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The Radio Society of Great Britain Members' Magazine

RadCom

£3.95 Vol 80 No. 3 March 2004

Project Goodwill Albania

Prof Sonila Agako, ZA1YL, one of 39 new Albanian licensees, gets to grips with the Yaesu FT-1000MP MkV. Read Roger Brown's report p20

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HOW TO WORK 3B9C
Some top tips on how to make contact with this major UK-led DXpedition to Rodrigues Island

TUNNELS
The problems of radio communications through tunnels are examined by Mike Bedford

TECHNICAL TOPICS
Close-spaced beams, the G8PO Special, and a new lower-voltage H-mode mixer

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IN PRACTICE
All you need to know about the practicalities of IF filters, and where to get them

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The conclusion of the mammoth 20-part series p56

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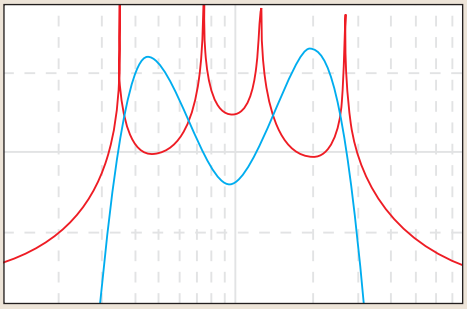
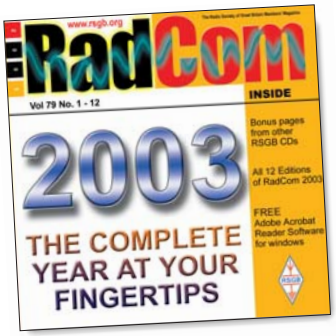


Review

The new TS-480HX HF/6m transceiver from Kenwood p33



Book & CD review

Time to reorganise your shack and replace your 2003 RadComs with the 2003 CD or Bound Volume p31

Half-year accounts from the RSGB and report on the 2003 Annual General Meeting p12

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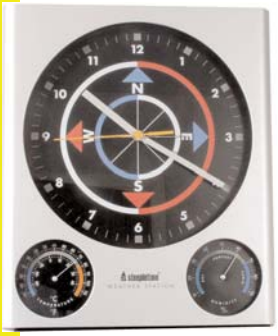


Get this lovely Wall Clock (worth £24.95) with temperature & humidity readout absolutely free. Purchase any transceiver or receiver more than £100 and mention this offer to get your *free* wall clock. Subject to Availability

YAESU FT-7800E BRAND NEW

Yaesu's Powerful low cost answer!

* 2m/70cms Dual Band Mobile
* High power 50W 2m /40W 70cms
* Wide receive inc. civil & military airband
* CTCSS & DCS with direct keypad mic.
* Detachable front panel
* 1000 memories plus five one-touch

£239 C

HORA C-150 2M HANDHELD

£79.95 SPECIAL OFFER

An amazing price for a 2m Handheld!
2W output on AA cells and 5W output on external 13.8V. 1750Hz tone, 20 memories, keypad control, 5 steps inc 12.5kHz, dial illumination receive 130 - 170MHz. You won't find a better deal! Includes flexi antenna, belt clip and instruction manual. (AA cells not included)

ICOM IC-756 PRO II SPECIAL OFFER £1895 C

NEW LOWER PRICE

Flagship of the Icom range of HF transceivers. HF & 50MHz, features large colour LCD with spectrum scope, auto ATU and 32-bit floating point DSP unit. **With *FREE* Watson HP-100 or HP-200 Headphones, state preference when ordering.**

ICOM IC-7400 SPECIAL OFFER £1299 C

HF/VHF 100W transceiver covers 1.8 - 146MHz Features large LCD with spectrum scope, auto ATU and same DSP system as IC-756PRO II. A great base station!
Comes with *FREE* SP-21 Speaker & SM-20 Desk mic

ICOM IC-703 NEW £589 C

NEW LOWER PRICE

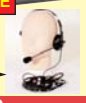
HF/ 50MHz Transceiver 0.1-10W Portable, Mobile, Base-Station. Ideal for Foundation Licence/QRP. Auto ATU, DSP memory keyer. External batt **BP-228 £71.76.**
Rucksack **LC-156 £62.**

ICOM IC-706 IIG DSP £769 C

NEW LOWER PRICE

HF/VHF/UHF mobile DSP transceiver. Its relative small size not only makes it a great mobile rig but also for fixed station use as well. HF general coverage and VHF & UHF .

Heil Traveler single ear "706" headset + PTT **£89.95**



ICOM IC-718 £449 C

NEW LOWER PRICE

HF 100W transceiver. Covers all HF bands plus wideband receive. C/w auto notch, dual VFO, SWR meter etc. Options include extnl ATU DSP & filters.

KENWOOD TS-2000 £1599 C

Top-of-the-range Kenwood transceiver. HF/VHF/UHF or up to 23cm with the optional module. Built-in auto ATU, DSP and its unique TNC.

ARCP Control Software. **£44.95**

KENWOOD TS-870S DSP £1399 C

HFDSP 100W base station. 1.8 - 30MHz. Excellent all round rig great for DX working with its ability to winkle out weak stations using its true IF DSP. No filters to buy.

MC-60A base mic with pre-amp. Ideal match. **£117.95**

KENWOOD TS-570DGE £849 C

HF100W base station with built-in auto ATU. Very popular rig, excellent performance on SSB and CW. Two fitted antenna sockets - very handy.

SP-23 Matching base station receiver **£68.95**

ICOM IC-910X with 23cm £1249 C

Icom's all mode VHF/UHF transceiver with 23cm.
Large clear LCD with lots of facilities. 100W on VHF and 75W on UHF, 10W on 23cm.

UT-106 DSP unit **£84.99**

Basic Model IC-910H £1129

YAESU FT-1000 MKV £2349 C

200W HF transceiver, EDSP, Collins filter, auto ATU, 220V AC PSU - Acknowledged as one of the finest DX rigs on the market. Superb tailored audio and the ability to select Class A bias for dramatic signal purity.

YAESU FT-1000 FIELD £1749 C

100W HF transceiver, EDSP, Collins filter, auto ATU, 220V AC / 13.8V DC - Building on the success of the FT-1000MkV, the Field has become a respected leader in its class.

KENWOOD TS-480SAT & TS-480HX

NEW

The **TS-480SAT** is the 100W version of this new HF+6m transceiver from Kenwood. Smaller than the TS-2000/ TS-B2000 it has many similar features.
TS-480SAT £999 C
The **TS-480HX** is the 200W version of this new HF+^m transceiver. **TS-480HX £1099 C**

YAESU FT-897 £979 C

NEW LOWER PRICE

100W HF rig plus 2m and 70cms (50W/20W) 13.8V external supply / internal optional FP-30V AC power supply / self powered portable using optional Ni-MH pack at 20W output. Compatible with FC-30 auto ATU and ATAS 120/100 antennas. The "must have" radio for 2003.

YAESU FT-847 £1199 C

1.8 to 440MHz, this all-in-one transceiver offers unbeatable value. 100W on HF plus 6m, and 50W on 2m and 70cm. You get genuine RF clipping on SSB for up to 6dB gain and there are 4 separate antenna sockets.

YAESU FT-857 NEW £749 C

NEW LOWER PRICE

HF / 50 / 144 / 430MHz Mobile Transceiver. HF/6m 100W, 2m 50W, 70cm 20W. (13.8V DC)
Developed on the FT-897 and FT-817 transceivers. Built-in features 32 colour display, spectrum scope, AM airband aircraft reception, built-in memory keyer, detachable front panel.

YAESU FT-817 £529 C

NEW LOWER PRICE

bhi NE-DSP1061 Module available!

160m - 70cms. Up to 5W output all modes. ***Ours includes*** **battery and charger.** **Add £110 for DSP ready fitted.**

NEW DSP Module
There is NO new FT-817 DSP! The fact is that the UK manufacturers, **bhi**, (of whom we are their largest distributor), have produced a lovely 4-stage DSP module that can be fitted inside the FT-817. The NE-DSP1061 module costs £89 plus a fitting charge of £25 for retro-fitting to existing models. This includes installing a mini switch and LED on top cover.

TOKYO HY-POWER HL-50B £269.95 C

FT-817 VERSION !

This Linear Amplifier has been specifically designed for use with the FT-817. Enjoy up to 50 Watts output

HING 'TIL 2005!

MONTHS ON SELECTED ITEMS MARKED BY £

THE ONLY THING WE CUSTOMER SERVICE WON'T DISCOUNT

ICOM IC-E208 NEW £279 C

VHF/UHF FM Dual Band Mobile Transceiver *Freq range 144-146MHz, 430-440MHz Tx *55/50W (3 pwr steps each band) *Wideband Rx 118-173, 230-549 & 810-999MHz *512 memories *FM narrow capability *104x2 DTCS, 50 CTCSS tone squelch *16 DTMF channels *HM-133 remote control mic *Packet ready for 9600/1200bps-mini DIN or 1200bps-mic socket *Supply 13.8V

ICOM IC-2725E £269 C

The Icom IC-2725 dual band FM transceiver is proving very popular. Easy to install, the controller is separated from the main unit - great where space is limited.

ICOM IC-2100H £229 C

2m 55W FM mobile. Commercial grade, rugged construction. One piece die-cast aluminium chassis. Selectable green or amber display.

YAESU FT-8900R NEW £349 C

Want the best of all worlds then the FT-8900R is just the ticket! A rig with four of the most popular mobile bands - 10m/6m/2m & 70cm. Detachable head.

YAESU FT-2800M NEW £159 C

*144-146MHz *FM *137 - 174MHz expanded Rx *RF Pwr 65/25/10/5W *25/12.5kHz channel spacing.The NewFT-2800M from Yaesu with 65 Watts High Power, rugged construction, excellent receiver performance and direct keypad entry.

YAESU FT-8800E £269 B

Dual Band FM Mobile 50/35W
The FT-8800R series operates as two radios in one, with independant two channel operation.
Remote head mounting capability, wideband receive on VHF & UHF and over 1000 memories.

YAESU FT-1500M £139 B

Built like a battleship, this rugged design benefits from Yaesu's commercial product range. 2m 50W and a DTMF microphone. Great value.

We Price Match!
Call 08000 73 73 88

KENWOOD TMD-700E £449 C

Certainly the best 2m/70cm dual band mobile transceiver with APRS. Does not need extra high cost boards to function. The only extra if required is a compatible GPS receiver.

KENWOOD TM-V7E £359 C

Dual-band 2m/70cm.
A lovely cool blue display, easy to read with 50/35W output. 50W/35W plus 280 memos and five storable operating profiles.

KENWOOD TM-G707E £289 C

Dual Band
If you are looking for simplicity and low cost, here's the answer. 2m &70cms with detachable front panel and "Easy operation mode." GREAT!

YAESU VX-7R £299 B

6m/2m/70cm

Available in Silver or Black

The VX-7R is the best outdoor handie ever. The case, keypad, speaker and connectors are all sealed against water damage. Wide Frequency coverage from 500kHz to 900MHz the VX-7R is ideal for monitoring a variety of broadcasts. The display is a dazzling 132x64 dot matrix providing easy-to-read frequencies and information plus pictorial graphics.

YAESU VX-150 £125 B

The VX-150 is a fully featured compact yet incredibly rugged 2m 5W Handheld. Features include direct keypad frequency entry, CTCSS, DTMF, 1750Hz tone calling, wide/narrow deviation selection. It has a die-cast case, large high output speaker, illuminated keypad and battery voltage meter.

YAESU VX-2E NEW £169 B

Dual Band handy, 1.5W (2m) and 1W (70cm). Full DTMF, CTSS and DCS. With 1300 memories and AM/FM coverage 500kHz-960MHz.

ICOM IC-E90 £269 B

The new E-90 offers triple band coverage of 6m, 2m and 70cms. Up to 5W output and rx coverage from 495kHz - 999MHz makes this a very attractive rig.

ICOM IC-T3H £129 B

The IC-T3H 2m handheld features tough quality but with slim looks. Its striking green polycarbonate case has been ergonomically designed. The rig is capable of providing a powerful 5.5W output with either Ni-Cad or Ni-MH battery packs. Supplied with charger and rechargeable battery.

KENWOOD TH-D7E £319 B

DATA COMMUNICATOR

One of the most successful handhelds over the past few years. It has a built-in TNC for Packet use. You can also use it for APRS operation in conjunction with an external GPS unit. Plus NMEA, 200 memos, and up to 5W output.

KENWOOD TH-F7E £249 B

WITH EXTRA WIDE RX COVERAGE

- 144-146MHz Tx/Rx: FM
- 430-440MHz Tx/Rx: FM

NEW LOWER PRICE

Up to 6W out with Li-ion battery and "scanner" style coverage from 100kHz to 1300MHz including SSB on receive! This is a great radio to have at all times when you are on your travels.

KENWOOD TH-G71E 199 B

If you want an excellent 2m/70cm dual-bander then you can't go wrong with the TH-G71. Fully functional with three power levels, 200 memories, CTCSS tone encoder/decoder, illuminated keypad and backlit LED.

YAESU VX-110 £119 B

Combining the ruggedness of the VX-150 with the simplicity of 8-key operation, the VX-110 is a fully featured 2m hand held ideal for the most demanding of applications. With its die-cast case, large speaker, and illuminated keypad, it is particularly well suited for most conditions. The VX-110 is a very affordable, rugged and reliable handheld.

WEB ORDERING
www.wsplc.com

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01702 206835/204965
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FAX: 01702 205843

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- W&S @ LOWE, BENTLEY BRIDGE, CHESTERFIELD RD, MATLOCK, DERBYSHIRE, DE4 5LE

ENQUIRIES: 01629 580800
FAX: 01629 832375

SCOTTISH STORE

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FAX: 01592 610451-CLOSED MONDAYS

carriage charges: A=£2.75, B=£6, C=£10

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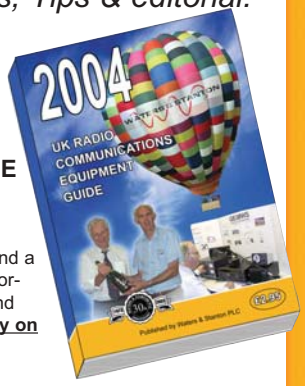

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TIGERTRONICS SignaLink™ SL-1

SignaLink Model SL-1 & **SignaLink Model SL-1+** Soundcard Radio Interfaces

These advanced soundcard radio interfaces cover most of the digital modes such as PSK-31, MT-63, WSJT, FSK441, Packet, APRS, AMTOR, RTTY and other modes such as CW, SSTV, WeFAX and ACARS®. They require a PC and SoundBlaster® compatible soundcard. All SignaLink Interfaces incorporate Auto PTT and do not require a serial connection to the computer. There are a wide assortment of radio cables for all the common mic/data connections. The SignaLink part number determines which radio cable is supplied with the unit i.e. SL-1RJ45, SL-1RJ11, SL-1+8R (8-pin round), please state which you require when ordering. 2.1mm power plug, jumper wires & CD-ROM included.
The SL-1+ model includes improved Auto-PTT sensitivity, adjustable receive and transmit audio levels, selectable fixed or variable transmit "hang time", Voice modes plus the ability to use the radio's mic, data or accessory ports.

SignaLink SL-1 (8R,RJ11,RJ45) **£59.95 B**
SignaLink SL-1+ (8R,RJ11,RJ45) **£69.95 B**
SL-ASSY Accessory cable kit audio & PC **£9.95 A**

WATERS & STANTON

PRICE MATCH

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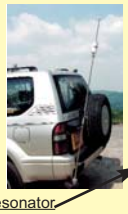
VERTICAL ANTENNAS

Hustler Mobiles

Get top performance when on the move. Purchase the **MO-3 base** (137cm) for **£24.95** or the **MO-4 base** (68cm) for **£22.95**. Then add the resonator of your choice. **RM-10, RM-12, RM-15**, all **£19.95** ea. **RM-17, RM-20 £24.95** ea. **RM-40 £26.95, RM-80 £29.95**

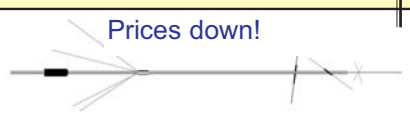


Resonator

MA5V Base vertical
No radials needed

Base section → MO-3 or MO-4

Prices down!



CUSHCRAFT BASE ANTENNAS

MA6V *NEW*	20-17-15-12-10-6m 250W PEP	**£269.95**	C
MA5V	20-17-14-12-10m 250W PEP	**£239.95**	C
R8	40-30-20-17-15-12-10-6m 1.5kW	**£469.95**	C
R6000	20-17-15-12-10-6m 1.5kW PEP	**£329.95**	C

DIAMOND CP6 £239.95 C

**Bands: 3.5 -50MHz *Power: 200W *VSWR: Better than 1.5:1*
**Socket: SO-239 *Height: 4.6m *Radials: 1.8m adjustable*

Covers five popular HF bands and the 6m band. Low angle radiation makes it ideal for DX work. Outperforms dipoles for long distance contacts and compares favourably with beams located 10m+ above ground. It doesn't need long wire radials. Adjustable rigid radials, DC return helps the antenna get rid of static noise. Antenna is adjustable for each band.

HARI High quality German traps. (Pairs)
200W 20m £44.95 40m £49.95 80m £53.95
1kW 20m £59.95 40m £64.95 80m £73.95

HARI High quality German Baluns
SO-239200W 1:1, 4:1 or 6:1 £25.95 ea.
1kw 1:1 £34.95 4:1 or 6:1 £41.95 ea

HORIZONTAL BEAMS & DIPOLES

CUSHCRAFT Prices down!

Premier HF beam used around the world by serious DX'ers.

X-7	20/15/10m 7 el. Yagi 2kW	**£669.95**	D

Not got the space for a full sized HF beam antenna, then the mini beam MA-5B should be considered.

MA-5B	10-12-15-17-20m 4 el. Yagi 2kW	**£369.95**	C
A4-S	10-15 & 20m 4 el. Yagi 2kW	**£569.95**	D
A3-WS	12 & 17m 3 el. Yagi 2kW	**£379.95**	D
D-3	10-15-20m dipole element 2kW	**£249.95**	C

Don't want a wire antenna but can't fit a Yagi, then consider a rotatable dipole.

D-3W	12-17-30m dipole element 2kW	**£249.95**	C
D-4	10-40m dipole element 2kW	**£349.95**	C
D-40	40m dipole element 2kW	**£319.95**	C
TEN-3	10m 3 el. Yagi 2kW	**£229.95**	C
ASL-2010	13.5-32MHz 8 el. log periodic	**£749.95**	C

RADIO WORKS

A choice of quality wire antennas available to fit almost any circumstances. Prices down!

CW-160	160-10m 76.8m long	**£129.95**	C
CWS-160	160-10m 40.5m long	**£114.95**	C
CW-80	80-10m 40.5m long	**£89.95**	C
CWS-80	80-10m 20.1m long	**£109.95**	C
CW-40	40-10m 20.1m long	**£84.95**	C
CW-20	20-10m 10.36m long	**£89.95**	C
CW-620	20-6m 9.7m (32ft) long	**£89.95**	C
G5RV PLUS	80-10m with balun 31m (102ft) long	**£59.95**	B

WATSON FC-130 FREQUENCY COUNTER £59.95 B

**1MHz-3GHz *Impedance 50 Ohms*
**LCD readout *10-digit display*
**16 segment bargraph*
**BNC Whip Antenna*
**Black anodised case *Internal Ni-Cads*
**600mAH *6 hours operation*
**AC charger *9V DC 300mA*
**68 x 80 x 31mm*240g*

WATSON HUNTER FREQ. COUNTER £49.95 B

**10MHz-3GHz *Impedance 50 Ohms*
**LCD readout *8- digit display*
**BNC Whip Antenna*
**Black anodised case *Internal Ni-Cads*
**AC charger *9V DC 300mA*
**68 x 80 x 31mm *210g*

PORTABLE ANTENNAS

MIZUHO (FOR FT-817)

ATX-WBN	Walkabout 80-6m Whip 1.5mBNC	**£49.95**	B
ATX-WPL	Walkabout 80-6m Whip1.5mSO-239	**£49.95**	B
ATX-W38	Walkabout 80-6m Whip 1.5m 3/8in	**£49.95**	B

New Low price on Walkabout whips, three to choose from with three different connectors.

AT-80	Single band 80m whip with BNC	**£19.95**	A
AT-40	Single band 40m whip with BNC	**£19.95**	A
AT-30	Single band 30m whip with BNC	**£14.95**	A
AT-20	Single band 20m whip with BNC	**£14.95**	A

Range of single band HF antennas with BNC connection. Ideal for FT-817.

AT-17	Single band 17m whip with BNC	**£14.95**	A
AT-15	Single band 15m whip with BNC	**£14.95**	A
AT-12	Single band 12m whip with BNC	**£14.95**	A
AT-10	Single band 10m whip with BNC	**£14.95**	A

Zero Space - - DX Antennas

From Hustler USA

Run full legal power - 80m to 10m - with no masts or guys to worry about. 50 Ohm feed.

Small garden, planning problems or similar restrictions? Then the Hustler range is the answer. These HF verticals will take 1kW of power, work at ground level, and are self-supporting. A single earth rod will get you going. Add buried radials for even better results. Many hams have got on the HF bands with just this simple system. So why not join in the fun. These are rugged, well-built antennas that American hams have been using for years. Now they are available in the UK from our three stores.

4BTV
40-20-15-10m. 6.52m high. Full band coverage.
£159.95 C

5BTV
80-40-20-15-10m. 7.64m high. Full band coverage (100kHz on 80m).
£199.95 C

6BTV
80-40-30-20-15-10m. 7.3m high. Full band coverage (100KHz on 80m).
£219.95 C

MFJ Compact Portable Tuners

MFJ-971
QRP portable tuner, 300/30/6W. Wire, coax or balanced. **£99.95 B**

MFJ-902 Travel Tuner
Smallest 150W ATU in the world! 3.5 - 30MHz coax or end fed wires. Real air spaced capacitors! **£74.95 B**

MFJ Power Tuners

MFJ-989C £359.95 C
3kW 1.8 - 30MHz. Wire, balanced and coax feed. Full metering and switching

3kW fast differential tuning design. 1.8 - 30MHz. Wire balanced and coax systems. Full metering and switching.

MFJ-986 £329.95 C

MFJ Popular Tuners

MFJ-949E £159.95 B
1.8 - 30MHz. 300W wire, balanced and coax. Inc dummy load, metering and antenna selector.

Similar to the MFJ-949E, but without internal dummy load. One of the most popular ATUs in the world!

MFJ-948E £139.95 B

MFJ Match Makers

MFJ-910 £24.95 A Mobile Matcher. Connect between mobile whip and transceiver. See your VSWR come down as you switch impedance match.

Auto ATU extender. It let's your internal transc. ATU handle difficult coax antennas such as G5RVs etc. Greatly extends the range cpability.

MFJ-914 £64.95 B

Antenna Analysers

MFJ-259B £259.95 B

Full diagnostic information about your antenna. 1.8 - 170MHz. Totally portable. Great value.

MFJ-269 £349.95 B

The most comprehensive diagnostic analyser ever made. 1.8 - 170 plus 415 - 470MHz

MFJ-969 ATU £199.95 B

The latest design from MFJ, this unit features an active power meter for really accurate PEP measurements. Powered by an internal PP3 battery (not supplied) or an external 12V source. This is one of the most popular 300W models, having a very wide frequency range an excellent power and VSWR accuracy.

MFJ-260C DUMMY LOAD £37.95 B

MFJ-260C 1.5MHz - 150MHz 300W 50 Ohm SO-239
**Size 180 x 57 x63mm • Weight 450g*

Handles 300W for 30 seconds and lower powers proportionally longer.

MFJ-901B VERSA TUNER £85.95 B

This compact tuner is a low cost alternative where the main station already has a VSWR meter and just requires the 'bare bones' tuner. It will handle all types of aerials, match coax fed systems, long wires and balanced feeders and is very simple to use. It retains the basic MFJ T-network that has a wide impedance matching capability.

MFJ-461 MORSE READER £84.95 B

The MFJ-461 is a stand-alone pocket sized Morse code reader. Similar in size to the MFJ Morse tutors, all you do is hold it close to your receiver and it instantly displays CW on the 32 character high contrast LCD. It has automatic speed tracking, a serial port - if you wish to connect to a computer to display the text on a bigger screen. It can also be connected to your receivers audio if required.

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THE NATIONAL SOCIETY WHICH REPRESENTS UK RADIO AMATEURS

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Member society of the
International Amateur Radio Union
Patron: HRH Prince Philip, Duke of Edinburgh, KG, KT

Membership is open to all those with an active interest in radio experimentation and communication as a hobby. Applications for membership should be made to the Subscriptions Department from which full details of Society services may also be obtained.

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Details of the Society's volunteer officers can be found in the RSGB Yearbook 2004

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RSGB matters

RSGB 2004 - 05 President Jeff Smith, MI0AEX, pictured at the Presidential installation dinner held in Belfast in January with his opposite number from across the border, IRTS President Sean Donelan, EI4GK.

RSGB ANNUAL PRIZES AWARDED

A report on the RSGB 2003 AGM, held at the University of Wolverhampton Telford Campus on 6 December, can be found on page 13 of this issue of *RadCom*. At the AGM, the Society presented its annual Board awards and trophies to individuals in recognition of their work and achievements.

Robin Page-Jones, G3JWI, was appointed a Life Vice-President of the Society in recognition of his outstanding contribution in the important area of EMC and lately his dedication to the fight against the introduction of PLT. Also made a Life Vice-President was Colin Thomas, G3PSM, for his hard work as Chairman of the HF Committee and as the Society's HF Manager. Colin also won The Founder's Trophy for his work on behalf of amateur radio as a member of the UK delegation at WRC-03.

The Calcutta Key is awarded for outstanding service to international friendship and in December it was awarded to the Society's Islands on the Air (IOTA) Committee. IOTA is close behind DXCC as the most successful amateur radio awards programme in the world and this is only because of the hard work and dedication of this Committee.

Dave and Kath Wilson, M0OBW and M1CNY, received the Kenwood Trophy for their outstanding contribution to amateur radio training and education. Dave and Kath and their team have put through 360 successful Foundation Licence candidates in the last two years.

A series of awards was made to authors of outstanding articles published in *RadCom* over the previous year. These went to George Fare, G3OGQ; Colin Horrabin, G3SBI; Dave Roberts, G8KBB; David Bowman, G0MRF; Ted Garrott, G0LMJ; 'Danny' Dancey, G3JRD; and Steve Hartley, G0FUW.

Finally, two special awards were presented in for the Society's 90th anniversary year. These went to Simon Brown, HB9DR / GD4ELI, and to Peter Halpin, PH1PH / G7ECN, for their significant contribution to the development of amateur radio technology.

Robin Page-Jones, G3JWI, is made a Life Vice-President of the Society.

George Fare, G3OGQ; Colin Horrabin, G3SBI, and Dave Roberts, G8KBB, of CDG2000 fame, receive their award from Bob Whelan, G3PJT.

EXAMINATION FEES TO RISE

Since its introduction in 2002 the Society has endeavoured to keep the Foundation examination fee as low as possible to encourage growth in the licence and the hobby. It is fair to say that this strategy has been extremely successful. However, the cost of running and administering the exam was set unrealistically low and has enjoyed a high level of subsidy.

Both Ofcom and the RSGB realise that the administration of the Radio Communications Examination scheme must be cost effective and the fee structure for the three exams must be set at a level consistent with today's market.

In view of this, the cost of taking the Radio Communications Examinations will rise from 1 April 2004. From that date the following charging structure will be in place:

	Current	*From 1 April*
Foundation	***£5***	***£15***
Intermediate	***£10***	***£20***
Advanced	***-***	***£25***

These charges are still extremely competitive compared with the C&G charge. The final cost of the RAE under C&G was £31.00.

DON'T FORGET THE M5s!

In the 'Licensing: suddenly it's simple' feature on pages 5 - 6 of the February *RadCom*, under the sub-heading 'What are the callsigns allocated to each licence category?', the prefix M5 should, of course, have been included with G, M0 and M1 in the list of Advanced licence prefixes. Apologies to all M5 licensees for this omission!

PAST PRESIDENT GEOFF STONE, G3FZL, SILENT KEY

The Society is sad to announce the death of Geoff Stone, G3FZL, after a long illness. Geoff was a loyal servant of the Society, serving on Council and numerous RSGB Committees including the VHF Committee. He was the Society's President in 1964.

Geoff Stone, G3FZL.

As VHF Committee Chairman in 1971 he was instrumental in lobbying the then Ministry of Posts and Telecommunications for permission to establish the UK's first 2m repeaters. The first experimental repeater, GB3PI, in Cambridge was commissioned the following year.

Geoff's funeral took place on 11 February, at Brenchley Crematorium, Forest Hills, South London. The family requested no floral tributes but asked that donations could be made to the Radio Communications Foundation (www.commsfoundation.org) or the European Parkinson's Disease Association, EPDA (www.shef.ac.uk/~nr1pp/test).

RSGB HFC2004

The date of the RSGB International HF & IOTA Convention (HFC2004) has just been announced. It is to be held over the weekend of Friday 22 October to Sunday 24 October. Further announcements will follow shortly.

GB5HQ TAKES SILVER MEDAL

The final results of the 2003 IARU HF Championship contest have now been published (at www.arrl.org/contests/results/2003/IARU.pdf). In the very closely-fought Headquarters Station category, the winning team was once again the DARC's DA0HQ, with a score of 16.5 million points. In second place was the RSGB's entry, GB5HQ, scoring 15.7 million in its first 'serious' entry in the HQ stations category, which permits separate stations for each band and mode. In third place was the French entry, TM0HQ, with a score of 15.4 million. These results are a correction to those published in the February 2004 *QST*, when a computer error had mis-scored some of the HQ stations' logs.

TRAINING AT RSGB HQ

RSGB HQ in Potters Bar is to be closed for staff training purposes between 9.15am and 11.15am on Tuesday mornings for the next few weeks. Many new people have joined the RSGB staff during the last year and this opportunity is being taken to bring them up to speed with amateur radio matters in the UK and to train them on the software being used by the Society.

Eight new members of staff have started a Foundation Licence course being held at RSGB HQ.

ADVANCED RADIO COMMUNICATIONS EXAM SYLLABUS

The syllabus for the new Advanced Radio Communications Examination, which replaces the former City & Guilds RAE, has been released by Ofcom and is now available on the RSGB website at www.rsgb.org/full/advancedsyllabus.pdf Pilot exams based on the new syllabus are scheduled for February, April and June 2004, after which the examination will be available monthly, prior to a transition to a 'short notice' scheme. The new Syllabus represents many hours of co-operative development by Ofcom and formerly the Radiocommunications Agency, and a Working Group drawn from the Society's Amateur Radio Development Committee, comprising Ed Taylor, G3SQX; Steve Hartley, G0FUW; Brian Reay, G8OSN, and John Craig, G3SGR. The working group will continue developing the syllabus based on experience gained through the period of the pilot examinations.

To aid the Society in making arrangements for the Pilot Examinations on 26 April and 21 June, Brian Reay, G8OSN, requests Instructors who have candidates for these examinations to advise him of the numbers of candidates for each date. Brian can be contacted by e-mail at brian.reay@bigfoot.com

'TRAIN THE TRAINERS' SESSION IN BLACKPOOL

As part of the Society's commitment to training within amateur radio, and following from October's highly successful 'Train the Trainers' session, another one is scheduled for 21 March. The venue is the Northern Amateur Radio Societies Association Rally, held in Blackpool. The Train the Trainers initiative is aimed at all those offering training in amateur radio and all instructors are urged to attend. Further Train the Trainers sessions will be scheduled in other parts of the country, subject to demand and suitable venues. Registered Lead Instructors wishing to attend the Blackpool session, or who are interested in a sessions in other areas, are requested to contact Brian Reay, G8OSN, at brian.reay@bigfoot.com

RSGB QSL BUREAU NEWS

A new RSGB QSL Bureau submanager has been appointed for the G2 series of callsigns. He is John Godfrey, M0JOH, 17 Lichfield Road, Sneinton Dale, Notts NG2 4GF. John takes over from Mr C Adams, RS10906, who is thanked for his services in the role.

EMC COMMITTEE MEMBERS

Apologies to Hilary Claytonsmith, G4JKS, and Fred Robins, G3GVM, whose names and callsigns should have been included in the list of members of the EMC Committee in the 2003 RSGB Annual Report, published with the November 2003 *RadCom*.

SCIENCE WEEK 2004

National Science Week takes place between 12 and 21 March. As of the date of going to press, the following radio clubs had announced that they would be putting on stations and/or amateur radio exhibitions for Science Week: Prudential ARS, York ARS, West Manchester RC, Mexborough & District ARS, Felixstowe & District ARS, Swindon DARC, Tynemouth ARC, Richmond School ARS, QRZ AR Group of Sussex, Northampton Scout ARG, Island ARC (Western Isles); Dorking & District RS, South Dorset RS, Moray Firth ARS, Braintree & District ARS and Sheffield ARC.

VOLUNTEERS WANTED

The Society currently seeks self-motivated volunteers to assist in the work of the Society in the following areas:

VHF AWARDS MANAGER

DEPUTY REGIONAL MANAGERS, as follows:

District 27	Borders
District 43	West Yorkshire
District 53	Hereford / Worcestershire
District 81	N Belfast / Co Antrim
District 92	Berks / S Bucks
District 93	Herts / N Bucks / Beds
District 111	Cornwall
District 124	Kent
District 133	Derbyshire

Interested? Full details can be obtained from RSGB HQ, tel: 0870 904 7373, or e-mail gm.dept@rsgb.org.uk

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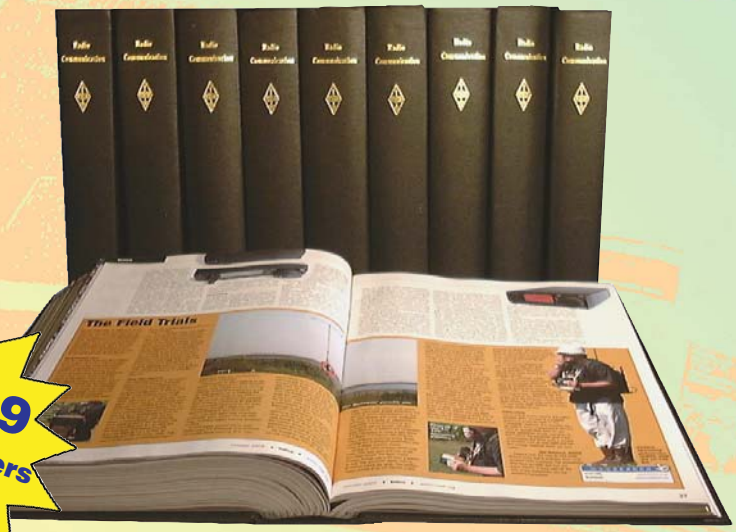

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All band All mode Base Transceiver

- The TS-2000 is a full function HF, 6M, 2M, 70cm and 23cm (with optional UT-20) DSP base station. Built in Auto ATU, it has on board 9k6 packet modem, full remote capabilities when used with the optional RC-2000 controller. The TS-2000 is, which ever way you look at it, the most advanced all band all mode operation transceiver available today.

RRP: £1699.99

ML&S: £1599.00

ZERO DEPOSIT 36 x £58.13

Package deal

- TS-2000E/X Transceiver
- UT-20 23cm 10w unit
- MC-60A Desk Microphone
- SP-23 Desk Speaker
- ARCP-2000 Control Software

RRP: £2301.79

ML&S: £2169.00

ZERO DEPOSIT 36 x £78.86

The remote controller RC-2000 is also available at £209.95

New! Kenwood TS-480SAT/SX

HF/50MHz All Mode Transceiver

DX Distinction - Creative Concept, Elegant Engineering

One Rig to Rule Them All - Kenwood Engineering at Its Finest

As a go-anywhere HF/50Mz all-mode transceiver, Kenwood's new TS-480HX/TS-480SAT is well ahead of the pack when it comes to advanced electronic engineering, convenient features and ease of operation.

200W output (50MHz: 100W) DC 13.8V operation: The TS480HX is a highly portable rig offering 200W output (50MHz: 100W) - making it ideal for both base station and DX'ing applications. 100W model: The 100W TS-480SAT is additionally equipped with a built-in automatic antenna tuner.

Remote control (Kenwood Network Command System):
Using the ARHP-480 radio host program, you can control the transceiver remotely over a LAN or via the Internet. The Kenwood Network Command System also enables VoIP (Voice over Internet Protocol) applications.

Base Station Package Deal ONE:

- TS-480SAT 100W version c/w ATU or HX 200W version*
- VGS-1 Voice guide & Storage unit
- YF-107SN SSB Narrow Filter
- SP-23 External Speaker
- MC-60A Desk Microphone

ML&S Price: £1315

Pay NO deposit, then 36 x £47.81

*TS-480HX 200W

ML&S Price: £1399

Pay NO deposit, then 36 x £50.86.

Mobile Station Package Deal TWO:

- TS-480SAT 100W version c/w ATU
- SP-50B Mobile Speaker
- Maldol HMC-6 HF Mobile Antenna (7-432MHz)
- Maldol mobile mount & cable assembly

ML&S price: £1139

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Details and membership application forms are available from RSGB HQ.

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Regulars

Pupils speak to school 'old boy' by amateur radio

King's School Canterbury contacts International Space Station

Carlos Eavis, G0AKI, establishing contact with Mike Foale, operating as NA1SS from the space station. In the background, Howard Long, G6LVB, of ARISS, and Alex Shannon, a pupil at The King's School.

On 28 January The King's School at Canterbury had a successful amateur radio contact with astronaut Mike Foale, KB5UAC, on board the International Space Station, NA1SS. The contact was made by GB4FUN through the ARISS (Amateur Radio on the International Space Station) programme. NA1SS was transmitting on 145.800MHz and the contact took place from 1745 - 1753UTC.

Five pupils from the school and from Junior King's School were chosen to ask Mike questions about life in space. What made this ARISS contact unique was that Mike Foale was himself a former pupil at the school - and his former physics teacher was listening in the audience! 17-year old Alex Shannon, who is the current holder of the school's prestigious Michael Foale Award, had met the astronaut when he revisited the school in 2001 and it was therefore appropriate that he should have been one of the pupils chosen to ask Mike several questions.

The contact went off without a hitch and earned an enthusiastic round of applause from the audience when the space station disappeared beyond the horizon and the signal from NA1SS faded out.

The event was covered by BBC and ITV news, on BBC and commercial radio, in Kent newspapers and on the BBCi website. Rarely can amateur radio have received so much positive publicity from an eight-minute contact!

A more detailed report will appear in *RadCom* next month. Video and audio recordings of the contact are available on the website of Howard Long, G6LVB, of ARISS, who was instrumental in ensuring the success of the contact. The URL is www.g6lvb.com/kings but please note that some of the files are very large.

RAFARS members honoured

Two members of the Royal Air Force Amateur Radio Society have recently been awarded Operational Honours for their service during the Iraq conflict. Squadron Leader Graham Kyte, G4RPP, was awarded an MBE for his outstanding work planning, managing and leading upgrades and extensions to the UK's strategic and operational communications in the Gulf. Sergeant Chris Vernon, G0TQJ, received a Queen's Commendation for Valuable Service for his leadership and commitment whilst running a field kitchen in the Kuwaiti Desert.

Graham Kyte, G4RPP, on duty in Basrah.

Chris Vernon, G0TQJ, with some of his team in the dining hall in the desert.

OZ7DAL celebrates 10th anniversary

'OZ7 Danish Amateur Lightship', located in the radio room of the decommissioned Danish lightship *Fyrskib XXI*, is 10 years old on 25 March. To celebrate the event the station will be active as much as possible between 25 and 28 March on all HF bands as well as VHF / UHF. A special QSL is planned which can be used towards the '*Fyrskib XXI* Diplom' (details at www.oz7dal.dk).

Oscar 40 in trouble

Towards the end of January, the main battery voltage on AO-40 dropped from around 26 to 18 volts, causing the satellite to go silent. Stacey Mills, W4SM, of the AO-40 command team said, "Our current best understanding is that we suffered a catastrophic failure of the main battery, which is clamping the bus voltage at a low level". He added that it was likely that the main batteries suffered some damage during the incident that occurred while testing the propulsion system less than a month after the launch of Oscar 40 in November 2000. That mishap destroyed some of the spacecraft's functionality and may have caused other damage that's only now coming to light.

At the time of going to press, ground controllers' efforts to restart Oscar 40's 2.4GHz downlink transmitter had proved unsuccessful. "If it's at all possible to bring AO-40 back, we will," Stacey Mills said. "No success for even weeks or months does not mean that we won't eventually be successful. We will keep trying." The AO-40 ground team has been sending blind commands to the spacecraft to activate its on-board computerised control system, switch in the auxiliary battery bank, and disconnect the main battery.

NEWS BRIEFS

- The Longleat Rally, organised by the City of Bristol RSGB Group, was closed down in 2002 after 45 years, when the Longleat Estate Office decided that it no longer wished to host the event. Now, the Severnside TV Group has decided to hold a rally in Frome, Somerset (4 miles from Longleat) on the last Sunday in June, the date vacated by Longleat. This year the new West of England Radio Rally will be held on 27 June at the 'Cheese & Grain', Market Yard, Frome BA11 1BE - see www.westrally.org.uk for details.
- In the January *RadCom* News we said that "Roger Brown [G3LQP] was issued with a personal callsign, ZA/G3LQP, believed to be the first Albanian licence issued to a British amateur." However, Terry Langdon, W6/G3MHV, now claims this 'first' for himself: he was licensed as ZA/G3MHV when he visited Albania in 1992 with his wife Mady, KA6ZYF (now KP3YL). See the report from Roger Brown on Project Goodwill Albania on pages 20 - 23.
- Icom (UK) has updated its website at www.icomuk.co.uk to give it a 'fresh polish'. All sections of the site have been upgraded including 'Diary', which highlights the trade shows that Icom (UK) will be visiting, and 'Downloads', which allows a user to download electronic copies of guides etc. A competition page allows users to win Icom equipment and merchandise each month.
- The Vintage & Military ARS will be holding its 'Southern Event' on Saturday 3 April at Field Place Conference & Sports Centre, The Boulevard, Strand, Goring, Worthing from 10.00am to 4.00pm. The event features demonstrations, displays, a bring and buy and traders. Details from Mike Hoddy, G0JXX, tel: 01903 260291; e-mail: chairman@vmars-manuals.co.uk
- The IRTS AGM weekend is on 6 / 7 March and this year is being hosted by the Limerick Radio Club. The IRTS AGM dinner is at 8.00pm on 6 March and the AGM is on 7 March. Details from Paul, EI6FE, on +353 61 360122 or Sean, EI4GK, on +353 1 2821420.
- Finnish club stations can now apply for NoVs to allow them to operate on 5MHz. The following eight frequencies are available for use on USB at up to 50W power: 5278.6, 5288.6, 5298.6, 5330.6, 5346.6, 5366.6, 5371.6 and 5398.6kHz.
- Following the success of its Telnet access system, the GB7NHR *DXCluster* has stations from all over the world connecting on a regular basis. GB7NHR now has its own website at www.gb7nhr.com

SOTA news

On top of Pendle Hill on 25 January, Alan Poxon, M1EYO, became the first Summits on the Air (SOTA - www.sota.org.uk) activator to achieve the supreme SOTA 'Mountain Goat' award. Alan has ascended and activated 212 summits since 2 March 2002. His feat involved activating hills in England, Wales and Scotland almost every weekend since the award scheme started. "One of the beauties of the SOTA scheme is that it is a combination of two of my favourite activities - hill walking and amateur radio," Alan said.

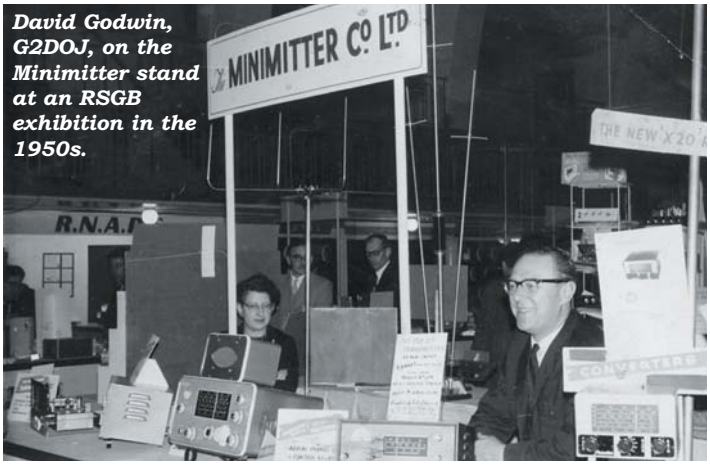
A popular part of the award for those not able to get into the hills is summit chasing. Keith, G0OXV, gained the first supreme chaser award (the aptly named 'Shack Sloth' award) in 2003.

SOTA Beams has announced that 13-year old Josh Thomas, MW3EPA, has won the first 'SOTA Beams Challenge'. The Challenge is open to amateurs under 18 and is awarded to the person who does the most Summits on the Air activations in a calendar year. Josh activated 14 mountains including two of over 3000ft in 2003. His prize is a SOTA Beam and SOTA Pole. The Challenge will be run again in 2004 - details at www.sotabeams.co.uk

Josh Thomas, MW3EPA, with his SOTA Beam and pole, ready to activate another summit.

'Minimitter man' David Godwin, G2DOJ, SK

David Godwin, G2DOJ, died on 8 December 2003. He was 85 years old. David was famous for the Minimitter series of equipment which he started building in 1953 in a shed in his garden. The Minimitter Company was formed in 1954 and the Minimitter Transmitter De Luxe, a five-band 150W unit followed soon after. As the company grew, production moved first to Paddington and then to Kilburn. The Minimitter range expanded and in 1959 the company won 'First Award for Manufacturers Equipment' at the RSGB exhibition at the Royal Cultural Old Hall in London. Minimitter was sold in 1964 and David started a company producing sound units for the audio and film industry. John Lennon visited David's factory and offered him a job at Apple, where David helped to record some of The Beatles' hits. He remained an active radio amateur throughout his life and continued to transmit past his 85th birthday, maintaining regular 'skeds' with friends across the world until he was hospitalised in November. (Thanks to David's son, Steve, G6YWI, for the biographical details.)



David Godwin, G2DOJ, on the Minimitter stand at an RSGB exhibition in the 1950s.

Rossendale Raynet group callout

The Rossendale Raynet Group was called out by their County Controller, Chas Warr, G0AWM, on 6 January, following a request from the Lancashire County Emergency Planning Officer (CEPO). A garage fire involving gas cylinders in a residential area of Colne, Lancashire, had caused residents to be evacuated from their homes to the Emergency Rest Centre.

Iain Groom, G0FCA, and another group member attended the rest centre to assess the situation. Raynet's agreed role is to provide internal rest centre communications between all attending voluntary groups and, if required, to provide a radio link back to the CEPO. A meeting with all involved parties gave invaluable information for planning the rest of the night, which became a 24-hour incident involving 100 people. A rota/shift system was quickly planned, putting other Raynet members on standby at 2300. Due to the number and age of people evacuated, it was decided to transfer residents to neighbouring hotels, with their pets going to local 'pet hotels'. All voluntary groups were stood down at 0130.

ML&S new look website

Martin Lynch & Sons has launched a new-look website at www.hamradio.co.uk It is a new, easily navigable site providing "one of the most extensive ham, short-wave and scanner radio information resources on the web". The pre-owned equipment pages have also been given a facelift and you can now view the stock of used equipment and see pictures and specifications before deciding which to purchase. MD Martin Lynch commented, "The new look website confirms our wish to offer the best and most flexible ham website on the Internet. We value functionality over aesthetics. The site should get you the information you want quickly and easily; and after that it should look good, which I think it does." www.hamradio.co.uk offers a secure environment for all on-line orders: 128-Bit on-line encryption ensures that each transaction is completed securely offering guaranteed safe shopping.

RADIO SOCIETY OF GREAT BRITAIN

Unaudited Income & Expenditure Account
For the six months ended 31 December 2003

	31-Dec-03	31-Dec-03	31-Dec-02	31-Dec-02
Income				
Subscriptions	434,539		433,995	
RadCom Advertising	86,797	521,336	84,130	518,125
Books and Products for Resale		174,618		162,516
Other Services		93,843		87,860
Total Income		**789,797**		**768,501**
Contribution from Subscriptions, *RadCom*, Publications and Services				
Subscriptions net of *RadCom* Publication Costs	320,287		321,689	
Amateur Radio Costs, net of Income	(59,291)		(52,067)	
GB4FUN	(16,422)	244,574	(7,852)	261,770
Books and Products for Resale		89,088		82,404
Other Services net of expenses		2,044		7,160
Total Contribution from Activities		**335,706**		**351,334**
Less Non Activity Specific Overheads				
Commercial Costs	(65,014)		(58,003)	
Administration	(176,514)		(162,450)	
Despatch	(24,452)		(26,174)	
Personnel Costs	(12,702)		(4,307)	
Office Costs	(54,761)		(63,260)	
Landlord Costs	(23,962)	(357,405)	(23,387)	(337,581)
Net (Deficit)/Surplus from Activities		**(21,699)**		**13,753**
Interest Income		6,529		8,883
Building and office refurbishment		(25,819)		(38,604)
Net Deficit for the half year		**(40,989)**		**(15,968)**

Commentary on the Income & Expenditure Account for the six months ended 31 December 2003

The Society reports a deficit in the unaudited Income & Expenditure Account for the six months to 31 December 2003 of £40,989 after interest and refurbishment of £25,819. This compares with the prior year deficit of £15,968 after interest and refurbishment of £38,604.

The refurbishment relates to the internal decoration of the offices of the building, and is now complete.

Despite an increase in rates, subscription income showed only a small increase compared with the equivalent half year. An increasing number of members qualify for concessionary rates, which has an adverse effect on subscription income. Membership numbers were 25,721 at 31 December 2003 compared with 24,644 in the prior year. The figure at 31 December 2003 includes 1600 new members who took advantage of the July Guinea offer.

Advertising income has shown a slight improvement over the corresponding period last year. Book sales have been encouraging with a great deal of interest being shown in titles which are radio related but not part of the Society's normal product list.

The Demonstration Vehicle, GB4FUN, has pursued a full programme in the half year and attracts a great deal of interest, especially with the school visits. Donations to support this facility have now been transferred into the Radio Communications Foundation, which will, as projects are defined, support some of the running costs.

From 1 January 2004 the Society became responsible for the administration of the radio amateur examinations, now the Radio Communications Examinations. The Foundation examination continues to generate a great deal of interest with only a 16.3% fall in the number of candidates taking it in comparison to the prior year. This is very encouraging for the future of amateur radio.

The Society upgraded its membership database at the beginning of the financial year. This has resulted in an increase in depreciation and other IT expenditure. Headcount has increased to satisfy the demands of the new examination structure with a resultant increase in recruitment fees.

Signed: J D Smith, MI0AEX, President ***K Ashcroft, FCA, FCMA, G3MSW, Acting Treasurer***

RSGB 2003 ANNUAL GENERAL MEETING

RSGB 2003 AGM HELD IN TELFORD SATURDAY 6 DECEMBER 2003, UNIVERSITY OF WOLVERHAMPTON - TELFORD CAMPUS

At the top table: General Manager, Peter Kirby, G0TWW; 2002-03 President Bob Whelan, G3PJT; Honorary Treasurer, Ken Ashcroft, G3MSW.

Bob Whelan, G3PJT, hands over the Presidential Chain of Office to 2004-05 President, Jeff Smith, MI0AEX (left).

RSGB Radio Communications Voluntary Services National Co-ordinator Paul Gaskell, G4MWO; Board member Richard Constantine, G3UGF; and AGM regular Harry Bellfield, G3SBV.

Colin Thomas, G3PSM, Chairman of the RSGB Spectrum Forum, spoke about the forum and the issues it was facing.

The following is a report of the 77th Annual General Meeting of the RSGB. This report is not the formal minutes of the meeting. The formal minutes will be included in the Society's Annual Report which will be published in the November 2004 edition of *RadCom*.

Despite wide-spread publicity and a very active club scene in the area, a disappointingly low number of members turned up for the 77th Annual General Meeting. This year the weather could not be blamed for the poor attendance as the day, although seasonally chilly, was bright and sunny.

Opening the meeting the Society President Bob Whelan, G3PJT, welcomed everyone and outlined the Agenda for the meeting and for the days events.

The first item for discussion was the confirmation of the minutes of the 76th AGM held in Swansea, in December 2002. No questions were raised and the motion to accept the Board's recommendation to accept the minutes was proposed by Roy Clark, G8AYD, and seconded by Mike Street, G3JKX. The motion was carried unanimously.

Item number two on the agenda was the adoption of the Society's accounts for the financial year ending 30 June 2003. The President called on the General Manager, Peter Kirby, G0TWW, to read the Auditor's report. On completion the Honorary Treasurer, Ken Ashcroft, G3MSW, highlighted the key areas of the accounts and invited questions from the audience.

AGM regular Harry Bellfield, G3SBV, asked how many people had taken up the 90th Anniversary 'One Guinea' offer. In reply the General Manager, Peter Kirby, advised the meeting that 1600 people joined or rejoined the Society during the Anniversary month in July 2003. Harry Bellfield congratulated the Society on the initiative and hoped that all 1600 maintained their membership at the end of the year.

Mr Bellfield went on to ask two further questions on Rally and Exhibition costs which were addressed by the Treasurer.

The President told the meeting that there was no formal requirement to adopt the accounts and moved on to item three, the Board and Regional Council election results. The President expressed his disappointment in that, for the second year running, no election took place as there were no candidates for the two Board places available and four candidates for five positions on the Regional Council. That being the case, the Regional Council candidates were elected unopposed.

