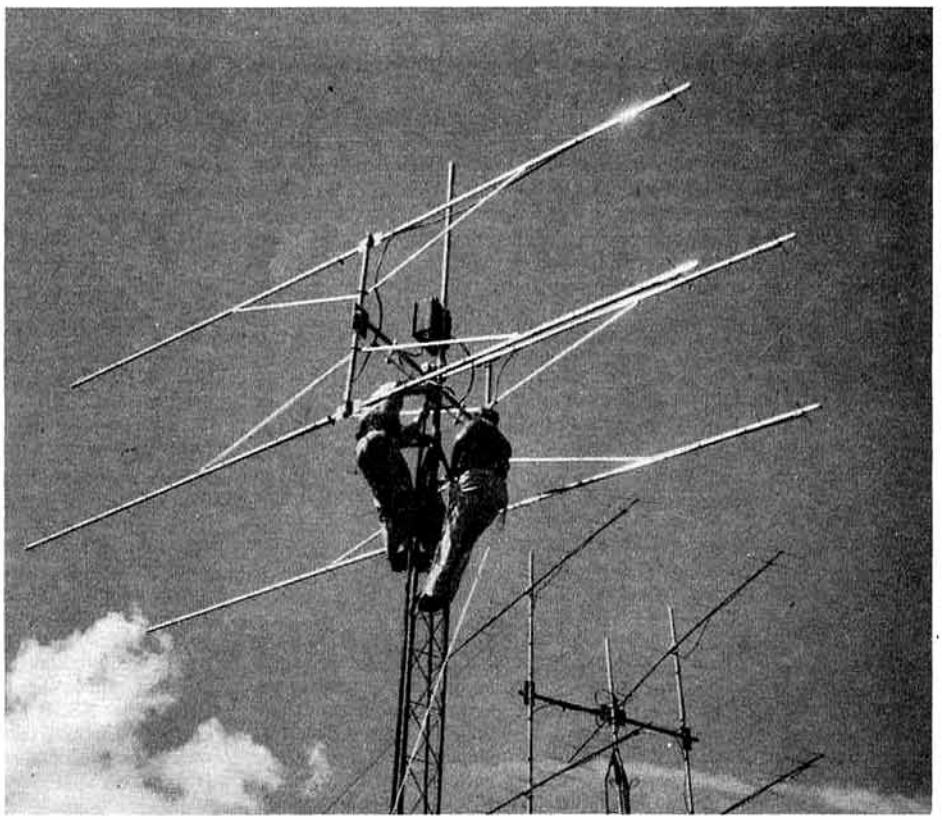
[1] Gain figures are sometimes quoted in decibels above a dipole (dBd), and sometimes in decibels above isotropic (dBi). dBd is easy to understand: you put your new beam in place of the old half-wave dipole, and get *x*dB stronger signals when you point the beam the right way. But even a half-wave dipole radiates better off its sides than off its ends, so it has some gain over an isotropic antenna which radiates equally poorly in all directions; 2·15dB more gain, in fact. So the gain of an antenna expressed in dBi looks 2·15dB better than the gain of the same antenna in dBd.

Don't be put off by the fact that a dipole exists, while a true isotropic antenna doesn't. They are both equally useless for *practical* gain measurement! dBd and dBi are merely concepts, and you need to be comfortable with both of them. Just remember that dBi looks 2·15dB bigger than dBd, but the antenna itself doesn't care.

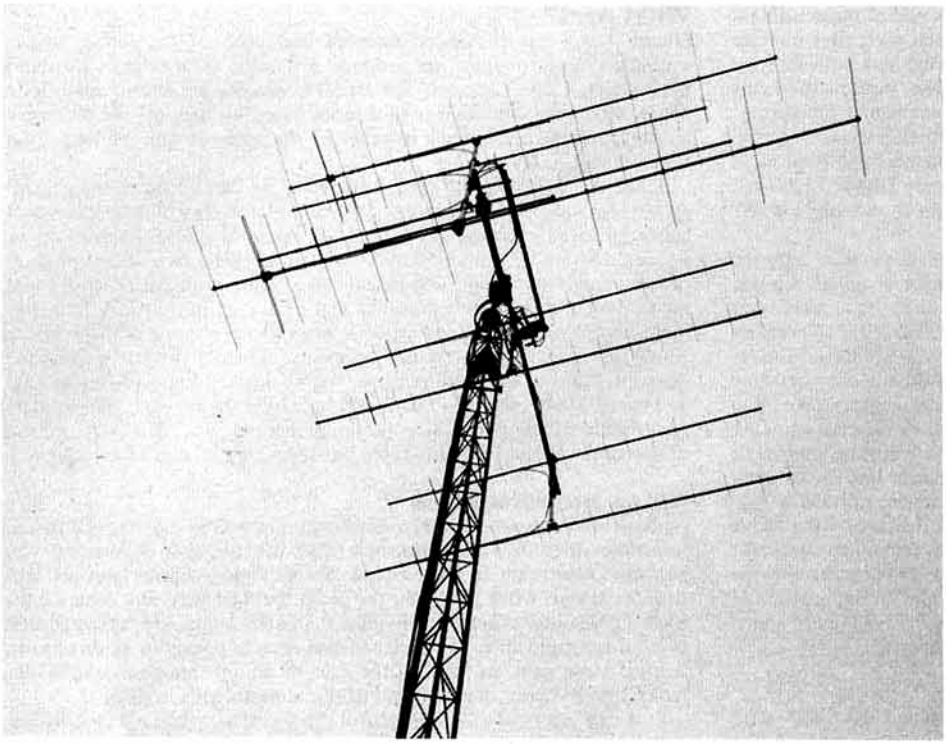
Gains of mobile antennas are sometimes quoted in dB above a quarter-wave, but that's not relevant to Yagis.

[2] At ±90° in the E-plane, you are viewing the individual Yagi elements end-on. Since the elements are all basically dipoles, and dipoles don't radiate off their ends, the Yagi as a whole won't radiate in those directions either.

Skewing of the measured pattern may indicate some imbalance in the driven element, causing sideways radiation due to rf currents running up



WA2AAU and WA2SPL get to grips with four 31-element DL6WU Yagis for 432MHz. In the background are four 15-element NBS Yagis for the USA 220MHz band



In an unusual asymmetrical array, DL6WU has stacked two 11-element 144MHz Yagis of his own design with six of the highly-respected K2RIW 19-element Yagis for 432MHz

and down the metal boom. Even if there is nothing wrong with the antenna, apparent asymmetry could be caused by stray reflections on the antenna test range; this can easily be checked by turning the antenna over.

[3] Doubling the boomlength of a long Yagi, and hence nearly doubling the gain, would reduce both the E-plane and H-plane beamwidths to about 70 per cent of their previous values. This follows from the so-called Kraus formula relating gain to E-plane and H-plane beamwidths:

$$B_E \times B_H = 25000 / (\text{antilog } G/10)$$

where the beamwidths are in degrees and G is in dBd. Since the two beamwidths are almost equal for a long Yagi, you can estimate them both with reasonable accuracy.

The Kraus formula is *not* accurate enough to estimate the gain from the beamwidths. The presence of sidelobes, together with quite minor inaccuracies in beamwidth measurement, can totally blur the difference between a good Yagi and a poor one.

[4] Yagis developed by maximizing only the forward gain tend to be poor in all other respects. Fortunately, cut-and-try experimenters always run out of time, enthusiasm and aluminium before they can completely ruin the Yagi's performance. But a computer will pursue the process to its logical and absurd conclusion, unless you tell it what you really want. A successful computer optimization program needs to take account of all the other performance criteria I've been discussing in this article.

[5] At the 1982 RSGB VHF Convention, SM5CHK gave a graphic account of the effort involved in staging a gain-measurement weekend, starting from an empty field. To summarize; allow at least one day for building and checking the test range. As well as needing two crank-up, tilt-over towers, you'll have to build two long mesh fences to suppress stray reflections. Allow one more day (preferably of Scandinavian summer length) to do the measurements, plus at least two years to recover.

Let's be quite clear about the amateur's standing in this area. The technical concepts are certainly not beyond our grasp; many amateurs in their spare time reach higher levels of understanding than some full-time professionals ever will! It's just that good quality antenna performance measurements make heavy demands in areas where our amateur resources are the least, namely physical facilities and time. If we admit that our back-garden measurements are not reliable, then at least it shows that we understand how measurements *should* be done.

[6] The travelling wave explanation is helpful when looking at Yagis in broad terms, but it doesn't take much account of the fact that a Yagi is actually an array of distinct elements. When attempting to explain the performance of a Yagi with a particular set of element dimensions and spacings, it's better to take the latter view. A vector diagram of the currents in the individual elements should show a regular sequence of phase differences between successive directors, with each director contributing fully to the forward radiation of the whole array. See "Yagi antennas",

G Hoch, DL6WU. *VHF Communications 9*, March 1977, pp157-166.

[7] "A new method of obtaining maximum gain from Yagi antennas", H W Ehrenspeck and H Poehler. *IRE Trans. on Antennas and Propagation*, October 1959, p379.

[8] "*Long* long Yagis", Kmosko, W2NLY and Johnson, W6QKI. *QST* January 1956. The old J-Beam 10-element Skybeam was a faithful copy of the W2NLY/W6QKI design, and very good it was too, for its time.

[9] "Yagi Antenna Design", P P Viezbicke. *NBS Technical* Note 688, December 1976. Almost twenty years elapsed before this work was published! In the meantime, the 'leaked' 4·2λ NBS design became well-known as the W0EYE Yagi.

[10] "How to design Yagi antennas", J H Reisert,W1JR. *Ham Radio* August 1977, pp22-30.

[11] "Notes on the development of Yagi arrays", C Greenblum. *QST*, August and September 1956. Various Yagis developed from Greenblum's work for the Telrex company were subsequently described in *QST* and other ARRL publications by Ed Tilton, W1HDQ.

[12] "Extremely long Yagi antennas", G Hoch, DL6WU. *VHF Communications 14*, March 1982, pp131-138. (For earlier work by DL6WU, see [6] and also "More gain from Yagi antennas", *VHF Communications 9*, April 1977, pp204-211.)

If you can read Dutch, the best current reference to the work of DL6WU is "Zelf Ontwerpen en Bouwen van VHF en UHF Antennes" by DL6WU and PA0MS, published by VERON, the Dutch national amateur radio society. The forthcoming ARRL *uhf/microwave handbook* will include a whole chapter by DL6WU.

[13] The forgiving nature of the logarithmic taper can be exploited to simplify construction. In principle the director lengths should decrease gradually, with no two the same. In practice, beyond the launcher section close to the driven element, all the different lengths can be rounded-off to make a series of equal-length groups. Almost all the element lengths for a 1·3GHz DL6WU Yagi can be cut to the nearest millimetre in groups of two, three or more, and careful measurements show hardly any difference in performance [12].

I have also investigated the bandwidth and dimensional tolerance of the DL6WU 49-element Yagi for 1·3GHz using a reliable computer model. The computed gain bandwidth of the Yagi itself (as distinct from its matching network) is more than 100MHz between −1dB points! And the logarithmic taper structure does seem extraordinarily tolerant of both random and systematic errors in director lengths. If all the elements are too long or too short by as much as 1mm, or if the lengths vary randomly within the same range, the only significant changes are in minor features of the pattern. Thus the computations confirm that the variations in gain, first sidelobe levels and f/b ratio would be very difficult to measure on a test range, and would be quite undetectable on the air.

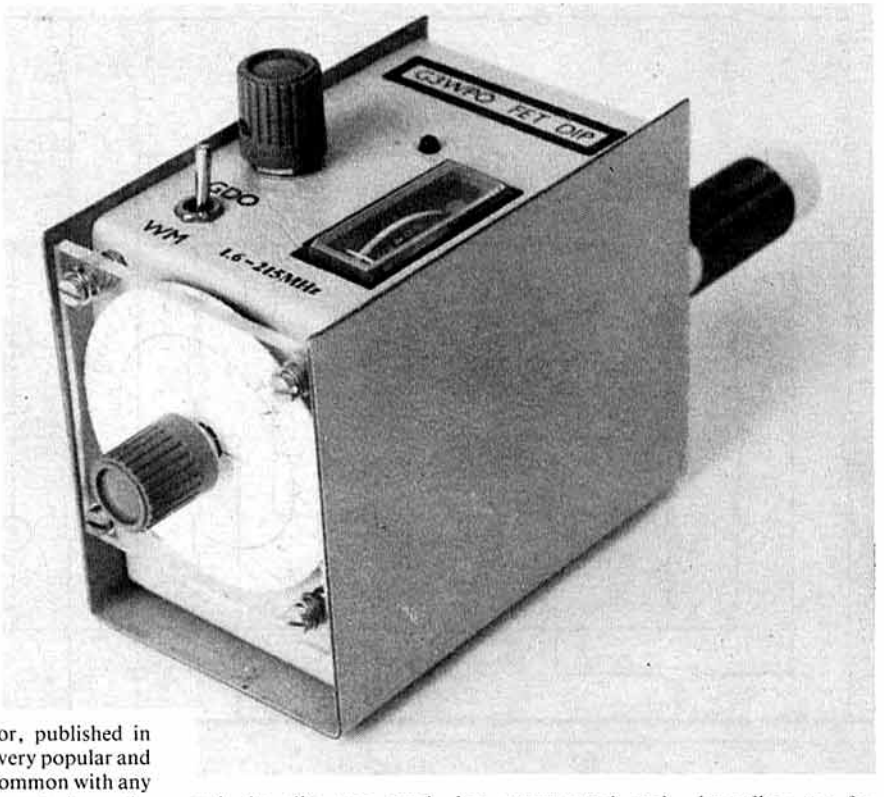
[14] Program listings are available in either Microsoft/GW Basic or BBC Basic from: RSGB *VHF/UHF Newsletter*, PO Box 73, Hereford. Please enclose an A4-size sae and specify which listing you require. The program may also be available on disc; please enquire.

[15] "VHF/UHF World", Joe Reiseart, W1JR, *Ham Radio* December 1986.

□

THE G3WPO FET DIP OSCILLATOR Mk2

Tony Bailey, G3WPO*



THE ORIGINAL DESIGN for a kit-form dip oscillator, published in *Radio Communication*, November 1981, has proved to be very popular and reliable, with over 4,000 of the kits built and working. In common with any design, however, a number of improvements have been suggested over the past five years by constructors and, together with some circuit improvements from the author, a revised pcb design is presented in this article which shows a very considerable enhancement in performance both in dip and in wavemeter modes.

Like the original design, full kits of parts will be available and, as the new design uses nearly all of the original parts except for a new pcb, coils and recalibration, a modification kit is to be made available for those who wish to rebuild the Mk1 version.

The new design features:

(*i*) coverage of 0·8–170MHz in six ranges;
(*ii*) enhanced dip and wavemeter functions;
(*iii*) reproducible design on one pcb;
(*iv*) new precalibrated scale; and
(*v*) audio and meter dip/wavemeter indications.

Mk1 problems

The original circuit utilized a fet kaliatron oscillator covering 1·6–215MHz. Both meter and audio indication of the dip point were provided. While the dip indication obtained was reliable at the higher frequencies, at the lower end the dip was much less pronounced and, depending on fet transconductance, sometimes difficult to detect. The main reason for this is that with such a wide (135:1) range oscillator having no inbuilt means of adjusting the gain between bands, the level of oscillation varies tremendously, and at the lower end is so high that very close coupling is often required to produce a visible or audible change in the detected output, particularly so in the 1·6–30MHz region.

The other main problem was that of insensitivity in the wavemeter mode, where the voltage supply to the oscillator is removed and the circuit simply used to detect and indicate the frequency of an rf oscillator.

Improvements

One of the concepts behind the original design was that the plug-in coils should not be complicated by needing taps, either inductive or capacitive. This eases reproducibility problems and, provided that the coil-winding details are followed to the letter, it should be possible to use the precalibrated scale provided, cutting out the tedious calibration procedure.

The original kaliatron oscillator has been retained but now uses two dual-gate mosfets rather than single-gate fets. This change in itself produces a somewhat better dip, but the presence of the second gate now provides an ideal means by which the gain of the oscillator can be preset quite easily on

Tony Bailey was born in 1945 and first licensed in 1967, after several years as an swl, and has always been interested in home-construction. After many years on top band, he moved to vhf/uhf, where he became one of the first stations on 432MHz ssb using homebrew gear. He is a founder and honorary life member of the Mid-Sussex ARS.

He is well known as a homebrew designer and author of constructional articles, and was awarded the Ostermeyer Trophy for his work in this field in 1981 and 1982. His interests in the hobby are varied, having attempted nearly all aspects, and he was the first editor of *Oscar News* for several years. Originally trained as a chemist, he is a freelance writer for both amateur and professional electronic journals, also turning his pen to novels in his spare-time.

* 20 Farnham Avenue, Hassocks, W Sussex BN6 8NS

Components list (required to convert a Mk1)

R1	10kΩ	**C1**	Toko polyvaricon
R2,7	39kΩ	**C2,3,8,9**	10nF ceramic disc
R3,5	56kΩ	**C4,5**	12pF ceramic disc 5%
R4,6,18,19	100kΩ	**C6,7**	10pF ceramic disc 5%
R8	220Ω	**C10,11**	10nF mylar
R9	2·2kΩ	**L2,3**	Toko 470μH choke type 7BS
R10,11	47Ω		
R12,21	1·5kΩ	**TR1,2**	3SK88
R13	3·3kΩ	**TR3,4,5**	BC238 or similar npn
R14	470Ω	**D1**	3mm red l.e.d
R15,16	33kΩ	**D2,3**	BA481
R17,20	4·7kΩ	**ZD1**	5·6V 400mW
R22	1kΩ	**Extension spindle**	Cirkit
All resistors are 0·25W 5% carbon film types.		**Wire**	Insulated copper, 0·2mm diameter
VR1	470Ω vertical mount 10mm preset		

Toko and Alps components are available from Cirkit Holdings plc, as is a Mk1 modification kit, or a complete set of components for the Mk2 together with drilled pcb, coil formers and finished case (see advert on page 294).

Members who wish to homebrew the pcb can obtain a copy of the construction details and diagrams by sending a large self-addressed envelope to the editor at RSGB headquarters.

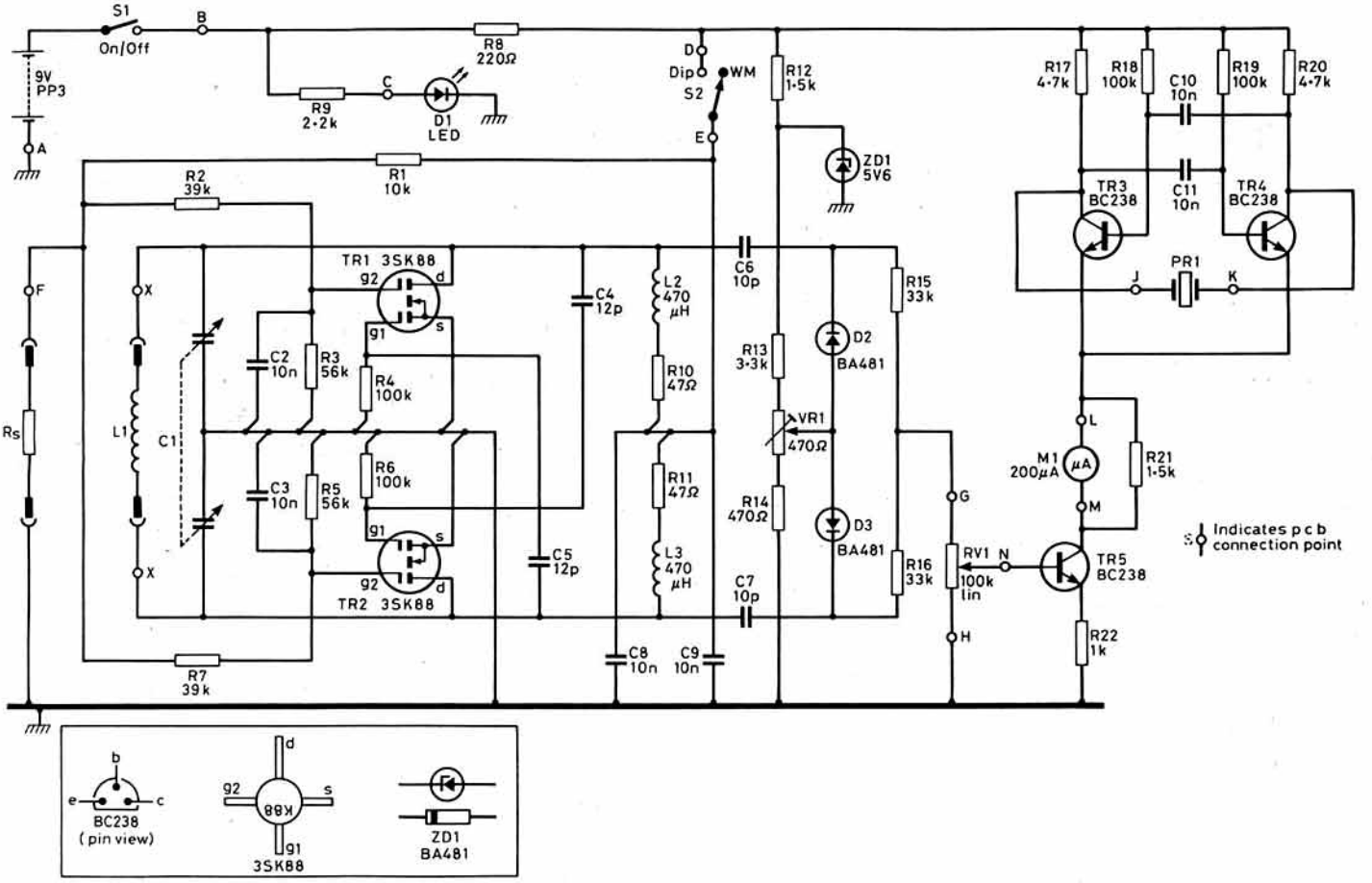


Fig 1. Circuit diagram

each range by means of a single fixed resistor. The resulting dip is now very considerably improved on all ranges.

To improve the sensitivity of the wavemeter, again by a large factor, the two detector diodes have been changed to Schottky barrier types, with these being permanently biased into conduction by a small standing current.

For those without a copy of the original article, photocopies are also available from the editor at RSGB headquarters.

Circuit

The new rf oscillator is a mosfet kaliatron design, offering wide coverage and the ability to control the overall gain by varying the Gate 2 voltage from an external fixed resistor mounted within the coil former. Inductor L1 sets the frequency coverage in conjunction with C1. The latter is a Japanese polyvaricon dual-gang type and, despite the low cost, has a very high reproducible specification.

Without Rs in place, the Gate 2 voltage is fixed at around half the drain voltage by (for TR1) R1/2/3, with the circuit running at maximum gain. On all frequency ranges, the gain is reduced by the addition of Rs as the other half of a voltage divider with R1, thus lowering the Gate 2 voltage and the overall gain. The circuit is capable of oscillating up to about 240MHz (the upper limit being fixed by circuit strays and the minimum capacitance/self-inductance of the polyvaricon) but it is difficult to optimize the performance at this high a frequency when also trying to obtain coverage below 3MHz. Consequently, the upper limit has been fixed at 170MHz for this version, thus still covering all the amateur hf and vhf bands. The self-inductance of the capacitor has been reduced by improving the stator earthing arrangement.

R10/11 damp the two rf chokes in the drain circuits, reducing to low levels inherent false dips from self-resonances. The rf is detected by D2/D3, which are Schottky barrier types biased into conduction by a stable bias voltage adjustable by preset resistor VR1—this is set so that the indicating meter reads half-scale deflection with the sensitivity control RV1 at maximum. This bias current is primarily designed to increase the sensitivity in "Wavemeter" mode, where the supply is removed from the oscillator and the circuit used as a passive indicating wavemeter, but also assists the dip slightly so has been left as a permanent feature. It also has the advantage of acting as a battery condition indicator.

The detected dc voltage is applied to the base of an npn transistor, TR5, which controls the current flowing through a simple audio multivibrator consisting of TR3/4. As the current through TR5 increases, so the audio note from the piezo resonator (PR1) increases in frequency, and the reading on meter M1 also increases. The meter and audio levels are set by the sensitivity control, RV1. This circuit has a higher audio output than the original by the addition of R21 as a meter shunt. The multivibrator commences oscillation at about mid-scale meter reading, and has a readily detectable note which drops sharply as resonance of the rf circuit is reached.

In use as a wavemeter, S2 removes the voltage supply to the oscillator, and the circuit becomes a passive wavemeter with an increase in meter reading and a rise in the audio frequency as resonance is reached. The circuit runs from a PP3 9V battery, with R8 acting as a current limiting resistor. Consumption varies, depending on the band, from about 5mA up to 15mA on the highest band. LED D1 is provided to act as an on/off indicator.

Table 1. Value of Rs vs band

Band	Rs	Band	Rs
A	150Ω	D	680Ω
B	470Ω	E	2·2kΩ
C	470Ω	F	10kΩ

These values can be adjusted for improved sensitivity by lowering Rs until oscillation ceases at some point, then increasing the value slightly.

Coil formers

As with the original, DIN plugs fitted into rigid plastic electrical conduit tubes are used as coil formers. These are now five-pin types, two pins used for the coil connections and two for the gain setting resistor Rs. Only the actual plug end itself is used, and is Araldited into the former after winding the coil. The conduit is widely available from electrical stockists. The lowest four range coils are wound directly onto the formers, but the two highest ranges are air wound with the former used a protective plastic shroud.

This design now uses an additional coil to extend the lf coverage down to 0·8MHz, with the highest range coil also modified against the original to suit the new circuit constants. □

Technical Topics

by Pat Hawker, G3VA

BOB RALPH, G4KSG, a founder-member of the Collins Owners Club, writes in support of the view expressed in *TT* that the ability to understand, to maintain and, where necessary, to modify the equipment we use should be considered an essential or at least a highly desirable part of the enjoyment of amateur radio as a hobby. Yet, increasingly, none of these requirements is met with the complex, computer-aided, surface-mounted, integrated technologies now dominating the black-box market. He writes: "Obviously, I and my fellow club members wish to stay in the past. We take pride in the fact that we do understand the design of our equipment and can maintain it easily without sophisticated equipment. We do not desire to exchange these attributes for the glossy razzamatazz of 'do-it-all', computer aided design, computer aided maintenance, computer aided everything else equipment, all totally unnecessary to the enjoyment of our hobby.

"The licence is issued for the purpose of self-training as a radio station operator. This surely implies one should be in a position to maintain one's whole station in any eventuality.

'It is my personal opinion that the Society should take the responsibility of arranging for a HW100-type kit to be available together with the associated training/instructions/literature/parts etc. Construction and training could become part of local club and society activities if adequate training back-up to instructors were provided."

Valves for audio?

Neville Williams, VK2XV in his *Forum* column in *Electronics Australia* has recently been drawing attention to the way in which some of the current generation of hi-fi enthusiasts are being persuaded to buy expensive "super-quality" audio cables for which the claims being made vary from the modest to the preposterous and for which there is no shred of objective supporting evidence. He also knocks those who claim that the older-type valve af amplifiers had some special quality of reproduction denied to well-designed solid-state amplifiers. KT88 valves now sell at very high prices.

A few years ago, Peter Baxandall, a recognized UK authority on hi-fi, made a similar point in an article in *Wireless World*, stressing that both valve and solidstate amplifiers, if well engineered, contribute such a small percentage of distortion to the overall sound reproduction that any differences between them are undetectable, objectively and subjectively.

There is a very real danger that amateurs without reasonable technical understanding can become prey to myths—indeed some would claim that the long-standing swr fetish is an example of this. On the other hand, as suggested in recent *TT*s, soldistate versus valves *in transmitters* is still a debate in which it is logical to engage.

And even for audio, for the chap who likes to maintain his own equipment, the hankering back to ultra-linear valve amplifiers is not entirely a matter of nostalgia or myth. VK2XV reports an "enthusiast from way back" commenting: "Say what you like, the old valve amplifiers are friendly bits of gear. Switch 'em on and they come alive. You can trace the circuit from socket to socket by just looking at the wiring; and you can measure the voltages just as easily, and pick those that make sense from those that don't.

"Transistor amplifiers aren't like that and ic amplifiers are even worse. They may be more efficient and all that but they're a bit like diesel and electric trains, they don't have the personality of a steam engine."

Of course not all the old valve transmitters had a friendly personality —some I have met were decidely antisocial! But nobody could ever call them soulless black boxes, or unduly difficult to service.

Valve ratings

Even in the heyday of valve technology there was a good deal of misunderstanding about the published ratings and characteristics of valves, and the effect of exceeding the manufacturers recommendations. There was also the question of using television line-output valves in transmitter applications for which they were not designed.

As the ARRL's *Radio Amateur's Handbook* used to put it: "Vacuum tubes are designed to be operated within definite maximum (and minimum) ratings. These ratings are the maximum safe operating voltages and currents for the electrodes, based on inherent limiting factors such as permissible cathode temperature, emission and power dissipation in the electrodes." To this should also be added the important limiting factor for transmitting applications — the maximum temperature of the valve envelope.

American handbooks tend to show ratings in terms of "icas" (intermittent commercial and amateur service) which is defined to include the many applications where maximum power output under "operating" and "standby" conditions apply and where maximum power output is considered more important than very long life. Other publications, manufacturer's leaflets etc may be based on "ccs" ratings — ie continuous commercial service, applicable for example to am broadcast transmitters which have to run continuously for hours or even in 24-hour service. The American icas ratings are considered entirely suitable for amateur transmitters, though this may involve some shortening of valve life; this should be no handicap for normal amateur operation, particularly for Class C cw/or nbfm. Sensible valve ratings for ssb operation involve the question of the speech wave form: with no clipping (af or rf speech processing) the peak envelope power is delivered only over a small percentage of transmission time. On the other hand the quiescent "standing" current has to be 100 per cent dissipated by the anode electrode.

It is worth emphasizing, since many amateurs mistakenly confuse maximum anode (plate) dissipation with maximum dc input, that "plate dissipation is the power dissipated in the form of heat by the plate as a result of electron bombardment. It is the difference between the power supplied to the plate of the tube and the power delivered by the tube to the load." Thus, for example, the 807 had a plate dissipation of 30W, but in Class C cw service (say 66 per cent efficiency) it can run with icas ratings with say 800V on the anode, 100mA anode current, ie 80W dc input; but the anode would run cherry red and the valve quickly expire if one ran the tube with so little negative bias (Class A) that there was 80W dc standing input and no output. Fortunately, a transmitter power amplifier shows a deep "dip" in anode current when the tank circuit is resonated; this is the reason why a driven Class C power amplifier tank circuit must quickly be tuned to resonance whether or not a load is connected.

In case the impression is given of personal bias in favour of thermionic devices, I would stress that rectifier valves were a pain in the neck when used in transmitters. The need for high cathode current meant that valve rectifiers were (are) prone to loss of emission; most rectifiers required a separate isolated heater supply, and the voltage drop across a "hard" rectifier could be substantial (a voltage drop of 44V per anode with a 5U4 at 225mA); safe current depends on the type of ripple filter with a limitation on the value of the reservoir capacitor; mercury-vapour rectifiers were not only prone to radiate hash but needed careful storage in an upright position and a "delay" before the ht was applied.

The life of a rectifier valve operating near its maximum current rating is often seriously affected if the heater is under-run.

The introduction of high-slope, high-perveance (ie high peak cathode emission) transmitting valves in the 'fifties, including the 6146 (later 6146B), require more precautions than were usually considered necessary for the earlier beam-tetrodes (6L6, 807, 813, 814 etc.) RCA provided some useful hints. These include: check ac heater voltage directly at the valve sockets (under voltage often more damaging than slight over voltage); always provide adequate ventilation; do not have shiny surfaces positioned so that they reflect heat back into the valve (the unpainted aluminium valve shields are a major form of life-shortener for all valves, notoriously the miniature (B9A) receiving valves); use circuits with lowest possible resistance in grid and screen circuits; include overload protection in anode and screen circuits; check that the anode does not change colour at full load; reduce ht or insert a screen resistor for tuning under no-load conditions; do not overload valves tuning under no-load conditions; do not overload valves during tuning up; use adequate grid drive (too little drive can cause high anode dissipation); use flexible lead connection to anode caps to avoid strain, and finally, keep within manufacturer's recommended ratings.

So many readers kindly sent details of the TT11 that I feel embarrassed for having mentioned it. The particular attraction of that valve (anode dissipation 7·5W) was that it was designed for use at full ratings to 100MHz and at reduced ratings to 200MHz, making it useful for 144MHz. It was also popular for 1·8MHz, 10W a.m transmitters.

Solidstate hf linear amplifier

In recent months *TT* has stressed that, for high power linear amplifiers for the amateur service, the overall balance still comes down on the side of valve technology on both economic and performance grounds. Nevertheless there are situations which call for solidstate if only as a learning exercise.

The large Australian hobby firm of Dick Smith Electronics Pty Ltd has developed and is now marketing (Australian price about $A300, roughly £130) a kit for a solidstate amplifier designed to provide about 150W pep output from 15W input (about 50W from 10W drive on 28MHz). This is intended for use between 1·8 and 30MHz and incorporates switchable low-pass filters in the output. Harmonic output is given as at least 30dB down and the unit is claimed to provide a good clean signal. Greg Swann in describing this unit in detail in *Electronics Australia* (November and December, 1986) does not include any measurements on intermodulation products etc achieved with the two 2SC2290 devices with a 13·8V power source such as a car battery.

Fig 1 shows only the basic amplifier stage. The complete unit includes vswr, rf overdrive and excess-supply-voltage protection.

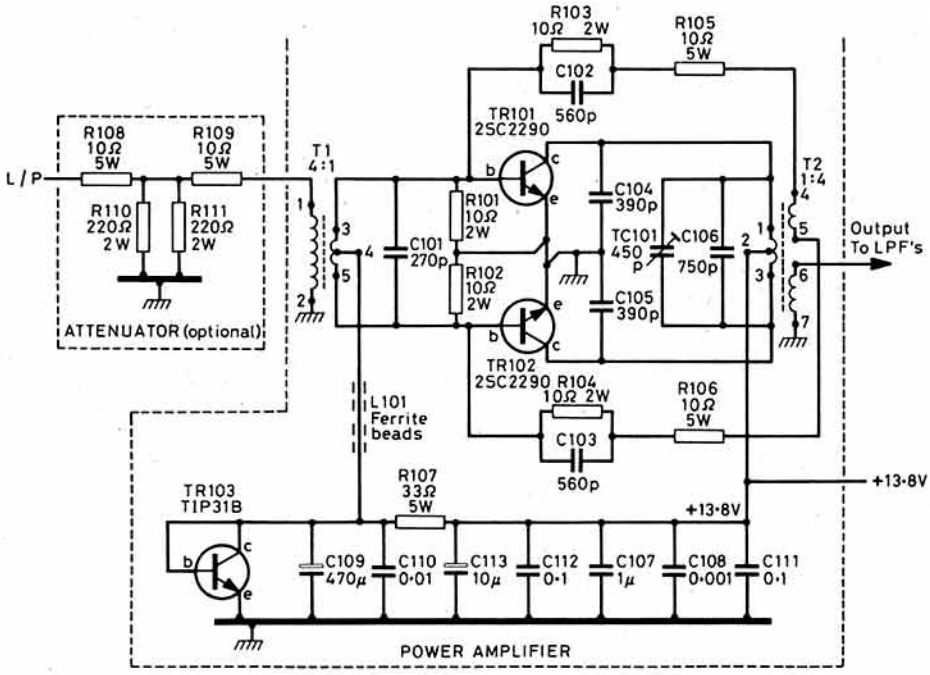


Fig 1. Solidstate amplifier stage of the Dick Smith Electronics 150W linear amplifier kit

Protective multiple earthing hazards

From time to time, *TT* items have drawn attention to the different domestic electricity-supply wiring systems used on the Continent to the traditional three-wire (phase, sometimes still called "line" or "live", neutral and earth) system used for many years in the UK. For example, in the standard UK system the neutral and earth conductors should always be kept isolated though this is not always the case with the Continental systems.

But, to add to the confusion, K A Jones, G8CZM has drawn attention to the increasing use in the UK of a system known as pme (protective multiple earth). Although this is by no means a new technique, it has only come into widespread use since about the mid 'seventies. It is now being applied to probably a majority of new properties and has been retrospectively applied to a number of older homes when there has been a change in the Electricity Board network. While pme systems are designed to meet normal safety requirements, they could, under fault conditions, impose a hazard to the radio amateur using equipment with its own earthing system. G8CZM provides a useful introduction to what is clearly an increasingly important topic (See also *News Bulletin* February). He writes: "In simple terms, a pme system is one in which the electricity supply authority uses a single conductor to act as both neutral and protective (mains) earth. In a cable system this is usually a single, pvc insulated, concentric sheath laid over the three-phase cores. The phase cores are paper or pvc insulated and there is no cable armour. At the incoming electricity supply position in the house, the neutral and protective (earth) conductors are split to provide the familiar three-wire (phase (line)/earth/neutral) domestic distribution system, defined in the 15th edition of the IEE Wiring Regulations as a type TN-C) system and shown in simplified form in Fig 2.

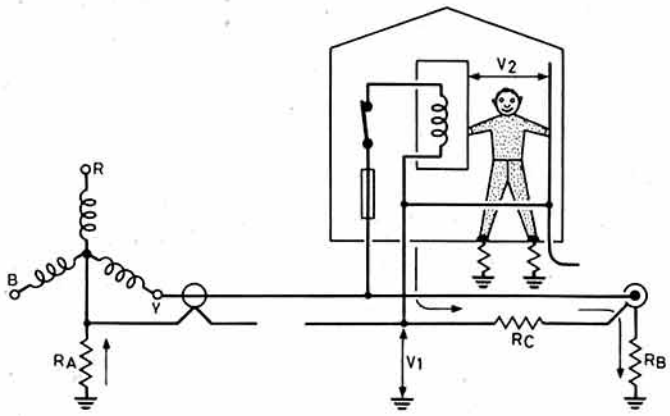


Fig 2. Protective multiple earth domestic wiring system (only one incoming phase shown for clarity)

"In the event of an internal fault in an appliance, the fault current is discharged safely as shown. However, because the neutral conductor carries return current, there will always be a potential difference on the metallic casing of any appliance with respect to local earth, although this is usually negligible.

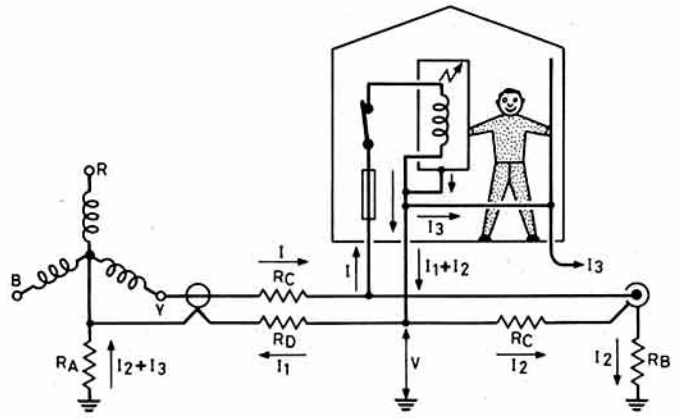


Fig 3. Situation in the event of an electricity supply system fault where the neutral/earth conductor has become open-circuited. More likely on an overhead-fed network than with buried cables although not unknown with such systems

"Fig 3 shows return paths for normal current. The overall resistance to earth of the supply system neutral must not exceed 20Ω and the substation earth (RA) does not usually exceed 40Ω. In the case of radial feeders, the terminal earth, RB, might consist of only one unmeasured and unmonitored earth electrode, with a resistance from 20 to 3000Ω or so.

"Now take the case of an electricity supply system fault where the neutral/earth conductor has become open circuited. This is more likely to happen on an overhead-fed network but is not unknown on underground cable systems. Fig 4 indicates such a fault condition. The casing of an appliance can now reach a significantly higher voltage relative to local earth because it is connected through its common point with the neutral conductor and the load, to the live "phase" supply. This voltage is limited by the presence of alternative current paths, particularly through RB/RC and RA, but because the ohmic resistance values can be quite high, the voltage appearing on the metal casing of an appliance can, in the worst case, approach 240V.

"Fortunately, there is another requirement that has to be met when installing a pme system. This, put simply, is to ensure that any metalwork which might achieve a different potential from surrounding metalwork during fault conditions must be bonded together. Thus gas, water and oil

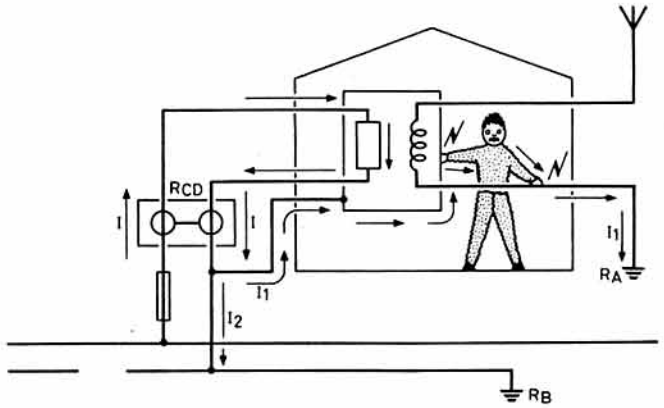


Fig 4. The possibility of a shock-hazard with a pme system where a separate signal earth lead has been brought into what is virtually the Faraday screened enclosure of a pme system. RA is more likely to be a better connection with "earth" than RB

pipes, central heating pipes and appliances etc are all bonded so that a person touching any of these appliances will detect no potential difference. It is possible to detect a pd because his feet will be in contact with an unbonded floor, but since domestic floors are usually carpeted and shoes are worn, this is unlikely to cause more than a slight tingle. Telecommunication-earths, however, are exempt from the bonding requirement.

"PME wiring presents no real hazard to the vast majority of people but the radio amateur and swl is likely to use a separate earth or counterpoise earth to their receiver, transmitter or transceiver; indeed this is essential with many antenna systems and may also form part of the safety precautions. It is widely recognized that the use, for this purpose, of a "mains earth" for signal purposes is likely to add to electric interference noise levels since this is a current carrying conductor. This is the reason why telecommunications earths are exempt from bonding.

"This means that under certain supply/fault conditions the casing of any metal or conductive cabinets in the shack can reach a dangerously high voltage above the separate earth.

"Furthermore, anyone touching the case of apparatus that is "live" in this way and simultaneously touching an unbonded conductor connected to another earth will not be protected by a residual current devices (rccd/elcb) since the current passing via the casing of appliances to earth passes both in and out of the elcb, thereby maintaining its balance; see Fig 4."

The T & P Committee is recommending a series of measures to reduce the hazard to a minumum. For his part, G8CZM feels that the first step is for the amateur to ascertain whether his electricity supply mains is of the pme type and, if so, to be aware that there will be a risk in bringing "earths" into a protective bonded enclosure. They should take precautions to avoid the possibility of simultaneously touching metalwork earthed to a local "signal" earth and any that is connected into the domestic protective-bonded enclosure. No exposed metalwork connected to the signal earth should be located within six feet or so of any metalwork bonded to the mains earth (radiators, portable electrical equipment etc).

When the rig is opened . . .

Dick Biddulph, G8DPS, comments on the "Open at your own risk" notes in the January *TT*. He writes: "My opinion is that commercial rigs have got so complex *and* so small that the average amateur with normal sized fingers cannot tackle them. Also the circuit diagrams are often very bad. I own two old commercial rigs, a Trio 7010 (ssb 144MHz) and a Yaesu FT2 auto (fm 144MHz) rig. Both are relatively simple and, by comparison with modern rigs, quite large. I have no great trouble in working on them. I use a bright light (a 60W sealed beam headlight which has a burned-out dipped beam), an angled mirror (Fig 5), and an array of simple tools such as tweezers, a soldering iron with a bent bit for working on the underside of a circuit board, etc.

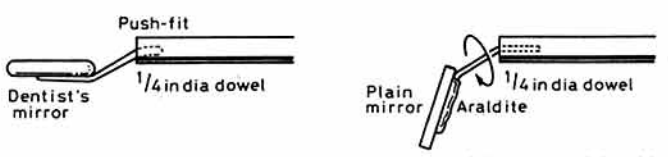


Fig 5. An angled mirror can be a useful tool when servicing some of the older transceivers (G8DRS)

"I managed easily using these simple tools to replace the idiot diode in the TR7010. How do you blow an idiot diode? By being an idiot(!) and connecting the rig to a fully charged accumulator the wrong way round without a fuse!

