www.rsgb.org

RadCom

The Radio Society of Great Britain Members' Magazine

£3.95 Vol 81 No. 6 June 2005

Amateur radio museums

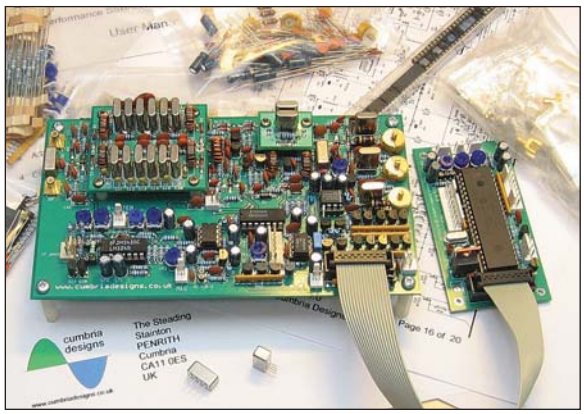
It's International Museums Weekend this month. We take a detailed look at two of the radio museums participating p38

NVIS

Improved understanding of Near-Vertical Incidence Sky-wave propagation may lead to better NVIS antenna designs p76

QRP

A new transceiver subsystem from Cumbria Designs p54



The legality of mobile

A 'guest editorial' by David Taylor, G4EBT, a magistrate as well as a radio amateur and motorist p22

INSIDE

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W-25SM 25 Amp PSU ***£39.95***
*Boom Headset needs Heil adaptor lead £14.95


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With the Waters & Stanton Clubcard you pay no interest for up to 5 months if you spend over £75. You can use it in all three of our stores and also at rallies and shows. To apply for your card, simply phone, e-mail or fax your name and address. Alternatively, download the application form from our web site in the "leaflets" section.

W&S Fifteenth Annual

Hockley Open Day 2005

29th May 2005 10am

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Our Massive Open Day gives you bargains galore! FREE food & drink plus raffle. Support from Yaesu, Icom, Kenwood & Repeater groups.

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NEW HANDS-FREE MOBILE SYSTEM

Supplied with easily detachable lead to match your radio - so you can change radios in the future with ease!

Delivery expected in July

More Great Ideas!

£39.95

Code WM-S

An economical way of staying legal. Flexible boom microphone mounts under sun vizor bolt and PTT box mounts on gear changer. All powered from rig mic socket!

PTT Box

Icom HF Transceivers

ICOM IC-756 PRO MkIII

Top of its range HF transceiver. HF & 50MHz, features large colour LCD with spectrum scope, auto ATU and 32-bit floating point DSP unit. **£2099 C**

IC-7800 £6400 C
Flagship HF 200W transceiver. 200W max. The ultimate receiver - the ultimate design! AC psu built in.

IC-7800-PACK £6995 C
The superb transceiver as above plus 17" flat screen, keyboard and SM-20 base microphone.

IC-7400 £1299 C
HF/VHF 160m - 2m transceiver 5 - 100W. SSB CW FM AM. 12V DC. Nice big display. Lovely price.

IC-706 MkIIGDSP £769 C
It's unbeatable. 160m - 70cm (up to 100W HF) yet so small with detachable head. The ultimate mobile.

IC-718 £449 C
This is a budget class radio HF 16 - 10m at a price that belies its performance. Beautiful display.

IC-703 *Free IC-703 Logbook* £539 C
Take an IC-706, reduce power to 10W max and get rid of VHF. 160 - 6m of pure QRP joy!!

Going HF Mobile?

Then check out the great 80m - 6m SIDE-KICK motorised mobile whip from USA. No hassel and great performance. £249.95 C

Kenwood HF Transceivers

KENWOOD TS-2000

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. **£1389 C**

TS-2000
The station in a box. 160m - 70cm with every feature imaginable inc. DX cluster. Kenwood fans dream rig.

TS-2000X £1799 C
Take the TS-2000 and add a superb 23cm module. The best 23cm we know of plus all other bands!

TS-B2000 £1299 C
Designed for the 21st century. You get HF - 70cm with PC software for direct PC control. It works great.

TS-870S £1249 C
Kenwoods great HF radio that uses phasing for SSB. No more filters to buy - they are all inside the box!

TS-570DG £839 C
The best budget radio at the price. Superb 100W from 160m to 10m. As used by Peter Waters, G3OJV

TS-50S £595 C
A great rugged mobile for 160m to 10m with up to 100W output. Also a great price.

TS-480SAT £899 C
HF 160m - 6m with remote front panel. Large enough for base use, small enough for mobile. Big display

TS-480HX £1049 C
Take the TS-480SAT, remove the auto ATU and offer a beefy 200W output. That's a really potent package!