The forth item of business was to call the for scrutineers for the 2004 Board and Regional Council elections. From the floor, three members present volunteered, Alan Betts, G0HIQ; Ian Brothwell, G4EAN; and Dick Whittering, G3URA.

The last Agenda item was to vote on the resolution to re-appoint the Society's auditors KPMG LLP and to authorise the Board to fix their remuneration. The resolution was proposed by the President Bob Whelan, G3PJT, and seconded by Gordon Adams, G3LEQ.

INFORMAL SESSION

Following the AGM came the annual Board awards and trophy presentations and the Presidential review.

The President, breaking with tradition, instead of presenting his Presidential address gave a *PowerPoint* presentation on the activities of the past year. The presentation covered the 50th anniversary of Raynet, amateur radio contact with the International Space Station, WRC-03, GB4FUN and the Radio Communications Foundation.

After lunch the Society held an 'open forum' for members and non-members.

Board members presented their Portfolio reports and the newly-appointed Chairman of the Spectrum Forum, Colin Thomas, G3PSM, spoke of the aims of the forum and some of the issues it was facing in defence of amateur bands.

Angus Annan, MM1CCR, the Chairman of the EMC Committee, briefed the meeting on the current state of the PLT debate and outlined the Society's plans to combat the introduction of PLT systems.

A very enjoyable day was rounded off with the traditional 'amateur radio dinner', which was held in Priorlee's Hall.

The Society would like to thank the Telford and District ARS for their help and assistance in the organising and running of the event. ◆

Club and Regional News

Items for club news should be sent to the *RadCom* Office at HQ to arrive by the 26th of the month, ie approximately a month before publication (eg 26 January for the March Issue). News items should be sent in writing (fax, letter or e-mail: gb2rs@rsgb.org.uk) by the club secretary or the person responsible for publicity. Post cards for this purpose are available from RSGB HQ. A database of all meetings is shared between *RadCom* and GB2RS, so information only needs to be sent once.

Region 1: Scotland West & Western Isles

AYR ARG
3, Film night. 17, Club open meeting. 31, Printed circuit board manufacture John, MM1JAS, 01292 445599.

PAISLEY (YMCA) ARC
3, My favourite wire aerial. 17, Satellite working demonstration. 31, Build your own SWR bridge. Jim, GM3UWX.

Region 2: Scotland East & the Highlands

ABERDEEN ARS
5, Junk sale. 12, On-hand construction night. 20, *Echolink* and its use in amateur radio, Ellis Philip, GM4JLZ. 27, Morse training. Ellis, GM4JLZ, 01224 580594.

COCKENZIE & PORT SETON ARC
19, 'Space weather and how it affects radio', Alan Thompson, BGS Edinburgh. Bob, GM4UYZ, 01875 811723.

LOTHIANS RS
8, Field day & portable operating creature comforts, Norman, GM1CNH. 22, Junk sale. Toby, MM0TSS, 07739 742367.

Region 3: North West

SOUTH MANCHESTER R & CC
5, 'The Exploding Tent and Other Field Day Experiences', Ron, G3SVW. 12, 'BSEnsor: an electronic, live test for mad cow disease', Dr Chris Pomfrett. 19, 'Vinyl into MP3', Chris, G4HON. 26, 'The Ukrainian Expedition', Chris, G3ZDM. Ed, 0161 969 1964.

Region 4: North East

DENBY DALE ARS
17, Surplus sale at Denby Dale Pie Hall, details Gerald, G3SDY, 01484 602905. Darran, G0BWB, g0bwb@btinternet.com

GREAT LUMLEY AR & ES
17, 'Early Recordings', Brian, G8FBQ. Nancy, 0191 447 0036, 07990 760 920, Nancybone2001@yahoo.co.uk

GRIMSBY ARS
4, Noel's quiz. 18, HF on air. George, G4EBK, 01472 887720.

HALIFAX & DARS
16, Members' favourite equipment. Tom, M0TKA, 01484 715079.

KEIGHLEY ARS
25, '101 reasons not to fly', Rod, M3HLD. Cath, G0OSA, 01535 656155.

NORTH WAKEFIELD RC
4, Pie & pea evening, Jim, G3YDL. 11, Website design, Peter, G0BQB. 18, On air. 25, 'Electronics & Magnetism', Ian M0BFO. www.g4nok.org

SHEFFIELD ARC
1, 'Raynet Today', David, G0JJR. 8, VHF radio. 15, Science Week. 22, VHF radio. 29, Club night. Nick, G4FAL, 0114 255 2893.

TYNEMOUTH ARC
12, Brains Trust. 26, 'Free Lift: Balloons and Kites', G0BSN. Glen, G0SBN.

WAKEFIELD & DRS
2, HF radio operator training. 9, VHF radio operating training. 16, Radio quiz. 23, On air. 30, 'Ships Ahoy', G7JTH. Rick, G4BLT, 01924 255 515, www.wdrs.org.uk

Region 5: West Midlands

CHELTENHAM ARA
5, 'More Miles on VHF', David, G4ASR. Ron, G3SZS, 01452 713761.

GLOUCESTER AR & ES
1, Valve audio projects. 8, HF on air, workshop. 15, Science Week demonstrations. 22, HF on air, workshop. Tony, 01452 618930 office hours.

HILLCREST ARS
4, Empire of the Air, video by Horace, M1WHW. Stuart, M0SJV, m0sjvstuart@supanet.com

KIDDERMINSTER & DARS
2, On air, test gear evening. Tony, G1OZB, 01299 400172.

MID-WARWICKSHIRE ARS
9, AGM, video evening. 23, Licensing update. Bernard, M1AUK, 01926 420913.

ST LEONARD'S ARS
4, Shack night. 11, Who has built the best club projects? 18, AGM. 25, Shack night. Derek, G0EYX, 01785 604904.

STRATFORD UPON AVON DRS
8, Test equipment evening. 22, Contest planning. Terry, G3MXH, 01789 294387.

TELFORD & DARS
1, Intermediate course commences. 3, Open evening, on air. 10, Major construction competition (partly-built items are very acceptable). 17, Regenerative receiver club project, M1RKH. 24, 'Spider Beam', G3UKV. Mike, G3JKX, 01952 299 677

Region 6: North Wales

No club details received.

Region 7: South Wales

No club details received.

Region 8: Northern Ireland

BANGOR & DARS
3, 'Space weather, the ionosphere and radio communications', Prof Brian Gilbody. Mike, GI4XSF, 028 4277 2383.

Region 9: London & Thames Valley

AYLESBURY VALE RS
10, AGM. Roger, G3MEH, 01442 826651, roger@g3meh.fsnet.co.uk

BROMLEY & DARS
17, Radio quiz with prize of free 2004 subscription, Graham, G4NPD, & Alan, G0TLK. Alan, G0TLK, 020 8777 0420.

CRYSTAL PALACE R & EC
5, Technical discussions, club projects. 19, The FT-817, Keith, G3MCD. Bob, G3OOU, 01737 552 170 or Victor, G1PKS, 020 8653 2946.

DORKING & DRS
20, Foundation Licence: open meeting to welcome all M3 licensees, 2.00pm - 4.30pm. 23, Members' evening. John, G3AEZ, 01306 631236.

ECHELFORD ARS
11, *'SuperDuper'*, Dennis, G3KKG. 25, Surplus equipment sale. Robin, G3TDR, 01784 456513.

MAIDENHEAD & DARC
4, Wartime digital computers, inc *Colossus*, Charles Coultas. John, G8RYW, 01628 628463.

MILTON KEYNES ARS
8, Bring-and-buy. 24, Club dinner. Malcolm, M0MBO, 01525 874075.

RS of HARROW
19, Slow scan TV on VHF. 26, AGM 8pm sharp. Jim, G0AOT, 01895 476933 or 020 7278 6421.

READING & DARC
11, Annual junk sale (rules at www.radarc.org). Pete, G8FRC, 01189 695 697.

SHEFFORD & DARS
4, AGM. 11, PCB practical fault finding. 18, Friedrichshafen. 25, Life at Sea. 27, Club dinner. David, G8UOD, 01234 742757.

SILVERTHORN RC
5, Table-top sale. 12, Informal evening. 19, General meeting. 26, On air. Les, G0CIB, 07980 275081.

SURREY RCC
1, Spring surplus equipment sale. Ray, G4FFY, 020 8644 7589.

SUTTON & CHEAM RS
18, History of the BBC Radiophonic workshop, Dick Mills. John, G0BWV, 020 8644 9945.

WIMBLEDON & DARS
12, 'Getting out on 160m', Martin, G4FKK. 26, Club project (PicATUne etc). Jim, M0CON, 020 8874 7456.

Region 10: South & South East

ANDOVER RAC
2, Video: *Battle of the beams*. 16, Antenna erection, Rick, G8NDN. Terry, G8ALR, 01980 629346.

FAREHAM & DARS
10, How does it work - the DVD. 17, The mobile telegraph. 24, Video. 31, Foundation Licence, members' discussion. Steve, G7HEP, 01329 663673.

FARNBOROUGH & DRS
10, New licence structure, Ivan, G3GKC. 24, Resonance, John G3KND. Norman, G0VYR, 01483 835320.

HARWELL ARS
5, Lunchtime shack activity. 9, *Hydra*, a *Robot Wars* contest-

ant. 12, 19, Lunchtime shack activity. 23, Shack activity evening. 26, Lunchtime shack activity. Angus, G0UGO, hars.g3pia@tiscali.co.uk

HASTINGS E & RC
17, TBA. R C Gornall, G7DME, 01424 444466.

HORNDEAN & DARC
2, Social evening. 23, 'The London to Portsmouth Waterway', Peter Rogers. Stuart, G0FYX, 023 9247 2846.

ITCHEN VALLEY RC
12, AGM. 26, Outside events, Mike, G0WIL. Sheila, G0VNI, 023 8081 3827, sheila.williams@ivarc.org.uk

MID-SUSSEX ARS
5, Radio evening. 12, 'Radio Communications at the Battle of Arnhem', G8JBJ. 19, Radio evening. 26, Spring surplus equipment sale. Alan, G8YKV, 01273 844511.

SOUTHDOWN ARS
1, Computers, John, G3JYG. John, G3DQY, 01424 424319.

SWINDON & DARC
4, Software Radio, Ian, G8JHC. Mike, M5CBS, 01793 826465.

TROWBRIDGE & DARC
3, 'Starting off in Astronomy'. Ian, G0GRI, 01225 864698 evenings / weekends.

WORTHING & DARC
3, Old telephones, G3ZQW. 10, Setting up your station. 17, Trams, Ian Gleohill. 24, Video. 31, Club annual dinner. Roy, G4GPX, 01903 753893.

Region 11: South West & Channel Islands

BLACKMORE VALE ARS
2, VHF on air. 7, Valve Day 2. 9, RRM11 Barry Scarisbrick, G4ACK, plus AGM notices. 14, Table at Bournmouth Rally. 16, HF on air. 23, Black Propaganda video. 30, Shack tidy. Tony, G0GFL, 01258 860741 or tm@io80vv.freeserve.co.uk

CORNISH RAC
8, Computer section. John, G4LJY, 01872 863849.

POLDHU ARC
9, 'The work of Ofcom', by local Technical Investigation Officer. Keith, G0WYS, 01326 574441.

SOUTH BRISTOL ARC
3, Computer clinic. 10, Workshop on cables, connectors and multimeters. 17, Buy, sell, exchange radio books. 24, Quiz. 31, On air. Len, G4RZY, 01275 834282.

SOUTH DORSET RS
9, Accidents that could take place in our hobby, talk / demo by St John Ambulance. Carol, 2E1RBH, 01305 820400.

TAUNTON & DARC
5, Mana Antenna Software, Graham, G0GTR. Dave, M0CIF, david.rosewarn@virgin.net

YEOVIL ARC
4, 'Hints and Kinks', M0WOB. 11, How I got my M3 Licence, M3NYX. 18, Adjudication of constructors' contest. 25, On air. Derek, M0WOB, 01935 414 452, m0wob@tiscali.co.uk

Region 12: East & East Anglia

CAMBRIDGE & DARC
5, 'Early days of wireless', Ron, G3KBR. 12, Informal / Project evening. 19, Solar Panel Project, Clive, M5CHH. 26, AGM. Ron, G3KBR, 01223 501712.

CHELMSFORD ARS
2, 'Antennas', Alan, G3NOQ, senior engineer with BAe. George, G3UTC, 01277 622707, george3utc@btopenworld.com

DOVER ARC
3, On air. 10, Digital Audio Broadcasting, Matt. 24, 'Gadget night', talks and presentations. 31, On air. Brian, G4SAU, g4sau@bcuff.freeserve.co.uk

EAST KENT RS
2, Junk sale. Paul, G3VJF, mail@paulnic.com

FELIXSTOWE & DARS
8, Construction evening (part 1). Paul, G4YQC, paul.whiting@bt.com

HARWICH ARIG
10, GB3BZ and Q&A on RSGB matters, Malcolm Salmon, G3XVV. Tony, G4EYE, 01255 886065.

NORFOLK ARC
3, Informal, construction. 10, Kenwood UK. 17, Informal, construction. 24, Contesting, Andy Cook, G4PIQ. 31, Informal, tuition, construction. Reg, G0VDO, 01603 429269.

Region 13: East Midlands

DERBY & DARS
2, Junk sale. 16, Technical topics. Martin, G3SZJ, 01332 556875.

EAGLE RADIO GROUP
9, Marconi & Lincolnshire's part in the forgotten 1920 radio revolution, Ken, G3RRN. Terry, G0SWS, 01507 478590.

LOUGHBOROUGH & DARC
2, Electrical switchgear, Noel, G0WTA.9, Tesla coils, Martin Dale. (this is one definitely not to miss!) 16, Radio racing', a fun night. 23, HF on air. 30, Digital pictures & open forum, Chris, G1ETZ. Chris, G1ETZ, 01509 504319.

MELTON MOWBRAY ARS
19, Building K2 kit, Ron, G4ASE; Aerials, John, G4YSP. Phil, G4LWB, Phil@croxtonkerr.fsnet.co.uk

RAF WADDINGTON ARC
11, American Cars, Don, G0STT. Martin, M3MDF, martin@farmer4.freeserve.co.uk

FROM FOUNDATION TO ADVANCED

Dundee Amateur Radio Club (www.dundee-amateur-radio.co.uk) congratulates four of its Foundation Licence holders on their successful completion of the final City & Guilds RAE in December. The successful four are Martin Higgins, MM3AWM and now MM0DUN; Peter Moodie, MM3PMH/MM0GMP; Stewart MacIntosh, MM3AXE/MM0STX; and Jim Wilson, MM3JFW/MM0DXD. Also thanks go to the club's tutors for their help and guidance.

CARS ANNUAL AWARDS

Each year the Chelmsford Amateur Radio Society (CARS, www.g0mwt.org.uk) presents two awards, the 'Amateur of the Year', which is decided by a ballot of club members, and the Roy Martyr, G3PMX, Shield, awarded for technical excellence. This time the Amateur of the Year was Trevor, M5AKA, and he was presented with the award by CARS president Harry, G5HF. The Roy Martyr, G3PMX, Shield was presented to Anthony, M1FDE, a keen constructor and Foundation and Intermediate course tutor, by Ela Martyr, G6HKM. For further information about CARS, contact the secretary, George, G3UTC, tel: 01277 622707; e-mail: info@g0mwt.org.uk

Anthony, M1FDE, receives the Roy Martyr, G3PMX, Shield from Ela Martyr, G6HKM.

GROUP FOR EARTH OBSERVATION

A new radio interest group, the Group for Earth Observation (GEO), has been formed. The group was formed to support people interested in the live reception of the new generation of weather satellites. All members are dedicated to the amateur nature of the hobby and about 60% of members are also licensed radio amateurs. The commonest question asked is: "How do I get started?" and GEO is responsive to the needs of absolute needs of beginners. GEO produces a quarterly publication on weather satellite reception: anybody sending their name and address to the group's database will be sent GEO's first publication free of charge, after which further publications can be received at a modest cost.

Image received by a GEO member.

GEO has a national event planned for **1 May** at the National Space Centre in Leicester. There will be workshops and live weather satellite reception as well as expert speakers. There will be a modest entry fee with the bonus of free entry to the Space Centre's exhibition area. The National Space Centre has its own amateur radio station but GEO will have its own special event station GB0GEO operating during the weekend.

For further details, visit www.geo-web.org.uk or if you do not have Internet access send your name and address to GEO, Coturnix House, Rake Lane, Milford, Godalming GU8 5AB.

AMATEUR RADIO AT BLETCHLEY PARK

At weekends, the GB2BP special event station, organised by member of the Milton Keynes ARC, is active from Bletchley Park. Visitors and new members are welcome, but please call first so that site security can be advised of your visit. Contact Malcolm, M0MBO, tel: 01525 874075 for further details.

WREXHAM ARS RETURNS TO 'SCIENTRIFFIC'!

The Wrexham Amateur Radio Society has announced its third trip to Wrexham Science Festival's 'hands-on' event called 'Scientriffic' on Saturday 27 March. The event is open between 10.00am and 5.00pm.

This year, the club will be located at the ex-Yale College Crispin Lane campus and will have a different line-up of events. The plan is to run a bigger exhibition, with GB2WSF demonstrating HF voice, data and contest operating throughout the day (the event coincides with the *CQ* WPX SSB contest). There will also be all manner of hands-on demonstrations - everything from Morse to antennas is planned, with everything in between. The club will also have a 2m voice station active throughout the day.

Visitors are welcome to turn up on the day to see it all in action, or just to work the station on the bands. GB2WSF can be QSLd via the normal routes, eqsl, or by e-mail to gb2wsf@qsl.net For up to date information on the event, and pictures of the previous two years' events, head to www.qsl.net/gb2wsf

Scientriffic also caters for the non-amateur, and has all manner of events to get involved with - the organiser's website is at www.wrexhamsf.com

A demonstration of UI-View up and running at last year's Scientriffic.

CHELMSFORD ANTENNA TALK

On 2 March Alan Boswell, G3NOQ, a Senior Engineer from BAe Systems Advanced Technology Centre will be giving a talk on antennas to the Chelmsford Amateur Radio Society (www.g0mwt.org.uk). One of his designs, an HF radar antenna array is pictured here. This is a phased array with electronic beam scanning operating on licensed HF channels. The elements are tetrahedrals, a type of wideband element invented by Alan and patented in 1995. Alan is one of the UK's leading antenna designers covering ELF through to the millimetric bands. The meeting will be in the Marconi Social Club, Beehive Lane, Great Baddow at 7.15pm and visitors are most welcome. For further information contact the secretary, George, G3UTC, tel: 01277 622707 or e-mail: info@g0mwt.org.uk

HF radar antenna array designed by Alan Boswell, G3NOQ.

THE LICENSING SCENE IN REGION 7

John Hammond, GW3JBH, must be one of the most prolific amateur radio licence instructors in the South Wales area. He started in the challenging role of tutoring a Novice course for a partially-sighted student. Since the introduction of the Foundation Licence, John has run eight Foundation courses at Caldicot, Chepstow and Cwmbran, resulting in 39 new licensees. In addition he gave 11 former Class B Morse assessments, making a total of 50 new callsigns. A further batch of new calls in North Gwent followed at Blackwood ARC by an instructor recruited at a talk given by John on the Foundation licence. Since then, John has had more Foundation students in Monmouthshire, West Gloucester and Glamorgan. Most recently, seven students were engaged on John's Intermediate course at the1st Bulwark Scout HQ, Chepstow, a recently-registered Examination Centre. Thanks and congratulations to John for his efforts and thanks to DRRM Gareth Price, GW3MPP, for this news story.

OLDHAM RALLY 'EVACUATED'

The Oldham Amateur Radio Club (www.oarc.zen.co.uk) rally is by tradition held on the third Sunday of January, making it the first rally of the year. It is held at the Oldham Sports and Leisure Centre and this year was attended by over 41 traders, including Waters & Stanton, who made the long journey all the way from Essex to put on a large stand. The ever-popular bring and buy stall was run by members of the neighbouring Rochdale club (www.mbc.co.uk/RADARS). The rally organiser, Hazel Crabtree, 2E1WIC, and her large team of enthusiastic helpers were hard at work from 6.00am ensuring the venue was ready when the traders arrived. The talk-in station, GB4ORC, was operated by Geoff Oliver, G0BJR, and Keith Feay from the new Oldham club building.

The rally was temporarily brought to a halt at 1.04pm, though, when the fire alarms sounded throughout the centre. Hundreds of amateurs streamed out of the hall through the fire exits in an orderly fashion and waited outside. Fire tenders arrived but it was rapidly established that it was a false alarm. People were allowed back in the building after a 10-minute wait and trading continued through the afternoon.

The Oldham club meets every Thursday at 7.30pm in the Air Training Corps, Park Lane, Royton, and offers Foundation and Intermediate courses as well as ATC Communications courses. For further information contact the secretary Mike Crossley, M1CVL, tel: 01706 367454, e-mail: m1cvl@thersgb.net

Top: Tony, M0DHC, of Diode Communications (www.diodecomms.co.uk) demonstrating one of the new range of EcoFlex coax cables at the Oldham rally. This cable has a diameter of 15mm and is usable to 6GHz yet is extremely flexible.

Bottom: Amateurs file out of the Oldham rally as the fire alarm sounds.

HAVERING CLUB PULLS ITS WEIGHT

The Romford area of Essex is now "awash" with Cubs and Brownies proudly wearing their Communications Badges, thanks to the efforts of members of the Havering and District ARC. The club has a Morse class before each of its Wednesday meetings and says it has 'converted' as many unlicensed CB users to amateur radio as most clubs. The club net bristles with new callsigns and the number of punters jostling for space at the club's junk sales has recently doubled. As hon sec G3TPJ says, "Teaching others has done our club no harm at all!" Amateur radio courses are on-going: see www.haveringradioclub.co.uk for details.

BLACKMORE VALE ARS VALVE DAY

The Blackmore Vale ARS is holding its second annual 'Valve Day' at Youth Club Hall, Coppice St, Shaftesbury, Dorset on Sunday 7 March. There will be talks on military manpacks, historic Weymouth radios, and the evolution of amateur radio valve receivers along with displays of valve transmitters and receivers, 405-line TVs and valve test gear. An HF station on air, trade stands, and stands by local clubs, BYLARA and VMARS make up what will be an interesting day out for valve and vintage radio fans. Refreshments and hot food are available on site. For further information see www.bvars.org.uk or tel: 01258 860741.

By Carlos Eavis, G0AKI, c/o RSGB HQ.
Photographs by Richard Constantine, G3UGF.

'ASE' fun with GB4FUN

January was another busy month for GB4FUN, starting with a four-day visit to the University of Reading, where the Association for Science Education (ASE) was holding its annual meeting. Later in the month, GB4FUN went on to The King's School in Canterbury to make an extremely successful contact with Mike Foale on board the International Space Station.

The Association for Science Education (ASE) held its annual four-day meeting at the University of Reading between 8 and 11 January. The primary aim of the association is to assist all those involved in science teaching and introduce them to new innovations and exciting ways of promoting their subject. Amateur radio is fast becoming an essential tool by assisting teachers in demonstrating some areas of the science curriculum. In higher education it is currently the only way of covering some of the practical parts of 'A' level physics!

It was for this role that the ASE requested the presence of GB4FUN to show the teachers what can be achieved with amateur radio and to demonstrate the use of RF science.

The first day was for international delegates, most of whom had not considered the possibility of radio beyond that of conventional broadcast radio. Some were very surprised that such an "old" technology was still in use! When explained that RF technology is still at the forefront of all science exploration and the medium that has become taken for granted still has a lot to offer, their opinion soon changed, however.

GB4FUN also helped to dismiss the incorrectly-held notion that TV and radio were two different technologies. In a world filled with Bluetooth, WiFi, mobile phones and the Internet, it is easy to understand why these misconception are generally held, but once the RF behind the technology is explained most were more than eager to expand on the learning possibilities.

The next three days were divided between primary, secondary and further education, and gave GB4FUN the opportunity to educate the teachers on what an excellent resource amateur radio has always been. The possibilities of using GB4FUN for International Space Station contacts, allowing young people to communicate across the world and enhance both their science and geographical knowledge, was not lost amongst the teachers. Some also commented on how such a medium was excellent for language studies.

The RSGB and RCF (Radio Communications Foundation) display at the Association for Science Education meeting.

Carlos Eavis, G0AKI, with a life-size model of the Beagle 2 Mars lander at ACE.

All visitors were given the chance to operate the station. Most found the equipment a little daunting - but felt their younger pupils would have no problem. Many were just happy to listen and ask questions.

GB4FUN has certainly made its presence felt within the educational establishment, its demand to attend schools across Great Britain is set to increase dramatically as every visitor requested information as to how to organise a visit. The most common comment was "it's amazing" followed by "when can you come?" GB4FUN is set for a busy year!

[A short report on GB4FUN's involvement with the space station contact on 28 January can be found in the 'RadCom News' this month (see page 10) and will be reported in more detail in next month's *RadCom - Ed.*] ◆

Supporters of the Radio Communications Foundation

We asked members when renewing their membership to include a donation to help to support the work of the Radio Communications Foundation. The following is the list of those members who have kindly sent in a donation by the deadline date for this issue. Contributions continue to be wanted: if you would like to help, please send your donation to RCF, c/o RSGB HQ.

RCF 'Big Hitters'	
S J Brown	GD4ELI

Lonsdale District Scout Council	
P Fletcher	2E1ECM
G Bauer	DE0SGB
D G Gibbons	EI5IA
J Corless	EI7IQ
R Cramet	F8CB
K Taylor	G0APQ
G A Gulliford	G0DVP
R F Bickley	G0EBK
E C Wilson	G0ECW
A G Swanborough	G0JUS
F H Jones	G0KKY
H Wright	G0LKB
H W Smith	G0LQT
F W W Gardiner	G0MXQ
J C Fox	G0OAZ
J M Brown	G0PIA
G N Belt	G0SCV
J Worsnop	G0SNV
R A Gould	G0VKM
W W Wright	G0VMO
V Worton	G0XYS
W S Bevan	G2ADC
J S H Garner	G2BGG
H G Baker	G3EBL
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T I Lundegard	G3GJW
K G Sullivan	G3KYF
D J Goacher	G3LLZ
Dr J E Larson	G3NBL
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Maj J E P Philp	G3NJM
G W Hubber	G3NVJ
E F Taylor	G3SQX
PA Neale	G3UHN
B Clark	G3VCL
A L Wragg	G3WEX
D A R Poulter	G3WHK
J F Grieve	G4ARZ
Post Office Res ARC	G4BPO
R W Hammond	G4DBW
R T Dedman	G4DFY
M Bryan	G4DTB
K Hircock	G4KFE
D A Brown	G4MUI
A B Keeble	G4RUI
M W Stoneham	G4RVV
M N Bland	G4WPE
J H Smith	G4ZMA
N B Wiltshire	G6AQW
A Lewis	G6FIT
A J Cuthbertson	G6JRS
D R Banks	G6KIE
C F Hosegood	G7IRU
A J Tite	G7KQM
K Peacock	G7TLN
P C Funnell	G8AFI
R B Vieira	G8AJF
D L Woolley	G8AMJ
S Barker	G8AXX
P C Thompson	G8DDY
R Elgy	G8EZT
P J J Lyall	G8FRH
A G Hobbs	G8GOJ/M3GOJ
A Sierota	G8LVF
L M Overton	G8MRZ
W Parkin	G8PBE
F E Wyer	G8RY
C I Mobbs	G8UHW
D C W Hewitt	G8ZRE
A C Alexandre	GJ4YBM
G K Olesen	GM3MQO
S Norris	GM3ZAS
W S McDicken	GM4XMD
D J Locke	GW3TKG
L D Connery	GW4ZBN
M Terry	GW8TBG
J A Neale	M0CHD
P Dickman	M0DFQ
E Gouldsbrough	M0GEM
Miss A Morris	M0HDE
N R Male	M0NRM
D R Ellis	M1BXO
P N Bristow	M1DMC
P G Howell	M1PGH
P Youens	M1PSY
M Butcher	M3EDR
P Harris	M3FPH
R M Powell	M3FXD
J C Symons	M3GUN
M P Reilly	M3MPR
R O J Mills	M3OLY
W A Richardson	M3WAR
T J Burke	M5LXU
P C Anderson	M5WOC
Dr T B Littler	MI0TBL
W Tait	MM0BHY
K R G D Mackintosh	MM0GKB
D S Jones	MW0BLQ
M L Heron	MW1KDP
J Klerck	PA0IJ
K Bowdler	RS171904
Dr W D Henderson	RS187631
B A Emson	RS43610
D V Debbage	RS94986
C J Dodd	VK6DV
B Ajeti	YU8AB

THE RSGB IS ALSO GRATEFUL TO THOSE MANY GENEROUS MEMBERS WHO HAVE SENT DONATIONS ANONYMOUSLY, OR WHO HAVE ASKED US NOT TO PUBLISH THEIR NAMES.

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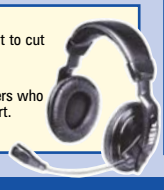

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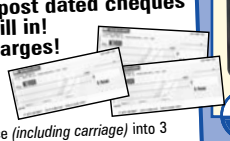

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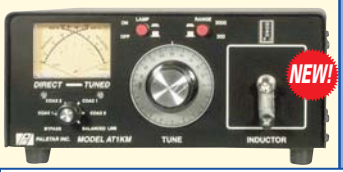

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40 amateurs from 10 countries descended on Albania - once the rarest amateur radio country of all - in November and December 2003 to put amateur radio on the syllabus at the University of Tirana. Roger Brown describes his once-in-a-lifetime experience, putting something back into amateur radio, helping to create 39 new Albanian licensees - and to operate using the legendary ZA prefix himself!

PROJECT GOODWILL

From left: At the opening ceremony. From left: Eduard Andoni, Vice Minister of Education; Martti Laine, OH2BH, Programme Director; Spartak Poci, Minister of Transport and Telecommunication; Perparim Hoxha, Rector of the Polytechnic University; and Prof Giorgio Goggi, I2KMG, who lectured at the opening ceremony on electromagnetic waves.

The amateur radio course was well attended all the time. RSGB material was used for the CEPT syllabus, with daily 'motivational spots' introducing the excitement of amateur radio and its potential role in society. From left: John, G3OKA; and Sonila Agako of Tirana University; with ZA1B and EA1QF in the 'motivational stream'.

The Rogner Europark Hotel was located only a quarter of a mile from the University and during the early part of the course some demonstrations were managed by beaming straight into the classroom.

'Project Goodwill Albania 2003', headed by Martti Laine, OH2BH, was a project to teach the radio amateurs' examination syllabus to CEPT standard to a group of fourth- and fifth-year students at the Polytechnic University of Tirana. With lecturers coming from all over Europe and the USA, the course instruction was to be conducted in English. The study material for the course was the RSGB's *RAE Manual*, and 50 copies of the book were donated by the RSGB for the project.

Martti approached me about joining the project early in 2003. Nearly all the preparation was done either by e-mail or telephone, although we did have personal meetings in Dayton and Friedrichshafen to aid the preparation.

My own personal goals were to represent the RSGB, fly the UK flag high, and perhaps more importantly, having been licensed since 1957, put something back into this great hobby of ours which has given me so much pleasure over the years.

Apart from the two main instructors, Professor John Share, G3OKA, and Ulrich 'Uli' Weiss, DJ2YA, all other members of the project paid their expenses in full.

The day of departure finally arrived. I checked in at Heathrow Terminal 2 laden with 50 RSGB *RAE Manuals*, plus other books donated by the Society. The check-in lady was very kind to me: I was 22kg overweight, but to my great delight she only charged for 10kg.

On the same flight to Tirana via Milan was John, G3OKA, from Liverpool University, who was recruited via a GB2RS news broadcast to be the principal instructor for the first three weeks of the course. We had suffered a major setback earlier, when a professor from Germany had to pull out of the project due to health problems, so I advertised on GB2RS for the vacant position. I received replies from eight people, two of whom could speak Albanian, but John's qualifications stood above the rest. It proved to be right choice and he did a super job.

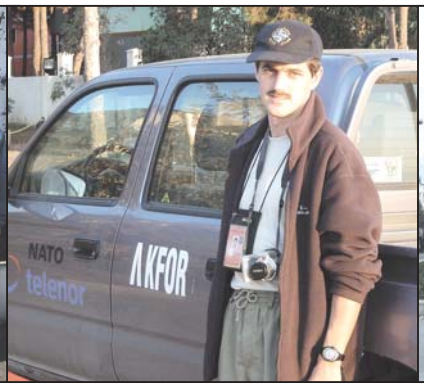
ARRIVAL

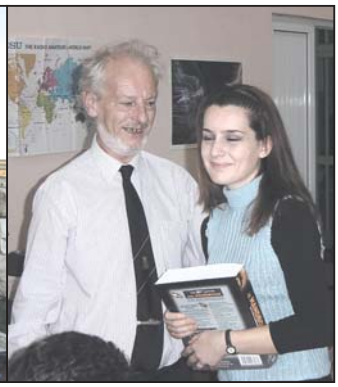
We arrived at Tirana's Mother Theresa airport late afternoon, to be met by Geni, ZA1B, and Dik, ZA1E. Two others members of the project were on the same flight, Professor Giorgio Goggi, I2KMG, and Angel Padin, EA1QF, President of URE, and we were all transported to the Rogner Hotel in Tirana.

The Rogner was special for many reasons. It was going to be our base for the project, it was the most expensive hotel I have ever stayed in, and by stepping through its doors you went from the third world to the first world. Another special feature was that half of the second floor housed Italian NATO military HQ and the embassy of the Sovereign Military Order of Malta.

By Roger Brown, G3LQP, 262 Fir Tree Road, Epsom Downs, Surrey KT17 3NL. E-mail: g3lqp@aol.com Photographs by Martti Laine, OH2BH

ALBANIA 2003





My allocated room was also on the second floor (Martti stated that as a Welshman I needed extra protection). That first evening was spent at the hotel, dining with other members of the project and discussing the plans personally for the first time.

The next morning we were summoned to the university rector's office, to meet up with him and the rest of his staff. It was a formal but friendly meeting, and I was able to present him with a copy of the *RAE Manual* on behalf of the RSGB. He and others were most appreciative of the gesture.

After a quick lunch, we were transported by mini-bus to the port of Durrës, which is about 35km southwest of Tirana, to Hotel Leonardo, where two German operators, DL6LAU and DL7AJA, had set up a station operating RTTY and meteor scatter for the first time in Albania. I would like to mention that the road between Tirana and Durrës was the most dangerous I have ever been on. Driving in Albania leaves a lot to be desired, and at many places on the journey there were bunches of flowers at the roadside where people had been killed - an average of four a day. It is recommended that foreigners do not drive at night, especially on this road.

We all returned to the Rogner Hotel for the opening ceremony that night, in the Vienna room, which was a ▶

From left: The amateur radio course HQ shared the same building with NATO headquarters and the operating site in Durrës was also next to a NATO base. Very friendly cooperation was experienced and NATO people were frequent visitors to the ZA1A site. Here, author Roger Brown, G3LQP, is at the NATO sign.

Steve, the young Hungarian responsible for NATO telecomms, was extremely valuable to the course. He was quickly integrated into the team, becoming a lecturer and ultimately passing the CEPT A level amateur radio exam with high marks. We expect Steve to be active from Albania soon.

OH2BH, K7WX and ZA1B finally meet at the Skanderbeg statue in downtown Tirana to drink a beer that they had planned ten years earlier. These multinational friendships are long-lasting.

During the course many give-aways were used to reward excellent performance by the students. Here Alma, now ZA1DL, received an ARRL 2003 Handbook from John, G3OKA, for full marks with her homework.

ON-THE-AIR FUN AT ZA1A AND ZA1UT

by Martti Laine, OH2BH, Leader, Project Goodwill Albania

What motivated 40 hams to visit ZA was in part the fact that Albania is still much sought-after on the bands as a rare country on a number of modes, including the excitement of ZA1A showing up in the CQWW CW contest and making ZA available on all bands. We would all like to be once in the limelight of a DX pile-up - on stage, so to speak.

Many of the teachers took a weekend off and moved to the seaport city of Durrës where the major operating site was located as an addition to a powerful station at the Tirana hotel. While ZA was active with meteor scatter on 2m and PSK31 on HF bands, the highest penetration was probably provided on the low bands (160m and 80m) where Albania was still rare.

The US operating team led by Robin Critchell, WA6CDR, and Rich Chatelain, K7ZV, built up a major low-band antenna site with phased verticals. It was no wonder that DX contacts were easy to come by. Working through to the US West Coast via long path needs a lot of hardware and a serious effort. In all 85,000 QSOs were made during the programme - of these some 15,000 at ZA1A during the CQWW CW contest by the multinational group.

The entire contest site was used as a training ground following the contest, providing the Albanian students with a welcome break from a classroom setting.

From left: After three weeks the course leadership changed when John, G3OKA (left), returned to England and the course was continued by Uli, DJ2YA (right). University teacher Sonila Agako, soon-to-be ZA1YL, is in the middle. On the right Geni, ZA1B, who spent six weeks making sure that all local arrangements would jell.

Spirits were high when the course moved from Tirana to Durrës, 50km from the busy capital. This was a definite highlight of the programme and a welcome break from the classroom.

After the CQWW CW contest the ZA1A site was visited by the students who learned the magic of antenna theory and also got their hands on operating radio for the first time. The Hotel Majestic was used mainly because of its own 'almost reliable' generator and friendly staff. The high-band beams were donated by Force 12 and SteppIR. Every student valued this field trip: hands-on is what counts!

The course had a high percentage of female students - the same percentage as at the university as a whole. If these young ladies all came on the air, the YL percentage from ZA would be highest in the world! From left; Elda, ZA1BQ; Sonila, ZA1YL; and Diana, ZA1BP.

grand affair. On the wall behind the top table RSGB posters were placed in full view for local TV coverage. Over 50 people attended the function, and I addressed the audience with a message from RSGB 2002-03 President Bob Whelan, G3PJT, which was warmly received. After the speeches a cocktail party was held and an enjoyable time had by all.

THE COURSE

The next morning we descended on the university to meet up with the students for the first time. Lots of our fears were unfounded. They have been hand picked, all spoke and wrote good English, although it was going to be first time they had been taught in English. Professor Sonila Agako from the university was assigned to the course to help with the tuition. She became 'hooked' herself and went on to take the licence examination along with her students. Sonila is now licensed as ZA1YL.

Professor Giorgio Goggi, I2KMG, started the course off with an excellent *PowerPoint* presentation on electro-magnetism, and then John, G3OKA, took over. Martti and other members walked back to the Rogner Hotel, with a quiet satisfaction: after all the preparation Project Goodwill Albania was at last up and running.

After the first day John reported that it had gone extremely well. This proved to be the case right to the end of the course. Each day we had conferences to discuss any problems and to see what improvements could be made. John and I had a big advantage over the other guys involved, because of the students' interest in English football. Being a Chelsea season ticket holder, I took out with me a Chelsea football shirt which I presented to one of the students. I thought by his reaction that he had won the lottery!

OPERATING

At the end of the first week, the USA team arrived, to teach and to set up a big *CQ* World Wide CW contest station in Durrës on the coast. They were ably assisted by Istvan 'Steve' Nagy, a Hungarian former SWL and now a telecomms engineer at the NATO base next to the hotel in Durrës used as the base for the contest. Along with Sonila, he went on to take and pass the Albanian licensing examination at

THE NEW ALBANIAN AMATEURS

by Carl Luetzelschwab, K9LA, of ARRL

Of the 39 new amateurs, 14 are YLs - so working an Albanian YL is a very high probability in the future. With a total of 39 new hams, a good question to ask is "will all of these new operators be able to get on the air?" One way for them to get on will be to use the station at the university. It is expected to be operational in the spring, with an FT-1000MP MkV Field and VL-1000 Quadra amplifier. It has been assigned the call ZA1UT (for the University of Tirana).

To help the newly-licensed individuals get on from their homes, the Project Goodwill Albania 2003 team is soliciting donations for transceivers. If you have an older-but-functional rig (preferably solid state) sitting around gathering dust and you'd like it to be put to good use, please contact the author of this article.

Zaiti, ZA1BC
Desar, ZA1BC
Ahmed, ZA1BD
Albi, ZA1BF (YL)
Landri, ZA1BH
Armand, ZA1BI
Mandi, ZA1BK
Buna, ZA1BN (YL)
Denis, ZA1BO
Diana, ZA1BP (YL)
Elda, ZA1BQ (YL)
Bere, ZA1BR
Geni, ZA1BS
Erion, ZA1BT
Era, ZA1BU (YL)
Erald, ZA1BV
Genti, ZA1BW
Aldo, ZA1BY
Klajd, ZA1DC
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Mirgen, ZA1DI
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Anita, ZA2BA (YL)
Blero, ZA2BB (YL)
Miri, ZA2BD
Liri, ZA2BE
Ada, ZA2BF (YL)
Mira, ZA3DA (YL)
Neri, ZA4BA
Erion, ZA5BA
Jeta, ZA5BB (YL)
Sead, ZA5BC

The 39 new ZA licensees




the end of the course and is now licensed as ZA1DX.

I stayed in Albania until the Tuesday of the second week, returned to the UK for three weeks and then went back to Albania for the final days.

I did quite a lot of operating, firstly as ZA1A, and then with my own callsign ZA/G3LQP, mainly from Rogner Hotel in Tirana. I was described by the Project Leader as a "five-star expedition operator", as conditions in Durrës were a little rougher, with power and water supply problems. It was good to contact so many old friends from yet another overseas destination, especially as I never thought I would ever visit Albania, let alone operate amateur radio from there.

THE FINAL WEEK

After I returned to Albania, the final week of the project turned out to be joyous time. Wednesday was to be examination day.

I, along with others, expected the results to be good, but when we found that 39 of the 41 candidates had passed, we were absolutely delighted. The highest pass mark was 94%, and even the two who didn't quite make it (maybe because of language difficulties) still received 60%.

At the graduation ceremony, the students received their certificates from the rector with great pride. The top student, Euglent Kola, now licensed as ZA1BS (= "Best Student"?) received a Yaesu FT-847 transceiver as a prize and I presented London 2004 calendars to the university professors. In turn OH2BH, OH2PM, DJ2YA, ZA1B, G3OKA and I were made Senior Fellows of the Polytechnic University of Tirana, an honour rarely given to people outside Albania.

Ole Garpestad, LA2RR, Chairman of IARU Region 1, arrived earlier that day and also attended the graduation ceremony. That night, we all went out for dinner at the Hotel President to celebrate in a big way.

CEPT LICENCE SOON?

Despite the previous night's celebrations, Martti, Ole and I had to be at the Ministry of Telecommunications building at 9.00am the next morning to discuss with the Minister of Telecomms the possibility of Albania signing the CEPT agreement. After over three hours with the Minister, nothing was actually signed, but further meetings were arranged for the next day. It's just a matter of a short time before Albania joins the rest of Europe on this matter.

Since the early 1990s things have changed greatly in Albania. They still have a long way to go, because you cannot live in isolation for 40 years, and then catch up with the rest of the world quickly. Things will change. English is now being taught in schools from an early age, the younger generation wants to be part of that world, and with this project hopefully we will have opened a few more doors to change the lives of those wonderful students.

There was a feeling of great satisfaction when members of the project finally departed from Tirana airport on a mid-December day, after a most enjoyable and interesting experience that will live with us for the rest of our lives.

I was about the last person to leave Tirana, due to ticketing conditions. During my last two days I was shown around by Nico, ZA1D, and taken out to dinner by Dik, ZA1E, and his daughter. Everyone I met was extremely kind and polite. So it was with great sadness that I left Albania, but with happy memories, hoping that in the future I will be able to visit again, and operate under the CEPT agreement. Even Albania knows that the world does not stand still anymore.

Thanks to everyone for making this possible for me, my understanding wife Beryl, who listened to me on the air; Past President Bob Whelan, G3PJT, for his wonderful support; and everyone at RSGB HQ, especially Commercial Manager Mark Allgar, M1MPA. In addition to the RSGB, thanks also go to the ARRL, URE, the Northern California DX Foundation, the *Yasme* Foundation, Vertex Standard (Yaesu) Co Ltd and Allen Baker, W5IZ, for contributing to this project. As Martti, OH2BH, has said in the past, "Where do we go next?" Watch this space, because despite being interested in ham radio for over 50 years, there is always something new to do... ◆

From left: Perparim Hoxha, Rector of the Polytechnic University of Tirana, receiving the donation of a complete FT-1000MP MkV and Quadra amplifier system from Programme Director Martti Laine, OH2BH, on behalf of Vertex Standard Co Ltd. Left, Programme Organiser Pertti Simovaara, OH2PM, and University Dean Gezim Karapici, while Ole Garpestadt, LA2RR, Chairman of IARU Region 1, looks on (right).

The best student on the course; Eugelent 'Geni' Kola, ZA1BS, who was presented with a Yaesu FT-847. BS in Geni's call obviously stands for Best Student.

The students received their amateur radio certificates from the university officials and programme organisers.

After it was all done it was time to review the entire programme with the Ministry of Transport and Telecommunications representatives and to assist them in their plan to get Albania fully integrated into CEPT. IARU Region 1 Chairman Ole Garpestadt, LA2RR (third left), flew to Albania to assist in this phase of the programme.

Article author Roger Brown, G3LQP, Senior Fellow of the Polytechnic University of Tirana.

WEBSEARCH

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AOR	AR-8600mkII	Base Scanner / Receiver	£499.00
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Drake	MS-8	Speaker	£89.00
Fairhaven	RD-500	Communications Receiver	£500.00
Fairhaven	RD-500VX	Communications Receiver (20kHz - 1.75GHz)	£550.00
FDK	Multi-750	2m Multimode Transceiver	£129.00
Fujion	F-2000A	Radio Direct Finder	£99.00
Global	AT-1000	Manual Short Wave Tuner	£50.00
Hunter	750	Linear Amplifier	£599.00
Icom	IC-2100H	2m FM Mobile Transceiver	£150.00
Icom	IC-2710H	Dual Band Mobile	£225.00
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Icom	IC-551E	6m Multimode Base Transceiver	£299.00
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Icom	IC-7400	HF / 6m / 2m Built In ATU	£999.00
Icom	IC-746	HF / 6m / 2m Built In ATU	£875.00
Icom	IC-756	HF / 6M All Band Transceiver	£950.00
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Kenwood	TH-235	2m Handheld Transceiver	£85.00
Kenwood	TH-47E	70cms Handheld Transceiver	£80.00
Kenwood	TH-79E	2m / 70cms Handheld Transceiver	£175.00
Kenwood	TH-D7E	Dual Band Handheld	£219.00
Kenwood	TH-F7E	Dual Band Handheld	£199.00
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Kenwood	TM-451E	70cms Mobile Transceiver - Data Ready	£175.00
Kenwood	TR-751E	2m Multimode Transceiver	£250.00
Kenwood	TR-9000	2m Multimode Transceiver	£220.00
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Microwave	MOD-144/30	30 Watt Amplifier	£79.00
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Sony	CV-21	World band Receiver	£950.00
Sony	ICF-SW100E	FM/SW/MW/LW Portable Receiver	£90.00
Sony	ICF-SW7600GR	World band Receiver	£99.00
Standard	C-156E	2m Handheld Transceiver	£125.00
TenTec	RX-350	HF Receiver	£999.00
Tokyo	HL-30V	2m - 25W Amplifier	£75.00
Tokyo	HL-35V	2m Power Amplifier with Pre-Amp	£89.00
Tokyo	HL-37V	Linear Amplifier	£60.00
Tono	T-777	Communications Terminal	£120.00
Transverter	QM-70	28/144 Transverter	£100.00
Trident	TRX-200	Latest Scanner	£175.00
Trio	TR-9000	2m Multimode	£199.00
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Uniden	UBC-860XLT	Base Scanner / Receiver	£99.00
Uniden	UBC-9000XLT	Base Scanner	£199.00
Welz	AC-38M	200W Mobile Matching Network	£50.00
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WinRadio	WR-1550E	Trunking Software	£450.00
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Yaesu	FRG-9600	Communications Receiver	£199.00
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Yaesu	FT-1500M	2m 50W Mobile Transceiver with DTMF Microphone	£129.00
Yaesu	FT-221R	2m Multimode Base Station	£200.00
Yaesu	FT-2600M	Mobile VHF / FM Transceiver	£120.00
Yaesu	FT-290RmkII	2m Multimode Mobile Transceiver	£225.00
Yaesu	FT-41R	Handheld Transceiver	£120.00
Yaesu	FT-470R	Dual Band Handheld	£129.00
Yaesu	FT-480R	2m Multi-mode 10W out put (MINT)	£250.00
Yaesu	FT-50R	Dual Band Handheld	£150.00
Yaesu	FT-5100	Dual Band Transceiver	£199.00
Yaesu	FT-51R	2m / 70cms Handheld Transceiver	£199.00
Yaesu	FT-690R	6m Multimode Mobile Transceiver	£199.00
Yaesu	FT-7	HF Mobile Transceiver	£200.00
Yaesu	FT-7100M	2m / 70cms Mobile Transceiver	£220.00
Yaesu	FT-726R	6m / 2m / 70cms / HF Transceiver	£575.00
Yaesu	FT-726R	2m / 70cms / HF Transceiver	£400.00
Yaesu	FT-76R	70 cms Handheld Transceiver	£99.00
Yaesu	FT-790R	70cms Multimode Transceiver	£175.00
Yaesu	FT-790RmkII	70cms Multimode Transceiver	£250.00
Yaesu	FT-8100R	2m / 70cms Mobile Transceiver	£220.00
Yaesu	FT-817	Mobile HF, VHF, UHF Transceiver	£450.00
Yaesu	FT-847	HF / 6m / 4m / 2m / 70cms Satellite Transceiver	£899.00
Yaesu	FT-8500	Dualband Mobile Transceiver	£199.00
Yaesu	FT-897	Multiband Transceiver	£850.00
Yaesu	FT-900AT	Yaesu HF Transceiver with ATU (MINT & BOXED)	£599.00
Yaesu	FT-920AF	HF / 6M Base Transceiver	£899.00
Yaesu	FTV-101Z	External VFO	£99.00
Yaesu	FTV-1000	200 W Transverter	£475.00
Yaesu	FTV-430MHZ	Module for Transverter	£99.00
Yaesu	FTV-901R	Transverter including 2m Module	£165.00
Yaesu	MW-1	Remote Control Microphone & Infra-Red	£60.00
Yaesu	SP-901	External Speaker	£30.00
Yaesu	SP-980	Speaker	£60.00
Yaesu	System 600	HF Commercial Radio	£600.00
Yaesu	VR-120	FM / WFM / AM Receiver	£99.00
Yaesu	VR-500	Yaesu Handheld Scanner	£149.00
Yaesu	VR-5000	Top Class Base Scanner	£450.00
Yaesu	VX-1R	Handheld Transceiver	£120.00
Yaesu	VX-2E	Dualband Handheld Transceiver (1 month old)	£129.00
Yaesu	VX-5R	Triband Handheld	£220.00
Yaesu	VX-7R	Triband Handheld	£240.00
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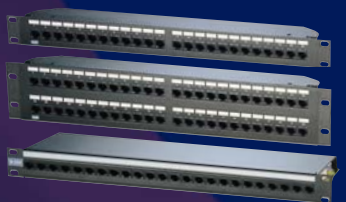

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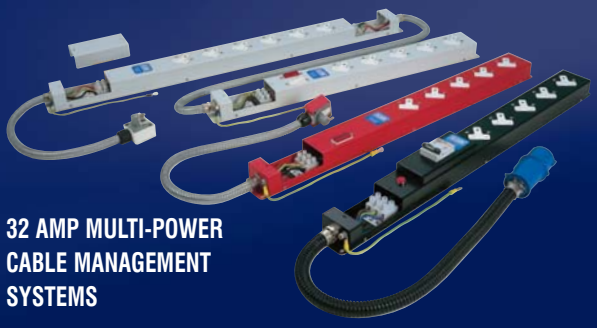

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Is the International Space Station a satellite or a vehicle? Read on to find out the answer . . .

Newcomers' news

The absence of any satellite access for Foundation Licence holders has been bemoaned by many. The changes to the various licences made at the time that the Morse requirement was dropped introduced satellite access for Intermediate Licence holders but not for Foundation Licensees.

Dennis Shields, M3JWJ, asked if the International Space Station was a satellite or just a very special mobile station. I believed it to be a satellite but gave an undertaking to check with the Radiocommunications Agency (now taken over by Ofcom). Alan Betts, G0HIQ, explained that, whilst manned, the ISS is considered to be a 'vehicle' and therefore fair game for an M3 contact (QSO). He also confirmed that he was content for me to include this interpretation in the column.

So there you have it, the ISS is not a satellite and M3 stations can make contacts with the amateurs onboard, providing they observe the appropriate protocols and do not interfere with other pre-arranged QSOs ('skeds').

RADIO FAMILY GOES 3G

Peter Cabban, G4OST, has been a radio tutor for over 10 years and whilst he doesn't get that many students, he does get good results. His latest group studied for the Foundation exam at the Thornbury Amateur Radio Club and include father and son duo Chris and Martin Nelmes.

Under the watchful eye of Alan Jones, G8AZT (Thornbury's deputy Mayor), they passed the assessments and the exam to join grandfather Basil, G7FEQ, on the air and make it a three-generation radio family.

Great news Peter. Let's hope for some Intermediate successes next.

XYL M3/M

Mary Neame, M3KBK, may not be the only lady with an M3 callsign, but Dave, her partner, M3CLQ, thinks she may be one of the few who are regularly active whilst /M (mobile). In her first few weeks on the air, Mary made over 60 contacts while mobile and another 20 from the home location (QTH).