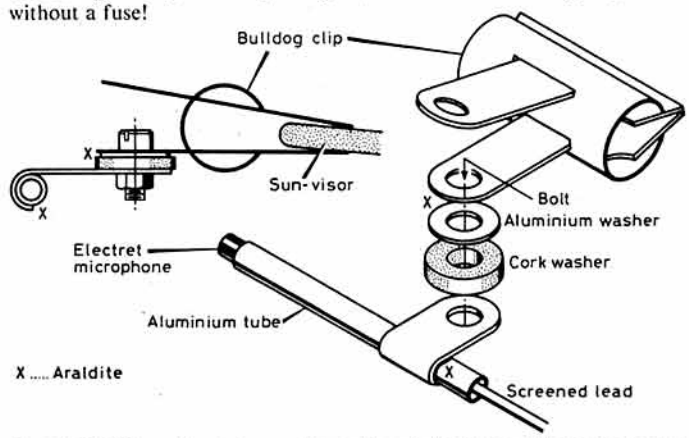


Fig 6. G8DPS's method of mounting a "hands-free" microphone for mobile operation

"With reference to mobile microphones I came to a similar conclusion to G1SJU about mobile operation but found a different solution. I fixed the microphone (same type, Tandy, 85p) to a short piece of aluminium tube (see Fig 6) to a large bulldog clip clipped to the sun visor. I put the T-R switch on the steering wheel spoke, near the right thumb position, and connected it to a small die-cast box on the fixed part of the steering column by a curly cable. The circuit I used was almost identical to that of G1SJU except that I put the l.e.d transmit indicator on a magnetic mount (old loudspeaker magnet covered with pvc tape) so that the light is visible directly *and* reflected in the windscreen so as to be visible without removing ones eyes from the road. The only snags so far are the pick-up of rather a lot of internal car noise and the curly cable squeaks as the steering wheel goes from lock to lock."

Regenerative "straight" receivers

New recruits to amateur radio are faced with the basic problem that the cost of a good, factory-built, general coverage hf receiver is tending to restrict the hobby to the well-heeled. CB equipment is still within the reach of many who now find it difficult to gain experience of the "short waves" by the traditional process of becoming first an enthusiastic swl and then a licensed radio amateur. The Yaesu FRG8800 costs more than £600, the Trio/Kenwood R5000 almost £900, the Icom IC R71 almost £800 and the welcome re-entry of a British designed communications receiver, in the form of the new Lowe HF-125 receiver, at £375 plus options, although significantly lower in cost than most of the Japanese competition, still represents an investment of several hundred pounds.

Secondhand receivers and transceivers, particularly those of fairly recent design with general coverage receive facilities, are not particularly cheap in the UK and there is always fear that the seller is anxious to dispose of a rogue piece of equipment. In terms of sheer value-for-money there is much to be said for some of the better, if bulky, receivers built 30, 40 or 45 years ago—but youngsters, not unnaturally, believe these to be virtually antiques.

What about home built receivers? Few would suggest that beginners, other than those already professional engineers, could expect to build a receiver fully comparable with or as small as factory models such as those noted above. More promising are the two basic forms of direct-conversion receivers: the homodyne receiver with a balanced product detector, af filter and high-gain af amplifier; and the classic "straight" receiver with a high-gain regenerative detector. A good homodyne can give excellent performance on both ssb and cw but does call for some care in construction, with the high af gain making it difficult to avoid some degree of direct demodulation of strong broadcast signals, particularly on 7MHz.

The introduction of solidstate homodyne dc receivers, with the first UK publication being a PA0KSB design in *TT* back in 1967, tended to distract attention from the considerable merits of the regenerative detector, either valve or solidstate, as popularized for hf by John L Reinartz in the early 'twenties and initially demonstrated by Howard Armstrong in 1913. It is worth recalling that, until about 1937, most of the hf dx worked from the UK was received on simple regenerative receivers. Admittedly, such self-oscillating detectors tend to lock on to really strong broadcast signals but a just-oscillating detector, as used for ssb and cw, is surprisingly selective when not overloaded.

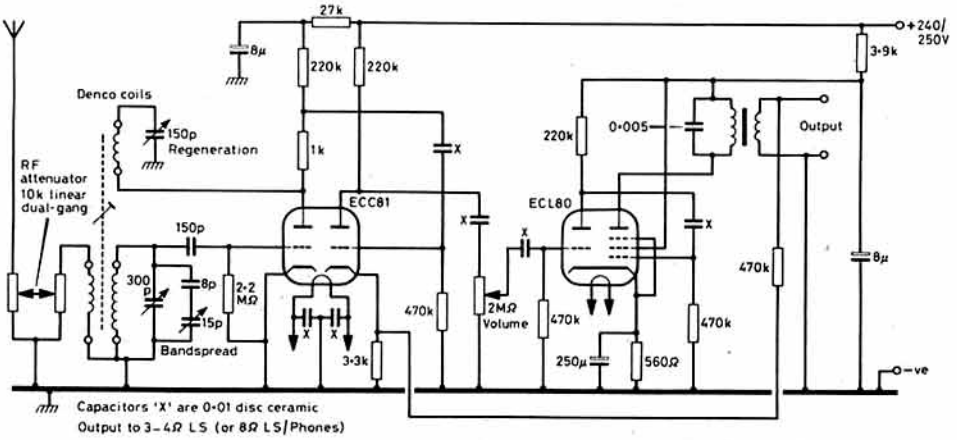


Fig 7. The simple but effective two-valve, four-stage (0-v-3) general-coverage receiver built by RS88565 for listening to broadcast and amateur signals (including ssb). The incorporation of the variable rf attentuator has proved a major aid in coping with strong signals. Straight receivers can still provide a valuable introduction to amateur radio

It is worth considering the ideas and experiences of Alan Radmore, RS88565. "My hf listening, for various reasons, lapsed for several years during which I had no receiver other than a compact self-contained basic valve superhet I built in 1967. ECH42, EAF42, ECC81, BY100 rectifiers, plus bfo and with a useful psu output socket at the rear.

"A year ago my interest revived. I felt there was no hope of building a modern 'black box' so I bought my first factory-built set. I wanted something without too many 'knobs' and settled for a Trio R600 which is 'useful' but its 6kHz filter does not give me the 'entertainment-quality' audio that I like when listening to hf broadcast stations.

"With valves and components in the junk box and the psu in the old superhet receiver, I decided to build a general-purpose receiver. It needed to be simple, effective over all hf broadcast bands, and capable of checking through all the hf amateur bands. Simplicity ruled out the superhet. Good quality on broadcast stations ruled out the homodyne form of direct conversion. Logic dictated the 'straight' receiver. But it needed to be suitable for the 'eighties.

"Results? Well worth the effort! Audio quality is good and, with a large loudspeaker, of classic 'radiogram sound'. Sensitivity is excellent, 'reaction' (regeneration) is really smooth, as it should be, over all the ranges. There are no tuning dead spots. Plenty of audio output as needed for ssb on the speaker. Permits negative voltage feedback so that audio on ssb is superb.

"Selectivity? Those who have never used a regenerative receiver will claim that it can't be any good. There is, I agree, only one tuned circuit. Yet I find it gives me loudspeaker reception of broadcast and amateur signals from around the world. On the crowded 3·5 and 14MHz ssb segments, not even 2·7kHz guarantees interference-free reception.

"The secret, if there is one, is the incorporation of a variable attenuator culled from the receiver chapter of *Radio Communication Handbook* (This stemmed originally from *Electronics Australia* via *TT*—G3VA). Simple but the most effective of several that I tried. Most of the time it can be pre-set after evaluating band conditions, needing little subsequent movement one way or the other. It works well with a valve leaky-grid detector or a fet equivalent. The incorporation of an rf attenuator in a simple receiver would have been almost unthinkable in the old days.Today with so many strong signals it really is a case of being able to turn it down.

"I find it ironic that with this simple receiver (Fig 1) I can resolve weak top band signals during dark evenings when background noise often makes it impossible to do so with the R600 (and I'm not denigrating the Trio). On 3·5MHz ssb signals are often clearer during daytime on the simple set. Performance can be improved with a tuned rf stage (EF80) which was built externally for my prototype design and may be incorporated as a tuned/untuned stage in the final design, but again I have used an rf attenuator to avoid the need to vary voltages on the valve electrodes.

"I would stress that, at least for a listener, the classic trf receiver remains as useful as in the old days—with the ability of ssb to provide good signals adding to its value, both to beginners and others, both as a fun set or as a useful spare. It restores to the listener the vital wonderment of radio that comes from building a set that works. Plug-in coils (no complex band-switch), no need for a printed circuit board, something that often works at first go yet provides scope for bringing it gradually to near-perfection. And with firms now advertising factory sets as 'the ultimate' no need to wonder whether their next model will become 'more ultimate'."

Short antenna elements

Some 25 or 30 years ago, 1·8 and 3·5MHz mobile operation sparked interest in the use of radiating elements very short in terms of wavelength. It was soon discovered that inductively-loaded elements needed to be very accurately tuned (ie high Q, narrow bandwidth); base-loaded whips left a lot to be desired; moving the loading some way up the element improved performance but made the antenna top-heavy and liable to bend over alarmingly while the car was moving. Theoretically, the optimum position for a loading coil on a whip is at a height varying from about 0·4 to, with top capacitance loading, about 0·66 of the height.

An alternative to the loading coil is the helical-wound antenna that provides inductive loading continuously throughout its length. Although this provides a useful increase in the radiation resistance, it does mean that about 0·5λ of wire is needed to achieve 0·25λ resonance. This also implies that a metal whip cannot form a low-resistance antenna element so that, unless very thick, low-gauge wire is used, the rf ohmic losses will tend to be higher. Dielectric (eg ferrite) loaded whip elements are possibly the optimum approach for transmission but this technique has received little attention from amateurs.

It will be appreciated, at least by regular *TT* readers, that theoretically a short, well-matched radiator can be just as efficient and has the same radiation pattern as a full-length monopole or dipole. Unfortunately, this cannot be fully achieved in practice since the efficiency (E_f) of an antenna is $R_r/(R_r + R_{loss})$ where R_r is the radiation resistance and R_{loss} is the *rf* ohmic resistance of the element, the loading coil, and the ohmic losses in the matching network. If there were no R_{loss}, this would reduce to unity regardless of the shortness of the radiator and consequent very low radiation resistance. The practical problem is that as the radiation resistance becomes much lower, the ohmic losses assume proportionately more significance. The radiation resistance tends to decrease as the square of its length and may well be only of the order of an ohm or so on 1·8 or 3·5MHz.

A continuously loaded element does raise the radiation resistance significantly above that of a base-loaded element, and this can be further materially improved and the bandwidth increased by the use of a capacitance hat.

Since the transfer of most UK mobile operation to vhf/uhf, interest in very short and/or compact antennas has tended to be concentrated on balcony antennas, antenna arrays that need to rotate without extending over neighbours' gardens, and transmitting loops.

Ten years ago, Ronald Gorski, W9KYZ (*QST* April 1977) wrote a basic article, "Efficient short radiators" that provided some useful notes on helically-wound short elements, using wide copper ribbon tape, in conjunction with capacitance-hats.

He investigated these techniques on model antennas at about 100MHz showing that they can result in physically short but efficient two-element Yagi arrays providing some 4dB forward gain and about 15dB front/back ratio.

The vhf model comprised a 28in length of 0·75in cpvc tubing (plastic water pipe) wound with 38 equally spaced turns of 0·5in wide copper tape (resonance 104MHz). Then he added two 5·5in diameter, six-spoke, capacitance hats (resonance became 84MHz) and fed at low impedance via a C-match network (ie capacitors not inductors).

Translated to 14MHz, bandwidth would be 500kHz with element lengths slightly over 12ft and boom 10·5ft, diameter 1·5in or more.

W9KYZ's 1977 design pointers remain valid:

1. Make the element length no shorter than physically necessary for the particular location since both bandwidth and efficiency improve with longer elements.

2. Use large capacitance hats as these reduce the length of helical conductor for a given frequency and this minimizes R_{loss}.

3. Use large formers of good dielectric quality (eg fibreglass). The larger the form diameter (eg 1·5in), the greater the length reduction for a given number of turns and the greater can be the width of the conductor, so reducing R_{loss}.

4. Solder *all* joints and seal with silicone rubber. Do *not* rely on pressure joints.

5. For a good f/b ratio of a Yagi array with a split driven element fed from coaxial cable, some form of balun transformer is needed.
6. Use of a gdo is the only practical method of securing resonance with a fixed physical length. Construction requires cut and try. Proximity to surrounding objects affects resonance and should be minimized during tuning up.

Anchoring the big ones

David Reynolds, G3ZPF, who in *TT* (November 1984, pp 965-6) gave useful advice on mast foundations and other matters concerned with the stability of antenna masts and towers (and who has also written in *Short Wave Magazine* on such topics) was not convinced that the advice given by W4XS in *QST* and reproduced in *TT* (January 1987, p29) would result in a really secure anchor for some of the highest or heaviest towers. He writes:

"I was somewhat taken back at W4XS's 'recommended' secure guy-anchor for a number of reasons:

"Firstly, all that stops the rod from being pulled out of the concrete is the local bond between the curved surface of the rod and the surrounding

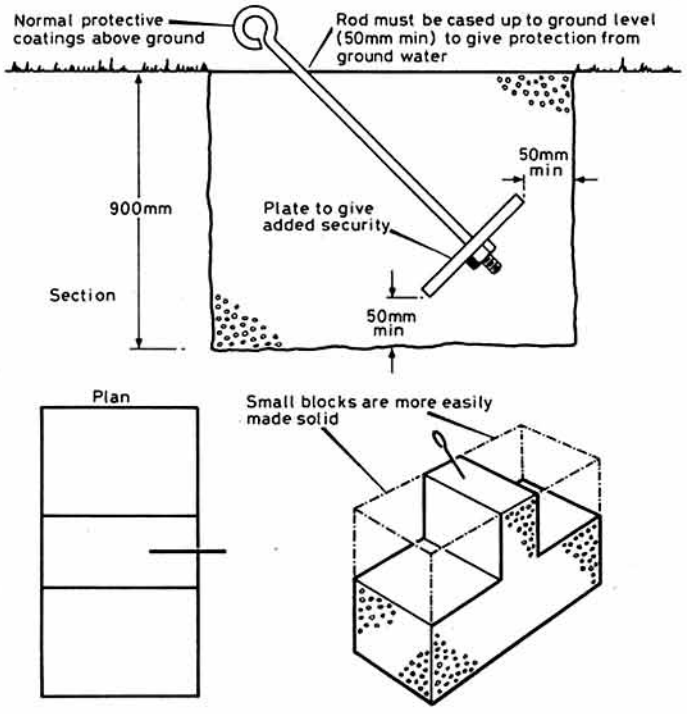


Fig 8. G3ZPF's recommended modifications to W4XS's guy anchor for high masts or towers as given in *TT*, January, Fig 5

concrete. With a light load *and* correctly compacted concrete there would probably be little to fear. But with really large towers, more common in the USA than in the UK, and with the likelihood of less than perfect mixing/compacting of the concrete with a diy project, a number of factors could contribute to local bond failure either instantly or over a number of years.

"Apart from fairly obvious corrosion of the bolt exposed to the air, there is the more insidious corrosion of the bolt where it is in contact with earth below ground. This would not be obvious until it failed. In Fig 5 of the January *TT*, the rod is shown passing right through to the lower face of the concrete. Again local corrosion from groundwater, plus ingress of water (especially through poorly compacted concrete *or* concrete of poor or

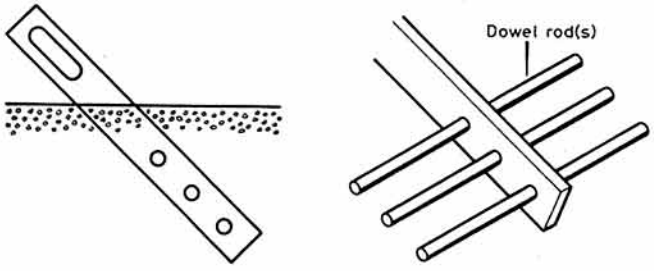


Fig 9. G3ZPF's alternative method of making the guy-anchor more secure. One or more dowel rods reduce any possibility of a "pull out"

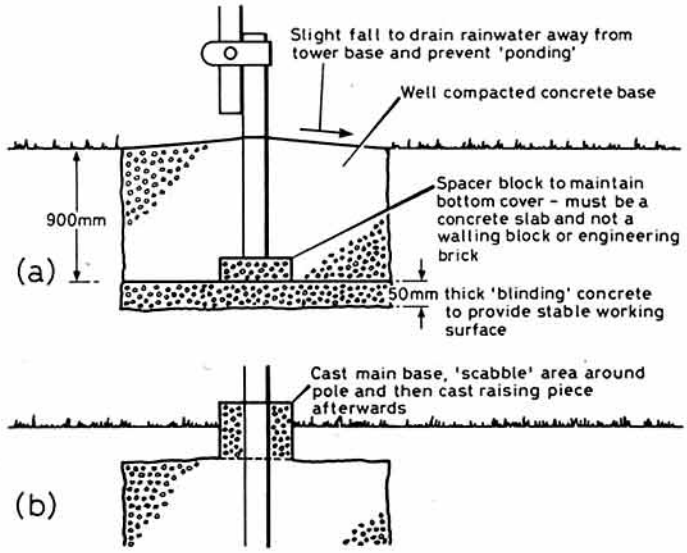


Fig 10. G3ZPF's recommendations for secure fixing the base of tower, tiltover mast etc. The base size will depend on the particular circumstances and professional advice is usually needed. (b) For situations where it is considered essential to hide the top of the concrete base

uneven mix proportions) would cause expansion and bursting of the concrete, thus reducing the local bond area available and/or exposing further areas to corrosion.

"Figs 8 and 9 show the alterations I would make to W4XS's design but there are some additional points worth driving home to anyone contemplating a diy job on a 'big league' antenna installation, apart from the obvious one of seeking competent professional advice:

"1. With bases of any size the amount of concrete needed becomes rather too large to be mixed by hand. It will save much heartache/backache if you obtain it ready mixed. The advice of the supplier can be sought on a suitable mix of concrete. Some soils require the use of sulphate-resistant concrete, for example.

"2. Good compaction of the concrete is *essential*. This *cannot* be obtained by 'stamping around' in wellies, whatever your friendly navvy may tell you. Poorly compacted concrete contains voids into which groundwater can and will percolate. Those voids near the surface can freeze up during the winter, spalling the upper surface of the concrete. Any metal encased in concrete is protected from corrosion by the strongly alkaline nature of concrete, but this protection is removed if water is held in voids in contact with the metal or if the concrete 'cover' is insufficient to withstand the test of time. A minimum of 50mm (2in) of cover is needed over metal near concrete faces exposed to earth, so aim for twice that and maybe you will end up with just enough once the swirling around of wet concrete being placed has moved things around in the hole.

"3. Compaction of concrete is made simple by the hire of a 'concrete-vibrator'. This consists of a mechanically vibrating tube usually powered by a compressor. Placed in the concrete it causes this to flow freely and ensures freedom from voids.

"4. *Never* pour in the whole of the concrete and then just push in an eyebolt afterwards. Always put any fixings in position *before* the concrete is poured and remember that concrete is heavy. As it swirls about in the hole any flimsy bracing intended to position the fixing will rapidly collapse/move about.

"5. The bottom surface of structural concrete in the ground should be at least 900mm below ground level in order to ensure freedom from 'frost heave' of the soil.

"6. Pouring concrete on to an earth base will stir up mud into the lower portions of the base and allow the fluid part of the matrix to leach into the soil, leaving cement-coated aggregate (ie the gravel). This void-filled area will give no protection to any metal fixings which extend into it. Always seal the base of the hole with a thin layer of 'blinding concrete' to provide a stable surface on to which to pour the remainder.

"Again I stress that these measures are significant only to 'big-league' antenna support installations. Nevertheless, the general principles (Fig 10) can be adapted to make even minor installations safer over longer periods of time than would otherwise be the case. With diy installations there will inevitably be corner cutting, but if these are from a 'Rolls-Royce' base rather than a 'flawed' plan, there is a far better chance of achieving a good result."

The transmitting receiver

In my youth, inspired by books and films such as Somerset Maugham's "Ashenden" stories, John Buchan's *Greenmantle* and *39 Steps* and Compton Mackenzie's real-life *Greek Memories*, I nourished ambitions, never fulfilled, of writing spy fiction, although at that time still lacking any practical experience of the murky if fascinating world of secret services. In my files I still have a small part of a typescript of a never-completed story that I sketched out in the very early days of the second world war.

This, for reasons that now escape my memory, involved my hero, Jack Davidson, being kidnapped in Stockholm and left by his Nazi captors in a room from which it was essential for him to escape. In the room, fortunately, was a shortwave receiver, in his pockets pliers and a screwdriver (yes, it was that type of story!): "At once he set to work. Dashing to the radio set he switched it on. It seemed ages before the valves heated up. He twirled the knobs, the set responded well. On the shortwaves station after station came bumping in. Scared of attracting the attention of his guards, Jack turned the volume down, satisfied by the sensitivity of the receiver that the aerial was a good one.

"With his tools, he soon had the back of the cabinet removed and the mass of wires, coils and condensers exposed to view . . . For the next three hours he worked as never before. He stripped a number of the components off the chassis, re-arranged the circuits until he had a receiver which, though inferior to the original, would still be capable of bringing in a number of signals. Turning his attention to the parts he had removed, he asembled a crude single-valve transmitter.

"This much was comparatively straightforward if time consuming. The hardest part was yet to come. It was minutes before careful handling of the receiver resulted in the faintest of buzzing which he recognized as the transmissions he sought. Then carefully he adjusted his flea-power transmitter until it was tuned to the same frequency. It remained only for him to couple the aerial to the makeshift station and to construct a crude morse key from his screwdriver and aluminium screening removed from the receiver . . . ."

Needless to say it all came right in the end. He successfully sent a message summoning help. There followed the exposure of Nazi intrigue in neutral Sweden and Jack's return to the welcoming arms of the unimaginatively named heroine, Jill Travers.

A few years later, I proved that a very simple tuned-plate, tuned-grid oscillator using one of the old 2V-filament battery valves could be tuned quite accurately to an incoming 7MHz signal received on an "all-wave" broadcast receiver and then loosely coupled to a 66ft antenna to establish a scheduled contact with a station several hundred miles away.

What I did not know then was that my fictional radio had actually already been successfully used in an emergency by Henry Jenkins, W7DIZ, in October 1934 or that a somewhat similar idea in the form of a plug-in adaptor and standard radiogram was being used in real life by the German Military Intelligence (Abwehr) for clandestine (agentenfunk) radio communications.

The story of W7DIZ's exploits have been recalled by Bill Orr, W6SAI, in his *Ham Radio Techniques* column (*Ham Radio Magazine*, December 1986, pp 59-62). W7DIZ was one of the keepers of the Tillamook Rock lighthouse off the coast of Oregon when a gale damaged the building, cutting off the power generator which extinguished the light, silenced the foghorn and put shipping at great risk from the dangerous shoals. There was no means of warning the superintendent on shore except by radio—but at that time the lighthouse was still without an official radio transmitter.

All that was available was a collection of parts from an old Atwater-Kent broadcast set, a few dry batteries and scraps of tinfoil, copper and brass. On two pieces of wood, W7DIZ built from these parts a simple 3·5MHz transmitter and receiver. Lacking even valve sockets, he drilled holes in the breadboards to hold the valves and soldered wires directly to the pins (still a solution for those lacking sockets for transmitting valves?) using a gas torch. Coils were fashioned from wire taken from an audio transformer and wound on cardboard torch battery cases. A tuning capacitor for the transmitter was salvaged from the broadcast receiver; fixed capacitors made from tinfoil and wax paper taken from a loaf of bread. The transmitter was a simple tnt oscillator (ie tuned-anode, not-tuned grid) with no grid resistor or capacitor. The first morse key consisted of breaking the battery connection by hand, later improved by using a piece of spring brass. A 40ft antenna used wire salvaged from a broadcast coil. The receiver was just an oscillating detector, twisted wire forming an antenna coupling capacitor, a tinfoil unit as grid capacitor with no grid leak. The tuning capacitor comprised two brass plates separated by more waxed wrapping paper, and adjusted by moving one plate over the other with a pencil. But it worked! W7DIZ made a contact with another W7 station and passed his emergency message.

Another view on tinnitus

R E Parkes, P29PR/VS5RP/G3REP draws attention to the "alternative medicine" view that tinnitus (ringing in the ears) and nerve deafness tend to be aggravated by the consumption of refined sugar and flour products, salt, caffeine, tobacco, alcohol and drugs. In his own case, identifying an allergy to sugar brought about major relief. He sent along an article from *Healthy Living*, July 1986 by Paul Yanick of the US Hearing and Tinnitus Help Association. This claims that some hearing problems can be improved by changes in diet and lifestyle, and adds: "Protect your ears from loud noises, especially hearing aids that are too loud; exercise daily." The author advises us all to read the labels on supermarket food and wherever possible to eat natural foods; avoid soft drinks and tap water; and think positively. But remember this is alternative medicine and health-food philosophy which sometimes pushes a good idea to the extreme.

The *Healthy Living* article concludes: "For more information on how to overcome hearing and tinnitus problems, write to the Hearing and Tinnitus Help Association, PO Box 231, Iselin, NJ 08830, USA." But don't blame me if the association wants to change your lifestyle in ways that may prove as hard to accept as tinnitus or some loss of hearing!

P29PR in Papua, New Guinea has found that living with open windows rather than double glazing has also been beneficial. The note on the danger of overloud hearing-aids does, of course, apply also to any listening on headphones.

Tips and topics

Mark Rogers, G4RGB, apropos my remarks on metal oxide varistors in the January *TT*, points out that a range of these components suitable for 240V mains (275V limiting on ac, 350V with dc) *is* included in the RS Components trade list (Stock nos 238-609, 615, 621 sold in packets of five and priced according to their energy absorption rating but less than £3 per packet for the highest rated devices). My apologies for not spotting these devices in the suppressors/filters section of the massive RS 700-page catalogue.

Feedback on the 813 linear

G3OHE apologises for the omission from Fig 4 (*TT* February) of a vital component. This can be a 25KΩ 10 or 5W (or, say, two 22KΩ 2W resistors in series) wire-wound resistor across the output of the screen voltage quadrupler tying the 813 screen to ground in the absence of drive.

BOOK REVIEW

RADIO! RADIO! by Jonathan Hill (1st edition 1986). Published by Sunrise Press (2-4 Brook Street, Bampton, Devon, EX16 9LY). 244 large pages (A4 format). De luxe signed and numbered hardback edition: £18 plus £2 p&p. Softback: £12.95 plus £2 p&p.

This new and diligently researched book traces in pictures and words the development of the domestic "broadcast receiver" and of "broadcasting" from the earliest experimental days in which amateur experimenters played a prominent role, the start of regular broadcasting in the early 'twenties right through to the early transistor sets in the 'fifties and 'sixties. There will be few amateurs, even among the younger generation, who will not find an illustration and brief description of the radio on which they first "listened-in-to" in their youth. It needs to be stressed that Jonathan Hill is primarily interested in cabinet design—and there have been some weird and wonderful designs—rather than circuit developments. But it is fascinating to see, for example, some 90 illustrations in a section on "The Golden Age of Loudspeakers 1922-30" with all the variations on horn and moving-iron speakers, or the 40 or so valves, "Westector", magic-eyes etc from the "R" (Captain Round) valve of 1922 up to the introduction of the B8A base in the UK in 1953. For collectors of "vintage" broadcast receivers this is an essential handbook. My personal regret is that unlike the rather similar but less comprehensive American paperback *A flick of the switch* by Morgan McMahor, there is no attempt to cover the development of amateur radio communication receivers; although a few of the early short-wave receivers and converters, including the 1928 Marconiphone "Short Wave Receiver Model 34", and the 1933 Eddystone "short wave converter", are among the 800 UK models illustrated.

For readers interested primarily in circuit design, attention is drawn to an excellent 50-year anniversary paper in *The Journal of the Institution of Electronic and Radio Engineers* (*J.IERE*), October/December 1986, pp 325-341, by Keith Thrower of Racal-Chubb: "Evolution of circuit design for a.m broadcast receivers: 1900-1935". There is a lesson to be learned from his introductory remarks: "This paper traces the development of the a.m, broadcast receiver from the early attempts at wireless telephony by Fessenden in 1900, through to the near perfection of the superheterodyne receiver by 1935, with its high sensitivity, good selectivity, bandpass tuning and automatic gain control. Very little in the way of improvements to valve receivers came after this time, although the valves were made smaller, more robust and with a higher mutual conductance. The major post-war developments have been the semiconductor revolution, fm stereo broadcasting and true high-fidelity. It is interesting to note, however, that the performance of the average low-cost domestic radio of today is little better than the table models of 1935, and in some respects is worse, particularly with regard to bass response and ease of tuning." *G3VA*

NEWS BULLETIN

50 MHz SURVEY ANALYSED

Society puts its views to DTI

It's now just a year since limited release of the 50 MHz band in the UK took place. With an eye to further progress, the Society wrote to the DTI earlier this year to outline progress so far. Part of the text of our letter read as follows:

"We...conducted two surveys in 1986 to gain information, one in April and the other in December. The combined response was over 25 000, which is a significant sample of the amateur population....We concentrated our efforts in two areas, namely the level of activity and activity related to beam direction, the latter being a factor which you asked us to investigate.

"In April 1986 some 7.7% of Class A licensees were equipped to use the 50 MHz band. By December the proportion had increased to 9.3%.

Of those Class A stations surveyed in December 1986, we noted that the average number of contacts per station was 95 (1,300 maximum) involving an average of 5 countries per station (maximum 23 countries worked).

The average maximum distance worked was 1,047 km, with the best contact recorded at 5,500 km.

"....We are not aware of any problems which have occurred as a result of UK amateur activity. Indeed, many administrations have relaxed their requirements between 50 and 52 MHz and permitted amateur operation for the first time.

"With all these factors in mind, we have no hesitation in requesting that we hold a meeting to discuss the future of the 50-52 MHz allocation in the UK ....these are our current thoughts;

1. We see no reason to restrict Class B operation in this band and would propose that the Class B schedule be extended to include 50 MHz.

2. .....We propose that the band be extended to 52 MHz.

3. ....The Society recommends that the power limits in the band be increased to 16 dBW (carrier) and 22 dBW (ERP)

4. ....We would wish to be able to permit vertically polarised operation on this band specifically for mobile operation.

5. We believe that the present restrictions on the use of this band from the home station only are unnecessary".

A meeting between the Society and the DTI duly happened on 5 March 1987, and all these points were put to the Department. A great deal of discussion took place, and we now await the outcome. There will have to be various internal consultations and discussions within the DTI, and no doubt it'll take a little time for the wheels of officialdom to turn but hope springeth eternal at Potters Bar....

Obviously the Society hopes very much that some of the current restrictions relating to the 50 MHz band can be removed and that radio amateurs in the UK can make more use of this fascinating part of the radio spectrum.

As soon as there's any news it'll be reported via the usual channels - watch this space and keep your fingers crossed.

Very Special Event Stations

Two overseas special event stations are due to take place over the next few months.

The first will be located at the IARU Region 1 Conference which will be held at Noordwijkerhout in the Netherlands from 12-17 April, hosted by our sister society VERON.

The callsign of this very special station will be PA6IARU - yes that's right, a four-figure suffix - and it will be on the air throughout the conference.

Licenced members of the delegations will be able to operate the station and special QSL will be sent for all contacts and swl reports.

In addition to the special station, all articles sent by post from the Conference Centre will bare a special postmark. Anyone who would like to receive a postcard or envelope with this postmark should send the pre-addressed item together with one IRC in an envelope to:

Mr P van Weerlee, PA0YZ
Julianlaan 62
2215 He Voorhout
The Netherlands

.... before 17 April.

The second very special station will be run by the Templehof Amateur Radio Club in Berlin to celebrate the city's 750th Anniversary. It will be active from 6-8 June and plans to link-up with other towns or cities that are twinned with Berlin or Templehof.

In particular, it is hoped that contact will be made with Barnet in north London on Saturday 6 June and amateurs in that area are asked to make every effort to contact the station. Unfortunately, we do not know the callsign which will be used.

Helplines

INTERFERING WITH THE NEWS?:

The Norwegian national society (NRRL) has informed us that its news bulletin transmissions are suffering from interference caused by UK amateurs. Both NRRL and ourselves suspect that the reason is simply that the times and frequencies of their bulletins aren't generally known in the UK. Of course, no-one has specific rights to frequencies in the amateur service but it would be courteous to give those used for news broadcasts a big miss if possible.

The Norwegian news broadcast schedule is as follows:

0700 - 3585 kHz RTTY by LA9HQ
0730 - 3585 kHz RTTY by LA9HQ
0730 - 3580 kHz CW by LA1C
0900 - 3680 kHz SSB by LA1C

The bulletins last about 30 minutes.

"CLUB OF FRIENDSHIP":

Ken Norvall, G3IFN, is the UK co-ordinator of a group of amateurs dedicated to promoting friendship between UK and USSR radio amateurs.

Ken tells us that at present the best place to look for contacts with other members of the group is on 14.065 MHz CW at around 1000 GMT on Sundays. Callsigns to listen for are UT5IB, UA3PIP and G3IFN.

Anyone wanting more details can contact Ken at:

24 Ryedene,
Vange,
Basildon,
Essex SS16 4SY

HAMIGOS EN LE SOL:

This association of foreign radio amateurs on the Costa del Sol was the brain child of Richard Robinson, EA7DGA (ex G2ANX), who has been living in Spain since 1971. The aim of the association is to help visiting and resident foreign amateurs to make contact with others in the area either on-air or personally.

The inaugural meeting was held on Sunday 21 December 1986 at the Restaurant Hawaii in Torremolinos. The restaurant is owned by Carlos, EA7ASI, and his wife Christine. Amateurs visiting the area are welcome to meet for Sunday brunch between 12 noon and 1500 local time. Carlos is always there and usually offers his shack with HF rig and beam to visiting amateurs.

The net frequency for the association is around 14.170 MHz at 1300 GMT (1200 GMT in summertime), looking for members who are not in Spain at the time. Whilst in Spain amateurs should call in on S20.

Anyone interested in joining the association should contact:-

Fred Pilkington, G3IAG
24 High Street
Cheveley
Newmarket
Suffolk CB8 9DQ
Tel: 0638-730373

SORRY, CAN'T HELP:

Melvyn, G4JZQ, the designer of the RSGB Morseman kit project, left HQ's employment some time ago. Although he was able to help a number of constructors resolve their problems with the Morseman, his circumstances have altered such that he cannot undertake any servicing or repair to customers' kits in future.

MORSE TESTS

The following list shows the dates and locations of all the available test centres from the end of April to the end of May 1987, as we went to press. Because of space limitations, we cannot print a complete list of all the test centres notified to us, but these can be found on the application form itself. If you want to take a test and any of the centres shown is within striking distance, send for an application form immediately. Completed applications will be dealt with strictly on a first-come first-served basis.

Morse tests will be carried out in groups of three and will be of half an hour's duration. Details of the test, the venue and how to get there will be sent to you as soon as your application has been processed and your place confirmed.

COUNTY	TOWN OR LOCATION	DATE
Avon	Redland, Bristol	29/04/87
Greater London	Wood Green, London N22	29/04/87
West Glamorgan	Swansea Rally	03/05/87
Borders	Kelso Rally	03/05/87
West Yorkshire	Halifax & DARS	07/05/87
Isle of Wight	Binstead, Ryde	09/05/87
Mid Glamorgan	Rhydyfelin	10/05/87
Wilts	Swindon Rally	10/05/87
Central	Stirling	12/05/87
Lincolnshire	Louth	12/05/87
South Yorkshire	Stocksbridge, Sheffield	14/05/87
Cornwall	Liskeard	14/05/87
Strathclyde	Ayr	16/05/87
Bucks	Bletchley, Milton Keynes	17/05/87
South Glamorgan	Penarth	19/05/87
Merseyside	Huyton, Liverpool	19/05/87
Bedfordshire	Luton	21/05/87
Suffolk	East Suffolk Wireless Revival	24/05/87
West Midlands	Sandwell ARC	30/05/87

We receive notification of new centres almost daily and the application form gives a full list of these as far ahead as the end of the year, as we went to press.

Christmas Quiz Winners

Well, our profound and plangent plea for some answers to the Christmas Quiz certainly got results - we'd received about 60 entries by the closing date, which cheered us up no end. No-one got all the answers right and it took the wet towel round the editorial swede to work out the order of winners, but here they are;

1st (£15 RSGB book token) - GM6FPX obo GB3GT repeater group
2nd (£10 RSGB book token) - A P R Watt, G3ZBU, Horsham
3rd (£5 RSGB book token) - Don Field, G3XTT, Henley-on-Thames

Congratulations to those and commiserations to those who didn't quite make it.

70 CENTIMETRES

You'll have noted that one of the things which is much on our minds here at Headquarters is the old cliche about "use or lose".

There's no doubt about it - pressure on the scarce natural resource known as the radio frequency spectrum is higher than it's ever been. It sometimes seems to us that every man and his dog wants access to radio in some form or another, and practically everyone from the Ministry of Defence to the local dustman is using radio these days. The situation can only get worse as radio becomes a part of the life of John Q Public to a greater and greater extent. Hence the "use or lose" bit.

One of the bits of the spectrum allocated to the amateur service is 430-440 MHz, and we've gone into some detail in previous Bulletins about who we share it with and so on. That 10 MHz allocation is one which an awful lot of potential users would dearly love to get their hands on; it's in part of the radio spectrum which is extremely attractive for all sorts of commercial and professional use. We thought that in this month's Bulletin we'd take a look at the scene at 430 MHz and perhaps inspire some of you to get going on the band, since there still isn't anything like as much activity there as there is at 144 MHz. Sooner or later some official monitoring station is going to register that there doesn't seem to be all that much activity in those ten precious MHz and the Society will have to explain to them why they're wrong (they would be, actually, but we've already got too much to do....)

Nowadays, many newly-licensed amateurs start their amateur career on 144 MHz and for a good many new and not-so-new operators 144 MHz remains their favourite band. It's there that you'll hear some of the myths about 430 MHz flying around, usually from those who've never tried it! So for starters, let's explode a few of them.

Exploding the myths

SIX MYTHS ABOUT SEVENTY:

1. "430 MHz doesn't propagate - it's practically microwaves and it doesn't go anything like as far as 144 MHz when the band is flat".

Well, in theory the "path loss" between a given pair of stations will be higher at 430 MHz than at 144 MHz. However, what seems to happen in practice is that both stations have a bit more antenna gain at 430 MHz and the antenna may well work better anyway since it's further away from the ground in terms of wavelengths. So if the distant station runs the same power on both bands, the odds are that signal strengths will be quite similar on 144 and 430 MHz when conditions are normal. If conditions are even slightly above normal, the 430 MHz signals might even be louder than those on the lower band - see (3) below.

2. "There's much more fading and flutter on 430 MHz".

Not quite true. There doesn't seem to be much correlation between the fading patterns of 144 and 430 MHz paths between two particular stations; you'll find that it depends very much on conditions. In general terms, the fading on 430 MHz tends to be a bit deeper than on 144 MHz and signals over any distance will quite often have a little more flutter on them than 144 MHz transmissions. However, this pattern can be completely reversed. When he was living in London your scribe had many contacts with GW8ELR in Dyfed on both 144 and 430 MHz, and the fading pattern on each band was different every time. Quite often there was a little more flutter but less overall fading on 430 MHz. If the path between two stations is close to an "airway" - i.e. a route flown by aircraft on more-or- less constant headings - you can expect some quite spectacular reflection effects on 430 MHz, which can enhance signals by 20 dB or more. This is especially noticeable in the UK along a north- south axis between London, the Manchester area and central Scotland, which lies close to the airway known as Amber One. Sounds like a new propagation mode; "Tristar trails" or "Jumboscatter", perhaps....

3. "430 MHz doesn't go as far as 144 MHz when there's an opening".

Wrong! For a start, 430 MHz often opens before 144 MHz at the beginning of a lift, and quite often an opening affects 430 MHz much more than 144 MHz. Signal strengths from distant stations active on both bands can be far greater on 430 MHz than on 144 MHz, and you'll often find that a handful of watts will get you a 5/9 report from a very long way away. Furthermore, the pile-ups are much less ferocious than on 144 MHz. 430 MHz is an excellent band for tropo, and in several ways it's better than 144 MHz. Some of those summer duct-type openings can produce slow and deep fading on 144 MHz in which the exotic DX drops out at your QTH for minutes at a time. This phenomenon seems much less apparent at 430 MHz.

4. "It's no good for aurora, though"

Well, it certainly isn't as good as 144 MHz; and although no-one knows for certain what Sporadic-E is or how it works, it seems pretty clear that it doesn't work at 430 MHz. 430 MHz isn't so hot for MS either, although it's a superb band for EME work.

5. "I think it's only good for mobiles".

With something like 150 repeaters operational or planned, the 430 MHz band is superb for mobiles. As RSGB staff members will tell you, you can drive from Scotland to Potters Bar and be within the coverage area of a 430 MHz repeater all the way - we tried it coming back from the Scottish Convention a year or so ago. Ditto between HQ and various other parts of the UK.

6. "Equipment costs more".

Commercial black boxes for the band do cost a bit more than their 144 MHz equivalents. However, a potent 430 MHz antenna is dead easy to make for a few pounds and home-brewing a 430 MHz linear can be even simpler than doing one for 144 MHz. There are plenty of valves which go off well at 430 MHz, and if you want to go to the full legal limit you can still use 4CX250Bs. However, if you're just thinking about getting started on the band you don't have to spend a fortune - you can buy a second-hand transverter for a few tens of £ and drive it from whatever you have for HF or 144 MHz if all else fails.

Those are the usual excuses you hear for not getting going on 430 MHz, and we hope we've demolished them for good! Taking a slightly more formal look at propagation on the band, tropo propagation at 430 MHz is quite similar to that on 144 MHz; the theoretical path loss is higher but, as we've said, most stations who are at all serious about using the band tend to have antennas with more gain. In Europe there are many stations with very large antenna arrays for 430 MHz, and they really are loud in the UK when conditions are at all favourable. Don't forget that a respectable 430 MHz antenna will be quite a bit sharper than the average 144 MHz device, so when you first start on the band don't be afraid to make your rotator work for its living and listen on lots of different beam headings. This factor is actually the single biggest reason why people switch on, listen around for five minutes, hear no signals at all, declare that the band's dead and that no-one operates on 430 MHz and go somewhere else. A choice piece of DX could be just off the edge of the forward lobe and they'd never know it....Equally, don't just make one CQ call and assume that because no-one replied there's no-one on the band. Because of the high activity on 144 MHz, we all tend to think that one or two CQ calls ought to be enough to establish contact. Not true on 430 MHz, for two main reasons; a) there's not as much activity and b) antennas are sharper.

GETTING GOING:

Probably the cheapest way to get going on 430 MHz - assuming that you're not an ardent home-brewer who knocks up transverters in the time it takes most of us to put a 13A plug on the power supply - is to buy a second- or third-hand transverter which will produce 430 MHz when driven from your existing rig. The Microwave Modules models are quite often available through the "Member's Ads" column; they're a little long in the tooth now and their strong-signal performance is a bit less than state-of-the-art, but unless there's a major opening or you live two doors down the road from a 430 MHz DX-chaser with the full legal power to an aluminium overcast you probably won't have too many problems. From the antenna point of view both Jaybeam and Tonna do nice 430 MHz antennas; there are no doubt other good commercial ones but we've tried both of those and they seem to work well. As we said earlier, you can easily build your own; there are some designs in the RSGB "VHF-UHF Manual" and several American publications. The well-known "NBS" designs are also easy to build and have been well documented. One other good thing about 430 MHz antennas is that their wind loading can be a good bit less than a 144 MHz array with the same gain. If you're taking your first steps on the band there's nothing wrong with using the same feeder as you're using on 144 MHz; UR67 or H100 will work quite well although the feeder losses will be somewhat higher than they are on lower frequencies. When you get hooked on 430 MHz you'll no doubt invest in Heliax and a quiet masthead preamp, but by that stage it'll be you that's writing pieces about how good 430 MHz is, not us!

If you're newly licensed and considering the purchase of new equipment, don't overlook the fact that some of the newer rigs have dual-band (144 and 430 MHz) facilities, or have provision for extra modules to cover other bands.

BEACONS:

When you've put up your antenna and you're starting to listen on 430 MHz, it's very helpful to get the feel of how sharp the antenna is by using one of the beacons, if you can hear one (you can always use a distant repeater, although they tend not to be up all the time). The current edition of the Callbook gives details of all 430 MHz beacons. Beacons are also very useful when you're getting a feel for propagation at 430 MHz; it can be very revealing to tune to one you think you ought not to hear and find it a rock-steady S3 or thereabouts. If it's co-sited with a 144 MHz beacon, as is the case with GB3CTC and GB3ANG, it's also intriguing to listen to the two of them alternately (or simultaneously if you can). One thing which you may find when you do this, especially if conditions are good, is that the antenna seems to squint a bit. It may not be the antenna; 430 MHz signals can occasionally arrive at your location some way off the heading you think they should. Your scribe can remember at least two occasions when this happened in a big way when working Swiss stations from London. On one occasion is was necessary to beam slightly north of east and on another the signals peaked up when the antenna was looking at Spain. This wasn't happening on 144 MHz.