Yaesu HF Transceivers

YAESU FT-1000 MKV

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. **£2099 C**

FT-1000 FIELD £1699 C
The HF choice for DXers. With this rigs reputation on DXpeditions what more persuasian do you need?

FTV-1000 £729 C
6m 200W module for the FT-1000 range. Probably the ultimate for 6m DXing.

FT-897D £649 C
160m - 70cm self-contained portable. 100W and up to 20W from optional internal batts.

FT-857D £579 C
160m - 70cm mobile with up to 100W output. Lovely tuning control from remote head unit - and great price!

FT-847 £999 C
Complete station in a box! 160m - 70cm - up to 100W (50W 2m/70cm). Great for satellite work.

FT-840 £399 C
Is there any other radio that comes close to this price? One of our all-time best sellers. 100W 160m - 10m

FT-817ND £489 C
The ultimate QRP self-contained radio. Up to 5W output 160m - 70cm. New low price. UK warranty.

FT-817DSP £589 C

Warning - as a regular advertiser you can be sure all our stock is genuine UK warranted. Check serial numbers!!

Carriage Charges: A=£2.75, B=£6, C=£10

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Icom
VHF/UHF Mobile/Base

ICOM IC-E208

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*
£239 C

IC-910H £1099 C
2m / 70cm 100W Base station all - modes with option for 23cm module (**UX-910 £359)**

IC-910HX £1249 C
As above but with 23cm module ready fitted and a big saving as well.

IC-2100H £189 C
2m 55W FM mobile with rugged construction and all-in one die-cast chassis.

IC-2725E £269 C
Icom's dual band 2m / 70cm radio. Very easy to operate and install and a lovely detachable head.

Kenwood
VHF/UHF Mobile/Base

KENWOOD TMD-700E

2m/70cm dual band mobile transceiver with APRS. Does not need extra high cost boards to function. Only extra if required is a compatible GPS receiver. **£439 C**

TM-G707E £269 C
Dual Band 2m & 70cm with detachable front

TM-V7E £359 C
Dual Band 2m & 70cm with 50/35W output

TM-271E £189 C
Dual Band 2m FM 60W mobile transceiver

Yaesu
VHF/UHF Mobile/Base

YAESU FT-7800E

**2m/70cms Dual Band Mobile*
**High power 50W 2m /40W 70cms*
**Wide receive inc. civil & military air-band *CTCSS & DCS with direct keypad mic.*
**Detachable front panel *1000 memories plus five one-touch*
£229 C

FT-2800M £159 C
*2m FM Mobile transceiver * High power 65W * Capable of VHF wideband receiver

FT-8800E £269 C
*2m/70cmDualband FM Mobile transceiver * 50W 2m, 35W 70cm * Wideband receiver

FT-8900R £339 C
*2m, 70cm, 6m & 10m Quadband FM Mobile transceiver * Independent dial for each band

Watson
Mini Mag Antenna

WSM-270 £19.95 B

Dual Band 2m/70cm mobile whip. 2.5dB gain and 1.5:1 VSWR.).8m long. Complete system including 3.5m cable. No drilling involved. Powerful micro magnet in base. Simple and very effective.

Icom
VHF/UHF Handhelds

ICOM IC-E90

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. **£269 B**

IC-T3H £129 C
2mFM handheld 5.5W c/w BC-01 & BC-146

IC-T22A £149 C
2mFM 5W handheld transceiver

Kenwood
VHF/UHF Handhelds

KENWOOD TH-F7E

• 144-146MHz Tx/Rx: FM
• 430-440MHz Tx/Rx: FM
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. **£239 B**

TH-D7E £299 C
2m/70cm dualband FM handheld transceiver with data communications

TH-G71E £179 C
2m/70cm dualband FM handheld transceiver

TH-K2E £139 C
2m FM 5W portable transceiver c/w Ni-MH battery/charger

TH-K2ET £145 C
2m FM 5W portable transceiver c/w Ni-MH battery/charger

TH-K4E £139 C
70cm FM 5W portable transceiver c/w Ni-MH battery/charger

Yaesu
VHF/UHF Handhelds

YAESU VX-7R

Totally waterproof! Wide Frequency coverage from 500kHz to 900MHz AM/FM. Dazzling 132x64 dot matrix display providing easy-to-read frequencies and information plus pictorial graphics. **£249 C**