Mary studied at the Klive Court Education Centre near Bridgwater under the expert tuition of Adrian Denning, G4JBH; passed the Foundation exam and then did all the practical exercises for the Intermediate assessment along with partner Dave. Hopefully we will be hearing of a double upgrade very soon.

ANOTHER ANTENNA IDEA

Like many other readers, David Sumner, G3PVH, was interested to read your feedback on the G5IJ antenna in the January *RadCom*. David has found that a monopole can be 'broadbanded' to some extent by using a toroidal autotransformer with a 1:2 ratio (see diagram).

Using this arrangement David reports that it is often possible to obtain an SWR of less than 3:1 over a broad frequency range. The antenna works over a range where its length over the frequency range is something like 3/16 to 3/8 of a wavelength (λ).

Whilst you may still need an antenna matching unit, or ATU if you prefer, this might be another quick and easy way of getting started on the high frequency (HF) bands. Thanks for the tip David.

WELSH STARS

Wyn Mainwaring, GW8AWT, sent in details of a small friendly club in south west Wales - the St Tybie Amateur Radio Society (STARS). The club is affiliated to the RSGB and is a registered radio communication examination centre. They run Foundation and Intermediate courses and Wyn has mentored the more ambitious through to the Full (now Advanced) Licence.

The club meets every other Monday at the St Tybie Community Centre where there is ample car parking in the old school yard. Further details can be had from the club secretary; Eileen, 2W1BPS, Wyn's XYL (wife), at Tyle Bach, Manordeilo, Llandeilo, Dyfed SA19 7BA.

FINAL RAE RESULTS

The December Radio Amateurs Exam (RAE) was the last one run by the City & Guilds Institute of London [the Full RAE is now known as the Radio Communications Examination Advanced level and is run by the RSGB on behalf of Ofcom - *Ed*]. Not only did it see the highest number of candidates for some time (624) but it also had a very high success rate, with over 85% of candidates gaining a pass. Congratulations to those who passed and we all hope those who failed will try the new-style exam run by the RSGB. David Pratt, G4DMP, the RAE's Chief Examiner, has provided some very interesting historical information about the RAE.

The first exam was in May 1946 when there were 182 candidates. The biggest entry was in 1982 when there was a massive 12,955. At that time an extra exam in March was introduced to cope with the increased numbers. Including the December 2003 sitting, City & Guilds ran 104 RAEs.The multiple-choice format was introduced with the May 1979 paper. For those who wish to look back to 'the good old days', the 1946 paper is currently on David's website (see 'Websearch').

The percentage of candidates successful ranged from 36.8% (in May 1947) to 85.8% (in December 2003). The average percentage successful over the years was about 69%. As each paper varied in its level of difficulty, each paper was moderated by using a detailed analysis of each question on the paper. This involved comparing how each question has been answered in the past with the candidates' performance in the current paper. In consequence, the pass mark was adjusted and was between 42 and 48 out of a total of 80.

It is not a well-known fact, but the RAE was approved as a Level 2 GNVQ and attracted external funding for many colleges. It is hoped that this recognition will continue under the new arrangements.

The final paper was considered to be a difficult one but the pass rate was the best ever. A full report of the paper is also on David's website. I think we should all send a huge vote of thanks to David and everyone at City & Guilds for their sterling work over the years. Well done! ◆

Fig 1

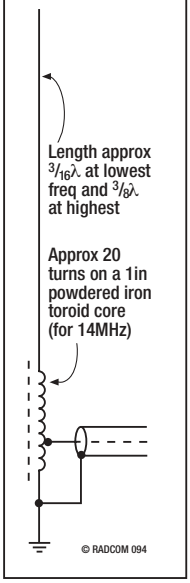


Fig 1: David Sumner's idea for a broadband antenna (see 'Another Antenna idea').

Above left: Chris and Martin Nelmes after their Thornbury exam (see 'Radio Family Goes 3G').

WEBSEARCH

RAE REPORTS & 1946 PAPER www.kippax.demon.co.uk/c-and-g

Project Star Reach:

How to work the 3B9C Rodrigues DXpedition

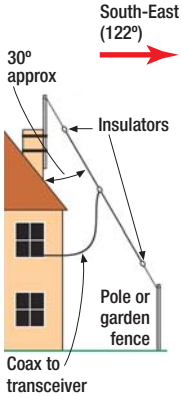
'Project Star Reach' is the name of the latest project by the Five Star DXers Association (FSDXA), which organised the 1998 9M0C and 2001 D68C DXpeditions. Its forthcoming expedition, to Rodrigues Island in the Indian Ocean, will sign 3B9C and will be active from around 19 March to 12 April.

Top: The Nevada Trophy that is up for grabs for working 3B9C on as many bands and modes as possible (see text).

One of the successes of the D68C Comoros DXpedition was the way in which it brought some 3400 UK amateurs on the HF bands to work the expedition: about 10% of all the amateurs licensed for HF operation at that time. Many had brushed off their old valve transceivers to work the expedition, and some clubs organised special club nights so that those who had limited stations at home could still have a shot. Many of these amateurs would probably not have bothered with other HF DXpeditions; there is a feeling that DX chasing is only for those with huge antennas and kilowatts of power. The FSDXA team had made a point of taking plenty of hardware themselves, so that the chasers stood a good chance, even with modest stations of their own. Since 2001, many more HF operators have come on the bands, through new licence structures and, most recently, through the abolition of mandatory Morse testing in many countries.

Rodrigues has just one resident amateur, Robert, 3B9FR, and has seen no DXpedition activity since 1999, almost half a sunspot cycle ago. Yet it's accessible enough to permit the DXpedition to ship six tonnes of equipment and should have excellent propagation to the major centres of amateur radio population (Europe, the USA and Japan). An advance team has already been to Rodrigues to ensure that the necessary logistics are in place, and to establish relationships with key local contacts, including Robert. Project Star Reach is very much aimed at *you*: the organisers are keen to ensure that you are able to participate through making contact with 3B9C on a range of bands and modes and chasing the attractive trophies on offer. For those new to HF, while the team can't guarantee you a contact on all nine bands, almost everyone should be able to manage at least a few QSOs. The main purpose of this article is to give you some advice on how best to go about doing so.

Fig 1: Suggested antenna to work 3B9C for those without beams.



WHICH BAND?

One decision DXpeditions have to make is when to operate on each band. Operating from near the equator means that only the highest bands are open during local daylight, but from dusk to dawn, all nine HF bands can be open simultaneously. With fewer than nine stations available, some would have to be missed. The good news is that 3B9C will be able to operate all nine bands at once (Yaesu, Principal Sponsors, are providing 10 FT-1000MP MkV transceivers and VL-1000 Quadra amplifiers) and, all being well, may even be able to activate more than one station on some bands (10, 15, 20 and 80m) on both CW and SSB together. So, if there is an opening to 3B9 on a particular band, rest assured that 3B9C will be there!

Propagation forecasts are on the DXpedition website but if you want to run your own prediction there are plenty of software packages available (see 'Websearch' below). Almost certainly, the easiest bands on which to look for your first QSOs with the expedition are going to be 20, 17 and 15m. As the sunspots start to reduce in number, openings on the highest bands become less frequent, while the low bands are always a tougher challenge, with greater absorption and higher noise levels.

Most serious DXers have gain antennas for 20, 15 and 10m; a triband Yagi or even stacked monobanders. So on those bands you may well have to wait your turn for a QSO (the good news is that 3B9C will be active for three full weeks and four weekends). Fewer DXers have gain antennas for 30, 17, and 12m, so 17m may well be an excellent band on which to focus to make that first 3B9C QSO.

This highlights one of the dilemmas facing the would-be HF operator. With nine HF bands available, not to mention the VHF bands, how can you put up an effective antenna system to cover them all? Unless you live on a farm, the answer is probably "no way". This is why multiband antennas such as trapped verticals or the G5RV are so popular but, inevitably, they are a compromise. It's often forgotten that when Louis Varney, G5RV, came up with his design, not only did the WARC bands not exist, but neither did 15m. Also, the antenna was not expected to present a resistive 50Ω load to the transmitter but, in those days of valve PAs, that didn't matter. Modern solid-state rigs behave differently, and reduce power in the face of what they see as a mismatch.

A SIMPLE ALTERNATIVE

In the article which preceded the D68C expedition (see *RadCom* February 2001) the team recommended focusing on one band at a time, and to install a resonant sloping dipole, orientated towards D6. This led to a great deal of positive feedback after the expedition, many operators discovering that such an arrangement worked much better on that specific band than their multiband system. So the recommendation is the same again. A full-size, resonant dipole, out in the clear and, ideally, sloping and orientated towards 3B9C is an excellent starting point for those without beams (see **Fig 1**). Suitable dimensions are given in **Table 1** (you may need to modify dimensions slightly to achieve best SWR, as lengths can be affected by surrounding objects). The antenna can be suspended from a chimney or gutter, perhaps. Feed with 50 or 75Ω co-ax, with the centre conductor to the higher half and the outer to the lower half. Seal the feedpoint to keep out moisture, with insulators at either end and you have an excellent single-band antenna.

On the low bands such an arrangement becomes prohibitively large, so other approaches must be tried. On 40m, the half-wave above ground required to achieve low-angle radiation from a horizontal antenna is 20m (67ft), so it is easier to use some sort of vertical. A 40m quarter-wave vertical is just 10m (33ft) high. Like any vertical, it will only work properly with an effective ground system, and for practical purposes this means run-

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ning out as many radials as you can, of whatever length, in whichever directions they can go. One of the authors has had great success on 40m with an elevated ground-plane consisting of a 10m glass-fibre fishing pole, with the quarter-wave radiator wire running up its length (held with insulating tape), mounted on an insulating support (old fence post) just 1 metre high, with two elevated quarter-wave radials (if you use elevated radials, do not have an earth connection in addition). Feed the centre of the coax to the vertical radiator and attach the outer to the radials.

RIGS AND OPERATING TECHNIQUES

Most transceivers these days are more than capable of doing the job, as are most elderly ones. The only feature you will need that you may not use in your day-to-day operating is split-frequency capability. 3B9C, like most DXpeditions, will operate split-frequency in the early parts of the expedition, though may revert to co-channel working when the pile-ups diminish, for those without the capability. What is split-frequency operation, and why is it used? Quite simply, DXpeditions transmit on one frequency and listen others, eg transmit on 28495kHz and listen between 28500 and 28520kHz. There are two reasons:

- If the DXpedition listens on the frequency on which it is transmitting, it will not be heard by those calling because of the pile-up on that frequency.
- The DXpedition operator will be faced with a huge barrage of calls and will not be able to differentiate between them if they are all calling on the same frequency.

Experienced DXpeditioners tune slowly up and down their listening band. Listen to the stations working the DXpedition and establish the operator's tuning pattern. Work out where he is likely to be listening next and then call - bingo! Never, ever, transmit on the DXpedition's transmitting frequency unless the DXpedition says "Listening this frequency".

On CW, generally all you need to do is set your receiver to the 3B9C frequency and use XIT (transmitter incremental tuning) to offset your transmitter by the necessary split (see your transceiver manual if you haven't had occasion to do this before). Activating RIT (receiver incremental tuning) will also allow you to hear the calling stations, while leaving your main receive frequency on 3B9C. RIT and XIT usually only work for splits of up to 10kHz, which may not be sufficient for SSB operation. In this case you need to bring your second VFO into operation. Set, say, the 'A' VFO on the 3B9C frequency. Set the 'B' VFO to the frequency where 3B9C is listening and activate 'Transmit on B, receive on A'. Again, your transceiver's manual will explain how to do this.

TABLE 1: LENGTHS OF HALF-WAVE DIPOLE ANTENNAS

Band	Dipole length	
MHz	feet	metres
7	66.0	20.1
10.1	46.3	14.1
14	33.0	10.0
18	25.8	7.86
21	22.0	6.70
24.9	18.8	5.73
28	16.5	5.00

TABLE 2: SUGGESTING OPERATING FREQUENCIES FOR 3B9C DXPEDITION.

MHz	CW	SSB	RTTY
1.8	1822	1842	N/A
3.5	3502	3795	3570
7	7002	7047	7035
10.1	10102	N/A	N/A
14	14022	14195	14085
18	18072	18145	N/A
21	21022	21295	21085
24.9	24892	24945	N/A
28	28022	28595	28075
50	50102	50145	N/A

PSK31 activity will be around 14071, 21071 and 28071kHz. Satellite will be via AO-40 and any EME operation will take place on 70cm.

When 3B9C responds to your call, the exchange will consist simply of an exchange of signal reports. Make sure the 3B9C operator has your callsign correct. The reason for the short, contest-style, exchange is simple: the expedition operators want to maximise the number of people who get a chance to work 3B9C, so contacts are kept as short as possible. Information such as QSL route have been announced in this magazine and elsewhere, and there will even be a log look-up facility on the 3B9C website so you can be sure you're in the log. If not, do feel free to have a second attempt. If your contact is OK, please try to work 3B9C on other bands and modes.

So where on the bands will you find 3B9C? The plan is to focus on the frequencies listed in **Table 2** (subject to change for operational reasons). The team is aware that band plans in some countries, including the USA, restrict certain classes of operator to sub-sections of the band. This will be reflected in both the listening frequencies and also the transmitting frequencies as the DXpedition progresses. With widespread use of *PacketCluster* and the *DX Summit* website, if you don't hear 3B9C immediately, you should be able to find out very easily where the expedition is currently operating. The team is aware of at least one other major DXpedition active while 3B9C is on the air, so may decide to change transmitting frequencies to avoid confusion. Typically, a DXpedition transmitting on 14195kHz will listen in the range 14200 to 14220kHz. If 3B9C finds itself operating on the same transmit frequency as another DXpedition it will, for example, move down around 5kHz to 14190kHz and will listen *down*, say between 14165 and 14185kHz, so as to split the pile-ups and avoid confusion.

Listen to the operator carefully. Each has been briefed to give the 3B9C callsign at least after every two QSOs and to announce the listening frequencies every five QSOs. 3B9C will *not* 'work by numbers'; believing that with good ears and equipment this is quite unnecessary.

There really isn't the space here to discuss how to get started with the more specialist bands and modes, but the team does encourage readers to have a go. There have been many articles about getting started on RTTY and PSK, which is straightforward using a personal computer and its built-in sound card. There will be a section on the 3B9C website giving some hints and links; the same is true of satellite and EME. The latter requires a well-equipped station, but satellite operation through AO-40 doesn't require large investments in equipment, especially if you already have a 70cm multimode radio (3B9C will be using the popular FT-847) and 70cm Yagi. Again, follow the links for advice on getting started.

NEVADA RODRIGUES TROPHIES

As an encouragement to both individuals and clubs to work 3B9C on a wide range of bands and modes, Nevada is sponsoring the Nevada Rodrigues Trophies. There are 22 separate categories, covering all continents, both newly-licensed operators and old-hands, SWLs and club entries. The trophies are attractive locally-made models of sailing *pirogues*, as used by the Rodrigues islanders. For those who don't qualify for a trophy, but hit predetermined numbers of band-slots, there will be a range of certificates. Full rules and how to apply can be found on the 3B9C website.

SPONSORSHIP

A significant number of sponsors, led by Principal Sponsor Yaesu, is supporting this DXpedition. A colour brochure has been prepared about the project and has been circulated to DX clubs throughout the world. If any club is interested in sponsoring Project Star Reach please contact Bob Beebe, GU4YOX, e-mail gu4yox@cwgsy.net

We very much hope this article has inspired those of you who are inexperienced in DXing to have a go and work 3B9C. You could be pleasantly surprised at what is possible. We look forward to putting your call in the log. ◆

WEB SEARCH

3B9C	www.fsdxa.com/3b9c
DX LAB (includes PropView)	www.qsl.net/dxlab
DX SUMMIT (DX spots)	http://oh2aq.kolumbus.com/dxs
DX ZONE (propagation prediction programs)	www.dxzone.com/catalog/Software/Propagation
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Book & CD review

We're now well into 2004 but, if you're like most members, you will still be referring back to articles in last year's *RadComs*. Now is the time to replace your 12 dog-eared copies of *RadCom 2003* with either the RadCom 2003 CD or the de luxe *RadCom 2003* Bound Volume - or both!

RADCOM 2003 (VOLUME 79) CD

RSGB Publications
Reviewed by RSGB HQ Staff

Remember the Peter Hart review of the Icom IC-703? Or the Yaesu FT-857? How about Pat Hawker's two-part series on the 90-year history of the RSGB? Or the 'Spiderbeam' constructional article? Do you remember the 'Pseudohet' CW transceiver? These are just some of the highlights of *RadCom* in 2003 that you will undoubtedly want to refer back to in years to come.

The *RadCom 2003* CD contains all 1224 pages of *RadCom* published last year in easily-readable form. The CD contains PDF files: one for each month of the year plus an index and a 'welcome' file, which explains in simple terms how to use the CD, as well as providing information about RSGB membership. As a special bonus, included for the first time on an annual CD are nine sample issues of *RadCom* (The *T & R Bulletin*, *RSGB Bulletin* etc) from July 1939 to January 1991, providing a fascinating look back over seven decades of the Society's magazine.

The 2003 *RadCom* monthly PDFs each represent the 100 (or more) pages of the magazine. A small vertical strip down the left side of the screen is used for 'thumbnail' images of each page to help you to navigate through each issue.

You can jump to any page you want or simply start at page 1 and work your way through to the end. Once a page is displayed on the screen, you can reduce it in size to view the whole page or, more likely, zoom in to a particular part of the page so that it fills the screen. This is ideal for the partially-sighted who require a very large print size to read articles comfortably. Any page can be printed out, for example if a diagram is needed for a construction project.

One advantage of *RadCom 2003* being on CD is that you can find words or phrases such as "Foundation" or "M3 licence" and the first instance that word or phrase is found will be displayed, followed by any or all subsequent instances.

In order to read the PDF files you will need to have Adobe *Acrobat Reader* software installed on your PC. This is included free of charge on the *RadCom 2003* CD, along with clear instructions of how to install it. Once loaded, you will be able also to read PDFs from other sources such as the Internet.

If you're a new member of the Society and so did not receive all 12 issues of *RadCom* last year, or if you have lost one or more issues, if you regularly search through your *RadComs* for specific items, or if you simply want to store your magazines in a small space, the *RadCom 2003* CD is for you. [All the years from 1953 to 2002 are currently available on CD, with 1939 to 1952 coming soon - contact RSGB Sales for more details.]

Minimum system requirements
Pentium PC with CD-ROM drive, Windows 98 (second edition), ME, XP, or NT 4.0 (with Service Pack 5) or later, 16MB RAM, 30MB available disk space.

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RSGB Publications
Reviewed by RSGB HQ Staff

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Reviewed by Peter Hart, G3SJX, The Willows,
Paice Lane, Medstead, Alton, Hants GU34 5PR.

Kenwood TS-480HX HF + 6m transceiver

Kenwood does not often bring out new HF transceivers, but when it does it is usually something a little different. This is certainly true of the new TS-480, to which Peter Hart gives his unique full technical review treatment.

The TS-480HX control panel on its mounting bracket.

The TS-480 is available in two versions; the TS-480SAT gives 100W output power and has a built-in antenna tuner, while the TS-480HX, the subject of this review, features 200 watts output power and has no tuner. These are separate models, the amplifier and tuner are not interchangeable between versions or retrofittable options.

Whereas a number of radios now feature detachable front panels, with the TS-480 the front panel incorporating the loudspeaker is a completely separate unit, common to both models and connected to the main body of the radio via a cable. The radio is provided with a selection of different mounting brackets and stands with both long and short separation cables to adapt to different installation requirements. The panel can be mounted remotely such as in a vehicle or for tabletop use particularly where space is at a premium or it can be mounted adjacent to the main unit with the supplied frame and carrying handle. In this way the radio is well suited to the different needs for home, vehicle or transportable use.

BASIC FUNCTIONS

The TS-480 operates from a 13.8V supply drawing around 40A for the higher power TS-480HX or 20A for the TS-480SAT. The higher-power model uses two combined power amplifiers each with a separate power lead. The power leads can either be connected to a common power source or to two separate supplies, providing the voltage difference between them is less than 1V. With only one power lead connected the radio operates on receive only. The main unit measures 179W x 70H x 278Dmm and weighs 3.2kg and the control panel measures 183W x 78H x 68Dmm and weighs only 0.5kg.

The receiver tunes continuously from 30kHz to 60MHz and the transmitter is enabled only within the exact amateur allocations. There are variants covering the American and European band allocations but only the American version transmits in the 60m band as standard. The maximum power output is nominally 200W on the HF bands and 100W on 50MHz, reducing to 5W minimum. Modes covered are USB, LSB, CW, FSK, AM and FM. FSK requires a digital RTTY input and the shifts and tone frequencies may be set via the menu. Reverse sidebands are selectable on FSK and CW.

All controls are mounted on the remote front panel which also contains the rear facing speaker and headphone jack. Apart from the 35mm rotary tuning knob and two other concentric rotary controls all other functions are selected by push buttons. These are multipurpose in most cases but fairly intuitive in their operation. The yellow backlit LCD panel is clear and bright and easy to read. A menu of some 60 items provides user selection or tailoring of many of the functions of the radio.

Setting the radio on frequency can be done in a variety of different ways. The rotary tuning control tunes in 10Hz steps on SSB, CW and FSK modes with a tuning rate of 2.5, 5 or 10kHz per knob revolution. On AM and FM the rate is 10 times faster with 100Hz step sizes. A fine tune button reduces all these by a factor of 10. For faster tuning across the bands a click-step rotary can tune in a variety of mode-dependant step sizes and also a 1MHz step for coarse navigation. Finally, the frequency can be entered directly via numeric buttons. Both receive and transmit incremental tuning is provided (RIT / XIT) over a range of ±10kHz. Up / down keys scroll through the bands. An automode facility will automatically select the mode according to the frequency. A table of up to 32 frequency / mode relationships may be set which is sufficient to allocate CW, FSK and SSB sub-bands for all the bands with some for AM broadcast. This is very helpful and an alternative and possibly more flexible arrangement to band stacking used on other radios.

The usual A / B twin VFOs are provided with split frequency capability and a means to check and set the Tx frequency. Several button presses are needed, there is no quick split facility. There are a total of 100 memories which can be tagged with alphanu-

TS-480HX control unit and main unit.

Close-up of rear of main unit showing cooling fan.

Optional narrow IF filters installed.

meric names up to eight characters long and a one press store and recall quick memory feature for saving 10 frequencies on a stack. The usual comprehensive scanning features are provided allowing scanning across a frequency range or across the memories with various scanning parameters user selectable.

The main unit is fitted with twin fans for the higher power model and mini-DIN accessory sockets to interface to external linears, data terminals, PC sound card etc. The menu allows several different linear amplifier switching configurations including delayed transmission for slow changeover speeds. Twin antenna sockets on flying leads are provided and either can be switched to any band. Separate jacks for the internal keyer paddle and for external keying arrangements are also included. A 9-pin D connector interfaces directly to a PC serial COM port without the need for level conversion and this also provides direct connection to other Kenwood radios for *PacketCluster* tuning and other data transfers. The radio is provided with a hand microphone fitted with a longer cable than normal for plugging into the main unit.

The receiver is a double conversion superhet with IFs of 73.095MHz and 10.695MHz with a third conversion on FM to 455kHz. DSP is used for audio filtering functions in both the receiver and transmitter circuitry. The main channel selectivity is achieved at 10.695MHz where a 2.4kHz bandwidth filter is fitted as standard. Up to two optional extra filters (1.8kHz, 500Hz or 270Hz) can be fitted for narrower bandwidths on SSB or CW / FSK. An optional TCXO (temperature compensated crystal oscillator) reference can also be fitted which provides frequency stability to within 0.5ppm.

ADDITIONAL FEATURES

Receiver features include selectable RF preamplifier / attenuator, all-mode squelch, fast / slow AGC, IF shift to move the receive passband away from interfering signals and an IF noise blanker for ignition or pulse noise. DSP is used at audio to provide additional noise pulse elimination as well as multiple beat cancellation (audio notch) and background noise reduction. Two noise reduction modes are implemented as also used in previous Kenwood radios. The Line Enhancer method is particularly suited to SSB and is based on adaptive filtering. The Speech Processing / Auto Correlation (SPAC) method uses a statistical auto-correlation algorithm and is particularly effective for CW.

DSP is also used to provide audio filtering functions on receive and transmit. On receive, adjustable high cut and low cut filters are implemented on speech modes and narrow bandwidth bandpass filters on CW and FSK modes. Several bandwidth settings are selectable down to 50Hz on CW or 250Hz on FSK and these filters track the CW pitch setting. For data communication in SSB mode

KENWOOD TS-480HX MEASURED PERFORMANCE

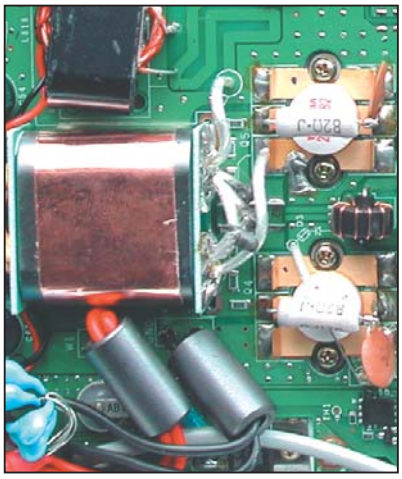
RECEIVER MEASUREMENTS

	SENSITIVITY SSB 10dBs+n:n		INPUT FOR S9	
FREQUENCY	PREAMP IN	PREAMP OUT	PREAMP IN	PREAMP OUT
136kHz	2.0µV (-101dBm)	3.2µV (-97dBm)	280µV	700µV
1.8MHz	0.16µV (-123dBm)	0.40µV (-115dBm)	22µV	110µV
3.5MHz	0.14µV (-124dBm)	0.35µV (-116dBm)	22µV	100µV
7MHz	0.11µV (-126dBm)	0.28µV (-118dBm)	16µV	80µV
10MHz	0.14µV (-124dBm)	0.35µV (-116dBm)	20µV	100µV
14MHz	0.13µV (-125dBm)	0.35µV (-116dBm)	18µV	90µV
18MHz	0.13µV (-125dBm)	0.35µV (-116dBm)	18µV	90µV
21MHz	0.13µV (-125dBm)	0.32µV (-117dBm)	16µV	90µV
24MHz	0.10µV (-127dBm)	0.32µV (-117dBm)	20µV	90µV
28MHz	0.10µV (-127dBm)	0.32µV (-117dBm)	20µV	90µV
50MHz	0.10µV (-127dBm)	0.35µV (-116dBm)	11µV	90µV

AM sensitivity (28MHz): 0.6µV for 10dBs+n:n at 30% mod depth
FM sensitivity (28MHz): 0.14µV for 12dB SINAD 3kHz pk deviation
AGC threshold: 0.6µV
100dB above AGC threshold for +1.5dB audio output increase
AGC attack time: 2 - 3ms
AGC decay time: 100 - 300ms (fast), 2 - 5s (slow)
Max audio at 10% distortion: 2.0W into 8 Ω
Inband intermodulation products: -30dB to -40dB

S-READING	INPUT LEVEL SSB	
(7MHz)	PREAMP IN	PREAMP OUT
S1	0.8µV	4µV
S3	1.4µV	6.3µV
S5	2.8µV	14µV
S7	8.9µV	45µV
S9	16µV	80µV
S9+20	130µV	630µV
S9+40	1.6mV	8mV
S9+60	20mV	100mV

IF FILTER	IF BANDWIDTH	
	-6dB	-60dB
2.4kHz SSB	2490Hz	4800Hz
1.8kHz SSB	2010Hz	4060Hz
270Hz CW	300Hz	840Hz
6kHz AM	7.4kHz	22.9kHz
FM	10.3kHz	21.2kHz



Close-up of TS-480HX with top cover removed.

TS-480HX main unit.

Close-up of TS-480HX with bottom cover removed. Detail of PA board.

such as PSK31 or RTTY via a sound card, additional DSP audio filtering for narrower bandwidths and higher tone frequencies can be selected. However, switching back and forth between voice and data involves switching this filter on and off via the menu system which is a little cumbersome. On voice modes, several preset audio frequency responses (equalisers) are available for both the receiver and transmitter to suit different operator's voices or ears. The transmit audio bandwidth is switchable wide or narrow and DSP also provides a speech processor and automatic tuning / netting for CW signals.

Transmit features include variable output power from a few watts to 200W, speech processor, VOX, a transmission monitor, full or semi break-in and a full message keyer on CW. The keyer accommodates various paddle arrangements and speed compensated weighting and operates over the range 10 to 60WPM. Three 50 character message stores allow for interruption to insert contest serial numbers, for example, and may be set to repeat automatically.

An optional plug-in module for the TS-480 is the VGS-1 voice guide and storage unit. The voice guide provides voice readout of the frequency and several other settings for the front panel controls which are not announced as Morse characters. This includes the S-meter and can be a boon to those with impaired vision. The second use of this option is to provide an audio store. This can be used to record up to three 30-second messages for playback on air as CQ calls or contest exchanges for example. Store 3 will also record the receiver output continuously and retain the last 30 seconds. This can be stored and played back as desired or can be played on air to show a station what his signal sounds like.

Other features include a transmission timeout timer and automatic power off and interfacing for transverters with 5W drive. The transverted frequency is displayed on the LCD but only three digits for the MHz are available. FM operation covers both wide and narrow deviations and has facilities for repeater access including CTCSS tones.

PC AND DIGITAL CONTROL

Kenwood provides a software control program, ARCP-480, which is downloadable free of charge from the Kenwood website (see 'Websearch' below). The download size is about 6MB. Full control of all the radio features may be made from a PC running *Windows 98* or later and I had this working satisfactorily with a 200MHz machine running *Windows 98*. Dual control from the radio panel or the PC is allowed and both displays track together. It is a different way of operating the radio but VFO tuning is faster and more responsive when implemented from the radio panel. There are few extra features on the PC software, a bargraph spectrum

INTERMODULATION (50KHZ TONE SPACING)

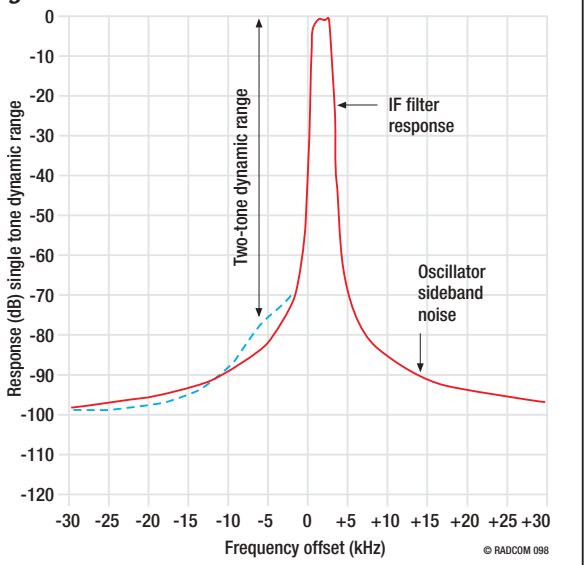
	PREAMP IN		PREAMP OUT	
Frequency	3rd order intercept	2 tone dynamic range	3rd order intercept	2 tone dynamic range
1.8MHz	+10dBm	95dB	+24dBm	99dB
3.5MHz	+10dBm	96dB	+18dBm	96dB
7MHz	+9dBm	97dB	+22dBm	100dB
14MHz	+9dBm	96dB	+21dBm	98dB
21MHz	+8.5dBm	96dB	+23dBm	100dB
28MHz	+3dBm	93dB	+18dBm	97dB
50MHz	-5dBm	88dB	+15dBm	94dB

CLOSE-IN INTERMODULATION ON 7MHz BAND

	PREAMP IN		PREAMP OUT	
Spacing	3rd order intercept	2 tone dynamic range	3rd order intercept	2 tone dynamic range
3kHz	-36dBm	67dB	-21dBm	71dB
5kHz	-29dBm	71dB	-15dBm	75dB
7kHz	-22dBm	76dB	-7dBm	81dB
10kHz	-10dBm	84dB	+4dBm	88dB
15kHz	+7dBm	95dB	+16dBm	96dB
20kHz	+7.5dBm	96dB	+18dBm	97dB
30kHz	+8dBm	96dB	+19dBm	98dB
40kHz	+8dBm	96dB	+21dBm	99dB
50kHz	+9dBm	97dB	+22dBm	100dB

FREQUENCY OFFSET	RECIPROCAL MIXING FOR 3dB NOISE	BLOCKING PREAMP IN	BLOCKING PREAMP OUT
3kHz	78dB	-38dBm	-24dBm
5kHz	82dB	-38dBm	-24dBm
10kHz	89dB	-36dBm	-22dBm
15kHz	93dB	-24dBm	-10dBm
20kHz	95dB	-13dBm	+1dBm
30kHz	98dB	-4dBm	+8dBm
50kHz	103dB	-4dBm	+8dBm
100kHz	110dB	-4dBm	+8dBm
200kHz	116dB	-4dBm	+8dBm

Fig 1



display in scan mode is one bonus but advantage could have been taken to provide a comprehensive memory access system. However, it is free of charge so I cannot be too critical.

A second software control program available free of charge from the Kenwood website is the ARHP-10 Host program for the Kenwood Network Command System. This 5MB download enables the radio to be controlled remotely over a network such as a LAN or the Internet. In addition to the serial port connection, the transmit and receive audio lines from the radio are interfaced to the PC sound card and VoIP (Voice over Internet Protocol) is used to transfer the audio data across the link. The ARHP-10 is used at the radio end of the link with the ARCP-480 at the controlling end both running under Windows 2000 or XP. It remains to be seen what changes would be needed to current licensing conditions to make such operation acceptable.

A further feature addressed by the serial COM port is to provide a direct connection to the Kenwood TM-D700E 2m / 70cm radio. This enables incoming DX *PacketCluster* spots to be used to tune the TS-480 automatically on frequency. This set-up can also be configured to provide a cross-band repeater.

MEASUREMENTS

Measurements shown in the table were made with the review radio powered from twin 13.5V supplies. The review radio was fitted with 1.8kHz and 270Hz IF filter options. The receiver is very sensitive and overall gain high with an AGC threshold at 0.6µV. The sensitivity is lower at LF but adequate at 136kHz and lower frequencies. Rejection of images, IFs and spurii was better than 90dB, a very good result. The third order intercept and dynamic range is excellent at wide spacings, on a par with the very best radios, but rather poor close in. Reciprocal mixing figures are fairly reasonable, rather better than some recent radio introductions but not as good as some Kenwood radios from the past. **Fig 1** shows the overall selectivity plot.

The transmitter performance was well up to scratch. SSB intermodulation products were generally quite reasonable and not significantly degraded by the speech processor with low levels of harmonics and spurious outputs. CW keying was very clean with low distortion and optimal rise and fall times although the first attack edge was noticeably sharper. Full and semi break-in gave identical results. The data switching envelope was also nicely rounded.

ON THE AIR

I used the TS-480HX in the home station with the control panel mounted on the tabletop panel bracket and the main unit tucked out of the way. I found it convenient to place the radio on the left side of the logging keyboard and tilted up at a steep angle which makes all controls easily accessible. It is useful to be able to move the radio around at will. The audio quality from the rear downward facing speaker was surprisingly good and very clean but as always so much better on headphones. I found the receiver performance to be excellent. I could detect no strong signal overload effects on 40m and the radio was very sensitive on the quiet bands. Good performance extended to AM broadcast and VLF time transmissions. It performed very well on 80m to VK, JA and W7 during the excellent December conditions. The AF DSP filtering is also very effective but there is no substitute for narrower IF filtering on CW. The AGC can be captured by inaudible signals filtered out by the AF filter which pass through the wider IF filter. This is particularly noticeable with the low AGC threshold on this radio and results in a quietening when strong close-by signals are present. I would recommend fitting the 500Hz filter rather than the narrower 270Hz filter if only one CW filter is fitted. The narrower filter can only be selected when the DSP AF filter is narrowed to a similar bandwidth and for general use 270Hz is a little too narrow for my preference.

Transmitter quality reports on SSB were good as was CW performance on both full and semi break-in. Generally the user ergonomics are very good considering the limitations of a small panel and high number of features. Obviously much thought has gone into this aspect, although some operations such as memory access I found a little cumbersome.

CONCLUSIONS

Overall the TS-480HX is an excellent radio for use at home, in the car or transportable use. It is easy and convenient to use with an excellent receive and transmit performance. Computer and network control are added features. At 200W the extra power can be a major advantage when used standalone and can be particularly attractive for mobile and lightweight DXpeditions. However, if a linear amplifier is also used, the lower power TS-480SAT is preferable. Priced around £1000 - £1100 depending on model, the TS-480HX and TS-480SAT are available from most major suppliers.

My thanks to Kenwood Electronics UK for the loan of the review radio. ◆

TRANSMITTER MEASUREMENTS

FREQUENCY	CW POWER OUTPUT	HARMONICS	INTERMODULATION PRODUCTS 3rd order	5th order
1.8MHz	212W	-68dB	-34 (-28)dB	-46 (-40)dB
3.5MHz	216W	-65dB	-36 (-30)dB	-46 (-40)dB
7MHz	210W	-72dB	-34 (-28)dB	-46 (-40)dB
10MHz	212W	-70dB	-30 (-24)dB	-43 (-37)dB
14MHz	210W	-70dB	-32 (-26)dB	-46 (-40)dB
18MHz	210W	-70dB	-28 (-22)dB	-40 (-34)dB
21MHz	210W	-66dB	-31 (-25)dB	-41 (-35)dB
24MHz	212W	-73dB	-26 (-20)dB	-38 (-32)dB
28MHz	213W	-73dB	-26 (-20)dB	-38 (-32)dB
50MHz	105W	-68dB	-31 (-25)dB	-44 (-38)dB

Two-tone transmitter intermodulation product levels are quoted with respect to PEP, figures in brackets are with respect to either tone.

Carrier suppression: 65dB approx
Sideband suppression: 60dB @ 1kHz
Transmitter AF distortion: 1%
Microphone input sensitivity: 1mV
FM deviation: 4.3kHz (wide) 2.1kHz (narrow)
SSB/data T/R switch speed: mute-TX 14ms, TX-mute 4ms, mute-RX 24ms, RX-mute <1ms
NOTE: All signal input voltages given as PD across antenna terminal. Unless stated otherwise, all measurements made on USB, preamp switched in, normal default bandwidths and with two 13.5V supplies.

WEB SEARCH

KENWOOD (SOFTWARE DOWNLOAD)
www.kenwood.com/i/products/info/amateur.html

Reviewed by Chris Lorek, G4HCL, PO Box 400, Eastleigh SO53 4ZF. E-mail: g4hcl@rsgb.org.uk

In addition to its well-known Noise Eliminating Speaker and DSP module for retro-fitting inside a transceiver, British manufacturer bhi also produces an in-line module to allow you to benefit from the same audio digital signal processing facilities on your own favourite loudspeaker and without having to modify your transceiver in any way.

bhi Noise Eliminating In-line Module and Switch Box

I reviewed the NES10 Noise Eliminating Speaker from bhi in the December 2002 issue of *RadCom*, finding it an excellent, easy-to-use plug-in accessory that can significantly improve your receiver's audio performance and readability. In this, the DSP-based electronics are built into a mobile-sized speaker, the noise reduction level being set in eight steps using small DIP switches at the rear of the speaker case. A little later, bhi came up with a module which could be fitted wholly within a transceiver itself, with a single-button control to switch the noise reduction in and out and vary its level in four steps. I reviewed the FT-817-fitted version of this module in the December 2003 issue of *RadCom*.

Time marches on, and the audio-based DSP noise reduction algorithm used by bhi in their products has proven itself to be extremely efficient: it's now used by hundreds and probably thousands of amateurs and professionals world-wide. As well as offering noise reduction to make noisy signals readable, the system includes an automatic audio notch which can also reduce audio heterodynes down to virtual inaudibility.

Many amateurs, myself included, like to use a dedicated or 'tailored' speaker for receive use, sometimes with high / low pass filtering built in. bhi now also has an 'In-Line Module' available, the NEIM1031, which can be used between your receiver and an external speaker. This provides all the DSP filtering facilities of the built-in electronics in the NES10 Noise Eliminating Speaker, with the added facilities of front panel input and output audio level controls, DSP filter level, plus switched line (fixed level) and audio (high level) input selections. Phono sockets are provided for line input and output, with 3.5mm jack sockets for speaker-level input and output.

Supplied with the unit are a screened audio lead terminated with 3.5mm jack plugs and a DC power lead. The unit requires a 12 - 24V DC supply. The NEIM1031 measures 165H x 82W x 33Dmm and is supplied as standard with its fascia controls printed in 'vertical' mode as shown in the accompanying photograph. Four small stick-on feet are also provided for desktop use. Options include a 'horizontal' fascia at £2.95, as well as an AC wall plug-in power supply and a stand.

ON THE AIR

I found the in-line module replicated the excellent on-air results found in the past. It usefully has eight noise filtering levels, selected by a small front panel rotary switch. At first I found this a little fiddly in use. A larger switch knob, similar in size to the audio level controls would have been better in my opinion, but it didn't take long to get used to it. Setting up the levels was very easy as green and red LEDs gave an indication of the correct input level, and I simply used the 'Output Level' knob as an overall volume control. [bhi says that since the review sample was provided it has added filter levels on both the vertical and horizontal labels, making it easier to see what level of noise cancellation has been selected - *Ed.*]

A useful 'extra' was a small, separate line output level control just above the main output level knob. Using this I easily matched it to the input line on my PC's sound card as well as via a *RigBlaster* multimode unit, thus giving me a dual benefit; DSP filtering on both 'listening' audio as well as line-output audio for data decoding. A headphone output socket is also fitted, this usefully disconnecting the output speaker audio but not the output line audio when headphones are connected.

1042 SWITCH BOX

As well as using the DSP unit with a single transceiver set-up, bhi also provided on loan their 1042 Switch Box. This has the facility of letting the user choose up to six audio sources; three 'loaded' inputs each with an 8Ω internal resistive load (to replicate an attached speaker), and three 'unloaded' (ie straight through) inputs, with a single output which typically connects to the in-line module or the NES-10 speaker system. The switch box is supplied with two screened audio leads each terminated with a 3.5mm jack plug at each end, further audio leads with either two 3.5mm jack plugs (ie speaker audio) or phono plug to 3.5mm jack (ie line audio) are available as options.

It's a small desk-top size, measuring 104W x 74D x 35Hmm. OK, this switch box isn't anything unique, instead it's one of those things of which you say, "Why hasn't anyone thought of this before?" It certainly saved me a lot of plugging and unplugging, as well as reaching behind my various receivers each time I wanted to switch between them! To be quite honest I'd probably have got my soldering iron and hand-drill out and made up something like this if it wasn't commercially available. My conclusion: what a good idea, and a very useful add-on to the DSP filter system!

Our thanks go to bhi for the loan of the units for review. The NEIM1031 In-Line Module is currently priced at £129.95, with the 1042 Switch Box priced at £19.95 (until 31 March 2004, thereafter £29.95). Products available from Waters & Stanton, ML&S, and Radio World, or direct from bhi, tel: 0870 240 7258; www.bhi-ltd.co.uk. ◆

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COBRA17
18,068–18,168 MHz
BW: 800 KHz VSWR 2:1 1,5 MHz +/- 3db
COBRA20
14 – 14,350 MHz
BW: 1 MHz VSWR 2:1 2 MHz +/- 3db
COBRA30
10,000 – 10,150 MHz
BW: 400 KHz VSWR 2:1 800 KHz +/- 3db
COBRA40
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BW:200 KHz VSWR 2:1 400 KHz +/- 3db
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By Pat Hawker, G3VA,
37 Dovercourt Road, London SE22 8SS

TT

An 'antenna special' this month, with more of the history of the close-spaced beam unfolding. A more positive look at the much-maligned 'G8PO Special' is provided, and details are given for designing folded dipoles with wire of different diameters. Finally, a new 3.6V H-mode mixer is described, and there is a follow-up on receiving SSB and CW on super-regenerative receivers.

THE UNIDIRECTIONAL [YAGI/BROWN] ARRAY

The roles of Dr George Brown and *Radio* magazine in the development of the close-spaced 'Yagi' unidirectional HF beam ('TT', October and December, 2003) continue to unfold. Dave Gordon-Smith, G3UUR, admits to being an avid wireless historian and vintage gear operator with a modest collection of old magazines, books and literature from earlier days. He writes: "One of my favourite old magazines is *Radio*, and I have a patchy collection of these back to 1932 (they are hard to come by in the UK, and not too easy in the USA). After Walter Van B Roberts' article in the January 1938 issue (see October 'TT'), there was a follow-up general design article by the Editor, W W (Woody) Smith, W6BCX: the 'Practical Design of Close-Spaced Unidirectional Arrays' (June 1938, pp38-41), a photocopy of which is enclosed. The first article by John Kraus, W8JK, on his 'flat-top' (8JK beam) appeared in the March, 1937 issue in which he states his indebtedness to Brown for the idea of the close-spaced anti-phase array and in which he also suggests an array which closely resembles the G8PO antenna [see below]."

G3UUR notes that the 1938 articles on close-spaced parasitic arrays all credit Brown, but in the following years they cite the previous articles and ignore Brown's contribution entirely. An exception is in the RSGB book *HF Antennas for all Locations*, by Les Moxon, G6XN (2nd edition, p23): "Spacings between the elements of additive arrays normally need to be at least λ/2, although a row of elements may be backed by a row of reflectors spaced λ/4 and phase-shifted by 90°… Additive methods were the only ones generally recognised until the appearance of a classic paper by G H Brown in 1937 which demonstrated the practical possibility of gains in excess of 5dB from pairs of closely-spaced elements. One of the sequels was the development of the W8JK array… but, despite its deep roots in the history of amateur radio and the sanctity conferred by long and extensive use, it has to be said that the W8JK antenna has few practical merits. This is because (a) achievement of gain despite close-spacing and antiphase excitation implies large currents with consequent reduction in efficiency and bandwidth and (b) major improvements require only a small modification, in the course of which the W8JK antenna gets deprived (perhaps rather unfairly) of its label. On the other hand, its virtues include extreme simplicity and the ease with which an understanding of its mode of operation can be extended to include all other small beams."

G3UUR, in commenting on how many writers have ignored Brown's contribution, adds: "The same thing appears to have happened with A E Green's contribution to ladder filter design. As far as I can find out he worked for Marconi. Dishal credits him with major contributions to the modern theory of ladder filter design in his early papers, but he gets ignored in his vital paper 'Modern Network Theory Design of Single-Sideband Crystal Ladder Filters' (*Proc IEEE,* September 1965, pp1205-1216). The crucial generalised coupling coefficient equation, that is so important to those of us who design high-order filters from Butterworth to high-ripple Chebyshev, is actually due to Green, not Dishal! There's little justice in this world!"

To return to the evolution of close-spaced antenna arrays, there seems no doubt that Woody Smith's article in the June 1938 issue of *Radio* represented a significant contribution in highlighting the importance of the vertical radiation pattern of the horizontal elements of a driven flat-top or a parasitic array. He suggested that there was already confusion among those attempting to apply the radiation patterns shown in Fig 28 of Brown's paper. These were based on vertical monopole elements.

W6BCX pointed out that, as indicated by Brown, by using a properly-adjusted director or reflector in conjunction with a dipole element, it is possible to increase the forward gain by up to 5dB, and attenuate the power radiated to the rear by as much as 12dB. But, because the director will reduce the effect of the earth upon the VRP of the driven dipole, the radiation from the dipole element will be increased at a lower, more useful [for DX] angle. "For this reason, a dipole of such height above ground that there is but little power radiated at low angles (a quarter wavelength above earth, for example) will often exhibit more than the theoretical 5dB gain when a director is added. If the dipole is far removed from earth, the gain will more nearly approach the theoretical value when a director is added."

An array can, in practice, because of its lower elevated angle of radiation compared with a dipole at equivalent height, provide a performance on DX signals that is better than its total forward power gain. This, as W6BCX indicated in 1938, has often led to confusion in the claims made for antenna gain. There is, in fact, still some confusion between 'radiation efficiency' and 'effectiveness' of antennas over specific paths. The effectiveness of an antenna, either for NVIS or for DX, is highly dependent on its environment. The addition of a director or reflector to a dipole antenna at a modest height can, in effect, change what may be quite a useful antenna for medium distances to a good DX performer.

REVERSIBLE UNIDIRECTIONAL ANTENNAS

The mention by G3UUR of 'The G8PO Special' - a reversible unidirectional antenna based on the W8JK driven 'flat-top' bi-directional beam array (**Fig 1**) - led me to look again at the original article by J E (Ted) Ironmonger, G8PO (*RSGB Bulletin,* November 1947, pp86-88). This design was noted briefly in 'TT' September 1990 in an item 'The 8JK Revisited and the New BRD-Zapper'.

Fig 2 shows the G8PO antenna as given in the original article and as reproduced in the September, 1990 'TT'. The 21MHz unidirectional Zapper (**Fig 3**) stemmed from W9BRD and utilised an end-fed W8JK, fed via a two-wire stub that is gamma-fed from coax and carefully adjusted to provide a 135° phase-difference (the direction could presumably be reversed by transferring the gamma connection to the other feeder, although this was not mentioned by W9BRD).

There have been various centre-fed designs derived from the basic W8JK bi-directional antenna, using driven elements phased so that they provide a unidirectional beam, including the ZL-Special and the HB9CV. Both of these designs have become firmly

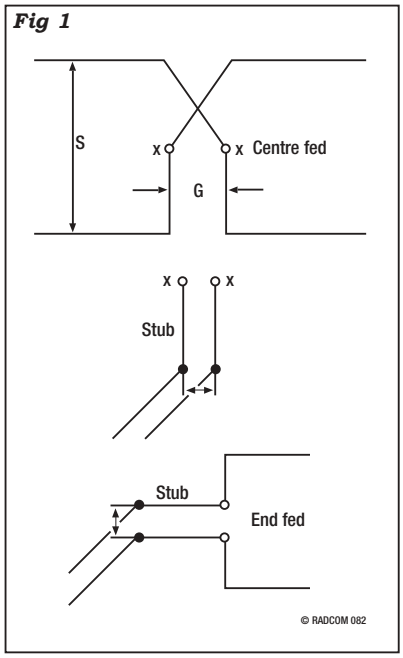


Fig 1: Basic single section W8JK flat-top bi-directional antennas. In 1981, Dr Kraus pointed out that the centre-fed arrangement can be used over a continuous frequency range of 3:1. With a typical spacing, S, of about λ/8 on the lowest frequency used, the dipole element lengths can effectively range from less than λ/2 to more than 1.5λ.

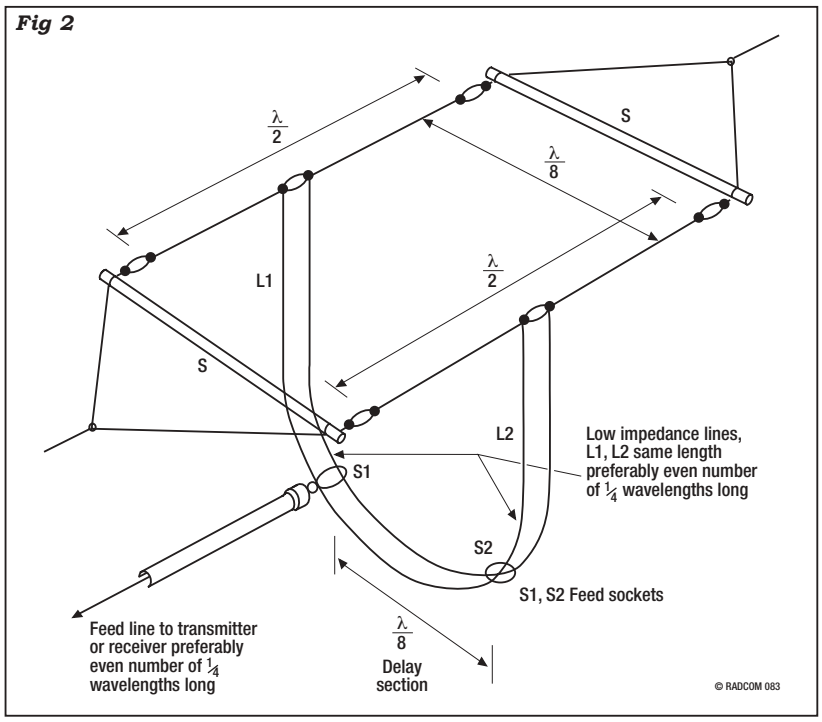


Fig 2: The original 'G8PO Special' reversible unidirectional array, as described in 1947. Direction depends on whether transmitter feed is connected at S1 or S2. The delay line is twisted once to provide the 135° out-of-phase drive. Note that some amateurs experienced difficulties when implementing the antenna as shown, primarily due to high standing waves on the feeders (see text). The claim in the 1947 articles for the very high front-to-back ratio was excessive for a correctly-implemented antenna.

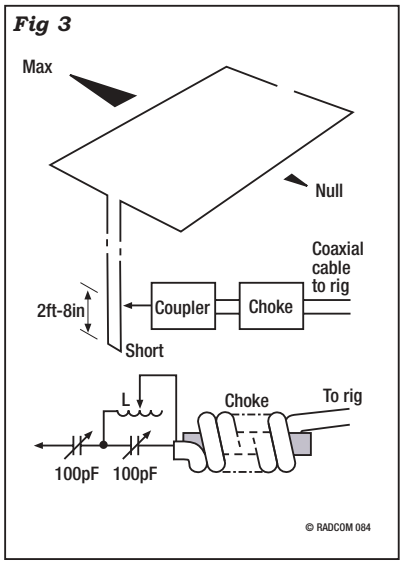


Fig 3: How W9BRD converted a 21MHz end-fed W8JK array into his BRD-Zapper.

established. I began to wonder why the November 1947 G8PO with its facility of reversing the beam direction by simply plugging the transmitter output into one of two feed sockets, spaced to provide a 'delay line', seems to have virtually disappeared from the scene, although in 1947 it attracted considerable attention.