FINAL-FINAL:

The Society's VHF Committee had a scheme for encouraging activity on 430 MHz last year which proved very popular; one of the interesting things which came to light was that quite a large proportion of the UK amateur population has equipment for 430 MHz but only uses it when there's a contest or an opening, or in many cases when mobile. In the course of contacts, it emerged that a good many UK amateurs firmly believe Myth 1 above - which we've ceremonially exploded.

430 MHz is a superb band, especially for those who enjoy 144 MHz and who have some idea of what can be done with it. The Society would very much like to see more activity on it on an everyday basis - not just when there's a huge opening to KO field - and intends to institute some form of encouragement to UK amateurs to do more with it. Watch this space - and let's hear you on 430 MHz!

Events Diary

Mobile Rallies

This is a list of all rallies, exhibitions and conventions notified to HQ (as at press date). Items are given in detail for the next three months inclusive and in brief thereafter. Please send detailed information, including contact callsign and telephone numbers direct to HQ and marked 'Bulletin'.

5 APRIL

Pontefract & DARS Components Fair - Carleton Community Centre, Pontefract. Opens 11am. Bring & buy stall, component dealers, bookstall, refreshments & bar, talk-in on S22. Details G0AAO, tel: 0977 43101.

Cambridge Repeater Group Junk Sale Rally Extravaganza - PRCS (Pye Telecom) Canteen, St Andrew's Rd, Chesterton, Cambridge. Opens 10.30am, auction items booked in from 10am. Junk sale auction, bring & buy, some trade stands. Talk-in by G5PI on S22 and via GB3PY on RB14. Details G8XMS, tel: 022023 3362.

12 APRIL

North Cornwall Radio Rally - Launceston National School. Opens 9am, talk-in on S22 by G0ANM. Details tel: Launceston 5632.

East Cleveland ARC Mini Rally/Bring & Buy - Marske by the Sea Leisure Centre. Opens 11am. Trade stalls, refreshments. Details Bob, tel: 0642-474769 after 6pm.

26 APRIL

RSGB VHF CONVENTION - Sandown Park Race Course, Esher, Surrey. Usual trade stands, comprehensive lecture programme, *RSGB Membership Services & book stall. RSGB Committee stands*. Refreshments and bar. Ample carparking, talk-in. Details VHF Committee.

3rd Radio Rendezvous - Grange Farm Hobbies Centre, Scunthorpe. Details G4ATA, tel: 0724 867137.

Lough Erne Mobile Rally - Killyhevlin Hotel, Enniskillen. Opens 12 noon - more traders - guest speaker GM3HAT - shield and cash prize for best construction project. Details Bill Ward, tel: 0365-24905.

3 MAY

BATC Rally - Crick Post House Hotel, near Rugby. Opens 10.30am. Traders & junk stalls. Not just TV!! Details Trevor, tel: 0532 670115.

Swansea ARS Rally - Patti Pavilion, Swansea. Opens 10.30am. Bring & buy stall, usual traders, lucky programme, full catering. Talk-in S22 by GB2SWR and via GB3WG on RB6. Details GW4HSH, tel: 0792 404422.

4th Anglo-Scottish Rally - Tait Hall, Kelso, Borders. Opens 11am, traders, club stalls, bring and buy, raffles, refreshments & bar. Talk-in on S22. tel: 0573-24664.

4 MAY

Mid-Cheshire ARS Rally - Winsford Civic Hall. Opens 11am, free parking. Details G4XFD QTHR.

10 MAY

Drayton Manor Rally - Drayton Manor Park, Staffs. On A4091, 1 mile from A5 junc. Opens 11am, talk-in on 2m by G1MAR/A and 70cm by G3MAR/A. Details Norman G8BHE, tel: 021-422 9787.

Swindon Rally - Oakfield School, Marlowe Ave, Swindon. Opens 10.30am. Bring & buy stall, usual traders, raffle, attractions for family, ample carparking. Morse tests bookable via RSGB. Details Ken G8SFM, tel: 0666 89-307.

3rd Yeovil QRP Convention - Preston Centre, Yeovil, Somerset. Details Eric G3GC, tel: Yeovil 75533. (see display panel)

17 MAY

30th Northern Mobile Rally - Gt.Yorkshire Showground, Harrogate. Usual traders and craft stalls, *RSGB stand*. Refreshments and bar. Details G3CQQ, tel: 0943 602118.

Cambridge & DARC Rally & car boot sale - Colleridge Community College, Radegund Rd, Cambridge. Opens 10.30am (10am disabled). Trade stands, bring & buy, refreshments. Ample car parking, talk-in S22 by G2XV. Details G4TRO, tel: 0223-353664.

24 MAY

Maidstone Mobile Rally - Maidstone YMCA Sports Centre, Melrose Close, Maidstone. Opens 10.30am. Usual traders, children's room, refreshments. Talk-in on S22. Morse tests bookable via RSGB HQ. Details G6FZD, tel: 0622 50709.

11th East Suffolk Wireless Revival - Civil Service Sports Ground, Bucklesham, near Ipswich. Opens 10am, free parking, lots for the whole family. Details G4IFF, tel: Ipswich 688204.

Plymouth ARC Mobile Rally - Plymstock School, Plymouth. Opens 10am, ample free parking, talk-in S22. Details G0BNT, tel: 0752 777777.

30/31 MAY

Milton Keynes Amateur Radio Exhibition - Bletchley Leisure Centre. Trade stands, refreshments, large free carpark nearby. Details G1GOF, tel: 0234 767904.

31 MAY

Bolton ARC Rally - Dean Sports Complex, New York, Junction Road, Bolton. Trade stands, refreshments & bar. Facilities for disabled and ample carparking. Details Kenneth Wightman, tel: 0204-696906.

6/7 JUNE

West Middlesex Radio Group Rally - Twickenham Rugby Football Club. Details G1DDR.

7 JUNE

Spalding Mobile Rally - Springfields Gardens, Spalding, Lincs. Opens 10am, usual traders. Details D Hoult G4OO, tel: 077 586 382.

14 JUNE

Elvaston Castle Mobile Rally - Elvaston Castle Country Pk, near Derby. Usual traders, talk-in on 2m & 70cm by GB2ECR. Details G4PZY, tel: 0332 767994 or G4CTZ, tel: 0332 799452.

RNARS Mobile Rally - HMS Mercury near Petersfield, Hants. Opens 10am. Talk-in on 2m and 70cm. Details G4UJR, tel: 0703 557469.

Mid-Lanark ARS Open Day - Wrangholm Hall Community Centre, Jerviston Street, New Stevenson, Motherwell. Satellite operation, RTTY, HF/DX demo, QRP. Traders, junk sale, car-boot sale. Talk-in on 2m. Details GM1SSA, tel: Holytown 732403.

19/21 JUNE

Ham Radio '87 - Friedrichshafen, Germany. 100+ international exhibitors at largest amateur radio exhibition in Germany.

21 JUNE

Denby Dale Mobile Rally - Shelley High School, near Huddersfield. Opens 11am. Usual traders, refreshments. Talk-in on S8, SU22 and 10m FM. Details G3SDY, tel: 0484-602905.

28 JUNE

30th Longleat Rally - Longleat Park, near Warminster. Usual traders and displays. Gardens and other attractions for the whole family. Details G4FRG, tel: Portishead 848140.

IN BRIEF - More details later.

12 JULY

Worcester & DARC Droitwich Mobile Rally - High School, Droitwich. Details G0AOC.

Sussex Mobile Rally - Brighton Racecourse. Details G4HUJ, tel: 0903-200572 evening.

17/18/19 JULY

AMSAT UK Colloquium - University of Surrey. Details Ron, G3AAJ, tel: 01-989 6741.

Events Diary

19 JULY
Cornish Mobile Rally - Camborne College of FE. Details G1AJB.
McMichael '87 Rally - Haymill Youth & Community Centre, 112 Burnham Lane, Slough. Details GOBTY, tel: High Wycombe 29868.

26 JULY
Scarborough ARS Rally - The Spa, Scarborough. Details Ian G4UQP, tel: 0723-376847.

2 AUGUST
RSGB MOBILE RALLY - Woburn Abbey, Woburn, Bedfordshire.
Rolls-Royce ARC Mobile Rally - Rolls-Royce Sports & Social Club, Barnoldwick. Details, G4ILG, tel: 0282 812288 or 0282 813271 (day).

9 AUGUST
30th Derby Mobile Rally - Lower Bemrose School, St Albans Road, Derby. Details Martin G3SZJ, tel: 0332 556875.
Hamfest '87 & Craft Fair - Wimbourne, Dorset. Details GOCDY, tel: 0202 872503.

16 AUGUST
Red Rose Rally - Bolton Sports & Exhibition Centre. Details G1IOO, tel: 0204-24104.

6 SEPTEMBER
Preston ARS 20th Annual Rally - Lancaster University. Details G3DWQ, tel: 0772 53810.
Bristol Radio Rally - Hareclive Youth & Harecliffe Community Centres, Hareclive Road, Harecliffe, Bristol. Details Len G4RZY, tel: 0272 834282.
West Kent Amateur Radio Rally - Angel Centre, Tonbridge, Kent. Details G4KIU, tel: 0892 515678.

13 SEPTEMBER
Lincoln Hamfest - Lincolnshire Showground, Lincoln. Details G8VGF, tel: 0522 25760
Scottish AR Convention - The Magnum Sports & Leisure Centre, Irvine, Ayrshire.
National Amateur Radio Car Boot Sale - Old Warden Aerodrome, Beds. Details G6EES, tel: 0582 607623.
SMC Open Day - Chandlers Ford Industrial Est, Eastleigh, Hants. Colin Ward (SMC), tel: 042 15-55111.
Telford Mobile Rally - Telford Racquet & Fitness Centre. Details G3UKV.

20 SEPTEMBER
Peterborough R & ES Rally - Wirrina Sports Stadium, Peterborough. Details G4PNW.
Trafford Rally & Components Fair - Lancs CCC (Old Trafford), Talbot Road, Stretford, Manchester. Details G1IJK, tel: 061-748 9804.
Vange ARS Rally - Nicholas School, Leinster Road, Laindon. Details G4OJN, tel: 02774-4386.

27 SEPTEMBER
Harlow Mobile Rally - Harlow Sports Centre. Details G4KVR, tel: 0279 22365, daytime or G3UEG, tel: 0279 27788, evenings.

4 OCTOBER
Wakefield Mobile Rally - Details G4RCH, tel: 0532 536633.
Great Lumley AR & ES Rally - The Comunity Centre, Great Lumley, Chester-le-Street, County Durham. Details G4MSF, tel: 091 469 3955.

10 OCTOBER
RSGB Midlands VHF Convention - Madeley Court Centre, Telford, Shropshire. Details Peter G3UBX.

7/8 NOVEMBER
North Wales Radio Rally - Aberconwy Conference Centre, Llandudno, Gwynedd. Details Derrick Watts, tel: Colwyn Bay 530041.

15 NOVEMBER
Bridgend Rally - Bridgend Recreation Centre, Angel Street, Bridgend. Details GW1OUP, tel: 0656 723508.

22 NOVEMBER
West Manchester RC Winter Rally - Pembroke Halls, Walkden. Details G1IOO, tel: 0204-24104.

6 DECEMBER (Provisional)
Verulam Christmas Rally - St Albans City Hall. Details Hilary G4JKS, tel: 0727 59318. Trade: Watford 52959.

OTHER EVENTS

2 MAY
Cambridge University Wireless Society, G6UM and Oxford University Radio Society 1987 Annual Reunion Dinner - Selwyn College, Cambridge. Limited accomodation available. Details Dr James Keeler, G4EZN, Selwyn College. Old members very welcome.

19 JULY
Microwave Bands Assembly and Dinner - The Dunstall Suite, Dunstall Racecourse, Wolverhampton. Details F T Smith G6FK, tel: 0902-343746.

GB Calls

The list below shows ALL the special event stations licensed for operation during April and early May - (as at press date)
It is taken direct from the GB Calls file on the HQ computer. These callsigns are valid for use from the date given but the period of operation may vary from 1 to 28 days. There's now no need to send details direct to the editorial office.

1 APRIL
GB4SG - ST GEORGE: Lancing, W.Sussex. Details G3LQI.
GB2BRL - BELL ROCK LIGHTHOUSE: Arbroath Museum, Signal Tower, Arbroath. Details GM4YWS.
GB2HRR - HUMBERSIDE RADIO RENDEZVOUS: Grange Farm Hobbies Centre, Scunthorpe. Details G4ZGJ.
GB4SG - ST GEORGE: Lancing, W.Sussex. Details G3LQI.
GB8BC - BARNARDO'S CENTENARY: Llandeilo, Dyfed. Details GWOAIY.

4 APRIL:
GB2MGY - CALLSIGN RMS TITANIC: Theobalds Park College, Waltham Cross, Herts. Details G2FQS.
GB4LDC - LLANELLY DISABLED CENTRE: Coleshill Social Centre. Llanelli, Dyfed. Details GW4XLK.

6 APRIL:
GB8HHC - HAYWARDS HEATH COLLEGE: W.Sussex. Details G1POD.

9 APRIL:
GB2HWW - YORK ARS (G3HWW): United Services Club, York. Details G3FTS.
GB4HHC - HAYWARDS HEATH COLLEGE: W.Sussex. Details G3TDL.

10 APRIL:
GB4LDS - LEWISHAM DISTRICT SCOUTS: Sedgehill Comprehensive School, London SE6. Details GOEGA.

12 APRIL:
GB2SJW - SIR JOSEPH WHITWORTH: Bolehill, Wirksworth, Derby. Details GOFDR.

14 APRIL:
GB2MGY - CALLSIGN RMS TITANIC: St.Johns Church, Farncombe, Surrey. Details G2FQS.

16 APRIL:
GB4WIS - WE'RE INTO SCOUTING: Wisbech Market Place. Details G4UQN.

17 APRIL:
GB2NTS - NATIONAL TRUST FOR SCOTLAND: Culzean Castle, Maybole, Ayrshire. Details GM3MTH.
GB2SJW - SIR JOSEPH WHITWORTH: Whitworth Institute, Darley Dale near Matlock. Details GOFDR.

18 APRIL:
GBOLBL - LEVER BROTHERS LIMITED: Bebington, Merseyside. Details GODVV.
GB2YRS - YORK RADIO SOCIETY: "The Hamlet", Tollerton, York. Details G3TMN.

19 APRIL:
GBOSGD - ST.GEORGE'S DAY: Long

Events Diary

Sutton, Spalding. Details G4KHF.
GB4SGD - St.GEORGE'S DAY: Wisbech, Cambs. Details G4ODH.

24 APRIL:
GB2LRS - LOUGHTON RADIO SOCIETY: Loughton Hall, Essex. Details G3OPA.

25 APRIL:
GB0MCP - MANOR COUNTY PRIMARY: Braintree, Essex. Details G0EMK.

26 APRIL:
GB6HWM - HERNE WINDMILL: Herne Hill, Herne Bay. Details G6TTL.

1 MAY:
GB2BHS - BALSHAWS HIGH SCHOOL: Leyland, Preston. Details G4BEE.
GB2FSF - FALKIRK SPRING FLING: Callendar Park, Falkirk. Details GM4MCB.
GB2SJC - ST JOHN CANNOCK: Cannock Baths, Cannock. Details G4PFO.
GB2YSC - YMCA SPORTS CENTRE: Melrose Court, Maidstone, Kent. Details G4YTU.
GB4HVP - HISTORIC VEHICAL PARADE: Sandwell Valley, West Bromwich. Details G4ZAD.
GB8RRA - RED ROSE AWARD: Bolton, Lancs. Details G1IOO.

2 MAY:
GB2RAM - RAMSEY: Bride, Isle of Man. Details GD4PTV.
GB2WWW - WORCESTER WILDLIFE WEEK: BBC Wood Norton (Radio Club), near Evesham. Details GODXX.
GB4SWA - SWANLEA: Swanlea, Kent. Details G4WYG.

3 MAY:
GBOLIB - LIBERATION DAY: St.Martins, Guernsey, C.I. Details GU4NXR.
GB4SAC - SUTTON AND CHEAM: Wallington, Surrey. Details G4FKA.

8 MAY:
GBOIOS - ISLE OF SKYE : Dunvegan, Isle of Skye. Details G5LP.
GB2GBB - GLASGOW BOYS' BRIGADE: Glasgow. Details GM4HYF.
GB2LOW - LOW POWER: QRP Convention, Yeovil. Details G3GC.
GB8SRC - SWINDON RADIO CLUB: Oakfield School, Swindon. Details G8SFM.

9 MAY:
GBOALG - ALGERINES: Matlaske, Norwich. Details G0AZR.
GBODAS - DOUGLAS ATWELL SHIELD: Winscombe Recreation Ground, Winscombe, Somerset. Details G4SIY.
GB4BKA - BEEKEEPERS ASSOCIATION: The Royal Agricultural Showground, Stoneleigh, Warks. Details G4BCY.

Contests

Listed below are the VHF and HF contests for the next quarter. The full list of RSGB's VHF and HF contests for 1987 was given in the December 1986 issue.

VHF CONTESTS 1987

5 APR:	432 MHz CW (rules March 87)
11/12 APR:	70/144 MHz & SWL (rules March 87) BARTG VHF/UHF
12 APR:	10 GHz Cumulative (rules March 87)
2/3 MAY:	432 MHz - 24 GHz (rules March 87)
10 MAY:	10 GHz Cumulative
30 MAY:	432 MHz Trophy & SWL (rules April 87)
31 MAY:	1296 MHz Trophy (rules April 87)
14 JUN:	432 MHz FM (rules April 87)
21 JUN:	10 GHz Cumulative

HF CONTESTS 1987

5 APR:	ROPOCO 1 (rules March 87)
12 APR:	G T Peck Memorial Trophy DF (rules April 87)
19 APR:	QRP Fixed
26 APR:	DF Qualifying - Oxford (rules April 87)
17 MAY:	Region Round-up DF Qualifying - Coventry
6/7 JUN:	HF NFD CW IARU
11/12 JUN:	SWL Contest
14 JUN:	DF Qualifying - Northampton
27/28 JUN:	Summer 1.8MHz DF Qualifying - Dartford Heath

INTERNATIONAL CONTESTS

Organising Society in brackets.

4/5 APR:	SP DX CW (PZK) (rules March 87)
11/12 APR:	Yuri Gagarin CW (RSF)
25/26 APR:	Helvetia (USKA)
9/10 MAY:	CQ M CW/Phone (RSF)
23 MAY:	World Telecom Day CW (LABRE)
24 MAY:	World Telecom Day Phone (LABRE)
30/31 MAY:	Ibero-America Phone (URE)
6/7 JUNE:	Field Day CW (DARC)
20/21 JUNE:	All Asian DX Phone (JARL)

CLUB CONTESTS

ATV Contests:

21 APR	70cm Easter Extravaganza
4 MAY	May Day Microwave
20/21 JUN	Summer Fun (all bands)

THIRD YEOVIL QRP CONVENTION - GB2LOW

(Yeovil Amateur Radio Club)
The Preston Centre, Monks Dale, Yeovil.
(via Preston Road and Larkhill Road. Maps available from Secretary)

Sunday, 10th May, 1987

Entrance £1.00, including programme with lucky-draw number.

PROGRAMME
0900 - Talk-in commences on S22 by G8YEO/A
0930 - Convention opens
1030 - Lecture: "The Theory and Incidence of Chordal Hop Propagation" by G3MYM. (Followed by discussion).
1200 - Lunch Break
1400 - Lecture: "Construction Techniques" by G4BUE. (Followed by discussion).
1600 - Prize Draw
1700 - Convention Closes

* GB2LOW operating QRP on the HF & VHF bands. * Display of QRP and home-constructed equipment (Bring your own too!) * G-QRP Club stand. * Retail kits and components stands. * Light refreshments *

Further information from:
Eric H Godfrey, Dorset Reach, 60 Chilton Grove, Yeovil, Somerset BA21 4AW Tel: 0935-75533 or 21246.

Around the Groups

AMRAC NEWS:

AMRAC, the national Amateur Radio & Computing Club, has just revised its subcription rates. With effect from 1 May, the new subcription rates will be:

UK - £8.00
Europe - £10.00
Rest of the world - £12.00

AMRAC produces a 40 page, bi-monthly news letter "AMRAC User", which covers all the latest news, ideas and technical items on packet radio, AMTOR and RTTY. In addition there is also a "Hot-news sheet" which is designed to keep members up to date with the latest news in the intervening months.

AMRAC is keen to encourage the formation of local groups which will hold regular meetings and premote digital communication at 'grass-roots' level. Such groups have already been formed in Hampshire, the Thames Valley and Essex.

Further details are available by sending a stamped addressed envelope to the secretary:

Phil Bridges, G6DLJ
9 Hollydene Villas,
Hythe,
Hants. SO4 5HU

or on Prestel Mailbox 703847754.

RAOTA NEWS:

Attention award hunters. A certificate is available to all licenced amateurs and swls who have contacted 50 RAOTA members, with increments for each additional 15 stations.

The G2OT (Old Timers') nets take place at the following clock-times and frequencies (+/- QRM):

Thursdays 11am - 3765 kHz
Thursdays 7pm - 3765 kHz
Sundays 11am - 3605 kHz (CW)

Back copies of "OT News" are available at the following rates including p&p:

Nos. 1-4 inclusive, £1.00 ea or all 4 for £3.75.
No. 5 (including members list), £1.25
All 5 copies at the special rate of £4.25.

"OT News" is also available on cassette tape if you prefer.

Membership to RAOTA is open to all licenced amateurs and swls who have been actively interested in amateur radio for 25 years or more. Full details can be obtained from:

Sylvia Havard, G4USN
Hon Secretary/Treasurer
"Altonswood"
Merricks Lane
Bewdley
Worcs DY12 2PA

RAIBC CABARET DANCE:

David Caldwell, GI1VLZ, from Belfast, tells us that he's organised a fund raising event for Northern Ireland members and supporters of RAIBC.

The event, which will be a cheese and wine cabaret dance will take place on Thursday 7 May at the Conway Hotel, 300 Kingsway, Lisburn Road, Dunmurry, Belfast from 8pm to midnight. The price, which will include a glass of wine or soft drinks, is £3.50. Guide dogs and wheelchairs are more than welcome and members are asked to donate a small gift for the tombola prize.

Tickets are available from Dave, GI1VLZ, on Belfast 673824 and discounts will be given for block bookings made in advance.

ORKNEY ACTIVITY MONTH:

From the DX point of view (hands up everyone who's worked it - we haven't...) Orkney is a relatively rare part of the UK. The Callbook shows 34 licensees (14 class A and 20 class B) though not all are active. With a view to stimulating some interest and to provide others with a chance to work Orkney, the Orkney Group of Radio Amateurs have decided to feature the month of June as an "Activity Month", during which as many Orcadian amateurs as possible will make a special effort to be active on the various bands. The suggested frequencies for operation are as follows:-

1973 kHz
3753 kHz
7023 and 7053 kHz
14.033 and 14.253 MHz
21.253 MHz
28.800 and 29.600 MHz
70.26 MHz
144.033 and 144.353 MHz

Further information from:
Bill, GM3IBU or John, GM4YBJ.

PS

The RSGB's QSL Bureau will be closed for one week commencing Saturday 25 April. Please DO NOT send any cards to arrive during that week.

From 25 February, planning fees for antennas went up from £27 to £30. They are due to rise again on 1 July to £33. This is so that Local Authorities can recoup 50% of the cost of this type of application. So the moral is apply now and beat the price increase.

Last month we said that the 6m Group's AGM would be held at NEC Wrong! It will be held at the VHF Convention on Sunday 26 April.

RRs period of office extended

Council is conscious of the need to improve the RSGB organisation in the field.

To permit a further opportunity for wider discussion on this subject, Council has decided to extend the period of office for Regional Representatives for up to six months beyond the end of June 1987.

NEWS & VIEWS

HF

*John Allaway, G3FKM**

MORE CASES of alleged misuse of callsigns. This time a complaint from G4IAR who says that ever since he was first licensed he has been receiving QSLs for a "Tom", formerly of Haverhill and more recently of Cambridge. All are for 14MHz cw contacts and mostly from eastern Europe. Ideas please to Dave, QTHR. A second report, this time received from G4IAD, says that he is receiving cards for QSOs he is alleged to have had as G4IAD/5N4 and G4IAD/MM on 7 and 14MHz cw and ssb.

World Radio Amateurs Day

This takes place on 18 April and is not a contest but an activity in which we can all take part. The idea is to recognize the founding of the IARU on 18 April 1925 by doing something different during the period between 1200 on 17 April and 1200 on 18 April each year. (These dates and times represent the start and finish of the day of 18 April at the International Date Line). The idea is to show unity by everyone observing exactly the same period of activity. Examples of "doing something different", as set down for example by ZL2AMJ of NZART, include working new stations, trying a new mode or band, to use or listen to a satellite, build a piece of gear, or exchange greetings with someone new. There are no prizes, awards, or certificates but just the satisfaction that you have reactivated some amateur spirit, that you have recognized the day and the debt that we owe to the International Amateur Radio Union for its achievements on our behalf.

Overseas news

Ted Miller, 9M8EN, has sent "another message from the rain forest", to say that his contract with Shell finished on 1 January and that his trusty FT980 was, at time of writing, in a wooden box en-route to Hong Kong. He is hoping to be back on the air by mid-summer with a VS6 call. It seems that 9M8PV, Andy, opened up from Bintulu last August and is heard in the SEANET on 14,320kHz at 1200 from time to time. Andy has also promised to join in Uncle Bill's net with W7PHO on 14,227kHz at 2300, although this is mainly of interest to the USA. Ted believes that Gordon, 9M8GH, is still active from Kuching but that seems to be all the activity from Sarawak at the present time. However, there is a possibility that a former G8 who is at present in Miri may get a licence. The journey to VS6 will be leisurely and if possible Ted will appear from other places on the way.

JA1HOD is active on 14 and 21MHz cw, ssb, and rtty, and looks forward to meeting as many UK members as possible. If you hear him please call.

From OH1ZAA/FO0ZA/NN0Y/PA0FIN comes news of his visit to Tahiti between 18 and 25 September last. Although no advance information had been given, operating permission had not been obtained before arrival in French Polynesia, and conditions were disturbed, over 2,000 QSOs were made from 3·5 to 28MHz on cw and ssb. QSLs were being printed in mid-January (see *QTH Corner*). Jan will be making other expeditions and these will include 50 and 144MHz activity on Es/tep.

Paris amateurs have established a new club—the Paris International Amateur Radio Association. Its aims are to support, promote, and encourage amateur radio among the international community in the city. New members are welcomed and a free copy of the club newsletter can be obtained by sending an sae to Chuck Martin, F/AB4Y, 24 Quai du 4 Sept, 92100 Boulogne, Billancourt, France. Chuck notes that reciprocal licences are now issued "over the counter" to US nationals holding a valid licence. Meetings of the club take place on the fourth Friday of each month.

Visitors to Ontario who find themselves near Guelph may like to visit the Hammond Museum of Radio. This is located at 95 Curtis Drive, Guelph, and is open from 0800 to 1700 (local) on weekdays. It contains an excellent selection of equipment some of which dates from 1912 and includes many examples of amateur gear, valves, etc.

DX news

There will be a special amateur station on the air from the location of the 1987 IARU Region 1 Conference in Noordwijkerhout in the Netherlands between 12 and 17 April with the callsign PA61ARU. This will be operated by the delegates and special QSLs will be sent out via the bureaux.

Another special station—this time from Sierra Leone and celebrating the Bicentenary of the founding of the capital city, Freetown. SLARS will operate between 1 May and 31 December this year using the prefix 29L. The remainder of the callsign was not known at the time of writing.

Activity by stations purporting to be in the **United Arab Emirates** seems to have been on the increase recently. Unfortunately there is little evidence that any of them have full authorization and it could well be that only A61AA and A61AB are really operating with proper permission.

According to an *ARRL Bulletin* dated 6 February, **Peter 1 Is** does not count as a "new country" until it has been added to the DXCC list, and that therefore QSLs should not be sent until this has happened. I feel that the Norwegian government may not feel too happy that its sovereignty over the island has yet to be confirmed for amateur radio purposes!

During 1987 stations in **Luxembourg** will be allowed to use the /50 suffix. This will mark the 50th Anniversary of RL. The society's club station LX0RL will become LX50RL.

5A0A seemed to be quite easy to work on 7MHz cw at the time that this column was being written. 7,001kHz seemed to be a favoured frequency and early morning (0600) a good time. DXCC credit has now been granted. According to *DX News Sheet* Herbert was due to return to Poland for a

To mark the anniversary of their patron saint, San Sebastian, members of the Radio Club Cultural Mallorca put on a special exhibition station with the callsign EA6WQ by the lake in front of Palma Cathedral, where this happy group was snapped by G3KPO. L to r: Gabriel, EA6VQ; Antonia, EA6WQ; Austin, EA6XG; Alan, G4WUL; Jan, EA6WV; Lou, EA6XS; and Mike, EA6SX; with Vic, G4UPG, kneeling in front

*10 Knightlow Road, Birmingham B17 8QB

QTH CORNER

C30CCA	J Roscoe, 27 Northfield, Bridgwater, Somerset TA6 7HA.
FO0ZA	J Hubrach, OH1ZAA, Mantyluodonkatu 1, SF-28880, Pori, Finland.
HS0B	RAST, GPO Box 2008, Bangkok, Thailand.
TR8JJC	BP 13398, Libreville, Gabon.
VK9XS, VK9YS	via VK9NS, J Smith, PO Box 90, Norfolk Is, 2899, Australia.
VK9YW	W5KNE, R B Winn, 635 Williams Way, Richardson, Tx, 75080, USA.
VU4APR, VU4NRD	NIAR, 5-B, P S Nager, Hyderabad 500-457, Andra Pradesh, India
XF4DX	K9AJ, J McGirr, 13 Oak Hill Dr, Crete, Ill, 60417, USA.
ZD8CW	via G4JA, P Stenning, Lakewood, Tathwell, Louth, Lincs LN11 9SR.
ZF2HM, ZF2KE	K9QVB, J F Meyer, 315 15th St, Wilmette, Ill, 60091, USA.
ZL7TZ	N Rio, Tuku Rd, Waitangi, New Zealand.
ZY0PSB, ZY0ZSA	PY1BVY, Rua Presidente Backer 34/1502, 24220 Niteroi, RJ, Brazil.
5L2SI	B Drobnica, Zedernweg 6, D-5010 Bergheim, FR Germany.
5V7/I2VA	I5GWO, via Solerina 22, Milan, Italy.

short break and hoping to have an FT-101 with him on his return. QSLs have been received from him via SP6BZ.

SM7BUA is now active from Napo Province in **Ecuador** with the callsign HC7SK. He has an IC-751A and FL2100 with a TH7DXX beam and wires for the lower frequency bands. SM6RT/7 is in the same area and hopes for an HC7 call soon.

DX News Sheet quotes a US report that ZS6BJH is trying to obtain operating permission in **Mozambique**. The possible location would be Inhaca Is, near Maputo. This doesn't seem a very likely event to me, but we can hope that in due course the Mozambique authorities will change their attitude to amateur radio—an operation not fully authorized could set this time back by some years.

Readers will be very sorry to hear that Iris Colvin, W6QL, of Yasme fame, fractured her hip when in the Maldive Is. This meant transportation to Sri Lanka for treatment, but Iris is hoping to continue the expedition and not return to the USA.

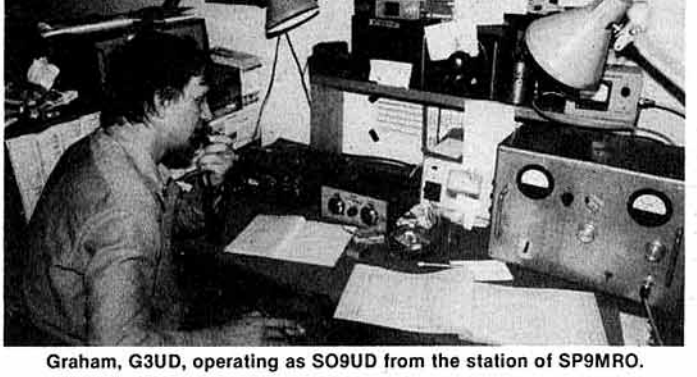
Phil Connolly, VK2BPC, should have arrived on Norfolk Is on 22 March for an indefinite stay. He intends to work all hf bands, ssb and rtty, and is interested in working into the UK. At the time of writing, Phil's VK9N call was not known.

Peter I island

The recent dxpedition to Peter I Island by LA1EE and LA2GV, as 3Y1EE and 3Y2GV, seemed to me to be one of the very best. Under very unpleasant conditions the two operators seemed to manage to keep at least one signal on the bands for almost 24h daily. The news releases issued regularly by LA6VM were of great use and I would like to congratulate the LA DX Group on their performance which was truly professional in concept and execution. Hopefully enough money will be collected to defray at least part of the large sum which was laid out by the participants. I'm sure that donations would still be welcomed via Erling Wiig, LA6VM, Jacob Fayes vei 6, N-0287, Oslo 2, Norway. The account no is 7085.05.06025, Den Norske Creditbank, Oslo.

Cocos-Keeling Is

Cres, VK9YC, has sent along a sheet describing this unique and very isolated island group. He says that dx activity with the exotic VK9Y callsign has been sporadic and rare because the area is inaccessible and entry visas are only granted to those who have specific invitations from one of the 600 residents. Cres has lived on Home Is (one of the two inhabited islands) for several years and he now has the exclusive opportunity to invite select groups, their xyls, and families to stay on the island and operate a rare dx station. The "Cocos DXperience" is offering the chance of a lifetime trip to the islands for a one or two-weeks stay in luxury accommodation



Graham, G3UD, operating as SO9UD from the station of SP9MRO.

10MHz COUNTRIES TABLE

	All-Time	1987
G4VDX	64	13
G4YWG	50	11
G4OBK	47	6

1987 28MHz COUNTRIES TABLE

G4JBR—24
G4XAH—14
G4MUW—6
G3XQU—4

A reminder that scores for the "All-Time" countries table organized by G3GIQ to appear in the June issue should reach him no later than 7 April. This will show current countries only. Please note also that no new entries for the *yearly* G3GIQ tables will be accepted after the first three.

alongside the blue lagoon set among 10 acres of tropical gardens. Self catering is provided. Several hf antennas are available on a 60ft tower at the water's edge and a fully equippped radio shack with 240V mains supply and 12V dc batteries supplied. The special VK9Y callsign will be issued in Perth. The whole project sounds delightful and anyone interested in making such a trip should contact Cres Thursby-Pelham, VK9YC, 107 Melvista Av. Nedlands, W. Australia 6009, telephone +61 9 386 4745, fax +61 9 386 8381, or telex AA 92579 Wescom. Cres may also be written to at Oceania House, Home Is, Cocos—Keeling Is, Indian Ocean 6799.

Welcome

To the following who joined the Society during January: DJ9TK, DJ9UN, EA3ERT, EI2CH, EI5CTB, EI6GN, EI8GM, F3KJ, SM7ASN, SM0FOW and 9L1IS.

Contests

AGCW-QRP/QRP Party

1300-1900 1 May

CW only. 3,510-3,560 and 7,010-7,040kHz only. Class A—input up to 10W or maximum output 5W, Class B—up to 20W input/10W output, and Class C—listeners. Exchange RST plus serial QSO number and class. One point for QSOs with own country and two with others. Each contact with a Class A station counts double. A station may be worked once on each band. Listener logs must show both callsigns plus at least one complete report. The multiplier is the number of DXCC countries worked and the final score sum of QSO points times multipliers on each band. Send entries before 31 May to Wolfgang Kuhl, DL1DAL, Schulenstrasse 12, D-4780 Lippenstadt, FR Germany.

Helvetia Contest

1300 25 April to 1300 26 April

Phone and cw. 1·8 to 28MHz on cw, 3·5 to 28MHz on phone. Mixed modes only with single and multi-operator and listener classes. Exchange RS/T plus serial QSO number (from 001). Swiss stations will also send a two letter code to indicate their canton. Each QSO counts three points and a station may only be worked once on each band, either on cw or on phone. The multiplier is the number of cantons worked on each band added together. Use separate log sheets for each band and include a summary sheet showing the total of QSOs and cantons on each band, the category, and full name and address. Enclose a signed declaration that all rules and regulations for amateur radio in the entrant's country have been obeyed and post before 31 May to Walter Schmutz, HB9AGA, Gantrischweg 1, CH-3114 Overwichtrach, Switzerland. There are 26 cantons and their abbreviations are: AG, AI, AR, BE, BL, BS, FR, GE, GL, GR, JU, LU, NE, NW, OW, SG, SH, SO, SZ, TG, TI, UR, VD, VS, ZG, and ZH. In the **1986** contest UK scores were: **GM3ITN** (17,877 points), **G4IQM** (16,350), G3SJX (7,140), G4UPS (6,960), GW3MPB (5,445), and G4ISK (1,188).

Awards

EDR 60 Jubilee Award

In 1987 EDR is celebrating its sixtieth anniversary and on that occasion will issue this award. Sixty points are needed and may be obtained by working OZ stations between 1 January and 31 December 1987. Each OZ counts one point but QSOs with club stations count five. All bands/modes may be used but not repeaters. Special endorsements are issued for all cw, all ssb, rtty, single bands etc. Send a log extract, certified by two licensed amateurs, together with six ircs to Allis Andersen, OZ1ACB, Kagsaavej 34, DK-2730 Herlev, Denmark, no later than 31 January 1988. The awards will not be despatched until after this date but will be numbered in the order in which applications were received. A list containing callsigns of club stations is obtainable from OZ1ACB in exchange for an irc and sae.

Birmingham Postal Zone Award

Sponsored by the S Birmingham Radio Society (G3OHM/G4OHM/G8OHM). The award is in three Classes—Bronze (25 points), Silver (50 points), and Gold (75 points). Working (or hearing) the club station is mandatory and this counts five points. Members of the society in different postal zones count two points and others in different Birmingham postal zones one. No repeater contacts (other than by satellite) may be counted. Send log details with the application (QSLs may be required). The cost is £1.00, six ircs, or US$3.00. Apply to award manager John Harvey, G4IVJ, 38 Bodenham Rd, Birmingham, B31 5DS. Enquiries and requests for membership lists should be sent to G4IVJ together with an sase.

Diploma 60th Anniversary of REP

Rede dos Emissores Portugeses celebrates its 60th anniversary this year and is issuing this award to celebrate the fact. It is available to licensed amateurs and listeners for contacts (reports) between 26 January 1987 and 31 December 1987. All vhf and hf bands may be used, and ssb, cw, mixed, rtty, and fm modes may be used but no cross-mode. European applicants need 60 points, African and American 40, and others 20. Each Portuguese station may be contacted once per band and each counts one point. QSOs with club stations CT1REP or CT60REP count five points. Send QSO details including

date, time, callsign, frequency, mode, and include full name, callsign, and QTH of applicant, and have list of QSLs certified by applicant's national society. Separate awards are issued for each mode. Send, together with eight ircs or US$4.00 before 31 December 1989 to Diploma 60th Anniversary of REP, PO Box 2483, 1112 Lisboa Codex, Portugal. The rules say that the award is free to any radio club or IARU member society.

St George's Day Award
For contact or confirmed reports with/from either GB0SGD, GB4SGD, or GB6SGD plus (for UK applicants) eight other G stations between 19 April and 16 May. European applicants need only five G QSOs and others three. Send log extracts to the organizers, Wisbech & District AR & E Club, including £1.50 (UK), six ircs (Europe), or eight ircs (rest of world). Address to D Wilkinson, G4KHF, "Leon", Lutton Gowts, Long Sutton, Spalding, Lincs, PE12 9LQ.

Band reports

Well supported again this month by the return of the regulars who were thrown into a state of confusion by the various date changes! These include: G2HKU, G3YY, G4QK, G5JL, G1XEO, GM3CSM, G3GVV, GM3ITN, G3s KSH, LOL, LPS, PJT, PXT/M, YRM, G4sEHQ, JBR, GW4KGR, G4s LRS, MUW, NXG/M, OBK, RFE, UZN, XAH, and RSs 25429, 52868 and 87259—to whom, many thanks.

As usual, callsigns in italics were stations using A1A.

1·8MHz 0000 *AA1K, W2ZZ/CT3, NP4A, TF3KG.* **0100** *UG6GAW, VP2VA.* **0200** *N1ACH(N.H.), UI8VAA,* 4X6DK. **0300** *KL7Y, UV1OO, W3GA.* **0400** HK0HEU, *PJ9J,* YV4TI. **0500** *SV0AA,* TG9NX, XE1L. **0600** HP3FL, HK0HEU, *KL7Y, TK5VN, W1-5, 8-0.* **0700** *EA6ET,* KV0G, VP2VA, *W2GD,* W0CM. **0800** *VO1MP.* **0900** W2YOZ. **1900** *KL7Y, 4X4VE.* **2100** *7S6FRO.* **2200** *W1,4,8.* **2300** *W2ZZ/CT3, EA6ET, K5NA,* LX1PD, NP4A, *VO1CV.*

3·5MHz 0000 HI8RKM, TA4N, TZ2XN, VE8RCS. **0100** AP2ZR, *W1BIH/PJ2, UA0YO, VE2EDK* (Zone 2), IK1FOS/5N2, *9Y4BK.* **0200** CE3ESS, *FM5ES, S79KG.* **0300** A92BE, TK5BL/FS, HK0NK. **0400** UZ9FZA, *ZS6AL.* **0500** ZF2JA, 3Y1EE. **0700** HH9E, KL7Y, TI9W. **0800** N7ERR, NN7F, WB7BST. **0900** *KP2J, OY7ML.* **1500** YC4FRX. **1700** ZL4sBO, KE. **1800** A4XJZ, JY5AH, *OY6FRA,* YC6XE, *YI1BGD.* **2000** KH0AC, SU1ER, I8CZW/4S7. **2100** HV3SJ, *JA5TTE,* J37AH, S79LJ, VE8RCS, *4U1ITU,* IK1FOS/5N9. **2200** OD5YU, FM5s BH, WS, OD5RH. **2300** HC5EA, J88AG.

7MHz 0000 *FY4EE, LU6UO/Z,* TZ6VV, TU2AK, *VP2MDY,* VU2CVP, 9K2EC. **0100** CU2AR, *TA4O,* VP2EC, YX5D, *XF4DX, 5L2SI.* **0200** *KL7U, VU2PTT.* **0700** *3Y1EE,* 7X5AB. **0800** *HC1AI, JA, PY,* VR6YL, *ZL2-ZL4.* **0900** KP4KC. *VK6, W6.* **1300** *HL1EJ, JR1AIH, V85HG, YB0AH, 9M2AX.* **1400** *KK7K/DU2,* VS6DO, *YB0DUA.* **1500** UA0FF, *VK6s LW, XA.* **1600** A61AB, *S79KG, UV1OO,* V85GA, WL7E. **1700** ED6VE, FT8WA, J28EM, VU2DVP, 3A2EC, 4S7VK. **1800** JY5CI, S79LJ, SU1ER. **1900** TA3C. **2000** 4K1K. **2100** KH0AC, *UM9MZC, 4K1C,* ON7UD/5N6. **2300** DU7FG, *5L2SI,* K2BMI/KP2, KP4AM, TR8JLD, *ZD9CW,* ZS5MY.

10MHz 0700 *UW9TB, ZL3AAM, ZL1AAT/A.* **0800** *JR0VDU, VK2, VK6AKG, ZL1BKZ.* **0900** *UA0AG, VK2,3,6, ZL2IN.* **1000** *OY1R.* **1100** *C30LGI, JH1HGY, LZ1KSP.* **1400** *W9AND.* **1400** *VK3OQ.* **1500** *VU2LAM.* **1600** *HB0/DJ2CS, UI8OAA, 9V1sTL, VS.* **1700** *CU2AR, UF6AW, VE8AW, VK2,3, 9H1EJ.* **1800** *FM5WD, UH8CJ.* **1900** *DK9WCY, K5HK/KP2, TK5UC, W1-W4.* **2000** *PZ1DV, TR8JJC, ZS1CT.* **2100** *FG5XC, OA4IW, ZD8CW, 9Y4BK* **2200** *LU2YA, ZS5BH.*

14MHz 0700 A71BK. **0800** AH2F, FK8EB, H44AF, HZ1HZ, VP8BLQ, VS6DO, ZK1XC, ZL7TZ, 3Y2GV. **0900** AP2MQ, C21FS, FK8FS, JD1AMA, JT1BT, KX6LU, VK, ZL7AA, 9N1MM. **1000** H44RO, HL9YG, OX3FM, TA2D, VK, VS6UO, ZL. **1100** A92EV, H44DL, JA, P29DN, TI9W, VS6UA, *8P9DX.* **1200** A71BK, J73AH, *VU2MKS.* **1300** 3Y2GV, 9K2AN/IC5, 8Q7CL. **1400** V85HG. **1500** S79KG, VU, YI1BGD. **1600** FR5DC, *VK6s,* XF4DX, 7Q7LW. **1700** *C56/SM0NJO, FT8ZA, VE6-VE7, W6-W7.* **1800** 5U7/I2VA. **1900** C53AK, D44BC, VP8BLQ. **2000** FM5DX, TZ6VV, ZL4AB. **2100** J37AG, TR8CA, 9L1LA. **2200** CP5CP/OA7, VP8ZR, 3Y2GV. **2300** W6, W7, W0, WL7E, ZL4BO.