VX-2E £119 C
2m/70cm miniature handheld transceiver with LiON battery/charger

VX-110 £94 C
2mhandheld transceiver with 8-key keypad NiCd & charger

VX-150 £99 C
2m handheld transceiver with 16-key keypad NiCd & charger

Alinco
VHF/UHF Handhelds

DJ-V5E £159 C
2m/70cm FM 5W dualband handheld transceiver

DJ-193E £91 C
2m FM transceiver no keypad, Ni-Cds & charger

DJ-195E £99 C
2m FM transceiver with keypad Ni-Cds & charger

DJ-C7E £124 C
2m/70cm credit size FM handheld

Linear Amp UK
HF Linear Amplifiers

RANGER 811H

**1.8 - 29.7MHz*
**800W CW or SSB, 400W RTTY*
**Uses 4 x811A vertically mounted*
**Drive 10 - 100W*
**Toroidial AC Power Transformer*
**6:1 Reduction Drive on Tuning Controls *"Near Silent" Papst Cooling fan *Front-panel ALC Adjust Control *Built-in AC 230V @ 8A Supply*
£945 B

CHALLENGER III £1795 C
HF linear amplifier 10-160m WARC 100W in 1.5kW out

Ameritron
HF Linear Amplifiers

AL-1200XCE £2499.95 C
HF linear amp 10-160m 1.5kW

AL-1500XCE £2799.95 C
HF linear amp 10-160m 1.5kW

AL-800X £2699.95 C
HF linear amp 10-160m 1kW

AL-82XCE £2399.95 C
HF linear amp 10-160m 1.5kW

AL-80B £1399.95 C
HF linear amp 10-160m 1.5kW

AL-811HXCE £849.95 C
HF linear amp 10-160m 500W (3x811A)

ALS-500MXCE £849.95 C
HF linear amp 10-160m 500W solid state

ALS-600X £1299.95 C
HF linear amp 10-160m 600W (export only)

SGC
HF Linear Amplifiers

SG-500 £1399.95 C
"Power Cube" 1.6-30MHz 500W solid state

Yaesu
HF Linear Amplifiers

QUADRA (VL-1000) £3795 C
HF + 6m linear amp. 1kW comes with PSU

Tokyo Hy-Power
HF Linear Amplifiers

HL-1FKX £1399.95 C
HF linear amp. 1.8-29.7MHz 500W PEP max, solid state

HL-2FKX £2699.95 C
HF +6m linear amp 1.8-29.7MHz + 50MHz 1kW PEP max, solid state

HL-100BDX £429.95 C
HF+ 6m linear amp 3.5-29.7 & 50MH\- 1-10W in 100W PEP solid state

NEW STOCK & OFFERS

W&S European Locator Map

Full colour European Locator Map with new countries and callsign prefixes. Available in high gloss finish with a choice of three sizes. These maps will grace any shack, charts are provided to show how to calculate your locator from latitude and longitude.

A2 Size (LOCW-MAP) £4.99 A
A3 Size (LOCD-MAP) £2.99 A
A4 Size (LOCS-MAP) £1.99 A

YAESU FT-60E

**Wide band Reception 108-520MHz & 700-999.990MHz (Cellular blocked)*
**New Emergency Automatic ID System*
**High 5W Power Output*
**Ni-MH Long-Life Battery FNB-83 (7.2V,1400mAh)*
**Programmable Keys for user convenience*
**Split CTCSS/DCS and DCS Encode-Only Capability.*
£179.95 B

NEW MFJ-935 /936 "Magic Circle" Loop Tuner

This is the most amazing antenna we have seen in years. For optimum results take a wire around 1/5th wave long, bend into square loop (14ft on 20m = 3.5ft square) and attach to MFJ-935. Result: Ultra low indoor noise and VK, ZL & W all on SSB! That's what we achieved in one day's operation! 20m loop works on 15m as well. Now in Stock! Great for QRP and portable as well.

MFJ-935 is portable version with smaller meter internal coil. **£179.95** **MFJ-936** has larger meter and is ideal for base use. **£229.95**. You use your own wire to make loop (approx 1/5 wave total length for lowest band) or purchase **MFJ-57** with cross arm and wire for 20/17/15m - approx 2ft per side £39.95. **MFJ-58** has addition of wire for 40/30m **£54.95**

Watson
Mobile Antenna's

ANTENNAS

W-2LE	1/4 wave 2m 0.48m 200W	£9.95 B
W-285	5/8th 2m 1.33m long 200W	£14.95 B
W-77LS	2m/70cm 0.42m 50W	14.95 B
W-770HB	2m/70cm 1.1m 200W	24.95 B
W-7900	2m/70cm 2m/70cm 1.58m	£32.95 B
WSM-270	Dual band mini magnetic	£19.95 B

BASES

WM-08	8cm diam magnetic	£9.95 A
WM-14B	14cm diam magnetic	£12.95 A
W-3HM	Hatch mount	£14.95 A
ECH	Cable kit	£10.95 B

NOTE: All antennas have PL-259 ends. Mag mounts have cable attached. Hatch mount needs ECH cable.