I found that my 'look-back' in 1990 had suffered from a common shortcoming in such 'research'. I had missed the follow-up letters in subsequent issues, including those from G2HDU (December 1947), G3JR and VK2NO (both August 1948). Some were critical on theoretical grounds or practical experience, some constructive (for example, VK2NO advocated folded-dipole elements). More importantly, I had also missed a second article 'Reflections on the G8PO Aerial', by Ted Ironmonger who, at the time, was in Australia as VK3WU (*RSGB Bulletin,* August 1949, pp38-48). This acknowledged the difficulties that some users had experienced in attempting to duplicate the results achieved with the antenna of Fig 2. G8PO recognised that problems arose because the phase delay on a transmission line changes appreciably when there is a significant SWR, almost inevitable with the impedance of close-spaced dipole elements being a poor match for low-impedance twin-wire feeders.. He introduced a reversible 28MHz two-section array with a Bazooka matching section.

But, by then, the 'G8PO Special' had gained a reputation for inconsistent performance; the results claimed in the original article were difficult to achieve, particularly the high front-to-back ratio. However, there can be no doubt that the basic principles are sound and capable, if implemented with an understanding of the problems, of providing a useful reversible-beam antenna.

A detailed discussion and some practical hints are given on reversible driven-element antennas in the section 'Two-Element Driven Arrays' (Chapter 3, 'Close-Spaced Beams', pp75-78 of the *first* (1982) and pp90-93 of the *second* edition of *HF Antennas for all Locations*, by L A Moxon, G6XN. **Figs 4** and **5** are reproduced from G6XN's book but, for a full understanding of the pros and possible cons of such reversible unidirectional designs, it would be advisable to read all the relevant sections of this valuable (if at times not easy to read) book.

I7SWX's 3.6V 2T H-MODE MIXER/LVDS SQUARER

'TT', April 2003, pp82/83 featured a two-transformer version of G3SBI's H-mode mixer developed by Gian Moda, I7SWX/F5VGU. While this remains a valid design, Gian points out that there is now a new production by several manufacturers of fast bus switches, basically similar to the 5V FST3125, but focused on 3.5V types. He notes that going down in supply voltage has the potential disadvantage that it takes the mixer application into an area where the high level signals to be handled may come near the limit levels of the switch, ie 3V p-p. On the other hand, the lower voltage types provide better switching characteristics than the earlier 5V types (although some recent production of these show improved characteristics). Faster (ie shorter) switching times permit the use of higher local oscillator drive frequencies, hence higher IF and signal input frequencies are possible with lower attenuation.

I7SWX writes: "Having collected some 3.3V FST3125 devices, I have assembled a 3.6V I7SWX two-transformer H-Mode Mixer. There is not a lot of difference between the 5V version (powered up to 6.8V) and the 3.5V one, except that some resistor values are changed: **Fig 6.** If you wonder why I used a 3.6V supply rather than 3.3V, the answer is that 3.3V IC regulators are much more expensive than the classic 78L05, 78L06 or LM317. With these inexpensive devices, it is quite simple to provide a 3.6V supply, as shown. A possible 3.3V PSU is shown in **Fig 7.**

"The main and most important part of the 3.6V mixer is the LVDS (low voltage differential signalling) squarer. The new LVDS components are of two types: 'drivers' and 'receivers'. Most are for 3.3V applications, although a few are for 5V use. The 3.3V types have a higher speed than the 5V ones, around 200 to 300MHz against 75 to 150MHz. These components are normally used for high-speed digital communication over balanced line and correspond to the ANSI TIA/EIA-644 standard. There are three types of LVDS line receiver IC: single, dual and quad. There are also types with mixtures of drivers and receivers.

"Some dual- and quad-receiver ICs could prove very interesting as they have a single or dual Enable control.

This function could be used to inhibit the receiver mixer(s) – two or three 'receivers' at a time) applying the 'noise blanking' system suggested by Bill Carver, W7AAZ for the Triad super HF receiver (see *Experimental Methods in RF Design*, by Wes Hayward, W7ZOI, *et al,* ARRL, 2003 pp6.48/49). The noise-blanking signal needs to be generated and controlled by an external noise receiver and would make a very interesting and important noise blanking system. These LVDS SMD ICs have low power dissipation and are simple to use. The balanced input signal should be about ±100mV, while the output is a TTL/LVTTL logic level.

"Why use an LVDS squarer instead of the 74AC86 as used in earlier H-Mode mixers? The 74AC86 is still usable with the 3.6V version but, when used with a local oscillator exceeding 40MHz, its symmetry and phasing degrade very rapidly, particularly if not using balance adjustment.

"The LVDS squarer shown in Fig 6 derives from an idea of Harold Johnson, W4ZCD, mentioned to me by Bill Carver, W7AAZ. Apparently, W4ZCD began experimenting with these LVDS components with the object of finding an adjustable solution for balancing the output waveforms and phasing to 180° over a wide bandwidth. Because of other priorities, W4ZCD did not go ahead but I was triggered by his idea. I tried various arrangements to implement a squarer that would give the maximum output waveforms and phase balancing over a wide band to improve the drive to the H-Mode mixer, lower the attenuation and reduce the second harmonic output of the LO. The squarer shown was the simplest tested and probably the one that performed best."

I7SWX has provided extensive information on this mixer and squarer, including additional basic information, detailed measurements of attenuation, list of suitable LVDS devices, a power supply using a low-voltage LM317L regulator, waveforms etc. He also points out that anyone wishing to experiment with this LVDS H-mode mixture can purchase the PCB from Stefan Petrov, LZ1OV. Two PCBs for 5 Euros, three for $10. For additional information e-mail: i7swx@yahoo.com and stefanp@yahoo.com For more information on the I7SWX two-transformer and G3SBI three-transformer H-Mode mixers see 'TT', April 2003, October 1993, July, August and September, 1998.

FOLDED DIPOLE FEED IMPEDANCES TO ORDER

In the 'TT' item last October on the contribution of George Brown (see above), I referred to a letter I received in 1979 from Walter Roberts, W3CHO/W2CHO/K4EA that included a mention of an article he had written on folded dipoles. To quote: "Another of my antenna articles 'Input Impedance of a Folded Dipole' (*RCA Review*, June 1942), will tell you more than you probably want to know about the subject."

This intrigued me and I tried on various occasions at various libraries to trace the June 1942 issue of *RCA Review*, but always met with the response that there was no such issue. The librarians insisted that the publication of this journal was suspended during the years that the USA was engaged in WWII. It was only recently that I discovered by accident that K4EA had made a typing error in his letter: the issue concerned was June 1947!

This discovery came from reading

Fig 4

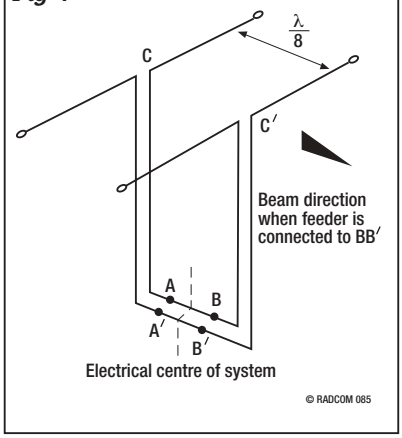


Fig 4: G6XN describes this two-element reversible array with resonant (or mismatched) feeders. If the elements are resonant, the length CABC must be an even number of half-wavelengths. AB can be regarded as the phasing line, but is much less than λ/8 if open-wire lines are used. Note that the feeders are crossed over as for the W8JK antenna.

Fig 5

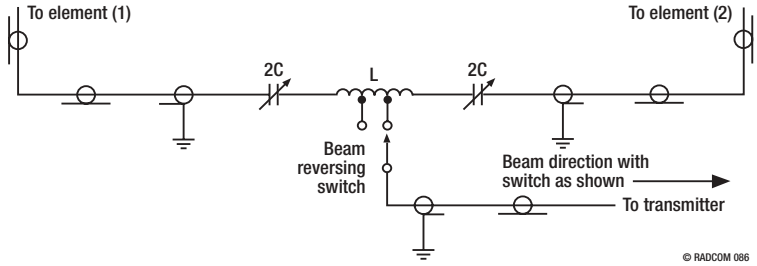


Fig 5: G6XN's suggested phasing network for two-element beams. Coaxial outers are bonded together. Elements of close-space arrays must be antiphase connected, so that if the inner or the coaxial feeder goes to the right-hand side of one element, it goes to the left of the other. For details see HF Antennas for all Locations.

Fig 6

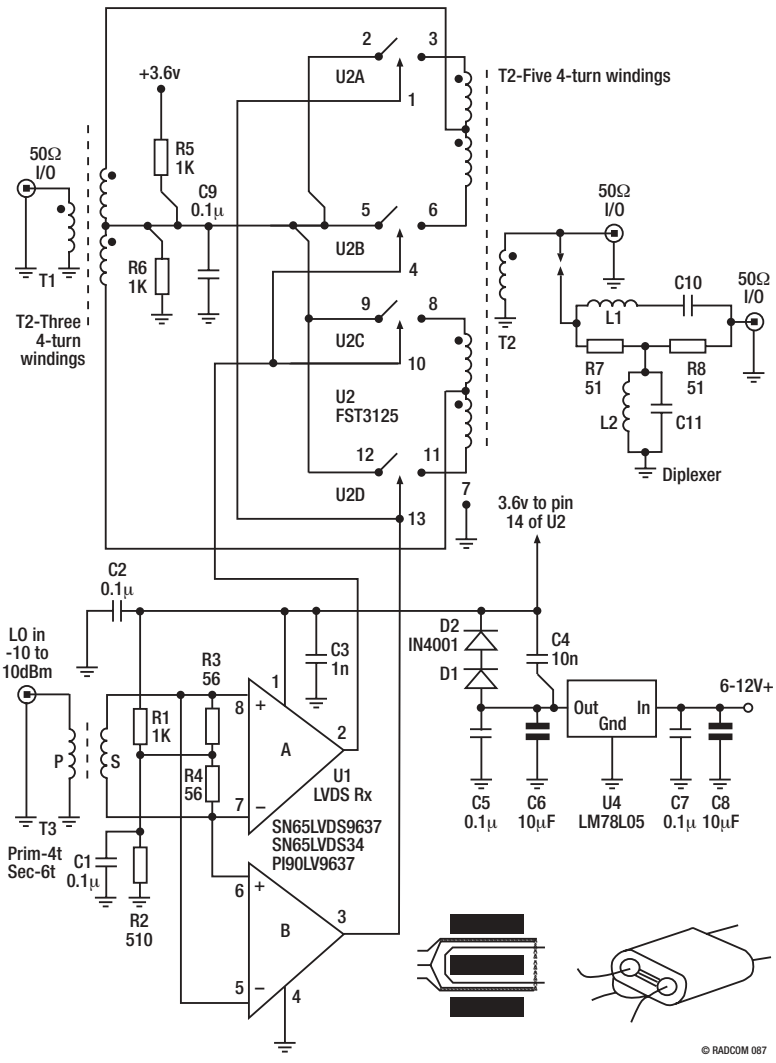
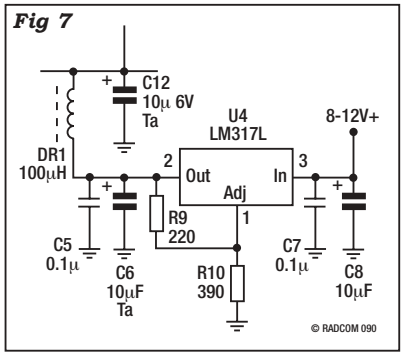


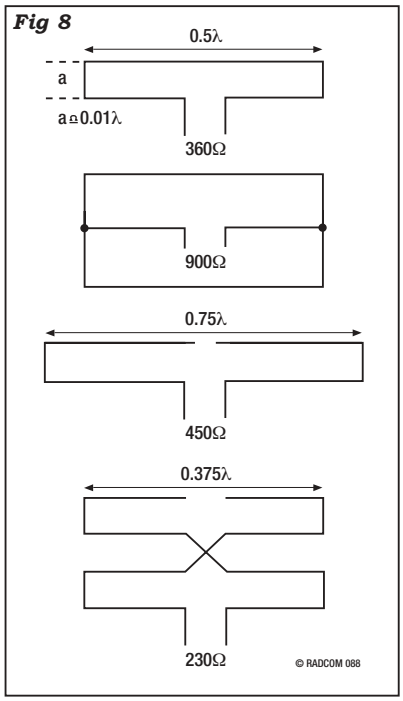
Fig 6: 3.6V two-transformer H-Mode Mixer with LVDS squarer as developed by I7SWX.

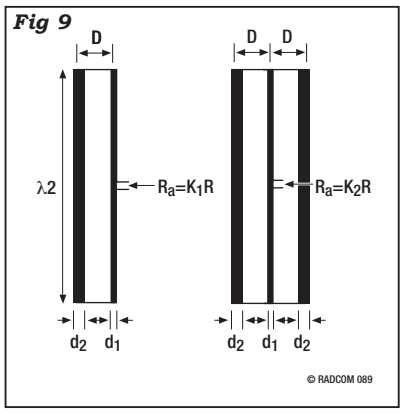
Fig 7: PSU using the higher-cost LM317L.

Fig 8: Basic folded-dipole element impedances using conductors of the same diameter as originally described by Dr Kraus, W8JK.

Fig 9: Walter Roberts, K4EA, showed how the impedances could be multiplied by a factor, k, when conductors are of different diameters. Calculations were simplified by 'Ham' Clark, G6OT, and he developed an Abac to eliminate the arithmetic. It should be noted that the impedance multiplier, k, depends not only on the ratio of the diameters of the two conductors but also on the spacings of the two wires.







an old, but still useful, article 'Folded Dipoles with Equal and Unequal Elements', by H A M Clark, G6OT (*RSGB Bulletin,* October 1947, pp62-64, 75), sub-headed 'Here at last is a method of finding the effective resistance [feed impedance] of a folded dipole in which the wires are not all of the same diameter. An easy-to-use Abac is given which saves all the arithmetic'. G6OT was a senior engineer with EMI, a company that had close contact with RCA. Incidentally, he was responsible for the design of the audio side of the 1936 Alexandra Palace 405-line television system – and post-war was the chief technical engineer at the famous Abbey Road recording studios.

In the '*Bull*', G6OT wrote: "So far, only aerials with one or more wires of the same diameter have been discussed, and it is seen that the resistance can be multiplied by 4, 9 or 16, by the use of two, three or four wires. [Some examples of folded dipoles using conductors of similar diameter, as originally announced by Dr Kraus, W8JK, are shown in **Fig 8 –** *G3VA*]. These are rather large steps and it may be that it is required to multiply the resistance by some intermediate factor, say 6 or 12, in order to effect a match in a particular case. It has been known for some time that this can be done by using wires or rods of unequal diameter in the same loop. Up till now, however, it has been common practice to employ hit-and-miss methods to obtain these intermediate values.

"In the June 1947 *RCA Review,* W Van B Roberts has developed a formula for calculating the multiplying factor when unequal diameters are used: **Fig 9**. This is information which the author believes has been wanted by the amateur for some time. The mathematically-minded are recommended to refer to the original article but, for the sake of those who merely wish to apply the results, the formula is given here with acknowledgement to the author and an original Abac will be given by means of which the resistance of any practical arrangement can be obtained without any arithmetic..."

Walter Roberts originally and then 'Ham' Clark provided information on two-wire and three-wire folded elements using wires of different diameters. Subsequently, a simplification of G6OT's original Abac, but covering only two wires, has appeared in all editions of the RSGB *Radio Communication Handbook*. The text note states: "Ratios of transformation other than four or nine can be obtained by using different conductor diameters for the elements of the radiator. When this is done, the spacing between the conductors is important and can be varied to alter the transformation ratio. The relative sizes and spacings can be determined with the aid of the nomogram in Fig 12.55 [Sixth Edition], These variations of the basic folded dipole do not lend themselves readily to multiband operation."

SSB & CW ON SUPER-REGENS

In the recent 'TT' item 'Super-Regenerative Detectors' (January 2004, pp 42-45), I rashly stated: "Super-regeneration will detect AM and wideband FM signals but, in its usual form, is unsuitable for CW and NBFM reception and has broad selectivity. *There seems no way in which it could handle SSB."* The item, however, included a claim by N1TEV, that use of a clean sine-wave quenching oscillator greatly increases selectivity and allows detection of NBFM.

André Jamet, F9HX, whose detailed description of a 10GHz super-regenerative receiver described in *VHF Communications* 1/1997, was noted briefly in 'TT', May 1997, has also contributed articles on super-regeneration in French and American magazines including: 'La Superréaction à 144, 432 et 1296 et ... 10GHz' (*Ondes Courtes Informations,* 6/7, 1996); 'Un Récepteur 10GHz à Superréaction' *(Ondes Courtes Informations 10/11/12 1996);* 'SHF Super-Regenerative Reception' (*QEX,* January/February 2001).

F9HX points out that he has already asserted that SSB and CW signals can be detected on any regenerative or super-regenerative receiver by a heterodyne effect from a signal generator. The frequency of the insertion signal has to be carefully adjusted in order to obtain a zero beat for SSB or the audio signal required to listen to CW. The reception stability is due only to that of the generator."

Old timers may recall that this form of signal-frequency carrier insertion was quite popular in the early days of SSB, permitting reception on receivers not fitted with a BFO or not sufficiently stable. I recall using a 3.5MHz VFO to provide carrier insertion on 3.5, 7,and 14MHz etc since a relatively weak but stable harmonic signal resulted in excellent demodulation of SSB.

F9HX also points out, in connection with the January notes relating to the waveshape effect on the performance of super-regeneration, that "It's obvious from professional studies that the frequency (or rather the *dv/dt*) of the quenching wave is directly related to the selectivity of the system. These professional studies include two 1948 articles in *Electronics:* 'Super-Regeneration Theory', by W E Bradley of the Philco Corporation, and 'Super-Regeneration Devices', by A Hazeltine and B D Loughlin.

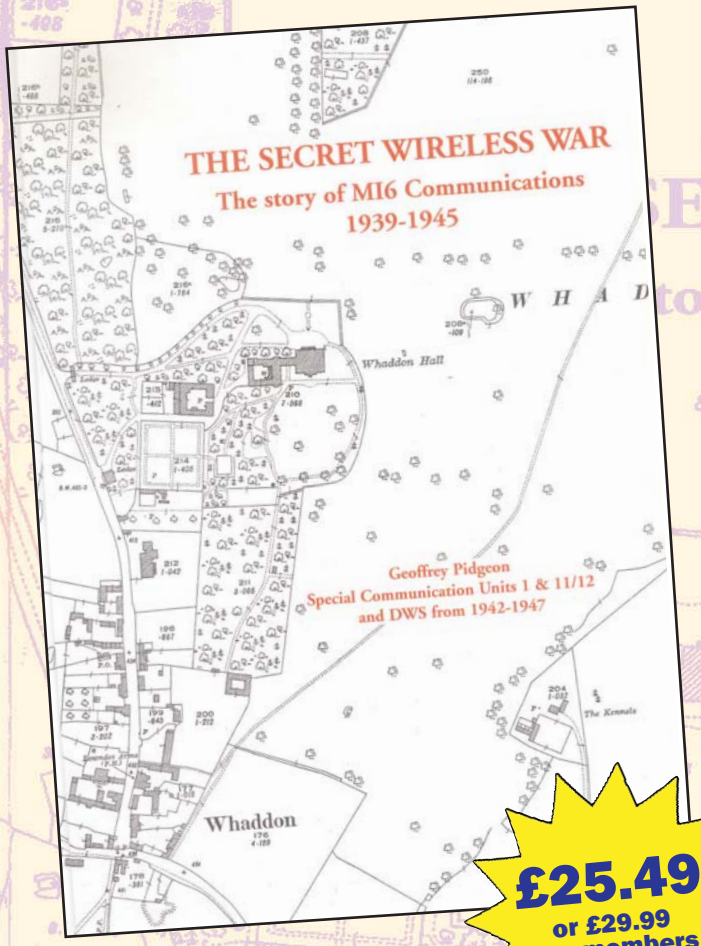
Finally, F9HX draws attention to possibly the only book devoted entirely to this topic: *Super-Regenerative Receivers*, by J R Whitehead (Cambridge University Press, 1950). This book has been mentioned several times in 'TT', as I recall many years ago finding a copy in the Patents Office Library (now part of the British Library) and have also noted that Brian Bower, G3COJ, reported a few years ago that the copy in the BBC Library seemed, undeservedly, to have attracted very few borrowers other than himself! The book stemmed from a detailed wartime study by Whitehead at TRE in connection with the development of more reliable super-regeneration for IFF (identification friend or foe) equipment.

F9HX hopes that his comments will help to fill out and complete the outline of super-regenerative reception history!

HERE & THERE

Apologies for an error in Fig 1 of the January 2004 'TT'. There should have been a 100k (half-watt) resistor between the HT+ line and the anode of the second triode-section of the 6SC7 of the Polish clandestine-radio set. ◆

The Secret Wireless War



By Geoffrey Pidgeon

Possibly the most important UK wireless traffic in World War II was handled by a unit formed in 1938 by Brigadier Richard Gambier-Parry head of MI6 Section VIII - the communications division of SIS. This book tells of its formation and includes diary entries by one of the 'founding fathers' recording the secret meetings that took place, and the assembly of its talented staff. It also reports the earlier days of the original SIS wireless 'Station X' based in Barnes in SW London. The building of its second station in a bungalow in Surrey with the strange name of 'Funny Neuk' and the units wireless stations at Bletchley Park and Whaddon Hall are also described. It documents the work of our agents in embassies abroad, and of those in occupied territories; the story of Churchill's personal wireless operator, and there is the description by a German soldier of the Afrika Corps of his operating an Enigma machine at Rommel's HQ in the desert. The story of 'Black Propaganda' is told and the units handling of the military ULTRA traffic out to commanders in the field. Personal tales by those who were part of this most secret of units are included in this important record of people and events that helped to win the war.

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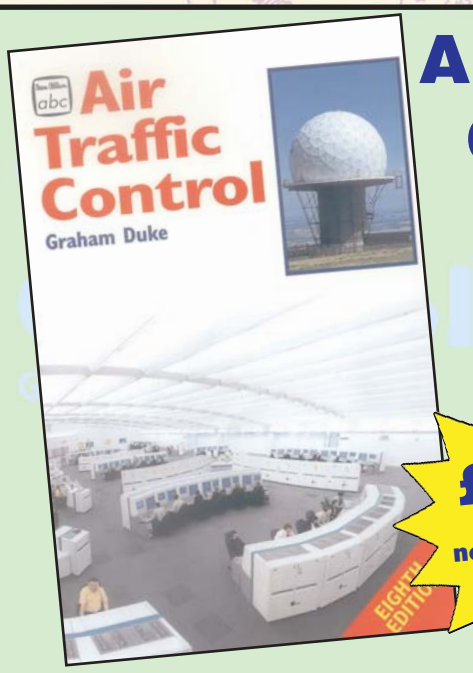

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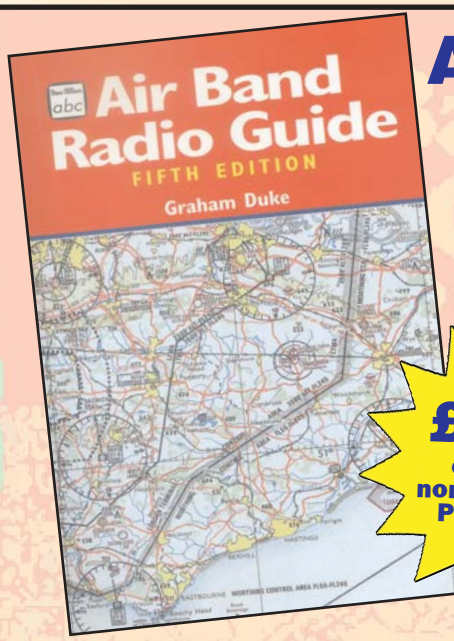

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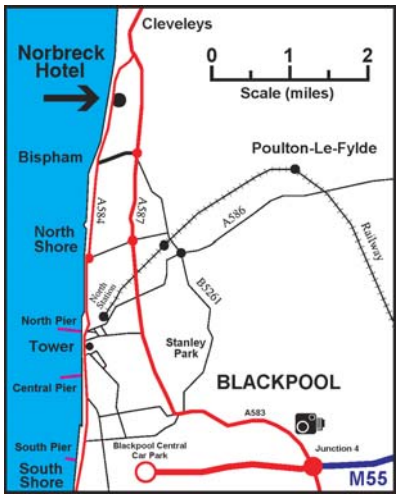

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By Steve White, G3ZVW, 31 Amberley Road, London N13 4BH. E-mail: steve.white@rsgb.org.uk

Is there even more life left in the incandescent lamp? Steve describes some exciting new work in America • The prospect of printing your own chips and circuits is not as far away as you might think • 1GHz DSP chips are now available from Texas Instruments • Transistors are still shrinking in size – to 65nm so far.

Whatever next

The incandescent lamp has been around for a long time – indeed, it has altered little since Thomas Edison developed it 125 years ago. However, recent developments into photonic crystals are causing people to re-examine and re-appraise their understanding of incandescent lamps.

Shawn Yu Lin, an electrical engineer at Sandia National Laboratories in Albuquerque, New Mexico, has used an array of minuscule tungsten rods stacked up like trellis panels (see the picture) to produce a different kind of incandescent lamp. Tungsten is the material used for the filament of incandescent lamps, and an ordinary lamp emits radiation over a wide range of frequencies, only some of which are visible to the human eye. However, when heated by an electrical current, the perforated structure of the photonic crystal makes the light produced (a) far more intense, and (b) confined to a narrow band of frequencies. This special quality of the emissions, recently recognised for the first time, has raised the prospect of incandescent lamps that are many times more efficient than those available today. The frequency (colour) of light emitted by the tungsten photonic crystal is approximately equal to the spacing of the lattice elements, but the development is not without controversy because the characteristics of the emissions apparently contravene Planck's Law, one of the pillars of scientific understanding of heat and radiation. Lin and his team admit that they don't yet fully grasp what is going on themselves.

Next month I'll tell you about another possible use for photonic crystals.

HOME-BREW CHIPS

If we cast our minds back in time to the post-WWII era, electronic components were connected together by wires. Tag boards and tag strips were commonplace, because the notion of wiring that was 'printed' or etched onto a sheet of insulating material just hadn't reached the masses. These days, printed circuit boards rule the roost; indeed, there are plenty of people designing and making their own PCBs, but still it is necessary to solder components onto them.

Looking into the future – and probably not too far into the future – organic ink printing to inexpensive desktop stereolithographic printers are items which are already being developed. When these reach the market, the possibility of home-printing active electronic circuits will come to fruition, so not only will we be able to make our own PCBs, we will be able to print our own electronic components and custom designed chips straight onto them. Such a thing will truly revolutionise electronics, as there will be little further need for discreet components. The cost savings will mean that mass-produced electronic circuits will drop to little more than the price of the 'paper' and ink. Whilst the cost of a suitable printer may be outside the reach of home constructors (initially, at least), the Internet will undoubtedly come to the rescue. There is no reason why it should not be possible for experimenters and constructors to design their circuit on-screen, test it in a virtual environment, then e-mail the design to a commercial printer. Your completed circuit would arrive in the post, by return.

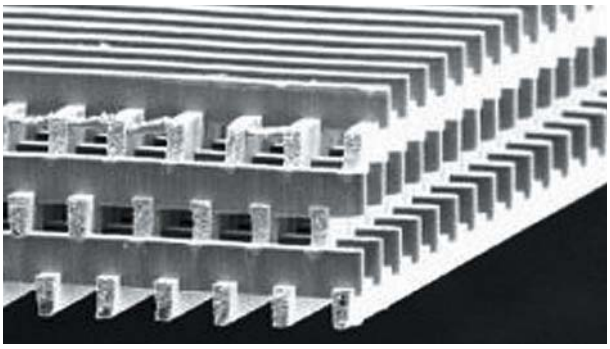
This last step in the process doesn't require a leap of faith, because it is exactly the way in which companies have small production runs of PCBs produced anyway.

EVER-FASTER DSP

Texas Instruments has recently released a new range of Digital Signal Processing (DSP) chips, the fastest of which runs at 1GHz. The new 1GHz TMS320C6414T-1000 can process up to a staggering 8 billion instructions per second. It has a couple of cousins, the 600MHz TMS320C6414T-600 and the 720MHz TMS320C6414T-720. They are all pin- and code-compatible with the devices they are designed to supersede, but cheaper.

To shrink the price, TI has employed a new fabrication process that has reduced the size of transistors to 90nm (most current CPUs for personal computers are using 130nm transistors). Smaller transistors mean less current drawn from the power supply, less heat dissipated and more chips produced per wafer of silicon. All-in-all it makes the new devices more attractive to equipment designers. These chips also have very low power supply voltages: 1.1V for the 600MHz version and 1.2V for the other two.

It is beyond the scope of this column to detail the architecture of these new devices, but suffice to say that those interested can read more about it on the Internet (see the reference at the foot of this page). A note of caution, though, to anyone thinking of soldering one onto a PCB; you'd have 532 pins to deal with.



SOURCE: SANDIA

An array of tungsten rods forms a photonic crystal.

EVER-SMALLER TRANSISTORS

While Texas Instruments have just reduced the size of a transistor to 90nm, Sony and Toshiba have been collaborating on pushing the size even smaller; to 65nm, in fact. The pundits are saying the Japanese duo might be biting off more than it can chew if it decides to produce CPU chips to rival Intel, and the market seems flooded with cheap memory chips, so what is it going to do with this technology? In fact, Sony sees the 65nm transistor as a logical next-step to increase the power and functionality of its PlayStation. At present, it is a gaming machine, but it could be developed into so much more. Coincidentally, Bill Gates sees the Microsoft X-Box being developed into a multi-purpose device.

Toshiba/Sony chips, employing 65nm transistors, are scheduled to start rolling off the production line next year, exactly the same as the other major chip manufacturers expect to start producing chips with transistors of exactly the same size.

It's getting tight at the top! ◆

WEB SEARCH

TI DSP	http://focus.ti.com/docs/prod/folders/print/tms320c6414t.html#inventory
65nm TRANSISTORS	http://techextreme.newsfactor.com/story.xhtml?story_id=22849

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By Lawrence D Woolf, BA (Hons), BSc, Dip Math (Open), GJ3RAX,
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Part 2

Comparison of SSB phasing methods

This month, we look at some phase-shift circuits due to John Hey, G3TDZ, James Millen, W1HRX, and Robert Dome, W2WAM.

Most early versions of SSB phasing generators and receivers used passive networks that could be described as bridge circuits. They bore a certain similarity to the Wien Bridge, although the frequency-determining arm was used twice. They are driven by a pair of antiphase signals that might be of the same or different amplitudes. An example of this is in the design of John Hey, G3TDZ [2]. It had previously been quoted in the *RSGB Handbook* [3] and described as being similar to the configuration used by W2KUJ in his 'SSB Jr' design, but with different component values.

The phase-shift network shown in **Fig 6** must be driven by two input signals in antiphase. The amplitude of Vi1 must be 3.5 times the amplitude of Vi2. This is now easily achieved with modern operational amplifiers. The original implementation would have used a valve amplifier to drive with a transformer, probably with a balancing potentiometer, to achieve the input phase and amplitude requirements.

REFERENCES

[2] *RadCom*, July & Aug 1993.
[3] *Radio Communication Handbook*, RSGB, Fourth Edition 1968, p10.11.
[4] *ARRL Handbook*, 33rd edition 1956, p300.
[5] *The Radio Handbook* by W I Orr, W6SAI, 15th Edition, p339.
[6] *Electronics*, Dec 1946.

This circuit, and the others to be described, were originally analysed using the *ARRL Radio Designer* software, which provides graphs or tables of the two phase outputs against frequency steps. It was then necessary to calculate the difference between these outputs, which should ideally have been 90° over the appropriate range. Then, 90° had to be subtracted from these results to provide a table of the phase error against frequency. Finally, at each frequency step, Equation 8 or 9 could be used to calculate the unwanted sideband suppression in dB. This would have been rather tedious to do manually, so a program was written using *Visual Basic* to calculate and display the results.

The graphs in **Fig 7** show that the G3TDZ design, if implemented with the exact component values stated, would have a maximum phase error of about 1.3° over a range from 300Hz to 3kHz, shown by the blue curve. This would lead to the opposite sideband being suppressed by a little less than 39dB at some frequencies in this range and by rather more over the rest of the range, shown by the red curve. It should be noted that when the blue curve crosses the 0° axis, the opposite-sideband suppression curve, in red, reaches very high values, but only briefly.

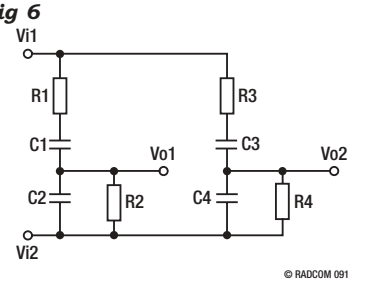
The phase-response curve, in blue, shows two distinct peaks. This is typical of this kind of circuit. A more complicated circuit might have more peaks and could, perhaps, produce a better phase response and over a wider frequency range. Remember that this is the phase response, not the amplitude response, which would have had a totally different implication.

The tabulated results were also checked for amplitude error between the two outputs. The worst case was about 0.08dB at 300Hz, equivalent to less than 1% difference in amplitude. The opposite-sideband suppression would then be degraded by less than 0.8dB at some frequencies, so it was

Fig 6: Phase-shift network used by G3TDZ.

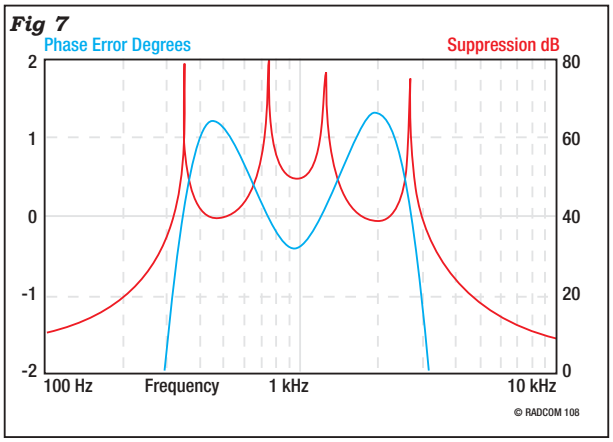
Fig 7: Phase error and opposite-sideband suppression – John Hey, G3TDZ.

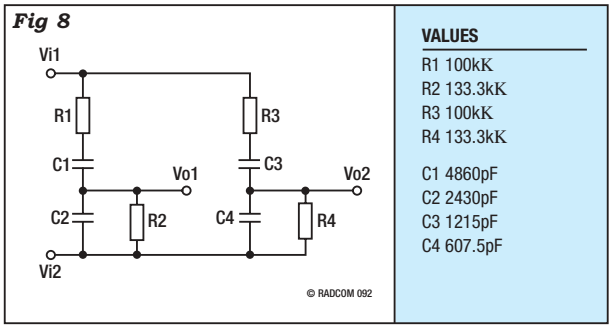
Fig 6



VALUES
R1 487.5kK
R2 770kK
R3 125kK
R4 198kK
C1 680pF
C2 430pF
C3 680pF
C4 430pF

Fig 7





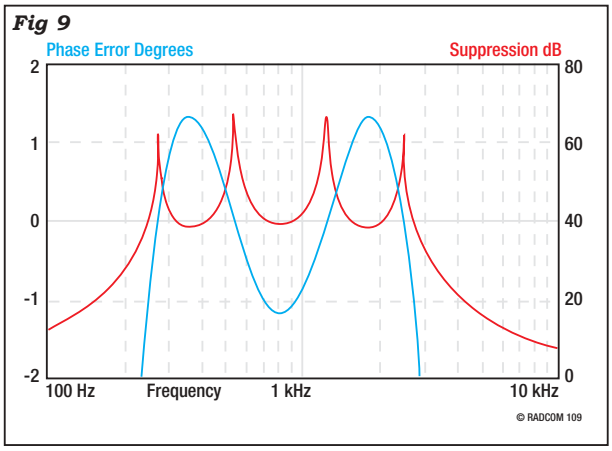


Fig 8: Phase-shift network used in the Millen 75012.

Fig 9: Phase error and opposite-sideband suppression – James Millen, W1HRX.

Fig 10: The Dome phase-shift network.

Fig 11: Phase error and opposite-sideband suppression – Robert Dome, W2WAM.

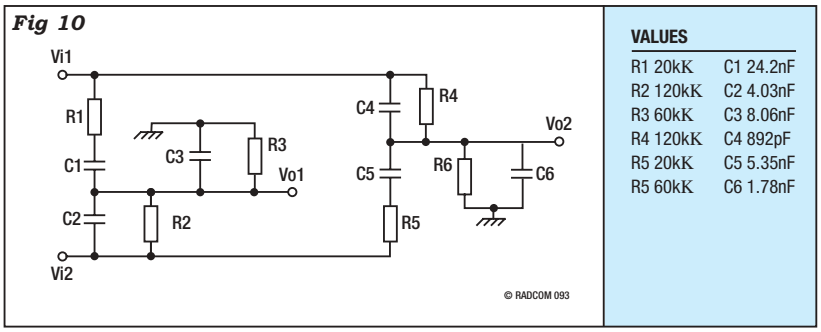
not considered vital to include amplitude error in the equations used. The amplitude imbalance was less at the frequencies where the phase error was at maximum, which also lessens its impact. Even using close-tolerance components, the variations from ideal values will produce more degradation than the theoretical figures discussed above. In general, the G3TDZ circuit tends to be more susceptible to component tolerance than some of the other types of phase-shift circuit to be described later. This is due to the difficulty in creating a matched set of components, a problem which also applies to the other bridge circuits.

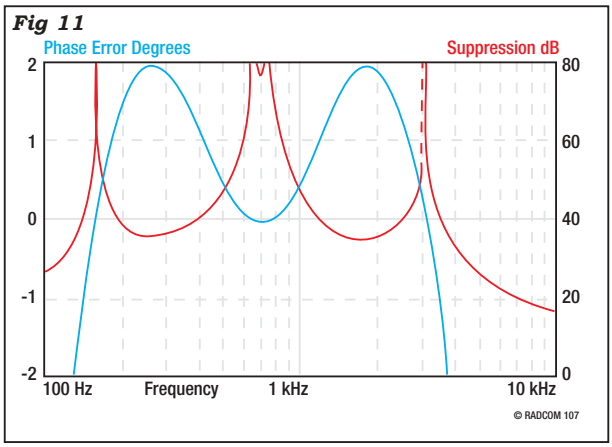
THE MILLEN, W1HRX, NETWORK

This second phase-shift circuit (**Fig 8**) looks very similar to the first one. The actual circuit configuration is the same, but the component values are different. It also requires the amplitude ratio of 3.5:1 between the two inputs. It was offered commercially by The James Millen Manufacturing Company, as part number 75012, for use in valve-based SSB transmitters and shown in an application published by the ARRL [4]. This SSB phasing network was available for $9.75, according to a 1960 price list.

It can be seen that the capacitor values are all different. It is easier to get close tolerance resistors than capacitors. It is also easier to match the pairs of capacitor values as used in the previous circuit. This is a circuit that seems to have some disadvantages from the start when compared with the previous one.

Analysing this circuit in the same way as before showed that the amplitude error was much less, and so could be ignored.





The performance (**Fig 9**) of the Millen circuit is, as expected, quite similar to the G3TDZ circuit. The peaks in the blue phase-error curve are still about 1.3°. The negative-going peak in the middle is greater than before, but still within the range of the positive-going peaks. The frequency range is shifted slightly lower, to extend from 240Hz to 2.7kHz. The opposite-sideband suppression is similar, at around 39dB, although worse than before at mid-range, around 1kHz.

THE DOME, W2WAM, NETWORK

This circuit (**Fig 10**) has some similarities to the first two. The component sequence in the second arm has been reversed and the outputs have been terminated to ground by parallel pairs of resistors and capacitors [5, 6].

The signal inputs, Vi1 and Vi2, are equal in magnitude, but opposite in phase. As in the Millen circuit, the capacitor values are somewhat obscure and would probably have to be derived from series or parallel pairs of standard values. This approach is usually more economical with resistors.

The description says that the range is from 160Hz to 3.5kHz, which is wider than that of the previous circuits. Over this range the phase error peaks at 1.95°. This equates to an opposite-sideband suppression of 35.5dB, which is rather worse than the previous two circuits.

The response has, again, two peaks in the phase error, as **Fig 11** shows. We are now seeing a correlation between phase error and bandwidth and, in fact, there is a trade-off between these parameters for circuits of a similar order. It would now seem likely that, if better suppression of the opposite sideband is needed, we must compromise with a narrower bandwidth or use a more complex phase-shift circuit with more components. Ideally we need more opposite-sideband suppression *and* also a wider bandwidth than these circuits offer.

CONCLUSIONS ON BRIDGE CIRCUITS

The circuits considered could, at best, give opposite-sideband suppression of nearly 40dB. In practice, this is unlikely to be achieved, because very close-tolerance components must be used. The results are also dependent on achieving the ideal 90° phase shift between the carrier signals, as well as precise amplitude balance for both pairs of signals. To avoid introducing further phase and amplitude errors, the mixers must also be matched and perfectly balanced.

The bridge-type circuit is also limited in useful bandwidth, since increasing the bandwidth generally leads to degraded opposite-sideband suppression, or *vice versa*. The bandwidth and the sideband suppression standards expected of today's communication systems are achievable with more recently-developed circuits. ◆

NEXT MONTH

Various polyphase networks are compared in detail.

By R G 'Danny' Dancy, G3JRD, 1 Ladds Corner, Little Twydall, Gillingham, Kent ME7 2UW. E-mail: robertdancy@lineone.net

A useful audio level indicator

Many amateurs, when wanting to try the many digital modes on offer, find that connections must be made from their transceivers to their computers. Recently, in the January 2004 *RadCom*, Ian White, G3SEK, explained how to make these connections, and gave advice on how to set the transmit audio levels so that overdriving and non-linearity were avoided. Here, Danny Dancy, G3JRD, provides an excellent piece of ancillary equipment to enable you to monitor the levels you set, thus ensuring complete repeatability when setting up.

In the January 2004 *RadCom*, G3SEK, in his 'In Practice' column, described the problems of setting transmit audio levels for PSK31 operation; a similar problem exists on receive for the NOAA and other weather satellites requiring software for the computer sound card. Several years ago, a useful level indicator was designed and built, which has been in use in my shack ever since, for several modes including PSK31 and WXsat.

WHAT DOES IT DO?

Connection of the indicator to the input terminals of the final piece of equipment in the chain enables the level for correct operation to be achieved easily. Receive calibration should be by the traditional hit-and-miss method, reviewing the results of each test until the optimum is found, the procedure being quite straightforward. Then you can make a note of the indicated level for future use. When using the device to monitor your audio transmit level, particularly for PSK31, use the technique described by G3SEK to set the level, and then use the indicator to register its magnitude, enabling you to set it precisely again when you have been using other modes.

THE CIRCUIT

The original indicator, the circuit of which appears in **Fig 1**, was built on a piece of stripboard about 5cm x 12cm (2in x 5.75in), and drew its power from the RIG RX2 receiver, but a simple power supply utilising a 12-0-12V transformer, two diodes and an electrolytic capacitor could be used.

Note that the 741 op-amp requires ±10V. This balanced supply is derived partly from the circuit of **Fig 2**, which provides +10V regulated from a +15V unregulated supply, and **Fig 3**, which produces -10V from the single +10V supply.

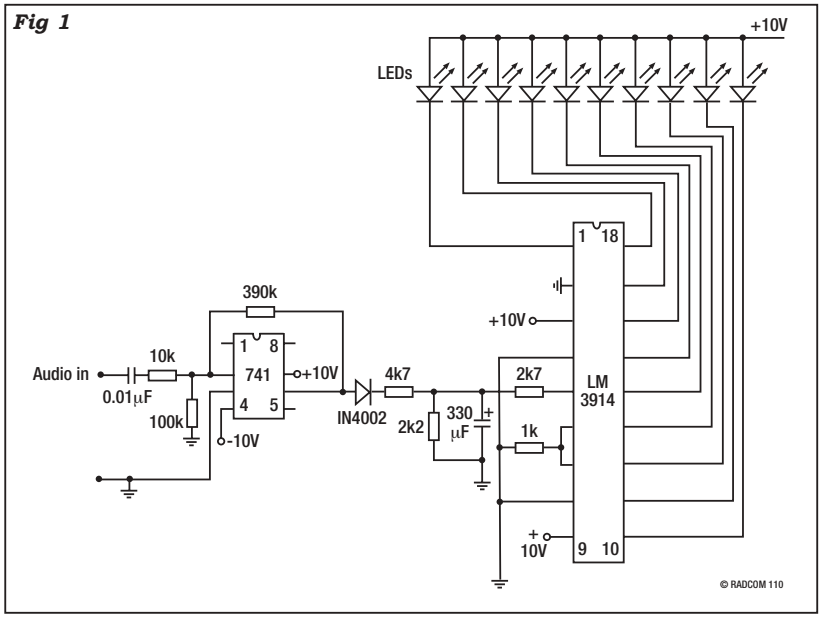
In the circuit, the audio signal is applied to the inverting input of the 741 op-amp, the output of which is rectified and, after integration, an LM3914 LED bargraph display driver is used to provide visual level indication by means of 10 discrete LEDs or a single bargraph module.

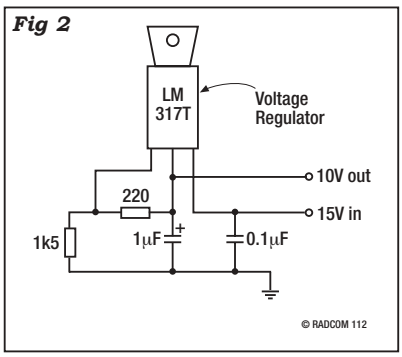
AN ALTERNATIVE

A sensitive moving-coil meter could easily be used here, in place of the LM3914 and LEDs, although I have not tried it.

The LED option is probably less expensive and is certainly very robust.

No claim is made that the design is an optimum one, but it worked as soon as it was switched on, and has proved to be completely reliable. The unit could probably be used as a training project for potential radio enthusiasts, as well as being a useful piece of gear around the shack. ◆





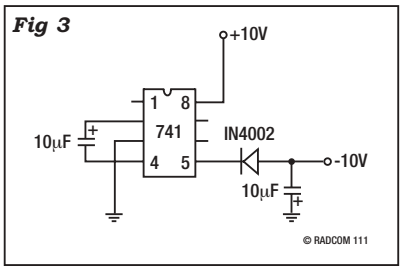


Fig 1: The level indicator circuit.

Fig 2: Deriving the +10V regulated supply from a +15V unregulated source.

Fig 3: -10V is generated from the +10V supply.

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In practice

This month's column is devoted to questions about IF filters – is there a source, and which filters are best?

Q Where can I buy narrow-bandwidth IF filters such as the Collins mechanical types? Internet searches have come up with plug-in modules for upgrading commercial equipment, but no retailers for the bare filters. Which filters are the best?

A There isn't much practical difference between the bare filters and the modules that plug into commercial transceivers. At most, you might have to remove the filter from a small adapter board. Since these modules offer the widest choice of high quality IF filters, they seem to be the best source of ready-made filters for home-builders too.

A good place to see what's available is the website of International Radio (Inrad, USA) which offers a wide range of ready-made filters to upgrade existing transceivers [1]. Filters are available for IFs both in the HF range and at 455kHz. The frequencies of the HF filters depend on the transceivers for which they are intended, and are typically in the range from 8MHz to 10.7MHz, offering a choice to home constructors. Most of the Inrad products are their own crystal filters, but Inrad also sell the Collins mechanical filters for 455kHz. Exactly the same Collins filters are available as Yaesu-branded upgrade modules, which are available from the major UK amateur radio dealers. Those dealers also stock the transceiver manufacturers' own replacement and upgrade HF filters, and one of those might suit your home-built project too. Other potential sources are Sherwood Engineering (USA, specialising mostly in filters for the Drake range), Barend Hendriksen (Netherlands), Hy-Q (Australia) and Golledge (UK) [1, 2]. Some of these suppliers also sell filters in the low VHF region, which may be useful for the first IF of up-converting general coverage HF receivers.

Which filters are the best? Well, that depends entirely on what you personally mean by "best"! Best for which mode - SSB, CW, data modes, FM? Best for ragchewing, or best for DXing and contesting? Best for performance, best for low cost, or best value for money? Best on the test bench, or sounding best to your particular ears? Here are a few things to think about when choosing an IF filter.

The filter's *frequency response* is what determines which signals you will hear, and which you won't, and how loudly or weakly in either case. **Fig 1** shows the key characteristics:

- **Insertion loss** - the power loss due to inserting the filter in circuit (compared with a straight-through link). Insertion loss is actually a power ratio, but is more commonly quoted as a difference in decibels relative to the 0dB 'reference level' at the top of the frequency-response plot [3]. Although strictly speaking the whole frequency response is a plot of insertion loss, the term most often refers to the *minimum* loss, which is found at the highest point in the passband. Thus, in Fig 1, the entire frequency response curve is shifted downward, relative to the reference level at the top of the plot, by that amount.
- **Passband**, **stopband** and **skirts** - the frequency response is broadly divided into those areas, as shown in Fig 1. In an IF filter, signals that you have tuned into the passband are the ones you want to listen to, and signals that fall outside the passband, into the skirt and stopband areas, are the ones you'd prefer not to hear.
- **Passband width**, or simply **bandwidth** - the frequency difference between the points on the 'shoulders' of the passband that are 6dB down from the highest level (6dB is a convenient standard figure, representing the half-voltage or quarter-power points). The optimum bandwidth depends on the mode in use, and your operating preferences.

Typical bandwidths for SSB are 2.4 - 2.7kHz, or 1.8kHz for fighting the QRM when HF DXing and contesting. The narrower filters restrict the audio bandwidth and give poorer voice quality, but sometimes that's the price if you want to copy the signal at all. For CW it's typically 500Hz for ragchewing, and 250Hz or even narrower when the going gets hard. A 250Hz filter is also good for RTTY with the standard 170Hz shift. The sound-card software will establish the selectivity for very narrow-bandwidth modes such as PSK31, but it's generally best to use the narrowest IF bandwidth available (subject to any limitations due to phase distortion - see below).

Fig 1

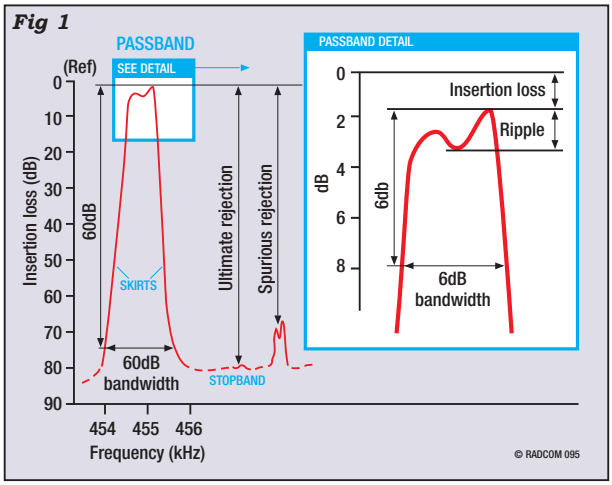

Fig 1: Main features of bandpass filters.

- **Passband ripple** - the difference between the highest and lowest points within the passband. For ease of tuning and minimum coloration of audio, passband ripple should be as small as possible, although ripple less than 1dB is likely to be unnoticeable in most amateur radio applications.
- **Skirt rejection** - a general term for the steepness of the transition from the passband into the stopband.
- **Shape factor** - a measure of skirt rejection, usually quoted as the ratio of the -6dB and -60dB bandwidths as shown in Fig 1.
- **Ultimate rejection** - the leakage through the filter at frequencies far outside of the passband and skirts. This is partly determined by the filter, but equally by the layout and RF grounding of the board on which it is installed.
- **Spurious response rejection** - the suppression of spurious responses at frequencies outside of the passband and skirts. Many crystal filters are prone to spurious responses, and may need to be backed up by filters of a different kind (that don't share the same problem), to improve the spurious responses and ultimate rejection for the receiver as a whole.
- **Poles** - the number of 'poles' in the

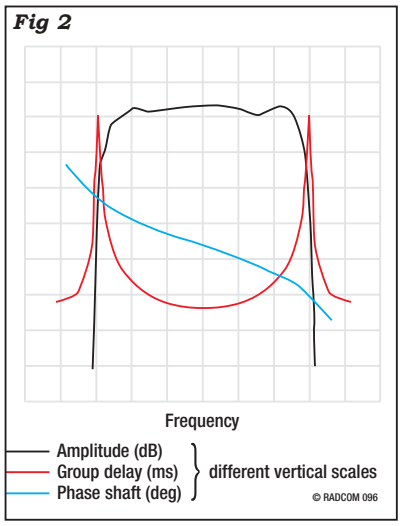

Fig 2: Problems with phase linearity and group delay most often occur at the shoulders of the passband.

filter's response has a precise mathematical definition, and is usually equal to the number of independent resonators in the filter. Thus it is also used as a marketing term to indicate how complex a filter you're buying, and the general level of performance you can expect. For example, a well-designed 8-pole filter can deliver very adequate selectivity, even on today's crowded bands. In contrast, a 2-pole filter has only limited uses, eg as a 'roofing' filter to protect the early stages of a receiver, leaving the main selectivity to be developed by a more complex filter further downstream.