21MHz 0800 S79KG, VK, YB. **0900** HL2INX, *SV5OX,* VK9YS, *ZS6AQX.* **1000** VU2SMN. **1100** J40DX, TA3C, TZ6VV, *VK8AV,* 3B8DB, *5A0A,* 9K2EC. **1200** C53FB, OD5RH, VK8NHN, *YC.* **1300** TR8JLD, ZS3SWA, 3Y1EE. **1400** FR5DB, TU2LB, *VK9YS,* VK9YW, *XE3AAF.* **1500** CE6DOE, 3D6BW, 7Q7LW. **1600** CP8AB, J37AE, VP8BKK. **1700** VP8BLZ, W1-W5, W8, 9J2EZ, 9L1AR. **1900** HH6I, W1-W4. **2000** CP, HP, J3, LU, VP8. **2100** 3Y1EE.

28MHz 0800 FR4DN. **1100** 4X4FR, 5N8ZHN. **1200** ZS3SWA, ZS6AAE. **1300** CT1BBJ. **1600** CX7BBR, LU6ADZ. **1800** C30LAY, G4ZWU/EA6, 9H1IF. **2100** CE3HFI, CX, LU, PP5QA.

Thanks are also due to the following for items extracted: *CQ Magazine* (W1WY), *DXNL* (DL3RK), *Long Island DX Bulletin* (W2IYX), *DX News Sheet (G4DYO), The Ex-G Radio Club Bulletin* (GI3OEN/W6), *Long Skip (VE3IPR), Lynx DX Group Bulletin* (EA2JGO), the *DX Family Newsletter* (JH1KRC) and *DX'press* (PA3CXC).

Closing date for receipt of material for the **June** issue is **8 April**—and for **July** issue, **14 May**.

HF F-layer propagation predictions for April 1987

The time is presented vertically at two-hour intervals 00(00)gmt to 22(00)gmt for each band, ie ♀ = 0000, ♀ = 0200, ♀ = 0400 etc.
The probability of signals being heard is given on a 0 (indicated by a dot) to a 9 scale; the higher the number the greater the probability, with 1 meaning 10 to 19 per cent of days, and so on. Additionally 50MHz F-layer and 1·8MHz openings are indicated by a plus (+) sign in the 28 and 3·5MHz columns respectively.

Time / / GMT	28MHz 000001111122 024680246802	24MHz 000001111122 024680246802	21MHz 000001111122 024680246802	18MHz 000001111122 024680246802	14MHz 000001111122 024680246802	10MHz 000001111122 024680246802	7MHz 000001111122 024680246802	3.5MHz 000001111122 024680246802
** EUROPE								
MOSCOW	.....	.....	.....11111..	...1233333..	...45666674.	114555456784	7543222235588	+42.....25+
MALTA	.....	.....	....111112..	...13333451.	...46667786.	323755556896	887432233689	++42.....3++
GIBRALTAR	.....	.....	.........1..	....1111131.	....5545576.	1..566556894	766643333689	+++3.....3++
ICELAND	.....	.....	.....	.....	....1233344.	...145556784	533543333567	+++3.....245
** ASIA								
OSAKA	.....	.....	.....	....1111....	...133331.1.	...13212235.	....1...1351	.....2.
HONGKONG	.....	.....	.....111....	...123221...	...23434432.	12123571	1363	.....3.
BANGKOK	.....	.....	...11211....	...22433....	...23444221.	2123562	1.....1366	43
SINGAPORE	.....	.....	...1122221..	...2343443..	..123444673.	1....12123682	1.....1366	43
NEW DELHI	.....	.....	...112222...	...234344...	..122344631.	111..1123674	51.....1368	2.....45
TEHERAN	.....	.....1.11...	...2232332..	...3344554..	..2433446741	4231..123686	741.....1368	5.....45
COLOMBO	.....	.....1.1....	...123231...	...334454...	..1223445121	111..1123476	41.....1368	2.....45
BAHRAIN	.....	....11111...	...2233342..	...3445564..	..2323446751	5331..113687	841.....1368	+2.....45
CYPRUS	.....	....111121..	...23444551..	...56666773.	113666667883	766433335798	97411.112478	+4.....24+
ADEN	.....1111...	....122331..	...2345563..	...4445676..	2.2322346843	7431...13688	861.....1368	+3.....45
** OCEANIA								
SUVA/S	.....	.....	.....	.....1....	....1223141.	...23212252.	...21....31.	.....
SUVA/L	.....	.....	.....3.	...1.....5.	...421...161	.11531111431	..121....31.	.....
WELLINGTON/S	.....	.....	.....	.....	...12222111.	....43212343.	..121...132.	.....
WELLINGTON/L	.....	.....	.....	.....1.	...21.....41	12252....142	..131....22.	.....
SYDNEY/S	.....	.....	....11.....	...223.....	...45411241.	..1332113661	...1....1351	.....2.
SYDNEY/L	.....	.....	.....	1	....3.....24	1.1231....63	...11....141	.....
PERTH	.....	.....1.....	...2231.....	...3452.....	..135431.11.	211132112462	1.....1365	42
HONOLULU	.....	.....	.....	.....1..	.....1..232.	...12211331.	..121.....	.....
** AFRICA								
SEYCHELLES	.....1111...	....122332..	...2345565..	...34566772.	2.1322446873	743...113688	851.....1368	+2.....45
MAURITIUS	.....11111..	....123332..	...2345665..	...34566772.	2.1433446873	8231..113688	851.....1368	+2.....4+
NAIROBI	.....12221..	....124443..	...2346761..	...34557783.	2.1422246883	8542...13688	883.....1368	+5.....4+
HARARE	.....12432..	....124664..	...13467871..	...34567884.	21.533346883	8643...13688	884.....368	++2.....35
CAPETOWN	.....344...	....125662..	....347785..	...2556787..	1..554346831	651521113676	8852.....368	++3.....35
LAGOS	.....2444..	....1146761.	....3367883.	...15456896.	12.553235892	77252...3588	8862.....368	5+3.....35
ASCENSION Is	.....234..	....1123562.	....3345785.	....5445688.	.1..64224793	571.31..1488	88521.....268	++3.....35
DAKAR	.....224..	.....124462.	....2346685.	....5455688.	.1.164323693	564431..1378	88631.....158	++3.....25
LAS PALMAS	.....1..	.....11131.	....2334464.	....5556687.	...376666894	665654334689	997421111368	++52.....3+
** S. AMERICA								
Sth SHETLAND	.....121..	.....1353..	.....46762.	.....156775.	13445773	544222113457	78631....235	4+3.....2
FALKLAND Is	.....1231.	.....13452.	.....145675.	.....256777.	...114445673	544422112357	88631.....25	++3.....2
R DE JANEIRO	.....1121.	.....12352.	.....234575.	.....455577.	115433574	5644321..258	88631.....27	++3.....5
BUENOS AIRES	.....121.	.....12242.	.....234565.	.....445577.	5443564	55441211.247	88631.....15	++3.....2
LIMA	.....	.....11.	.....11234.	233451	1....1.342344	63223111...14	78631.....2	4+3.....
BOGOTA	.....	.....11.	.....11123.	223351	1....2332244	6211221...14	68631.....2	4+3.....
** N. AMERICA								
BARBADOS	.....	.....11.	.....111234.	3233461	1....5322355	6322221...26	88631.....3	++3.....
JAMAICA	.....	.....	.....1122.	222341	1....1332234	52111211..14	57521.....1	2+3.....
BERMUDA	.....	.....	.....1112.	1222341	1....3332355	51.11211.125	67521.....2	4+3.....
NEW YORK	.....	.....	.....11.	112231	1333354	41...2111124	56321.....2	2+3.....
MEXICO	.....	.....	.....11.	.....2222.	233222	31....111..2	25321.....	.33.....
MONTREAL	.....	.....	.....1.	111231	2333354	41...2111134	56311.....2	2+3.....
DENVER	.....	.....	.....	.....	22122	2.....112112	2332.....	.23.....
LOS ANGELES	.....	.....	.....	.....	12121	1.....121.1	1232.....	..3.....
VANCOUVER	.....	.....	.....	.....	1111	1.....12111	1232.....	..3.....
FAIRBANKS	.....	.....	.....	.....	.....111..	...121112221	..121....1..	.....

The provisional mean sunspot number for January 1987 issued by the Sunspot Index Data Centre, Brussels, was 9·8. The maximum daily sunspot number was 23 on 23 January, and the minimum was 0 on 8-13, 16 and 30 January. The predicted smoothed sunspot numbers for April, May, June and July 1987, are respectively: (classical method), 19, 21, 22 and 23; (SIDC adjusted values) 26, 28, 29 and 32.

VHF/UHF

*Ken Willis, G8VR**

Earth to moon with QRP, that's real dx!

Did you ever stop to think where your vhf signals might be going after they have passed through the ionosphere? The answer is, probably quite a long way, certainly to the moon and a good deal further out into space.

I asked two well-known vhf operators, Ian White, G3SEK, and Bob Atkins, KA1GT, to do some sums which might indicate the real dx capability of a typical vhf station on 144MHz, and their results may come as a surprise. In moonbounce operation where you depend on energy being reflected back from the moon towards earth, for every kilowatt you hurl at the moon, what comes back is equivalent to a station located on the moon and running less than a milliwatt! So, if a really QRP station operating on the moon could just about be heard on earth, what sort of signal would result from a 100W 16-element 144MHz station located on the moon? Or vice versa, what would be received on the moon from a station on earth?

In fact, these would be quite big stations for direct earth-moon communication. Let's assume that you have a Yagi with a gain of no more than 10dBi, and a poor receiver front-end with noise-figure of 5dB, and bandwidth 2,400Hz, altogether a modest station by any standards. With this set-up, ssb could be received from a station on the moon running only 5W into a similar antenna, and the signal here on earth would be about 6dB over noise! If cw were used, and the receiver bandwidth reduced to 100Hz, a smaller antenna would suffice, say, one with a gain of only 6dBi. Then a station on the moon running 1W would produce a cw signal on earth nearly 5dB above noise.

The results for 432MHz are equally startling. Maybe somewhere out there the things we hear on the bands are being monitored in an attempt to understand what life on this planet is all about!

Several assumptions have had to be made in arriving at these figures. For instance, ionospheric absorption and a mismatch between the polarization of the receiving antenna and the incident wave are but two of the parameters which have to be taken into account. On 144MHz the one-way path loss is about 180dB. Contrast this with the moonbounce path-losses of about 250dB and you see a yawning gap of about 70dB which moonbouncers have to bridge using their own resources. The moon-earth one-way path loss is actually no greater than the losses we overcome every day in routine middle-distance tropo contacts.

Not bad for a path length approaching 250,000 miles, but don't go pointing your beam at the moon and calling CQ, there isn't anyone out there to heed the call. But what global chaos might have resulted if those astronauts who visited the moon had left behind a 144MHz repeater with no facilities for remote shut-down!

Some contest dates

Edmund Ramm, DK3UZ has sent information on vhf contests sponsored by *Dubus* magazine. They are scheduled for the first weekends in March, May, July, September and October, from 1400gmt Saturday to 1400gmt Sunday in each case. All European vhf/uhf opperators are eligible "operating within the terms of his/her licence" as Edmund puts it! He must have heard about some of those Kentish kilowatts (not me, folks!). If you would like a copy of the rules, please send me an sae plus 10p in stamps.

The Third Annual CQ Wide World VHF WPX Contest starts on Saturday 18 July at 0000gmt and ends 2400gmt Sunday 19 July. The rules are rather detailed, so again please send me an sae and 10p stamp for a copy. In the 1986 event, GJ4ICD was winner of the single-operator single band award with 89,612 points, the next in line being KB7IJ/5 with 47,362, quite a gap between first and second places.

Sporadic-E

It is not too early to start thinking about how you propose to monitor for Es openings in the coming "season", since this mode should become noticeable on 50MHz, at least, during next month, Theories as to the origins of this mode of propagation continue to abound. Austin Uden (Aylesbury), who is preparing an article for *Radio Communication* giving his own views based on a long study, has submitted a long list of dates on which he urges UK amateurs to be "vigilant for one-hop Es". The dates are: 18 to 21, 24, 27 and 31 May; 1 to 4, 7 to 11, 14 to 20, 24, 25, 28 and 30 June; 3 to 7, 10, 14 to 19, 22, 25, 26 and 31 July; 6, 7 and 15 to 18 August. That's 48 days in a period of 93 days, so it would be surprising if some of these dates failed to produce some Es. Austin would like reports giving details of the starting times and duration of events, sent either to headquarters or to me for onward transmission.

Seventy megahertz

A surprising amount of correspondence on the subject of 70MHz shows that the band is not quite as dead as we might have imagined. Here are some of the comments received:

Martyn Vincent, G3UKV (Telford): "Definitely suffering from an attack of the QSY to 50MHz, but someone is on every evening, while Sunday mornings and to a lesser extent Tuesday evenings are the busiest times. In the mid-December contest, there was the lowest activity in the past 10 years during which I have kept records. GD, GI and GM have gone quiet, and only Alan, G0FRT, (ie GM4ZUK/A) is regularly on. During the winter this band is more reliable than 50MHz in the Midlands, with less of the characteristic long deep QSB of 50MHz. Gdansk on 70·310MHz remains a useful indicator for Au, ms and Es."

Steve Foote, G4FOH (Cambs): "Came across a paragraph recently in the *VHF bands* feature of *Short Wave Magazine* May 1968 which said: 'Just reported that beacon ZE1AZE now in operation on 69·998 Mc/s . . . and as the ZE's now have the 4 metre band, there will be opportunities for real dx this season'." He asks whether any G or anyone else ever worked ZE on 70MHz?

Alan, GM4ZUK (Aberdeen) says: "We really should publicise this band as much as possible as it is grossly under-used. Perhaps a 'Tuesday Night Award' might help. GM0FRT (Aberdeen VHF Group) worked EI9FK/P and G4NWD in the Quadrantids, taking no longer than 8min."

Alan was active from GM0FRT in the 70MHz cumulatives and found activity to be quite good. He finds that in any contest activity, G4RFR in Dorset always puts in a consistent signal, which is surprising since the distance is 700km. He has also heard a number of stations on 70·260MHz using fm, presumably local nets, giving their locators as IO91. He could not get them to respond to his calls, and thinks that they may not have realized that their signals were reaching Scotland. Never previously had Alan heard any 70MHz fm activity at his location. He comments that activity in his area is generally very poor on 70MHz, with only one other club station, BM4HAM (Edinburgh), using the band. Alan also reported hearing GB3ANG on 70·060MHz back again after a long break.

Ray Cracknell, G2AHU (Shrops) writes: "5B4AZ is very much alive and wrote to me asking for a Heathkit catalogue so that he can get back on the air. The G4BPY 70MHz transmitter has been in continuous use as a beacon. I also worked Nick crossband 70/144 from ZE2JV. The 50 and 70MHz beacons are QRT for building alterations . . .

Jack Hum, G5UM (Leics), the vhf/uhf awards manager, reports: "Martyn, G4TIF (Leamington Spa), claimed a rare 70MHz Senior award which brought him a Supreme. Martyn started on 70MHz in March 1984 with 10W to a homebrew three-element Yagi, then in April last year went QRO to 100W into a three-element MET, this permitting the more distant counties to be worked. All 62 cards submitted were for ssb contacts, and all but two via tropo. QSL returns were very high, a 95 per cent rate."

Jeremy, G3IMW, (London), said: "I heard the 70MHz beacon on seven days in 1985 but none in 1986. Some of the 70MHz openings lasted only 1 or 2 min, the longest 35min on 3 June 1985. In order to catch these openings I found it best to monitor the 28,220MHz beacon. The muf seems to rise to its highest value within a few minutes and then fall gradually. I was busy with 50MHz crossband operation in 1986, but my impression is that there were fewer days in the year when the muf exceeded 50MHz. Looking through some old *Radio Communications,* I found an entry showing that the European record on 70MHz must be G to TF, and also that in 1969, G to ZB2 had already been worked!" (Note: this entry described contacts by G3JVL and G8LY, in that order, with TF3EA on 27 June 1969, and went on to discuss ZB2BO's amplitude-modulated contacts with UK stations, no calls given. Monitoring Polish and Czech fm stations via metor scatter was also mentioned, and this 20 years ago!)

Malcolm Franks, G4MKF (Newbury), confirmed what others have said when he wrote: "I have been in contact recently with Nick, 5B4AZ, who is not active at the moment due to business commitments, but I sense his interest is increasing. I intend to offer him a 70MHz converter if it will help get him back on the air. I feel he deserves all the credit we can give him for investing in 70MHz equipment when ZB2BL is his nearest neighbour and the rest of us are 3,000km away."

But to settle it all, here are some comments from the most recent letter received by G4MKF from Nick, 5B4AZ. Nick says: "I have learned from Andy, 5B4DN, that the 70MHz Cyprus beacon is to be used by the ZC4 boys to make contact with the UK, so I will not have it for this Es season.

*6 Lerryn Gardens, Broadstairs, Kent CT10 3BH.

However, I see from *VHF/UHF* January 1987 that the ZC4s are determined to make it all the way to the UK on 144MHz. I should be in action on 144MHz myself using an FT290 and portable arrays, working from the west coast of Cyprus in the first few days of June. I hope you can do some 70MHz tests with the ZC4s—they will be up the highest peak of the mountains with very good gear. I hope we can work on 144MHz. It ought to be possible as I have worked Italy barefoot with the FT290 using the built-in whip antenna."

So there it is. Seventy megahertz is by no means dead, and it looks as if there could be plenty to listen for this summer.

VHF Convention 1987

The VHF Convention will be held on 26 April at Sandown Park, and full details of the program were published in *Radio Communication* for March. The VHF Committee stand is expected to offer facilities for testing the linearity of 144MHz power amplifiers, so bring yours along if you wish to have it checked. Solid-state amplifiers will be most easily accommodated, but provided your valve rig presents no major problems associated with blowers and power supplies, it will probably be possible to test it.

Brian Bower, G3COJ, advises that the agm of the Six Metre Group will be held at the convention between 1130am and 1230pm.

Transequatorial propagation

Ray Cracknell's comments on this rather exotic mode of propagation in the February issue prompted Jan Hubach, OH1ZAA, to send some further information on the subject. Jan has been mapping possible tep trajectories covering areas which have a large enough amateur community to take advantage of this mode. He suggests that those fanatical enough (and presumably blessed with large enough bank balances) should mount expeditions to the right spots. For best results, these would need to be scheduled around the equinox periods in years of high solar activity (starting in 1990) though Jan says that isolated solar eruptions like the one in October 1986 can occur at any time. For those who at least like to dream of these things, Jan lists the following paths as being most likely to exhibit tep propagation: Northern Australia outback VK8 to Japan and China; Easter Island to all of Central America and Pacific coastline of Mexico; Argentina and Uruguay to Carribean, Venezuela and surrounding countries; St Helena to Southern Spain and Northern Africa; Namibia, Zambia and Zimbabwe to Cyprus, Greece and Mediterranean/North African coast.

Some of these locations are not too far from the UK, and some of the countries mentioned already have a record of vhf achievement. Jan would particularly like to see something attempted between southern Spain or Gibraltar and St Helena, ZD7, and believes that it is not too early to start planning for this. Maybe this will be a challenge to some of our expedition groups who have tired of Andorra and are seeking fresh fields to conquer. Jan's own plans are to go to the Australian outback, VK8, in 1991.

Digital voice communication via meteor scatter

Rex Beastall, G1LRI (Nottingham), has drawn attention to a most interesting contribution to *Electronic Letters* 2 January 1987, from a group of researchers at the GTE Corporation, Westborough, Massachusetts.

Recognizing the low data rate which can be achieved by the use of voice communication over meteor-scatter links, they have experimented with digital signal processing and associated speech recognition techniques to transmit a narrow-band voice signal over a meteor-burst link. Speech was greatly compressed for transmission, and then reconstructed at the receiving end using a speech synthesizer. In the first test over a path of 195km, a 12-word text taken from a well-known American poem was compressed into a transmission time of only 86ms; this including the necessary protocol bits required for addressing and message control. The test was repeated over a link of 650km, when the same text was transmitted more than 30 times, verification of the reception of each message being provided by an automatic acknowledgement signal returned via the same meteor trail, and a telephoned confirmation in each case.

With so many amateurs possessing microcomputer equipment and skills, this could be a field in which definite contributions could be made. Rex feels that while voice synthesis is widely available, voice recognition would be the major problem for amateur use of this technique. The number of words needed for stereotyped amateur communication is quite limited, but the need to insert the callsign of the dx station at short notice would no doubt pose problems, Off-hand I would not care to say what view the licensing authority would take of this form of transmission. Provided stations identified themselves by normal voice at the beginning and end of each transmission, there appears to be no reason why it should not be regarded in the same way as any other form of data transmission, so let's hope someone will soon make some tests to establish the feasibility of this technique for amateur use. What a relief it would be for ssb operators if they no longer had to repeat all those calls and reports!

Beacon monitoring via meteor scatter

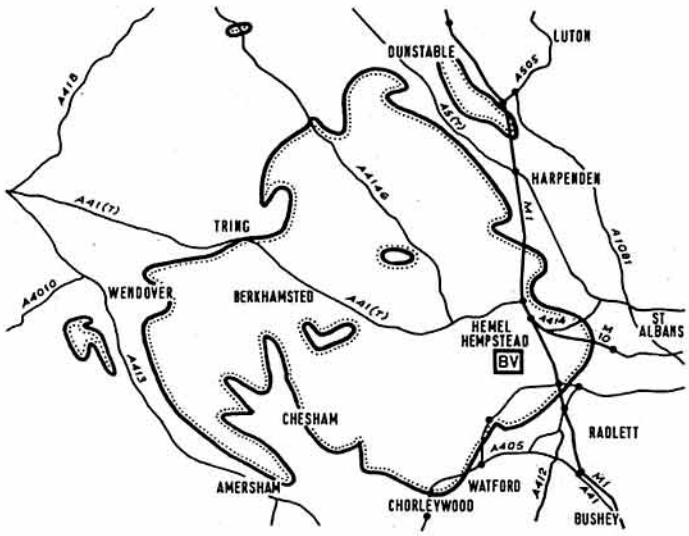
DL7YS maintains a watch on the UK vhf beacons and logs reception of them via meteor bursts. On 50MHz he has problems with GB3SIX because of a local computer which generates a "birdie" on the beacon frequency, but he has copied 2s bursts from it at 10dB. GB3NHQ is well received, and he lists 13 reflections between 2 and 10s duration, one of them 40dB plus for 8s. On 70MHz he says that the GB3CTC and GB3WHA frequencies are always full of broadcast reflections, so he cannot find these beacons. EI4RF on 70·130MHz is similarly affected, but GB3BUX on 70·050MHz is a useful performer, with many reflections in the range 2 to 18s at strengths 5 to 30dB.

Repeater news

In his *Repeater Report*, Issue 87/1, circulated to groups, Chris Young, G4CCC, the RMG publicity officer, deals with several administrative matters, among them the thorny subject of delays in the issue of repeater licences. He commented on the speed by which packet radio repeater licences were granted, and said that because these applications related to a single band, and proposed antennas at heights which made site-clearance procedures and MoD approval unnecessary, the whole process became very streamlined. The RMG was quick to note the lessons to be learned from this and intends to propose a speedier system in future, while DTI was also due, earlier this year, to present its own proposals for a vetting system which should reduce delays considerably.

Chris mentioned seven repeater licences which had been approved: GB3SG Cardiff (RB15), GB3BV Hemel Hempstead (RB1), GB3DD Dundee (RB10), GB3GM Paisley (RB12), GB3RE Chatham (RB11), GB3DT Dorset (RB0) and GB3PD Peterhead (RB10); the last two being site changes.

This was good news for the Aylesbury Vale group which is responsible for GB3BV, the Bulbourne Valley 432MHz repeater (RB1), located some 3km southeast of Hemel Hempstead. It uses a single three-element Jaybeam 145m asl on a beam heading of 300°. The receiver is a Pye R470 fitted with a low-noise preamplifier, and the transmitter a Pye T461, giving a maximum erp of 12W. The logic is "homebrew", featuring tone access and tone or carrier-only re-access, with no time-out. Coverage is designed to minimize duplication of the areas already covered by GB3HR (RB14) and GB3VH (RB13).



Coverage of the recently-licensed repeater GB3BV, Hemel Hempstead

Still awaiting a licence after more than two years, however, is Gloucester Repeater Group's GB3GH (RB5). Nick Negus, G6AWT (who is RRR for D3), says that while some progress has been made in that the county council has taken over the proposed site for the repeater, nothing has been heard about the licence although it was promised "by last Christmas". They hope to be on the air by mid-summer, and meanwhile intending members of this group should contact Nick, G6AWT QTHR, or telephone (after 5pm) 0452 504515.

Robin Waite, GM6LJE, who is secretary of the Anglo-Scottish Repeater

Group, reminds us that life does not cease north of the Watford Gap, and that his group is very much alive and well. They operate two Cumbrian repeaters, GB3AS Caldbeck (R0) and GB3EV Appleby (R4), for which Nick provided some technical details. "AS" has its antenna on the IBA mast at Caldbeck, some 17km southwest of Carlisle. The site is over 900ft asl, and the antenna installation comprises two dipoles fed with heliax. A new repeater, based on Wood & Douglas units, has been put together by G4TUZ, who also designed the microprocessor logic for the system. To minimize "blipping", a new feature is tone-burst plus audio access. When not in use, the repeater transmits its QRA in cw at regular intervals. Coverage of "AS" extends over large areas of the Borders country, into West Cumbria and the Solway A74. During this year's bad winter weather, the repeater provided much-needed information on road conditions, greatly appreciated by professional and amateur drivers alike.

GB3EV is located on Great Dun Fell, eight miles north of Appleby, using a single antenna and Wacom diplexer. The site is 2,000-plus ft asl and, being northwest facing, for half the year temperatures are well below freezing. This creates hazards not just for the equipment but also for the group's engineer G4EXD, and G4UWG who provides four-wheel drive transportation to and from the site. "EV" covers the M6 from south of Carnforth up as far as Carlisle, and encompasses Morecambe and the Eden Valley, with unexpected "windows" into other areas. However, this "machine" is not used as much as the group would like, so a little more activity would be welcome (Would that some other repeaters suffered such problems!). Membership of this group costs £5 per annum, for which you also get four copies each year of the *FM News* published by Central Scotland Group, which alone is worth the price of membership in my view. Contact Robin, GM6LBE, QTHR, for further information, or the treasurer, G4TUZ, 8, Mayson Street, Carlisle.

Although strictly not in my baileywick, Bristol FM TV Group has submitted an application for a tv repeater (GB3ZZ) (1,249MHz input, 1,318·5MHz output) to provide fm tv colour and i/c sound facilities. Contact Shaun, G8VPG, for further information. Also GB3SE (RM3) Stoke-on-Trent is operational in both repeater and beacon mode (1,291·075MHz in, 1,297·075MHz out), callsign every 35s with fsk. Details from Geoff, G8DZJ.

Quadrantids

Some late reports on the Quadrantids seem to indicate that the shower was quite good. Gerald, G4OIG (Northants), said that it was the most surprising of five Quadrantids showers he had experienced because of the long distances involved. He worked UB5BAE (MJ) on the random cw channel (as did G4XEN and others), plus UR1RWX (MT), UP1BWR (MO), EA7TL(XW), all in skeds, and finally OK1YA (HK) on random. Gerald feels as strongly as I do that we must soon settle once and for all whether periods on the cw random channel are to be 5 or 2·5min. He also was upset that IW5BML (I5RSR) had double-booked some skeds with G stations. Gerald's coincided with G4KUX, and possibly others! He now has 39 countries and 213 squares to his credit, and is hoping soon to have the 200 confirmed to update his award.

Fifty megahertz

Writing in January, Jeremy, G3IMW (London), said that he had been monitoring 50MHz beacons, and found ZB2VHF very good early in December, after which it appeared to be switched off. He has made some interesting observations which, space permitting, I will include in a later issue. During the Geminids meteor shower he could detect quite clearly when the shower radiant went below the horizon. Many operators fail to take account of this, and often contacts ascribed to a shower are in fact via sporadic meteors, since the shower meteors are not accessible at the time because of the position of the earth relative to the radiant. Incidentally, Jeremy had a crossband contact during last summer with 9H3EN (50/28) which he believes to be a "first".

Paul, G4IJE, commented that he does not find the level of activity on 50MHz as low as some would suggest. He is active most evenings and usually manages four or five contacts. Up to 12 January he had made 1,350 contacts in 12 countries and 45 squares (some crossband, some via meteor scatter), which averages about four contacts per day. In all, he has worked 34 different stations crossband, and feels that some operators have not given the band a chance. He comments: "10W to a dipole is just not good enough, except perhaps during sporadic-E." Paul says: "The maximum legal power is required to make full use of 50MHz, preferably obtained by running about 20W into a 6-7dB gain antenna at least 30ft agl."

Ian White, G3SEK, commented in similar vein when he said that he was having a "love-hate relationship" with 50MHz, because he feels that it could only be properly explored if a higher erp were to be permitted under the terms of our licences. □

SWL

*Bob Treacher, BRS32525**

VHF in 1987

As we move towards the summer it is time to consider the fun to be had on vhf. I hope that, following the news of vhf activity in this column over the last two years, other swls have now equipped themselves with 144MHz facilities, and that more will be taking an active role in 144MHz dxing this summer. Achievements with simple antenna systems can be most rewarding; most listeners who report loggings or take part in contests have only a nine-element Yagi on the chimney. These Yagis are still quite cheap, and a converter will only cost around £30, so for about £60 you too could listen to all that fine dx on 144MHz.

I have now acquired 50 and 70MHz converters, so reports on happenings on these bands will figure in this column in future. David Whitaker, BRS25429, should also have a 50MHz converter by the time you read this, as he is thinking of concentrating on that band instead of 432MHz this summer; he has heard over 100 squares on the band and thinks it is time he turned his attention to some other bands.

Now for a look at RSGB contests which have an swl section this year. Last year's events produced an exciting fight for the winner's spot, which was eventually taken by Martin Parry, BRS52543, and this year the VHF Contests Committee is looking forward to an even bigger entry. Here are the contests to put in your diary now:

11/12 April	70/144MHz	9 August	432MHz
30 May	432MHz	5/6 September	144MHz
4/5 July	VHF NFD	20 September	70MHz
8 August	144MHz		

All these contests count towards the SWL VHF Championship. There are also swl sections to the IARU vhf and uhf contests on 5/6 September and 3/4 October and the VHF Contests Committee is always pleased to get check logs for the 70 and 432MHz Cumulatives.

VHF news

Michel Monteil, F11ATZ, sent a photocopy of a QSL card he received from F1EAN/7X, and I am suitably impressed! Michel heard his signals at 1735 on 27 June last year; the 7X was running 40W to a 19-element Yagi. In G-land, the 27th marked the beginning of several days of good tropo. Perhaps the same "high pressure" system was responsible for both the good conditions to 7X from mid-France and the good conditions we experienced to HB9, OZ, LA and SM over the following few days. Michel also mentioned receiving the Society's "VHF Square Award" No 272, for confirmation of 40 squares/10 countries for 144MHz. Not content with listening at 432MHz, Michel now has equipment for 1,296MHz and had heard his first stations on the band last December.

Mick Toms, BRS31976, reported on the Quadrantids meteor shower, which apparently peaked at around 2100 on 3 January. Around 2300, Mick logged SP3MFI (J091), OH7PI (for a new country), HG2RG, IV3GBO, IV3BST, I1ANC, SM1LAA and SM5EBM—all these on ssb. On cw, IK6FHF and OK3CPY were heard. Mick had a nice new toy for Christmas —a ZX Spectrum +2 computer, and he was hoping to write a program to calculate distances and points in readiness for this year's dx season and for the RSGB contests.

Mick Toms, BRS31976, has 50 and 432MHz converters on order and was toying with the idea of getting equipped for 1,296MHz. Between us, we hope not to miss too much in the way of tropo, sporadic-E, ms or aurora this coming dx season.

HF happenings

There were two talking points during the month under review—the LA trip to 3Y, and the US trip to XF4. I would like to thank LA1EE and LA2GV on behalf of all the listeners in the British Isles for the fine job they did in activating Peter I Island in extremely unpleasant conditions. Several listeners mentioned hearing their signals for a new country on 3·5, 7, 14 and 21MHz. Those guys who went to XF4 also deserve our thanks, because they encountered problems of a different kind. Many heard them on 3·5 and 14MHz.

Looking forward, trips to VK9L, VK9Y, VK9X and VU4 (Andamans) should certainly have kept everyone busy, and the results will no doubt be seen when the All-Time list is published in a couple of month's time.

*93 Elibank Road, Eltham, London SE9 1QJ.

The Society's 7MHz SSB Contest was a rather more hospitable affair this year. There were actually some Gs (and GWs) who were taking it seriously, and this promoted much activity. DX conditions were quite good, especially with a good opening to JA at around 1530 on the Saturday and 0750 to 0830 on the Sunday. The adjudicators should expect some large scores to check!

In general, 7MHz conditions had been excellent in January, with several listeners managing quite easily to log 100 countries during the month. At the time of writing, that feat had been achieved by BRSs 8841 (101). 25429 (102), 31879 (115), 32525 (117) and ONL383 (125). BRSs 25429 and 32525 also achieved the magic 100 on 3·5MHz, as had ONL383. The 1·8MHz band, although good to the USA, had been sadly lacking good dx from the Caribbean. Several mentioned still needing J37AH, who is very active on the band. Hopefully, as we slip towards the equinox, conditions will improve. Having said that, Mick, BRS31976, mentioned hearing 9M2AX, who was 599 at 2300 on 21 November, and VS6DO, 549 at 2245 on 10 December.

The hf table

The final 1986 table appears this month. Unfortunately it was not possible to publish the full table in 1986, and that may have kept the number of entrants down this year. However, congratulations to Robert Small, BRS8841, who wins the table for the fifth consecutive year with a winning score of 856, much higher than I suggested in my March 1986 column. With the change of format adopted for 1987, I look forward to some greater participation and two worthy "champions" at the end of the year.

1986 COUNTRIES TABLE
FINAL SCORES

Station	DXCC	28	21	14	7	3·5	1·8	Total
BRS8841	255	67	186	231	169	162	59	856
BRS31879	218	97	146	187	151	118	64	763
BRS25429	216	53	115	183	127	151	60	689
BRS87156	207	56	132	174	112	121	54	649
BRS32525	190	59	89	126	132	122	76	604
BRS31976	177	40	126	134	78	109	68	555
BRS1066	167	38	109	135	121	82	66	551
BRS50134	182	44	73	114	101	111	61	504
ORS45992	197	74	122	186	76	20	1	479
BRS52543	135	52	93	89	96	87	49	466
BRS87259	132	0	46	70	78	102	48	344
BRS20249	133	16	52	110	57	61	15	311
BRS88639	130	39	58	110	33	36	27	303
F11ATZ	121	54	81	34	21	44	9	243
BRS44984	112	11	31	82	45	65	0	234
BRS88201	—	0	22	34	55	84	25	220

Finale

There we are for another month. Please send me your scores for the new hf tables, together with your news and views. Copy dates for the June issue are 2 April with late copy by 9 April. □

MICROWAVES

*Mike Dixon, G3PFR**

Components service and other RSGB support

Spring is in the air, even though there has just been a snow flurry as I write!

It is rumoured that a well-known group of East Anglian operators is preparing to market an "instant inversion" kit for use at microwave frequencies. This will consist of a set of specially-selected, economically-priced, pressurized, sealed cans of North Sea fog of differing density and radio refractive index. When slowly and carefully released into your local atmosphere, a duct, lasting several hours and capable of almost lossless propagation of all microwave frequencies, will result.

This could revolutionize microwave communication and bring the performance of many distantly- or poorly-sited stations up to that of east coast or Mediterranean stations. The one remaining technical problem, before the product appears on the market, appears to be transport: the cans are designed so that the dry, cold air is always at the bottom of the can and the moist, warm "inversion layer" at the top. It has been found that, under some conditions of transport, an unacceptable degree of mixing occurs, which partly cancels the desired effect!

More seriously, can I remind readers that the components service is still alive and well? Current stock and price lists are available from the Membership Services Department at RSGB HQ, and they are regularly published in the *Microwave Newsletter*, which is also available (on subscription) from HQ. (From this month's issue, they are also published in the Mail Order Price List—*Ed.*) Those readers of this column who don't subscribe to the *Newsletter* are missing a lot of topical news and technical matter which, because of space considerations, cannot be published in *Radio Communication*.

I understand that a degree of confusion exists about the identity of the RSGB Microwave Committee and the "Microwave Society", especially among newer licensees who may not yet be members of the RSGB.

The Microwave Committee is a working committee of specialist members reporting to the RSGB Council and responsible for advising Council on all matters relating to microwaves; ie all frequencies from 1·3 to 250GHz, a total spectrum space (at the moment) of over 5,000MHz. It has strong connections with many other RSGB committees, notably VHF, VHF Contests, Licencing Advisory, Technical & Publications and the Repeater Management Group. It is responsible for the components service, and the compilation and editing of the *Microwave Newsletter*. Members are always available ('phone or letter) for technical advice or, provided that the travelling distances are kept sensible, for lectures/demonstrations. The current membership is: G3PFR, G8AGN, G3PHO, G4FRE, G3WDG, G4KGC, G4DDK, G3YGF, G3JVL and G3RPE. With the exception of G4FRE and G3RPE, all are QTHR. In addition, corresponding members are also approachable and can feed queries and other information into the main Microwave Committee: they are G3JHM, G4FSG (microwave beacon co-ordinator), G3RWL (Amsat UK), G4KNZ/ZL2AZQ (not QTHR) and G3XDV (RMG).

The "Microwave Society", organized and run by G8MWR, has no connection with the Microwave Committee and is **NOT** an RSGB affiliated society, although G8MWR is an RSGB regional representative. This society publishes an occasional newsletter and "beginners pack". It also supplies a limited range of components (mainly doppler units for 10 and 24GHz, and some pcbs for simple, wideband equipment). It does not appear currently to support any other bands but does offer assistance and advice to beginners on the two bands mentioned. If, as has been reported, it claims to be the "RSGB Microwave Society", this is incorrect and queries should not, therefore, be directed to the Microwave Committee, but to G8MWR, QTHR.

Operating news and correspondence

Brian, GI4KIS (Antrim), wrote objecting to the "half-page advert" for the Square Bashers Expedition Group's 1986 efforts (*Rad Com*, February), especially the reference to the "cost per QSO". This, basically, was written in this way to highlight the enormous amount of effort (both time and money) which goes into such a venture: indeed, it was intended to underline the relatively poor support given to the expedition in the form of requests for skeds on the microwave bands, and the fact that poor propagation conditions did not allow contacts with other than the more persistent or skilled operators on most of the bands acutally used. What Brian described as "an enjoyable amateur radio holiday" must, under these circumstances, have been more of a "labour of love" than a pleasure!

However, more positively, he indicated that he is frequently out /P with 144 and 432MHz and 1·3GHz equipment, and would be pleased to arrange skeds. On the latter band he runs four 23-element Yagis and a MM transverter: in the past year he has operated from over 100 sites in all the GI counties, embracing the "old" squares VO, WO, WP, XO and XP. He also remarked that "GI doesn't get much of a mention" in this column —I can't report what I don't get to hear about via correspondence (!) and would welcome reports from those stations well away from the main centres of activity; *viz* GI, GW, GD and GM. Most of the reports currently received come from either the Midlands, the east coast or the microwave awards manager, G5UM. Meanwhile, can I appeal to all operators to point their beams towards the less-active areas?

One thing suggested by some readers is the creation of an activity night (or nights) or the setting up of regular microwave nets at vhf or uhf. I would welcome readers' comments or suggestions but, due to my other heavy commitments, cannot undertake to co-ordinate such activities, other than publishing the suggestions: it is then up to the participants to organize their own skeds or general activities to correspond to the majority suggestions. The Microwave Committee has for some years been trying to encourage this kind of co-ordinated activity and has started a "microwave adder" in the *Newsletter*. Any activity on any band (but particularly on the higher bands) is eligible for entry but, again, its success will depend on regular reporting of operators' results. It may be possible to institute a special simple certificate for such activities, although readers are reminded that the **confirmed** (QSL) contacts in any activity periods, cumulatives or contests are all eligible for existing certificates, both the Distance Awards and the Squares Awards. Details of either can be obtained from G5UM, QTHR.

*"Woodstock", Gaze Bank, Norley, Warrington, Cheshire WA6 8LL.

Finally this month, a letter from Stuart, GW3XYW (near Swansea), outlined his 1·3GHz eme activity this year. His equipment includes a 20ft skeleton dish (f/D = 0·55) with a W2IMU dual-mode feed. Azimuth and elevation control are effected under computer control "using my faithful old 8k Pet". The head preamplifier is an MGF1402. As an aside, the construction of such a dish, feed and preamplifier are all described in the forthcoming *Microwave Manual*, for those who may wish to set up a station with eme receive capability.

Stations worked so far this year are HB9RM, HB9SV, JH3EAO, OK1KIR, G3LTF and K4QIF. Stuart believes that the JH3 contact (Loc PM74KR) may be a "first" JH/UK QSO on 1·3GHz eme—any challenge? The contact took place at 1443gmt on 7 February 1987. Takao was using a mere 200W to a 13ft skeleton dish and an MFG1402 preamplifier, his receive set-up being capable of detecting 11dB of sun noise. Stuart's final comment was: "I hope to stay on 1·3GHz eme until Easter, when I will change the feeds and return to 432MHz to give some new eme stations the chance of GW QSOs. □

RAYNET

*Geoff Griffiths, G3STG**

A hectic January

Many groups throughout the UK worked very hard during the spell of exceptionally bad weather during January, and Ronnie Cowan has provided the following details from Scotland.

"Although the national weather was extremely severe, Glasgow was not very cold, with temperatures dropping to only about −5°C, but deep snow, falling over three days, proved to be the major problem, cutting road and rail links. On the evening of 13 January, in response to a broadcast appeal, contact was made with the emergency standby centre in Yorkhill, Glasgow, which asked for two four-wheel drive vehicles to be available there by 0001. This was done, and we remained on duty until 0230. On the 14th we were on duty from 1900 until 0230, and on the 15th from 1900 until 0300. There was no requirement on 16th, but we were out again on the 17th from 1201 until 2130, and again on the 18th from 1130 until 1600. We stood down at 1730 as most roads were by then passable with ordinary cars.

"The call-out was for four-wheel-drive vehicles only, but during the week other stations hearing us on air called in or dropped in to help. We went to the aid of children at risk, delivered food parcels, ferried social workers, transferred old people from their flooded homes to council homes for the elderly, took DHSS staff on their rounds, went for coins for electricity meters, delivered coal, collected office staff, returned absconding children from police stations to children's homes, checked on old people living alone etc. All this in snow up to 3ft deep in places, and supported by the net discipline and communications facilities practised and developed by the group.

"Important lessons were learned:

(i) Vehicle relief drivers should be available.

(ii) Each vehicle should have street maps of the same type covering the entire area so that grid references can be given easily.

(iii) Owing to the sensitive nature of the work, names and addresses could not be passed over the air and regular telephoning could be very time-consuming. As we could pass street names, a simple code for house numbers and the spelling of names on some coded form would have quickened our work considerably.

(iv) Considerable change for telephones should be carried and, if the operation involves the elderly, 50p pieces for meters would be helpful.

"The net got considerably slicker as the week went on, with much less "chat". (Maybe the operators were getting more tired and less "chatty" —*STG*). A new location at the home of GM4COX in the village of Law made the use of a second relay unnecessary. From here I think we could have controlled half of Scotland.

"Thanks are especially due to GM1SRP and GM0AAJ for undertaking particularly long journeys in the early hours. And thanks too to the other members who took part: GM0ART, GM0DZP, GM0GIB, GM1FML, GM1VBE, GM1VBG, GM3ZDH, GM4COX, GM4SOY, GM4SRL, GM4SSI, GM4UXX, GM4VPA, GM6OQN, GM6VQH, GM8HBY, GM8KWQ, RAY00519 and RAY00520.