Carriage Charges: A=£2.75, B=£6, C=£10

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NEW

£9.95 A

* Cigar Plug-in DC adaptor
* 1.5 - 12V DC 1.5 Amps
* Stabalised and protected.
* 7 - way DC adaptor set.
* Matches most Yaesu / Alinco sockets.
* Works from 12 V or 24 V vehicle systems.

POCKET MORSE READER

MFJ-461

Reads CW
Just hold near receiver speaker

£84.95 B

That's right - just hold this self-contained decoder near your speaker and see the text scroll across the screen. Absolutely amazing

SG-2020ADSP QRP 20W HF Radio

160m - 10m
0.1 - 20W
Full DSP
Diecast Chassis

Perfect for QRP. SSB / CW and DSP processing. Passband down to 100Hz. Built-in SWR meter and electronic keyer. Max Tx drain 4A. Size 15 x 6.5 x 18cm. 680g.

£589.95 B

Antenna Accessories

Dipole Bits

Kevlar	Strong 400lb strain line 200ft	£22.95	A
FW-PVC-50	50m clear PVC 2mm wire	£39.95	A
Flexweave	50m multi-strand 2mm wire	£29.95	A
HDCW	50m hard drawn 16g copper	£14.95	A
Insul-8	Black ribbed insulator	£0.99	A
WDC-50	SO-239 dipole centre insulator	£6.49	A
Egg-m	Medium ceramic egg insulator	£2.15	A
Egg-s	Small ceramic egg insulator	£1.75	A
WS-2580	25pcs 3" ladder line spacers	£9.99	A

Diamond 50 Ohm Balunas

BU-50	1:1 1.7MHz 40MHz 1.2kW	£26.95	A
BU-55	1:1 3.5MHz - 75MHz 500W	£34.95	A

Antenna Traps (pairs)

TR-200	200W 14MHz (20m)	£44.95	B
TR-200-10	200W 10MHz (30m)	£47.95	B
TR-200-7	200W 7MHz (40m)	£49.95	B
TR-200-3.6	200W 3.6MHz (80m)	£53.95	B
TR-1000-141kW	14MHz (20m)	£59.95	B
TR-1000-101kW	10MHz (30m)	£61.95	B
TR-1000-7	1kW 7MHz (40m)	£64.95	B
TR-1000-3.61kW	3.6MHz (80m)	£73.95	B

German Made High Quality Baluns

HB-1-200	1:1 3.5 - 30MHz 200W	£25.95	B
HB-4-200	4:1 3.5-30MHz 200W	£25.95	B
HB-6-200	6:1 3.5 - 30MHz 200W	£25.95	B
HB-1-1	1:1 3.5 - 30MHz 1kW	£34.95	B
HB-4-1	4:1 3.5 - 30MHz 1kW	£41.95	B
HB-6-1	6:1 3.5 - 30MHz 1kW	£41.95	B

Remote 4:1 1.5kW Balun

REM-BAL	For coax to ladder line match	£45.95	B

Patch Leads

WPL-70	V low loss 75cm PL-259	£6.95	A
WPL-50	Standard 50cm PL-259	£2.99	A
WPL-50BNC	BNC version of above	£2.99	A
HQ-66	66cm RG-213 PL-259	£4.99	A
HQ-10m	10m long PL-259	£14.99	A

SGC External Auto ATU's

SGC SG-231

1 - 60MHz. 3 - 100W pep (50W CW). Min wire length, 7m. 50 Ohm feed. Needs 12V at approx 900mA.

£349.95 C

SG-239 £189.95 C
Mini auto ATU 1.8 - 30MHz 1.5 - 200W PEP primarily for long wires - non waterproof. 12V DC

SG-231 £349.95 C
1.8 - 60MHz 100W PEP. A great random wire tuner that you can use outdoors. 12V DC

SG-237 £299.95 C
1.8 - 60MHz 100W PEP. Great for mounting outdoors and feeding long wire. Waterproof. 12V DC

SG-230 £339.95 C
1.8 - 30MHz 200W PEP. The original design that handles end fed or coax unbalanced. Waterproof. 12V

SG-235 £749.95 C
3.5 - 54MHz. A hunky 120W PEP tuner that handles long wires. Great outdoor design. Waterproof.