Two less well-known filter characteristics are **phase linearity** and **group delay**. You don't see much about these on data sheets, but they can make or mar the on-air performance of an IF filter. Signals passing through any filter will inevitably experience both phase shifts and time delays. These effects are not harmful in themselves; but variations across the passband and shoulders of the frequency response can be a problem. Phase linearity and group delay are closely related [4] and are just two different ways of looking at the same behaviour. **Fig 2** shows how the shoulders of the filter passband are often associated with kinks in the phase response, and 'Batman ears' in the group delay. Phase linearity is an important requirement for IF filters intended to pass data modes with complex phase modulation, because poor phase linearity will introduce spurious phase modulation. Group delay is important for its effects on the 'ringing' caused by noise impulses and other sudden amplitude transitions such as CW keying. On amplitude-modulated voice modes such as SSB, poor phase linearity causes phase distortion in the high and low parts of the voice frequency spectrum; which is equivalent to saying that the filter's poor group delay characteristics cause differential time delays in the highs and lows. Either way you choose to think about it, the voice doesn't sound right. Improving these filter characteristics can improve readability on all modes, and markedly reduce operator fatigue.

Phase linearity and group delay are intimately connected to the bandwidth, the passband ripple and the shape factor. Unfortunately it's a trade-off, because filters that have good phase linearity and more constant group delay tend also to have very rounded shoulders to the passband and very poor shape factors. Conversely, filters that have well-defined passbands with sharp shoulders and steep skirts, also tend to have more passband ripple, poor phase linearity and very marked 'ears' in the group delay characteristics. There are various design methods that can offer improved compromises, but these require very tight production control in order to deliver the promised characteristics in practice. Also the 'sound' of an IF filter remains very much a matter of individual taste.

This brings us back to comparisons between different filters. **Fig 3** compares two different '500Hz' filters centred on 455kHz. The Collins 7-pole mechanical filter (red curve) actually has a -6dB bandwidth of almost 600Hz, and the passband has excellent flatness and symmetry. I don't have the phase response or group delay characteristics for this filter, but in practice it sounds very 'smooth' and is easy to listen to for long periods. The blue curve in Fig 3 is the Inrad 721 crystal filter. The -6dB bandwidth is narrower at 550Hz, and although the passband has about 2dB of ripple, the skirts are very steep with an excellent shape factor of 1.67. When you tune a signal out of the passband of this filter, it's gone - a highly desirable characteristic for contesting and DXing. In contrast, Fig 3 shows that unwanted signals 600Hz away from the one you're listening to will be at least 30dB stronger through the Collins filter, so you can often still hear them. They may be weak, but the mental effort of ignoring them will inevitably add to operator fatigue. On the air, the Inrad filter has a little more ringing, but it is still very acceptable unless the band is full of loud static crashes... in which case you may prefer the Collins filter with its better transient response. It just goes to show that there is no perfect IF filter!

However, modern developments have certainly raised our expectations. A particularly useful development has been the cascading of HF and 455kHz filters in multiple-conversion receivers. When two filters with similar bandwidths are cascaded so that the wanted signal passes through the centre of both passbands, the combined steepness of their skirts is much improved. One filter passband can also be shifted relative to the other (by manipulating the frequencies of the relevant conversion oscillators) and this opens the way to other QRM-fighting facilities such as passband tuning, IF shift and variable bandwidth.

The other major development has, of course, been digital signal processing. DSP can offer the best achievable compromises between all aspects of filter performance, with perfect reproducibility on the production line. But DSP has subtleties and imperfections all of its own. After the signal has literally been taken to bits and put back together again, the resulting sound is not always to everyone's liking. Also, the DSP implementations in most current transceivers allow few user adjustments, and the code is built into the hardware and cannot be upgraded as the technology matures (this is changing, but still only in the very latest top-of-the-line models, or advanced homebrew projects like the *CDG2000* or *PIC-a-STAR*). For the present, my personal preference is still to use excellent crystal or mechanical filters, backed up by DSP but not totally reliant on it.

All of this has been written from the 'consumer' viewpoint. If you prefer to build your own filters, there are many sources of good designs, starting with the excellent summary in *Experimental Methods in RF Design* - a highly recommended book for all home constructors and designers [5]. ◆

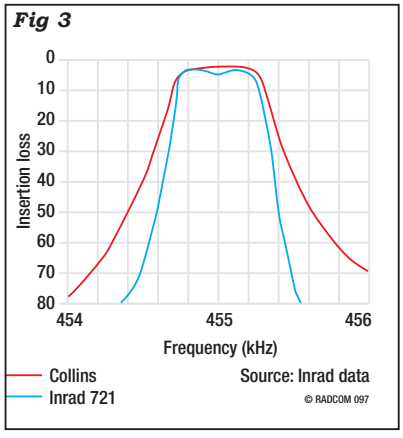

Fig 3: Comparison between two 455kHz filters with nominal '500Hz' bandwiths.

NOTES AND REFERENCES

[1] For all websites referenced this month, follow the links from the 'In Practice' website, www.ifwtech.co.uk/g3sek/in-prac

[2] Inrad filters are available either by personal import (but beware of shipping, duty and VAT costs) or from the UK importer, Vine Antennas [1]. The Collins 500Hz filter is also available as a Yaesu-branded accessory (YF-115C) from the major UK dealers, so by all means shop around for the best prices.

[3] If you're not already familiar and comfortable with decibels, don't give up - find out!

[4] $\Delta t = -d\Phi/d\omega$

[5] *Experimental Methods in RF Design*, by Wes Hayward, W7ZOI, Rick Campbell, KK7B, and Bob Larkin, W7PUA (ARRL, available from the RSGB Shop).

HF EXCITEMENT

INTRODUCING YAESU'S ALL NEW HF MOBILE

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(*DSP supplied as standard in the UK)

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PIC-A-STAR

PART 20 CONCLUSION

This is the concluding episode of the article - but the project lives on. So if you are awaiting the end before you start, this is your beginning!

The Constellation Beta. Starry-eyed and legless after their much-acclaimed performance in the accordion band competition.

In summary, the hardware design feels completely stable so I have more time available now to support other builders - and to enhance the software continuously, which remains *the* objective.

MODULARITY IS EVERYTHING

From the outset, this project has been modular by design. Both in the sense that several people have substituted different blocks of hardware and software in their STARs and, conversely, have used STAR blocks in other applications.

To summarise the whole article, with an emphasis on the modularity dimension:

Part 1 - a discussion of STAR hardware integration possibilities.
Part 2 - a discussion of software options and flexibility.
Part 3 - a generalised process for producing precision one-off PCBs.
Part 4 - a T/R changeover timer that would suit any transceiver.
Parts 5 & 6 - details of a DSP processor assembly that could be the basis for any DSP project, with modular daughter boards to allow future upgrades.
Part 7 - a completely repeatable generalised process for mounting SMD ICs with lots of closely-spaced (eg 0.5mm) pins.
Parts 8 & 9 - a bi-directional IF strip that could be readily adapted for use in any home-brew design.
Part 10 - a PC-based loader and controller that could be adapted for any Analog Devices 218x DSP project.
Part 11 - one of a number of possible physical implementations. A glance at the photo above shows you that every Betabuilder exercised completely different options here. There are no two the same.
Parts 12 & 13 - an adapter to replace an 18-pin PIC to give greater I/O and more processing capability generally, and a bargraph S-meter.
Part 14 - a spur reduction filter for any DDS, and a stable reference oscillator.
Part 15 - a useful DSP shopping list, at the least. Check out the competition!
Parts 16 & 17 - a general purpose bi-directional mixer/amplifier with configurable topology. Of the strong and silent type.
Parts 18 & 19 - a universal front-end that could drop into almost any existing HF transceiver.

You don't have to be building a STAR to find something of interest here.

Equally and oppositely, you don't have to build it all to benefit from STAR DSP.

But conversely, if you just want to build an error-free transceiver design that works beautifully, now is the moment.

HALF A MILLION POUNDS?

Yes, at the most conservative consultancy rate, this is the cost to date of my development time. That of the Beta team was not recorded and I would estimate it to be about the same again.

For your interest, this splits down approximately 15% on hardware development, 65% on software development, 10% on creating and maintaining the project documentation - including this article - and 10% on offering explicit help to others.

By comparison, the materials cost is completely buried in the noise - and certainly is significantly less than the price of a new commercial transceiver. Strangely, the cost of ink-jet ink was the single largest line item for me. Horrendous!

WHAT DOES THIS DO FOR ME?

This 'time-to-materials ratio' is about as good as you can get in any hobby, since the time is in fact free - and yet spending it is also the source of all the pleasure, reward and satisfaction.

At the very least when I am having a QSO, I know that it is truly *me* having the satisfaction of that QSO - and not merely my acting as the surrogate operator on behalf of some RF design engineer in a far-away land. If you have never experienced the difference, you have missed out on one of the unique thrills of the hobby.

And you get that pleasure with every single QSO.

WHAT DOES THIS DO FOR YOU?

Well, all the fruits of this development are available to you at no charge, provided only that they are for your personal use.

To obtain all the software - including the source code - follow the process given in Part 2. For all the PCB artwork, any enhancements and all ongoing support, simply join the Group (see 'Websearch').

You don't need to understand DSP. At least not to use my STAR code and get your transceiver going. Thereafter, it is entirely both up to you - and down to you.

DIY DSP FILTERS

This is the last technical topic I want to touch on - and that, briefly. There is not much prescriptive that can be said here. The trick is to search the web for a program that will generate coefficients for FIR filters. From time to time these are available in the public domain. These coefficients then need converting to a format suitable for loading.

Experimental Methods in RF Design, by Hayward, Campbell and Larkin is also a useful source of understanding - pages 10.13 to 10.19 in particular. This tells you how to do it - and provides the software on the CD to let you.

I suggest the best way to prove the process in the first place is to see if you can build the existing medium-width SSB filter (FL5), plug it in and prove to yourself that yours is no different.

To this end, all the Rx filters are packaged individually and discretely. The specification for the existing FL5 is:
Sample rate = 8kHz
Remez equiripple - but not mandatory
Order = 198, ie 199 coefficients
Passband = 320Hz - 2284Hz
Lower stop = 177Hz
Upper stop = 2400Hz

Once you have replicated this and proved the process, you can rapidly produce filters for any specialised application, eg RTTY.

STAR BUILD SEQUENCE

Most receiver designs start from the antenna and logically follow the signal flow to the loudspeaker. This project has taken (more or less) the opposite approach. This is to encourage you to build the trickiest bits first.

I think it is a better strategy anyway, since once you have some sort of noise coming out of the speakers, you can work back towards the antenna, using the completed elements to test the new build. I commend it to you.

Once you have the STAR receiver working, the few incremental components to get the transmitter going can be taken from any of the many HF designs. You need a driver, PA and low-pass filters - commensurate with the amount of power you want to run.

CORRECTIONS

At the time of writing there are no known unpublished errors in this article - and hence to the hardware build. But as somebody famous once said, we still await the unknown known errors.

This is down to the diligence of the Beta team and to *RadCom* which - on *this* project - published the original masters of the engineering drawings (Figs 1-44) from which we all built.

All of these published drawings were hand-crafted using a drawing package with no engineering intelligence.

This is because I have never found affordable layout software that can do a better job than I can - and I enjoy the challenge. But this approach does increase the risk of errors - and it is a credit to the team that we have not had a single significant one. Yet! In any event, for the latest state of play, please see 'Websearch'.

On the software side, with some 4,000 lines of DSP assembler and about the same again for the PIC code, there have been one or two interesting learning opportunities. But the great logistics attraction here is that your updated radio is never more than an e-mail attachment away.

ACKNOWLEDGEMENTS

There are lots of these, since this was and continues to be a truly collaborative and international effort. In summary and in no special order:

THE ORIGINAL BETA TEAM

The photograph shows the original team that still today builds, evaluates, tests and continuously suggests improvements - for both the hardware and software.

Left to right; top row: Alan, G3TIE, Harry, G3NHR, Les, GW3PEX, and Peter, G3XJS. Bottom row: David, G4HMC, Eddie, G0SEY, Peter, G3XJP, Bill, W7AAZ, and Harold, W4ZCB, with Harold's STAR.

INFRASTRUCTURE & UTILITIES

My thanks to David Tait for his latest and greatest *TOPIC* (PIC programming software). Jim Tonne, WB6BLD, for *ELSIE* (filter design software). Analog Devices for their DSP utilities and code fragments.

INSPIRATION & ACTUAL HELP

Lee, G3SEW, for much useful discussion on the UI in the early days. Gian, I7SWX, for use of his test equipment and mixer design. Bill, W7AAZ, for many, many ideas and encouragement. Harold, W4ZCB, for the design of the front-end filters, for much performance evaluation - and his unwavering enthusiasm. (It took him three weeks to work DXCC with his new STAR).

Keith, G3OHN, Paul, G0OER, Mike, G3XYG, Jim, G3ZQC, Michel, ON4MJ, and John, G6AK, for much building and testing and the benefit of their diverse skills and wide-ranging experience.

Fran for the proof reading. She is starting to lose her value here - since she is developing a dangerous understanding!

George Brown, M5ACN, the Technical Editor of *RadCom*, for steering all this into print with his oft-tested but never-phased sense of humour.

And last, but by no means least, our thanks to Bob Larkin, W7PUA, for sharing his original DSP-10 work, the DSP chapters in *Experimental Methods in RF Design*, the adaptation of the STAR boot code, his advice and suggestions - and the ultimate inspiration for the whole STAR project.

THE LINEARITY CONUNDRUM

Why does a STAR sound so good both on receive and transmit? There can only ever be one answer. It is because it is linear.

Because STAR is an IF processor it has a built-in head start over any AF add-on. The latter may indeed be better than nothing, but if the DSP has neither control of the AGC nor of the detection process then the damage has already been done - so to speak - before there is any chance to benefit from subsequent DSP.

Thereafter, most of the 'star quality' derives from the inherent nature of digital (as opposed to linear analogue) signal processing.

With analogue processing, the quality is determined ultimately by device linearity. Any non-linearity - and all devices have some - results in intermodulation distortion products which can fall within the pass-band. And to a varying extent they grate on the human ear - which is particularly sensitive to their presence.

With digital processing, the nature of any distortion is quite different. It arises from rounding errors, quantisation errors and lack of arithmetic precision generally.

As long as the system is not grossly overloaded (in which case it would fall apart in a big way) these errors do *not* result in discrete in-band IMD products.

Rather, they result in a general noise floor - of trivial amplitude. And in any practical HF radio communication system, this noise is indistinguishable from and is buried well below the band noise. There are simply no conventional IMD products to hear.

So the answer to the conundrum is this - and it may not be instinctive. Digital signal processing is inherently more linear... than linear analogue processing.

This is the technical rationale for the PIC-A-STAR project. And the ultimate rationale for the project? You may have guessed it by now. Promoting the interests of *amateur* radio. ◆

WEBSEARCH

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http://uk.groups.yahoo.com/group/picastar/

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By Peter Dodd, G3LDO 37 The Ridings, East Preston, West Sussex BN16 2TW. E-mail g3ldo@ukonline.co.uk

This month's subject is the balanced feed-line. *EZNEC 3.0* simulations show how things are supposed to be when the line is perfectly balanced, and how they are in practice, when the line is unbalanced by its environment, producing radiation of its own.

Antennas

I occasionally receive from readers antenna designs that have been found to work well. One of these is a design by Peter Nichols, M0RCS. It is a 66ft (20.12m) folded dipole configuration fed 16.5ft (5m) from one end using balanced feeder, but the antenna itself is inherently unbalanced. (This antenna is discussed in more detail below).

This had me thinking on just how important 'balance' was in a doublet antenna system.

Early amateur radio stations used open wire feeders coupled to the tank circuit of the transmitter in such a manner that the current in each of the wires of the feeder were equal and opposite. This ensured that only the antenna radiated but the feeder did not. Many operators went to a lot of trouble to ensure that the current in each of the feeder lines was equal by installing a current meter in each of the conductors of the feeder [1, 2]. They also provided methods of adjusting the coupling circuit for equal current. Additionally, there was a technique for further improving the balance on a transmission line. This involved transposing the positions of the feeder wires at regular intervals with the aid of a special spacer.

Most antenna books show the current distribution of antennas in their examples as though they were balanced. I have used antenna modelling software *EZNEC 3.0* to give some indication of current distribution on an antenna, my 50ft (15.25m) centre-fed special [3, 4] on several bands. In all the modelling illustrations the feedpoint is shown by a small circle. Currents are indicated by the red lines. Relative level is indicated by the distance of the red line from the antenna element.

The phase is indicated by the relationship between one red line and the other, as can be seen on the transmission line. *EZNEC 3.0* has current phase markers, but they proved to be a bit confusing on the printout. The transforming effect of the line can be seen on some illustrations - points of low current represent high impedance, conversely points of high current show low impedance.

At 7MHz, see **Fig 1**, the 50ft (15.25m) antenna is electrically short. The current distribution on the antenna is symmetrical, but an area of maximum current occurs in the feeders where the current in the lines is equal and opposite and therefore does not radiate. It does show that, for maximum efficiency, a multi-band doublet should be at least one half-wavelength long at the lowest operating band. It also shows that, in a restricted QTH, a short doublet will still work quite well.

On 14MHz, see **Fig 2**, the impedance at the centre of the antenna is fairly high and the SWR on the line will be very high. Notice that, again, the currents are still equal and opposite, so no radiation from the line takes place. On 21MHz, **Fig 3**, this short wire is quite a respectable DX antenna.

ANTENNA WITH AN UNBALANCED FEED

The images of the current distribution on an antenna shown in Figs 1, 2 and 3 are theoretical and idealistic. In the real world, the antenna feed is rarely balanced. Nearly all commercial ATUs now use a T-match, which is an unbalanced antenna tuner. For this type of tuner to be used with twin feeder, some type of balun transformer must be incorporated as shown in the photograph. While a balun transformer provides a very simple solution for coupling a balanced feeder to an unbalanced tuning unit, it is not likely to be as effective in providing a properly-balanced feed. Furthermore, in an urban environment, there are usually lots of electromagnetic obstacles that further upset things.

So how much does a properly-balanced feed matter?

To try to find out I have again modelled the 50ft (15.25m) antenna, but fed in such a way that a degree of unbalance occurs in the feeder as shown in **Fig 4**. The amplitude of the currents on the feeder are unequal and, although it cannot be readily

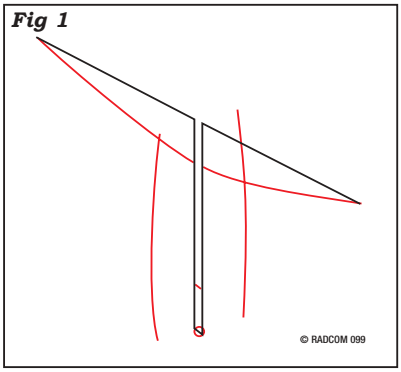


Fig 1: Current distribution of a 50ft (15.25m) length of wire, 30ft (10m) high, centre-fed with balanced feeder on 7MHz. With moderately good ground, the gain of the antenna is 5.5dBi, with most of the radiation going vertically. A good NVIS antenna for working over a few 100km.

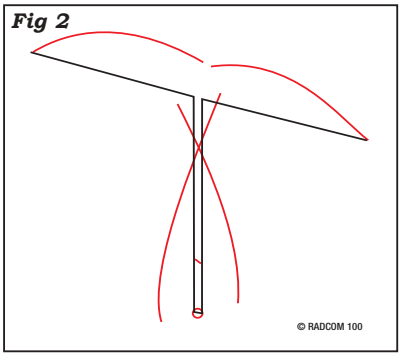


Fig 2: Current distribution of a 50ft (15.25m) length of wire, 30ft (10m) high, centre-fed with balanced feeder on 14MHz. The centre of the antenna is a fairly high impedance, transformed to low by the transmission line to the feedpoint. Maximum gain (6.5dBi) occurs at 40°.

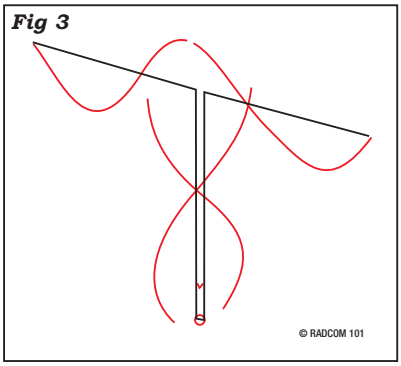


Fig 3: Current distribution of a 50ft (15.25m) length of wire, 30ft (10m) high, centre-fed with balanced feeder on 21MHz. Maximum gain (nearly 10dBi) occurs at 26°.

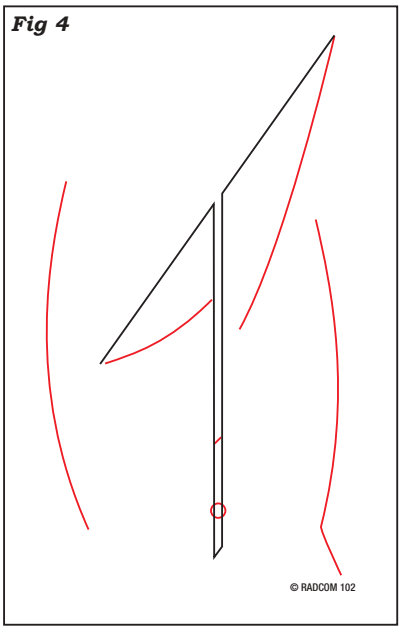
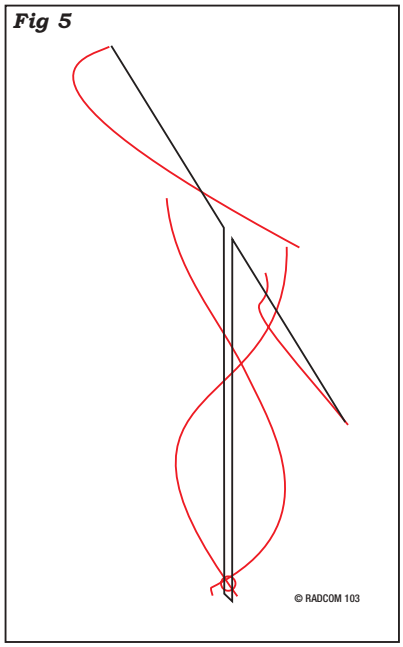
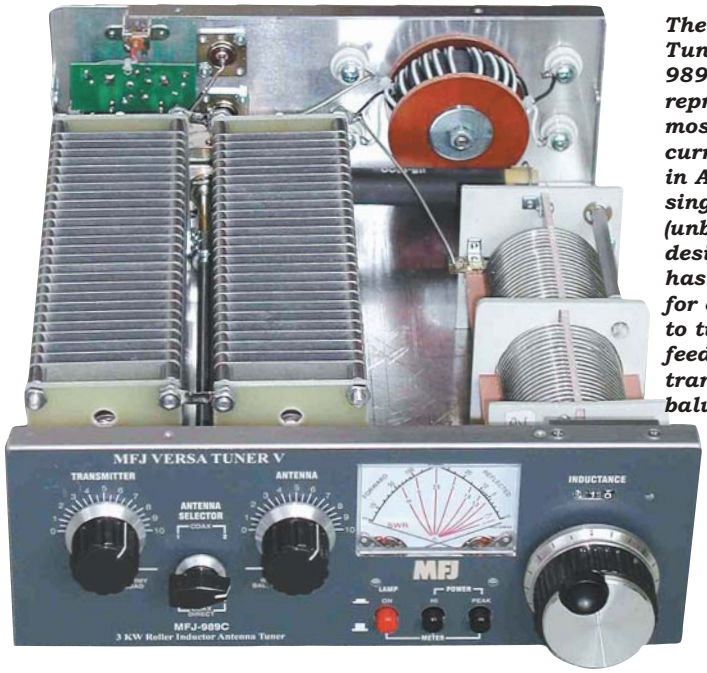


Fig 4: The unbalanced feeder situation, implying that the feeder radiates. The current distributions on each section of the doublet are now not equal giving a small amount of distortion to the azimuth pattern.

Fig 5: The amplitudes and phases of the 50ft (15.25m) antenna at 21MHz with an unbalanced feed.





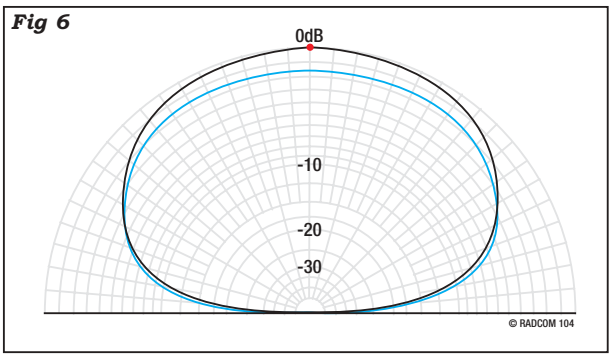
The MFJ Versa Tuner V, MFJ-989C, which represents the most popular current design in ATUs. It is a single-ended (unbalanced) design, which has provision for connecting to twin-line feeder using a transformer balun.

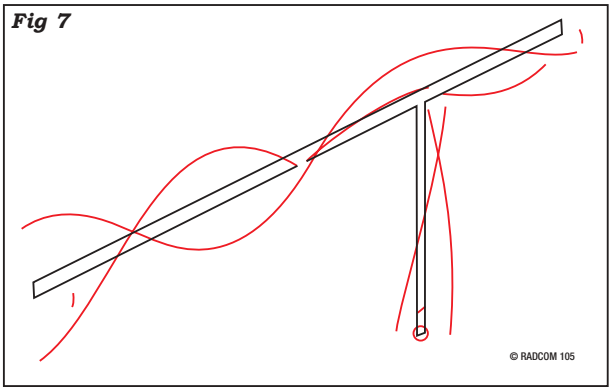
Fig 6: Elevation patterns of a 50ft (15.25m) length of wire, 30ft (10m) high comparing a balanced feed (black) with a partially-unbalanced feed (blue).

Fig 7: The DOC66 antenna by Peter Nichols, M0RCS. The total length is 66ft (20.12m). The antenna is fed with balanced line 16.5ft (5m) from one end. Current distribution is shown at 21MHz.

seen in the diagram, the phases of the feeder currents are not at 180° to each other; the amplitudes and phases on each leg of the doublet are also unequal. This same antenna shows some convoluted amplitudes and phases on 21MHz, see **Fig 5**, and probably represents what is happening with our antennas more accurately than the diagrams found in most antenna books.

It is obvious that there is a degree of radiation from an unbalanced antenna transmission line. This radiation can in some ways enhance the performance the doublet antenna. For example note the elevation polar plot of the balanced 50ft (15.25m) doublet antenna shown in **Fig 6**. The elevation plot of an unbalanced antenna is superimposed and shows a reduction in vertical gain and a slight increase in low-angle gain, making the antenna slightly more suitable for DX. The degree of unbalance in this case is not very great, having calculated current ratios of 1.3A and 1.6A on each of the feeder lines, respectively. The model implies that the characteristics of an antenna can be changed by altering the degree of current unbalance in the feeders. Has anyone ever noticed the characteristic?





However, the downside of an unbalanced line is that it radiates right down to the ATU in the shack, giving rise to possible BCI and TVI. Because of the reciprocal nature of antennas, the transmission line can also receive, increasing the risk of electrical QRM or a reduced signal-to-noise ratio on receive. If the level of RF in the shack is high, there is a chance of transmitter instability or RF burns from radio equipment when running high power. I recently tried feeding a balanced antenna from the single-ended coax port of an ATU and got quite a sharp RF 'bite' from the case of the ATU when running 100W.

WHICH ANTENNA FOR YOU?

It is probable that the strictly balanced case derived from commercial practice where relative power was high and a small degree of unbalance resulted in high RF levels at the operating position. It could also result in power loss on long transmission line lengths. With lower power amateur transmissions some transmission line unbalance may not be a problem and there is a chance that it could be beneficial provided the transceiver is not located a long way from the antenna.

This brings me back to the M0RCS antenna introduced earlier and shown in **Fig 7**. It comprises a 66ft (20m) long folded dipole with the conventional centre break in the lower wire. However, instead of being fed at this break point it is fed half-way along one leg of the doublet. The obvious characteristic of this antenna is that it is unbalanced and the feeder will be working as an antenna element. It seems to work well for M0RCS. He faced the challenge of erecting an HF antenna within a confined space in terms of ground area and height. He goes on to say "A number of attempts at modifying existing designs failed to produce the desired performance, until I produced what I now refer to as the DOC66. The results were very satisfying with strong signal reports throughout the UK and on all bands from 40 to 15m tuned with a MFJ-934 Versa Tuner II". The antenna worked with reduced efficiency on 80m, and 10m was not open during the testing period. The antenna height is restricted to 16ft (4.9m) due to environmental considerations.

I tried modelling this antenna as shown in Fig 7. It took a lot of effort to effort to get the wires of the model in the right order and the right phase and even so I am not sure how good the model is. Even conventional multi-band doublets require careful modelling. For more on this subject, I recommend *Unfolding the Story of the Folded Dipole* by W4RNL, see [5]. ◆

REFERENCES

[1] 'A Balanced-Line ASTU', Ted Garrott, G0OUJ, *RadCom* July/August 1998

[2] *Backyard Antennas*, Peter Dodd, G3LDO.

[3] 'Antennas', *RadCom* July 2002.

[4] 'Antennas', *RadCom* February 2003.

[5] 'Unfolding the Story of the Folded Dipole', L B Cebik, W4RNL, www.cebik.com/fdpl.html

By Don Field, G3XTT, 105 Shiplake Bottom, Peppard Common, Henley on Thames RG9 5HJ. E-mail: hf.radcom@rsgb.org.uk

HF

Even with the falling sunspot numbers there were around 290 DXCC entities on the air in 2003, providing plenty of DX if you were in the right place at the right time. As spring comes around there are plenty of interesting DXpeditions planned for March and April, keeping interest levels high.

COUNTRIES WORKED, 2003

(Final table, sorted Mixed totals, and including all who have participated during the year)

CALL	CW	SSB	DATA	MIXED
W1JR	262	245	163	286
G3TBK	245	165	0	254
GM0TGE	168	221	0	252
G3YVH	227	179	0	250
G3XTT	231	166	134	247
G3TXF	243	137	0	246
M0AWX	0	240	81	244
G3SXW	244	0	0	244
G4WFQ	219	76	100	238
G4WXZ	178	192	0	233
G4KFT	218	0	0	218
G4IRN	217	1	0	217
HS0ZEE	0	172	40	212
G4EDG (QRP)	202	2	0	204
G3LHJ	188	105	109	203
G4KIV	158	165	2	202
G0NXX	200	0	0	200
G3VDL	199	0	0	199
GU4YOX	149	138	0	188
M3RDX	0	170	93	187
MU0FAL	164	137	0	183
G0ARF	0	0	177	177
G4OBK	160	37	80	176
M0CNP	12	164	47	171
M0BKV	1	150	66	157
G0GFQ	3	156	4	156
G3ZRJ	156	0	0	156
G4IDL	142	15	0	153
M3CLY	0	152	0	152
G3JFS (QRP)	128	99	75	147
G3YMC (QRP)	145	0	0	145
M0BVE	136	0	0	136
ZC4VG	131	34	57	134
GU0SUP	0	0	132	132
MM0BQI	92	74	101	132
M5PLY	-	-	71	131
M5GUS	0	127	0	127
G4UCJ	124	10	24	126
G4FVK	68	109	0	121
G0LGJ/M	0	119	0	119
ZC4DW	85	71	74	116
G4IFB	115	0	0	115
GU7DHI	17	107	0	107
GI0NQC	1	73	69	104
G4YWY/M	0	95	0	95
GM8OEG	1	94	44	95
G6FCI	0	84	32	91
GW4ALG (QRP)	90	0	0	90
G4ZPL	0	2	87	87
G1UGH	0	80	0	80
G4DDL	74	45	26	77
GM6MEN	1	76	0	77
G0URR	0	0	75	75
G3URA	0	0	71	71
G7FSI	0	63	0	63
M0RZZ	51	34	0	63
G3WP	62	0	0	62
M5AEF (1W)	27	52	0	59
GM0ELV (QRP)	47	0	0	47

I mentioned last month that DF3CB had noted 288 countries active during 2003. There has been further correspondence on this subject and it looks as though the total may actually have been 291. That, of course, means that 44 saw no activity at all. These include (Africa) 3B6, 3Y (Bouvet), 5A, 9X, D6, E3, FR/G, FR/T, FT/W, FT/X. FT/Z, VK0 (Heard) and ZS8; (Antarctica) 3Y (Peter 1); (Asia) 1S, 7O, BS7, P5, VU4 and VU7; (Europe) 1A0 and R1M; (North America) CY0, FO/C, KP1, KP5, XF4 and YV0; (Oceania) 3D2/C, FK/C, KH1, KH5K, KH7 (Kure), T33, VK9M, VK9W, ZL7 and ZL9; (South America) CE0X, HK0/M, VP8 (SG) and VP8 (Sand). Not known: C21, JX, R1FJL. Some surprising ones there, but 1A0 has already been on in 2004, and several of the others are due for expeditions as the year goes on.

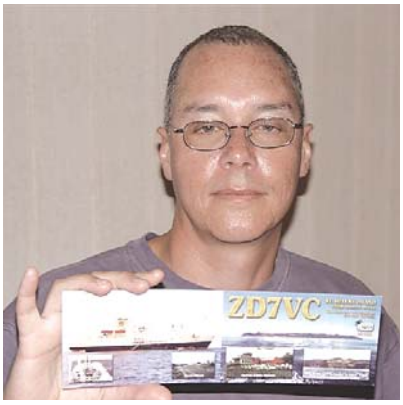
It looks as though there will be plenty to keep us entertained on the HF bands during March and April. As well as 3B9C (see the article in 'Down to Earth' on pages 28 / 29), there are several other rare ones due to start up, as well as plenty of what might be considered more regular fare.

Actually, the first I want to mention doesn't fire up until 4 April, but the guys will be trying out their technique in the *CQ* WPX SSB contest on 27/28 March during a stopover *en route*. This one is **Banaba** Island, somewhere in the remote Pacific, callsign T33C. 21 operators, including GM4FDM from the UK, will run seven stations round the clock for two weeks. A shipping container is already *en route* via Fiji to Tarawa (T30) and the team will rendezvous with it in **Tarawa**, before operating under a T30 callsign in the contest. There may also be some operations from **Fiji** (3D2) and **Nauru** (C21). Both the T33C and 3B9C teams are well aware that their operations will overlap, and will take care not to cause mutual interference.

A group of French amateurs will sign 5V7C from **Togo** starting 6 March for 7 days (a couple of them arrive slightly earlier and may be on before that date). There will be three

The shipping container loaded with equipment for the T33C Banaba DXpedition.

Phil Storey, VE7YBH (ex-G3YBH), emigrated to Canada some time ago and would like the UK DX community to know he is still around! He recently travelled from Cannes to St Maarten on the SV Star Clipper and met Paul Cooper, DX editor of the Radio Amateurs of Canada magazine on board.



Bruce Salt, ZD7VC, of St Helena Island, South Atlantic Ocean, poses with his QSL card.

HF stations, and they will focus on bands and modes not covered extensively by previous operations (I take this to mean the WARC bands and SSB, as the 5V7A Voodoo team made large numbers of CW contacts in successive CQWW CW contests in the mid- to late-90s). Check their website for further information.

Jim, G3RTE; Phil, G3SWH and Ray, HS0ZDZ (G3NOM), who are all members of FOC and CDXC, in association with Greg, V85GD, will be mounting a multi-band, multi-mode DXpedition to Negara Brunei Darussalam (**Brunei**) between 8 and 15 March. The team will be active on all bands and modes, including a single-operator entry (as V8NOM, QSL GM4FDM) in the Commonwealth Contest. At other times they will sign V8JIM (QSL G3SWH).

A DXpedition to **Clipperton Island** (FO0) is scheduled to start around 8 March, for an 8 to 10 day operation, all bands and modes, with five stations active. The team is led by K4SV and Icom America is the main sponsor. The callsign will not be announced until just prior to departure.

Gerd, DL7VOG, will be active again as HK0GU from **Providencia Island** (NA-049), probably starting around 18 March through to about 5 April. He will be on 80 to 10m with 100 watts and a vertical, but with a very good coastal location. Check his web page for further information.

I have a note that several Mexican operators should be on from Socorro Island (NA-030, **Revilla Gigedo**) starting 3 March for two weeks. However, another press release gave the dates as 28 February to 3 March, and there have been no recent bulletins, so I don't know how firm the plans actually are. Nevertheless, I mention it, as this is a rare one and well worth looking out for.

ZA/Z35M reports that he made 21,500 QSOs in 2003, using 100 watts to a wire antenna in the centre of **Tirana**. There are daily power cuts of three hours or more. Vlado has now made over 40,000 QSOs from ZA, helping to meet the need for one of the rare European countries.

Cliff, G0MMI, writes that a new **Iraq** Radio Society has been formed, with Diya, YI1DZ, as president. There has certainly been plenty of YI activity on the bands of late; let's hope this remains the case, with plenty of local Iraqi interest in addition to operations by what we might euphemistically describe as 'visitors'. Certainly the Memorandum of Association, of which I have a copy, points the way to a formal licensing structure, organised courses towards gaining a licence, and much else that is praiseworthy. It appears that the Society, rather than any government department, will actually be the body which grants licences. To my mind this is a good thing; in many emerging countries government officials have little understanding of amateur radio and regard amateur licensing as nothing more than a nuisance.

Chad, WE9V, was due to sign 9Y4/WE9V from **Tobago Island** (SA-009) from 29 February to 10 March. QSL to his home call.

Gary, KH6GMP, and Tuck, KH6DFW, will be active (SSB and RTTY) as T32I (QSL KH6GMP) and T32BI (QSL KH6DFW) from **East Kiribati** from 1 to 8 March.

DL1VKE and DF2SS plan to be active from **Samoa** (5W) and **Niue** (ZK2) between 15 March and 10 April. This will be an all band operation on SSB, CW and RTTY. QSL via DL2MDZ.

Jan, PA9JJ, will be active as C56JJ (**Gambia**) from 29 March until 5 April, using 100 watts and a G5RV. He will be on the WARC bands and will also try to be active on RTTY and PSK31. More details from his web page.

Finally, there will, as always, be a number of interesting prefixes and countries active especially for the *CQ* WPX contest. These include VP51V (yes, Victor Papa Five One Victor, Turks & Caicos), multi-single, by W5AO and others; FM/T93M by T93M (QSL DJ2MX); P40A (Aruba) by KK9A, D4B (Cape Verde) by 4L5A (who will also be there for other contests later in the year); A52PRO (Bhutan) by W4PRO; PJ4P (Netherlands Antilles) by DF7ZS. Several of these will be active before and / or after the contest.

DXCC

The ARRL has recently announced that it has removed paragraph 1(c) from the criteria to be used in determining what is to be a DXCC entity. This was the rule that allowed existing countries (entities) to apply for IARU membership, and hence spawn other qualifying entities (Chesterfield Islands, part of New Caledonia, and Ducie Island, part of Pitcairn, were brought into the DXCC program by this back-door route). It is clear that the rule was open to abuse, and several more such applications were pending (IARU membership for American Samoa and Tristan da Cunha, for example), quite simply, it would appear, so that their outlying islands could then qualify as new entities in their own right. This door has now been closed, though those entities which slipped in (mentioned above) will stay on the list.

CORRESPONDENCE AND TABLES

This month sees the latest 9-band table prepared, as always, by Henry, G3GIQ. To set the numbers in perspective, the ARRL recently released the latest DXCC Challenge standings. These are similar, but include 6m, and are only for contacts confirmed and accepted at the DXCC desk. The top ten are as follows:

1 W4DR Bob Eshleman 3083
2 W1NG Ken Bolin 3076
3 OZ1LO Leif Ottosen 3051
4 K5UR Rick Roderick 3049
5 SP5EWY Rys Tymkiewicz 3045
6 W9ZR Randy Schaaf 3042
7 N4WW Austin Regal 3037
8 I4EAT Fausto Minardi 3035
9 W1JR Joe Reisert 3021
10 K8MFO Don Karvonen 3018

The commentary notes that the difference between 1st and 2nd place reduced from 30 band countries last year to just seven this year. G4BWP is the leading UK station, at 15th place

9 BAND TABLES No 49

MIXED MODE

CALL	1.8	3.5	7	10	14	18	21	24	28	TOTAL
G3KMA	257	303	329	323	334	330	335	324	332	2867
G4BWP	250	306	333	322	335	328	335	316	326	2851
G3XTT	235	281	320	287	334	317	333	300	314	2721
GW3JXN	193	262	301	290	328	320	322	298	305	2619
G3GIQ	152	246	304	266	334	320	333	308	328	2591
G4OBK	188	234	287	291	330	310	319	304	303	2566
G3SED	234	263	296	280	314	295	302	275	287	2546
G3TXF	140	241	301	298	329	302	325	285	305	2526
G3SNN	176	239	289	240	333	293	326	283	305	2484
G3TBK	143	241	285	269	331	305	319	293	293	2479
G3LAS	120	209	262	272	319	306	317	300	301	2406
G3YVH	139	172	267	290	325	314	314	280	287	2388
G3IFB	64	228	290	249	327	254	307	253	289	2261
GM3PPE	148	210	254	269	320	269	279	243	228	2220
G4PTJ	49	192	254	214	326	279	322	271	304	2211
G3VJP	107	187	260	190	329	277	316	248	286	2200
G0JHC	3	135	237	280	289	309	317	300	310	2180
G3AKU	115	171	242	254	303	270	277	267	276	2175
G3KMQ	60	214	267	214	325	251	282	259	249	2121
G5LP	75	228	287	227	312	248	286	189	254	2106
G3VKW	50	173	239	148	328	249	324	263	310	2084
G3IGW	129	198	318	242	289	246	264	137	238	2061
M0BEW	74	131	227	204	289	246	278	232	267	1948
M0AWX	48	127	168	26	298	266	292	241	253	1719
G4OWT	54	100	202	101	311	143	299	119	271	1600
G4WFQ	29	134	210	180	245	203	224	160	183	1568
G4NXG/M	26	59	142	0	296	231	291	202	254	1501
G0LRX	4	105	127	0	241	66	260	82	234	1119
G4FVK	43	79	107	63	191	108	194	86	176	1047
MM0BQI	39	77	136	54	201	86	186	66	175	1020
M0CNP	11	56	85	9	166	98	150	80	123	778
M5AEF	0	18	4	0	66	92	69	29	30	308
AVERAGE	**105**	**182**	**238**	**199**	**294**	**248**	**284**	**228**	**262**	**2040**

CW ONLY

G3KMA	251	284	326	323	334	324	332	312	322	2808
G4BWP	230	237	307	320	308	309	311	285	268	2575
G3XTT	225	255	307	287	310	300	309	279	290	2562
G3TXF	140	238	299	298	324	300	320	284	295	2498
GW3JXN	190	239	288	290	315	308	311	276	279	2496
G4OBK	180	219	279	291	314	299	298	287	287	2454
G0NXX	177	239	282	294	300	292	278	269	270	2401
GM3POI	211	237	289	266	306	258	284	238	254	2343
G3SED	233	249	291	280	288	264	267	230	226	2328
G3YVH	138	172	262	290	317	301	300	265	272	2317
G3SXW	96	209	266	269	318	290	303	260	286	2297
G3LAS	119	153	243	272	283	288	289	265	267	2179
G3AKU	115	171	242	254	293	260	265	249	260	2109
G5LP	75	224	286	227	301	248	277	189	247	2074
G3VJP	106	150	249	190	301	254	287	222	254	2013
G4PTJ	47	146	224	214	278	260	288	251	263	1971
G3VKW	44	114	195	146	254	196	276	207	221	1653
G4OWT	48	97	178	101	247	100	241	93	218	1323
G4WFQ	29	130	196	179	174	159	166	131	115	1279
GM4FAM	41	73	102	120	137	109	148	123	124	977
MM0BQI	26	57	100	54	121	54	119	34	117	682
AVERAGE	**130**	**185**	**248**	**236**	**277**	**246**	**270**	**226**	**245**	**2064**

NEXT DEADLINE 8 April 2004. PREPARED BY G3GIQ 8 January 2004
henry@topdx.com

with 2966. The full list can be found via the ARRL web page.

Ken, M0RZZ, looks back on 2003 to note that he worked less under his new call than he had under his old M3 call, with its various restrictions. This was due to a change of QTH and, he believes, inferior ground at the new location. But he still managed some excellent QRP DX during the year, so isn't complaining too much. Damian, M0BKV, focuses most of his note on his attempts to work 1A0KM (Sovereign Military Order of Malta) in early January. He was dismayed to hear so many people transmitting on the DX station's frequency with comments like "Who is the DX?", "What is his QTH?" 1A0 is certainly a rare one, but is listed in all the prefix lists and, of course, computer logging programs will certainly know of it. So there is really no excuse.

Steve, GW4ALG, looks back on a successful year, including 1050 QRP contacts in November's CQWW CW contest, using his Elecraft transceiver and G5RV. There have been some technical improvements to his station, such as an automatic antenna tuner, and linking his radio to the logging program, but he also notes that he is learning to copy at higher CW speeds which, in contests in particular, is of great benefit.

Peter, G3JFS, is another QRP operator and has found the poor conditions quite discouraging, though he too found CQWW CW in November an opportunity to knock off a good score. He feels that propagation this sunspot cycle has been the worst he has experienced in 50 years on the air and has only worked the number of countries he has as a result of the large number of DXpeditions, snappier operating procedures and the benefit of being retired.

Terry, G1UGH, reports a few nice SSB contacts on 20m, for example SU9BN (Egypt), but says he doesn't get into the shack too much in the winter as it is too cold. You have my sympathy Terry, as I operated for several years from a small garden shed and it wasn't too much fun!

Alan, G3PMR, writes that he is now permanently resident in Cyprus, and has the callsign 5B4AHJ. Graham, M5AAV, writes to point out that I was only partially right in giving I2YSB as the QSL manager for the Italian ZK3 expedition (p62, February 'HF'). I2YSB will handle direct cards, but bureau cards should go to M5AAV. It's rather confusing when an expedition appoints multiple QSL managers, but Graham tells me there is some problem with having bureau cards routed to I2YSB.

Tom, DL8AAM, reports that Finnish club stations now have access to frequencies on 5MHz (by way of an NoV), and the first contact has taken place between OI3W and OI3AY. This is the first 5MHz news I have received in a few months and more reports would be welcome.

Finally, please note an earlier-then-usual deadline for the May column, as I will be heading off to 3B9.

THANKS

Special thanks go to the authors of the following for information extracted: *OPDX Bulletin* (KB8NW), *The Daily DX* (W3UR) and *425 DX News* (I1JQJ). Please send items for the **May** issue by **13 March**. ◆

QTH Corner

5B4AHJ	Alan Jubb, PO Box 61430, 8134 Kato Pafos, Cyprus.
5V7C	Franck Savoldi, F5TVG, PO Box 92, F94223 Charenton Cedex, France.
I2YSB	Silvano Borsa, PO Box 45, 27036 Mortara (PV), Italy.
PA0VDV	Joeke van der Velde, Delleburen 1,8421RP Oldeberkoop,The Netherlands.
YI9ZF	Eric Wennstrom, SM1TDE, PO Box 94, SE-62016 Ljugarn, Sweden.

WEB SEARCH

5V7C:	http://5v7c.free.fr/defaulteng.htm
C56JJ:	www.qrz.com/c56jj
HK0GU:	www.qsl.net/hk0gu
T33C:	http://dx-pedition.de/banaba2004

HF F-Layer, Propagation Predictions for March 2004

	7.0MHz	10.1MHz	14.0MHz	18.1MHz	21.0MHz	24.9MHz	28.0MHz
Time	000011111220	000011111220	000011111220	000011111220	000011111220	000011111220	000011111220
(UTC)	246802468020	246802468020	246802468020	246802468020	246802468020	246802468020	246802468020
*** Europe							
Moscow	771....17767	..2.1122661.	..2334557...	...88899....	...68997....	.....	.....
*** Asia							
Yakutsk	2331	..21.1356662	..24452.....	...352......	....5.......	.....	.....
Tokyo	.......122..	.......122..	.......11...	....1.......	....1.......	....1.......	.....
Singapore	........111.	.......121..	......132...	......352...	.....133....	.....132....	......11....
Hyderabad	1	2222	.......233..	..1..1577...	..1223675...	...66788....	...35675....
Tel Aviv	661.....6666	7.5....47677	...422567.4.	...24455....	....112.....	.....	.....
*** Oceania							
Wellington	.......37...	....12367...	...245556...	....111.1...	....1.......	.....	.....
Well (NZ) (LP)	.18........	369.......11	5583....1654	...5.....65.	...4.....5..	.....	.....
Perth	........111.	.......1211.	.......11...	.....1222...	.....11.....	...123......	...122......
Sydney	.......121..	.......331..	......122...	....13552...	....2222....	...14.......	....2.......
Melbourne (LP)	..37........	.1381.......	1..85.......	...64.....1.	.....	.....	.....
Honolulu	.....	...21.......	...11.......	.....	.....	.....	.....
Honolulu (LP)	.....	.....	.......15...	..1...1.72..	..11111.72..	...322..6...	...333..5...
W. Samoa	.....	...2111.....	...1234.....	....123.....	.....12.....	.....	.....
*** Africa							
Rodrigues(3B9C)	1........111	1111	.......121..	.......22...	.......21...	.......1....	.....
Johannesburg	78......2788	56......6887	.1.....18865	......2741.	...1111461..	...556777...	...356676...
Ibadan	12.......111	524.....3433	..72...2551.	..68666774..	...877778...	...978887...	...8.666....
Nairobi	.....	11.........1	3.......1124	..2....1231.	..21..1241..	...332355...	...544561...
Canary Isles	665.....3656	6662...14566	2..62113567.	...7766778..	...7777785..	....66667...	....23232...
*** S. America							
Buenos Aires	556.......25	112.......11	...1......1.	...21...141.	....11.123..	....121221..	.....1112...
Rio de Janeiro	111.......11	1.1......11.	.........1..	....21.1261.	....321245..	....332342..	....22123...
Lima	.....	...1........	...1........	...3.1...1..	.....21111..	.....2111...	.....1.11...
Caracas	.....	.........1.	.........1.	.........1..	.....1.11...	.....5445...	.....1122...
*** N. America							
Guatemala	.....	.....	.....	.....	.....	.....	.....
New Orleans	.....	.....	.....	.....13334..	......5552..	......454...	.....
Washington	212........2	3.........24	.........24.	.....43345..	.....15562..	......121...	.....
Quebec	665.......77	...1.....12.	.......112..	.....76777..	.....34575..	........6...	.....
Anchorage	243........1	..........1.	........11..	.....	.....	.....	.....
Vancouver	.....	.....	.....	.......131..	........1...	.....	.....
San Francisco	.....	.....	.....	.......11...	........1...	.....	.....
San Fran (LP)	.....	.....	.......3....	.......62...	..1....641..	.......63...	.......43...

Key: Each number in the table represents the expected circuit reliability, e.g. '1' represents reliability between 1 and 19% of days, '2' between 20 and 30% of days, etc. No signal is expected when a '.' is shown. **Black** is shown when the signal strength is expected to be low to very low, **blue** when it is expected to be fair and **red** when it is expected to be strong. The RSGB Propagation Studies Committee provides propagation predictions on the internet at http://members.aol.com/g4fkhgwyn. The page is updated monthly. The provisional mean sunspot number for January 2004 issued by the Sunspot Data Centre, Brussels, was 37.2. The daily maximum / minimum numbers were 61 on 20 and 21 January, and 0 on 27 January respectively. The predicted smoothed sunspot numbers for March, April and May are respectively: (SIDC classical method - Waldmeier's standard) 53, 52, 50 (combined method) 57, 56, 55. Longpath predictions are shown with (LP) following the path name. Higher input power and superior aerials have been used for these predictions; less well-equipped stations may find the longpath predictions somewhat inaccurate.

By Roger Balister, G3KMA, La Quinta, Mimbridge, Chobham, Woking, Surrey GU24 8AR. E-mail: g3kma@dsl.pipex.com

IOTA

YAESU, PRINCIPAL SPONSOR OF THE IOTA PROGRAMME

IOTA Manager Roger Balister looks at the requirements to obtain not only a licence, but also landing and other operating permissions when putting on an IOTA operation. Plus news of activity from a semi-rare UK IOTA group.

Claudio, LU7DW, with Trevor, G3UAS, on a visit to Buenos Aires last year. Claudio is a keen IOTA supporter who was on the October 2002 L65W Leones Island (SA-065) DXpedition, among others.

Everyone knows about the need, when operating abroad, to be properly licensed. The CEPT licence has of course made things very much easier but there is still a majority of countries where a locally-issued licence needs to be obtained. Where do you start to find out what's required? Veikko, OH2MCN, runs a superb website which covers the licence requirements of almost every country in the world - see 'Websearch' below. It is regularly updated and is undoubtedly the most comprehensive source of other countries' licensing available on the Internet.

When planning an island DXpedition you should also always check to see if any permits are required. This is not just for landing on your target island but for operating an amateur radio station there. The two are not synonymous and possession of a UK, CEPT or overseas amateur radio licence does not render obtaining either or both unnecessary.