"It was the first real call-out for the group in living memory, (GM3s excepted), although we have dealt with many emergencies during routine exercises. Ronnie was pleased with the way this one was handled, and would like to thank everyone concerned, including the stations who stood by at home and were not required, GM0ETC who covered Newton Mearns, and GM1MMK who collected 50p pieces.

New publications

The Home Office recently published the first issue of its new quarterly magazine *Civil Protection* as a follow-up to the legislation regarding volunteer efforts for the community. Raynet members might be interested to read the magazine, which can be obtained through their local county emergency planning officer, since it contains much of interest to the volunteer. The next issue is expected to contain an "in-depth" interview with a well-known husband and wife team in Raynet, and should be available by the time this column appears.

Also recently available is the final report of the working party on Civil Defence Communications published by the Home Office, and this too is worthy of study by all Groups.

The publishing programme for *Zonews* has been disrupted by family problems for the editor. David's son Timothy has been seriously ill, and we send best wishes to David and Cath for an early improvement in Timothy's condition. In the meantime, a somewhat abbreviated edition of *Zonews* is on the stocks.

IARN

The International Amateur Radio Network is an organization based in the USA dedicated to providing international links for welfare traffic during times of disaster relief, and members may well remember that the links provided by the IARN were of tremendous assistance during the traffic handling for Mexico, Columbia and San Salvador. In particular, the IARN's efforts following the San Salvador earthquake have been quite astounding, with welfare traffic still being handled at the time of writing this column in February.

Routine traffic nets are held every other Saturday, and full details are given regularly on the UK Raynet Controllers net, or can be obtained together with details of membership and support from Les Graves, G4BCP, QTHR.

User services

The county emergency planning officers of England and Wales are required to identify and recruit communications volunteers, and make plans for the establishment of emergency communications during times of national disaster. Most cepos already have very good links with their local Raynet group, and make excellent use of their specialist skills and enthusiasm, while supporting groups in various ways.

In some counties, cepos have gone as far as to set up their own volunteer communications bodies, and these have met with varying success. In at least one county, an extremely successful organization blends the activities of the amateur, the cber and the community volunteer in an extremely harmonious way, while in at least one other county, the cepos efforts have resulted in all but a cessation in the local Raynet group's activities as an independent organization. This could be seen as a dangerous development, since inevitably the service to other bodies such as Red Cross and SJA may well suffer, and certainly the exclusion of contacts with other counties on peacetime disaster co-ordination is not a welcome move. The Raynet Committee is always ready to give advice to groups faced with this development, and contact should be sought through your zonal representative.

I am now very pleased to advise that the Raynet Committee has the nucleus of a video library available. This has been made possible only through the kindness and generosity of a number of groups who made their own video tapes available to us for copying. These all show the activities of the individual groups, and have been produced either as a record of group participation in events or for their own training purposes.

At the moment we have five tapes, with more promised, and copies can be made available to groups who send in blank video tapes to G3KWO. Please allow at least two weeks for him to arrange for the copy to be made and to return it to you. Also, may we ask that you ensure that sufficient postage is included on the return address label. It would appear that the postage payable is 64p, but it is suggested that you check this out at your local friendly Post Office when sending the blank tape to him. G3KWO has managed to twist an arm of a member of his own Raynet group to get the copies made **at no cost**, so please do your bit by ensuring that adequate postage is provided for the return tape. He is also in the course of preparing a list showing what videos are currently available and giving a brief resume

*11 The Grove, Asfordby, Melton Mowbray, Leics.

of their contents. These will be available to groups by about mid-April and can be obtained by sending G3KWO a 165 × 240mm (A5 size) self-addressed stamped envelope.

From our initial computations of Raynet events in 1986, it would appear that there were 655 events involving the user services reported to the committee, and it is interesting to note that just over three per cent of these involved more than one user service at an event. In fact there was at least one instance where **all four** user services were using our services at the same time. Another interesting fact to emerge is that Raynet were able to help the St John Ambulance Brigade at some 45 per cent of all events. A detailed analysis will be forwarded to all controllers as soon as the statistics have been completed.

While on the subject of the total number of events attended by Raynet in a year, it is noted that the chairman's "diary of events" which is published largely for the benefit of zonal representatives contains a greater number of event entries than for which event reports are received. While recognizing that the preparation and submission of event reports is by no means compulsory, it would help to give a more detailed overall picture of the entire Raynet activity all over the UK. So it means that someone has to sit down for a few moments to prepare the report card and then post it to HQ. Remember, a detailed written report is **not** requested, but if you can take time out to give one in addition to the "yellow card" then so much the better. It is always very interesting to read how a group has overcome a particular problem. The entire Raynet Committee is of the thought that no real merit can be obtained from "hiding our (individual) lights under bushels" or whatever.

Raynet members might like to be reminded that 1987 marks the 100th anniversary of the St John Ambulance Brigade as we know it, and a special event station, GB4SJA, is to operate from London in June. I have been told that the brigade membership, totalling approximately 31,000 men, women, girls and boys, now devotes about four million hours annually to training and attending events of all sorts. One million cases attended to more than adequately demonstrates the necessity for such a body of devoted people that depends entirely on voluntary subscription to cover its costs. I invite you to join me in wishing the St John Ambulance Brigade all possible success for the next hundred years. □

SATELLITES

*Bob Phillips, G4IQQ**

Oscar 10

Just after writing the final copy for the March issue, I received some information from Jim Miller, G3RUH, indicating the predicted solar illumination data for the satellite for 1987. One of the critical periods was from the beginning of March to the end of April, hence the advice not to use the satellite last month. The data for the year is summarized in Fig 2 which shows the percentage solar illumination at weekly points. It is recommended that the satellite not be used when the illumination falls below 50 per cent. So, please refrain from using Oscar 10 until around the end of the month and also for the months of September and October. To emphasize the importance of this advice, it is worth noting that the satellite goes into eclipse every orbit during 1987 and this only worsens the power situation. The satellite should never be used during an eclipse and a period of around 30min should be allowed after entry into sunlight to allow battery re-charging.

Many operators use various forms of satellite programs to generate orbital data for this and other satellites. There is a great temptation to update the orbital elements every time a new set is released even though this is not really necessary in the case of AO10. G3RUH has sent a set of smoothed ephemeris data which will be quite adequate for most applications for the entire year. The data is for 1987 day 0:

Epoch time	1987·000	utc	Arg of perigee	172·64	deg
Inclination	27·00	deg	Mean anomaly	319·82	deg
RA of asc node	42·7	deg E	Mean motion	2·0587846	rev/day
Eccentricity	0·603	—	Epoch rev	2668	

Whether the satellite will survive long enough for all of this information to be of use remains to be seen, however, if we all observe the common sense guidelines of when to use and when not to use the satellite, its life might be prolonged.

*Transvaal College, New Barn Road, Swanley, Kent BR8 7PW.

Even though the satellite should not be used this month, I have included the standard visibility chart (Fig 1). As can be clearly seen the satellite is now visible for rather more sociable periods than has been the case for some time.

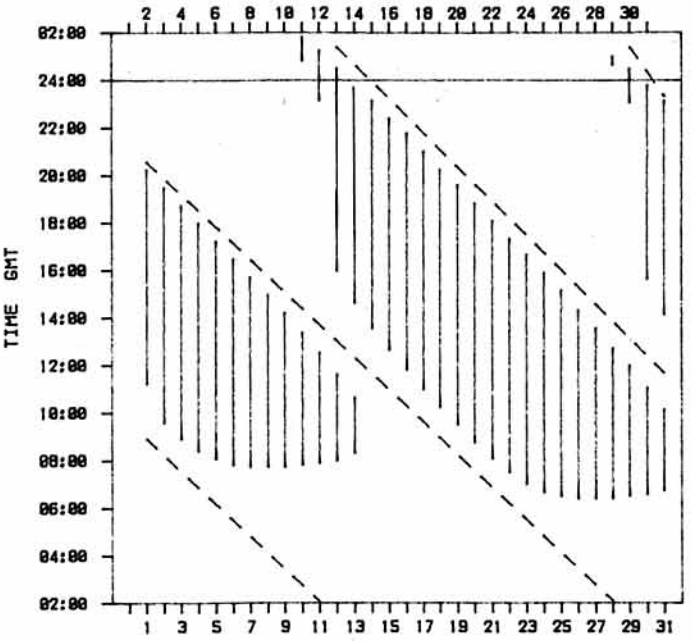


Fig 1 OSCAR 10 VISIBILITY (London area) - APRIL 1987

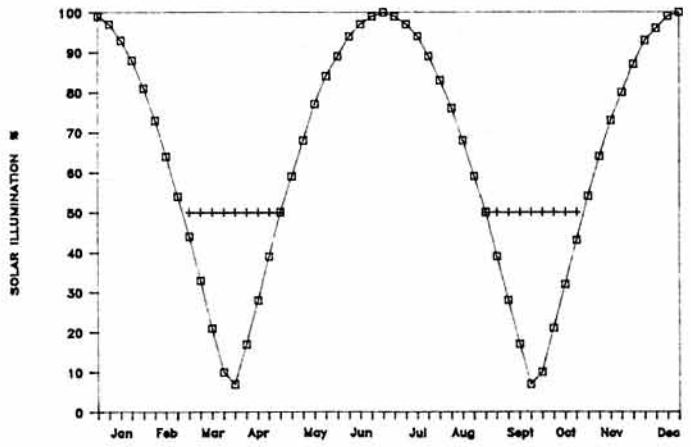


Fig 2. Solar illumination for Oscar 10 during 1987

Uosat

Considerable amounts of engineering work have been carried out on UO11 recently which has meant that the usual downlink signals have not been present at all times. The work has been part of the check-out of a computer program to reduce the unwanted motion which builds up on the spacecraft due to the non-spherical nature of the earth.

The team at the university is currently planning the design of its next satellite, Uosat-C and to help them decide the type of payload to be carried they are requesting input from all users of the existing two satellites. It would be most useful if you could let Surrey know which particular activities are of interest, plus maybe a few extra ones.

RS satellites

It is almost becoming embarrassing to say this, but there is still no firm news of the launch of the two new Soviet amateur satellites, RS9 and RS10, except that the launch is imminent!

Both RS5 and RS7 emerged from their eclipse seasons at the end of March so it will be interesting to see if they are able to continue their limited sunlight-only operation for a while longer.

Phase 3C

The delay in the launch programme for the *Ariane 4* rocket has been put to very good use by the builders of the satellite. Following the problems that occurred with Oscar 10 last year, it was decided to upgrade some of the cmos circuitry on the spacecraft. The integrated housekeeping unit for the new satellite has been provided with special radiation-hard memory chips from Harris and appears to be functioning well.

Arianespace has not published a new launch manifest recently, but it is expected that launches should re-start in April or May, which should lead to launch of Phase 3C some time in late August or September.

Other news

AMSAT-UK has published a comprehensive technical handbook for the Fuji Oscar 12 satellite. The book is essential reading for anyone interested in operating through the satellite, or simply knowing about its design and operation. Full details are provided for operation through the mode JA and JD transponders as well as the calibration equations for the telemetry signals. The book is available to members of AMSAT-UK for £2.95 or £3.50.to non-members (UK prices) from AMSAT-UK, London E12 5EQ. A set of up-dated sheets is planned for the future and these will cost £1.00 and £1.25 respectively. All prices include UK postage.

Preparations for the second AMSAT-UK Satellite Colloquium are now well in hand according to Ron Broadbent, G3AAJ. A draft programme has been put together and speakers sought to cover many aspects of amateur satellite operation. The colloquium, which is to be again held at the University of Surrey, will start on the evening of Friday 17 July and continue until around 5pm on Sunday. Registration forms should now be available from Ron at the above address. □

COMPUTING

*John Morris, GM4ANB**

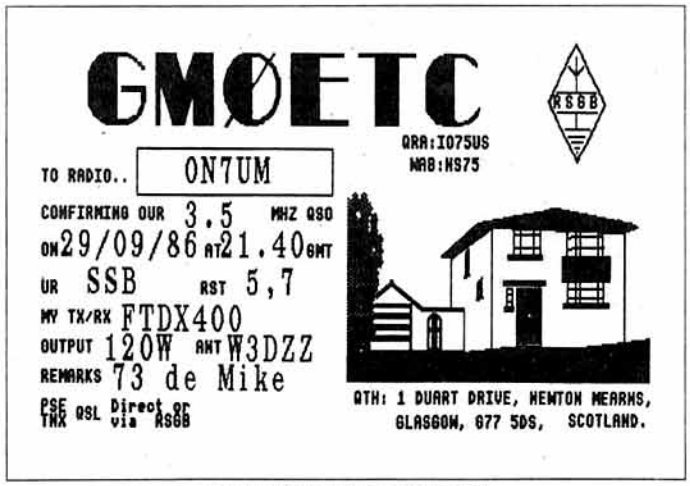
Christmas competition

There was a good response to the Christmas competition, with an interesting variety of computer produced QSL cards arriving through the post. The standard was very high, and trying to find a winner very difficult. The judging took into account ease of use, economy, inclusion of all QSO details, and an entirely subjective opinion of their artistic merit.

On this basis the winner is GM0ETC, with G4MUW and G6HKM close runners-up. Honourable mentions go to G4XXI, RS39882, N6VHF, G8WXP, G14TSK, G6ZYT and G1WBZ.

GM0ETC's card is shown below. It is of the cut and paste type; a paper printout which must be pasted to a postcard before being sent out. It was produced using a commercial "ART" package with a BBC B and Epson FX-80 printer. The entire card, including the nicely formatted callsign banner and drawing, is printed in one go from the computer. The resulting cards are economical, although they do take a few minutes to print out, and involve a bit of work to turn them into fully fledged QSLs. GM0ETC is considering getting the "arty" part pre-printed on a card and using a label for the text.

Given the high standard of the cards and the wide variety of techniques used, I will print some of the other entries in future issues. Hopefully they will give you ideas for your own computer generated QSL cards.



GM0ETC's computer QSL card

Program exchange register

The program exchange register is taking off. The aim of the register is to enable amateurs to exchange non-copyright radio-orientated computer programs. In addition it includes a short list of commercial software of interest to radio amateurs.

The demand for copies of the register has been such that my poor little printer is beginning to show the strain. Therefore the distribution is being taken over by RSGB HQ. To cover the cost of processing requests for copies, a charge of £1, to RSGB members, including all post and packaging, will be made.

Compilation of the register will continue to be done by GM4ANB. More entries would be most welcome. If you have any programs which you think would be of interest to other amateurs and are prepared to make copies available, please send these details: computer, purpose of program, distribution medium (tape, disc, phone, on-air etc), and any special hardware required.

At the moment the register has a preponderance of Spectrum and BBC programs, with the Amstrad CPC machines also quite well represented. Entries for some of the less common computers would be very welcome. If you have an unusual or badly supported computer, an entry on the register is a good way of getting into contact with other owners of the same model. No financial commitment is involved—one of the rules of exchange is that the person requesting a program must supply all necessary media, postage and packaging.

I would also like to expand the "commercial" section of the register. If you sell amateur radio software and would like to be listed, let me know. No charge is made, but due to space limitations only the briefest description of any program can be included.

Remember: **To get a copy of the register** write to RSGB HQ, marking your envelope "Software Register" and enclosing £1.

To add (or remove) a register entry, send the details to me at the address at the foot of this column.

Program 1

```
10 MODE 0
20 VDU 23,240,24,24,24,255,255,24,24,24
30 INPUT "Chars/line (1 TO 128)"; C
40 INPUT "Lines/page (1 TO 39)"; L
50 VDU 12,23;1,C;0;0;0,23;2,60 + C/2;0;0;0
60 VDU 23;6,L;0;0;0,23;7,18+L/2;0;0;0
70 FOR J=1 TO 2559:VDU 240:NEXT:T=GET:GOTO 10
```

BBC cross-hatch generator

A few months ago I asked if anyone had any information on re-programming the 6845 CTR chip in the BBC. I am indebted to Neil Savin, G8XYN, and Geoff Rumming for sending me not only information, but also discs and tapes demonstrating some of the features of this versatile chip. Programs to fully exploit its potential are a bit too long for this column, but BBC owning atv operators may be interested in the simple utility shown in Program 1.

It generates a fine cross-hatch pattern which extends beyond the normal screen bounds on all four edges. When the program is run you are asked to specify the width and height of the pattern, in terms of normal character spacing. Entering 80 and 32 respectively gives a format very similar to the normal BBC Mode 0. As these values are increased the hatch pattern extends towards the edges of the screen. Eventually they will start hitting the vertical and horizontal sync pulses, and the display will fall over. When this happens depends on the tv or monitor, but with a bit of experimentation you should be able to get a good full-screen image.

The horizontal display controls are set by line 30. Only the "Horizontal displayed" and "Horizontal sync position" registers are changed. For simplicity the sync pulse is always in the middle of the line blanking period. Much the same is done in line 40 for the corresponding vertical display registers. The hatch pattern itself is generated by filling the screen with a suitable user-defined character. When entering Program 1 take special care to distinguish between ";" and "," in lines 30 and 40.

For the tv enthusiast, the 6845 can also be programmed to generate tv signals of different line and field rates. For more details of the 6845 as used

*26 Main Street, Hillend, by Dunfermline, Fyfe KY115LE.

in the BBC, I recommend *The advanced user guide for the BBC micro* by Bray, Dickens and Holmes.

Oddbits

My apologies to everyone who typed in Program 3 in last October's issue and found that it would not work. I hope you spotted the correction on page 16 of January's *Radio Communication*.

Since Amstrad's buy-out of Sinclair computers, the Sinclair Amateur Radio User Group has announced that it plans to "go Amstrad", with limited support for the CPC464, 664 and 6128 series. Contact G4INP for information.

Please note the new address for all *Computing* correspondence, or you can contact me via Prestel on mailbox number 383824456.

DATA COMMS

*Ian Wade, G3NRW**

A QUICK LOOK at some of the club magazines and newsletters which have come my way recently. First, the new look *Digi Com* magazine from MAXPAK (the Midlands AX.25 Packet Radio Users Group): now in A4 format, with glossy front cover and photographs—very impressive! Issue No 2 contains full details of the GB3AP digipeater at Dudley. The tnc is controlled by an 8748 single-chip micro, which handles the cw id and power supply monitor—when the mains power fails, the system reverts to battery backup, and the frequency of the cw id changes, to indicate that the mains has indeed failed. Also included in this issue is a digipeater survival guide (with the usual pleas to keep simplex contacts off 144·650MHz, and not to transfer long files via the digipeater during busy periods), plus full details for upgrading a Tandy Model 100 micro, notes on Raynet and packet, and an abridged version of the AX.25 Level 2 specification. MAXPAK will be giving packet demonstrations at the Solihull Radio Club on 16 April, and to the Wolverhampton Radio Society on 5 May. More about MAXPAK from their secretary Andy Witts, G1DIL, on 0902 743164.

The February 1987 issue of AMRAC's magazine *AMRAC User* is, as usual, crammed with goodies. To list some of them: a full-length feature article by Steve Richards, G4OAK, on a cheap ZX81 rtty system; recommendations for using a packet mailbox; a reprint of a *Popular Computing Weekly* article on packet by AMRAC's secretary, G6DLJ; how to set up tnc parameters such as TXDELAY and MAXFRAMES; TNC-2 software updates; bypassing the MF10 switched digital filter in the TNC-1 and TNC-2; plus the usual chatty news and views items. More on AMRAC from Phil Bridges, G6DLJ, on 0703 847754, or Prestel 703847754.

The Sinclair Users Group (SARUG) continues to produce a very readable newsletter. The latest issue has extremely good examples of pictures produced by a Spectrum NOAA satellite system, comparing very favourably with those obtained by other more complex and expensive systems. There is a review of the COMLINK ZX81 RS232 communications adapter, plus notes on using a Spectrum with a packet tnc. Paul Newman, G4INP, is SARUG's editor, and says that the group will be including support for the Amstrad CPC464/664 and 6128 series in future, in addition to the Sinclair range. Paul is contactable at 3 Red House Lane, Leiston, Suffolk IP16 4JZ.

Finally in this section, an update on the RSGB's *Connect International* packet newsletter. Because of the recent appearance of packet mailboxes on the UK digipeaters, some of the items originally intended for the January issue of *CI* were put to one side, and two articles for beginners on how to use these mailboxes were included instead. Extracts from the articles are now accessible on RSGB's Prestel Databox. February's *CI* continues the controversy over horizontal-versus-vertical polarization for packet, and there are details of the improvements to the GB3UP mailbox. In addition there is a thought-provoking article by packet guru Phil Karn, KA9Q, questioning the need for tncs, and on the practical front there are several contributions covering improvements to the TNC-2.

On an ire plane . . .

When I wrote the "Heretical bits" piece in December's *Data Comms* I half expected to be deluged by letters of protest. In the event, I was snowed under—with two letters, one Prestel message and one digipeater mailbox message! Seems I must get myself a larger wooden spoon. One writer asks why I am knocking the inoffensive rtty operator, and recommends I turn the big guns instead onto the misuse of speech repeaters like GB3SL. Another presumes that before banning all modes in favour of packet I will suggest putting a time limit on each QSO. A third says that it will take at least until the year 2000 before I can get rtty banned!

Maybe I didn't get the point across clearly enough. At no point did I suggest banning anything. To return to the car analogy, there are many people today who are interested in vintage cars, and there is nothing wrong with spending many happy hours tinkering with them. But I certainly wouldn't dream of commuting to work on the motorway in a vintage car. By the same token, rtty is vintage data comms. By all means tinker with it (as I did several years ago, and learnt a lot from it), but be aware that there are now much better and faster ways of doing things.

Amtor primer, part two

Last month's column covered Amtor Mode A, otherwise known as automatic repeat request (arq) mode, in which the information receiving station (irs) acknowledges successful receipt of data blocks by responding with alternating control signals CS1 and CS2. If a block is not successfully received, the irs requests the information sending station (iss) to send it again, by repeating the latest control signal.

But interference works both ways, so what happens if the control signal from the irs to the iss gets corrupted? The iss will not know whether the previous data block was received successfully or not. Should it assume that the block was received intact and continue with the next one, or should it assume that it was not received, and send it again? Either way, it could do the wrong thing; the irs could finish up with one data block missing, or with two copies of the same block!

To overcome this predicament, the iss does not make any assumptions, but temporarily forgets about sending the message, and instead sends a special request to the irs to repeat the control signal it has just sent. This special request is the three-character sequence "RQ RQ RQ" (hexadecimal 66 66 66—see the table in last month's column). When the irs receives this sequence, it realizes that the other end did not get the last control signal, so sends it again. Then, assuming the control signal now gets through successfully, the iss resumes sending the message.

In other words, arq works both ways. If the irs loses a data block through interference, it requests the iss to send it again, and if the iss loses an acknowledgement control signal, it requests the irs to send it again. More about control signals next time.

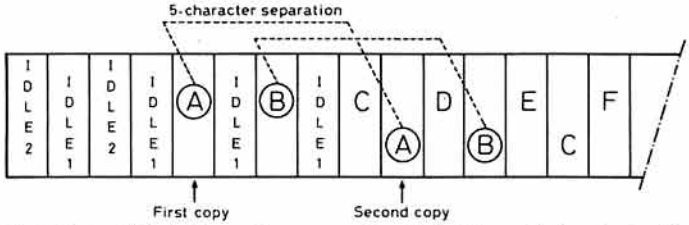


Fig 1. Amtor Mode B: forward error correction (fec). A transmission starts with a stream of "Idle-2" and "Idle-1" characters, to enable the receiving station to get into sync, and then follow the message characters (ABCDEF...). Two copies of each message character are sent, separated by five character times, so that if one copy is lost in an extended burst of interference, there is still a second chance to get the character

Forward error correction (fec): Mode B

Forgetting Mode A for the time being, let's look at the other method of sending Amtor messages. This is known as forward error correction (fec) mode, or more usually Mode B. This mode differs from Mode A in that there is no acknowledgement of any kind from the receiving station, irrespective of whether the message characters have been received correctly or not. Thus Mode B is particularly useful for general broadcast-type messages to all stations; eg CQ calls or news bulletins or round-table QSOs. (With Mode A, only two stations can participate in a QSO at one time).

However, the transmitting station does not simply send a stream of message characters, hoping that the receiving station gets them intact. Instead, each character of the message is sent twice, so that if one copy of a character is corrupted by interference, there is still a chance that the other copy will get through unscathed. To improve the chances still further, the second copy of each character is not sent immediately after the first, but follows five character times later; see Fig 1. Thus, if there is a burst of interference which knocks out, say, four or five successive characters, one copy of each character will still get through. Of course, if the interference lasts for longer than five character times, both copies of the character will be lost, and there is then no way of recovering it. So Mode B is obviously not as good as Mode A but, with two bites at the cherry, it is still significantly better than rtty.

* 7 Daubeney Close, Harlington, Dunstable, Bedfordshire LU5 6NF.
Prestel Mailbox 219999743.

Looking closer at Fig 1, a transmission usually starts with a stream of "Idle-2" and "Idle-1" characters (hexadecimal 66 and 0F respectively). These characters help the receiving end to get into sync, and they are also transmitted as filler characters whenever there are no actual message characters to send; ie when you are hunting around the keyboard looking for the next key to hit! Then, when a key is struck, two copies of the character are sent, separated by five character times. The first copy replaces an Idle-2 character, and the second copy replaces an Idle-1.

At the receiving end, the first copy is checked, by counting four "1" bits and three "0" bits as described last month. If it is error-free, it is then displayed on the screen, and the second copy is ignored. On the other hand, if the first copy is corrupted, it is ignored and the second copy is checked when it arrives. Again, if it is error-free it is then displayed. However, if this second copy is also corrupted, nothing is displayed on the screen (or, depending on the Amtor package in use, a special error character such as an asterisk may be displayed instead). □

QRP

*Rev George Dobbs, G3RJV**

A QRP jubilee

The Spring 1987 edition of *Sprat*, the journal of the G QRP Club, is a 44-page bumper 50th edition with more than the usual technical content. Constructional articles include a 50MHz transceiver, a 3·5MHz power amplifier, a simple double-sideband transceiver, QRP transmitters using ttl integrated circuits, an antenna rf current transformer, the Voxner transmitter, the Hula Hoop DDR antenna, an hf mobile antenna, the QRP80 transmitter, milliwatting and microwatting circuits, a compact Z-match, the TOP 40 transceiver, an hf bands converter filter and the NIG two-band receiver.

The NIG receiver is a very basic superhet or double-conversion circuit from George Burt, GM3OXX. A tunable bandpass filter selects 3·5 or 7MHz from the antenna input, and mixes the input with a 5,235 to 5,335kHz vfo. The product is tuned out at 1,735kHz and mixed in a simple two-diode mixer with a crystal oscillator on the same frequency to produce an audio product. Why 1,735kHz as an i.f? The QRP calling frequencies for the two bands are 3,560 or 7,030kHz, and by having the i.f at 1,735kHz, both frequencies come out at the same vfo frequency: 5,295kHz. Hence, by simply re-peaking the input tuning coils, the operator changes from one calling frequency to the other. The whole receiver only uses seven transistors and two diodes, and could prove to be a good choice for the beginner when attempting to build a first superhet receiver.

Sprat first appeared in the winter of 1974 when I wrote an open letter to the *Short Wave Magazine* inviting anyone interested in low-power operation and building amateur radio equipment to write to me. I received about 30 replies, some of which contained circuits and information about their stations, and over the Christmas of 1974 I borrowed a spirit duplicator from a local school and produced a simple newsletter on quarto-size paper; Gordon, G3DNF, suggested it to be called *SPRAT*: Small Powered Radio Amateur Transmissions, and 34 copies were posted to initiate the G QRP Club. The second edition was produced on A4-size paper in a format designed to be folded into three for posting, a third of the front cover being the address label, and was sent to 60 members. By 1977, 200 copies were distributed, and the first small-format edition, the 20th, was sent to 615 members. 5,000 copies of the 50th edition have been printed.

In 1983, after a private limited edition had been issued by the G QRP Club, the RSGB took over the printing and distribution of the *QRP Circuit Handbook*, which contains the best of *Sprat* from 1974–83.

An application form for the G QRP Club and a sample copy of *Sprat* can be had by sending a large sae to me at the address below. The *QRP Circuit Handbook* is available from RSGB (Sales), for details see the mail order price list in this issue.

A singular award

John P Trent, KL7DG, is indeed a singular man. Living in retirement in Anchorage, Alaska, he is far from inactive. John leads the Run and Rejoice Pulsators Running Club (what a name!) and is a keen QRP dxer. Since 1979 he has sponsored his own amateur radio competition for the Golden Pan Award, which is presented each year to the station with the highest score on the following basis: One point/QSO with KL7DG, when he is running 2W QRP. Score limited to one per band per day with a multiplier for 1,000km between stations. Last year it was won by JL1GUL who collected it in person. Details or claims for the award may be had from: John P Trent, KL7DG, 1700 East Tudor Road, Anchorage, AK 99507. USA.

*St Aidan's Vicarage, 498 Manchester Road, Rochdale OL11 3HE.

Guest of honour at a gathering of QRP operators in the shack of G3RJV was Bill Robinson, P29BR, on leave from Papua, New Guinea. Bill, P29BR (right), with (l to r) Peter, G3PDL; Gus, G8PG; Colin, G3VTT; Norman, G4LQF; and (seated) George, G3RJV. *Photo: Rochdale Observer.*

The QRP ARCI 1987 Spring CW Contest

The American QRP Amateur Radio Club International is once again organising a cw contest and inviting participation from any interested radio amateurs. The contest rules are given below. Further information and completed logs should be addressed to: Eugene Smith, KA5NLY, Pentagon PO Box 46599, Washington, DC 20050, USA.

1200gmt 18 April 1987 to 2400gmt 19 April 1987

Participants may operate a maximum of 24h. Members give RST, state/province/country (s/p/c) and QRP ARCI membership number. Non-members give RST, spc and power output. Stations may be worked once per band for QSO points: each member contact five points, regardless of location; each non-member contact, same continent, two points; each non-member contact, different continent, four points. Multipliers: states/VE provinces/countries. The USA and Canada do not count as countries (count states and provinces only for W/VE). An s/p/c may be worked once per band for s/p/c multiplier credit. Add s/p/cs separately for each band, one point each, then add up s/p/c points for all bands to arrive at total s/p/c multiplier. Power: 4 to 5W output × 2, 3 to 4W output × 4, 2 to 3W output × 6, 1 to 2W output × 8, less than 1W output × 10. Over 5W output counted as check logs only. The highest power used for any contact, any band, will determine the multiplier to be used for scoring the whole log. Bonus multipliers: natural power (solar, wind etc with or without storage) × 2, with storage, storage cells must be charged by the natural power source within 48h preceeding the start of and/or during the contest. Battery power × 1·5. No other source of power may be used at any time during the contest to qualify for these multipliers. Suggested frequencies: 1,810, 3,560, 7,040, 14,060, 21,060, 28,060, 50,360kHz; Novice and Technicians 3,710, 7,110, 21,110, and 28,110kHz. No 10MHz or 24MHz contacts will be counted. Call CQ CQ QRP DE (Callsign). QSO points (total all bands) times s/p/c multiplier (remember, a s/p/c may be worked on more than one band and counts once on each band for s/p/c multiplier points) times power multiplier times bonus multiplier (if none, use 1) equals claimed score. Use of the scoring summary sheet will help avoid errors; summary sheets may be obtained by sending a large sase or two ircs to KA5NLY. Separate log sheets for each band are suggested for ease of scoring. Send full log data plus separate worksheet showing details and time(s) off the air. No log copies will be returned. All entrants desiring results and scores please include a large sase or two ircs. It is a condition of entry that the decision of the QRP ARCI contest chairman is final in case of dispute. Logs must be received by 22 May, 1987. Logs received after that date or missing information wil be used as check logs.

Certificates to stations scoring in the top five percent overall, and to the high scoring station in each s/p/c which has two or more entries. In addition, Adrian Weiss, W0RSP, is sponsoring a special milliwatt certificate to the highest scoring station in the less-than-1W category, provided there are two or more entries in that category.

More hot water

The Hot Water Handbook is a collection of articles on the modification of the Heath HW8 QRP transceiver which was originally issued by Fred Bonovita, W5QJM, and a second edition of the book has been compiled by Michael Bryce, WB8VGE. The new edition contains all the interesting material of the first but with several additions. The *Hot Water Handbook* is a goldmine for the HW8 owner, giving circuitry for over 30 modifications of this popular QRP transceiver. Even amateurs who do not own an HW8 will find many interesting circuit ideas worthy of a place in a constructors' library of circuits. The *Hot Water Handbook*, 2nd Edn, is available from Michael Bryce, WB8VGE, 2225 Mayflower NW Massillon, OH 44646, USA, price $5 post-paid in the USA, and $7 (in USA funds) post-paid worldwide. □

Contest News

Region Round-up CW Contest rules

TRANSMITTING SECTION

1. The general rules for RSGB hf contests published in the "Operating Guide" supplement, *Rad Com* January 1987 will apply.
2. Eligible entrants. All paid-up members of the RSGB resident in the British Isles (G, GD, GI, GJ, GM, GU and GW) holding a Class A licence. Single-operator entries only.
3. When. 0700-1200 Sunday 17 May.
4. Contacts. CW only in the 3·5 and 7MHz bands. Entrants are requested to confine their 3·5MHz operation within the IARU Region 1 contest-preferred segment 3,510-3,560kHz. RST and serial number (starting from 001) must be exchanged, followed by R and the number indicating the operator's RSGB region—eg 579001 R03.
5. Sections. (a) Up to 150W input, (b) QRP—up to 10W input.
6. Scoring. Three points for each contact with a station within the British Isles. Each station may be contacted for points only once on each band. The final score is the total points on each band, added together and then multiplied by the total number of RSGB regions worked on each band added together.
7. Entries. Separate log sheets must be used for each band. It would greatly help the adjudicator if standard log sheets (form HFC1) were used. A cover sheet and signed declaration (Form HFC2) must accompany the logs, which must be sent to RSGB HF Contests Committee, c/o John Bazley, G3HCT, Brooklands, Ullenhall, Solihull, B95 5NW, and postmarked no later than 1 June 1987.
8. Awards. Certificates of merit will be awarded to each of the three leading stations in each section.

RECEIVING SECTION

1. Transmitting section rules 1,2,3,6 and 7 will apply, with the addition that holders of British Class B licences may enter.
2. A station may only appear once in the column headed "Station heard". The callsign of the station being worked may only repeat once in every three contacts logged, except when the station is a new multiplier. Entrants should log the time, callsign of the station heard, RST, serial number and region given by that station, and the callsign of the station being worked.
3. Awards. Certificates of merit will be awarded to the leading three receiving stations.

432MHz FM Contest rules

0800-1200 gmt 14 June 1987

This new contest is being introduced to encourage more activity on 432MHz, and to explore the potential for longer distance contacts on fm. The UK Bandplan should be adhered to, so recommended working frequencies are in the ranges 432·5-432·8MHz and 433·4-433·575MHz.

The general rules published in the "Operating Guide" supplement, *Rad Com* January 1987 will apply. There will be two sections, section F for fixed stations, and section O for other stations. Entrants may transmit only F3E(fm) and contact only other stations using this mode. County multipliers will be used (general rule 14).

All entries and check logs to: VHF Contests Committee, c/o D J Robinson, G4FRE, 15 Ferry Lane, Cavendish Park, Felixstowe, Suffolk, IP11 8UR.

September 1986 Trophy Contest results—correction

The list of disqualified stations at the end of the results table published in January 1987 issue should have read: disqualified (rule 2): G2XV/P, G6VAT/P, G8NJA/P, G1HHH/P; disqualified (rule 19): G4PUB/P. Apologies to the stations concerned. *G4JLG*

21/28MHz SSB Contest 1986 results

The sunspot minimum played havoc with this contest once again, making 28MHz contacts very few and far between. There was one allegation of a southern advantage on 28MHz, but in fact conditions were uniformly bad across the country. There was only just a path open to JA on 21MHz; the top three single-operators all had reasonable pile-ups, while Japan appeared infrequently in all the other G logs.

In a tight battle for the Whitworth Trophy, "Tim" Timbrell, G4STH, just stayed ahead of G3NAS, who maintained last year's second place despite doubling his score. Tim reported that he was kept going with "lashings of tea and tongue" by his xyl G4YLO, who intends to enter herself in 1987, so the situation will be reversed. The Guernsey Club station GU3HFN in third place was operated solely by Geoff Petit, GU0BGP, who at 15½ years of age will have to be watched. G3NAS has the consolation of winning the Powditch Trophy for 28MHz from his nine contacts and seven multipliers. Spare a thought for Steve Tidmarsh, G4VMM, who did a single-bander on 28MHz and reported enjoying the contest despite not managing one QSO per hour. One more QSO would have given him the Trophy.

Entries in the multi-op section were down by a third, and the Stamford & DARS, G4FPQ/P, operated by G4PEL, G4OSJ, G6AFT, G6SBV, G0AJN and G0BIZ, won by a very clear margin. Entries doubled in the British Isles receiving section, but no-one managed to dislodge Bob Treacher, BRS32525, who retains the Metcalf Trophy, but he will have to share the Powditch Receiving Trophy with Norman Henbrey, BRS28198.

UA6LQ repeated last year's success in the overseas section, and managed to find an extra 60 G stations to work this time, but one less multiplier. A clear run for UA6 at the top was thwarted by Stanley Ingram, G6ZY/EA6, who took third place, up 57 places on last year. Almost a "beacon" from Ibiza on cw, he found the microphone for his barefoot FT757 and took full advantage of the 28MHz conditions to give many Gs one of their few QSOs on the band. Entries in the overseas receiving section were well down, but it is hoped that the 1987 event will benefit from an upturn in hf conditions and encourage more activity in all sections.

G6QQ notes that not all competitors use beams and said that he found calling CQ fruitless. Out of the 44 who gave details of their antenna, only 12 were not using beams. The highest placed of these was G4WQN in fourth place with a dipole at 40ft, and G4AMT in eighth place used quad loops at 30ft. Big beams were in evidence throughout the listing—several TH6 and TH5 antennas, and G3NAS used nine elements up 80ft. By contrast, G4STH had a modest tribander up 50ft, but a good location. GM4TOQ gained joint sixth place without a linear, and G2QT was 3dB down on the rest with 200W p.e.p.

The entries of all sizes were much appreciated, down to the JAs recording just one QSO each. The adjudicator hopes that the 1987 competitors will be blessed with better conditions.

G4BUO

BRITISH ISLES TRANSMITTING—SINGLE-OPERATOR

Posn	Callsign	21MHz		28MHz		Adjudicated
		Contacts	Multipliers	Contacts	Multipliers	score
1	G4STH	411	72	1	1	90,009
2	G3NAS	357	74	9	7	88,938
3	GU3HFN	367	49			53,949
4	G4WQN	218	54	3	3	37,791
5	G2QT	220	49	7	5	36,774
6	G4IUF	210	54			34,020
	GM4TOQ	206	51	4	3	34,020
8	G4AMT	192	53	5	4	33,687
9	G3SJX	192	49	10	6	33,330
10	G6LX	158	56	6	5	28,182
11	GW4UZL	140	43	5	4	20,445
12	G4UJS	174	43			19,866
13	G4OBK	148	38	6	3	18,942
14	G3BZU	135	39	7	5	18,744
15	GW4HSH	146	40			17,520
16	G0BIR	141	31			12,183
17	G4XRX	98	29	4	3	9,792
18	G3UHU	75	33	10	5	9,690
19	G3MGW	118	27			9,558
20	G4XKR	112	24	3	2	8,970
21	G3XTT	82	27	9	5	8,640
22	G3LZQ	101	26			7,878
23	G4GXP/A	71	25	2	2	5,913
24	G4BUO	58	20	3	3	4,209
25	G3WBM	43	12	1	1	3,960
26	G4JTR	42	17			2,976
27	G4UPB	52	15	2	2	2,550
28	G4PCI/P	52	15	1	1	2,544
29	GM3CFS	69	17			2,499
30	G0DAY	50	16	2	1	2,496
31	G6QQ	46	14			1,932
32	G4FJT	40	11			1,320
33	G2FQR	38	10			1,080
34	GI4VIZ	27	13			1,053
35	G3UKH	27	6	1	1	588
36	G4UZN	20	8			480
37	G4LZZ	24	6			432
38	G4VMM			10	6	180

BRITISH ISLES TRANSMITTING—MULTI-OPERATOR

Posn	Callsign	21MHz		28MHz		Adjudicated
		Contacts	Multipliers	Contacts	Multipliers	score
1	G4FPQ/P	341	55	10	5	59,334
2	GW4EZW	207	55			32,505
3	G2KV/A	205	44	10	5	31,605
4	G4NLZ	206	48	3	2	31,350
5	G4ATH/A	140	44			18,480
6	G0DDA/P	84	23	5	4	7,209
7	GW4ZHM	75	28			6,300
8	GI0AZA	70	17			3,570
9	G8CA	63	17			3,213

BRITISH ISLES RECEIVING

Posn	Callsign	21MHz		28MHz		Adjudicated
		Contacts	Multipliers	Contacts	Multipliers	score
1	BRS32525	120	45	5	4	18,375
2	BRS87156	85	39	4	3	11,172
3	BRS26407	81	32	3	2	8,568
4	BRS28198	63	30	5	4	6,936
5	BRS20249	72	32			6,912
6	BRS87677	59	24	3	3	5,022
7	G1GMZ	53	22			3,454
8	BRS88825	39	16			1,872

OVERSEAS TRANSMITTING—SINGLE OPERATOR

Posn	Callsign	21MHz		28MHz		Adjudicated
		Contacts	Multipliers	Contacts	Multipliers	score
1	UA6LQ	333	21			20,979
2	UA6LDX	309	20			17,700
3	G6ZY/EA6	129	17	60	9	14,586
4	UA6ADC	265	19			14,535
5	LZ1YE	164	20			8,640
6	UB5ITW	188	16			8,544
7	RA4PM	176	17			8,466
8	RW3DR	135	17			6,885
9	UA3ASL	112	19			6,384
10	RA3QW	138	15			6,165
11	4X6DK	121	15			5,445
12	EA5BZS	48	10	41	9	5,073

Posn	Callsign	21MHz		28MHz		Adjudicated score
		Contacts	Multipliers	Contacts	Multipliers	
13	RB5QW	114	15			4,680
14	UA3QJC	109	14			4,578
15	EA3FWE	60	11	30	8	4,560
16	UY5TE	103	13			4,017
17	RW3PW	65	14			2,730
18	ZS6KU	64	9	5	3	2,484
19	RM8MA	71	11			2,211
20	Z23JO	24	6	32	7	2,184
21	RB5MP	61	12			2,124
22	UA4HNP	76	9			2,052
23	YU5JA	52	13			2,028
24	EA5CTZ	54	10	1	1	1,815
25	UB5EJB	59	9			1,593
	YC2CTW	61	9			1,593
27	UB4JB	47	10			1,410
28	UB5NGA	32	12			1,152
29	UA4CO	40	9			1,080
30	RB5EE	49	12			1,044
31	EC7DJL	38	9			1,026
32	UI8CAJ	37	9			999
33	IK2AVH	33	10			990
	VO1SA	33	10			990
35	K0SCM	34	9			918
36	EA8TE	40	7			840
37	UA3TAM	30	8			720
38	YO3AIS	24	8			576
39	EA3AYK	20	6	2	2	528
40	OH2BUU	19	9			513
41	UI8ZAA	27	6			486
42	UA1ZBY	22	7			462
43	VU2UR	19	6			324
44	LZ6FU	21	5			315
	LZ6UF	21	5			315
46	EA4CQF	16	6			288
47	CX4HS	12	6			216
48	YO3DCO	10	7			210
49	JA3PJL	8	6			144
50	PA3DJC	8	3			72
51	WK4F	9	3			63
52	OH2KI	5	4			60
53	Y24MB	6	3			54
54	YU1WR	4	4			48
55	YU7SF	5	3			45
56	JR5JAQ	3	2			18
57	OH5RZ	2	2			12
58	JA3BOT	1	1			3
	JA8OGB	1	1			3

OVERSEAS TRANSMITTING—MULTI-OPERATOR

Posn	Callsign	21MHz		28MHz		Adjudicated score
		Contacts	Multipliers	Contacts	Multipliers	
1	LZ1KOZ	118	16			5,184
2	YY1C	14	6			252
3	UQ1GWT	20	3			180
4	UQ1GXW	11	5			15

OVERSEAS RECEIVING

Posn	Callsign	21MHz		28MHz		Adjudicated score
		Contacts	Multipliers	Contacts	Multipliers	
1	ORS89020/ZS	62	12			2,232
2	UA4 095620	45	14			1,890
3	UA6 150409	27	7			567

Checklogs received with thanks from: G4MET, G5LP, LA3VP, UA3AGW, RA3DNC, UA3DPH, UA3PB, UA3QQQ, UA3RDG, UA3WAV, UA6ALV, RA6AR, UA6HCS, ONL3975, F11CDP.