LOCAL PERMITS

Where there is a reasonable size resident population, getting on to the island may not be a problem, although in some of the more remote areas of the world with island communities vulnerable to outside contact there are restrictions on access. Even on populated islands, permission to operate an amateur radio station may in certain cases be required. This is best obtained before you set out. That's not all. As in the UK, you may need on arrival to obtain additional local permission. Hotels and other accommodation providers will usually agree to your setting up station subject to antenna location feasibility and your complying with a few basic on-site requirements, but take nothing for granted! Always check in advance.

Visits to uninhabited islands present more potential problems because control of access is usually in the hands of private owners or government or quasi-governmental organisations who quite often have reasons for wishing to keep visitors away. Increasingly, wildlife and environmental agencies are seeking to confine access to people who can show good reason to visit, for example biologists, other research and scientific personnel or the military. Quite a few difficult-to-visit islands have been activated in recent years by 'dual-role' amateurs. They may not be able to provide 24-hour activity on the bands but give them due praise, they are very successful in bringing the island on the air in circumstances where it would otherwise be impossible.

Where permits are issued to amateurs, they usually specify certain conditions that have to be met, mainly non-interference with local wildlife, no harm to the plants and, on departure, removal of everything brought to the island as well as any rubbish. On many islands there may be sensitive scientific equipment and, whether the permit specifies it or not, it is best to site your transmitting station some way from it and avoid 'draping' your antennas over, around or from it! If there is a lighthouse, you will need to find out any restrictions on entry or use of it.

Where access to an island is denied, investigate if it's a blanket refusal to all visitors or if visits by certain special interest groups such as bird-watchers, scuba divers, fishermen and climbers are allowed. It is a feature of the current DXpeditioning scene that amateurs with dual interests are often teaming up with non-radio groups to make the visit.

FARNE ISLANDS

Nigel Wears, 2E0NJW, reports that the North Wakefield Radio Club plans activity from the island of Inner Farne, EU-109, off the Northumberland coast during daylight hours on 17 and 18 April. They will operate with the call GX4NOK/P on 40, 30, 20 and 17 metres as well as put on a digimode station and 2 metres. During the DXpedition further information including operating frequencies will be found on their website along with information about the Farne Islands. Nigel says they will be QSLing every contact. The North Wakefield Radio Club extend thanks to the National Trust for giving permission for the activation to take place, as well as to Leeds Amateur Radio for their QSL card sponsorship. The Farne Islands have been a difficult IOTA to activate in recent years and we join in thanking the National Trust for allowing this operation. ◆

IOTA 2004

MARCH 2004

AS-006	VR2	Hong Kong Islands
AS-015	9M2	Pinang State group
AS-019	9V	Singapore
AS-042	R0B	Severnaya Zemlya
AS-053	HS	Malay Peninsula West group
AS-075	XX	Macau Islands
AS-094	BY7	Hainan Island
OC-002	VK9X	Christmas Island
OC-003	VK9C	Cocos (Keeling) Islands
OC-021	YB0-3	Java Island
OC-022	YB9	Bali Island
OC-088	YB7/ 9M/V8	Indonesia Kalimantan / East Malaysia / Brunei
OC-143	YB4-6	Sumatra Island

APRIL 2004

AF-006	VQ9	Diego Garcia Island
AF-017	3B9	Rodrigues Island
AS-003	4S	Sri Lanka
AS-005	R0B	Kara Sea Coast West group
AS-013	8Q	Maldives
AS-083	R9K	Kara Sea Coast East group

MAY 2004

AF-013	5R	Madagascar
AF-016	FR	Reunion Island
AF-024	S7	Seychelles
AF-032	5H	Zanzibar Island
AF-049	3B8	Mauritius Island
AN-015	8J1	Queen Maud Land group
AS-002	A9	Bahrain
AS-004	5B/ZC	Cyprus/ UK Sovereign Bases
EU-019	R1F	Franz Josef Land

JUNE 2004

There are over 100 European counters in June. See the CDXC website.

Table 1: Some of the regularly activated island groups counting for premium points during March to June 2004. For further information on this current activity programme, see the CDXC website.

NEW REFERENCE

OC-265 VK9 Coral Sea Islands Territory South (Australia)

WEBSEARCH

RSGB IOTA Programme	www.rsgbiota.org
IOTA MANAGER'S WEBSITE	www.g3kma.dsl.pipex.com
IOTA CONTEST	www.blacksheep.org/hfcc/iota.shtml
CDXC	www.cdxc.org.uk
NORTH WAKEFIELD RC	www.g4nok.org
OTHER COUNTRIES' LICENSING	www.qsl.net/oh2mcn/license.htm

By Bob Treacher, BRS32525,
93 Elibank Road, Eltham, London SE9 1QJ.

SWL activity on the wane?

Bob Treacher with a roundup of UK SWL opinion and some tips on how to improve your DXCC 'heard' totals with simple receivers and antennas.

Although Simon, RS177448, is now licensed as M3CVN, he continues to receive QSL cards for his 50MHz SWLing activity.

Since I wrote the last column, my temperamental computer has finally completely expired. As a result, I currently have no computer and I have not been able to access e-mails since November last year. I am therefore unable to reflect properly your views on this page becoming a bi-monthly column. I have had a few letters by post, though, and the reaction was surprise and disappointment, although I detected a rather defeatist attitude from some. If listeners feel that there is real benefit to be gained in reverting back to a monthly column, I need to see further input to the column. It's as simple as that! I need to see a far greater input to the May column - but all by post, please. Your deadline is Saturday 6 March.

ACTIVITY

Peter Webb, BRS53907, who lives in Tiverton, reported on his recent activity. He listens on the bands daily, and had sent 860 QSL cards to the RSGB bureau in 2003. During the year he received over 400 cards via the bureau. He is not a believer of sending 'bare essential' SWL reports. He provides comprehensive comments with all the cards that he sends, and considers his return fully justifies the attention he places on QSLing.

In Peter's mind, the M3 licence has meant more activity on the bands, but the downside seems to be that his local SWL club has lost members. His radio experiences go back to January 1939 and he can send and receive CW at 20WPM.

Peter also comments on how operating standards appear to have fallen over the years. He offered some strong thoughts about current day pile-ups, the 'last two letters' syndrome and the poor signals that can be found on the bands these days. Peter really hopes that more listeners provide details of their activity so that the monthly page reappears.

Douglas Johnstone, BRS54163, was also disappointed at the decision to reduce the frequency of the column. Although he has been a listener for some while, I'm delighted to see that he picks up at least "one tip a month" from either my comments or points made by other listeners. His very positive reaction was "Come on boys and girls, let's take up the challenge so that we don't lose our only slot in this great magazine". Douglas had just moved to Wantage and had heard from the local council that they did not see the erection of an antenna outside his window as being a problem. Hopefully, he will have some concrete news about what he can put up by the time this column appears.

Mike Willison, RS171654, asked for advice about antennas to use with his R2000 receiver. There are plenty of possibilities which obviously depend on his listening preferences. Assuming he mainly listens around the HF bands, has an average size garden and does not have permission to erect a tower with a beam on it, an inverted-vee doublet 66ft in length (two 33ft lengths of wire fed with twin feeder) into an antenna tuning unit is a good one to try. Much of our hobby is about experimenting with antennas. If that is not a success, try one of the numerous designs in the *International Antenna Collection*, edited by Dr George Brown, M5ACN [available from the RSGB Shop - *Ed.*]

Finally this time, Wyn Mainwaring, GW8ANT, wrote from Carmarthenshire. Although licensed in 1965, Wyn had been an SWL for two decades before then! Even now, he prefers to listen rather than transmit. He provided some really interesting yarns about his short-wave listening, and hoped that other listeners or licensed amateurs who prefer to listen would react positively to the need to contribute positively to the listener movement.

WELSH REFLECTIONS

My account back in the October 2003 'SWL' column of reaching the milestone of hearing 200 DXCC entities using only a Sony ICF-7600G receiver and extremely modest antennas has clearly 'upset' some! I use the word "upset" as I have had a few letters from frustrated listeners who use the Sony receiver - with better antennas - and have had half the success that I have had.

I am particularly grateful to Cliff Stapleton, RS163599, who tells me that he uses that receiver with an inverted-L at 30ft. He is disappointed with his lack of DX on any band, and he would be overjoyed at hearing half the DX that I mentioned in the October column. He acknowledged that living in Torquay with its hilly terrain may not help, but he found it hard to understand why I heard some - very good - DX using the same receiver with either its whip or its short extension wire at beach locations, and with the wire only a few metres above the ground. I did not use the 11m wire on the beach - that was used at the hotel, and I did not use an ATU.

There is no one answer. A good antenna is usually the key to being able to hear the weaker DX stations that gets an SWL beyond the 150+ DXCC mark. From the home QTH, and assuming that most listeners cannot contemplate erecting a Yagi, my purchase of a Cushcraft R6000 vertical was one reason why logging the DX became easier. From my beach locations, being away from man-made noise was an obvious advantage, but even back at the hotel where I had to contend with the noise from overhead power lines, the TVs and other electrical equipment from 20 other rooms, it was possible to log some good DX.

Although location and antenna are important, skill and knowledge of propagation and band conditions - and a little luck - are key components to being able to log the better - often weaker - DX. ◆

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(SO239 fitting).....**£18.95**
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SO259 fitting **£12.95**
Hatch Back Mount 3/8 4mtrs coax/PL259 ..... **£12.95**
Roof stud Mount 4mts coax/PL259 3/8 or SO239 fitting **£12.95**

ANTENNA WIRE & RIBBON

Enamelled copper wire 16 gauge (50mtrs) **£11.95**
Hard Drawn copper wire 16 gauge (50mtrs) **£12.95**
Equipment wire Multi Stranded (50mtrs) **£9.95**
Flexweave high quality (50mtrs) **£27.95**
PVC Coated Flexweave high quality (50mtrs) **£37.95**
300Ω Ladder Ribbon heavy duty USA imported (20mtrs) **£15.00**
450Ω Ladder Ribbon heavy duty USA imported (20mtrs) **£15.00**
(Other lengths available, please phone for details)

HF BALCONY ANTENNA

BAHF-4 FREQ:10-15-20-40 Mtrs LENGTH: 1.70m HEIGHT: 1.20m POWER: 300 Watts **£129.95**

MISCELLANEOUS ITEMS

CDX Lightening arrestor 500 watts **£19.95**
MDX Lightening arrestor 1000 watts **£24.95**
AKD TV1 filter **£9.95**
Amalgamating tape (10mtrs) **£7.50**
Desoldering pump **£2.99**
Alignment 5pc kit **£1.99**

TELESCOPIC MASTS (aluminium & fibreglass options)

TMA3 3" to 1¼" heavy duty aluminium telescopic mast set, approx 40ft when errect, 6ft collapsed **£199.95**
TMA2 2¼" to 1¼" heavy duty telescopic mast set, approx 40ft when errect, 9ft collapsed **£149.95**
TMA1 2" to 1¼" heavy duty aluminium telescopic mast set, approx 20ft when errect, 6ft collapsed **£99.95**
TMAF-1 2" to 1¼" heavy duty fibreglass telescopic mast set, approx 20ft when errect, 6ft collapsed **£99.95**
TMAF-2 2¼" to 1¼" heavy duty telescopic fibreglass mast set, approx 40ft when errect, 9ft collapsed **£189.95**

HF YAGI

HBV-2 2 BAND 2 ELEMENT TRAPPED BEAM FREQ:20-40 Mtrs GAIN:4dBd BOOM:5.00m LONGEST ELEMENT:13.00m POWER:1600 Watts **£329.95**

ADEX-3300 3 BAND 3 ELEMENT TRAPPED BEAM FREQ:10-15-20 Mtrs GAIN:8 dBd BOOM:4.42m LONGEST ELE:8.46m POWER:2000 Watts **£269.95**

ADEX-6400 6 BAND 4 ELEMENT TRAPPED BEAM FREQ:10-12-15-17-20-30 Mtrs GAIN:7.5 dBd BOOM:4.27m LONGEST ELE:10.00m POWER:2000 Watts **£499.95**
40 Mtr RADIAL KIT FOR ABOVE **£99.00**

HF VERTICALS

VR3000 3 BAND VERTICAL FREQ: 10-15-20 Mtrs GAIN: 3.5dBi HEIGHT: 3.80m POWER: 2000 Watts (without radials) POWER: 500 Watts (with optional radials) **£89.95**
OPTIONAL 10-15-20mtr radial kit **£34.95**

VR5000 5 BAND VERTICAL FREQ:10-15-20-40-80 Mtrs GAIN: 3.5dBi HEIGHT: 4.00m RADIAL LENGTH: 2.30m (included). POWER: 500 Watts **£169.95**

EVX4000 4 BAND VERTICAL FREQ:10-15-20-40 Mtrs GAIN: 3.5dBi HEIGHT: 6.50m POWER: 2000 Watts (without radials) POWER: 500 Watts (with optional radials) **£99.95**
OPTIONAL 10-15-20mtr radial kit **£34.95**
OPTIONAL 40mtr radial kit **£12.95**

EVX5000 5 BAND VERTICAL FREQ:10-15-20-40-80 Mtrs GAIN: 3.5dBi HEIGHT: 7.30m POWER: 2000 Watts (without radials) POWER: 500 Watts (with optional radials) **£139.95**
OPTIONAL 10-15-20mtr radial kit **£34.95**
OPTIONAL 40mtr radial kit **£12.95**
OPTIONAL 80mtr radial kit **£14.95**

EVX6000 6 BAND VERTICAL FREQ: 10-15-20-30-40-80 Mtrs GAIN: 3.5dBi HEIGHT: 5.00m RADIAL LENGTH: 1.70m(included) POWER: 800 Watts **£249.95**

EVX8000 8 BAND VERTICAL FREQ:10-12-15-17-20-30-40 Mtrs (80m optional) GAIN: 3.5dBi HEIGHT: 4.90m RADIAL LENGTH: 1.80m (included) POWER: 2000 Watts **£269.95**
80 MTR RADIAL KIT FOR ABOVE **£79.00**

(All verticals require grounding if optional radials are not purchased to obtain a good VSWR)

TRAPPED WIRE DI-POLE ANTENNAS

(Hi Grade Heavy Duty Commercial Antennas)

UTD160 FREQ:160 Mtrs LENGTH:28m POWER:1000 Watts **£44.95**
MTD-1 (3 BAND) FREQ:10-15-20 Mtrs LENGTH:7.40 Mtrs POWER:1000 Watts **£39.95**
MTD-2 (2 BAND) FREQ:40-80 Mtrs LENGTH: 20Mtrs POWER:1000 Watts **£49.95**
MTD-3 (3 BAND) FREQ:40-80-160 Mtrs LENGTH: 32.5m POWER: 1000 Watts **£89.95**
MTD-4 (3 BAND) FREQ: 12-17-30 Mtrs LENGTH: 10.5m POWER: 1000 Watts **£44.95**
MTD-5 (5 BAND) FREQ: 10-15-20-40-80 Mtrs LENGTH: 20m POWER:1000 Watts **£79.95**
(MTD-5 is a crossed di-pole with 4 legs)

PATCH LEADS

STANDARD LEADS
1mtr RG58 PL259 to PL259 lead **£3.95**
10mtr RG58 PL259 to PL259 lead **£7.95**
30mtr RG58 PL259 to PL259 lead **£14.95**

MILITARY SPECIFICATION LEADS
1mtr RG58 Mil spec PL259 to PL259 lead **£4.95**
10mtr RG58 Mil spec PL259 to PL259 lead **£10.95**
30mtr RG58 Mil spec PL259 to PL259 lead **£24.95**
1mtr RG213 Mil spec PL259 to PL259 lead **£4.95**
10mtr RG213 Mil spec PL259 to PL259 lead **£14.95**
30mtr RG213 Mil spec PL259 to PL259 lead **£29.95**
(All other leads and lengths available, ie. BNC to N-type, etc. Please phone for details)

SPX-100 'PLUG N GO'

Normally £49.95. This month **£39.95**!! Plus £6.00 P&P
6mtrs through to 80mtrs.
Change band by using a simple fly lead and socket at the base coil and fine tune with the adjustable telescopic whip.
Standard 3/8 thread 1.65mtrs fully extended.

Contest

This month, Tim Kirby discusses the use of 'Cabrillo' files for making your entry to RSGB HF contests.

Stewart, GM4AFF, visited Shetland to operate as GZ7V for CQWW CW 2003. This excellent picture shows the antenna system, with the Island of Foula in the background.

The vast majority of contest entries received by the HF Contests Committee is now in the form of computer files, and these are generally 'Cabrillo' files. If you're an HF contester, even an occasional one, and you don't know about Cabrillo, take a look at Don Field's, G3XTT, excellent Cabrillo primer, which you can find at www.rsgbhfcc.org (then 'Features', 'A Cabrillo Primer')

Don's article will give you an insight into what Cabrillo is and why it's important in making the adjudication of contests more efficient. As an example of this, Don (with a little help from his friends) managed to adjudicate the 2003 RSGB IOTA Contest in time for the results to be published at the HF Convention in November last year, which is an unprecedented turnaround. With more and more logs being received in a standard format, Cabrillo, this means that the adjudicator's task is simplified.

What has been noticeable as more and more people start to use the format is that not everyone checks the header file section of the file. The header section might look like the following:

START-OF-LOG: 2.0
CONTEST: CQ-WW-RTTY
CALLSIGN: G3XTT
CATEGORY: SINGLE-OP ALL-BAND HIGH-POWER
CLAIMED-SCORE: 484750
OPERATORS: G3XTT
CLUB: Chiltern DX Club
NAME: Don Field
ADDRESS: 105 Shiplake Bottom,
Peppard Common,
ADDRESS: Henley-on-Thames, RG9 5HJ
ADDRESS: England

However, when you've generated your Cabrillo file from your contest program of choice, it's worth opening up the file in your text editor (eg *Notepad* on a *Windows* system will do) and seeing what's in there. In particular, make sure that the CATEGORY section reflects the section of the contest that you were entering. As Dave Lawley, G4BUO, comments, "For example in BERU [the RSGB Commonwealth Contest] or 21/28 you need to say whether you're open or restricted; in the 80m CC contests a sizeable minority have not indicated

whether they were LOW or QRP".

Something else to remember is that you can always insert a 'SOAPBOX' comment into the file, even if the program hasn't generated it for you. Simply add a new line - where isn't critical, but make it after the START-OF-LOG parameter and before the QSO data (perhaps in the above example, after the ADDRESS parameter) as follows:

SOAPBOX: Great contest - shame about the conditions and the 24-hour power cut [or whatever].

Don't forget to add the colon after 'SOAPBOX' before your comments. Do make the effort to do this. All adjudicators enjoy reading your comments and of course, they can provide useful feedback about how you find the contest.

By following these guidelines you can help provide the adjudicator with the appropriate information to ensure that your entry is included in the correct section.

CONTESTS THIS MONTH

We have lots of results to try to include this month, so little space to include too much detail about the highlights of the calendar this month. On HF, ARRL SSB on 6/7 March is always a great contest - super operators and it's compulsive trying to work as many different states as you can on the different bands. For the CW operator, the RSGB Commonwealth Contest on 13/14 March is a great event to play with propagation and learn about the best times to work countries such as Canada, Australia and New Zealand, as well as a host of African countries. If you're crafty and know your propagation, you can even get some rest!

On VHF, the first big contest of the year to 'encourage' portable activity is on 6/7 March. Some hardy souls do go out portable, so don't forget to reward them with a few contacts! ◆

CONTEST CALENDAR

HF Contests

Date	Time	Mode	Contest	Bands	Exchange
1 Mar	2000-2130	DATA	RSGB 80m Championship	3.5	RST+SN
6/7 Mar	0000-2359	SSB	ARRL DX SSB	1.8-28	RS+Power
10 Mar	2000-2130	CW	RSGB 80m Championship	3.5	RST+SN
13 Mar	1400-2000	CW	AGCW DL QRP	3.5-28	RST+SN+Category+Member No.
13/14 Mar	1000-1000	CW	RSGB Commonwealth Contest	3.5-28	RST+SN
18 Mar	2000-2130	SSB	RSGB 80m Championship	3.5	RS+SN
20/22 Mar	0200-0200	RTTY	BARTG RTTY	3.5-28	RST+SN+Time
27/28 Mar	0000-2359	SSB	*CQ* WW WPX	1.8-28	RS+SN

VHF Contests

Date	Time	Mode	Contest	Bands	Exchange
2 Mar	2000-2230 Local	All	RSGB 144MHz Activity / Club Championship	144	RST+SN+Locator
6/7 Mar	1400-1400	All	RSGB 144/432MHz	144/432	RST+SN+Locator
9 Mar	2000-2230 Local	All	RSGB 432MHz Activity	432	RST+SN+Locator
14 Mar	1000-1200	All	RSGB 70MHz Cumulative	70	RST+SN+Locator+QTH
16 Mar	2000-2230 Local	All	RSGB 1.3/2.3GHz Activity	1.3/2.3G	RST+SN+Locator
23 Mar	2000-2230 Local	All	RSGB 50MHz Activity	50	RST+SN+Locator
30 Mar	2000-2230 Local	All	RSGB 70MHz Activity	70	RST+SN+Locator

By Tim Kirby, G4VXE, Willowside, Bowbank, Longworth, Abingdon, Oxfordshire OX13 5ER. E-mail: tim@g4vxe.com

70MHz CW, 2003

The number of stations active during the event was higher than in 2002, with 26 stations across G, GW, GM and EI appearing in the logs. A number of entrants commented that well-known callsigns were absent this year. QSO totals and the number of entries were much reduced. Although activity reduced as the event progressed, 10% of contacts took place in the last hour, showing that there were still stations to be found.

Conditions were generally rated as 'average', with the usual 70MHz QSB. Entrants will notice that their claimed scores have been reduced. This was mainly due to logging errors on the longer distance QSOs.

Congratulations go to Phil, G3TCU, who repeats his 2002 success. Second place was extremely close with the honour eventually going to Martin, G3UKV. Clive, GM4VVX/P, took the 'single operator others' section from his remote location. These stations will receive certificates. A useful check log was received from GW3HWR.

Roger Dixon, G4BVY

SINGLE OPERATOR, FIXED

Pos	Call	Loc	QSOs	Score	Mults	Total
1*	G3TCU	IO91QE	17	2675	16	42800
2*	G3UKV	IO82RR	17	1962	13	25506
3	G3JYP	IO84SN	15	2456	10	24560
4	GM4AFF	IO86ST	7	2382	7	16674
5	G3IKR	IO82XF	11	1665	10	16650
6	G3XPU	IO92HM	7	1092	9	9828
7	G0UPU	IO91AX	8	728	8	5824

SINGLE OPERATOR, OTHER

1*	GM4VVX/P	IO78WA	3	565	4	2260

MAY 144MHZ, 2003

Weather for this contest was 'normal'. Normal for an RSGB contest, that is: high winds, rain, thunderstorms and high levels of static! Despite that, a number of groups made the effort to go out portable and were rewarded by some reasonable DX. There was no repeat of last year's east / west battle in the Multi-op section this year, with the East Coast stations taking the top four places. Congratulations to the Blacksheep CG, M0BAA/P, the winner of this section. In the single-op section Roger, G3MEH, took the top spot again, with Jonathan, M5FUN, runner up, despite only arriving back in the UK on the afternoon of the contest.

Congratulations also go to GM4WLL/P, G7RAU and MM0FVC/P. Also to PE1EWR as the leading overseas entry and 2E1GUA as the top placed low power single operator. There were a number of bad signal complaints received for this contest, and these are being discussed with those involved.

Pete Lindsay, G4CLA

SINGLE OPERATOR OTHER

Pos	Call	Loc	QSOs	Mults	Total	Best DX	Dist
1*	GM4WLL/P	IO85NR	114	70	2045890	G7EUA	588
2*	G8PNM/P	IO93FE	110	59	886888	F1MPQ	485

SINGLE OPERATOR FIXED

Pos	Call	Loc	QSOs	Mults	Total	Best DX	Dist
1*	G3MEH	IO91QS	250	81	4589541	DK1FG	865
2*	M5FUN	JO00DX	135	54	1272456	DF0CI	692
3	G0RNP	JO01EK	134	67	1265228	EI5FK	617
4*	PE1EWR	JO11SL	61	39	660075	MM0FVC/P	630
5	G8HGN	JO01FO	61	34	447134	DF0CI	676
6	G3YDY	JO01FQ	45	29	208713	DL3YEL/P	556
7	2E1GUA	JO01FR	33	32	86912	G4RRA	320
8	M0ZZO	JO01PW	18	12	33840	DF2VJ	492
9	MU0FAL	IN89RL	8	8	19464	G4ZAP/P	468
10	G6UBM	JO01CE	15	11	11550	GW5NF/P	234
11	M0WYE	JO01LE	9	7	5677	G8NJA/P	332
12	M3KGC	IO93FJ	4	5	1890	G4ZAP/P	202

MULTI OPERATOR

Pos	Call	Group	Loc	QSOs	Mults	Total	Best DX	Dist
1	M0BAA/P	Black Sheep CG	JO01KJ	590	111	21,645,111	OE5XBL	963
2	G4SIV/P	Five Bells	JO03CE	451	110	17,729,360	OK1KVK	918
3	G4ZAP/P	A1 CG	JO02QV	414	92	13,031,616	OL7C	834
4	G0VHF/P	Colchester CG	JO01HW	409	98	11,581,346	F6FHP	-
5	M1BQY/P	Trowbridge & DARC	IO91BJ	338	107	8,431,172	GM0HTT	861
6	G8NJA/P	Torbay ARS	IO80DQ	243	94	6,832,954	DK3EE	861
7	G6COL/P	Lincoln SW Club	IO93PH	140	70	1,659,070	DF0WD	630
8	G3YNN	Herstmonceux Megacycles	JO00EU	22	18	53,334	F5SE	318

1st 144 MHz BACKPACKERS CONTEST, 2003

The new Backpackers' season got off to a cold and windy start with this contest. Several entrants reported that the wind was strong enough to give them problems controlling the direction of the antenna. There was some DX available and almost half of the entrants managed to break the 500km barrier.

The standard of logging was extremely variable. Four stations managed not to lose a single point during adjudication - well done. On the other hand, six stations had the misfortune to lose between 20% and almost 28% of their claimed score. For one station, this was mainly due to misreading the rules and starting one hour early at 1100BST rather than 1100GMT. Please check the rules before the contest! The average loss of points was 12%.

Congratulations to the following stations for winning their respective sections: GW8ZRE/P (10W Single Operator); G4HLX/P (3W Single Operator); M0AFC/P (10W Multi Operator); GW5NF/P (3W Multi Operator).

All winners and runners-up will receive certificates. Thank you to G7ANV/P and G6ZME/P for their very useful checklogs.

Ian Pawson, G0FCT

10W SINGLE OP

Pos	Call	Loc	Dist code	QSOs	Mults	Total	Best DX	km
1*	GW8ZRE/P	IO83JA	LL	100	75	1176675	ON1LPA	684
2*	G0PQF/P	JO01AX	SG	45	54	413046	MM0FVC/P	463
3	G3IZD/P	IO84KD	LA	37	42	301014	M5FUN	421
4	G4RQI/P	IO94JF	YO	36	42	267498	G8NJA/P	429
5	M0BAO/P	IO81PH	BS	30	35	172935	GM4WLL/P	491

3W SINGLE OP

Pos	Call	Loc	Dist code	QSOs	Mults	Total	Best DX	km
1*	G4HLX/P	IO82NN	SY	61	58	503672	GM4VVX/P	612
2*	GW0PZO/P	IO83ID	LL	75	53	446366	ON1AEN	543
3	G1ATZ/P	IO82KV	SY	43	36	180864	M0BAA/P	320
4	G0BVW/P	IO91SW	LU	32	40	180800	MM0FVC/P	456
5	G1WKS/P	JO01ED	TN	31	39	176358	GM4WLL/P	553
6	GI7JYK/P	IO74BS	BT	16	26	99684	M0BAA/P	586
7	M0BHE/P	IO81JD	TA	17	25	67525	G4SIV/P	325
8	G8XQS/P	IO94AO	DL	15	23	53751	G8NJA/P	451
9	G6BHB/P	IO90LU	PO	12	17	25024	G4ZAP/P	281
10	G7ARW/P	IO83RP	PR	12	13	9919	M3SKI/P	127

10W MULTI OP

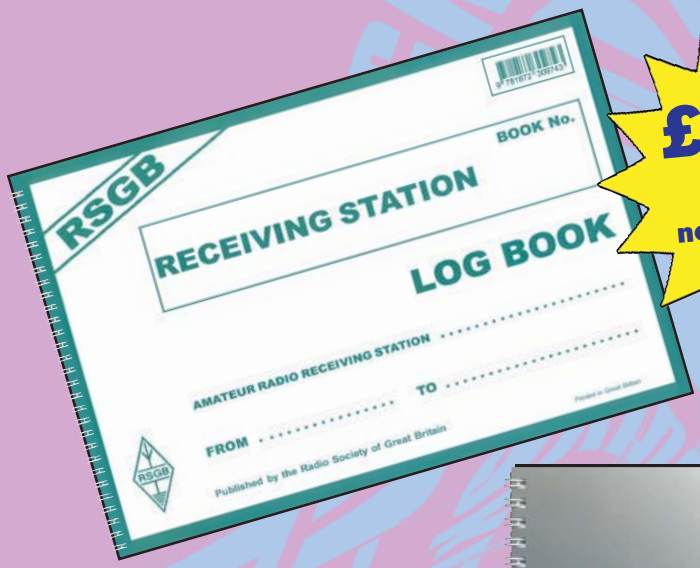
Pos	Call	Loc	Dist code	QSOs	Mults	Total	Best DX	km
1*	M0AFC/P	IO84SA	LA	95	81	1626156	F5CT	671
2*	G3BPK/P	IO83PN	WN	56	55	423335	PA0PVW	596
3	M1LOL/P	IO93AF	SK	41	46	263028	GI4OWA	398
4	G8NWM/P	IO92TR	PE	37	43	233361	DO3VG	574

3W MULTI OP

Pos	Call	Loc	Dist code	QSOs	Mults	Total	Best DX	km
1*	GW5NF/P	IO81LS	NP	58	53	484579	ON1AEN	483
2*	G0HDV/P	IO93UK	LN	50	55	452925	GM4VVX/P	563
3	G0RMX/P	IO82TA	WR	51	55	386760	ON1AEN	444
4	M1BAR/P	IO83XH	SK	46	44	208340	PA0PVW	547
5	G4HUN/P	JO02AA	SG	35	41	170888	GM4WLL/P	454
6	M0DBX/P	IO90NX	GU	25	33	128271	MM0FVC/P	553
7	G3LRS/P	IO92IQ	LE	24	31	84258	MM0FVC/P	361

Checklogs: G7ANV, G6ZME.

Stewart, GM4AFF, operating GZ7V from Shetland.



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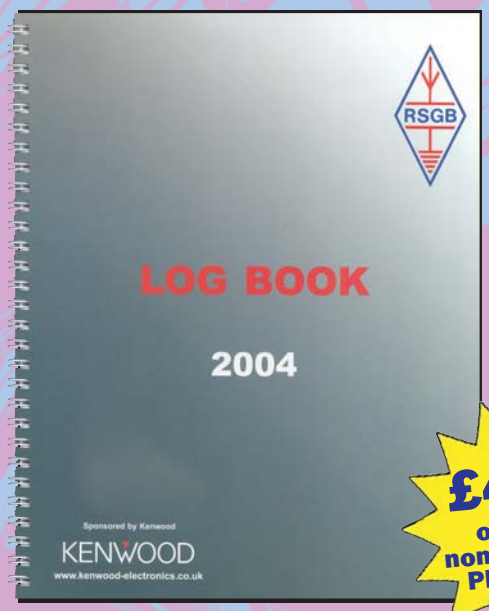

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Purley, Surrey CR8 1EZ. E-mail: g3fpk@compuserve.com

VHF/UHF

This month, Norman Fitch discusses 'firsts' and 'furthests' records and looks at some new VHF trans-Atlantic beacons.

At the start of another year most of us look back on what we achieved in the previous one and several readers sent detailed reports summarising their activity. 2003 was a fascinating year, which brought periods of excellent tropospheric, auroral and Sporadic E (Es) propagation. Many distance (QRB) records were broken and a number of 'firsts' claimed. These events were covered in as much detail as space allowed but for the bigger picture we need to refer to other sources, such as specialist publications and information posted on websites on the Internet.

The quarterly *DUBUS* magazine is an invaluable source of data recording contacts made in auroral, tropospheric, Sporadic E openings and meteor showers. For example, the maps published illustrate where the main reflecting points were in 2m Es events and sometimes reveal a double-hop phenomenon. In reports of auroral QSOs the information that contributors give about beam headings is revealing. A recommended service on the Internet is Derek Gilbert's, G0NFA, website - see the list - where he publishes contributors' lists of DX worked in meteor showers, auroras and other openings.

On the subject of records, Chris Bartram, GW4DGU (IO71), is concerned that, with the amalgamation of the RSGB VHF Committee into the Spectrum Forum, some of its records could get lost. He found that UK firsts and distance records reported on the Internet seem very out of date. He writes, "Those of us interested in DXing on the VHF and UHF bands have no organisation to represent our interests, unlike the microwavers, ATVers, Raynet, satellite operators and even HF DXers. If we don't organise as a group, there is a serious possibility that at the very least we could have pressure from other users on parts of the bands we currently occupy."

During my time as a member of the VHF Committee there were frequent requests from special interest groups asking us to allocate frequencies for everything from model control to horizontal FM. New technologies, especially in the digital communications field, developed so quickly that it was impossible to consider such requests quickly even for the UK, never mind on an IARU Region 1 basis. So quite often we just endorsed what had become *de facto* operation, an example being the use of 144.370MHz as the FSK441 random calling frequency.

Claims for firsts and 'furthests' will continue to be published in VHF/UHF so that they can either be confirmed or challenged. Tommy Björnström, SM7NZB, is the official keeper of VHF/UHF/SHF distance records but has a new website from that printed in the October 2003 VHF/UHF - see the list. Now that Croatian amateurs have access to 4m, there are frequent claims for firsts as reported later so if anyone is keeping such records please let me know.

PUBLICATIONS

Issue 4/2003 of *DUBUS* magazine includes 14 pages devoted to the October and November auroras and eight pages to the massive Es opening on 2m on 22 July. Volker Grassmann, DF5AI, discusses double-hop Es on 2m and suggests the possibility of ground reflection by lakes and rivers. There is a lot of very interesting information on his website - see the list. Five pages are devoted to the great tropo opening of 3 August. The UK agent for *DUBUS* is Roger Blackwell, G4PMK (QTHR), and dubus@marsport.demon.co.uk is his e-mail address.

The winter edition of the quarterly *VHF Communications* magazine features an article by Eugen Berberich, DL8ZX, on the omni-directional HO Loop antennas for 6m, 2m and 70cm manufactured by M² Inc in the USA. These can be stacked for increased gain. Andy Barter, G8ATD, edits the magazine which is published by KM Publications, 63 Ringwood Road, Luton LU2 7BG and there is a website - see the list.

THE ANNUAL TABLE

Congratulations to Bryn Llewellyn, G4DEZ (JO03), who was first in the 2003 Annual table by a considerable margin. I propose to run the table again this year and hope that a few more of you will enter although it's doubtful that we'll ever see 30 participants like we had in the past. The rules remain the same as those summarised at the end of the table. The district code list was not published in *RadCom* this year so please refer to the list on page 56 in the January 2003 issue.

SOLAR AND GEOMAGNETIC DATA

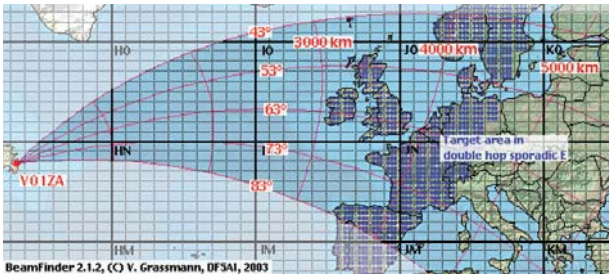
Solar activity appears to have settled down and in the 30 days to 13 January the average daily 10.7cm radio flux

ANNUAL VHF/UHF TABLE

JAN TO DEC 2003 - FINAL PLACINGS

	50MHz		70MHz		144MHz		430MHz		1.3GHz		Total
Callsign	Dist	Ctr	Dist	Ctr	Dist	Ctr	Dist	Ctr	Dist	Ctr	Points
G4DEZ	96	69	37	7	107	32	55	13	24	10	450
G3FIJ	36	31	40	4	60	11	24	4	-	-	210
M5MUF	22	42	34	8	48	19	-	-	5	3	181
G6TTL	5	30	-	-	59	14	17	10	6	2	143
G4APJ	22	18	-	-	45	8	38	9	-	-	140
M3CLY	4	12	-	-	14	8	5	2	-	-	45
G8RWG	-	-	-	-	27	18	-	-	-	-	45
G1UGH	2	10	-	-	6	2	-	-	-	-	20

The District Codes were the 124 listed on page 56 in the January 2003 RadCom.
Up to 6 different GI stations and up to 3 different GM stations in each Scottish district were counted. Countries were the current DXCC ones plus IT9. The deadline for the first 2004 entries is 9 March.



The map shows the location of the new 2m Newfoundland beacon VO1ZA and the target area for multi-hop Es across the North Atlantic.

REPRODUCED WITH PERMISSION FROM VOLKER'S, DF5AI, WEBSITE, WITH THANKS.

was 121.4 units. The minimum value was 101 on 15 December and the maximum of 142 was recorded on the 23rd. The daily sunspot numbers were below 100 on 22 days with a minimum count of just 15 on 30 December and a maximum of 152 on the 22nd. Only 18 new regions were observed. Geomagnetic activity declined considerably and the middle latitude A-index at Fredericksburg averaged 10.2 with a minimum value of just one on 19 December and a maximum of 20 on 10 January. Such activity tends to minimise around the winter solstice and any auroral propagation is therefore confined to northerly latitudes.

BEACON NOTE

DF5AI reports that VO1ZA is a new Canadian beacon on 144.400MHz in Newfoundland. It is situated in the middle of a turkey farm with a clear view of the North Atlantic Ocean through the mouth of Conception Bay on the south coast. The transmitter uses the 250W PA from the defunct VE1SMU transmitter and the antenna is an 11-ele Cushcraft Yagi about 90m ASL pointing at 60° true bearing. The latitude and longitude given equate to a locator of GM37JS. It was placed on air at 1330UTC on 19 October 2003. This project was realised by the Marconi Radio Club of Newfoundland and the Bacalieu Amateur Radio Klub and is an important part of the 2m trans-Atlantic beacon project. Reception reports should go to Frank Davis, VO1HP, at volhp@rac.ca and the latest information can be found on DF5AI's website.

MOONBOUNCE

Joe Kraft, DL8HCZ, e-mailed the details of this year's European Worldwide EME Contest sponsored by *DUBUS* and the French national society, REF. The first weekend is 6/7 March for 432MHz, 2.3GHz and 5.7GHz and the second weekend, 27/28 March, is for 144MHz, 1.3GHz and 10GHz, both 48 hour sessions from 0000-2400. The aim of the event is "…to encourage world-wide activity on moonbounce. Multipliers are DXCC countries plus all W/VE/VK states." There are several categories and the full rules are in *DUBUS* Issue 4/2003.

Howard Ling, G4CCH (IO93), only managed a few hours of 23cm operation in December due to high winds. On the 11th he completed on CW and SSB with GW3XYW when Stuart was testing his Septum feed. On the 14th he completed on CW with W5LUA, SK0UX, VE6TA, IK3COJ, DL4MUP, WA6PY, VA7MM and F2TU and with I0UGB on SSB.

GW4DGU writes about 70cm activity after making his first EME QSO on the band in 21 years. "The success of the little two Yagi antenna suggests that for the frustrated EME-er the concept of 'guerrilla EME' on 432 is a distinct possibility. The idea of putting-up a two or four Yagi array on a temporary support just during EME sked weekends could be quite attractive to some people - particularly those with the electronics, and a morbid fear of neighbour / planning reactions! Even with a few hundred watts, it would be possible to work some of the bigger stations on CW, and probably most 2 and 4 Yagi stations using JT65. Signals on 432 tend to be significantly stronger than on 144. Certainly the 'big guns' are significantly louder on 70cm than on 2m. Also modest antennas make 'handraulic tracking' easy. There's no need to think of complex (and expensive) antenna positioners." On 70cm over the December activity weekend he got his four Yagi array working and completed with DL9KR and HB9Q. He can usually detect his echoes using the Echo program in WSJT.

The following news is from the January *432 and Above EME News*. Peter Rackham, G3IRQ, is a new station on 23cm but only QRV when he can see the Moon as he uses a TV camera for tracking until he gets his dish under computer control. Peter Blair, G3LTF (IO91), found conditions on 70cm in the December activity weekend good with slow libration and little Faraday fading but, due to late night operating times and gales, activity was low. Tests on 13cm with OH6NVQ were incomplete so Peter says he must get some more power on the band. He again asks about 13cm, "Why is there not more US activity? What's the problem?" On 23cm on 12 December he worked UR5LX (M/O) for initial 201 and next day DF3RU, F1ANH, LA8LF and SK0UX. On 70cm he spent a lot of time calling CQ with great echoes but no replies. On the 14th he completed with YU1EV and is pleased to take skeds on 13, 23 or 70cm any time the Moon is above 5° north declination.

Stuart Hall, GW3XYW (IO81), tested his 23cm Septum feed on 6 December and echoes were found immediately at respectable strength but there were no replies to his CQ calls. On the 11th he completed with G4CCH, on the 13th with OZ6OL* and on the 14th with JR4ZZS* and SK0UX*, high winds preventing further activity. The *Newsletter* is edited by Al Katz, K2UYH and is now available in .pdf format from the website - see the list.

BAND REPORTS

50MHz

Chris Gare, G3WOS, is considering holding a 6m barbecue at his Farnborough, Hants, QTH, probably on 8 August starting at midday with food served around 1700 and drinking through the evening. There would be a nominal fee to defray costs. There are plenty of hotels in the Farnborough area and the town is easily accessible by road and by train from Waterloo and Gatwick airport. Please contact Chris if you are interested: his e-mail address is chris@gare.co.uk and his telephone number is +44 (0)1252 520354.

The January issue of *Six News*, the quarterly journal of the UK Six Metre Group, includes the results of the 2003 Summer Contest and the regular must read 'What's on Six' column by Clive Davies, G4FVP. DL8HCZ writes about the VP9DUB (FM72OH) beacon in Bermuda; the 'DUB' suffix is because it is sponsored by *DUBUS*. The Tx runs 15W to a horizontally-polarised loop antenna 15m AGL and is on 50.026MHz. Ken Willis, G8VR, has an article on using WSJT modes on 6m for MS CW. Dave Toombs, G8FXM, ends his 'Digital Bits' column with "WSJT Stop Press. JT44 is now dead! In the latest beta release 3.0 Beta 4.1.1 it has been replaced by a new mode called JT65. It is hoped that JT65 will be a significant improvement for QSOs via EME and also on extremely weak tropospheric paths." There are further details on the website - see the list. *Six News* is edited by Chris Deacon, G4IFX, and membership subscriptions are handled by G8FXM (QTHR) whose e-mail address is secretary@uksmg.org

Ted Collins's, G4UPS (IO80), report for December shows 29 days with nothing to report. On the 11th there was evening Es propagation to southern Spain resulting is QSOs with EA5AJX (IM89), EA5AAJ (IM99), EH5CSL (IM98), EH5CHT (IM97) finishing with EH5FKX (IM98) at 2049 with fade-out at 2055. At 1100 on the 21st he worked LY2BH* (KO25) and copied the GB3LER beacon at S8 for a few minutes. SP4MPB was heard at S6 working Gs and EI3IO.

6 January was a productive day from the late afternoon and brought Es QSOs with IK0FTA*, IK0NOJ*, I0WTD and IW0HEX all in JN61,

METEOR SCATTER

In a contribution to the G0NFA Newsletter Charles Coughlan, EI5FK (IO51), reports 16 QSOs on 2m in the Quadrantids shower when ODX was SM5CUI (JO89) at 1861km on 3 January. He was using FSK441 mode and runs 150W to a 13-ele Yagi. Clive O'Hennessy, GM4VVX (IO78), found the Geminids shower not very good that far north and only completed one QSO with OH6ZZ (KP12) for a new grid on 14 December.

Jamie Ashford, GW7SMV (IO81), was QRV in the Geminids and completed six QSOs using FSK441 on 14-15 December with DL3LST (JO61), YZ7MON (KN05 and ODX at 1859km), SP4MPB (KO03), YL3DW (KO26 for a new country), 9A1CAL/P (JN82) and S51AT (JN75). He found the Quadrantids shower good and on 3 January completed on FSK441 with ES6DO (KO27 for ODX at 1968km and a new grid), OY9JD (IP62 for a new country), OH6ZZ (KP12 for a new grid) and LA0BY (JO59) and on the 4th SM0EPO (JO89 another new grid).

IW5DHN (JN53), IW0GPN (JN62), IK0EIE (JN61), IZ6BXV (JN72), IW4DGS (JN64), IK5RLP (JN52), IS0KEB (JN40) and finally 9H1AW* (JM75) at 1745. Robin Burrows-Ellis, M1DUD (JO02) sent a resumé of his QRP activity for 2003 and seems very pleased with the results. He concludes, "So I guess the moral of the 50MHz story is stick with it. Dead? Far from it, it's merely taking a nap!"

70MHz

The main news about 4m is that the Croatian amateurs now have access to the band. On 24 December Zeljko Ulip, 9A2EY, confirmed that the Minister of Transportation, Maritime Affairs and Telecommunications had authorised the new regulations with effect from the 26th. The power is defined as 10W, and not ERP as earlier suggested. From 0820 on the 26th Ivan Dobnik, S51DI, contacted 9A3AB then 9A2EY/P* both in JN75. He reports that S54M contacted 9A2EY/P* who was also worked by S53X and S57LM and that 9A2EY/P and 9A3AB worked each other. Check the 70MHz website for the developing story - see the list.

Back home, GM4VVX tried the first 4m contest on 11 January but only heard a few MS pings. In the last few minutes Clive heard GM4WJA but didn't work him.

144MHz

Gavin Stirling, GM0WDD/P, was QRV in the RSGB Affiliated Societies contest on 7 December from IO85RU, "just to give away a few points" but he ended up with his best-ever score of 71 contacts. Highlights were EI5FK (IO51), 12 PAs, an ON and two DLs, both in JO44 where DJ3LE was ODX at 786km. He used an FT-847, 200W amplifier and 9-ele Yagi with masthead preamp. During the week he had been flying between Edinburgh and Amsterdam and when 3000ft above the Edinburgh control zone the Dutch controllers were audible on 121.200MHz. He says this is not unusual as there is often a tropo path down the East Coast.

GM4VVX had auroral contacts on 7 December with SM, PA, DL, OZ and GM stations, mainly on CW and the next day with G and GM stations. The 10th brought contacts with LA, G, SM, OZ, PA and GW stations, again mostly on CW. The 20th saw a big event that started at 1700 bringing QSOs with SP, G, DF and SM stations but it faded quickly with a weak second phase at 2300 with an SM contact. There was a tropo opening on 4 January with deep QSB. G0UWK and G1SWH were worked.

GW4DGU sent a detailed summary of his operations on 2m last year which resulted in Chris working 43 countries in four continents and about 150 grids in 22 fields and 10 US states by various modes including a few via ionoscatter. On 5 December GW7SMV made nine SSB tropo QSOs with DL, F, HB9 and ON stations, ODX being HE2MM (JN36) at 890km.

DEADLINES

That's it for another month. The copy deadline for May is **9 March** and for June it's **13 April**. As always any relevant pictures you have will be most welcome, either colour prints or JPEG images via e-mail. My CompuServe ID is g3fpk and the telephone answering and fax machine is on 020 8763 9457. ◆

WEBSEARCH

GONFA NEWSLETTER	www.144mhz.co.uk
IARU R1 DX RECORDS	http://home.swipnet.se/telecom/esr/VUSHF/dxrecord.html
DF5AI	www.df5ai.net
VHF COMMUNICATIONS	www.vhfcomm.co.uk
RSGB VHF CONTEST COMMITTEE (DISTRICT CODES)	www.blacksheep.org/vhfcc/rules/04rules/frameindex.html (then 'Postcode Districts')
432MHZ NEWS	www.nitehawk.com/rasmit/em70cm.html
WSJT NEWS	www.vhfdx.de/wsjt/history.htm
4M WEBSITE	www.70mhz.org

Continued from page 91

RALLIES

6 MARCH 2004

CRYSTAL PALACE R & EC Spring Radio Fair – St John's Hall, Sylvan Road, SE19. OT 10.30am, £1 (inc free drink), under-16s free. C, local parking free. Bob, 01737 552 170. [www.members.aol.com/rfcburns]

7 MARCH 2004

BLACKMORE VALE ARS Valve Day – Youth Club Hall, Coppice Street, Shaftesbury, Dorset. OT 10am, admission free. LEC, C, TS, Internet, VMARS, BYLARA, clubs, HF station, valve radios, 405-line TVs, valve test gear, etc. Tony, 01258 860 741. [www.bvars.org.uk]

Vintage Valve Technology Fair – Newton le Willows, Merseyside, 5min from M6 jn 23. OT 9.30am, £2.50 accompanied wives & children free. CP free. Up to 120 stalls selling vintage wireless, valve Hi-Fi, classic Hi-Fi, gramophones, telephones, comms eqpt, valves, records (shellac 78, vinyl and CD), vintage TV, etc. VVT Holdings 01274 824 816, vvt@supanet.com [www.myciunka.supanet.com/VVTF2003 (case-sensitive)]

13 MARCH 2004

LAGAN VALLEY ARC Rally – Lagan Valley Hospital Conference Centre. OT 11am, TS, B&B, C, radio, computers, etc. Ron, GI4NTO, 028 92 601 941, ronnie@mccaughey2.freeserve.co.uk [www.gi4lkg@qsl.net]

14 MARCH 2004

ABERYSTWYTH Amateur Radio & Computer Rally – *** **New Venue** *** – Ray, 01970 611 853 or mwmg01@aber.ac.uk

BOURNEMOUTH RS 16th Annual Sale – Kinson Community Association Centre, Pelhams Park, Millhams Road, Kinson. OT 10 am, £1. TI via G1BRS on 144.550MHz, TS, B&B, SIG, computers, clubs, C. Olive & Frank, G0GOX, 01202 887 721.

WYTHALL RC Radio & Computer Rally – *** **New Venue** *** – Woodrush Sports Centre, Shawhurst Lane, Hollywood, on the A435, two miles from jn 3, M42. OT 10am, £1.50. TS, C, B&B, CP, TI on 145.550MHz. Martin, G8VXX, 0121 474 2077, or enquiries@wrcrally.co.uk [www.wrcrally.co.uk]

20 MARCH 2004

SOUTH NORMANTON, ALFRETON & DARC 4th Junction 28 QRP Rally – Village Hall Community Centre, Market Street, South Normanton, Derbyshire, fully signposted, five minutes from M1 jn 28 and the A38. OT 10am. B&B, SIG, outdoor FM, C, LB, WIN. Includes traditional QRP Rally pie & peas. Russell, G0OKD, 01773 783 394 or russel.bradley@ntlworld.com or Mike, M0RMJ, 01949 876 523 or mike.jeffs@ntlworld.com [www.qsl.net/snadarc/]

21 MARCH 2004

NORTHERN AMATEUR RADIO SOCIETIES' ASSOCIATION Norbreck Rally – Norbreck Castle Hotel Exhibition Centre, Queen's Promenade, North Shore, Blackpool. OT 11am, £3, OAP £1.50, under 14s free). TS, clubs, RSGB, RA, B&B, construction competition, TI on 145.550MHz, DF. Local accommodation. Peter, G6CGF, 0151 630 5790. [www.narsa.org.uk]

TIVERTON (Mid Devon) Radio Rally – Pannier Market, Tiverton, Devon. OT 9.45/10am, £1. TS, B&B, C, TI, CP free. club@g4tsw.freeserve.co.uk [www.g4tsw.freeserve.co.uk]

4 APRIL 2004

Northern Mobile Rally (Harrogate) – Harrogate Ladies' College, Duchey Road, Harrogate. OT 10.30am, admission by programme, £2.50. Gerald, G0UFI, 07734 478 080. [www.harrogaterally.co.uk]

18 APRIL 2004

West London Radio & Electronics Rally – Kempton Park racecourse, Sunbury-on-Thames, Middx. £3.50, under-16s free. TS, CP for 2000, DF, C, LB, TI on 144.550MHz, B&B, external seating & picnic areas. Paul, M0CJX, 01737 279 108, m0cjx@ntlworld.com [www.kemptonrally.co.uk]

YEOVIL & DARC 20th QRP Convention – Digby Hall, Hound Street, Sherborne. OT 10am. LEC, TS, B&B, C, CP free, TI on 144.550MHz via GB2LOW. Derek, M0WOB, 01935 414 452, or m0wob@tiscali.co.uk

23 – 25 APRIL 2004

CORNISH RAC 2004 International Marconi Day – [www.gb4imd.co.uk]

25 APRIL 2004

ALDRIDGE & BARR BEACON ARC 5th Annual Radio & Electrical Equipment Sale – Aldridge Community Centre, Anchor Meadow, Middlemore Lane, Aldridge. OT 10am, £1 inc free raffle. CP, C, RSGB book stand. Doug, G4LQY, 01543 571 269.

LOUGH ERNE ARC 23rd Enniskillen Amateur Radio Show – Killyhevlin Hotel, Enniskillen. OT 12 noon, £3. CP, C, LB, free B&B, radio, electronics, computers, TS. Herbie, GI6JPO, 028 6638 7761, hng@ntlworld.com

3 MAY 2004

DARTMOOR RC Radio Rally – *** **New Venue** *** – Tavistock College, Tavistock, Devon. OT 10.15/10.30am. CP, DF, TS B&B, C, TI on 145.550MHz, picnic facilities. Ron, G7LLG, 01822 852 586.

MID-CHESHIRE ARS Rally – Civic Hall, Winsford. OT 09.45/10am. CP, C. David, G4XUV, 01606 77787.

9 / 10 MAY 2004

DENBY DALE & DARS National Mills Weekend – Brian, G0BFJ, g0bfj@ntlworld.com [www.qsl.net/g4cdd and www.spab.org.uk/mills]

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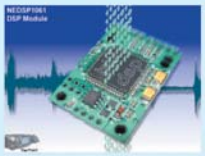

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By Simon Lewis, GM4PLM, Creoch Farm, Ochiltree, Ayrshire KA18 2QH. E-mail: uwave.radcom@rsgb.org.uk

Some interesting news this month, as signals from the ESA *Mars Express* are received by G3WDG • The 241GHz DX record has been broken again! • New microwave components from DB6NT.

Microwave

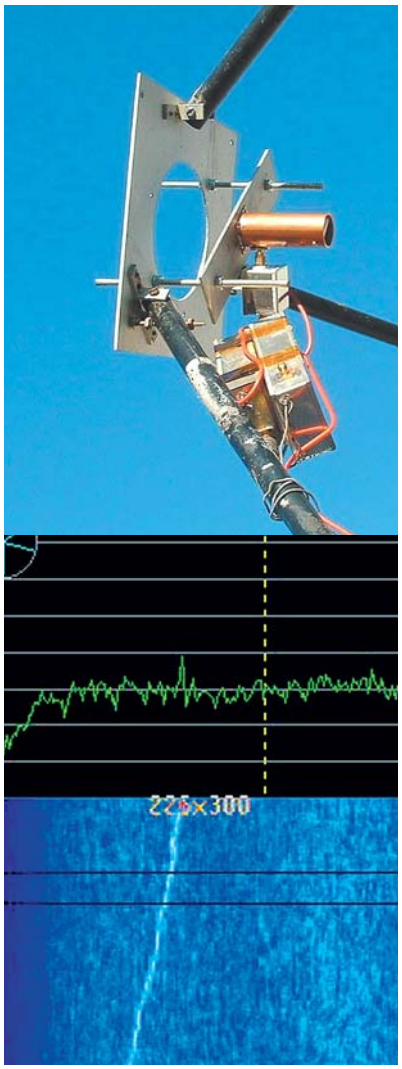
Winter has us in its grip again as I write this, and it is certainly not a time to be portable on the hills just a few miles to the south of my home in Scotland. But this type of weather certainly reminds us that we should extremely vigilant and prepared, should we go out portable, even on much lower ground.

If you are one of the adventurers who do brave the weather, please ensure you are well prepared. The news regularly carries details of unwary people who get into difficulties due to being ill-prepared. Please don't become a news item! Of course, sitting in front of the fire here on the farm sends the mind into warmer weather and the thoughts of spring. Make this year different, build for a new band, operate in some of the contest and activity periods but, above all, get out and enjoy the bands.

SIGNALS FROM MARS ORBIT

Using what he described as "just a quick throw-together" system, Charlie Suckling, G3WDG, has received a signal in the UK from the European Space Agency's *Mars Express* spacecraft. Unfortunately, the *Beagle 2* lander it carried was lost on landing during the Christmas period, but Charlie reports he heard the *Mars Express* signal on X-band (8.4 GHz) on 9 December using a 3m-diameter dish. In a message to James Miller, G3RUH, who provided him with advice on setting up his equipment, Charlie said his system noise factor was about 1dB, and he used James's S-Band 2.25-turn helix, scaled to 8.4GHz, as the feed (LHCP). Signals seemed very consistent for about two hours, the signal level was very approximately 0dB S/N in 2.5kHz. G3WDG also adds that it was not too hard to locate the signal, after about 10 minutes of searching ±100kHz and tweaking his azimuth and elevation settings.

In mid-November, a team of German amateurs was able to copy the *Mars Express* signal from a far more sophisticated setup in Bochum, Germany, using a 20m parabolic antenna. Reception of *Mars Express* provided a test run for the facility, which will serve as the ground control station for AMSAT-DL's *Phase P5-A* Mars orbital mission, planned for 2007. AMSAT-DL President, Peter Gülzow, DB2OS, said it was the first time ever that a signal of an interplanetary deep-space probe was received in Germany. "It was probably also the first time ever that such a signal was received by amateur radio operators," he added. You can find a full report on the AMSAT-DL Web site.



***The equipment used by G3WDG for reception of the signals from* Mars Express.**

The signals as received on 12 January at about 1434UTC, showing the Doppler frequency shift.

YET ANOTHER 241GHz RECORD

That 241GHz record just keeps improving, and Brian, WA1ZMS, writes with news of his latest record extension! "We had some rather dry weather here in Virginia, and I just couldn't pass up trying to better our own DX record for the band. After shorting a battery while setting up, I thought we'd never make the QSO! No fire, just a melted plug on the cable end of the CW straight key. The new claimed record is 61.8km and here are some specifics: 3 December, 2003 at 0148UTC, W2SZ/4 (WA1ZMS op), locator FM07FM; W4WWQ/4, locator EM97XE - 61.8km. The weather at the time of the QSO was -6.1°C, dewpoint -17°C, relative humidity 40%, station pressure 876mbar. These weather conditions resulted in a total atmospheric loss of 0.541dB per km."

NEW MICROWAVE COMPONENTS

DB6NT has been busy over the past few months, and has introduced a number of new items to his sales lists. An 8.4GHz converter and preamp are now available, allowing you to listen for the Mars probe at home, like G3WDG. The IF is 1270MHz. There is also a new 10GHz solid-state PA available with an output of 50W; this will certainly get you heard on the band, but be prepared to sell the wife! Also a new range of MOSFET amplifiers for 23cm has been released, and is well worth looking at. You can find details of all the latest items on the DB6NT website.

NO NEWS...

No news yet on the arrangements for the UK Microwave Group (UKµG) and the details on how it will support the UK microwave community. These details are still being discussed with the RSGB, and I hope this column will be able to carry more news in future. The only real news is that the Society has agreed that the UKµG can provide the support of the 2004 contest calendar, and the programme for this has now been agreed. You can find more information on the website of the *Microwave Newsletter* editor, Peter Day, G3PHO. ◆

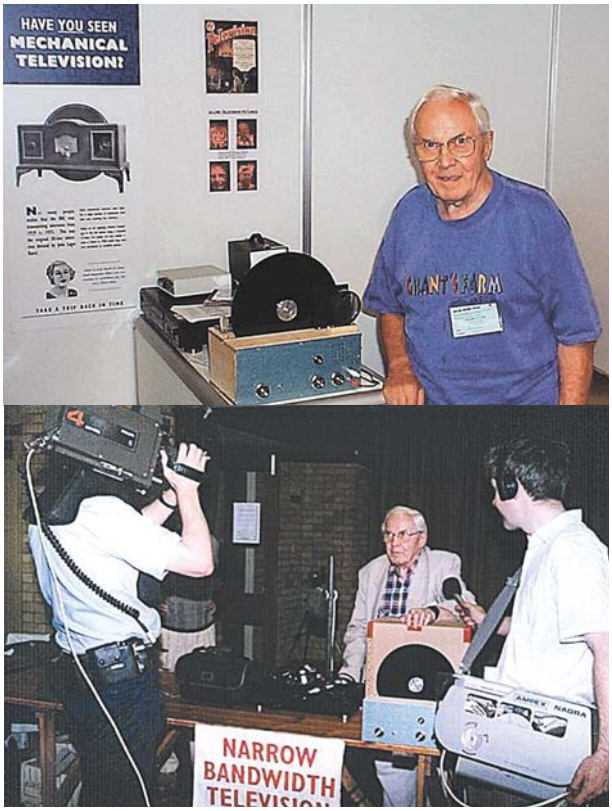
WEB SEARCH

MARS RECEPTION / AMSAT-DL	www.amsat-dl.org/p5a/reception_g3wdg.htm
DB6NT	www.kuhne-electronic.de/
UK MICROWAVE GROUP	www.microwavers.org
PETER DAY, G3PHO	www.g3pho.org.uk/

By Trevor Brown, G8CJS.
E-mail: chairman@batc.org.uk

ATV

The death of Grant Dixon, G8CGK, is reported with a short appreciation of his work. News of one operational digital repeater and one almost ready, the digital revolution is underway in the south-east. You are given advanced warning of the BATC BGM, and treated to some of the highlights from the TV magazines.



Two recent pictures of the late Grant Dixon, G8CGK, supporting two very different aspects of TV.

It is with great sadness that I must record the death of Grant Dixon, G8CGK, on 20 December 2003. Grant was the first BATC Chairman, and his interest in radio can be traced back to 1927 when, at the age of 11, he built his first radio receiver. Two years later, the first issue of the magazine *Television* appeared (later to become *Practical Television*). Grant bought it and was hooked. Within the next five years, he had built a 30-line mechanical-scan TV receiver, or 'Televisor', as it was known. After the war, Grant moved to Ross-on–Wye, where he became a schoolmaster and in his spare time built a receiver for the Alexandra Palace and Home Moss TV transmitters using surplus radar equipment. Grant was also keenly involved in slow-scan television and made many friends across the world. Grant was a pioneer - his help and enthusiasm touched us all.

WEB SEARCH

DATV INFORMATION	www.sr-systems.de/ www.adacom.org/index.html
BATC WEBSITE	www.batc.org.uk

DIGITAL TV – FROM GB3HV...

The Home Counties ATV Club experiments with Digital Television via the GB3HV repeater at High Wycombe continued on 3 January. In addition to being able to transmit digital pictures, it is now capable of receiving them. The first digital signals were received from G8GTZ and G8CKN over approximately 50-mile paths. The received signal level for an *analogue*, just-about-viewable, P1-grade picture, gave a P5-grade with *digital*, which is a near 'studio quality' picture. Currently the digital standard used is QPSK at a 4M symbol rate, with FEC 1/2. The digital transmission is significantly reduced in bandwidth compared with that used for current analogue ATV and also has the potential to reduce interference to other band users.

...AND FROM GB3TZ (ALMOST)

The Dunstable Downs Radio Club, which sponsored one of the first UK 23cm ATV repeaters, GB3TV, over 20 years ago, reports that it was now joined the digital revolution! While waiting for the issue of the NoV for its planned new 13cm repeater, GB3TZ, it has acquired one of the German Adacom DATV transmitter kits. This set of boards can be programmed to provide outputs in a number of different formats and data rates including DVB-S, which can use standard digital satellite FTA set-top receivers and also DVB-C encoding. Symbol rates between 5K and 40K can be selected with various FEC rates as well. The boards have low-level outputs on 23cm or 13cm and, in addition to the video stream, have one fixed test-card-type stream, full stereo sound and teletext capability. Initial experiments show that it is important to employ very linear 'linear' amplifiers to ensure that the transmitted signal bandwidth does not increase, but that a weak P2 signal in analogue FM terms can provide a digital P5 over the same path and with the same power.

BATC BGM IN MAY

The BATC annual get-together and BGM is again being held at the Shuttleworth Trust, Old Warden, Bedfordshire. There will be an informal get-together on the Saturday evening, 8 May, and the main event will be on Sunday, 9 May. It is open to non-members and the admission is free. There will be the usual trade stands, a full lecture programme and demonstrations which, I hope, will include at least one of the popular outside broadcast vehicles. See the BATC website for more details

IN THE MAGAZINES

CQ-TV 205 is now available and has a look back at the early days of Electronic News Gathering (ENG) by Peter J Stonard, as he compares the RCA TK76 and the Ikegami NHK1. Modern state-of-the-art equipment is reviewed by Mike Cox, in his report from IBC. Ian Bennett digs further into DATV. For the more adventurous, Brian Davis, GW4KAZ, goes maritime mobile with SSTV.

The German ATV magazine *TV Amateur* has also appeared. Although published in German, the technical articles are understandable, as a good circuit diagram always crosses the language barrier. In this issue is a beginners' frequency counter that works from 0.1 to 2.5GHz. The article is complete with a single-sided PCB layout, reproduced so it can be photo-etched at home. There is also an update on the DATV system designed by DJ8DW. The units are now complete and about to be despatched. Five of these are coming to the BATC so that the system can be evaluated. ◆

By John Heath, G7HIA/M3BBX, Chestnuts, Desford Lane, Kirkby Mallory, Leicestershire LE9 7QF. E-mail: g7hia@amsat.org

Something old, something new...

Be prepared for the launch of AMSAT *Echo* – information on the satellite is given here, together with news of the resurrection of *AO-27*. Read how you can help the ground controllers of *AO-27* by collecting telemetry data.

If you have never made a contact via satellite, this could be the year you have been waiting for. The soon-to-be-launched AMSAT *Echo* will have powerful transmitters capable of 8W which, from space, means 59+ signals received on the simplest of antennas. With FM voice and digital capability, using 2m and 70cm, there will plenty of enjoyment to be had. For the more experienced operators, and the experimenters, there will be PSK31, high-speed data and 2.4GHz downlinks.

Based on the highly-successful AMSAT Microsats, *AO-16*, *DO-17*, *WO-18*, and *LO-19*, launched in the 1990s, *Echo* makes full use of the advances in electronics and computing in the past 13 years. The satellite takes the form of a stack of aluminium trays bolted together to form a cube with 25cm sides. There is a tray is packed with electronics for each of the satellite subsystems, transmitters, batteries, computers, receivers, etc. On the outside, the cube is clad with six high-efficiency solar panels using triple-junction MCORE GaAs technology. At almost 27% efficiency, there is 20W of power generation to support spacecraft operations, and to enable *Echo* to operate in voice and digital modes simultaneously.

ON BOARD AMSAT *ECHO*

Richard Hambly, W2GPS, has given permission for me to take some highlights from his recent project status report, the full details of which can be viewed on the web, together with more pictures of the constructional details of *Echo*. These are interesting in showing how a satellite is constructed using the modular tray concept (which I believe was pioneered by Surrey Satellite Technology).

UPLINK AND DOWNLINK FREQUENCIES.

- Mode V/U
  145MHz uplink to the satellite, downlink 435MHz FM
- Mode L/S
  1.2GHz uplink, 2.4GHz downlink
- Mode HF/U
  29MHz uplink and 435MHz downlink

with several other combinations possible.

OPERATING CAPABILITIES

- Analogue operation including voice
- Digital store-and-forward using 9.6, 38.4, 57.6, and 78.8Kbps
- PSK31 repeater mode using 10m SSB uplink and UHF downlink
- Digital voice recorder
- Operates with voice and data simultaneously
- Active magnetic attitude control

ANTENNAS AND TRANSMITTERS

- VHF 18in whip on top
- UHF turnstile on the bottom, circular polarisation
- L- and S-band 'open-sleeve' antenna on the bottom.
- Two UHF transmitters with any power level from 1 to 8W

RECEIVERS

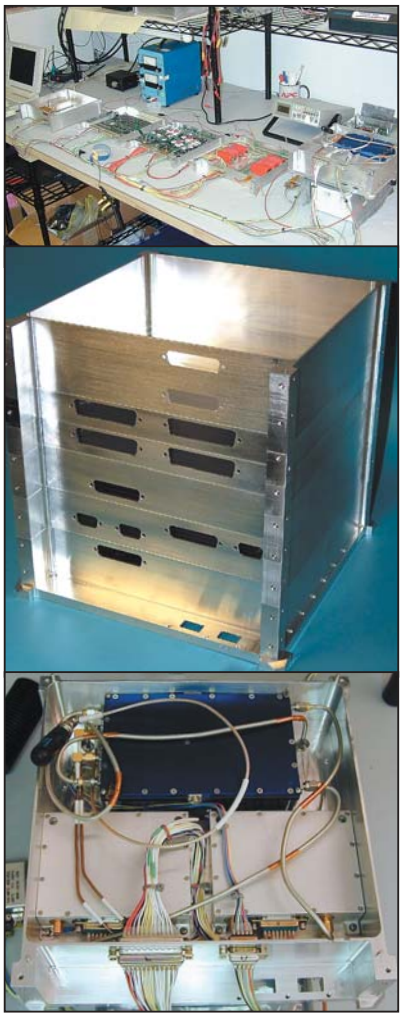
- Four miniature VHF/FM receivers weighing less than 40gm each
- A single all-mode receiver for 10m, 2m, 70cm, 23cm

GENERAL

Echo is due to be launched very soon on a converted SS-18 ICBM from the Baikonur Cosmodrome in Kazakhstan, at a cost of $110,000. If you are able to make a donation, you can enjoy operating through this satellite with that extra feeling of satisfaction which comes from knowing that you helped to get it launched. I will be happy to forward any donations, but by far the easiest way is to make a brief telephone call to Martha at the AMSAT North America office in Silver Springs, Maryland, on 001 301 589 6062, specify the dollar amount you would like to donate, and give Martha your credit card number. Alternatively, fax on 001 301 608 3410, or visit the website.

AO-27 IS BACK

Thanks to the major efforts of Chuck Wyrick, N1UC, N3UC and W4XP, the other ground controllers, this popular FM voice satellite is available once again, including during the hours of darkness. The operating schedule no longer uses the TEPR method, and works completely differently. Operating times are determined on board the spacecraft. As at 17 January, the analogue repeater was on for nine minutes followed by one minute of telemetry. To indicate when the analogue mode is about to switch on, there will be a 20-second burst of digital transmission. Whilst the batteries are being conditioned, the ground controllers need your help by receiving telemetry when the satellite is beyond range of their stations. Standard AX25 packet with the TNC in KISS mode will capture the data, and *AO27TLM* Version 1.1 will decode it. *AO-27* has a strong signal, and is easy to copy on 436.800MHz ± Doppler. Use the '/OT' command to process the data into a format usable by the controllers. Submit your files by e-mail. Decoding software and full details are available via the *AO-27* homepage. If you would like the information, but don't have Internet access, just send me an SAE. ◆



Top: Echo flight hardware powered up for testing in 'flat sat' configuration.

Middle: Echo's trays.

Bottom: UHF hybrid combiner (rear). Multi-mode receiver and two UHF transmitters (front).

WEB SEARCH

AMSAT-NA	www.amsat.org
***AO-27* home page**	www.ao27.org

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RG58CU, 5mm dia, 50 ohm stranded conductor	35p/m
RG1 74U, 2.3mm, 50 ohm Mini Coax	40p/m
RG11U,10.3mm, 75 ohm low loss Coax	£1/m
URM70,6mm, 75 ohm Tx grade Coax	35p/m
BT2002, 5mm, 75 ohm double screened Coax	35p/m
RG62AU, 6mm dia, 95 ohm Coax	50p/m
TV, 75 ohm, low loss Downlead	30p/m
MINI 8 low loss 7mm dia, 50 ohm coax	50p/m
POLYESTER (Dicrom type) 4mm GUY ROPE	30p/m
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RG223U	£1/m
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300 ohm Ribbon, HD USA Slotted type	65p/m
3 Core Mains/Rotator Cable, 5 amp	30p/m
6 Core Rotator Cable	50p/m
8 Core Rotator Cable	70p/m
Aerial Wire, light duty PVC coated	8p/m
Aerial Wire, medium duty PVC coated	10p/m
Aerial Wire, heavy duty PVC coated	25p/m
16swg HD copper	25p/m
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By Jeremy Boot, G4NJH.
E-mail: g4njh2@ntlworld.com

All that winter DX

Even though we are now passing the peak of this sunspot cycle, there is plenty of life left in it and the conditions as I write this is December 2003 are quite good, with 10m happily bringing home the bacon and even some Sporadic-E floating about, although it is not in season. So, by the time you read this, perhaps you couldn't do better than stay at home, switch on the rig and enjoy the DX which is floating about somewhere.

The traditional method of working DX is to *listen* regularly. Beginners to DX spend their time shouting at every distant station and clocking them up. This is great fun in its own right but, with the passing of time, comes a more selective approach and the pleasure is not just DX but that special station or newcomer that you want to work above all others. There is in this, as in everything else, a technique. I wanted to search the Internet for clues on this and all the practicalities of DX.

WHERE IS IT ALL?

So first, apart from trawling every band yourself or luckily landing on the very right spot, how do you find the DX? Well, join or watch a cluster. These can be found on packet systems, but they are available to all on Internet and they are interactive. You read what is there and you contribute to your colleagues worldwide too. Start with DXZone.com – a collection of sites with a very full series of subjects from propagation, software, technical reference, individual ham pages and in this case, DX Clusters.

CLUSTERS

Taking the home-grown first, look at the GM7MBC pages and log into the Spider DX Cluster which gives you real-time access. You are asked to log in, but no password is necessary. Updating is constant. On the pages you also have access to the Spider Software with various add-on patches. The view, assuming you have Java, is within a Windows shell; without Java, there is a simpler telnet window. Either way the result is the same as you would get with packet, which is the last time I used this sort of system myself. I like the ability (within the Windows window) to look up commands (which are a bit arcane if you are not familiar with them) quickly and all the usual commands such as distance and beam headings are available.

The history of the system is explained at some length: "Because of the gateway, GB7MBC gets users from around the globe at different times of the day and night. However, until recently, the cluster was only reachable from the Amprnet and not from the Internet. UK law did not allow direct connection from Internet addresses to amateur stations... However, the law was altered recently to allow Internet connection. It is now possible to connect to the cluster via telnet or by using a Web browser." Good. Thanks to everyone who made that work.

There are other clusters you can telnet to: PI5EHV-8, NC7J, NFDXA, CQRADIO Cluster (with a very pretty coloured display – includes CB info). The interest in different clusters is interesting rather than useful for operating. The US board NC7J shows you what it is like over there rather than over here but it has, for example, WWV messages and a search facility.

A good list of telnet sites (which work through Windows also) is to be found at the VE9DX site. If you're still not clear about what a DX Cluster is, read the Armscroft Communications pages, which I thought were very well written, clear and concise. The do's and don'ts of clustering are worth a glance. They give good advice.

NEWS AND CURRENT EVENTS

Having got the bug and seen and heard a few DX stations, you ought to know what the news is and who might be out there. QRZ.COM is a useful staging point for this as well as for callsign tracing. Databases abound on this site. See also the Buckmaster Ham Callsign pages.

425 DX AND DAILY DX

How can I ever have survived without digging into the wealth of information on DX-Central.com? Although not visually the most exciting site, it contains the 425-DX News bulletins from which GB2RS quotes each week. You can even have bulletins e-mailed to you. All the major (and not so major) DXpeditions are outlined. But, more than this, it unites into one site almost everything you could wish for: clusters, forecasts, nodes, statistics, news, analyses, WWV, archives. If you visit no other site, having read this article, visit this one. A subscription site also of value is the Daily DX site. But it doesn't come cheap.

Above: The GB7MBC DX Cluster page.

LISTENERS AND THE WIDER PICTURE

Not forgetting listeners (SWLs) and others who take their DX-ing beyond the usual amateur limits and like to listen around the globe to foreign radio, you could do no better than to start with Electronic DX Press from Australia. Apart from links, it has some interesting and varied articles: 'Audience Research for HF', 'Frequency Management with the HFCC', 'Broadcasting in Vietnam', and 'HF Digital Radio Transmission', to name but a few. For other DXing pages, try DXing Info, Wordwide DX Club, and HCJB, all of which have a variety of links and information.

TECHNIQUES AND GUIDANCE

I mentioned DX techniques earlier: try the highly individualistic N6HB for starters – 'The DX Years'. There is more too on contesting and other DX outlets. It's very informative and not preachy, covering every aspect of operation, preparation and technique.

Time and space have run out on us again. Enjoy some DXing as an operator or a listener. It's just one more facet of a an inexhaustably rich hobby with Internet as the guide. ◆

WEB SEARCH

DXZONE.COM	www.dxzone.com
DXZONE RESOURCES	www.dxzone.com/catalog/DX_Resources/Clusters/
PI5EHV-8, NC7J, NFDXA, CQRADIO see above under DXZone Resources	
GM7MBC	www.gb7mbc.net
VE9DX	www.ve9dx.xom
ARMSCROFT COMMS	www.armscroft.demon.co.uk/UKDXC/cluster.html
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By Don Beattie, G3BJ, Hares Cottage,
Woolston, Church Stretton, Shropshire SY6 6QD.

REGION 1 committee structures

The Chairman of the IARU Region 1 ARDF Committee, Rainer, DL5NBZ in the forest, during the Region 1 ARDF Championships in Poland.

This month, Don Beattie, the IARU Region 1 Secretary, focuses on the work of three of IARU Region 1's Committees: the HF, VHF / UHF / Microwave, and ARDF Committees.

As I mentioned in the 'IARU' column in October 2003, three significant IARU Region 1 Committees (EMC, Eurocom and the External Relations Committee) relate to work with the various international administrations that govern the climate in which amateur radio has to exist. In this context it is worth noting that IARU Region 1 has just signed a Letter of Understanding (LoU) with the ECC (Electronic Communications Committee) of CEPT. The LoU sets out a number of areas for cooperation between Region 1 and CEPT where the parties will work towards common European approaches on radio matters and will exchange information and hold meetings for this purpose. The LoU initially is for a three-year period renewable by mutual agreement. Commenting on the LoU, IARU Region 1 Chairman, Ole Garpestad, LA2RR, said "CEPT is a very important organisation in the regulation of the global radio spectrum. This Letter of Understanding reinforces the already positive and constructive working relationship between IARU Region 1 and CEPT".

Now I will continue with my description of other Committees in IARU Region 1 and some of their work. The HF, VHF / UHF / Microwave and ARDF Committees are three of the Committees concerned more with the internal issues of amateur radio in Region 1.

HF COMMITTEE

Chaired by Carine Ramon, ON7LX, the HF Committee seeks to agree and define HF technical and operating standards. Its recommendations are put to the three-yearly General Conferences of the Region, and voted on by all member societies of the Region present at the Conference.

The *HF Handbook* incorporates all the decisions and standards which are agreed in this way, and it is available at the Region 1 website (see 'Websearch' below). The index shows the breadth of its contents, including issues such as satellite and repeater operation on HF, use of amateur bands during emergencies, operating ethics, technical and operating standards and details of common licensing arrangements. In addition there is a section on HF contests, mainly for the benefit of national societies, giving guidance on the introduction of new contests, and the management of existing ones. The contest section of the HF Manager's responsibilities is covered by Tine Brajnik, S50A, as Chairman, HF Contests Sub-group.

Perhaps one of the more interesting issues under consideration at the moment by the HF community is the possibility of a new basis for HF band planning, and details can be found on the Region 1 website. The concept is to move from planning sub-bands by mode, to sub-bands defined by bandwidth of transmission.

Whilst most of the Committee's work is done by e-mail, HF Managers of the various national societies generally take advantage of being able to meet each year at the late-June Friedrichschafen Hamfair, to review progress on projects and plan for the next triennial conference.

VHF / UHF / MICROWAVE COMMITTEE

This Committee is chaired by Arie Dogterom, PA0EZ. There are a number of co-ordinators who support Arie, covering the areas of frequency allocations, satellites, propagation, records and beacons. Again, there is a *Handbook* available via the Region 1 website, covering a wide range of issues of interest to those who operate at VHF-and-above, and those in national societies with responsibilities in this part of the spectrum. Topics covered in the *Handbook* include frequency allocations and band plans, contests, propagation research, operating procedures, satellites, repeaters, beacons and technical recommendations. Members of the Committee again work by e-mail, and meet up to once a year to progress their work. UK amateurs holding Co-ordinator roles in this committee include Iain Philipps, G0RDI (VHF / UHF / Microwave Beacons Coordinator), and Graham Shirville, G3VZV (Satellite Coordinator).

The structure of each triennial Regional Conference reflects the importance of these two committees, in that a number of Conference sessions are held specifically on HF matters (Committee C4) and V-U-M matters (Committee C5), chaired by the relevant Committee Chairperson.

ARDF COMMITTEE

Whilst not one of the main spectrum committees, the Amateur Radio Direction Finding (ARDF) Committee performs an important role in coordinating and promoting ARDF activities in the Region. Particularly in Eastern Europe, ARDF has been seen as a way of attracting newcomers into amateur radio through this 'sport' activity, and the challenge of ARDF continues to attract many enthusiasts. As an example, at the 14th Regional ARDF Championships, held in Poland in September 2003, some 235 competitors from 20 countries took part.

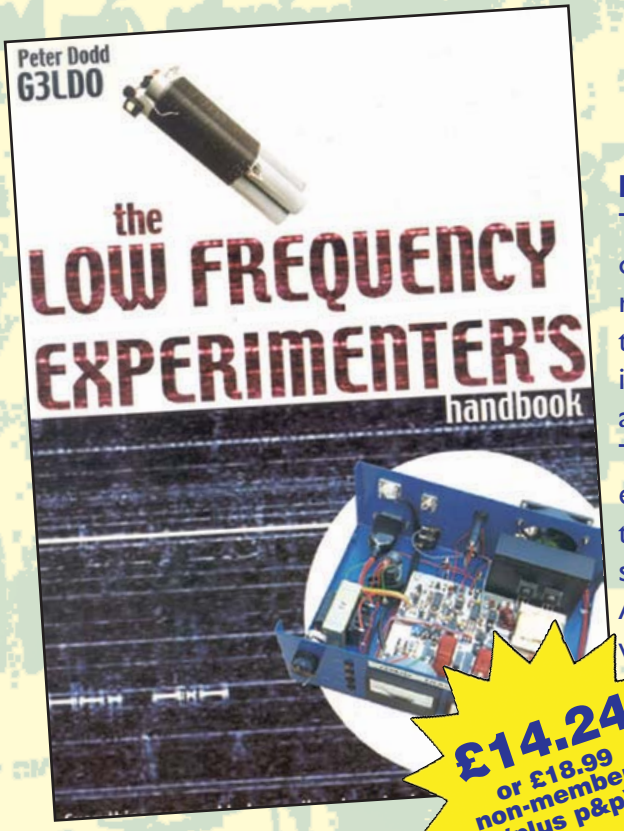
The ARDF Committee, chaired by Rainer Flosser, DL5NBZ, co-ordinates events, and provides guidance to organisers of such events. Again, its policy recommendations are considered and voted on at the triennial Regional conferences. Reports of ARDF events are on the Region 1 website, including a comprehensive report of the 2003 Championships in Poland, with pictures.

It is worth noting that, in the European context, ARDF Championships are generally run on the 144MHz or 3.5MHz bands, with 1.8MHz (popular in the UK) not featuring.

In the next 'IARU' column, I will be able to report on the IARU Region 3 Conference, being held in February 2004 in Taipei, Taiwan. ◆

WEBSEARCH

IARU Region 1 www.iaru-r1.org



The Low Frequency Experimenters Handbook

by Peter Dodd, G3LDO

The LF Experimenter's Handbook has been written to meet the needs of amateurs and experimenters who have an interest in low power radio techniques below 200kHz. Most of the techniques described are targeted at those using the 136kHz band, but they are also of great interest to readers in New Zealand and Australia with the 183kHz band and the Lowfers in the USA on 180kHz.

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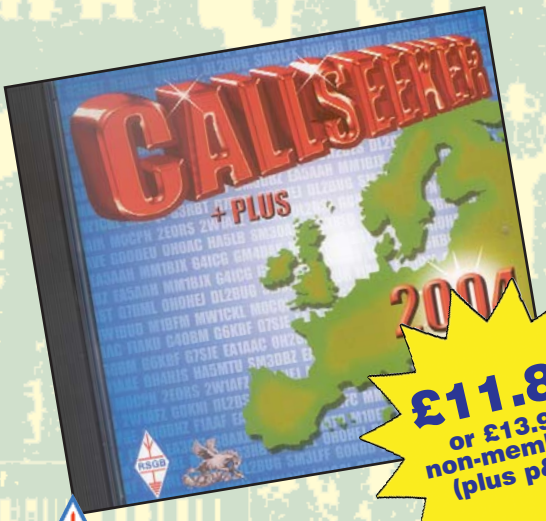

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By Mike Bedford, G4AEE.
E-mail: bedfordmd@aol.co.uk

This article is based on one written by the author for the *CREG Journal*. The Cave Radio & Electronics Group (CREG) is a special interest group of the British Cave Research Association (BCRA). Its members are committed to developing electronic equipment for use in cave exploration and research with particular emphasis on rescue communication. The *CREG Journal* is the world's premier publication on electronics in caving. Here you will find the problem described – can you solve it?

The gritstone challenge

Let's face it, most of the challenges in the world of communication have already been met. Certainly there still are challenges for the radio amateur, but they tend to be of the type which those with a more critical view of our hobby would describe as artificially-made. For example, you might aspire to contact Australia on 136kHz but the fact is, communication between the UK and Australia is trivially simple if you employ a more suitable method such as picking up the phone. This begs the question, "Are there any genuine communication requirements that can't be fulfilled using one method or another?". A recent request to the Leeds Raynet group by British Transport Police revealed just such a need. Here, I describe the problem, our work to date, and conclude by setting a challenge. So, if you fancy getting to grips with a knotty problem, what's more one which is unusual, a solution to which would provide a public service, read on.

THE REQUIREMENT

In the event of a serious incident in a railway tunnel, effective communication would be an essential element of any rescue. With this in mind, the British Transport Police had tested their hand-held VHF radios in the Standedge Tunnel, which runs under the Pennines of Northern England, and discovered that the range was severely limited. In particular, communication to the mid-point of the tunnel could not be achieved.

With this in mind, British Transport Police contacted Leeds Raynet to ask for their assistance. Although the initial request related to communications along the tunnel, most probably using VHF or UHF radios, Raynet's Chris Trayner, G4OKW, suggested that cave radios (LF inductive communication systems - see [1] for more details) should also be tested as a means of providing a through-rock link. Both ends are visible (just) from any point in the perfectly-straight tunnel and there is a maximum of 190m of overburden (see **Fig 1**). Surely providing communication, either along the tunnel or through the rock, would be trivially simple. How wrong that perception proved to be!

Although this article refers specifically to work in Standedge, we are keen to provide a solution for tunnels in general so, wherever possible, I've tried to generalise our findings.

ALONG THE TUNNEL

Our tests into communications along the tunnel took place in one of the single-bore tunnels which lie to the south of the double-bore tunnel which carries the main line from Leeds to Manchester. Since this is a disused tunnel, and the rails have been removed, there was no opportunity to try coupling the radios to rails to achieve guided communication. Although this technique may provide greater range, we were keen to prove techniques which would work even if rails were not present. Certainly, any railway accident would, by definition,

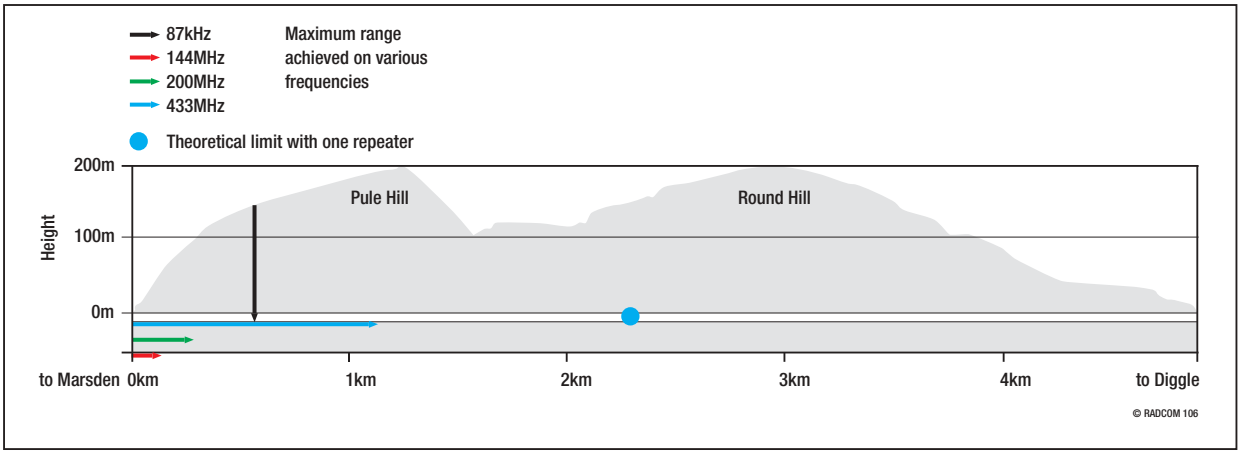


Fig 1: Profile of the Standedge tunnel.

occur in a tunnel with rails. However, we wanted to be able to provide communications, even if the rail was damaged (and hence no longer continuous) by the incident.

For each of the tests, a fixed station was set up at the Marsden portal and a mobile station went into the tunnel, on foot, from this portal. At regular intervals into the tunnel, the mobile station attempted to make contact with the fixed station.

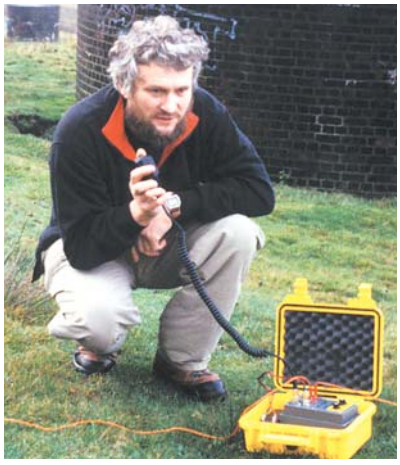
VHF (144MHz)

Tests on 144MHz were particularly unsuccessful. Although this was very much a secondary test and, accordingly, we had taken only minimal equipment, communication failed at around 150m into the tunnel. Using the Network Rail's 'Brunel' handsets, which operate around 200MHz, the effective range was about 300m. In view of the much greater range achieved at UHF, this line of investigation wasn't pursued any further.

UHF (433MHz & PMR 446)

At UHF, tests were carried out at 433MHz and in the licence-free PMR 446 band (446MHz). A variety of FM equipment was used, culminating in 35W into a 10-element Yagi (10dB gain) for the fixed station at the portal and 5W into a 10-element Yagi for the mobile station in the tunnel. This is equipment which would, on the surface, provide reliable communication over any line-of-sight path and, under favourable conditions, achieve a range of several hundred kilometres. In the tunnel, though, things proved to be very different.

Despite the fact that the Marsden portal could easily be seen (in fact the more distant Diggle portal was visible as a dot of light), a maximum range of a little over 1km into the tunnel was achieved. What's more, communication failed very rapidly and little additional range was achieved by increasing the power and/or antenna gain. With omni-directional whip antennas and a power of 1W on 70cm or 0.5W on PMR 446, strong clear signals (RS 59) were exchanged at just short of 1km. At 1150m, however, a 70cm signal was barely intelligible and not registering on the signal strength meter (RS 10) even though the power had been increased to 35W. Swapping the whips for Yagis allowed reliable communications to be established at 1150m but not much further – 1227m was the furthest point at which a semi-reliable link (RS 44) was established.



Communications from above: the Heyphone in use.

Having established on our first trip to Standedge that the limit of communications was likely to be in the region of 1km, for our second set of tests we obtained a repeater. This was placed at 1074m into the tunnel and the mobile station continued further into the tunnel. The limit of effective communication was from the mobile station at 2385m, back to the repeater. Unfortunately, shortly after installing the repeater, other services who were conducting exercises in the tunnel required our fixed station to move from the Marsden portal. Accordingly we never succeeded in establishing communication from 2385m to the portal via the repeater; but we are confident that it would have been possible. Since 2385m is virtually halfway into the tunnel, we had proved a means of achieving communication to any point in the tunnel, so long as a fixed station could be set up at either (or both) portals. Certainly there are longer tunnels than Standedge, and the technique could be extended by using additional repeaters positioned along the tunnel. Despite this success, the use of repeaters doesn't seem to present an ideal solution. Here I present Chris Trayner's reservations on the use of repeaters as expressed in his report on the tests.

Such repeaters are not normal Raynet property.

Allocation of frequencies becomes more complicated, three at least being needed.

Each repeater adds about a half-second delay to the start of transmission, which operators may forget, causing the first word or so to be lost.

Worst of all, every repeater constitutes a single-point failure risk, making it harder to guarantee the integrity of the entire radio link.

To appreciate this last problem, consider the effects of someone moving a repeater out of the way; even a metre or so into a side-passage could lose the signal. If traffic was quiet, it could be some time before Raynet control realised that the link had been lost. To restore it would require a Raynet operator to walk the entire route; to do this might require permission from the service in charge, which might not grant it for some time. Indeed, it might not be granted until safety had been checked with the team in the tunnel, which could not be done until the link was restored!

Problems with other services' vehicles had been anticipated; one of the tests still pending is the effect on radio propagation of vehicles such as fire tenders in the tunnel. In a live incident, Raynet would be there to provide a facility for the other services, not to get in the way, and so it must work round the other services. In this context, it should be noted that the repeater was stationed part-way across the tunnel; how far it would propagate if tucked into a side-passage has not been tested.

The problems described so far may call into question the viability of UHF in long tunnels. It is the opinion of some of the team developing these techniques that the problems are severe enough to make conventional UHF unreliable. This has been the motivation for developing other techniques, such as cave radio and along-tunnel radio using the running rails to guide the signal.

HIGHER FREQUENCIES

The significantly greater range achieved at 433MHz compared with 144MHz suggests that increasing the frequency further may increase the range. Tests carried out on the Beijing Underground Railway [2] indicate an attenuation of 3.2dB/100m at 820MHz compared with 10.1dB/100m at 465MHz. Since equipment for the 1.296GHz amateur band (the next highest frequency allocation after 433MHz) is not as readily available as that for 433MHz, we were not able to carry out any higher-frequency experiments in Standedge Tunnel.

If the Beijing tests are representative of what could be achieved in Standedge, there's every expectation that equipment operating on 1.296GHz will reach the mid-point of the tunnel without the need for a repeater. Even so, there are three concerns:

The quoted Beijing attenuation figures relate to the tunnel itself. The presence of the train made a considerable difference. With the receiver on the rear carriage of a train (ie such that the remainder of the train wasn't between the transmitter and receiver), the attenuation at 820MHz increased to 7.8dB/100m and, with the receiver on the front carriage, it was 21dB/100m. This tends to confirm our concern that, even if communication could be achieved in an empty tunnel, the presence of vehicles could cause the link to fail.

The Standedge Tunnel is perfectly straight, but many tunnels are curved. We know that the acute bends found in caves attenuate signals severely but we have no information on the effect of the broad curves found in railway tunnels. It seems likely, however, that they will further attenuate the signal to some extent.

At 4.9km the Standedge Tunnel is the fourth longest railway tunnel in the UK. However, in the world as a whole, there are around 200 longer tunnels. The longest, at 53.8km, is the Sei-kan Tunnel in Japan. Forty-eight are in excess of 10km in length. In addition, there are many longer road tunnels.

Taking all this into account, it seems sensible to consider UHF radio along a tunnel as a last resort.

THROUGH THE ROCK

The maximum amount of overburden above Standedge Tunnel is 190m, and we knew that the HeyPhone (which

The black hole: using 70cm from the tunnel entrance.

operates on 87kHz – see [1] for more details) was capable of providing communication through 800m of rock under ideal conditions. A similar system in France has been used over paths in excess of 1km through rock. Of course this comparison isn't exactly fair, since the tunnel lies in gritstone with some coal measures and shale rather than the limestone in which natural caves are found. However, all our previous tests in non-limestone areas such as the granite of Cornish tin and copper mines and the sandstone of the Alderley Edge copper mines had proved successful to a reasonable depth so we had reason to be optimistic.

INITIAL HEYPHONE TESTS

On our first trip into the Tunnel, we achieved good communication only to 140m into the tunnel, which corresponded to a depth of 70m. By 260m (100m depth) the up-link was barely readable (RS 25) and at 560m (150m depth), although the signal was detectable, no useful information could be passed in either direction.

We came away from that first test with two possible explanations for the much-reduced range.

Although we hadn't previously found geology that was significantly more attenuating than limestone at 87kHz, perhaps the gritstone of Standedge does fall into this category.

The principal method of using the HeyPhone involves injecting a current into the ground using earth electrodes. The floor of the tunnel was made of crushed limestone chippings to provide drainage. We found it very difficult to drive earth electrodes into the floor and, even when we did, the lack of mud or water would have resulted in a poor electrical contact.

In the light of the second of these possible explanations, we constructed a very large single-turn tuned wire loop for the second set of tests. Loop-to-loop and loop-to-earth electrodes are both alternative methods of using the HeyPhone. Whereas loops are usually less efficient than earth electrodes, we felt that the conditions in the tunnel may have changed that. In the event, the loop gave no substantial improvement over the poorly-earthed ground array, so we were left with the geology as the most likely explanation for our failure.

LF BROADCAST STATION SURVEY

To put our second hypothesis – that greater attenuation (probably due to greater rock conductivity) was to blame – we undertook a third trip into Standedge Tunnel to make measurements of the signal strengths of LF broadcast stations on a range of frequencies at various distances (and hence known vertical depths) into the tunnel. These would then be compared with the signal strengths on the surface to obtain attenuation figures for a range of frequencies at various depths. We hoped that this may give some indication of whether moving to a frequency lower than 87kHz would provide a solution.

Considering the geology, there's every indication that the rock above Standedge is significantly more conductive than limestone. If this was the case we would expect to see signals fade out as the amount of overburden increased, starting with the highest in frequency and working down the frequency range. This would contrast with the results achieved in limestone. Here, multi-frequency tests at medium depth had shown comparatively little frequency dependence and that frequencies higher than the HeyPhone's 87kHz were effective.

The results of our tests at Standedge were bizarre. The graph of attenuation against frequency was by no means a smooth curve. Thinking about this later, it appears that our experimental procedure was flawed. The signals from the broadcast stations would each have arrived at the site from a different direction. This, coupled, with possible non-uniform geology in the area above and around the Standedge Tunnel would mean that each signal could traverse a path through the earth with very different characteristics. This could well explain the large differences in attenuation of stations on similar frequencies. All we can say is that there was an indication that the lower frequencies penetrated the ground to a greater depth. At the maximum overburden, for example, only a signal on 16kHz could be heard whereas, at the closest point to the portal, all stations up to 198kHz were audible.

Unfortunately experiments on our most recent visit to Standedge, using a variable frequency power oscillator and general coverage receiver, were unsuccessful due to suspected equipment failure.

THE BOTTOM LINE

After four visits to Standedge, we still haven't managed to demonstrate effective communication to all points in the tunnel, either from a portal or from the moor above.

We have shown that we should be able to provide communication along the tunnel at UHF using one or more repeaters, but this isn't ideal from an operational viewpoint. Indications are that a higher frequency would be better.

We have shown that LF radio on 87kHz is only partially effective at providing through-rock communication, but that a move to a lower frequency may just provide a solution. However, we would want more evidence that a lower frequency would work before embarking on modifying a pair of HeyPhones. In separate tests, not reported here, we had shown that LF radio can be propagated along the rails for a considerable distance. It could be that this is the most likely solution, although it clearly isn't applicable in a tunnel without rails. To illustrate the need for communication in a tunnel without rails, I should point out that mountain rescue groups were carrying out search and rescue exercises on two of the occasions we were present in the disused tunnel at Standedge. Clearly incidents in railway tunnels don't always involve rail traffic.

So, in view of the limited success achieved to date, why have I chosen to write this article? First, it shows that we don't have all the answers and, despite suggestions to the contrary, it illustrates that there is still work to be done in the area of sub-surface communication. Second, we remain committed to providing a solution for the emergency services and hope that this article may just inspire others to take up the gauntlet and get involved in this project.

THE PEOPLE

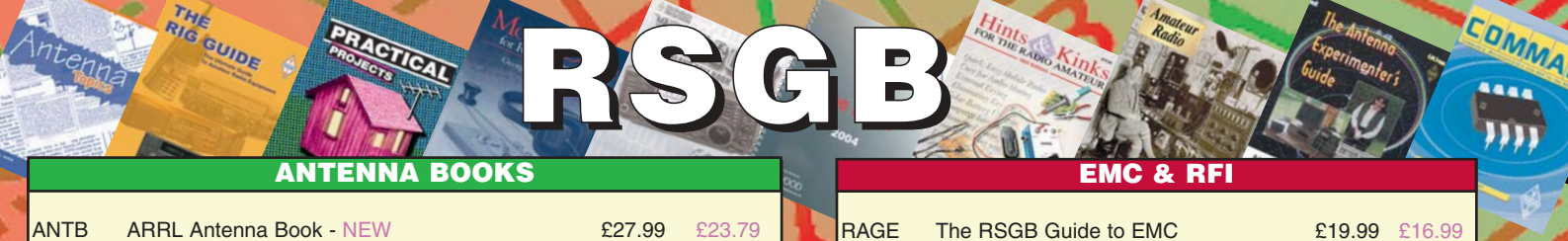
Although I've ended up as the scribe, I wasn't the one who masterminded these tests – most of the organisation was carried out by Chris Trayner, G4OKW, and John Rabson, G3PAI. In addition to myself, others involved in the tests included Margaret Bedford, John Hey, G3TDZ, Rhiânwen Jenkins and Rosy Rabson from CREG, and Graham Belt, G0SCV, Chris Arundel, G1YNH, Steven Collins, 2E1HDU, Eric Bailey, G8XIG, and Dave Wilson, G7VEB, from Raynet. Thanks also to PC Richard Lenny of British Transport Police and Richard Davies of Network Rail for arranging access. ◆

REFERENCES & FURTHER READING

[1] The 'HeyPhone' to the Rescue, M Bedford, *RadCom* January 2002, pp16-18.

[2] 'Measurements of the Propagation of UHF Radio Waves on an Underground Railway Train', Y P Zhang *et al*, *IEEE Transactions on Vehicular Technology*, 49, 4, July 2000, pp1342-47.

Back issues of the *CREG Journal* are highly recommended for those wanting a background in sub-surface communication. See www.bcra.org.uk/creg/ or contact Rob Gill, G8DSU, on 020 8892 8852 or creg@bcra.org.uk, for more details.



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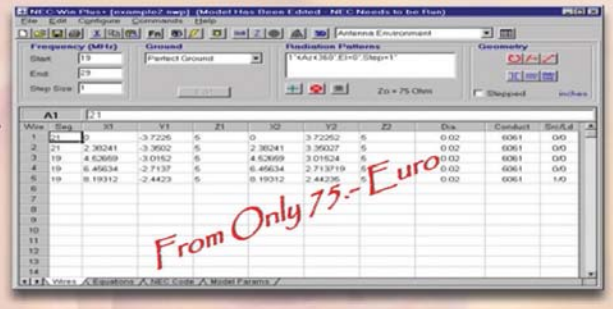

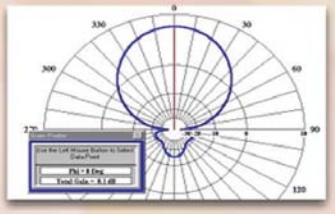

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Warning: ***Members are advised to ensure that the equipment they intend to purchase is not subject to a current hire purchase agreement. The 'purchase' of goods legally owned by a finance company could result in the 'purchaser' losing both the goods and the cash paid. Members' Ads also appear on the members-only website: www.rsgb.org/membersonly/membersads***

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AUTOMATIC antenna tuner, Daiwa model CNA-1001, 200W, 500W PEP, vgc, £95. G3IJL, QTHR, 020 8749 1454 (London).

BC221, £25. Memotech computer, £20. ZX interface, £5. Microdrive, £5. Acorn computer, £5. Kempston interface joystick, £5. Spectrum interface, £5. Printer, £5. DKtronics interface, £5. Thermal printer paper, £5. Scope tubes GE6 d/beam T1046H. GEC T924F Tektronix 5BHP2, VCR97, 3KP1, £5 each. G0IPT. 020 8374 9070 (London).

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BNOS 432-1-50 linear with built in pre-amp, £70. BNOS 432-10-50 linear with built in pre-amp, £50. Pye MX-296, 16ch VHF mobile working on 70cm, £45. Realistic PRO-38 scanner 66-520MHz, £25. Pye M-293 low-band AM mobile, 6ch, £25. Mike, M0CIE, 01823 259 424 (Taunton).

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CLARKE G-900 suitcase generator, 700W continuous, test run only. *Machine Mart* price £352. Bargain, £200. Offers? WHY? 01594 544 689 (Glos). E-mail: g7mww@virgin.net

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CUSHCRAFT A4S HF 4-ele Yagi with 40m ext kit. Both in vgc, £325. G4ZWY, 01885 488 100 after 6pm. 01885 488100 (Herefordshire). E-mail: g4zwy@hotmail.com

DATONG FL-2 filter, £40. Watson VSWR meter 1.6-200MHz new, unused, £35. Icom world clock GC5, £10. PSU SEC-1223 23A, £65. *Windows ME* original, £40. Postage extra. 01244 536 753 (Chester).

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FT-301S QRP, gwc, ops h/book. Watson 10amp PSU 13.8V. Both £230. Kantronics KAM Plus ver.7.01, £120. Buyer collects or pays postage. 01776 702 876 (Stranraer). E-mail: gd.maxwell@btopenworld.com

FT-736R inc 6m module, MD-1 mic, matching SP-767 spkr, £750. Kenwood TM-732E VHF/UHF mobile, remote control, £350. Icom R-7000 rcvr, £400. Icom R-7IE rcvr, £325. Yaesu G400RC rotator, £50. Pakratt PK-232MBX, SWR/power meters, coax switches etc – offers? Buyer collects or pays carriage. G7GYR, QTHR, 01257 453 213 (Chorley). E-mail: ken@random-walk.com

FT-990 A/C mic, man, two extra filters, boxed, £530. FT-900AT + PSU, mic, no man, £460. Both working well. Home-brew ATU wide-spaced capacitors with MFJ roller-coaster and commercial balun, £90. Prefer buyer inspects/collects. Bob, G3JJU, 01252 615 831 (Fleet).