VHF NFD 1987 rules

Following analysis of the comments made on the inclusion of 2·3GHz last year, the open section will be similar to 1986, with 1·3GHz and 2·3GHz combined for scoring purposes. To help reduce the burden on groups that found that the extra band overstretched their resources last year, the restricted section will not include 2·3GHz.

Stations wishing to take part in this year's VHF NFD must register their site by 1 June at the latest, see rule 2.

SWL entries will be welcome and will count towards the VHF Listener's Championship.

The general rules published in the "Operating Guide" supplement, *Rad Com* January 1987 wil apply except as modified by these rules.

1. Duration. 1400gmt 4 July 1987 to 1400 gmt 5 July 1987.

2. Site Notification. Each group intending to compete must send details of the site to be used to: VHF Contests Committee, c/o J H Quarmby G3XDY, 12 Chestnut Close, Rushmere St Andrew, Ipswich IP5 7ED, to arrive no later than 1 June 1987. The details required are: the name and address of the person responsible for the entry, the name of the group, the callsigns to be used on each band, the section (open or restricted), the locator and national grid reference of the site, and sufficient access information for an inspector to locate the site (preferably a sketch map). A stamped addressed postcard should be included if confirmation of receipt is required.

3. Bands. Up to four separate stations can be used, operating on the 70,144,432,1,296MHz and 2,320MHz bands. Single-band entries for 144MHz will not be accepted. Ony one station can score or give points on each band. On 70MHz stations must use cw only during the period 1400-2200gmt, phone only during the period 0600-1400gmt, and close down between 2200gmt and 0600gmt. The same callsign must be used on 1·3GHz and 2·3GHz, with no simultaneous operation on these two bands.

4. Operators. Any RSGB member or group of members operating from the British Isles (excluding Eire) may enter. Groups operating from the same site may combine their scores subject to rules 3 and 5.

5. Stations. 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. All equipment, including antennas, must be installed on site not more than 24h before the contest, and the site must not be used by the entrant for transmitting activities during the five days prior to the contest. Only portable accommodation can be used to house the stations. Power for all equipment must be derived from an on site generator or battery. The public mains supply may not be used.

6. Scoring. Contacts will be scored by the radial ring system. Scores from the two 70MHz sessions will be added to give the final 70MHz score. Scores on 1·3GHz and 2·3GHz will be added together to give a final microwave score. The overall score will be determined as per general rule 10 using the final 70MHz, 144MHz, 432MHz, and microwave scores.

7. Contest exchanges.

(a) On 70MHz the contest exchange must include the QTH, given in a different form in each session. Serial numbers start from 001 in each session, and one scoring contact can be made with a given station in each session.

(b) On 144, 432, 1,296, and 2,320MHz, QTH information need not be exchanged. One scoring contact can be made with any given station on each band.

(c) Contacts with stations whose callsigns appear on any of the group's cover sheets will not count for points.

8. Sections. There will be two sections:

(R) Restricted section:

(i) The power output on any band must not exceed 25W p.e.p at the transmitter.

(ii) The height of any antenna must not exceed 10m above ground level.

(iii) Only one antenna per band may be used (eg no stacked, bayed or colinear arrays, or switching between two or more antennas). A slot fed yagi or Quad antenna is permitted. Dish or Backfire antennas must not exceed 2m diameter.

(iv) 2·3GHz contacts will not count for points in this section.

(O) Open section: as per licence.

9. Inspections. All stations are subject to inspection by members of the VHF Contest Committee or nominated representatives. Should the inspector be unable to locate the site due to inadequate or incorrect information, the entry will be disallowed. In the event of a last minute change it is the responsibility of the group to make suitable arrangements for the inspector to find the site. The inspector must be given immediate access to all parts of the site with the right to stay as long as desired, and the ability to return at any time during the contest.

10. Entries.

(a) All entries must be postmarked no later than 27 July 1987.

(b) Entries must be addressed to: VHF Contests Committee, c/o J H Quarmby G3XDY, 12 Chestnut Close, Rushmere St Andrew, Ipswich IP5 7ED.

11. Awards. The Surrey Trophy will be awarded to the overall winner of the open section, the Arthur Watts Trophy to the overall winner of the restricted section, the Tartan Trophy to the leading Scottish entry, and certificates will be awarded to the winners and runners up on all bands in each section, and to the leading stations in each country.

Summer 1·8MHz Contest 1987 Rules

1. Eligible entrants. Single- or multi-operator British Isles entrants must also be members of the RSGB.

2. Period. 2100 utc(gmt) 27 June to 0100 utc(gmt) 28 June 1987.

3. Sections. (a) British Isles stations. **(b)** Overseas stations (including EI).

4. Frequency/mode. 1,820–1,870kHz cw only.

5. Contest call and exchange. "CQ Test". Exchange RST plus serial QSO number beginning from 001. British stations must also give their county codes as published in the "Operating Guide" supplement, *Rad Com*, January 1987.

6. Scoring. (a) British Isles section. Three points for each contact, with a bonus of five points for the first contact with each new county code and the first contact with each new country outside the British Isles.

(b) Overseas section. Three points for each contact with a station in the British Isles (but not EI), with a bonus of five points for the first contact with each new county.

7. Logs. Log sheets to be headed; date/utc (gmt); callsign of station worked; RST/number sent; RST/number received; if bonus; points claimed.

8. Declaration. Each entry must be accompanied by the following declaration, signed and dated: "I declare that this station was operated strictly in accordance with the rules and spirit of the contest, and agree that the decision of the Council of the RSGB shall be final in all cases of dispute."

9. Address for logs. G3FKM, HF Contests Committee, c/o PO Box 73, Lichfield, Staffs WS13 6UJ.

10. Closing date for logs. Logs must be postmarked no later than Monday 13 July 1987.

11. Awards. Certificates of merit will be awarded as follows:

(a) The leading scorer and runner-up in each section and, at the discretion of the HF Contests Committee, the leading entrant from each overseas country.

(b) The highest placed entrant in the British Isles section who had not reached 18 years of age by the date of the contest. Candidates should mark their entries "Under-18 Award".

1·3GHz Trophy Contest rules

0900–1500 gmt 31 May 1987

The general rules published in the "Operating Guide" supplement, *Rad Com* January 1987 will apply. There will be two sections, section F for fixed stations, and section O for other stations. The VHF Contests Committee Cup will be awarded to the station with the highest overall score in the contest.

All entries and check logs to: VHF Contests Committee, c/o C Easton G8TFI, Highlands, Townsend, Nympsfield, Glos.

432MHz Trophy and SWL Contest rules

1600–2400 gmt 30 May 1987

The general rules published in the "Operating Guide" supplement, *Rad Com* January 1987 will apply. There will be three sections, section F for fixed stations, section O for other stations, and section L for listeners. The 1951 Council Cup will be awarded to the station with the highest overall score in the contest. All entries and check logs to: VHF Contests Committee, c/o D J C Bushell G4WAD, "Tanglewood", Bridge Street, Lower Moor, Pershore, Worcs WR10 2PL.

1986 144MHz Fixed and Affiliated Societies Contest results

Conditions were generally reported to be average for this event, although the leaders managed to work some reasonable dx. Numbers of contacts made were broadly similar to last year in both sections. The overall entry is slightly down on last year, but it is encouraging to see many recent licensees taking part in a contest for the first time.

A number of comments were made about the definition of a fixed-station for this event, with a number of stations operating in the multi-operator section from apparently specially selected sites. Some changes will be made to the 1987 rules to ensure that stations operate within the spirit of this event.

As last year, a number of stations did not note their zone on the cover sheet, and are therefore not eligible for zonal awards. The 15 day period available for posting the logs caused some entrants a problem. This may be extended next year to give clubs more time to gather together their logs.

There were a few bad signal complaints, and some calls for a lower power limit, but the majority appeared to like the event in its present form.

Certificates and congratulations to all the zonal winners and to overall winners G4ANT, G4SWX, and the Sheppey Western Contest Group. Thanks go to those stations that submitted checklogs, particularly from overseas.

G3XDY

EQUIPMENT USED BY LEADING STATIONS

G4ANT:	IC211E + 8877	4 × 9-ele Yagi at 32m
G4KUX:	Icom hf + transverter, 2 × 4CX250B	4 × 19-ele Yagi at 10m
G4SWX:	FT901 + transverter, 2 × 4CX250B	4 × 19-ele Yagi at 15m
G4MDZ:	FT225RD + 4CX350	2 × 14-ele Yagi at 16m

Single-Operator Section

Posn	Callsign	Score	QSOs	Loc	Zone
1	G4SWX	3,591	377	02PB	C*
2	G4MDZ	3,092	356	01OC	C
3	G4WFR	2,907	301	01OV	C
4	G3NNG	2,819	395	91EP	D*
5	G4ASR	2,192	270	81MX	B*
6	G3XBY	2,113	315	92DG	B
7	G6XVV	1,610	225	93JK	A*
8	G4XEN	1,492	199	92PH	B
9	G6IAT	1,421	241	91TV	B
10	G4CCC	1,258	242	91ML	
11	GM4JJJ	1,245	116	86FC	G*
12	G8WPD	1,219	245	93BG	B
13	G1GEY	1,155	161	94FW	
14	G1DOX	1,106	169	84JC	
15	G4RWO	1,087	150	84JD	
16	G8JQQ	1,012	119	02OQ	C
17	G6XDM	963	163	92PB	D
18	G4EPA	944	190	92KI	B
19	G4TZM	922	149	01LU	C
20	G1NOD	908	181	92JC	B
21	G3BZU	884	178	90LX	D
22	G4LKD	872	142	01KU	C
23	G4UXC	857	171	92BC	B
24	G6FQE	832	146	01BX	C
25	G0EMS	817	158	82XC	B
26	G8YKM	806	178	91OG	D
27	GM4ZGB	791	97	86BD	G
28	G4ZKS	764	96	01MU	C
29	G3XWZ	758	159	93JD	
30	GM4RTN	742	90	86BD	G
31	G4YFB	738	155	91MK	
	G4MUT	738	160	91NK	D
33	GI4JUS	737	56	74AQ	F*
34	G3YDY	736	164	01FQ	
35	G4HLX	734	149	91FP	D
36	G4WXX	724	150	83QM	A
37	G0FCV	669	137	91LS	D
38	G0ERE	657	138	92QB	B
39	G0GFW	634	116	92OB	D
40	G1LGF	620	118	01NX	C
41	G4JLG	617	163	83TM	A
42	G8DOR	611	160	91OQ	
43	G8VPE	601	75	02TP	C
44	G8ATK	586	159	91OF	C
45	G6ZQE	577	71	02NN	C
46	G1NUS	576	158	83WG	
47	G0CLP	572	151	92KT	B
48	G4ZRS	571	130	01FJ	
49	G6XRD	563	96	01LS	C
50	G0GAG	547	134	93JD	B
51	G6IAW	545	105	01KU	C
52	GM4DGT	538	52	86CD	G
53	G1OUF	522	95	91IQ	D
54	G6HXU	520	131	83RF	A
55	G1GYC	519	126	83WI	
56	G1FON	509	56	80EM	D
57	G8LYB	503	141	92JI	B
58	G1HLT	491	118	93JD	B
59	G4ULS	490	121	82TI	B
60	GI4KIS	475	36	64VR	
61	G1PKE	465	114	83QP	A
62	G3LRS	451	114	92KP	B
63	G1AHM	445	94	83OP	A
64	G1JPN	432	92	93FK	A
65	G1PGV	418	99	91HK	D
66	G0DTI	417	111	83SR	A
67	G4JDI	396	101	92NR	B
68	G8ZRE	393	127	83NE	A
	G0GCI	393	118	91OF	C
70	G6LKB	389	71	84KE	A
71	G0ANZ	378	71	01JW	C
72	G3JMB	373	85	91WA	C
73	G0AMU	357	110	83WG	
74	G4NTY	355	101	83TM	A
75	G1KPU	346	114	91WF	
76	G4OBK	345	81	83QO	A
77	G1TXS	344	70	01EK	C
78	GM1RRF	336	38	86AE	G
79	G3LCH	335	105	91WK	C
80	G0ADU	334	97	83SE	A
	G4MYB	334	75	83TJ	A
82	G1URT	331	115	83OF	A
83	G6NTN	318	80	91IO	D
84	G0FDX	317	69	83OP	A
85	G1GVA	314	100	91PJ	D
	G4WAD	314	70	92AC	B
87	GW6VZW	313	51	81LQ	E*
88	G1KBS	308	95	83WF	
89	G8CIQ	300	82	91WM	C
90	GM0GDL	299	50	86CD	G
91	G8AZC	295	98	91VE	
92	G0AYA	287	85	91PM	
93	G6MXL	284	52	80XR	D
94	G1NTR	278	102	83WG	
95	G1FUT	276	40	02KH	C
96	G1TWK	263	69	91VC	C
97	G4RYV	253	75	91OI	
98	G4UZN	251	54	93FU	A
99	G8YGD	244	92	91PF	
100	G4YCA	239	127	83NE	A
101	G6MRP	238	70	91IP	D
102	G4SSD	229	46	80FJ	D
103	G1UUX	222	64	92BC	B
104	G4FAS	218	73	83VI	
105	G4HKC	212	57	01LV	C
106	G1CRH	209	41	92WK	B
107	G3TWG	193	65	91PN	
108	G8JXV	191	71	91VE	
	G8LNT	191	71	91WG	
110	G1IPO	185	60	91OH	D
111	G0ABZ	184	56	91QR	D
112	G3JKF	183	52	91VC	C
113	G8PHN	178	50	01FQ	C
	G4WCJ	178	30	90AR	D
115	G0AOU	176	62	83TJ	A
	G1TJI	176	73	91IJ	D
117	G1OSE	173	41	01BS	C
118	G1UUM	167	80	91PP	D
119	G1SVW	162	44	01LU	C
120	G4JFN	159	71	91PG	D
121	GM3WTA	150	27	87TF	G
122	G4WYN	141	48	92HR	B
123	G3RYY	136	52	83OP	A
124	GU1WDT	130	15	89RL	D
	G0FIW	130	36	01NT	C
126	G0CWI	126	61	91OO	
127	G6WFK	117	45	83PQ	A
128	GM1REK	113	35	86AC	G
129	G0AIZ	111	40	92IO	B
130	G3WBM	107	29	01KU	C
131	G1PRL	104	60	83MH	A
132	G2DHV	92	36	01BK	
133	G4SDZ	86	30	92KP	B
134	G4YWG	85	31	83QP	A
	G4XYX	85	24	80XR	D
136	G3GLL	82	17	01KS	C
	GM3UU	82	24	87WD	G
138	G3YSX	79	46	91WF	
139	G1RBZ	76	23	83PO	A
	G8ZHG	76	27	93HI	A
	G0FZE	76	36	92HR	B
142	G3ZDM	75	49	83UK	A
143	GM1LKD	73	16	87WE	G
	G4YME	73	40	91KO	D
145	G0COO	69	29	92CG	B
146	GM4GRC	67	19	86JE	G
147	GM0GBH	66	50	86GA	G
148	G6BVU	61	35	83RG	A
	GM1NTQ	61	25	86HF	G
150	G0BAI	59	20	92KN	B
151	G1UOK	55	32	83UK	A
152	G6IFA	53	23	83NE	A
153	G4UMQ	50	27	93FJ	A
154	G0CBJ	43	40	83TJ	A
155	G8ZVE	33	20	92KK	B
156	GM4YED	30	11	86HA	G
157	G4FUY	25	18	91NJ	D
158	GM4TEF	22	19	87WD	G
159	GM3EGU	15	15	86GC	G
160	GM6MGS	12	12	87WD	G
161	GM1RDG	7	7	87TG	G
162	G4VAH	6	6	91PG	D
163	GM1MCN	4	4	87WD	G
	GM3EWC	4	4	87WD	G

Multi-Operator Section

Posn	Callsign	Score	QSOs	Loc	Zone
1	G4ANT	4,318	391	02OO	C*
2	G4KUX	4,047	404	94BO	
3	G4NXO	3,676	422	82LB	B*
4	G4NUT	3,023	405	91OW	D*
5	GD4IOM	2,470	231	74OD	A*
6	G4ZAP	2,444	406	93DC	B
7	G8ZHP	2,426	273	92TR	B
8	G3KFT	2,314	344	91AV	D
9	G3ZMS	2,095	268	90WX	C
10	G4GFX	2,068	284	82UC	B
11	G3PIA	2,017	300	91IO	D
12	GM0FRT	1,941	141	87WB	G*
13	G4NOK	1,793	254	93FR	A
14	G4RFR	1,786	238	90AS	D
15	GW1SSQ	1,763	235	81LO	E*
16	G3WHK	1,472	265	91VJ	C
17	G4AAX	1,467	173	95FF	
18	G1LVY	1,398	247	92KK	B
19	G6KZP	948	208	91PR	D
20	G4CW	911	192	01BK	C
21	G6LMU	908	193	91VC	C
22	G1GLJ	866	161	91BN	
23	G1KAR	831	106	00DU	C
24	G4ATH	813	141	83LU	
25	G3TAD	781	147	81RL	
	G3SDC	781	189	92KO	B
27	G4GTT	774	210	91SM	
28	G3CDK	755	194	91WI	C
29	GW4EZW	748	142	81MO	E
30	G1UOW	712	158	92FJ	
31	G2DMR	706	217	91VH	C
32	G3ZTT	683	169	830E	A
33	G4APD	661	166	92JI	B
34	G3WSC	647	153	91UD	C
35	G8INE	622	104	01JT	C
36	G4TBR	603	181	91OQ	D
37	G1SWH	602	184	83OO	A
	G4NYZ	602	152	92AH	B

Checklogs acknowledged from: G8XTV, PA0GHB, PE1EWR, G4IDF, G0DXL
Disqualified: G3PJR, G8CWB, G1EUU, G4WZU (General rule 3) G1KDF, G1ORC, G0AGE, G3UOA (General rule 2) G8TRS (General rule 13).

OVERALL RESULTS

Posn	Club	Score	Callsigns					Zone
1	Sheppey Western CG	10,250	G4NXO	G3KFT	G4ASR	G4GFX		B*
2	Harwell ARS 'A'	6,510	G3NNG	G3PIA	G4HLX	G1OUF	G1PGV	D*
3	Colchester RA 'A'	6,087	G4WFR	G4TZM	G4LKD	G4ZKS	G8INE	C*
4	Rugby ATS 'A'	3,575	G1LVY	G4EPA	G4APD	G8LYB	G0COO	B
5	Sutton & Cheam RS	3,444	G3MES	G2DMR	G3CDK	G3WHK	G3LCH	C
6	Reading & D ARC	3,345	G4CCC	G4MUT	G4YFB	G8DOR		
7	North Bucks CG	3,023	G4NUT					D
8	Crawley ARC 'A'	2,926	G6LMU	G3WSC	G3GRO	G3YVR	G1TWK	C
9	Colchester RA 'B'	2,881	G1LGF	G4DKI	G6XRD	G0EGX	G6IAW	C
10	South Lakeland ARS	2,848	G1DOX	G4RWO	G6LKB	G1BFZ		
11	Vale of Evesham RAC	2,812	G4UXC	G0EMS	G4NYZ	G4WAD	G1UUX	B
12	Stirling & D ARS 'A'	2,706	GM4ZGB	GM4RTN	GM4DGT	GM1RRF	GM0GDL	G*
13	Central Lancs ARC 'A'	2,581	G1SWH	G4WXX	G1PKE	G1AHM	G4OBK	A*
14	Chesham & D ARS	2,572	G6KZP	G4TBR	G4KVI	G1RDX	G0ABZ	D
15	Isle of Man ARS CG	2,470	GD4IOM					A
16	Mid-Sussex ARS	2,468	G3ZMS	G3JMB				C
17	Derbyshire Hills CG	2,444	G4ZAP					B
18	Five Bells	2,426	G8ZHP					B
19	Farnborough & D RS 'A'	2,376	G8YKM	G8ATK	G0FRS	G0GCI	G1IPO	D
20	Aberdeen ARS 'A'	2,266	GM0FRT	GM3WTA	GM3UU	GM1LKD	GM4TEF	G
21	Milton Keynes & D ARS	2,254	G6XDM	G0ERE	G0GFW			D
22	Norfolk ARC	2,190	G8JQQ	G8VPE	G6ZQE			C
23	Mid-Cheshire ARS 'A'	2,171	G3ZTT	G6HXU	G1URT	G0ADU	G4XFD	A
24	Macclesfield & D RS 'A'	2,038	G1NTR	G1NUS	G1GYC	G0AMU	G1KBS	
15	North Wakefield RC	1,793	G4NOK					A
26	Flight Refuelling ARS	1,786	G4RFR					D
27	Denby Dale & D ARC	1,644	G3SDY	G0EOJ	G1FBC	G3YWI	G4KFP	
28	Maltby ARS	1,610	G6XVV					A
29	Dunfermline RS	1,579	GM4JJJ	GM3IDS	GM0GBH	GM4YED	GM3EGU	G
30	South Manchester RC 'A'	1,557	G4JLG	G4NTY	G4MYB	G0AOU	G3ZDM	A
31	Northumbrian ARC	1,467	G4AAX					
32	Colchester RA 'C'	1,358	G4YIR	G0ANZ	G4HKC	G1SVW	G0FIW	C
33	Reigate ATS	1,102	G1KPU	G8AZC	G8JXV	G1LNT	G3YSX	
34	Leicester RS 'A'	1,099	G3LRS	G4JDI	G4WYN	G0AIZ		B
35	North Kent RS	911	G4CW					C
36	Southdown ARS	831	G1KAR					C
37	Thornton Cleveleys ARS	813	G4ATH					
38	Harwell ARS 'B'	805	G6NTN	G6MRP	G1TJI	G4YME		D
39	Chester & D RS	789	G8ZRE	G4YCA	G1PRL	G6IFA		A
40	Leicester Poly (SU) CG	781	G3SDC					B
	Bristol ARC	781	G3TAD					
42	London Airways ARC	774	G4GTT					
43	Newport ARS	748	GW4EZW					E*
44	Central Lancs ARC 'B'	731	G0FDX	G3RYY	G6WFK	G4YWG	G1RBZ	A
45	Univ of Warwick ARS CG	712	G1UOW					
46	Sheffield ARC 'A'	682	G1JPN	G1SHA	G8ZHG	G4UMQ		A
47	Maidenhead & D ARC	606	G0AYA	G3TWG	G0CWI			
48	Telford & D ARS	578	G6ZME					
49	Poole RAS	547	G6MXL	G4WCJ	G4XYX			D
50	Melton Mowbray ARS	515	G1NPP					B
51	English China Clays RC	460	G0ECC					D
52	Cambridge & D ARC	435	G2XV					B
53	City University ARS	300	G8CIQ					C
54	North Bristol ARC	298	G6PNB					D
55	Plymouth Polytechnic ARS	238	G3TCP					
56	Leicester RS 'B'	221	G4SDZ	G0BAI	G0FZE			B
57	Brunel University ARS	214	G3UBR					
58	Farnborough & D RS 'B'	190	G4JFN	G4FUY	G4VAH			D
59	Colchester RA 'D'	189	G3WBM	G3GLL				C
60	Crawley ARC 'B'	183	G3JKF					C
61	Glenrothes & D ARC	128	GM4GRC	GM1NTQ				G
62	Stirling & D ARS 'B'	113	GM1REK					G

Posn	Club	Score	Callsigns					Zone
63	South Manchester RC 'B'	98	G1UOK	G0CBJ				A
64	Mid Cheshire ARS 'B'	61	G6BVU					A
65	Aberdeen ARS 'B'	46	GM0FJG	GM6MGS	GM1RDG	GM1MCN	GM3EWC	G
66	Rugby ATS 'B'	33	G8ZVE					B

*Zonal winners

G T Peck Memorial Trophy DF Event

Date: 12 April 1987.
Map: OS Sheet 175 1:50,000 series, Reading and Windsor.
Assembly: 1300bst for start at 1320bst.
Location: Peppard Common, NGR709818.
Competitors requiring tea should notify Mr W Pechey, Jays Lodge, Crays Pond, Reading, Berks RG8 7QG, tel 0491 680552, by 5 April 1987.

DF Qualifying Event—Oxford

Date: 26 April 1987.
Map: OS Sheet 164 1:50,000 series, Oxford.
Assembly: 1300bst for start at 1320bst.
Location: Shotover Plain, NGR565063. Please approach from the west.
Competitors requiring tea should notify Mr R Pearce Boby, College Farm, Pinchgate, Bletchington, Oxford, tel 0869 50767, not later than 19 April 1987.
Details of rules etc, for RSGB Top Band DF events may be obtained from E L Mollart (G6AGE) 17 Spinfield Mount, Marlow, Bucks SL7 2JU.

1986 1·3GHz/2·3GHz Cumulative Contests results

Activity in these contests was very similar to 1985, and sessions 1 and 4 provided the best conditions. Unfortunately, none of the sessions were very good, and the best dx worked was only 466km. Session 5 was very poorly supported, and G4NBS is probably right in suggesting that it is too close to Christmas.

It was disturbing to have to disallow seven contacts (50 per cent of the total) of one station on a 2·3GHz session, because these were clearly made with the same station operated by a number of others signing /A. If this was permitted, it would be a simple matter to assure success in a microwave contest by prior arrangement.

No less than 24 unnecessary 427s and 4422s were received. It would be appreciated if future contestants sent only one 427 for each band in 1987. If rule 3 were to be enforced, only three stations would appear in the results. The VHF contests committee promises to clarify the rules next year.

Nobody commented on the new two section format. Do you want to continue this in 1987? Please let us know your views.

Commiserations to G8CHW, whose antennas were blown down after session 1, and congratulations and certificates to G4THB/P, G4MGR, and G6OYL (1·3 GHz) and G4THB/P and G8TFI (2·3 GHz).

G4JLG

1·3GHz Cumulatives

FIXED SECTION

Posn	Callsign	Points	Loc	Pwr (W)	Ant	Best dx	Km	Sessions
1	G4MGR	598	83KH	120	4×23 Y	G4PRJ	365	1,2,4
2	G6OYL	445	93JK	30	1·4m D	G3JVL	296	1,3,4
3	G4NBS	442	02AF	4	4×23 Y	G1DOX	300	1,3,4
4	G4DEZ	415	01IN	12	4×55 Y	G4MGR	324	1,3,4
5	G8TFI	407	81UQ	240	2m D	PA0WWM	466	1,4
6	G8ULU	370	01NI	10	4×23 Y	G4MGR	274	1,2,3
7	G8IFT	357	82XJ	150	4×23 Y	G8ULU	246	2,3,4
8	G8HHI	278	91OH	30	15+15Y	G4MGR	274	1,3,4
9	G3IGQ	250	91QF	40	47 QLY	PE1EWR	290	1,2,4
10	G8ZQB	206	92JN	40	27 QLY	G8ULU	208	1,2,4
11	G4PMK	173	93GT	60	23 Y	G3XDY	264	1,2,4
12	G8NEY	153	81VK	100	4×23 Y	G3LQR	262	1,2,4
13	G8CHW	146	91TQ	10	48 QLY	G4PMK	247	1,3,4
14	G1DOX	130	84JC	80	4×23 Y	G4NBS	301	3,4,5
15	G8ATK	87	91OF	100	15+15Y	G8VLL	212	3,5
16	G1KDF	57	83NN	10	55 Y	G8TFI	212	1,4,5

OPEN SECTION

Posn	Callsign	Points	Loc	Pwr (W)	Ant	Best dx	Km	Sessions
1	G4THB/P	783	93AF	100	2m D	PE1EWR	420	1,3,4
2	GW8ACG/P	461	83JF	70	2×24QL	G8ULU	361	1,3,4
3	G6CSY/P	119	01BH	1	23 Y	G4THB/P	256	1,4
4	G4CCC/P	89	91JL	10	23 Y	G3XDY	170	1,2

2·3GHz Cumulatives

FIXED SECTION

Posn	Callsign	Points	Loc	Pwr (W)	Ant	Best dx	Km	Sessions
1	G8TFI	108·5	81UQ	50	1·2m D	G1DOX	276	1,4
2	G8IFT	38·5	82XJ	20	44 QLY	G3JXN	154	1,3,4
3	G1DOX	21	84JC	15	48 QLY	G8TFI	276	3,4,5
4	G4PMK	7·5	93GT	0·5	0·7m D	G6DER	27	3,4,5
5	G8CHW	6	91TQ	0·5	66 QLY	G8TFI	132	1

OPEN SECTION

Posn	Callsign	Points	Loc	Pwr (W)	Ant	Best dx	Km	Sessions
1	G4THB/P	104	93AF	50	2m D	G4KDH	251	1,2,3
2	G4TAW/P	4·5	01BH	1·5	66 QLY	G3JXN	37	4

OVERALL RESULTS

OPEN SECTION

Posn	Group/callsign	1·3 GHz	2·3 GHz	Total
1	The Hillbillies	1,000	1,000	2,000
2	GW8ACG/P	589	—	589
3	G6CSY/P & G4TAW/P	119	43	162
4	G4CCC/P	114	—	114

FIXED SECTION

Posn	Group/callsign	1·3 GHz	2·3 GHz	Total
1	G8TFI	681	1,000	1,681
2	Wirral ARC	1,000	—	1,000
3	G8IFT	597	355	952
4	G6OYL	744	—	744
5	G4NBS	739	—	739
6	Mudhoppers	694	—	694
7	G8ULU	619	—	619
8	G8HHI	465	—	465
9	Univ of Surrey	418	—	418
10	G1DOX	217	194	411
11	G4PMK	289	69	358
12	G8ZQB	345	—	345
13	G8CHW	244	55	299
14	G8NEY	256	—	256
15	G8ATK	145	—	145
16	G1KDF	95	—	95

Club News

The following is the latest information received by RRs from the RSGB affiliated societies, clubs and groups in time for inclusion in this issue. Basic unchanged information on other affiliated organizations will be published again in July 1987.

RSGB affiliated organizations are requested to report all programmes and new items to their regional representatives regularly. Information for inclusion in the **June** issue should reach them by **1 April,** and for the **July** issue by **1 May.**

Club programmes are given in order of date, subject, time and place of meeting. All callsigns of club secretaries and other contacts are QTHR (correct in the current *RSGB Call Book*) unless otherwise stated.

All clubs welcome visitors and would be pleased to hear from potential new members.

REGION 1—RR B Donn, G3XSN, 7 Thurne Way, Liverpool L25 4SQ.Tel 051-722 3644.

Accrington (NW Repeater Group)—16 Apr ("Packet and digipeater", G8UVE. Talk-in on S23, SU21, GB3RF and GB3PF). 8pm. Globe Bowling Club, Willows Lane, Accrington. Details G0DTI.

Barnoldswick (RRARC G3RR)—1 Apr (Interclub games, invite to all clubs), 6 May (Fox hunt). Morse classes every Monday night 7.30pm. Shack nights every 2nd and 3rd Wednesday of month. The Rolls Royce Sports & Social Club, Barnoldswick. Sec G4ILG, tel 0282 812288.

Bury (BRS)—8 Apr ("Optical fibre transmission", G4KLT), 12 May ("Maths with Maurice", G0BWN). Mosses Community Centre, Cecil St, Bury. Details G1VQE.

Darwen (DARC)—8 Apr (Inter-club quiz), 13 May (Visit by RIS rep). 7.30pm. Highfield Working Mens Club, Ratcliff St, Darwen. Details G2AKK, tel 0254 73767.

Fylde (FARS)—7 Apr ("Aurora, What causes it," part 2), 21 (Informal with morse), 5 May (Equipment sale). 7.45pm. The Kite Club, Blackpool Airport. Sec G8GG, tel 725717.

Isle of Man (IoM ARS)—10 Apr (Annual dinner dance), Howstrake Hotel, Harbour Rd, Onchan. Details GD4GWQ, tel 0624 22295. Additional local meetings are held 8pm at the British Legion, Douglas St, Peel, on Thursdays and Perwick Bay Hotel, Port St Mary on Fridays.

Leyland (Central Lancs ARC)—6 Apr (Noggin and natter), 13 (Committee meeting), 20 (No meeting), 4 May (May day operating event on hf, and barbecue). Morse classes, 7.15pm by G0ASH. Priory Club, Bradfield Drive, Leyland. Sec G4ZYN, tel 0257 452287.

Liverpool (L&DARS)—7 Apr (Talk on Raynet), 14 (Contest discussion), 21 (Radio quiz), 28 ("Grass Track Racing", G0AJL & G1JEI), 5 May (RTTY demo, G4CVZ). Morse and RAE classes, 7pm. Meetings 8pm. The Churchill Conservative Club, Church Rd, Liverpool 15. Sec Lynn, tel 051-728 8811.

Macclesfield (M&DRS)—7 Apr (Construction evening), 14 ("RTTY", G0DMV), 21 (Committee meeting), 28 (Open meeting), 5 May (Construction evening). 8pm. The Fermain Club, Oxford Rd, Macclesfield. Sec G1NUS, tel 0625 24534.

Manchester (SMRC)—3 Apr (Home built equipment contest), 10 (Lecture on fstv), 17 (Closed), 24 (Spring df contest), 1 May (Talk by the winner of the home built equipment contest), 8 (Visit by RR1), 8pm. Sale Moor Community Centre, Norris Rd, Sale. Details G2AKR.

Ormskirk (O&DARC)—2 Apr (AGM), 5 May (Rufford carnival). 8pm. Ormskirk Community Centre. Details G1KDF, tel 0695 74868.

Rossendale (RARS)—8 Apr (Fox hunt). 8pm. The Huntsman, Burnley Rd, Loveclough, Rossendale. Sec G4VVK.

Southport (S&DARC G2OA)—At the recently held AGM of the Ainsdale ARC the name of the club was changed. All future notices will be under the title of Southport & DARC. Meeting fortnightly, 8pm. St Mark's Church Hall, Scarisbrick. Sec G4YYV, tel Southport 79825.

Warrington (WARC)—7 Apr (AGM), 14 ("Photography", G4SCI), 21 (Quiz; WARC v Bury ARS), 28 (Open forum), 5 May ("The new transceiver", G3OGQ). 8pm. Grappenhall Community Centre, Bellhouse Lane, Grappenhall, Warrington. Sec G0CBN, tel 0925 814005.

Wirral (WARS G3NWR)—1 Apr (Video night), 15 (Quiz). 8pm. Ivy Farm, Arrowe Park, Birkenhead. Sec G3VEB.

Wyre (WARS)—8 Apr ("Talk on tropical fish", Ben Frost), 22 ("Amateur television", G6IGV). 8pm. The Breck Squash Club, Breck Rd, Poulton. Sec G4UHI, tel 854745.

My thanks to Darwen ARC for their hospitality during my recent visit. Welcome to the Wyre ARS and thank you for the invitation to visit on 27 May. Best wishes to the re-named Southport & DARC.

RR1

REGION 2—RR P R Sheppard, G4EJP, 9 Elvington Crescent, Leconfield, Beverley, N Humberside HU17 7LX. Tel 0401 50397.

Goole (GR&ES G0GLE)—3 Apr (Natter night), 10 (Ken Storey Constructors Trophy at Black Swan to be judged by RR2, G4EJP), 17 (Good Friday quiz night), 24 (Social evening, Black Swan). Meetings, West Park Pavilion. Details G0GLZ, tel 0405 69968.

Halifax (H&DARS G2UG)—24 Apr (Club dinner). Running Man ph. Details G0DLM, tel 0422 202306.

Keighley (KARS RS 84851)—14 Apr (Junk sale), 28 (Visit to HMS Forest Moor, Harrogate). Victoria Hotel. Details G1IGH, tel 0274 496222.

Leconfield (RCT ARS G4GGD)—2 Apr (Chat night), 16 (Monthly lecture). Normandy Barracks. Details G4SMB, tel 0401 51200.

North Wakefield (NWRC G4NOK)—2 Apr (Junk sale), 9 ("First aid in the shack", Tony Dixon), 16 (Talk by RIS), 23 (Night on the air), 30 (Monthly meeting). White Horse ph. Details G4RCH, tel 0532 536633.

Operation Raleigh (ORHARC GB4ORH)—Operating daily from Hull on either 3,560kHz cw, 3,732kHz ssb from 1000 to 1300 and on 14 and 21MHz when open. Meetings and exhibition at Queen Docks Ave, Hull. Details G1TFT, tel 0482 28217.

Pontefract (P&DARS G3FYQ)—2 Apr (Arrangements for components fair), 5 (7th Annual Components Fair). Carleton Community Centre. Details G0AAO, tel 0977 43101.

Spen Valley (SVARS G3SVC)—2 Apr (AGM), 16 (Film night). 8pm. Old Bank WMC. Details G4PHR, tel 0924 499397.

Todmorden (T&DARS G4WYT)—6 Apr (Talk by CEGB), 20 (Chat night). 8pm. Queen Hotel. Details G1GZB, tel 070681 7572.

UK FM Group (Northern G8KEM)—5 Apr (Monthly group meeting). 7.30pm. Royal Hotel, Barnsley. Details G4UNA.

Wakefield (W&DARS G3WRS)—7 Apr (Computer evening), 11 (Science museum trip), 14 (AGM), 21 (On the air and club project), 28 ("Egypt", G4AAU). 8pm. Ossett Community Centre. Details G4VRY, tel 0532 820198.

Wawne (Raynet Group G4UWE)—6 Apr (Communications tests with county groups), 13 (Group training night). EP Cell, Meaux Road. Details G4EJP, tel 0401 50397.

White Rose (WRARS G3XEP)—1 Apr (Surprise), 8 (Final bash the committee). Moortown RUFC. Details G4ATZ, tel 0937 842790.

York (YRCA G4YRC)—14 Apr (Club night quiz morse), 28 (Minster contest night). Ashcroft Hotel. Details G1FMA, tel 0904 704634.

REGION 3—RR G Ross, G8MWR, 81 Ringwood Highway, Coventry CV2 2GT. Tel 0203 616941

Aston (AUARS G3UOA, G8PGM)—Mondays, lunchtime; Thursday evenings and UCCA visiting day afternoon during terms. Introductions via admissions tutors or chairman. Details G6VWA, tel 021-359 3611 ext 5115.

Coventry (CARS)—3 Apr ("50 years of amateur radio", G3BA), 10 ("Police communications", Chief Insp Harnbrook), 17 (Morse class and night on the air), 24 (Fun competition). 8pm. Scout HQ, 121 St Nicholas St, Radford, Coventry. Sec G3UOL, tel 414684.

Evesham (ERAC)—2 Apr ("The RSGB at work", G8MWR). Sec G4UXC, tel Evesham 831508.

Halesowen (MEB RC)—14 Apr (Mystery talk, Paul Allen), 28 (AGM). 8pm. MEB Social club, Mucklow Hill, Halesowen. Sec G4RWH, tel 021-747 8784.

Oswestry (O&DARC)—7 Apr (Practice night and border awards), 21 (AGM). First Tuesday, 8pm, Gobowen. Third Tuesday, 8pm, Bell Hotel, Oswestry. Sec GW0DLW, tel 0691 831023.

Shrewsbury (SALOP ARS)—2 Apr (Construction contest). 8pm. Old Bucks Head ph, Frankwell, Shrewsbury. Sec G0EIY, tel 0743 67799.

Stratford-upon-Avon (SuAARC)—13 Apr ("Test your test equipment", G3MXH), 27 (Video night). 7.30pm. Baptist Church, Payton St, Stratford-upon-Avon. Sec G8OVC, tel S-u-A 750584.

Telford (TARS)—1 Apr (AGM), 15 (Junk sale at British Legion club), 22 (Exercises in Alberta), 29 ("Your match", G3UDA), 6 May (night on the air). 8pm. Dawley Bank, Community Centre, Dawley, Telford. Sec G0CZD, tel 0952 770568.

Warwick (WARS)—14 Apr ("Development of early comunications", G8CKL), 28 (Junk sale), 12 May (Bring your scanner), 8pm. St John Ambulance hq, 61 Emscote Rd. Warwick. Sec G6VHI.

West Bromwich (WBCRC)—5 Apr (Natter night), 29 (General meeting). 7.30pm. The Victoria, Lyng Lane, West Bromwich. Sec G4ZAD, tel 0902 48263.

Wolverhampton (WARS)—7 Apr ("QRP", Norman Field), 14 (Activity meeting), 21 ("ATV", G3RSX), 28 (Night on the air), 5 May ("Packet Radio", G1DIL). 8pm. Electricity Sports Club, St Marks Rd, Chapel Ash, Wolverhampton. Sec K Jenkinson, tel 0902 24870.

Worcester (WARC)—6 Apr (Construction contest). 8pm. Oddfellows Club, New St, Worcester. Sec G4RBD, 14 Oakleigh Heath, Hallow, Worcester.

Wythall (WARC)—7 Apr (Committee meeting), 21 (Oscar 10 video), 28 (Night on the air), 5 May (Committee meeting). 7.30pm. Community Centre, Silver St, Wythall. Sec G0EYO, tel 021-430 7267.

It is essential that club secs let me have details of meetings by the date shown on this column at the latest. If I do not get your entry I can't use it. I also need news and photos of things your club have been involved in. This column is not just a listing of events to come. You want a better *Rad Com*? Then help make it better. *RR3*

REGION 4—RR M Shardlow, G3SZJ, 19 Portreath Drive, Darley Abbey DE3 2BJ Tel Derby (0332) 556875.

Derby (DADARS)—1 Apr (Junk sale), 8 ("Historic avionics," Colin Baker), 15 ("Check your coaxial", G1EUP), 22 (144MHz df theory), 29 ("Commercial satellite operations", G4UWK), 7.30pm. 119 Green Lane, Derby. Sec G3KQF, tel Derby 772361.

Leicester (LRS)—6 Apr (VHF contest/nfd review), 13 (Committee meeting/night on the air), 20 (Night on the air), 27 (Constructors contest), 7.30pm. Gilroes Cottage, Groby Road, Leicester. Sec G4PDZ, tel Leicester 871086.

Mansfield (MARS)—5 Apr (Construction competition), 14 (tba), 7.30pm. Victoria Social Club, Mansfield. Sec G4AAH, tel Mansfield 642719.

Matlock (TORARA)—7 Apr ("Hazards of rf and explosives", G6YKN), 21 (AGM). 7.30pm. Greyhound Hotel, Cromford. Sec Syd Brown, tel Dethick 429.

Melton Mowbray (MMARS)—24 Apr (Construction contest), 7.30pm. St John Ambulance Hall, Asfordby Hill, Melton Mowbray. Sec G3NVK, tel MM 63369.

Spalding (SDARS)—(Visit by RIS) 7.30pm. The Ship Albion, Albion Street, Spalding. Sec G4NBR.

Worksop (WARS)—7 Apr (Junk sale), 21 (Visit to local police station), 8pm. Woodhouse Inn, Woodend, Rhodesia, Worksop, Sec G4ZUN, tel Worksop 486614.

REGION 5—RR J S Allen, G3DOT, 77 Rosslyn Crescent, Luton LU3 2AT. Tel 0582 508515 or at work on 0582 21151.

Bedford (B&DARC)—2 Apr (Club project), 19 ("The Floor is Yours"). 8pm. Allen's Club, Hurst Grove, Queens Park, Bedford. Details G4VHF, tel 0234 751763.

Dunstable (DDRC)—3 Apr ("Night Vision", G8XQN), 10 ("SSTV", G4ENB). 1 May ("Rig doctor", G6EES). 8pm. Room 3, Chews House, High Street South, Dunstable, Beds. Sec G6EES, tel Dunstable 607623.

Nene Valley (NVRC)—1 Apr (Informal evening), 8 Apr ("SSTV", G4ENB), 15 ("VHF mobile radio from 1945", G0AUO). 8pm. The Prince of Wales ph, Well Street, Finedon. Sec G6UWS.

Northampton (NRC)—2 Apr ("Basic car mechanics", G1JIP). 16 (Visit to Radio Northampton), (Construction contest). 8pm. Kingsthorpe Community Centre. Sec G8EUX.

Milton Keynes (MK&DARS)—13 Apr (Bring & buy sale). 7.30. The Meeting Place, Hodge Lee, Milton Keynes. Sec G0ERE, tel Cranfield 750629.

Shefford (S&DARS)—2 Apr (Club closed), 9 Apr ("Naval signals", Sid Lilliman). 8pm. The Church Hall, Ampthill Road, Shefford. Sec G4PSO, tel Hitchin 57946.

Wisbech (W&DAR&E Club)—The club's three special event callsigns, GB0SGD, GB4SGD and GB6SGD will be active from 19 April until 16 May for the St George's Day award. Details D Wilkinson G4KHF.

Club secretaries, please remember the revised closing dates for club news. To be posted to me and not to the editor.

RR5

REGION 6—RR N P Taylor, G4HLX, 87 Hunters Field, Stanford in the Vale, Farringdon Oxon SN7 8ND. Tel 03677 503.

Didcot (Vale of White Horse ARS)—7 Apr (Component sale), 21 ("Phase noise, intermodulation and dynamic range in receivers," G3RZP), 7.30pm. The Waterwitch, Cockroft Road, Didcot. Sec G4SYL, tel Didcot 816845.