G3GJX CMOS keyer (Aug *RadCom* 1997), £40. Advance 'Q' meter T2, £40. CDE-44 rotator, £150. Advance AF signal generator J2B, £30. Dymar Lynx 6ch 2m mobile tcvr, £15. Electrostatic voltmeter, 2 to 10kV, £20. K8 dual regulated PSU 2 x 10V, £15. Plug-in units for Tektronix 545 etc oscilloscopes, £10 each. 1 mile from junction 29, M6. 01772 337 815 (Preston). E-mail: g3azi@btinternet.com

HEATHKIT linear SB-1000, 1 x 3-500Z, 1000W SSB, 850W CW. All bands 160-10m, inc WARC. Full documentation, had light use only, vgc. Prefer buyer collects, £700. FT-817, Miracle Whip antenna, box, man, all as new. £450. Alinco EMS-14 desk mic, £30. Colin, G3UZM, 01395 273 090 (Exmouth).

IC-756PRO as new, £1100. TS-850SAT, £500. Dentron MT3000A 3kW tuner, £150. Dentron MLA2500B linear, 2kW, £350. IC-575H, £350. IC-271H + Mutek, £180. IC-251E + Mutek, £150. BMOS 100W 6m linear, £90. Mutek 6m tvtr, £80. FL-2100B as new, £280. Timewave filter new, £80. Datong FL-2, £20. Yaesu monitor YP-100, £100. Keyer ETM-9C new, £75. TS-820, £130. Remote VFO, VFO-820, £40. SP-820 spkr, £40. Colin, G3TA, QTHR, 01285 821 571 (Cirencester).

ICOM 706MkII little used, as new, £375 ono. PSU to suit, £50. G4OQG, QTHR, 01249 443 037 after 6.30pm.

ICOM IC-706 HF/VHF, £350. Kenwood TM-451E 70cm

CONGRATULATIONS to the following, whom our records show as having reached 50 or 60 years' continuous RSGB membership this month:

60 years

G2FUD	Mr A W Owen
G3EKL	Maj R A Webb
G3FDG	Mr R G Morris
GI5TK	Mr A R Irwin

50 years

G3JIR	Mr J A Hardcastle
G3JOT	Mr F G Whatley
G3JYL	Mr R M Woodman
G3LDU	Mr R Ballantyne

SILENT KEYS

We regret to record the passing of the following radio amateurs:

G1JUL	Mr R J F Metcalfe	10/12/03
G2AGH	Mr A G Hobson	05/01/04
G2DOJ	Mr D Godwin	08/12/03
G3FEX	Mr B Oddy	
G4AHH	Mr C Hayward	
G4ZHR	Mr A A Lock	01/01/04
G7HRK	Mr P B Hastelow	06/12/03
G7IDW	Mr C W Searle	06/01/04
G8VGF	Mr J V Middleton	01/04
GD0PNK	Mr L Ellison	
GD4TVG	Mr V Gill	
GM3BCL	Mr S Anderson	16/01/04
GM7PVT	Mr W McArthur	

mobile, £125. Yaesu FT-2400 2m mobile, £75. G0DEZ, 01905 351 879 (Worcester). E-mail: dez.zc4dw@virgin.net

ICOM IC-706 MkIIG, 250Hz CW filter fitted, boxed, vgc, £625. Daiwa LA-2035R, 35W 144MHz amplifier/preamp, £30. Ascom 4m PMR conversion, 25W, latest software upgrade, with full man, £50. All in good cond. John G0WUU, 01778 590 152, 07766 448 577(Stamford).

ICOM IC-737 tcvr, vgc, boxed with leads, man and mic, £485. G7OCQ, 01379 643 644 (Diss).

ICOM IC-R7000 rcvr exc cond, £450. M3FDA 01395 516 936 (Sidmouth).

ICOM IC-R7100 wideband rcvr, c/w mains pack and whip aerial. Exc cond, £495 ono. Nick, G0SMI, 01280 847 980 (Buckingham). E-mail: steadfast@freewire.co.uk

JRC JST-245 200W. Filters 2x1.8kHz, 2x0.5kHz. AC, ATU. Perfect cond, boxed with man £1200. G0RIE, QTHR, 01823 258 200 (Taunton). E-mail: dave@davidreilly.demon.co.uk

JRC NRD-535 HF rx in immac cond, c/w all mans, various frequency lists and a Sennheiser headset. Formerly owned by a 'silent SWL', it is being sold for charitable purposes. Offers of at least £300 are invited, and the total sum raised will be donated to the Prostate Cancer Charity to be added to the funds required to purchase a specialist holmium laser treatment machine to be sited in the Eastbourne area. Gavin, G6DGK, 01825 722 045. E-mail: gavin@hurstfields.prestel.co.uk

JST-245 HF+50MHz 200W tcvr, used only four times since new, £550. AMD 4m rig with colinear, both unused, £60. Eagle 50MHz Yagi new, £40. Tektronix TDS-320 100MHz digital storage scope, used twice since new, £275, with mans. HP-1741A 100MHz storage scope with mans, £175. Bob or Bill, G7SUU, 01303 874 852 (Kent).

KENWOOD 850AT tcvr, auto turner output 0-100W, £500. Doug, 10 Glenmead Road, Gt Barr, Birmingham B44 8UG, 0121 360 5062.

KENWOOD ATU AT-230, boxed, vgc, £110. Icom SM-20 desktop mic, boxed, £80. Heil Icom only HMM-IC, HC4 & HC5 mic, desk or mobile unused, £59. Carriage at cost. Ken, G3ACB, 01279 731 070 (nr Harlow).

KENWOOD R-5000 mains rcvr in vgc, £450. John, 01386 852 249 (Broadway).

KENWOOD TL-922A amp with EIMAC 3-500 tubes fitted, £995. Yaesu FP-757GX switching power supply, £75. Both in mint condition. M0HBK, 01344 620 279 (Ascot). E-mail: m0hbk@hotmail.com

KENWOOD TR-751E 2m 25W SSB/CW/FM tcvr, inc mic, owner's man, original box, £225. MFJ super Hi-Q mag loop control unit (new), £50. FL3 filter, £75. Yaesu FRG-100 inc FM board, owner's man, original box, £225. Mast safety belt, £20. G3XVF, (Norwich), g3xvf@btinternet.com

KENWOOD TS-50 HF tcvr, AT-50 ATU, MC-85 desk mic. Half-wave trap dipole, ProAm 20/80m mobile antenna, mag mount. Complete base and mobile antenna, mag mount, all one owner, as new, £595. G0WAJ, 01625 422 382 (Macclesfield).

KENWOOD TS-50S with bracket, not used much, in exc cond + spare PG-2Y power cable, £380. Seller will deliver to buyer within 120 miles of his QTH. Bill, M3IVI, 0191-385 5603 (Sunderland).

KENWOOD TS-570DGE hardly used. Perfect for Foundation Licence holder. Boxed, man, £550, buyer collects. Mike M0MFC, 01722 502 877 (Salisbury).

KENWOOD TS-820 with matching external VFO-820 + MC-50 base mic, £275. Kenwood TS-520, £175. All good cond. Nick, GW4VVF, 01544 260 188 (Herefordshire/Powys borders).

KENWOOD TS-850SAT tcvr with voice synthesiser, 500Hz CW filter and man (boxed). Showroom mint cond (non-smoker), £610 ono. Prefer buyer inspects and collects. 'On air' demonstration if desired. G5BM, QTHR, 01531 820 960 (Newent).

KENWOOD TS-950S Digital c/w digital units. Clean, in original box with mans. Inc narrow CW filter and stand mic. Prefer buyer collects/tests and pays cash, otherwise add delivery at cost, £800. Richard, G3RWL, QTHR, 020 8366 4297 (Enfield). E-mail: g3rwl@amsat.org

KW-600 immac, spare 572B with input tuner, man, £175. SM-220, PAN B8, mint, boxed, man, £160. Global 2000 SWL ATU, 12V 3A PSU, £10. MK704 key, brass base. G3RHM,QTHR, 01404 850 461 (nr Exeter).

LATTICE tower, 40ft, three section telescopic, galvanised. Wall mount, new cables and winch, inc two head units and HD rotator, £375 ono. Also Plessey 1.5GHz repeater, surplus to requirements, £150 ono (heavy rack mounted). Contact Barry, G4ZCN, QTHR 01429 287 022 (Hartlepool). E-mail: barry@oceantecs.com

MFJ-1025. Exc noise reduction. Unwanted gift, have one already, £100. 12V 3A PSU, £15. Global 2000 SWL ATU, £45, mint. UK post incl. This is the second ad due to time wasters. G Clarkson, 01404 850 461 (nr Exeter).

MURPHY B40 naval rcvr. Works. B/G with small tool kit. Circuit. May deliver. £80, no offers. Geoff, G3YVF, 01634 253 056 (Medway).

ONE Kenwood R-5000 rcvr with VHF conv in box, mint cond with man, £450. 01474 743 003 (Gravesend).

OSCILLOSCOPE, Leader LBO-523 (40MHz dual channel), gwo, £150. Ten-Tec Argosy II c/w PSU, mic, works well (10-80m + 10MHz), £150. SEM ATU (EZI-Tune) 10-160m, £50. Two wide spaced variable capacitors free to caller. Sabine FBX-901 and FBX-1020 digital processors (sound re-enforcement not amateur radio). Phone for details. 01566 782 463 (Launceston). E-mail: g-j-bowhay@beeb.net

OSCILLOSCOPES & test equipment clearout. Solartron CD1400, spare plug-ins, valves, service man, £40. Wayne Kerr B521 LCR bridge £40. AVOs etc. Francis, G8BCT, 01252 711 060 (Surrey). E-mail: francis@nwsys.freeserve.co.uk

QRO EHT plate transformers, 2000-0-2000V, 1800-0-1800V, 1500-0-1500V, high voltage oil filled capacitors 2.5kV, 4.0kV. Offers? G4SGV, 01527 545 304 (Redditch).

QTH for sale. Bungalow in north Shropshire, 1000ft ASL. Views over six counties, £275,000. Check website www.radioham.freeserve.co.uk Sorry, mast sold, but hole provided free of charge. Cushcraft A4S triband HF Yagi, £295. G0JFM, 01691 777 688 (Oswestry).

RACAL RA-17 rx, S-meter u/s, otherwise OK, £50, buyer collects. VHF & UHF SWR and power meter, £50. Cliff, G3THX, 01754 761 306 (Skegness).

RACAL RA-17L rcvr vgc and working order. Complete with service man and spare set of valves, £150 ono. Buyer collects. G3ZHZ, 01323 430 610 (Eastbourne). E-mail: martin@majusana.freeserve.co.uk

RCA ET-4336 high power transmitter 2-20MHz AM/CW 2x813 in PA. VFO. Crystal oscillator. Correct speech amp. Fully restored, almost mint. Ready to use, produces potent high quality proper AM signal. Well known on 80m AM nets. £700 ono. Consider swap for interesting items. WHY? G4XWD, QTHR, 01692 630 285 (nr Norwich). E-mail: jandr@macunlimited.net

SATELLITE equipment. Kansas City Tracker V2.4.3A inc software (tracker & tuner), interface cable, £35. Kenpro KR-500 elevator actuator with control box, £40. Kenpro KR-5600 dual az/el control box, £30. Oscar Polarphaser for 2m, £30. Tonna 20818 2m 9-ele crossed antenna, £15. Tonna 20438 70cm 19-ele crossed antenna, £15. Will accept £150 the lot. Buyer collects or pays delivery at cost. Roger, G0SWC, 07719 621 398 (Guildford). E-mail: roger.g0swc@virgin.net

SCANNER – Realistic PRO-2005, 400 chan, UHF/VHF with Jim M-75 low-noise wide-band GaAsFET preamp, 24-2150MHz, inc Icom discone tx/rx scanner antenna inc all conectors and cables, £150. Alan G7CDK. 01763 262 443 (Royston). E-mail: aj.flo@virgin.net

SILENT Key (Mr M J Good, M0CZD). Radio amateur equipment clearance sale. Trio TS-430S HF tcvr. Deluxe antenna tuner, MFJ-969. PSU EP-2500 25A, Kenwood LF-30A low-pass filter. Kenwood MC-60 mic. Will not separate, £350. No offers. 01702 559 099 (Benfleet).

SILENT key. Station monitor Kenwood SM-220. FT-290R, no mic. Timewave DSP-59+. Kantronics all-mode, no man. Kenwood TH-77E + mobile charger. No reasonable offer refused. Buyer collect or meet within 50 miles. G3FWB, QTHR, 01433 630 226 (nr Bakewell). E-mail: hunt@g3fwb.freeserve.co.uk

SURPLUS equipment for sale. Yaesu FT-290R MkI, £150. Yaesu FT-790R MkI, £150. Yaesu FT-690R MkI, £150. Yaesu FT-209RH 2m h/h, £100. Yaesu FT-709RH 70cm h/h, £100. Yaesu FT-23R 2m h/h, £75. All items in good cond, original boxes, mans, mics, whip antennas, chargers etc. Buyer to inspect and collect, or pay carriage. Keith, 0131 665 5944 (Edinburgh). E-mail: keith.blabey@lineone.net

SYNCAL 30 Racal, c/w battery box, some technical data, whip, headset, gwo, £340. Army PRC316 with accessories including burst transmission equipment with interface and leads, battery, battery adaptor, all aerial items, user notes, working, £425. All plus carriage. G3GTJ, 01963 240 319 (Castle Cary).

TEN-TEC Argonaut V model 516, TCXO, please see

RadCom February 2004 for full details, £450 plus carriage. G0GPO, QTHR 01227 711 261 (Canterbury).

TOKYO Hi-power HL-200 BDX 200W linear amp. 3.5-29.7MHz SSB, CW and FM, PSU 13.8V at 40A max, £450. Richard, G8BWB, 01822 852 005 (Devon).

TS-430S 9-band HF tcvr, SSB/CW/FM vgc, inc handbook and most accessories, £220. Geoff, G4FAS, 0161 437 7784 (Stockport). E-mail: geoff.royle@lineone.net

VINTAGE ham radio gear Codar, Collins, Drake, Eddystone, KW, especially AM/CW transmitters from Labgear LG-300, Minimitter. Also looking for KW-201, KW-2000E. Please let me know what you have for sale. Paul, G4CCZ, 01932 342 927 (Surrey). E-mail: g4ccz@6metres.com

YAESU 726, 3 modules 2-70-6, £350. Doug, 10 Glenmead Road, Gt Barr, Birmingham, B44 8UG, 0121 360 5062.

YAESU FT-1000MP in exc cond, with Inrad mod fitted. Double-boxed with mic and man, £1100. Icom 746 2m - 160m tcvr, owned since new, mint cond, boxed with mic and man, £750. Icom IC-706G, 18 months old, great cond, £600. 0131 661 4686 (Edinburgh). E-mail: gmradioham@aol.com

YAESU FT-102 HF tcvr, £150. Also Lowe HF-225 rcvr, £200 or offer. Increasing blindness forces sale. Buyer collects, please. Nigel G3GFC, QTHR, 01404 831 406 (Honiton).

YAESU FT-290 MkII, Nicads, charger, case, man, 25W amplifier, 6A PSU, all good cond, £160. Also FRG-7 rcvr, digital mod, £90. Robin, G1ZUC (Bath). E-mail: robin.d.johnson@btinternet.com

YAESU FT-736R base station. 6m, VHF/UHF all mode, vgc, boxed, mans, £525 ono. Icom 207H dual-band 2m & 70cm, as new, boxed, mans, HM-133 mic, £200 ono. Simon, 07793 362 999.

WANTED

12-POSITION rotary switch for my homebrew ATU project based on the ARRL's old 'Rollerless Ultimate' design. Ceramic, ideally. 0131 552 0702 (Edinburgh). E-mail: duncan_fisher_uk@yahoo.co.uk

ALL Racal or Watkins Johnson items wanted by enthusiast and collector in any cond. Any receivers, accessories, spares or mans. What have you? Especially looking for RA1772, RA1778 or RA6790, also RA17 LF converter and SSB adaptor, Cubic 3030, Collins HF-2050, and tall 19in equipment racks to house my radios. Can arrange collection from anywhere. G8WKA, QTHR, 01252 795 234 (Surrey). E-mail: richardreich@aol.com

CARRIER crystals 453.5 and 456.5kHz. Ideally HC6. Second choice B7G, or WHY? G3WCE, QTHR, 01692 538 794 (North Walsham).

CLARKE pneumatic mast or similar 40ft or more with top section minimum 1.5in diameter. Prefer complete with guys and legs but will consider any mast with good seals. Prepared to travel to collect. 01603 890 600 (Norwich). E-mail: g0tmt@aol.com

CLARKE PT9 pneumatic mast, 9m/1.9m, 115mm/38mm, 12kg headload. G3TTC, 01926 490 897 (Warwick). E-mail: keith@g3ttc.freeserve.co.uk

COMMODORE 64 PSU transformer details part no 90250307 BV220.003831 ELWE 24V 50Hz 33VA 9V 1A T4OIE 5V 15A T160mA. G4NYE, QTHR, 01984 623 762 (Taunton).

CW filter for Trio TS-520 (YF33HCW). AN212 IC for FT-75. Circuit diag for Heathkit HW17 & HG1013CVFO). Circuit for Wayne Kerr component meter. 1 x GE 6146B new & boxed. Modulator driver transformer. For Heathkit DX-100. G3YPS, QTHR, 07803 601 176. E-mail: atko99@tiscali.co.uk

DISABLED fan of old days seeks pre-1975 QSL cards, magazines etc. Mike, 8 Windsor Road, Reydon, Southwold, Suffolk IPI8 6PQ.

F and F telephone switchboard as used in Royal Signals or similar. Can collect. GM7KYX, 01542 870 322 (Keith).

HEATER transformer 10V at 11A. G4CEO, QTHR, 01234 782 443 (Bedford). E-mail: g4ceo@talk21.com

IC-2KL amplifier (500W). IC-AT500 ATU (500W). Must be in gwo. Raymond, G0FLY, 01282 844 733 (Earby, Lancs).

ICOM R-7000 rx, must be mint cond. G3NXQ, QTHR, 01905 20264 (Worcester). E-mail: tony@bodenham.fsnet.co.uk

MODULATION transformer and small audio driver transformer for DX-100. Also working counter/display board for Trio-Kenwood TS530/TS830 (or chassis). Any help much appreciated-thanks. David, G4CWB, 01423 504 373 (Harrogate). E-mail: g4cwb@qsl.net

MORSE keys wanted by private collector, straight and bug keys, sounders, relays, Morse inking machines, heliographs, all telegraphy-related items. For a friendly chat, ring Gerald, 01189 834 307. E-mail: gerald.beaver@btinternet.com

RS-232 interface card for Ten-Tec Paragon 585. Dave, G3JSK, QTHR, 01249 713 367 (Corsham). E-mail: g3jsk@deand.demon.co.uk

SILENT key clearout or just not needed. I collect QSL cards for their historic interest, preferably from periods before 1970. Please don't throw them away. I can collect or arrange collection. Tony, G4UZN, 01132 693 892 (Leeds). E-mail: g4uzn@qsl.net

VINTAGE ham radio gear: Codar, Collins, Drake, Eddystone, KW, AM/CW transmitters LG300, Panda, etc. Also looking for KW-201, KW-4B VFO, KW-160, KW Vanguard, Valiant, Victor Eddystone spkr, S-meter, Heathkit SB-610. Please let me know what you can help with. Paul, G4CCZ, 01932 342 927 (Woodham, Surrey). E-mail: g4ccz@6metres.com

WANTED Plessey 2250 rcvr for spares, or parts, Module 9, extender card, etc. 01924 366 152 (W Yorkshire).

YAESU FT-790R. Non-worker considered. Mike M0CIE, 01823 259 425 (Taunton).

RALLIES & EVENTS

Due to the overwhelming number of members' advertisements this month, a truncated version of 'Rallies & Events' now appears on page 73. A full list of these can be found on the RSGB members-only website. We hope to return to the normal format next month.

GB CALLS

These callsigns are valid for use from the date given, but the period of operation may vary from 1 – 28 days before or after the event date. Operating details are provided in an abbreviated form as follows: T = 160m; L = 80 or 40m; H = HF bands (30 – 10m); V = 6 and/or 4m; 2 = 2m; 7 = 70cm; S = satellite and P = packet. Please send operational details of your special event station to the RadCom office at least five weeks before publication. The only QSL Bureau sub-manager for special event station callsigns is as follows: GBxAAA-MZZ – Mike Evans, 322 Heol Gwyrosydd, Penlan, Swansea SA5 7BR, e-mail mw0cna@ntlworld.com. Will organisers of special event stations please ensure that they lodge plenty of envelopes with their sub-manager?

4 Mar GB0BTC: Belfast Titanic City. Belfast. LHV2 (GI0VAB)
8 Mar GB4AOS: Advancement of Science. Vale of Glamorgan. TLH2 (GW4XKE)
12 Mar GB4MJS: Murch Junior School. Vale of Glamorgan. TLH2 (GW4XKE)
GB4SSP: Stanwell School Penarth. Penarth, Vale of Glamorgan. TLH2 (GW4XKE)

The Members' Ads order form is now published here. If members do not wish to cut the form out of the magazine, photocopies will be accepted, as will recent copies of the form from previous months, or recent copies of the 'carrier' sheet. *As a last resort*, members may also send in their advertisements on separate sheets of paper, but if you choose to do this, you *must* supply an accurate word count - and, of course, the correct fee in the normal manner.

RSGB MEMBERS' ADS ORDER FORM

Application form for one For Sale, Exchange or Wanted advertisement. Do not mix classifications on this form; separate applications must be made.

Please ensure you read and understand the conditions of acceptance of these subsidised Members' Advertisements, printed at the top of the Members' Ads page of the current *RadCom*.

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Classified advertisements 58p per word (VAT inc.) minimum 14 words £8.12. All classified advertisements must be prepaid. Please write clearly. No responsibility accepted for errors. Latest date for acceptance is 1st of the month prior to publication.

Copy to: David Thompson, Manning Publishing Ltd, The Irwin Centre, Scotland Road, Dry Drayton, Cambridge CB3 8AR
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MISCELLANEOUS

G3LLL- PARTS Old Yaesu, also repairs for callers (Morecambe). Details g3lll@onetel.net.uk

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CALL IN ON THE 'GOOD NEWS' CHRISTIAN NETS! Every Sunday at 8am on 3747kHz and around 7047kHz and 144.205 at 3pm sharing Christian fellowship over the air. Info from WACRAL, 51 Alma Road, Brixham, South Devon, TQ5 8QR Tel: 01803 854504

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The last word

Value for money

Last month I had a mishap with my rig because of over voltage. Rather than try to get it going, as I have had it for the last 40 years I thought that it would be nice to have something new. What a shock. There is nothing on the market at sensible prices. Most HF rigs are priced around the price I bought my 1996 4X4 this year, and I know which has more use.

What are we coming to? If they get any smaller you will have difficulty in finding them on the shack table, I keep losing my mobile phone as it is. I wonder if there is competition to see how many push buttons and knobs can be got on the front panel - one rig has at least 51 buttons. Operating the modern rig is a nightmare, with too many knobs and buttons and so many unnecessary multi-functions. Let us be honest, most of us do not use a quarter of what is on the rigs.

To the manufacturers, let us have some rigs that are easy to use. Let the knobs etc be the size that arthritic fingers can use and a size that we can see. Remember 'KISS'.

C D Higgins, G3NRQ

[The RSGB Rig Guide and ads in RadCom show that UK dealers are currently selling new HF transceivers for under £500. In real terms this is a tiny fraction of what was paid for commercial equipment 40 years ago. At that price, though, what you get is a basic rig, without lots of 'bells and whistles' and not a tiny one either (hang on, that's exactly what Mr Higgins wants!) If it lasts another 40 years that £500 transceiver will cost just £12.50 a year, or about 3p per day! - Ed.]

Spirit of amateur radio?

I have no doubt that the content of the new *ARRL Handbook* (reviewed in the January 2004 *RadCom*) is excellent, but does its cover image really reflect the spirit of amateur radio? The cover shows a keen amateur aligning his new home-brew device with a marvelous collection of choice items from John Fluke, Tektronix and Hewlett-Packard, the sort that quite a few professional labs would lust after.

Perhaps American amateurs do things differently.

Michael O'Beirne, G8MOB

Dear Santa . . .

May I thank you and your helpers at RSGB and Ofcom for the 5MHz NoV which arrived in time for Christmas. Despite having just five spot frequencies available I find the concept of 'net' operating quite refreshing, where operators are encouraged to 'break in' and then one of the operators takes control of the group. The signal reporting using SINPO is also quite a good concept, since it takes away the 'rubber stamp' 59 and makes people think about QRM, QRN and fading.

However, I do regret to report that a descendant of Scrooge is alive and well and managing two amateur radio emporiums. When asked about how to modify two of my transceivers for use on 5MHz, one dealer said he would not tell me, but would do it for a charge and another said he wanted nothing to do with it, unless I purchased a rig ready modified. In the end I found out via the Internet (www.mods.dk) that it was just a matter of removing one resistor from my Kenwood TS-570DGE, and via Martin Lynch it was just a simple matter of adding one solder blob for my Yaesu FT-817.

Alan Ralph, G8XLH

Disadvantage of electronic QSLing

It is interesting to see that over the last two years electronic QSLing has really taken off, first with eQSL and now with the ARRL's 'Logbook of the World'. As someone to whom QSL cards are generally unwelcome extra paperwork, the idea of these innovations seems a good one. However, I do have concerns that they will make medium and large sized DXpeditions less easy to carry out. Why? One source of funding for expeditions has always been the US dollar notes tucked in with QSL cards. Frequently DXers will enclose more than is strictly required for postage and the profit goes some way to defraying expedition costs. The new electronic QSL systems will remove the need for any direct postal contact between DXer and expeditions and thus that source of income will, at best, be significantly reduced. I hope that the ARRL will acknowledge this side-effect when they decide what to do with the significant sums that they could earn from this initiative; and that DXers will continue to send those small but very welcome donations to help defray the costs.

Richard Newstead, G3CWI

Jupiter review

Having been using a Ten-Tec Jupiter transceiver since August 2002, I was interested to read Peter Hart's, G3SJX, review of it in the January *RadCom*. Mine is the 538AT version with the built-in antenna tuner which I consider an essential accessory. I also have the 302J remote keypad and encoder. I find the lower sensitivity a boon and often switch between my Icom IC-756 and the 538AT. While S readings are virtually the same, the background noise with no signal is far lower, so much less fatiguing, on the Jupiter.

Tony Dolby, F5VBY, is another Jupiter operator and we both agree that we have never found the need for a cooling fan, even with shack temperatures over 40°C. We find that the automatic notch facility is excellent and deals most effectively with those who play 'toy pianos' on top of your QSO. We have never found any strong signal problems on 40m even with a 2-ele beam at F5VBY. Regarding the 120 steps per revolution encoder, this could be better but remember this is a budget rig, the current ex-works prices in the USA being approximately £710 for the 538 and £880 for the 538AT.

The Ten-Tec website (www.tentec.com) and the Elecraft website (www.elecraft.com) include comprehensive performance data and comparisons with other popular makes of transceiver: very interesting, so have a look!

Norman Fitch, G3FPK

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Creeping EU-ification?

Further to the letter about UTC / GMT ('The last word' January 2004), at the risk of being accused of paranoia this seems to be the way our world is now run; we had it with Fahrenheit / Centigrade, we now very rarely indeed get other than metric measurements (not least from the RSGB!) and now we read of some RSGB regional reorganisation, would this by any chance fit in with the EU's idea of splitting Great Britain into Regions?

Don't let the EU rule Britannia!

Ant Astley, GW0AJA

... I enjoyed reading Denzil Roden's, G3KXF, letter ('The last word', January 2004). I am sure that he wrote with his tongue in his cheek. The whole topic reminded me of my view on the increasing use of the word Celsius, and dropping of Centigrade to illustrate temperature (Fahrenheit is definitely out). I personally object to the change for the good reason that Centigrade immediately indicates what it means, a scale with the reference points of 0° and 100°.

On the other hand GMT presupposes that Britain is still Great Britain, ruling the world, or a great part of it. UTC on the other hand moves with the times, and is Politically Correct, meaning Universal Coordinated Time, accepted by all.

Bill (William) Abrahams, ON9CGB / G0MEU

Wish upon a PIC-A-STAR

Now that Peter's, G3XJP, feature is reaching a conclusion, I thought it would be appropriate to congratulate and express thanks to him for what has been a mammoth project. A state of the art project for which he has given of his time to bring it to the attention of thousands of fellow amateurs in the interests of self education in amateur radio. I have put to verse a few lines of praise and gratitude for all his efforts:

When you wish upon a STAR
Your dreams come true from afar
Signals loud, signals clear
With DSP never fear.

With programmed PICs
State of art bits
You read, learn and build
Your wishes fulfilled.

So STAR gazers everywhere
Start to prepare
Iron to hand
PCBs will look grand.

A state of art project, one
without end
Programming skills on which
to depend
All put together with learning
in mind
Tricks of the trade, benefit all kind.

Peter, your STAR is shining bright
With results that please and
give delight
Creative person, should be proud
Of a project, praises sing loud.

Gratitude then to a man self taught
For all the hours of programming
thought
Well done that man
And of course, thanks to Fran.

Merv Williams, GW3VXC

Club prefixes

It is a pity that the issuing authority does not licence clubs with GC, GS, MX, etc as these would then be published in the *Yearbook* and not cause any confusion.

Incidentally, it is surprising how often we are asked whether we are on Jersey or Guernsey when operating with the GC prefix, although this prefix has not been so used for many years. Some operators seem to be using a very old prefix list!

Charles Bryant, GW3SB / GC4LZP

The 'forgotten amateurs'?

It appears to me and perhaps many others, that 'we' amateurs licensed before 1962 are now 'the old brigade' and therefore not worth any form of consideration when it comes to *new* licence conditions and the part the RSGB plays when dealing with Ofcom (see Ed Taylor's, G3SQX, article in 'RSGB Matters' *RadCom* February 2004).

Last year G4FPH used the word "eroded" with regard to our licence conditions ('The last word' September 2003). Please don't get me wrong, I am not against the new conditions to attract new members; I'm sure that dispensing with CW as one of the requirements was inevitable due to technical progress over the last 45 years.

But what is the RSGB doing for the 'old brigade'? My simple recommendation would be for a licence fee exemption for all, prior to the introduction of Class B Licences in 1962 (and who are not yet 75 years of age). This would be a starting point, others may have alternative comments. I am paying a modest £15 per annum and have been paying the full amount (whatever it was) since 1961. Fair enough!

But here are these new conditions, where newly-licensed operators pay the same fee and obtain far superior benefits (and a simpler exam) than 'we' ever did. This does not seem to be a level playing field - 'we' are not getting a fair deal! It's nothing at all to do with being 'elitist' or 'superior' to the newcomers to amateur radio.

But why worry? We are now one large happy bunch, all enjoying the same hobby. Well, that's what we are told, so it must be true!

Stewart Revell, G3PMJ (since October 1961)

Lacking character

I am amused and bemused by the recent correspondence on a Morse sequence for "@". After 46 years of CW operation, at ease in English, French and German with all the associated accents, I would be completely confused by 'dit-dah-dah-di-dah-dit', with or without the final 'dit'. After long and deep thought I have come up with a brilliant idea: why not 'di-dah' (space) 'dah'? This, of course, spells "at", which is what "@" stands for. Used when sending what is obviously an e-mail address this is likewise immediately obvious; I have been using it for some time now in CW QSOs in all three languages and it has always been recognised.

Gerald Lander, HB9AJU / G3OOH

... I must confess that I see no necessity in inventing another Morse character for the now more frequently used symbol "@". I have given my e-mail address over the air using Morse on several occasions and have found no ambiguity at all in just sending "at". If we really need to clarify the situation then send "(a)". The precedent has already been set for using existing characters to generate a non-existent one in as much as the percent symbol is sent using "o / o"

C J Osborn, G3XIZ

Drastic action

I read with mounting disbelief the letter from Malcolm Sadler, M0BHE ('The last word', February). While I too have some reservations about the new licensing system, I have to ask him just who he thinks he is to pour such scorn on ex-class Bs and newly-licensed M3s? With the ink barely dry on his M0 licence, he feels free to let rip at the 'effortless' access we have been given to the HF bands, comparing us to "poorly-trained black box operators" and "CBers". Is his shack crammed with homebrew receivers, transmitters and transceivers? Mine is. Can he build and operate noise bridges and measure third order IMDs? I can, and I can't hold a candle to many ex-class Bs. Some of us are appalled at the holier-than-thou attitude of some class As, many of whom can barely read the frequency indicated on the display of their FT-1000s properly. While I am proud of my skills, I am always aware that I have much to learn in order to get the best out of this great hobby of ours. Perhaps amateur radio is better off without Mr Sadler and his raging snobbery.

Andrew Howlett, G1HBE

... I would like to reply to the letter from Malcolm Sadler, M0BHE ('The last word', February.) Tell me, does holding a A-class licence and 12 words a minute pass in the Morse test make somebody into a super being? I would have thought that anybody holding any class of licence

has shown that they have an avid interest in the hobby and would benefit from the help of the older class of amateur rather than the degradation that Mr Sadler seems to espouse.

I think it very sad that an amateur of his experience holds his fellow licensees in such low esteem; not only the Foundation Licensees but also the previous holders of a Full B-class licence. I wonder what experience Mr Sadler has of operating radio or setting up ground stations in combat conditions, how many hours has Mr Sadler spent setting up ground stations in artic weather conditions? Please Mr Sadler, take into account that not all Cornflake licensees arrive with no knowledge.

If we don't hold a A-class licence, does that make us any less of a person, does it make our experience in life any the less interesting than yours or do we all have to know and talk about valves and other equipment that was in vogue before half of us were born?

Sam C Trevayne, M0RGJ, formerly M3CCG

Koch Morse tuition

The 'Morse' column in the February *RadCom* was a good article. Readers may be interested to know that I have a Koch Method Morse trainer available for free download on my website at www.g4fon.co.uk It also has an e-mail support group running on *Yahoo* called KochMorse.

Ray Goff, G4FON

Reissued calls: an overseas perspective

I've read the letters of GW3KJW, G2YT and GW3BV in the December and January issues of *RadCom*. At risk of offending all concerned, I offer the opinion of someone living in a different, if similar, country. Callsigns are certainly an emotionally-charged issue in Canada, as they are in the UK and perhaps everywhere else in the world of amateur radio. While there are many virtues in the UK callsign assignment system, I do think you could be somewhat less rigid in allowing the reassignment of old callsigns to new holders.

Here in Canada, if I were to pass away, my callsigns would be held back from re-issue for one year to give members of my family an opportunity to have any or all of those callsigns reassigned to them. After one year, those calls would be freely available for reassignment to anyone who wanted them. Prized two-letter callsigns are normally issued only to those who have held a licence of any class for at least five years.

In my 29 years as an amateur, I have held eight different Canadian callsigns, three of which I retain. Most were reissued callsigns. All of the callsigns I have surrendered have since been reissued to people I do not know. I'd venture to say that in Canada, almost all two-letter callsigns are reassigned, most not to relatives, and a fair proportion of three-letter calls are reassigned. Perhaps it's a miracle, but amateur radio in Canada does not suffer interminable chaos as a consequence, and I do not mourn for any of my former callsigns.

In reality, it matters to very few people that a now-dead ham's callsign has been reissued. A callsign's fundamental purpose is to identify a station. That we invest emotion in these things is secondary and irrelevant to the fundamental purpose. A callsign is not a tombstone and should not be used as such. Because a venerable (or even anonymous) ham dies, we do not have to engage in permanent, Queen Victoria-like mourning, regarding his or her now-unused callsign as a sacred memorial.

With the recent changes in UK regulations eliminating the differences between Class A and B licensees, it may now be appropriate for the UK licensing authority to allow the issue of any unused G and M callsigns to any qualified person who wants them, perhaps with a minor limitation based on seniority. Those who do not want to change don't have to. Who is harmed if G3FXB returns to the airwaves, or if GW7AA suddenly appears on the bands? So long as the callsign accurately reflects the location of the station, it serves its purpose. Leave the emotions out of callsign assignment.

Perhaps uncharitably, I view the sentiments of those who would allow no reissue or change of callsigns as equivalent to "I don't want it, therefore you shouldn't have it."

Dave Goodwin, VO1AU (also VE9CB and VO2AAA, ex-VE2ZP among others)

DAB quality inferior to VHF / FM?

The article on DAB (*RadCom* January 2004 p81) was very enjoyable and written in a nice clear style by Jeremy Boot. I would not take issue with Jeremy on anything he says, but I would like to raise an additional small but important point. Digitising an audio signal always increases its bandwidth. For instance, telephone speech occupies 3kHz but requires 64kbit/s to transport it. The 64kbit/s bit stream will require approximately 200kHz of bandwidth. Having digitally encoded the audio, the bandwidth may be reduced dramatically by removing 'unnecessary' information. For instance, a mobile phone may require just 8kbit/s. The final version is not a true replica of the original, though it may sound superficially similar.

For this reason, digitally compressed audio such as DAB cannot be thought of as high fidelity because the source and reproduced audio waveforms are different. They may sound similar if the processing has tricked the ear effectively. It is very sad to think that the true hi-fi quality of, say, Radio 3 on VHF / FM may not be available in the future. Broadcast listeners (both sound and television) are not aware that the spectrum to which they have had access all these years may be taken away and sold, and digitally compressed services substituted which do not offer the same quality.

David Sumner, G3PVH

Improving Morse ability

I was very interested to read the comments made by Alan Bateson, 2E0CDE ('The Last Word', December 2003). Even though Morse has been pushed into the background somewhat by the relaxation of amateur radio licensing requirements, there are still many operators who shun the use of microphones (I am one of them). All is not lost for beginners, however, and there are groups of operators scattered around the country who will be only too willing to help them to improve their CW. Do not be shy about calling the more proficient operators. This, I feel, is the easiest way to get one's foot on the first rung of the ladder.

One of the wonderful things about operating CW is that if we are honest, all of us, no matter how experienced we are, hear operators whose code is superior to our own. This sets us targets as we try to emulate them. As Alan stated in his letter, it can be difficult to copy what a poor operator is trying to send, even at low speeds, but, conversely, listening to a good operator is a joy to the ears.

I am not trying to boast, but I can honestly say it is easy to sit back and copy well-sent Morse at 50WPM. At my age, however, mental fatigue comes into play to limit how long I can enjoy that experience! The greatest skill is required for sending and it is only constant practice which brings about that improvement.

Richard Johnson, G2FFO

Nodding off?

Is it my imagination, or not? Because in that photograph ('RadCom News', page 11, February 2004) showing G3CVI making contact with GB2GM it looks suspiciously to me that BBC TV's *Flog It!* presenter Paul Martin is having 40 winks whilst all the action is happening in front of him!

Ray J Howes, G4OWY

No doubts

It was inevitable that the new licensing structure would raise a few eyebrows. My own experience has dispelled any doubt. So, if you want a callsign, get on the courses. No matter how clever you think you are, you will have a pleasant surprise and most importantly you will learn how to become a good operator and not a nuisance on the bands.

A P (Dick) Dixon, M3BUQ / 2E0AVP

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SM-1 SHOCK MOUNT

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This shock mount decouples the microphone from the boom and prevents vibration noises. The mic is suspended in an 8-point nylon band and comes with the standard 5/8in - 17mm fitting.

HEIL GOLDLINE HAND MICS

PRICES DOWN

Goldline professional quality dynamic microphone. Three versions available, GM-4 with Studio & HC-4 elements, GM-5 with Studio & HC-4 elements and GM-V Vintage Goldline with Vintage Studio high impedance element, for older valve rigs such as Drake & Collins. Includes stand threaded holder. Requires CC-1 adaptor £29.95.

GM-4	Goldline HC-4 hand mic	**£109.95**	B
GM-5	Goldline HC-5 hand mic	**£109.95**	B
GM-V	Goldline Vintage Hi-z hand mic	**£129.95**	B

HEIL CLASSIC DESK MICS

PRICES DOWN

The Heil Classic studio quality microphone, exact replica of the 1930's RCA 74B type of broadcast microphone. Inside it has the benefit of modern technology. Two inserts are provided, one for broadcast studio quality and a choice of one other Heil insert. Includes base stand, soft-touch PTT back panel switch and cover for microphone. Requires CC1 adaptor.

HCL5	Classic retro-look HC-5 desk mic	**£199.95**	B
HCL4	Classic retro-look HC-4 desk mic	**£199.95**	B
HCLic	Classic retro-look IC desk mic	**£199.95**	B

CB-1(H) MATCHING DESK STAND

This desk stand has been designed specifically for the Heil Classic & Heritage microphones.

PRICE DOWN **£49.95 A**

FS-2 PTT FOOT SWITCH

£39.95 B

Ergonomically designed to require less effort to operate. The hinge is under your heel instead of away from your foot. It can control two devices from a single operation.

TB-1 MATCHING DESK STAND

£23.95 A

This smart desk stand perfectly matches the HM stick series of microphones. Base diameter is approx 120mm and total height of stand is approx 110mm.

AUDIO

bhi NES10-2 DSP SPEAKER £99.95 B

Combined speaker and programmable DSP unit. Offers dramatic noise reduction, even reduces annoying hetrodynes. 8 Ohms, 8 filter settings, 3.5mm plug, 12-24V DC

bhi NES-5 DSP SPEAKER £79.95 B

Combined speaker and fixed setting DSP unit. Offers same dramatic noise and hetrodyne reduction. (Formally NESCB) 8 Ohms, 3.5mm jack plug, 12-24V DC 500mA

WATSON HP-100 HEADPHONES £19.95 B

Excellent lightweight communication headphones with tailored response ideal for the modern tranceiver or receiver.
**8 Ohms 200-9,000Hz *Adjustable headband *3.5mm stereo plug *1/4" stereo adaptor.*

WATSON HP-200 HEADPHONES £22.95 B

Superb headphones with tailored response for radio comms. Excellent sound proofing, can pull in the weak DX.
**Mono 8 Ohm 200-10,000Hz *Padded Ear pieces *3.5mm stereo plug *1/4" stereo adaptor.*

SGC SPECIAL OFFER

Buy an SG-2020 or SG-2020ADSP transceiver with any SGC Coupler (except SG-239) and receive a *FREE* SGC Multimeter (worth £19.99) *PLUS* £30 (inc Vat) *OFF* the price of the pair.

SG-220 £499.95
1.8-30 MHz 1W-20W

SG-220ADSP £589.95
1.8-30 MHz 1W-20W + DSP

PRICES DOWN!

SG-237 Auto ATU

1.8 - 60MHz. 3 - 100W pep (40W CW). Min wire length, 7m. 50 Ohm feed. Needs 12V at approx 300mA.

£299.95 c

SG-231 Auto ATU

1 - 60MHz. 3 - 100W pep (50W CW). Min wire length, 7m. 50 Ohm feed. Needs 12V at approx 900mA.

£349.95 c

SG-230 Auto ATU

1.6 - 60MHz. 3 - 200W pep (80W CW). Min wire length, 7m. 50 Ohm feed. Needs 12V at approx 500mA.

£339.95 c

SECONDHAND LIST

Glenrothes (Tel: 01592 756962)

TS-2000 HF/6m/2m/70cms ***as new***	£1345.00
FT-1000MP-MK5 HF transceiver	£1849.00
FT-920 all mode HF/6M transceiver	£820.00
TS-2000 HF/GC/6M/2M/70CMS	£1150.00
IC-703 hf/6m all mode transceiver ***as new***	£499.00
FT-920 all mode HF transceiver	£875.00
TS-850SAT +CW filter & voice recorder	£695.00
IC-R8500 .05-2000MHz all mode ***as new***	£850.00
IC-R75 all mode G.C. receiver ***as new***	£440.00
LOWE HF-225 Europa G.C. receiver	£299.00
IC-72 all mode receiver	£385.00
IC-R71E all mode receiver	£375.00
WIN 1550i Computer receiver	£275.00
LOWE HF-225 G.C.receiver	£150.00
TARGET HF-3 receiver	£79.00
FT-736 6M/2M/70CM all mode transceiver	£599.00
IC-T8E 6M/2M/70CM handheld	£199.00
TRIO TS-711E 2M base multimode	£375.00
IC-T3H 2M Handheld transceiver	£110.00
TR-2300 2M portable	£60.00
IC-R10 all band all mode handheld scanner	£175.00
MVT-7300 scanner full coverage all mode	£170.00
MVT-9000MK2 all mode scanner	£265.00
ROBERTS-RC-828 sw receiver + cassette	£145.00

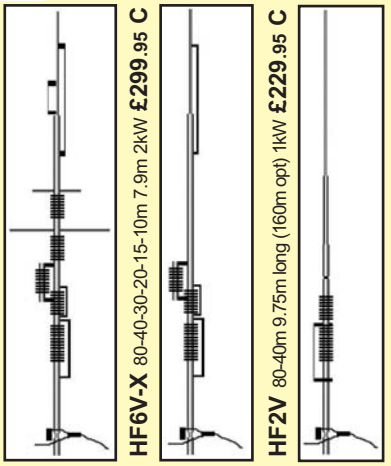
Matlock (Tel: 01629 832375)

FRG-100 Yaesu HF receiver	£295
IC-R75 HF receiver	£450
TS-2000 HF/6m/2m/70cms	£995
TS-850SAT HF transceiver	£600
IC-706MkII VHF transceiver	£395
VX-1R Handheld	£75
VT-225 Yupiteru Scanner	£139

Hockley (Tel: 01702 204965)

IC-2100H 2m Mobile	£169.00
TM-451E 70cm FM mobile	£249.00
TM-V7e Dual band mobile	£279.00
TR-751E 2m Multimode	£329.00
DJ-G5 Dual band handy	£169.00
FT-11R + DTMF 2m handy	£119.00
IC-R71E HF receiver	£329.00
Lowe HF-150 receiver	£199.00
Lowe HF-225 receiver	£249.00
Lowe HF-250 receiver	£329.00
Sony ICF-SW55 receiver	£179.00
Sony ICF-SW100E	£115.00
IC-R7000 Wideband receiver	£449.00
WR-1550e PC receiver	£329.00
AR-8200 Scanner	£249.00
AR-8200II Scanner	£299.00
IC-R2 Scanner	£99.00
VR-500 Receiver	£150.00

Butternut Antennas from Bencher inc, USA *PRICES DOWN!*



CPK Counterpoise Kit Acts as missing half of dipole, allows HF6V & HF9V to operate more efficiently. Bolts onto base, each side 2.5m. **£129 C**

STR-II Resonant Radial Kit 4 radials for 40, 20, 15 & 10m. Each radial is 9.5m long **£109.95 C**

RMK-II Roof Mount Kit Includes tripod/STR-II/hardware **£149.95 C**

TBR-160S 160m Resonator Kit **£114.95 C**

A17-12 17 & 12m adaptor for HF6V-X **£49.95 C**

A-6 6m Resonator for HF6V-X **£14.95 B**

30-MRK 30m Resonator for HF2V **£89.95 C**

TLK Top Loading Kit Increased band width on 80 & 160m, 4x7.62m wires + fixing bolts. For HF2V **£39.95 B**

WEB ORDERING
www.wsplc.com

PRICE MATCH

THE ONLY THING WE CUSTOMER SERVICE WON'T DISCOUNT

WATSON W-25XM PSU NEW £99.95 B

A compact sized switch mode power supply that will run your base HF station with ease. *Output voltage 10-18V *Output current 22A/25A peak *Over current protected *Switchable dual Voltage input

WATSON W-25SM PSU £79.95 B

Very popular budget switch mode power supply. *Output voltage 13.8V DC *Output current of 22A (25A peak) *Front panel output terminals *Over current & voltage protection *Quiet operation

WATSON W-25AM PSU £89.95 C

DC power supply for the shack & esp. for use with 100W transceivers. Separate voltage and current meters. *Output voltage 0-15V DC *Output current of 25A (30A peak). *3 sets of output terminals *10A cigar socket. *Over current protection

WATSON W-5A PSU £29.95 B

DC power supply for the shack and low power QRP transceivers. *Output voltage 13.8V DC *Output current of 5A (7A peak) *Front panel output terminals *Over current protection

MANSON EP-925 PSU £99.95 C

A general purpose 3-15V DC, 25A (30A peak) power supply able to provide the needs of the modern 100W HF transceiver. *Dual analogue meters *Over current protection *Large power terminals for rigs *Quick snap connectors for ancillaries

AVAIR VSWR Meters PRICEMATCH

AV-200 £49.95 B

Ideal for HF and VHF operation. It features high power handling up to 400W * 1.8-180MHz * 5W, 20W, 200W, 400W * Av or PEP

AV-400 £49.95 B

Ideal for VHF and UHF operation. It features high power handling up to 400W * 140-525MHz * 5W, 20W, 200W, 400W * Av or PEP

AV-600 £69.95 B

Two sensors used for HF and VHF/UHF operation. * 1.8-160MHz, 140-525MHz * 5W, 20W, 200W, 400W * Av or PEP

NEW SGC Master Antenna Controller

MAC-200 £339.95 C

* Automatic ATU
* 1.8-60MHz
* 5-Way Selector
* Coax or Balanced
* Long Wire

The MAC-200 will work with any HF transceiver up to 200W output. It has 3 outputs for coax and one each for wire and balanced - all switch selected. 168 revolving memory bins lets it remember for quick QSY. With an impedance range from 2 - 5000 Ohms, and built-in VSWR and power metering, it is all you are ever likely to need! Requires 12V DC.

WEST MOUNTAIN RIGBLASTERS

RIGblaster pro	Data interface 8-pin/mod, Cd & cables	**£229.95**	B
RIGblaster Plus	Data interface 8-pin/mod, Cd & cables	**£139.95**	B
RIGblaster M8	Data interface 8-pin, software & cables	**£109.95**	B
4T8-KIT NEW	Conversion Kit from M8 or Plus to 4pin	**£19.95**	A
RIGblaster nomic8P	Data interface 8-pin, software & cables	**£59.95**	B
RIGblaster nomicRJ	Data interface RJ, software & cables	**£59.95**	B
FT100-CBL	Adapts all units to FT100 input	**£12.95**	A
RB-CD	Standard RIGblaster program CD	**£9.95**	A

FREQUENCY COUNTERS

WATSON

The **FC-130** is an ideal frequency counter for the shack, mobile or portable use. Supplied complete with Ni-Cads, charger and telescopic whip.

Super Searcher	RF finder & freq. cnter 10MHz-3GHz	**£99.95**	B
Super Hunter	Frequency counter 10Hz-3GHz	**£149.95**	B
Hunter	Frequency counter 10MHz-3GHz	**£49.95**	B
FC-130	Frequency counter 1MHz-3GHz	**£59.95**	B

OPTOELECTRONICS

Top-of-the-range product from Optoelectronics, the **X-Sweeper** is a fully featured nearfield receiver that displays frequencies analogue signals in spectrum format on a 64x128 graphical display. It has 20 memory banks storing 100 freqs in each.

X-Sweeper NEW	Nearfield Receiver 30MHz-3GHz	**£1699.95**	C
Xplorer	Freq. cnter / CTCSS/DTMF decode	**£685.95**	B
Digital-Scout	Digital Freq. counter 60MHz-2.6GHz	**£459.95**	C
Scout	Freq. finder 10MHz-1.4GHz	**£349.95**	B
M1	Freq. cntr 50Hz - 40MHz	**£239.95**	B
M1-TCX0	M1 + temp controlled crystal oscillator	**£289.95**	B
Cub	Mini counter 1-2.8GHz	**£134.95**	B

TRANSMITTING LOGBOOK £4.99 A

Traditional Logbook for Radio Amateurs, A4 spiral bound for ease of use plus updated Prefix List and room for extra notes. A logbook is a legal requirement for any radio station.

MOBILE LOGBOOK £4.99 A

You've asked for one so here it is - the Radio Amateurs Mobile/Portable Logbook. A5 size, it also contains relevant repeater information. A mobile logbook is not a legal requirement.

Coax Switches

CS-600 2-way coax switch rated over 1kw (HF) and up to 600MHz @100W. Fitted SO-239 sockets. **£12.95 A**

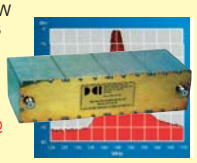
MFJ-1704 4-way coax switch rated over 1kw (HF) and up to 600MHz @100W. Fitted SO-239 sockets. **£69.95 A**

DCI High Performance Bandpass Filters

Razor sharp VHF & UHF filters

Simply place in antenna feed and clear up reception problems related to strong out of band signals. These are commercial grade filters with up to 68dB rejection.

DCI-145 2M Band Pass Filter. 200W handling. -68dB @ 136MHz, -55dB @ 155MHz. SO-239 **£99.95**
DCI-145-2HN "N" sockets **£109.95**



DCI-435 70cm Band Pass Filter. 200W. -47dB @ 415MHz, -50dB @ 455MHz. "N" sockets. **£119.95**

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Tel:01629 832375 Fax:01629 580020

3 South
WATERS & STANTON HEAD OFFICE
Spa House, 22 Main Rd, Hockley, Essex, SS5 4QS
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Fax:01702 205843

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One-Touch Operation
Wide Receiver Coverage

FT-2800M

Heavy Duty VHF Mobile
65W VHF FM
Extensive Memory System
Alpha Numeric Display
Versatile Scanning

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144/430MHz
50W VHF/ 35W UHF
Cross Band Repeat Capability
Wide Receiver Coverage

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