High Wycombe (Chiltern ARC)—22 Apr (Film show), 8pm. Sir William Ramsey School, Rose Ave, Hazelmere. Details G4XVP, tel 0494 35275.

Maidenhead (M&DARS)—2 & 21 Apr (tba), 7.30pm. Red Cross Hall, The Crescent, Maidenhead. Sec G8RYW.

Newbury (N&DARS)—Meeting changed to second Thursday each month, 7.30pm. Newbury Technical College. Sec G3VOW, tel Newbury 43048.

Oxford (O&DARS)—8 Apr (Natter night), 22 (tba), 7.45pm. Oxford Civil Service Sports Association Club, Govt Buildings, Marston Rd, Oxford. Sec G4PUU.

Reading (R&DARC)—14 Apr (Natter night), 28 (Alignment evening), 8pm. Clubroom, White Horse ph, Emmer Green, Reading. 7.30pm. Details G4YFB.

Slough (Burnham Beeches RC)—6 Apr ("Cable tv," Joe Delahunty of Windsor tv), 8pm. 20 (Foxhunt), 5pm. 2-4 May (Bank holiday picnic, no evening meeting). Haymill Community Centre, 112 Burnham Lane, Slough. Details G6EIL, tel Maidenhead 25720.

REGION 7—RR R Sykes, G3NFV, 16 The Ridgeway, Fetcham, Leatherhead, Surrey, KT22 9AZ. Tel 0372 372587.

Ashford (Echelford ARS)—13 Apr (AGM), 30 (Auction sale). 8pm. The Hall, St Martins Court, Kingston Crescent, Ashford, Middx. Sec G4VAZ,tel Sunbury 82823.

Coulsdon (CATS)—13 Apr (Surplus sale). 8pm. St Swithuns Church Hall, Grovelands Road, Purley, Surrey. Sec G6HC, tel 01-684 0610.

Cray Valley (CVRS)—2 Apr (Constructional contest), 16 (AGM). 8pm. Progress Hall, Admiral Seymour Road, Eltham SE9. Details G3TAA.

Croydon (SRCC)—6 Apr (AGM). 8pm. TS Terra Nova, 34 The Waldrons, South Croydon, Surrey. Sec G8IYS, tel 01-657 0454.

Crystal Palace (CP & DRS)—11 Apr ("Amsat progress report", G3AAJ). 8pm. All Saints Parish Room, Upper Norwood, SE19. Sec G3FZL, tel 01-699 6940.

Sutton and Cheam (S & CRS)—17 Apr (Junk sale). 8pm. Downs Lawn Tennis Club, Holland Avenue, Cheam, Surrey. Sec G4FKA, tel Epsom 21439.

Thames Valley (TVARTS)—7 Apr (Surplus sale). 8pm. Thames Ditton Library, Watts Road, Giggs Hill, Thames Ditton. Sec G3ENI.

Wimbledon (W & DRS)—10 Apr (Surplus sale), 24 (Maritime radio). 8pm. St Andrews Church Hall, Herbert Rd, SW19. Sec G3DWW.

REGION 8—RR M Elliott, G4VEC, 20 Haysel, Sittingbourne, Kent ME10 4QE. Tel 0795 70132.

Dartford (DDFC)—14 Apr (Pre-hunt meeting after 9pm, Horse & Groom ph, Leyton Cross, Dartford Heath), 19 (Sunday hunt, 2.30pm. Dartford Heath). 1 May (AGM, Scout House, Broomhill Rd, Dartford, 8pm). Details G8DYF, Greenhithe 884467.)

Dover (SE Kent YMCA ARC)—1 Apr (AGM). 8 & 22 (Natter night), 15 (tba), 29 ("Top band", G3BDQ), 8pm. Dover YMCA, Godwynehurst, Leyburne Rd, Dover. Details John H Dobson, tel Dover 211638.

Eastbourne (Southdown ARS)—6 Apr ("HF wire antennas & dx", G3BDQ), 7.30pm. Chaseley Home, Southcliff, Eastbourne. Various courses held Tuesday nights, and Friday night is chat night at the club rooms, Hailsham Leisure Centre, Vicarage Lane, Hailsham. Details G4XNL, tel Eastbourne 638653.

Eastbourne (Eastbourne Electronics & ARC)—New meeting place. Shinewater Community Centre, Milfoil Drive, Langney, Eastbourne, 8pm, every Sunday. RAE & morse classes also held. Details, tel between 8 and 10pm, Sundays, Eastbourne 768614.

Hastings (HERC)—15 Apr (Junk auction), 7.30pm. West Hill Community Centre. Details G4NVQ, tel Hastings 420608.

Horsham (HARC)—2 Apr ("Packet radio", G4OAK), 8pm. The Guide Hall, Denne Road, Horsham. Details G4UDU, tel Hassocks 5517.

Tunbridge Wells (West Kent ARS)—3 Apr (AGM), 8pm. Adult Education Centre Annexe, Quarry Road, Tunbridge Wells. Details G3XPX, tel 0892 48575.
Our apologies to those Region 8 clubs whose entries accidentally appeared in Region 5 last month—*Ed.*

REGION 9—RR A H Hammett, Rosehill, Ladock Truro, Cornwall TR2 4PQ. Tel 0726-882 758.

Axe Vale ARS—3 Apr (144MHz foxhunt), 1 May ("Meet the coastguards" a visit to Allhallowes School for film and talk by G4DOQ, and demonstration of a weather tracking station). Details G3VW, Lyme Regis 5282.
Devon Raynet—10 Apr (Social evening) Hare and Hounds near Honiton. Tickets and details G1DII, tel 0297 21424.
Exeter ARS—13 Apr (Inter-club Quiz). 7.30pm. Community Centre, St Davids Hill, Exeter. Details G3YBK, tel 0392 78710.
North Cornwall ARC—1 Apr (Planned visit to Bodmin Radio Station, still to be confirmed). Details G0DBD, tel Bude 4976.
Redruth (CRAC)—2 Apr (AGM and natter), 13 ("Data storage of the future", G3VWK), 16 (Constructors workshop), 7 May ("Crime prevention and the radio amateur", Sgt Richards, Devon and Cornwall Police). 7.30pm. Church Hall, Treleigh, Redruth (just off the Old Redruth Bypass). Details G4ZUI, tel Stithians 860 572.
St Austell (ECC Radio Club)— 6 Apr ("Slowscan tv", G3WKF & G4KNI), 20 ("Construction for the amateur", G3GHS). 7.30pm. Pentewan Road Labs, Pentewan Road, St Austell. Details G4OKS, tel 0726 813 935.
Torbay ARS—25 Apr (AGM). 7.30pm. ECC Social Club, Ringslade Road, Highweek, Newton Abbott. Details G1EUA, tel Teignmouth 78 554.
There is to be a meeting Sunday April 12 at Sparkwell Village Hall, just East of Plymouth commencing at 10am. There will be lectures on packet and satellite communications. A general discussion will take place in the afternoon. Catering will be available on site. For the family, the Sparkwell Wildlife Park is nearby. *RR9*

REGION 10—D H Phillips, GW4KQ, 17 Pentre Gardens, Grangetown, Cardiff CF1 7QJ. Tel 0222 35648.

Cardiff (CRSGBG)—13 Apr ("Communications over CEGB power lines", GW3NWS). 7.30pm. PantMawr Hotel, Tyla Teg, Pantmawr Estate, Whitchurch, Cardiff. Sec GW0CUM, tel 04463 3212.
Powys (PARC)—9 Apr ("Bees", GW1PTA & GW1URF). Sec GW4DWX, tel 0938 2068.
Rhondda (RARS)—2 Apr (Local clubs get together), 16 ("HM Coastguard"), 30 (General meeting). Sec GW4BUZ, tel 0443 432542.
Swansea (SARS)—16 Apr (Final preparations for SARS Rally). Sec GW0BBO, tel 0792 818100.

REGION 11—RR B H Green, GW2FLZ, 1 Clwyd Court, Tan-y-Bryn Road, Colwyn Bay, Clwyd LL28 4AH. Tel 0492 49288

Colwyn Bay (Conwy Valley ARC GW6TM)—9 Apr (Lowe Electronics Ltd), 14 May (Talk by GW3MZY). 8pm. Green Lawns Hotel, Bay View Rd, Colwyn Bay. Sec GW4KGI, tel 0745 823674.
Dolgellau (Meirion ARS)—2 Apr ("Computers and radio talk", GW6JJV & GW6ZZB). 7.30pm. Dolserau Hall Hotel, two miles from Dolgellau off the Bala Rd. Sec GW4GKZ, tel 0341 422 447.
Welsh Language Group—Every Wednesday at 1115gmt on 3·750MHz. Join the net for various discussions in Welsh. Net controller GW2HFR.

REGION 13—RR A J Scott, 2 Manderston Grove, Duns, Berwickshire TD11 3PP. Tel 0361 83221.

Dunfermline (DRS GM3IDS)—Apr (Mossmorran visit). Sec GM0DYD, tel 0383 413440.
Kelso (KARS GM4KHS)—6 Apr (Operating/antenna repairs), 13 ("Astrology", G3BRA), 20 (Projects), 27 (Rally discussion). Sec GM4UPX, tel 0835 62656.

REGION 14—RR T G Wylie, GM4FDM, 3 Kings Crescent, Elderslie, Strathclyde PA5 9AB Tel Johnstone (0505) 22749.

Ayr (AARG)—3 Apr ("Finishing techniques", GM6JIC), 17 (RSGB film; "Space shuttle,") 7.30pm. Community Leisure Centre, 24 Wellington Square, Ayr. Details GM4CUB, tel Ayr 262496.
Glasgow (WOSARS)—3, 17 Apr (Informal night), 10 ("Himalayan expedition," Graham Little). 154 Ingham St, Glasgow. Details GM0EFH.
Motherwell (MLARS)—24 Apr ("Radio propagation and antennas", Doug Smillie). 7.30pm. Wrangholm Hall Community Centre, New Stevenson. Details GM1SSA.
Sterling (SADARS)—1 Apr (Visit to Central Scotland Police communications department. Meet at 6.45pm at Police HQ. Places are limited). 9 (ten pin bowling at Glenrothes. 30 places available). Contact Sec asap for details. GM0BFS, tel Alloa 217702. Club also runs cw classes on Tuesdays at 7.30pm in the Club Room,. Argyle Centre, Princes Street, Stirling.
Club secretaries please notify of any changes after AGM to me. *RR14*

REGION 16—RR A Owen, G4HMF, 102 Constable Rd, Ipswich, Suffolk. IP4 2XA.

Braintree (B&DARS)—6 Apr (Constructors contest). 8pm. Community Centre, Victoria Rd (next to bus station), Braintree. Details G1NBV, tel 0376 44908.
Bury St Edmunds (BStEARS)—21 Apr ("Packet radio", G4XRK). 7.30pm. County Upper School, Beetons Way, Bury St Edmunds. Details G1FUU, tel 0358 50271.
Chelmsford (CARS)—7 Apr ("Shortwave and beams", J S Woods). 7.30pm. Marconi College, Arbour Lane, Chelmsford. Details G4KQE, tel 0376 83094.
Colchester (CRA)—2 Apr ("The art of wokking", G4BCH), 30 (Planning nfd and Rally). 7.30pm. Colchester Institute, Sheepen Rd, Colchester. Details G3FIJ, tel 0206 851189.
Felixstowe (F&DARS)—6 Apr ("BBC transmitters", G6CMD). 8pm. Scout Hut, Bath Rd, Felixstowe. Details G4YQC, tel 0473 642595.
Great Yarmouth (GYRS)—2 Apr ("Propagation", G3IOR), 23 (Quiz). 8pm. Drill Hall, York Road, Great Yarmouth. Details G3NHU, tel 0493 721173.
Ipswich (IRC)—29 Apr (AGM). 8pm. Rose and Crown ph, Norwich Rd, Ipswich. Details G4IFF, tel 0473 44047.
Loughton (L&DARS)—10 Apr (AGM), 24 (Planning special event weekend). 8pm. Debden Community Centre, Loughton Hall, Rectory Lane, Loughton. Details G4FKI, 46 Townfield Rd, Flitwick, Beds, MK45 1JF.
Norwich (NARC)—1 Apr (AGM), 8 (Natter night). 8pm. Valley Drive Community Centre, 79 Plumstead Rd, Norwich. Details G4RKK, tel Wymondham 606979.

REGION 17—RR T Emery, Wilverley, Old Lyndhurst Road, Cadnam, Southampton. SO4 2NL. Tel 0703 812435.

Amateur Radio and Computer Club (AMRAC)—3 Apr (AGM). 8pm. Botleigh Grange Hotel, Botley, Hants. Sec G4NAB, tel Locks Heath 84914.
Basingstoke (BARC)—4 Apr ("EMC", G4IWS), 7.30pm. Forest Ring Community Centre, Sycamore Way, Basingstoke. Sec G1OQV, tel 0256 59664.
Blackmore Vale (BVARS)—14 Apr (AGM). 7.45pm. The Bell and Crown ph, Zeals, (on the A303). Sec G4YXX, tel 0963 32389.
Eastleigh (Itchen Valley ARC)—10 Apr ("Electron microscopes", G4NMP), ("Metal detecting", John). 7.30pm. The Scout Hut, Brickfield Lane, Chandlers Ford. Sec G1IPQ, tel Southampton 736784.
Fareham (F&DARC)—8 Apr ("Contest operating", G0ERS), 7.30pm. Portchester, Community Centre, Portchester, Hants. Sec G3CCB, tel Fareham 288139.
Gosport (Rowners & DARS)-4 Apr start of Solent Fortifications Award with GB0/GB1CDA at Fort Blockhouse and GB0/GB1CDR at Royal Yacht Squadron HQ, Cowes Castle, IoW. Details G6MWY, tel Lee-on-the-Solent 551191.
Guernsey (GARS)—10 Apr (Quiz evening), 8pm. The Lodge, La Corbinerie, Oberlands, St Martins, Guernsey. Sec GU1PMY, tel 0481 26392.
Horndean (H&DARS)—2 Apr (Visit to SMC Ltd). 7.30 for 8pm. Murchiston Hall, London Road, Horndean Sec G4RLE, tel 0705 755274.
Liphook (Three Counties ARC)—1 Apr ("The Real Hobby", G8VFH), 15 ("The RSGB", G4FRX). 8pm. The Railway Hotel, Liphook. Sec G0BTU, tel Petersfield 66489.
New Forest Repeater Group (GB3NF)—For information or to join the group and help support the repeater, please contact G6DLJ.
Poole (PARS)—24 Apr (AGM). 7.30pm. Commanders House, Constitution Hill Road, Poole. Sec G4XYX.
Portsdown Hill Repeater Group (GB3PH)—For information or to join the group and help support the repeater, please contact Mr A L G Price, tel 0329 281852.
South Dorset Repeater Group (GB3SD & GB3DP)—For information or to join the group and help support the repeaters please contact G0EVW, tel 0305 771517.
Swindon (S&DARC)—2 & 30 Apr (Rally planning), 9 (Natter night), 16 Apr ("Radio intelligence", G3BGM), 7.30pm. Oakfield School, Marlowe Avenue, Swindon. Sec G4YQZ.
Trowbridge (T&DARC)—1, 15 & 29 Apr (tba). 8pm. Territorial Army Centre, Blythsea Road, Trowbridge. Please note new sec G6ZXN, tel Devizes 830383.
UK FM Southern Repeater Holding Group (GB3SN)—For information or to join the group and help support the repeater please contact Mrs Jan Steele, tel Fleet 613311.
Waterside (WSWC)—28 Apr (AGM). 7.30pm. Community Centre, Blackfield, Southampton. Sec G0BPA, tel Southampton 893937.
Weymouth (SDRS)—7 Apr (AGM). 7.30pm. The Civilian Mess, Army Camp, Camp Road, Wyke Regis, Weymouth. Sec G0FIT, tel Dorchester 67596.
Winchester (WARC)—17 Apr ("The RSGB", G3KWU). 7.30pm. Durngate House, Winchester. Sec Dick Murray, tel Winchester 880605.

REGION 18—RR Ian Gibbs, G4GWB, 61 The Gables, Widdrington, Morpeth NE61 5QZ. Tel 0670 790090.

Bishop Auckland (BARAC)—9 Apr (Domestic electrical installations), 23 (HF tuning and interference). Travellers Rest, Evenwood, Bishop Auckland. Details G0FBK, tel 0388 606819.
Blyth (BARC G4VKY)—The granting of another room in the community centre now allows for an increase in club membership. Interested parties to contact the sec. Club station operational on vhf & hf. Meetings Wednesday evening, the Community Centre, Warwick St, Blyth. Sec G1JFW, tel 0670 353069.
Galashiels (SBRG GB3BT)—26 Apr (AGM). 2pm. Focus Centre, Galashiels. Subs are due and can be sent to treasurer GM0FTJ. Sec GM4BDJ, tel 0541 80018.
Easington (EARS G4APN/G6APN)—Meetings Thursday evenings in the Masons Arms, Easington Village. Please note new club sec, Barry Glassford, 2 Gosling Letch, Easington Village.

REGION 19—RR R J C Broadbent, G3AAJ, 94 Herongate Road, Wanstead Park, London E12 5EQ. Tel 01-989 6741.

Cheshunt (CDARC G4MGC)—1 Apr ("Watch this Space", G3TKI). 15 (Natter), 22 ("Clandestine radio", G3VA). 8pm. Church Rooms, Church Lane, Wormley, Herts. Secs G4VMR and G4VSL, tel (evenings) 0920 84250. Club Net freq 144·535 MHz, 2000 hours to 2100 hours.
Chiswick (ABCARC)—21 Apr. (Demo of modern rtty, G4JLV.) 7.30pm. Chiswick Town Hall, High Road, Chiswick, London W4. Sec G3GEH, tel 01-992 3778.
Edgware (E&DRS)—9 Apr ("The origins of morse", G4FAI), 23 (Straight key evening). Community Centre, 145 Orange Hill Road, Burnt Oak, Edgware. Details G4IUZ, tel Hatfield 65707. Net on 3·775 at 0915.
Harpenden (HARC)—7 Apr (Junk sale at QTH G4JOV), 21 ("Antennas", G3JVN). 8pm. Silver Cup ph, St Albans Road, Harpenden. Details G1BJC, tel 05827 2455.
Southgate (SARC)—9 Apr (Surplus equipment sale), 23 (Informal). Holy Trinity Church Hall Upper Green Lanes, Winchmore Hill, N21. Details G4YLL, 0992 30051.
SW Herts UHF Group—This Group maintains GB3HR on RB 14, located at Stanmore. The group would welcome donations to help maintain this repeater which was put into operation for all to use. Send donations and get details from G3CWB.
St Albans (Verulam ARC)—14 Apr (Informal). 28 ("Amateur rigs of the year", G3OSS). 7.45pm. RAFA HQ, New Kent Road, St Albans. Details G4JKS, tel St Albans, 59318.
Welwyn (WHARC)—2 Apr ("Basic power supplies). 8pm. Lemsford Village Hall, Brocket Road, Welwyn Garden City, Herts. Morse classes on Thursdays. Details, K Dunwell, tel 0707 335162.

Westminster (CSARS G1CSR, G3CSR)—6 Apr (AGM), 20 (Natter). 1230pm. Civil Service Rec Centre, Monck St, Westminster, SW1. Station Manager, Bob Treacher on 01-212 8823. Sec G6IMM, 01-698 4437.
Westminster (NSYARS)—Not open to the public, but the club station is active from time to time using G4NSY and G6NSY. Contact Sec, Room 99, New Scotland Yard, Broadway, London, SW1H 0BG for details.

Club secs, if you only send me your dates and times of meetings they will only be printed in Jan and July. You must have a programme to get copy in this column every month.

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REGION 20—C R Hollister, 34 Battersby Way, Henbury, Bristol BS10 7SU. Tel 0272 508451.

Bath (B&D ARC)—1 Apr (Video show), 15 (AGM), 29 ("DF construction", Michael Smith). 7.45pm. Englishcombe Inn, Englishcombe Lane, Bath. Details G3FIH, tel Bath 837539.
Bristol (BRSGBG)—27 Apr ("Bristol fmtv repeater project", G8VPG). 7.30pm. Small Lecture Theatre, Queens Building, University of Bristol, University Walk, Clifton, Bristol. Details G4SQQ, tel 0272 508451.
Bristol (NBARC)—3 Apr (Committee meeting), 10 Apr ("QRP", Bill Beauchamp), 17 (Activity evening), 24 (Home brew competition). 7pm. Self Help Enterprise, 7 Braemar Crescent, Northville, Bristol. Details G4YQQ, tel 0272 690404.
Bristol (SBARC)—3 Apr ("Underwater cw"), 8 (3·5MHz activity evening), 15 (432MHz atv evening), 22 (cw evening), 29 ("Bristol fmtv repeater 144MHz GB3ZZ," G8VPG). 7.30pm. Whitchurch Folk House, East Dundry Road, Whitchurch, Bristol. Details G4RZY, tel 0272 834282.
Cheltenham (CARA)—17 Apr (Activity evening). 7.30pm. Charlton Kings Library, Cheltenham. Details G4VXE, tel 0242 36723.
Gloucester (GARS)—1 Apr (AGM). 8pm. (RAE & morse classes 7pm), St John Ambulance HQ, Heathviille Road, Gloucester. Details G6AWT, tel 0452 504515.
Weston-super-Mare WsMARS)—13 Apr (RSGB videos), 27 (Constructors night). 7.30pm. The Bristol Hotel, Locking Road, Weston-super-Mare. Details G1DJW, tel 0934 514429.
Yeovil (Y&DARC)—9 Apr ("Radio noise", G3MYM), 16 ("Indirectly coupled circuits," G3MYM), 23 (AGM), 30 (Natter night), 7 May (QRP briefing). 7.30pm. The Recreation Centre, Chilton Grove, Yeovil, Somerset. Details G3GC, tel 0935 75533.

The City of Bristol RSGB Group have continued their policy of supporting amateur radio by:
1) Donations to both the proposed Bristol fmtv repeater (GB3ZZ), and the very active Bristol packet repeater (GB3BP).
2) Locating and funding a permanent cw test centre in Bristol.

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OBITUARIES

The Society records with regret the deaths of the following radio amateurs:

Dr B E Andrews, G6SWK
Basil Andrews died on 18 December 1986. He was a member of the Norfolk group of the RAIBC and of Norfolk & NE Suffolk Raynet.
Mr F Atkins, G2DJP
Frank Atkins died on 4 December 1986 aged 80. He obtained his artificial aerial licence in 1939 and his full licence in 1947, and was a member of the East Devon net.
Mr P T Beer, G3AM
Percy Beer died on 26 October 1986. He was a member of the RSGB for 50 years and had been interested in amateur radio since his school days. He served with the RAF as a radar mechanic during the war and was proficient in the design and construction of communication equipment.
Mr J W Christian, GD0BUT
The Isle of Man ARS were saddened by the loss of Jim Christian, aged 29, with his friend Ken, G6DRQ, in a tragic boating accident on 6 September 1986. Jim was first licensed in 1983 as GD6OFS and soon mastered the key to become GD0BUT.
Mr W H Emmanuel, G6DXF
Bill Emmanuel died on 14 January 1987 at the age of 74. Recently he took on the duties of Raynet controller for Liverpool, and he was also the RAFARS area representative. He was a "backbone" of the Liverpool & District ARS, serving as chairman for three years, and treasurer and committee man for five years. He also conducted the RAE classes for the society.
Mr H Hillgrove, G6PO
Harry Hillgrove died on 28 December 1986 aged 76. He first became licensed in the 'twenties and was very active on cw, rtty and Amtor.
Mr W R Hopkinson, G4SQE
Roy Hopkinson died on 19 December 1986 aged 66. He was a member of the Royal Signals ARS, QRP Club and Stockport RS.

He was a dedicated cw operator, and was no stranger to QRP, having worked with the Greek resistance movement during the war, using a B2 set.
Mr D Raven
Dennis Raven, a dedicated swl, died on 9 January 1987 aged 58. He was a former member of the Lowestoft RC and a member of the British Railways ARC, and was actively involved in the organization of the FIRAC Congress which was held in Lowestoft in 1982.
Mr W H I Stephens, G3TFK, MP4BDB, VP6IS, VQ4DS, ZB2AK
Bill Stephens died on 26 January 1987. His amateur radio activities started in Jamaica before the war, while working with Cable & Wireless. After retirement he had almost daily contacts with a large group of "white stick" operators; log books confirm over 1,700 regular contacts with one station.

Weekly contacts were also kept with stations in Kenya. Last year the St Dunstan's ARS awarded Bill their "G3MOW" trophy for his help and advice to their members. The inscription on this trophy "The Gentleman of the Air" may surely be said of Bill.
Mr E Wake,G5RP
Ted Wake, G5RP, died on 12 February 1987. He was a member of the pre-war Civilian Wireless Reserve, and subsequently became a p.o.w in the Far East. G5RP was a dedicated dxer, and occupied a high place on the DXCC Honor Roll for many years. In spite of illness, he succeeded in working the dxpedition to Peter I Island only a few days before his death. An RSGB member for over 50 years, he was successively chairman of the Oxford, Harwell and Vale of White Horse amateur radio societies.

Also:
Mr W Bennett, G3CCE on 20 October 1985
Mr J A Bointon, G3BYO on 23 December 1986
Mr R Bull, G8BTI on 7 February 1986
Mr R J Campbell, G3NLV on 24 March 1986
Mr L A Downing, G4WWV
Mr E V Lapham on 7 May 1986
Mr H Leach, G8FHQ in October 1986
Mr P W Maddocks, G3VFU in December 1986
Mr M W Maidens, G6HGN
Mr R D Manners, G3ZVL in November 1986
Mrs J Overy, G1EVY in November 1986
Mr P Pollard, VK6IV (formerly G3DIV) on 26 August 1986
Mr C H Pook, G4LNS
Mr C N Theodorou, 5B4OP on 25 September 1986
Mr G E Thompson, G3PPL in September 1986
Mr J Williamson, GM3GSX in June 1986
Mr S Wootton, G4BLP in July 1986

Members' Ads

The Conditions of Acceptance are published below the Member's Ad form circulated with every issue of *Radio Communication.*

The current rate is £2.30 for 40 words or less: advertisements containing more than 40 words will cost an additional £2.30 for every additional 40 or less words. Each advertisement must be accompanied by the correct remittance, either as a cheque or postal order made payable to Radio Society of Great Britain.

FOR SALE •••••••

KW VANGUARD tx am/cw 180/10m and Eddystone rx model 840 300KHz/30MHz, £100 ono both. Buyer inspects and collects. Frank, G4SLS. QTHR, tel: Wellington (Som) 3367.

TRIO TS430S, mint, 18mths old, fm board, cw and am filters, £700. No offers. G4YSU, tel: 0772 612815.

AVO-8, Offers? Bush LW/MW/2xSW/vhf BC and airband, mains/batt, £10. Sharp airband, £5. WD binocs 30x6 1944, £8. WD testset no 2 Mk2, £4. WANTED: TA32Jnr AR22M. Lockwood G3XLL, QTHR, tel: Mellis 596.

TRIO 530SP hf tcvr, Lowes latest model, mint, never used, £575. Trio 2200GX 2m fm portable, fully xtalled with nicads, chgr, £70. Stuart, (South Durham), tel: 0740 20100.

YAESU FL102, SP102, superb, £565. FT757GX, MH1B scanning mic, absolutely mint, £595. SEM transmatch 1.8-30MHz, ezitune facility, mint, £85. Trio DM81 dipmeter, unused, boxed, £90. Datong filter FL2, £65. All equip must be seen, prefer buyer collects. G3MIN, W Sussex, tel: 0273 453552.

YAESU FT726R with 2m, 70cm, 6m, sat unit, vgc, orig pkg, £1100. YO901P monitor scope, offers? G4LJR, QTHR, tel: 0403 64275.

TS440S AUTO ATU pwr supply cw filter 2mths old in boxes and warranty, £1100 ono. AT230, £110. Datong FL3, £75. Iwatsu 2-chann 20MHz scope new, £120. Drake LPF, £15. G3KFB, QTHR, tel: 0908 322533 days or 0908 667360 evenings, w/ends.

AMTI WITH CW rx board, vgc, c/w leads, manual, boxed, £125 ono. FRG 7700 with memory, 2m and 70cm cvtrs, vgc, £250 ono. G2AFD, QTHR, tel: 06845 3242 anytime.

TRIO TR7730 25W 2m fm tx/rx. Scanning 5-mem incl repeater split. Used base but ideal mobile rig, c/w mounting brkt, £170 ono. G3TWN, QTHR, Wirral, tel: 051 334 5643.

TS940S INCL LOWE MODS and narrow filters plus SM220 monitor with Panadaptor module, £1750. IC505 £275. Spectrum plus 48k with Alphacom printer and VTX5000 modem, £75. Chris, G3TUX, tel: 0428 56255, office hours.

FT290R NEW NICADS, case, mobile mount, £250 ono. W1SL 144MHz 1kW PA metalwork kit, £50. SK620A new £60. SK610, £20. 4off 20-ele 432MHz NBS Yagis, £100. WANTED: 8874. G4RGK, tel: Marlow 72086.

PYE A200 LINEAR AMPLIFIER. 80W pep. Easily modified for 4m or 6m, with circuit diag, £35 ea. G4HRY, QTHR, tel: 0203 618648.

DRAGON 64 and single disk drive, OS9 DOS and basic tutorial beginners BMK morse tutor, all mint condx £175 ovno. G1DKT, QTHR, tel: Kettering 791069.

DATONG MORSE KEYBOARD Model Mk4, 64-char mem and auto repeat, £60. Microwave modules MMS1 speech synth, morse tutor, £60. 100m Popes H100 50ohm low loss cable still in wrapper, £38. Domestic Ferguson vhs video rcdr, fully serviced new heads, £130. Drae vhf wavemeter, £15. Altai dipmeter 1.5-250MHz with modulation, £30. Pye Vanguard vhf tcvr, £5. Txfmrs multiple windings 450-0-450V 310mA, 350-0-350 370mA 70V 2A 6.3V 3.5A 6.3V 1amp, £12. Woden UM3 modulation txfmr 120W, £5. 24V 100vA, £7. Variable capacitor 1000pF 08 airgap £12. SMC 13.8V 25A fully regulated pwr supply, £45 Would consider p/exch any of above for pre-1939 domestic radios. G4OOW, QTHR, tel: Hinckley 612091 after 7pm.

DRAKE 7-LINE, TR7A+PS7 tcvr, TR7+PS7 tcvr, RV75 dig/vfo, L7E 2k linear, MN2700 atu, SP75 s/proc, 7077 d/mic, all as new boxed. Also brand new unused R7A rx, SP75, s/proc, WH7 w/meter. Hufton, tel: 0602 609345, anytime.

TRIO TS520 tcvr mains or 12V, £275. Icom 701 tcvr 701ps, £395. Atlas 210X tcvr 12V, £375. CRMI rtty monitor and audioscope, £20, all vgc. Can deliver reasonable distance. G3NZT, QTHR, (Cheshire), tel: Bunbury 260323.

IC290E 2m 10W multimode, £300 ono, Drae 13.5V 12A psu, £60. Seif 13.5V 3A psu, £15. FX1 wavemeter, £15. Boots CR325 cassette rcdr, £15. Jonathan, G4MPN, tel: 0772 435316.

FT980, mint condx, fitted optional filters keyer, £950. G0CJU, QTHR, tel: 0342 312374.

COMPLETE HF, VHF STN, FT757GX, FP757HD, AT230, TB3 manuals. FT290, Slimjim, mobile antenna (02E), comp nicads, chgr carrying case slide mount, 30W linear preamp, all boxed mint condx, £1100. No offers, buyer collects. GM0EWF, QTHR, tel: 0506 633449.

RADIO CONTROLLED AIRCRAFT. Robbe Proggo trainer/ sports. New Enya 35, 6cc engine, Futuba 4-chann radio with 4 servos. Ready to fly. Value around £270. Exch for 2m portable or mobile, WHY? Paul Godolphin, G4XTA, QTHR, tel: 09313 359.

YAESU FRG7700 RX, as new, boxed, £225. Joystick and Joymatch. Offers? T&T electronic slimjim, £7. MMC 144/28 cvtr, £20. G0CBM, QTHR, tel: Canterbury 457539.

FT726R 2m only, mint. Plus unused, boxed, sat unit £675. G1FGS, QTHR, (Bournemouth) tel: 0202 422916.

VERSATOWER P60 tiltover h/duty winch operated, galv steel. Purchaser collect, £500 ono. HF rx realistic dx-160, £50 ono. G3YPD, tel: 0543 264882

MIZUHO SB-2X 144MHz-144.6MHz ssb 1W portable with rechargable batts, £80. 2m 2x8 double quad antenna with balun, as new, £30. GM0ETC, QTHR, tel: 041-639 3340.

AMT2 with BBC "B" Eprom, £130. It's a snip! G4SWF, QTHR, tel: 0256 461872.

AMT-2 TERMINAL UNIT, for rtty, Amtor, ASCII, morse £150. PK-80 packet TNC, £125. Modem house voyager 11 modem, £60. Serial i/face for Amstrad 8256/8512 plus disks and storage box, £50. G4ODK, QTHR, (Basildon), tel: 0268 418058.

FRG7700 gen/cov rx, gc, £175. G3JEP, QTHR, Devon area, tel: 0395 264863.

DX33 PENETRATOR 3-ele tribander, £140. TH3 Mk3 3-ele tribander, £175. Both vgc. Buyer collects. G3UAC, QTHR, tel: 01-688 2111.

WESTOWER 45' 2-section lattice tower c/w framed base and head unit, gc, £250 ono. EHT txfmr 3000V 300mA, £15. 8" dish, X-band rotating feed, £10. Buyer collects. G4CZB, QTHR, tel: Northampton 830129, evenings.

YAESU FT480R MULTIMODE. Gd condx, instr book, £325 Tonna 17-ele, slight damage to directors, £20. Wolfson W1200 vhf scanner, fitted 8 xtals, gd condx, £50. G1LUN, QTHR, tel: 0532 676939.

KW2000E KW600 LINEAR psu, mic, manuals, full service history, vgc, £250 ono. Photographic equip Durst C35 colour enlarger, timer, easel, developing tank, lots of accessories, as new, £200 ono. Peter Lewis, G4VFG, QTHR, tel: Plymouth 775851 work, OR Plymouth 894030 evenings.

YAESU FL2100Z WARC linear, as new, boxed, manual, £550. Trio SM220 monitor scope with pan adapter, as new, £250. G4OWV, tel: 05645 3652.

TW4000 DUAL BANDER, as new with box, £395 ovno plus Yaesu 208R handheld cw chgr and case and box £150. Covers 144MHz-148MHz. Come and test before you buy. G1IEY, NOT QTHR, (Croydon) tel: 686 9958.

FT290R, FP80A psu, FL2010 lin, £335. FT790R, £225. SMC MS8400 scanner, £120. FT708R 70cms handheld, £175. Eddystone 840CRX, £60. R1155 rx + psu, £45. W+O ATV tx 10W, £50. All vgc with manuals, nicads etc. G6PJT, QTHR, (Somerset) tel: 0278 685206.

TRIO TM201A 2m fm tcvr, 25W o/p, mint condx, c/w mobile slide mount, boxed and ready to go, £265, Dave, G1URQ, tel: 051-356 0883.

FT790R mint, boxed etc, £260. BNOS 25A psu, £100. 21-ele F9FT 70cm, £25. 144MHz linear 4CX250B built to professional standard, 380W for 2W drive, £295. Will deliver. Richard Mason, G6HKS, tel: 0723 354 354 between 12.30pm-1.30pm.

REALISTIC DX-400 direct entry PLL communications rx. 150KHz-30MHz am/ssb plus vhf/fm. Memories, autoscan, £125. Telequipment D33R oscilloscope, vgc, £85. Electroniques IF amplifier module type IFA/1.6/ssb incorporating lattice xtal filter and BFO, £12. G3WIF, QTHR, tel: Bristol 293738.

48-ELE BEAM 70cm, £15, 0.25 wave ground plane 2m, £5. Hornby 00 loco carriages, track. Offers? G4WLI QTHR, tel: 051 327 4280.

ADMIRALTY B40D rx, miniature valve version, perf wkg order, ex condx, £65. Buyer collects. Qty of spares for B40A/B/C/D, all models, everything except valves. REPEAT NO SPARE VALVES! Paul, tel: 0843 61448.

KW204 tx, KW202 rx c/w spkr, gd condx, in regular use, £200 the pair, bought Corsair. G3AZW, QTHR, tel: 02214 2655 anytime.

128 SET WITH PSU and selection of xtals, ideal QRP rig for 80/40, £150. Also CW brass key, vgc, £25. Prefer buyers to inspect/collect or carr extra. G4TMO, (Surrey), tel: Ottershaw 3892 after 6pm.

DRESSLER D200S 2m h/pwr linear, not used for contests, £700. TS430S fitted fm board and am filter, PS430 psu, £720. AT230 atu, first refusal to buyer of TS430S, £100. AR2001 scanner, £260. All vgc. G4CUS, QTHR, tel: Battle 3205.

TRIO TS180S with DFC, filters, desk/mic, SP180, AT180, VF0180, manuals. 200W 160-10m, £650. FT290 with nicads, chgr, case, boxed mobile 7/8 antenna, £260. Opus disk drive pwr supply i/face for Spectrum, £85, Dragon 32 with rtty/cw cartridge, no tape loading problems, Modem i/face, cw i/face, for rx/tx. Green screen monitor, Centronics microline printer, £175. 2 modems 300 baud Maplin and GPO. GPO in base of telephone, £30 ea. G6XXL, QTHR, tel: Milton Keynes 79630.

MMT 144-28 tvtr, mint condx, C146 standard 2m 2W fm handheld Schonnal with chgr and case. Sensible offers? G3KQJ, QTHR, tel: 0902 893037.

QTH OVERLOOKING EXETER: 15yr old chalet-type semi, 3/4 bedrooms with garage and wooden shack, 45' windup tiltatower KRC 6000 rotator TB3 3-ele triband council approved 100W, goes anywhere. G0BMP, QTHR, tel: Exeter 75861.

TEN-TEC CENTURY 22 and matching psu, £330. SEM tranzmatch, £45. Hansen FS210 swr/pwr meter, £45. Vibroplex paddle, £25. SEM paddle, needs base, £10 Brass morse key, £10. Ray, G0CCQ, QTHR, tel: 0625 529713.

VERSATOWER TRAILER mounted 40'. Recently overhauled with new winches and luffing wire, £495 Dave, tel: Waterlooville 267540, after 6pm only.

TRIO/KENWOOD R600 gen/cov rx. 0-30MHz manual. Ex condx, £230 ono. Write or phone Aidan Coldstraw, G1IXH, QTHR, tel: Wolverhampton 313131 during office hours only.

EDDYSTONE hf rx 830/7, £150. Eddystone vhf rx, £80 Buyer collects. G8WTY, QTHR, tel: Malvern 4968.

FT290RM, chgr, case, nicads, rubber duck, mobile mount, magmount 0.25 wave, slim jim, £300. TS130V with cw filter, PS20 and AT130 in purpose-built

wood cabinet, £500 or p/exch TS530S in gd condx. G4TMO, (Surrey), tel: Ottershaw 3892 after 6pm.

100W SOLIDSTATE AMP 1.8-30MHz 2-5W drive, £60. FL2 multimode Datong filter, £60. Both ex condx. P Darcy, G4YBP, QTHR, 254 James Greenway, Lichfield, Staffs WS13 7JZ.

COLLINS KWM2A and 516F2. Well cared for example (RE) of "These magnificent tcvrs" (G3OSS words) with spare valves, operating and service manuals and history, £400. Also offers for "as new" 312B5 in orig shipping carton. G3ONU, QTHR, tel: 0923 676344.

TC835 reel/reel digital drive professional tape rcdr, 10.5" reels. Cost £1,325. Less than 12hrs use, as new, boxed. Will sell for £850 ovno. Would consider exch for as new hf tcvr or jrc rx. Wylie tel: 041 889 5131.

ICOM 290D, scan/mic, base/mic mm preamp etc. Ex condx, £400 ono. Altron 35' wind-up SM30 mast c/w KR600 rotator, TET HB33m beam, £500 ono. All ex condx. Buyers collect. G4VVA, QTHR, tel: Stoke on Trent 337146, mornings preferred.

MODEM, PRISM VTX5000 for Sinclair Spectrum. Swap for keyer or atu for QRP tx. G3ZDF, QTHR, tel: 0243 782994.

TRIO TS820S with 500Hz filter and VFO820 remote vfo, handbook and service manual, immac, £500 to gd home. Paul, G4AFU, QTHR, tel: Penrith 66131.

YAESU FT102 hf tcvr am/fm cw/ssb filters fitted, SP102 spkr, FC102 atu, FV102DM dig/remote vfo, FTV107R tvtr 2m/70cm modules fitted, modified for FT102, YD844 and MH1B8 mics, ST5MC rtty terminal unit, Tokyo h/pwr HL160V 144MHz linear amp/200W, MML432/50 70cm linear amp/50W, HB33SP hf/3-ele tribander, 17/21-ele Tonnas 2m/70cm, BNOS 12/40A psu, T435 2m/70cm wattmeter, dummy load 0-1.2GHz, Spectrum+: Volex teletext cvtr, various A/radio progs, i/faces, leads/conns. All ex condx. Sell boxed comp stn, £1700 or split. SENSIBLE OFFERS? Peter, G4SVQ, QTHR, tel: Farnham Common 3669 or 01-900 7594.

AMATEUR RADIO EXAMINATION COURSE for home tuition by British National Radio and Electronics School. Twenty separate books covering entire course to get your "B" class licence. The top instr course available, £20. Howard, G1WQZ, tel: 0394 460 474.

ICOM COMMUNICATION rx IC-R71E fitted narrow cw filter fm board, about 2yrs old, very little use, boxed, £535. Peter, tel: Maidenhead 28940.

TRIO TR9130 2m multimode in ex condx, c/w mains mem backup, mobile brkt, handbook etc and 7-ele Yagi, £390. Martin, G1LHK, tel: 01-590 5490.

YAESU FT2700RH 2m/70cm dual-band tcvr c/w mobile headset and duplexer. Packed in orig box, also fitted with voice board for safer mobile use. SMC dual-band antenna also available, £300 the lot! G1BKV (Sussex), tel: Pulborough 3150.

SONY CRF320 32-band rx am/fm/ssb/cw, noise blanker xtal controlled synthesizer, clock, cover, handbook, service manuals. Cost £860, accept £350. Heathkit HW100 tcvr, £125, Datong morse tutor, £40 Henschel, tel: 01-851 7403 evenings.

FT290R, vgc, £280 ono. 100W linear preamp, vgc, £90 ono. 14-ele pbm beam, vgc, £45 ono. 160 dx hf rx, £50 ono. Bargain. Sale due to other commitments. tel: Deeside 822798.

RAYNET INTERFACE 4-core screened curly cables for rewiring handsets etc. 60cm relaxed 250cm stretched with 15cm 20cm straight tails. A few left after local group bulk purchase, at £3.33 ea, incl postage. G8CQH, QTHR, tel: 021 440 6269.

EA12 hf rx, handbook, £80 ono. Buyer collect or arrange transport. G4CUY, NOT QTHR, tel: 0532 639129 after 9.30pm.

2M MULTIMODE, 10W o/p c/w 40W PA, aerial rotator and 6-ele quad. Comp 2m stn, £350 ono. G4XBD, tel: 0438 362554.

DRAGON 32 AND DISK DRIVE. Programs incl assemblers and Forth version. Several books, Maplin RS232 board, £150. tel: Ware 5410.

TRIO 440S with ssb filter and psu 430, both new, 10mths guarantee left with Lowe, mint condx and boxed, £1050 ovno. TS830 taken in p/exch. G4XIS, tel: 01-866 7640 evenings.

RA117 RACK MOUNTING, needs attention on 10m. Sensible offer required. BC221 charts, mains operation, £12. Buyers collect. G4KGX, QTHR.

YAESU FT301D tcvr 160-10m, all solidstate digital display 100W o/p rf processor notch filter noise blanker 25KHz calibrator 600Hz cw filter mic FP301D psu digital clock. Ident facilities, all perfect as new £450. G3HRO, QTHR, tel: 01-460 7660

DRAKE TR4C, AC4 psu, mic, key+ spkr, £350. Kokusai filter MF455 10K, £10. Collins ssb filter 526-9897-010, £10. Admiralty handbook 1938 Vol 1+2 £15. Spare Vol 1, £6. G3CGK, QTHR, (Cambs) tel: 0954 210374.

KR500 ELEVATION ROTATOR, never used, £110. Welz SP400, £45. 2off Tonna Oscar specials, never used, £45. Datong morse tutor, £35. All ono. Roy, G6MNK, QTHR, (Humberside) tel: 0724 860809.

TRIO TS440S 3mths, c/w hand/mic, £795. G4RVD, NOT QTHR, tel: Weybridge 59253.

STANDARD C58 LINEAR+ mobile mount, £175. MM 2m/70cm tvtr, £100. Dave, G6FSP, tel: 0626 832005, Bovey Tracey, Devon.

TRIO R1000 GCRX, £245. Stephens James MK2 atu, £25 Both immaculate or £250 cash for pair. Buyer collects. Norfolk. tel: 0362 2790, anytime. G6DNC, QTHR.

TRIO TS440S fitted auto atu PS50 pwr supply, hardly used. Ex condx, £1,075. AMT2 all modes, £160. G4RPV, QTHR, tel: 021 459 7041 after 6pm.

TS530S hf tcvr, cw filter fitted with AT230, ex condx, £595. FT707 hf tcvr 160m and fm fitted with FC707, FV707-DM, FP707, ex condx, £575. Prefer no split. FT208 2m handheld with chgr and case, £185. G4MWD, QTHR, tel: 0403 68765.

COLOUR SSTV SCAN CVTR, home made (professional finish) based on Robot 400 plus many extra features incl three memories, picture processing, computer i/face and light pen, £600. Keyboard for above, wkg, almost complete, £50. G3OQD, QTHR, tel: 01-462 4223.

ICOM AT100 automatic atu, as new, £200. G3JYT, tel: 01-866 3878.

KENWOOD TR9000 2m tcvr, boxed, vgc, £280. Hygain TH2 Mk3 hf beam used only few times, portable, £120. Buyer collects or can deliver short distance G4EKG, QTHR, tel: 0386 41105.

JAYBEAM TB3, £199. Datong ANF, £50. XCB half wave vertical OK for 10m, £10. Trio TR2200 2m fm S20-19 17 16 14 WC, no mic, tatty but work. Offers? Jim, G0BGY, QTHR, tel: 01-942 7094.

EX WD SETS WS 19 22 B44 HF156 AR88. Mine det 4A. Misc leads and j/boxes. Some Larkspur kit. Send sae for list. G8ALM, QTHR.

JAYBEAM TRIBANDER TB2 Mk2, as new, £100. Kenwood DFC230 freq controller for 830S. Offers? G4TFU, QTHR, tel: 061 980 7508.

MICROWAVE BEAM ANTENNA Jaybeam 7127 nom freq 1599MHz, £45. Rad Com 1964 to present superb reference library, £25. Creed 444 teleprinter with spare motor, £25. Delivery by arrangement. G3URZ, QTHR, tel: 0954 60135.

TS430S WITH CW FILTER fm board, service manual and PS430 boxed in gc, £725. Daiwa CNW419 500W tuner crossed needle swr bridge 1.8-30MHz continuous cover, £140. Swan 10-15-20 beam, £40. 40ft lattice tower, £80. G4ROY, tel: 061 368 1912.

RTTY TU (ST5MC) 3mths old, very little use, £100. Also GW4WRD rtty prog on tape, £10. Also the TX-3 technical software, rtty, cw, ASCII transceive program, £15. Both for BBC-B PSE. Eddie, tel: 0544 267140 after 7pm.

COMPLETE KENWOOD HF STATION TS130S tcvr AT130 a/tuner PS30 p/supply DFC230 f/cont MC50 mic TH3jnr beam Stolle rotator with coax and service manuals, £650 plus delivery. Also Canon Typestar 6 electronic typewriter, brand new, £200. Morgan, tel: 0792 360503.

YAESU YC-500J freq count. 10Hz-500MHz, £75. Yaesu YP150 dummy load wattmeter 150W rating, fan cooled £55. Eddystone EC10Mk2 gen/cov rx, £50. Pedestal pwr mic, £12. All items mint, carr extra. tel: 0202 534933 after 6pm.

KW ATLANTA with psu/spkr and manual. A simple, but powerful rig (400W), £50. Ideal for newcomer to hf or as second set. G4LUF, QTHR, tel: Gara Bridge 442 evenings after 7.30pm or weekends.

YAESU FT709R, many accessories, £250. MMT432 28-S, £80. Jaybeam 5X-Y with harness (unused) and light rotator, £30. 10m 3-ele minibeam, £20. G4MH minibeam, £35. WANTED: Eddystone 898 dial and Drake R2B. Steve, G4VRR, Ashford, tel: 0784 256482

TRIO TS120S with cw filter, noise cancelling MC30S £375. Matching VFO120, £60. Datong automatic speech processor, £55. Sony ICF2001 digital phase locked gen/cov rx 150k/30MHz am/ssb +fm, £130, ideal for swl. All mint, orig pkg. G3XJN, QTHR, tel: Epsom 21486.

TH3 INCLUDED WITH detached four-bedroom home between town and Downs. Three recep rooms, luxury kitchen, sun lounge, study. Direct rail service to three London termini. Regular ssb contact maintained with VK/2L since 1968, £165,000 ovno. G3XJN, QTHR, tel: Epsom 21486.

40ft HEAVY DUTY TRIANGULAR TOWER. Three section, 15-15-10, very gd condx, dismantled ready for transportation, £150. Richard, G4MOE, tel: Grimsby 824568.

VERSATOWER P40 c/w 3-ele TA33J beam rotator control unit cables etc, gd condx, buyer collects, £325. G4FRK, QTHR, tel: 0253 852027 evenings OR 0253 28954 daytime.

MOBILE MOUNT FOR FT290R, immac and boxed, £20. G3WRO, QTHR, tel: Harlow (0279) 30609.

PROPERTY OF THE LATE G4IRI: Yaesu FT-7 hf mobile tcvr, £250; realistic DX160 hf rx, £65; Yaesu FT290R 2m tcvr, £270; Kenwood AT-120 atu, £65. G4FSN, QTHR, tel: Horwich (0204) 691536 evenings.

CALSCOPE SUPER 6, £110. Tono 550 terminal unit, £150, Timestep WX i/face for BBC computer incl rx and ROM, £100. Halbar WX and disk for BBC, £75. Sig/gen, £35. Sony 2001 rx, £90. Freq counter, £35 Realistic scanner 2001, £75. tel: 0903 724805, West Sussex.

FT690 IMMACULATE, £225. Trio 3200 portable, £100, OR £300 the pair OR swap FT709 with accessories or FT707. CODLY, QTHR, tel: 061 437 9620.

YAESU FT726R fitted 2m, 6m, c/w MD1 base/mic, £775 Also 60ft 3-section tower (telescopic) base mounted, £200. Accept £950 for both. Buyer collect or pay carr. G4RKV, tel: 0227 360841 anytime.

TRIO TH41E c/w dc adaptor, case, spare batt pack, chgr and BNC adaptor, £200. Jaybeam 8-ele 2m quad, £30 ono. Hitachi colour video camera VK-C750, £150 ono. Creed 7B teleprinter with TTL driver, £25 ono G6ZKA, QTHR, tel: Keynsham 02756 2275 anytime.

FT290R 144-148MHz muTek, case, nicads, chgrs, rubber duck 30W linear etc. Orig pkg, mint condx, £260. FT200 tcvr 80-10m 100W (spare valves), vgc, £160 for quick sale. Richard Hill, tel: Cardiff 20717.

T1154/R1155 INSTALLATION, Offers? TC512 installation, Offers? T1154, £60. Marconi Atalanta £60. SP600/10, £120. Heath DX40U plus vfo, £35. BC348, £55. BC211, £35. WS19, £10. CR300, £20. Decca hf/rt marine, sig/gen, scope, R1132, Fullerfone, Pye Vanguard. Offers? G3DVF, tel: 0665 602487.

RACAL 117 rx, fine tune ssb adaptor, vlf cvtr, all cased, gwo, used regularly, service manuals for ea and some new valves. No split. Buyer collects, £135. BRS85986, tel: Leicester (0533) 782711 after 6pm.

FDK MULTI 700 EX fm mobile 25W variable mobile brkt, ex condx, £135. Also FDK PS750 psu unmarked £25. Both together, £145. MM432/30L 70cm amp less than 1yr old, £95. John, G4WLD, tel: 01-857 8096.

BRAUN SE600 2m multimode tcvr. Twin vfo am/fm/ssb/cw. 12W o/p, 40W pep ssb. Mains 12V dc with mic, L/s, manual, leads, £90. Commercial psu +5V@2A, +12V@1A, -12V@1A, +24V@0.5A & 5V floating @100mA, £10. Minns 600-50ohm Balun 1.5-30MHz 750W pep, £10. Components worth over £1500, incl 8/16 bit processors, peripherals, RAM, EPROM, TTL, 74LS CMOS, xtals, A/D, D/A, S/H, specials, op-amps, regulators, diodes, transistors etc, not junk/surplus, £125. 12x3.5in s/s disks, £5. 1 Forse, tel: 0202 824644.

HEAVY DUTY STEEL LATTICE TOWER in 12ft sections, £30 ea. Buyer collects. Bob, G6HUN, QTHR, tel: Woolhampton (Berks) 713640.

ICOM 271H 2m 100W tcvr with muTek front-end; plus AG25 masthead preamp, £775. G4RHL, QTHR, tel: 091 5846435 OR 0385 41840 office hours.

YAESU FT980 hf tcvr with SP980 spkr and keyer unit £950. G4RHL, QTHR, tel: 091 5846435 OR 0385 41840, office hours.

ICOM 471H 70cm 75W tcvr; plus AG35 masthead preamp £800. G4RHL, QTHR, tel: 091 5846435 OR 0385 41840, office hours.

SPECTRUM ANALYSERS-H/P 140S/8552B/8553B 1KHz-110MHz, £2,500; 8553B rf plug-in, £995; 182T/8558B 0.1-1500MHz, £4,950; Singer ssb-50-20Hz-40MHz (160MHz with external sig/gen), single sideband analyser-10Hz resolution, £895; Marconi GCHQ surveillance rx, superb specs, 10KHz-30MHz, fully synthesized, 1Hz resolution type 2540, £695; matching hf drive unit, type 1541 synthesized, all modes, £595; microwave pwr meter, 10MHz-12GHz+, 1uW-10mW, £295; BWO tube for h/p 8551B spectrum analyser, £295, tested 50mW o/p, Eddystone Panoramic adaptor 1061, new, £275. All above equip is in ex condx, with manuals. G3PCN,

3 Eastcote View, Pinner, Middx HA5 1AT, tel: 01-866 3300.

KENWOOD TS130S w/vfo, ex condx, w/manual, boxes, astatic hand/mic, lined carrying case, £500. Call GD4OEA, Colin, tel: Peel (Isle of Man) 2520 evenings or write GD4OEA, 1 Peveril Terrace, Peel, Isle of Man. Will ship.

TRIO TR2300 with nicads chgr and helical, £110. 25W linear, £30. RS232 300BD modem, £30. Farnell 0-30V psu, £50. RGB colour monitor, £95. AZ-EL rotators, £40. G8DYK, tel: Tadcaster 835989.

YAESU FT209H, spkr/mic, nicad batt chgr, car adaptor chgr, £250. FDK 750XX 2m multimode, base, mobile, 1W 20W tcvr, £275. Bernard Rogers, G6ZTL, 24 Marmion Road, Coningsby, Lincoln LN4 4RG, tel: 0526 42899.

DAIWA CN520 swr meter 1.8 to 60MHz 200W to 2kW, hardly used, £25 plus p&p. GM4LPG, QTHR, tel: 047 985 254.

ICOM IC-290D 1-25W 144-148 all mode trx, mint, inc m/mount 2x5/8 base ant, £350. Standard C8800 1-10W fm, vgc, £115. Jaybeam 2m 10Y, £10. 5XY +harness, £15. Standard C7800 70cm needs attn, £40. rx/tx OK G4VOQ, NOT QTHR, tel: 0784 59503.

YAESU EXTERNAL VFO FV101B, £60. Also Yaesu digital readout YC601B for 101 series, £60. OR exchange both for FRG7 rx. WANTED: FRG7 also 572B valves at reasonable price. G4VOW, QTHR, Nottingham, tel: 0602 812588.

KW1000 LINEAR AMPLIFIER, less than 10hrs use, orig condx, £350 ovno. Homebrew hf amplifier BY63VUY 80-10m, four PL509, £90 ovno. Homebrew 2m ssb amplifier QQV0640A, £35 ovno. All plus carr. G4GDM Wirral, tel: 051 334 1819.

DRAGON 32k COMPUTER, gd condx, £30. Colour tv 14" portable for computer, £80. Icom ICB-1050 part converted 10m, £15. HFS ground plane set, £20. 7-ele ZL special, £8. KW match 75ohm swr meter, £12. WANTED: FT77. Alan, GOECX tel: Tiptree 815978

3.5 DIGIT 0.5" LCD and meter chip 7106, both unused, £12. G4DPJ, NOT QTHR, tel: Bristol 590413.

YAESU FT209RH c/w FNB4 5W, Vox headset, chgr, PA3 dc adaptor, £250. Datong morse tutor, £40. Avo Mk4 valve tester c/w full manual, £60. Met 70cm splitter, new, £20. AOR 2002 scanner, new, plus 70cm beam, £400. G0GNS, tel: 0773 55144.

DATONG D70 MORSE TUTOR, £30 plus postage. WANTED: Turns counter, 0.25" dia spindle, for atu roller inducter. Also 4th edition RSGB Radio Communications handbook and 20th edition Radio handbook (Wm Orr). G4ZHK, QTHR, tel: 0273 461275.

KW 2000B c/w psu, Shure 201 PTT mic, manual. Gd wkg condx and appearance, £195. Roland, G4HSD, QTHR, tel: 01-642 5179 weekends only please.

BOOKS. Best offers for: Vol 1&2 Admiralty handbook wir/tel. Radio Design's handbook w/world. Radio handbook USA 7th edition. Radio handbook supplement RSGB, all 2nd WW. Also LAR atu, £35. Jaybeam g/fibre 2m ant, £30. G0BUC, QTHR, tel: Bradford 597681.

ICOM 271E ULTIMATE 2m multimode ex condx, boxed, £650 ono. WANTED: IC202, IC402 in vgc. G6XXE, QTHR, tel: 0924 823866.

LOWE SRX30 gen/cov rx, £80, G3LIV rtty board built/aligned, requires box, £30, 2off 70cm 48-ele multibeams, £25 ea, 2-way coax switch (N-types), £15, HS770 duplexer 2m/70cm, £15, Cirkit 70cm rx, cvtr +homebrew tx, cvtr may need some attention, hence £15, Bell103 acoustic modem, £20, ITT Starphone RB4 part converted, £25, valve QY5-3000A (CV5219). Offers? All ono. Carr extra. WANTED: Yaesu FT225RD pref with muTek, gd price. Martin, G1GYC, QTHR, tel: 061-483 2330.

YAESU 290R c/w nicads, chgr, case, plus 5-ele Yagi with swr/pwr meter, £250 ono. G6ZPT, QTHR, tel: Sheffield 883277.

YAESU FLDX400 rx and Kenwood FLDX500 tx, both ex condx, works full tranceive, £275 ono. GM6JOD, QTHR, tel: 0294 217383.

YAESU FT620 50MHz multimode tcvr fitted with preamp, £250 ono. 2-ele 50MHz Yagi, £10. Buyer collects. 70cm 4CX250B amplifier with psu 200W o/p £200 ono. Buyer collects. John Moxham, tel: 0458 34105 any evening.

SILENT KEY SALE. KW Atlanta comp stn, £185. Bremi 10A psu, £25. 4A psu, £10. Avo multimeter in case, £15. Avo Minor, £5. 500mA ac/dc cvtr, £7. Class C wavemeter 136-7150Kcs, £25. G3YYP tel: 056 885 296

TRIO TS430S, gd condx, fully moded for Amtor, all filters fitted, plus AT250 auto atu. Tono 5000E communications terminal, also in gd condx. Amtor rtty ASCII c/w £1,500 or may split. G4WWD, QTHR Milland, tel: 042 876 366.

JST100, £700 ono; AT230, £120 ono; Trio 7500, £130 ono; EK160 key, £90 ono; Western PM2000A meter, £80 ono. Daiwa P5310m, £120 ono. URGENT SALE. Buyer must collect. Extras thrown in. John, G4NSX, QTHR, tel: 0636 76499 anytime.

PLESSEY TDMS6, unused condx, £35; Tandy TRS80 Model 3, 2-drive with 132-column printer, serial and parallel i/faces, Visicalc, Scripsit, communications software, many accessories, £550; Trio TS700G VFO drive damaged so only £150. For more details. Pete, (Herts) tel: 0442 69544 evenings.

PR 813s C/W BASES, £30; pr Eimac 4CX250F/G c/w NATO bases and 2 spare Amperex 4CX250F/G, £50, post extra. WANTED: HRO c/w BS coils, DX40U with or without VF1. G3RB, QTHR, Whitley Bay, tel: 091 2530504.

KDK 2033 2m 5/25W fm tx/rx 11-chann auto scan, ex condx, hardly used, handbook, £199. No offers. 5/8 2m ant, £5. Buyer collects or pays postage. G4AKP, NOT QTHR, (Sussex) tel: 0243 781803.

TONO 5000E COMMUNICATION TERMINAL, as new, £695; Trio SP930 spkr with filters, £45; Trio TM211E 2m fm mobile, as new, £245; Heathkit HM102 2kW swr rf meter, £45; Icom 735 hf gen/cov tcvr, £725. All ono. tel: 0462 811930 or 813235.

AMT-1 c/w VIC20 s/ware, ex condx, £180 ono. G4KJV, QTHR, tel: Seagry 720456.

TRIO TS430S hf tcvr. Fitted fm unit, am filter. Virtually new condx, £695. G4CEC, QTHR, tel: Bedford (0234) 720389.

OFFERS?: GERMAN FORCES 1940 5-band rx 1.5MHz-25MHz E52b-1 in wkg order. Hallicrafters HA5 very stable vfo 80m/6m plus 144MHz-148MHz, £35. 2m am-tx 30W by Green and Davis plus mobile p/pack, £40. G3TIL, QTHR, tel: 0724 732312.

YAESU FT221R vgc, in orig pkg with mic, £300 ono. G4CLV, QTHR, tel: 0323 841879.

POWER SUPPLY, FP700 YAESU/SOMMERKAMP, suit FT707 or FT77 or FT757, ex condx, surplus to needs, £110 G4HYY, QTHR, (West Yorkshire) tel: 070 681 5342.

QTH 3/4 BEDROOMS, det bungalow, gd shack, 5-ele hf beam several antenna, large garden facing fields, freehold, RV £280, £70,000. G4WLI, QTHR, South Wirral, Cheshire, tel: 051 327 4280.

MOSLEY TA33JR 3-ele, £80; Hygain 18AVT/WB-A, £75; Hidaka VS-41 4-band hf vert unused, £65; Icom 202 2m ssb tcvr, £90. All boxed plus manuals; Hallicrafter Sky Champion plus manual, £20. WANTED: Sony rx ICF7600D or 2001D. G2AQJ, QTHR, tel: 0722 25929.

DX HF PORTABLE RX, £100; R532 air band rx nicad batt with chgr, £100 or exch against 2m or 70cm handheld portable. G1HPC, QTHR, tel: 0226 713854.

48k ZX SPECTRUM with Amrad and other software, £50 Harry, G0DQL, NOT QTHR, tel: 0388 834270.

WANTED.....

FT401 or FT560 in gwo. G2CG, QTHR, tel: 0763 43093

FT7 or FT7B. Also 4m tvtr 2m IF. G0ESB, NOT QTHR, tel: 0543 264586 after 6pm or w/ends.

UHER 4400 STEREO IC. Service manual or circuit diag for this tape rcdr. Reasonable price pd for orig or photocopy. G6HXB, 102 Granville Rd, Hillingdon, Middx. tel: Uxbridge 32601.

NOSTALGIA TRIP. Ex ships r/o wants Marconi marine radio equip, esp ancillary gear plus Redifon R408 rx to recreate ships w/t room of 60's era. Bruce, GW4XXF, QTHR, tel: 0654 710741 or 711541.

EXCHANGE MINT TRIO MC85 mic for Shure 444D. Must be mint. G0EJK, tel: Blackburn 673184, 9am-4pm.

RECEIVERS DST100 and VRL. Also HRO coilpacks and S meter. Cushcraft R3 antenna. Morriss, G4GEN, QTHR, tel: 082571 2205.

SECONDHAND SONY 2001D radio for newcomer to swl. Hipkiss, tel: 0202 301913, evenings.

FM BOARD FOR FT102, small scope telequipment D52 or similar. G4CTU, QTHR, tel: Kidderminster 3966.

BBC FT757GX OWNERS - HELP! Need foolproof instrs on how to use these together with FIF232C i/face. Glaser, VP2MIX, Box 400, Montserrat, West Indies.

YAESU FL2010 LINEAR AMPLIFIER for Yaesu FT290R or anything with 10w o/p. G1UOM, 22 Trafalgar Road, Ilkley. tel: 0943 603146 after 6pm.

VALVE DATA BOOKS and tx or rx tube manuals. Any age or make for current types. Photocopy OK. Andy, GW4KOS, QTHR, tel: 059787 317.

HF LINEAR AMP. SB220, FL2100, TL922 etc. Anything considered. Also 40m 2-ele Yagi. FOR SALE: com in i/face rtty cw/for com 64, £65. G4SZD, QTHR, tel: 0388 814396 daytime OR 0388 819168 after 5pm.

YAESU FT780R plus swr meter, Welz or similar. EXCH Sharp MZ80A computer. Integral vdu and data rcdr, programs, manuals, boxed as new. G8HTP, QTHR, tel: Penketh, (Warrington) 8644.

TRIO TS830S hf tcvr with or without filters fitted Must be gd condx. Terry, G4OXD, tel after 6pm.

HF TCVR FT102 or similar. ATU etc. Just obtained "A" licence. Solman, tel: 0203 450476.

COLLINS 30LI OR KW600 linear amp. State price and condx. Would consider either that needs some attn. GW4ZXG, QTHR, tel: 0656 3585.

ANY DETAILS OF RTTY or amateur radio associated software for the Tandy model 100 portable computer (similar to NEC PC8201 and Olivetti M10). Contact John, G6IBC, QTHR, tel: 01-790 8163 after 5pm.

IC202S IN GOOD WORKING CONDITION. G4NGL, NOT QTHR, tel: 0707 60838

WARTIME SUITCASE RADIO A MK3 (B2 minor) or any other clandestine and resistance type radios for collection. Any condx welcome. Manuals and accessories. G4OFO, QTHR, tel: 01-949 2317.

FOR HEATHKIT MODEL SB-102 TCVR. 400Hz filter SBA-301-2 for cw operation. G3WPM, QTHR, tel: 021 745 2915.

HEATHKIT SB220 linear amplifier wanted urgently, or similar, any condx, please drop me a line or ring anytime, I will answer all letters or calls. G4SDP, QTHR, tel: 060 548 287 Hevingham Norfolk.

KW 202 rx in gd condx. Would consider Eddystone 888A rx. Bob, G3JJU. 31 Avondale Rd, Fleet, Hants.

YAESU FL2000Z hf linear amp, must be gd wkg order, with manual. G4RTE, QTHR, tel: 0803 864047 (Devon)

RECEIVER RCA-AR-8516L COMPLETE. RX G2DAFMk2 bits, abandoned project or complete. Signetics NE561B. Heavy items despatched Bucks address or collect later in year. Payment Sterling as and when asked. Don Gibbons, Patschair, Boheh, Westport, Co Mayo, S Ireland, tel: 09826317.

LATE STARTED OMEGA (wpo) want accessory kit and preselector mod kit. EI5FV, QTHR, tel: 01-471977 after 7pm.

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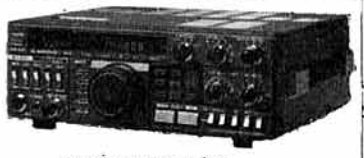

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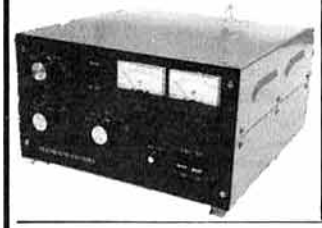

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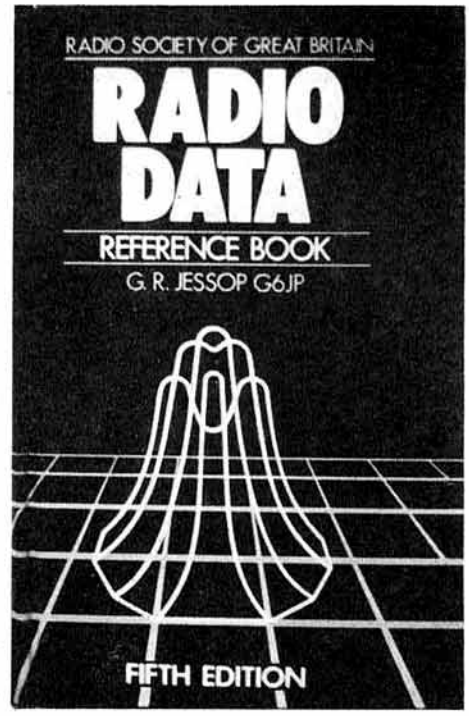


This handy publication is of use to radio amateurs, engineers and students alike. The book contains nine chapters: Units and Symbols, Basic Calculations, Resonant Circuits and Filters, Circuit Design, Antennas and Transmission Lines, Radio and TV Services, Geographical and Meteorological Data, Materials and Engineering Data, and Mathematical Tables. There are literally hundreds of useful tables, charts, and formulas.

Fifth edition, 1985. 244 pages. Hardbound.

This invaluable book should be in the shack of everyone who operates an amateur radio station. There are 10 chapters: The Amateur Service, Setting up a Station, Operating Practices and Procedures, DX, Contests, Mobile Portable and Repeaters, Amateur Satellites, RTTY, Slow Scan Television, and Special Event Stations.

In addition, there are eight appendices showing Continental and regional maps, callsign and countries lists, time zones, amateur frequency allocations throughout the world, standard frequency stations, and tips on conducting contacts in foreign languages.

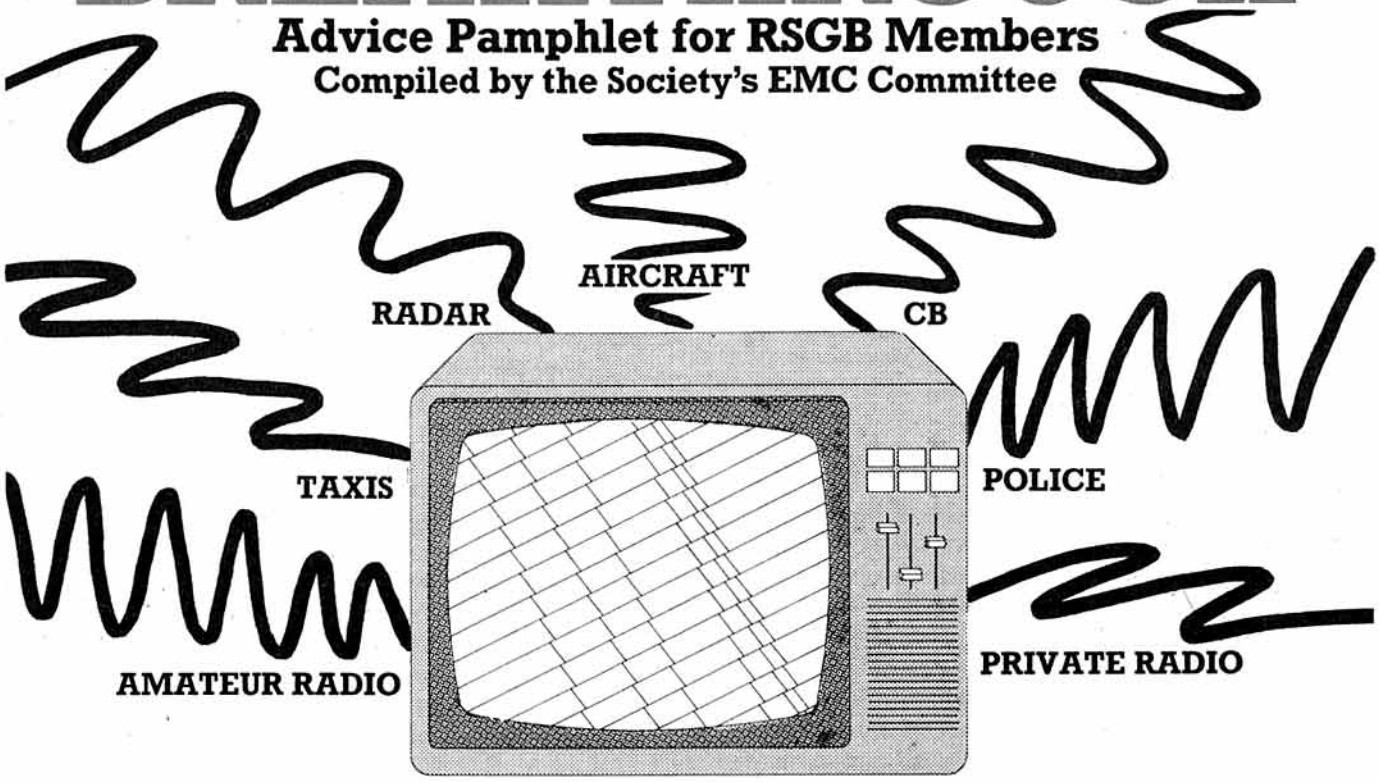
Third edition, 1985. 204 pages. Softbound.

INDEX TO ADVERTISERS

BREAKTHROUGH

Advice Pamphlet for RSGB Members

Compiled by the Society's EMC Committee



The Radio Society of Great Britain has drawn up a list of important measures which will help deal, to a greater degree than before, with the on-going problems of EMC (electro-magnetic compatibility). Three aspects of the situation need special attention.

The first is the inadequate standard of immunity of electrical equipment in general. This problem is already being addressed by the Society, the DTI and manufacturers. The Society's long-term aim is to make the manufacturers aware of the growing requirement for proper RF immunity and the consequent need to educate the relevant design departments. There should be a recognisable and substantial improvement in this area.

The second aspect is that we, as users of transmitters in what is often an urban environment, must ensure that we are 'whiter than white' before becoming involved in neighbourhood disputes. This means our installations must be 'clean' and that our own radio/TV/hi-fi equipment does not suffer from RFI.

Thirdly, the shortcomings of a FEW radio amateurs do little to further the cause of harmonious relations with neighbours, retailers and even in some cases, manufacturers. This social aspect is most important.

This article goes some way to indicating those areas which are directly controllable by radio amateurs. It will hopefully enable us to eliminate most 'in-house' problems as well as providing some social directives.

If we can be seen to be putting OUR house in order, it will go a long way to encouraging the manufacturers to do the same. Much of the advice may appear to be commonsense, but it does no harm to repeat it.

ARE YOU TAKING THE RIGHT STEPS?

Tread carefully when talking to your neighbours about the problem of EMC. Try not to use the word 'interference' as this suggests an anti-social activity. It is far better to use the word 'breakthrough' instead.

All amateurs should strive to live in peace with their neighbours. From the outset, it is good policy to make friends with the people in closest proximity to your QTH. If relationships are amicable there is less chance of a dramatic change of heart if problems of breakthrough occur.

Sometimes a confrontation is unavoidable. When this happens, try to find a solution by co-operative means. Taking the attitude that "I'm allowed to run full legal power and therefore I'm going to, no matter what", will get you nowhere.

On the other hand, not going on the air for fear of upsetting your neighbours is almost tantamount to admitting that you are at fault.

When entering into discussions with your neighbours do not attempt to blind them with science, Your use of technical and baffling phrases could create further resentment.

It might be helpful to rehearse your procedure with a friend so you can work out an acceptable approach. You will then both know what to do, if and when you hear that dreaded knock on the door in the middle of your sked on 3.5MHz!

If you are running a reasonable amount of power for the conditions prevailing and the problem still exists, do not avoid the problem but approach it in a diagnostic manner. Solving the problem often turns out to be a fairly simple affair. You do not need a degree in electronics, but merely be able to work in a reasoned logical manner.

Is your equipment blameless? Could you show a neighbour that your transmissions do not interfere with your TV, etc, which is in closer proximity? If you can show that:

(a) transmission to your TV = no breakthrough

(b) transmission to his TV = breakthrough,

then the logic should not be lost on him.

There is no single stock solution for all breakthrough but with patience and trial and error you can solve most of the problems.

So much for the social side of things; now read on for the more practical 'nuts and bolts' approach to the business of breakthrough.

Is your station designed for good EMC?

The chances are that when you designed your amateur radio station (if in fact you did), the last thing on your mind was minimizing breakthrough problems that might occur. Your licence includes a clause which requires that stations "shall not cause undue interference" to other wireless telegraphy (this somewhat dated phrase includes both radio and TV).

The following guidelines explain how your station can be designed to reduce the chances of neighbours suffering breakthrough problems.

Take sensible precautions

These precautions will not guarantee freedom from breakthrough problems. However, if you carry them out, you can demonstrate to the authorities that at least you have taken the "undue interference" clause seriously. These steps are a good insurance policy for the future.

Take these precautions now, and you will not have the hassle of modifying your station in a hurry with a 'live' breakthrough case on your hands. It wouldn't look too good if you solve a problem by modifying your own station.

STATION LOCATION

Keep your station away from the neighbour's property

By your 'station' we mean the place where your transmitter is located. Every part of your installation will radiate some signals apart from those you expect from the antenna. Some signals may be harmonics or other spurii that your neighbour doesn't want nearby. Lengthen the odds against breakthrough and interference by keeping the station as far away from his property as possible.

Remember - doubling the distance from your transmitter to his TV or radio will halve the strength of any unwanted radiation that he receives. Brick walls are almost transparent at RF, so even if your neighbour's equipment is not just the other side of the party wall, there is plenty of house wiring to carry your unwanted signals around his property.

Keep your HF station close to ground level

Many parts of your installation may need effective grounding. Keeping the ground connection leads short is easier if you put your HF station closer to the ground. This might also reduce the problem of RF feedback.

IMPROVE YOUR STATION DESIGN

Use an independent RF ground on your station

It is almost impossible to design a station that doesn't produce some unwanted RF signals on the case of the transmitter. These signals may find their way into the mains supply. You can give them signals a 'good home' by grounding your station with an independent earth connection.

Any part of your station which handles RF signals at a high level will benefit from being well grounded. This ground will, however, only be as good as the lead connecting it to your station. The lead should be less than 1/10th of a wavelength to be effective. This means that even at 14MHz the lead length needs to be less than seven feet.

Generally, this sort of grounding is ineffective above 30MHz and so mains supply isolation will be needed. NB: Special precautions need to be taken if the mains electricity supply uses protective multiple earthing (PME). Consult your electricity board for further details.

Isolate or filter the station mains supply at RF

Even with an effective station ground, isolating the mains supply at RF with a filter is still worthwhile. Apart from keeping your RF signals out of the supply, it will also help to keep mains-borne interference out of your station.

Usually a conventional mains filter (often called a hash filter) only filters the live and neutral conductors of the supply. The mains safety earth comes straight through, allowing most of the RF signals to bypass the filter altogether.

Effective isolation requires the use of a special mains filter which filters all three conductors. They are special in that the earth line is designed to carry fault currents of 100 amps should a short circuit develop on the station side.

A simple but effective filter can be made by winding the station incoming mains supply cable through a number of ferrite rings. Make sure that all three conductors (L, N, & E) are wound through the rings together.

Ferrite rings sold by the RSGB are suitable for this purpose. If you use these then the number of complete turns, times the number of rings should be at least 20. For instance, wind five complete turns on four ferrite rings.

Screen all your equipment that carries high level RF signals

All this isolation and grounding won't do much good if any part of your station carrying high level RF signals is unscreened. Every such item should be well screened; this includes the transmitter, linear amplifier, power meter, output filter, and antenna tuning unit. Leaving the screening off any one of them could spoil the whole effect.

The internal fields within these items will be very high. Even if they didn't contain any unwanted harmonics, the fundamental signal will still leap into anything nearby if you let it out. Apart from stray RF radiation being a potential health hazard, you might also produce unwanted RF feedback problems.

Use good quality coaxial cable within the house

Poor quality coaxial cable leaks RF signals! Try putting a dummy load on the far end of one of your antenna feeders and fire up your transmitter. If you hold a sensitive field strength meter near the cable you should not be able to detect any signal. If you can, then the chances are that the cable leaks.

If your feeder runs indoors close to any equipment or house wiring, then this leakage could pass next door regardless of where your antenna is. (See also 'Where and when to use a balun')

Always monitor your output power with a reliable power meter

If you can't monitor your output power whilst transmitting, then you can't be sure that you are not overdriving the transmitter. An over-driven transmitter will produce more harmonics and sometimes extra spurious signals, as well as extra splatter in-band.

If you are using SSB or CW then the power meter should respond to the peak envelope power. You can't rely on the peak output power level being the same as that selected during tune-up.

While operating, the peak power will always be higher than the steady state power, because all transmitter ALC systems are less than perfect (some much less perfect than others). Remember also that a VSWR meter may generate harmonics and should always be placed BEFORE any output filters.

Using a bandpass or lowpass output filter

On some commercial HF transmitters, the level of the harmonic output may still be high enough to cause interference to Band II FM radio. On VHF, the level of the harmonic output from 144MHz can also cause problems to Band IV TV transmissions.

All commercial transmitters produce some unwanted output signals. Although the level of these signals may be low enough not to cause trouble in most cases, use a good output filter unless you are sure that your transmitter is above reproach.

Select the right transmitter power for your QTH

Apart from being very bad value for money, running a few hundred watts to an antenna that is either indoors or below roof level is asking for trouble.

If you don't have the space or money to locate your station and your antennas away from your neighbour's property, then don't bank on being able to run high power on any band. If you expect the impossible from your QTH, then be prepared for the impossible neighbour!

CARE IN LOCATING YOUR ANTENNA

Locate your antenna as high as possible

Remember, the higher your antenna, the lower the chance of a signal finding its way into your neighbour's home (and the greater the chance that it will arrive at your contact's receiver). This is especially true when beam antennas are in use. Even small changes in height will sometimes place your neighbour's property outside the main lobe of the antenna.

Site your antenna well away from buildings

Whatever antenna you use, you should site it well away from buildings. This will minimize the signal strength inside the property.

Remember, the distance that matters is that from the nearest point of the antenna to the building. Make this distance as great as possible.

In any case, the increased distance may significantly reduce the interference YOU receive as well.

CARE IN CHOOSING YOUR ANTENNA

Choose the right size of antenna for your QTH

Select an antenna system that suits your property. Unless you live in a large detached property, fitting a large HF antenna into a small QTH will involve draping it over the house itself.

If this also brings the antenna close to your neighbour's house, then you may cause breakthrough even when using quite low transmitter powers.

Try using a smaller HF antenna sited away from the house. Although it may be slightly less efficient you may find the higher power you can use will give you an overall advantage.

Don't bring long wire feeds into the house

The long wire antenna is sometimes a poor choice. For good EMC, it could be disastrous as it brings radiated RF signals right into the building and picks up radiation from house wiring. Inevitably, the feedpoint is too far from the earth connection, even if the earth is a good one, and the transmitter will be 'hot' with RF signals.

Often, most of the radiation takes place from the portion nearest the feedpoint, which is generally far too low down. If you must use a long wire, move its feedpoint well away from the house, and feed it with 50ohm coaxial cable.

Provided the VSWR is less than 3:1 you may still be able to match the system with an ATU at the transmitter end. Alternatively move the ATU to the far end of the feeder, and tune the ATU by remote control.

Use only screened antenna feeders near to buildings

A screened feeder helps you ensure that only your antenna radiates or receives signals. Although coaxial cable is the obvious choice for screened feeders, some balanced antenna feeders can be screened too. For instance, you can make a screened 150 ohm balanced feeder by taping two 75ohm coaxial cables side by side.

Join the screens together at both ends, and connect the two 'live' conductors to the antenna at one end and to the ATU at the other. Leave the screen at the antenna end floating, but connect the screens at the ATU end to the station ground.

If an antenna system design demands 600ohm open wire feeder, you can use an ATU directly below the antenna with coaxial cable entering the house.

Where and when to use a balun

If you feed a balanced antenna (eg a dipole) from an unbalanced feeder (eg coaxial cable) then use a balun between the two.

We know it seems to work alright without a balun, but omit one and all sorts of things can go wrong; the two legs of the dipole will radiate unequal amounts of power,

and the outer of the coaxial cable will radiate up to 30% of the power.

Not only will this distort the beam pattern of the antenna, but it will bring RF signals back into the house, just where you don't want them. In any case, leaving out the balun will allow the coaxial cable to pick up all sorts of radiation from the house wiring, and pipe them straight into your receiver.

Ground the screens of all coaxial cables before they enter the house

Even if you follow all the good practice guidelines, you may still end up with RF currents on the outside of feeder cables, where these currents result from direct pickup of the radiated signal.

You can prevent this RF entering the house by grounding the screens of the feeders with short leads, to an independent earth, before they enter the building.

PUT YOUR OWN HOUSE IN ORDER

Cure all major breakthrough in your home

You should cure all major cases of breakthrough in your own home prior to any lengthy transmissions. After all, if you cannot solve your own problems, you can hardly expect your neighbour to cure his!

A household free from breakthrough can be a powerful tool for dealing with an upset neighbour, and solving the problems will provide some useful practice. If your household is free from breakthrough, your own television and radio can give you an early warning if anything does go wrong with the transmitter.

Install your own TV and radio efficiently

The equipment in your household should be a model of good practice. Use outdoor antennas for FM radio and television and ground their feeders where they enter the house.

If the signal is small, use larger antennas instead of masthead amplifiers. Buy a hi-fi system which is well decoupled. If you feel you cannot do these things, then you cannot expect your neighbour to do them either.

KEEP A GOOD FIRST AID BOX

Collect knowledge on EMC

Your shack library should contain at least one book on EMC. If you are conscientious then buy them all. Remember - they won't be much help unless you read and try to understand them. Knowledge is a most powerful weapon when dealing with EMC problems.

Keep a good stock of filters

Your neighbour will be much happier if you react to his breakthrough problem immediately. You don't have to provide him with any cures if you don't want to, but you should have a sample of each type of filter to show him exactly what he needs.

A minimum kit for the HF operator should be a braid-breaker, at least four ferrite rings (RSGB type), a high pass filter for Band II radio, and a high pass filter for Band IV/V television. The VHF operator should keep at least four ferrite rings, and a selection of coaxial notch filters, one for each band he uses.

Keep an auto CW key and/or a two tone oscillator handy

Ideally, two people are required to investigate a breakthrough problem - one to operate the transmitter, while you visit the neighbour. You will sometimes need to investigate a case on your own. Driving the transmitter with an auto CW key or a two tone oscillator as appropriate, will allow you to do this.

Apart from the need for frequent identification, you should monitor the band at regular intervals to ensure that your signals are not causing trouble to other radio amateurs.

FURTHER HELP

If this article has inspired you to further action, it is important to know where to go and who to ask for additional advice.

Chapter 17 of the RSGB Radio Communications Handbook gives quite comprehensive coverage of EMC. This, coupled with Chapter 40 of the ARRL Handbook, could well form the basis of your background reading.

For more specific information the ARRL produce an EMC publication, 'Radio Frequency Interference - how to identify and cure it', which deals with all aspects of the subject in greater detail.

The RSGB is about to publish a new EMC Manual, which not only deals with the practical side of the problem but also puts emphasis on the social aspects.

A free colour booklet, 'How to Improve Television and Radio Reception', which provides a useful guide to reception problems is available from most Post Offices.

RSGB Headquarters is the place to apply for filters and ferrite rings. The filters are made by Armstrong Kirkwood Developments (AKD) and five different types are stocked.

BB1 - This is a 'braid breaker' filter suitable for rejection of braid-borne interference between 2MHz and 50MHz.

HPF2 - This is a high pass filter for Band II with low insertion loss above 88MHz and rejection better than 50dB below 30MHz.

HPF1 - This combines the action of BB1 and HPF2 but is only suitable for use in Band IV and Band V as it has a high insertion loss below 300MHz.

TNF2/2 - This is a 144MHz tuned notch filter which will reject 144MHz signals on both the inner and outer of the co-axial whilst letting all other signals pass.

RBF1/70 - This is a 430MHz tuned notch filter.

All these filters can be purchased on request from RSGB, Lambda House, Cranborne Road, Potters Bar, Herts EN6 3JE. (Tel. 0707 59015).

The RSGB EMC Committee is working hard to make certain that the subject is being handled properly and also giving help and support to members with EMC problems.

Soon, a network of EMC Co-ordinators will be set up throughout the UK. This means that not only will help be at hand, but at your fingertips!

In the meantime, if you feel that things are getting out of hand or that you might get out of your depth, contact the Chairman or any member of the EMC Committee before compromising your position. They will be only too pleased to help.

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For further information turn to the inside front cover and page 168

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