Icom External Auto ATU's

AH-3 £479.95 C
1.8 - 28MHz. A hunky 120W PEP tuner that handles whips or wire longer than 2.5m. Waterproof.

Alinco External Auto ATU's

EDX-2 £289.95 C
1.8 - 30MHz 150W long wire tuner designed for use with DX-70 transceiver. Waterproof.

MFJ Internal Auto ATU's

MFJ-993

*Auto ATU with digital data display *1.8-30MHz *Long wire, coax & balanced line *300W SSB, 150W CW *Cross needle metering

£249.95 C

MFJ-991 £209.95 C
1.8 - 30MHz auto ATU. Similar to MFJ-993 but no digital display. Works with any HF transceiver. 150W PEP

MFJ-994 £349.95 C
1.8 - 30MHz high power auto ATU. 600W PEP / 300W CW. Tunes wire, coax and balanced feed.

SGC Internal Auto ATU's

MAC-200 £259.95 C
1.8 - 60MHz 200W PEP. Wire, coax and balanced feeder. Features auto antenna switching.

SG-237PCB £279.95 C
1.8 - 60MHz 100W PEP. Same as SG-237 but without housing for building into your own housing.

SG-211 £189.95 C
1.8 - 60MHz works off internal dry cells. Zero drain wait state. 60W PEP. Ideal for portable (Min 1W).

Yaesu Internal Auto ATU's

FC-20 £249.95 C
1.8 - 60MHz 100W matched for FT-100/Ft-847. Desk top unit to match transceivers. Coax systems only.

FC-30 £249.95 C
1.8 - 60MHz 100W. Designed for use with FT-857/FT897. Coaxial input / output.

FC-40 £239.00 C
1.8 - 60MHz 100W. New waterproof ATU designed for use with FT-897 / FT-857 and mobile operation.

Icom Internal Auto ATU's

AT-180 £349.95 C
1.8 - 54 MHZ ATU designed for IC-708. Plugs directly into transceiver for seamless operation. Coax only.

Kenwood Internal Auto ATU's

AT-50 £319.95 C
1.8 - 30 MHZ 100W ATU specifically designed for use with TS-50 transceiver. Coaxial only.

Cushcraft HF Antennas

MA5V £239.95 C
Vertical 5-band 20m - 10m. No separate radials needed. 250W. Self-supporting. 4.48m tall.

A3-S £469.95 D
The classic 20 15 10m 3-el beam. 2kW 8dB gain. 8.45 el. Turn radius 4.72m. F/B ratio 25dB.

A3-WS £379.95 D
Dual Band 3 el beam for 17m & 12m. 2kW. El length 7.66m. Turn radius 4.4m. Gain 8dB. F/B ratio 25dB.

A4-S £569.95 D
Tri-band 4 element Yagi. for 20m - 10m. DXers delight. 2kW . 8.9dB gain F/B 25dB. Turn radius 5.49m

R-8 £469.95 C
8-band vertical 40m - 6m. No separate radials needed. 1.5kW. Height 8.7m

R-6000 £329.95 C
6-band vertical 20m - 6m. No separate radials needed. 1.5kW. Height 5.8m. Great small garden ant.

MA5B
£369.95 C

5-band 2 El mini beam. 20m - 10m 2kW. Elements 5.2m Turn radius 2.7m. (Dipole on 17/12m) 5dB gain

Diamond HF Antennas

DIAMOND CP6

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.

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

£239.95 C

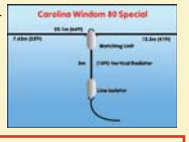
Radio Works HF Antennas

CW-160 £129.95 C
8-band 160m - 10m dipole with 22ft vertical radiating feeder. 1.5kW. Balun fed. 265ft long.

CWS-160 £119.95 C
Compact 8-band 160m - 10m dipole with 22ft vertical radiating feeder. 1.5kW. Balun fed. 133ft long.

CW-80 £89.95 C
7-band 80m - 10m dipole with 22ft vertical radiating feeder. 1.5kW. Balun fed. 133ft long.

CWS-80 £109.95 C



Compact 7-band 80m - 10m dipole with 22ft vertical radiating feeder. 1.5kW. Balun fed. 66ft long.

G5RV Plus £59.95 C

Rugged 2kW balun matched G5RV with 102ft element and 31ft ladder line. Requires ATU. Made in USA

Hustler Base Antennas

6-BTV £229.95 C
80 - 6m 6-band vertical. 7.3m tall 1kW. Can be used at ground level with earth stake. Ideal small gardens

5-BTV £199.95 C
80 - 10m 5-band vert. 7.64m tall 1kW. Can be used at ground level with earth stake. Ideal small gardens

4-BTV £169.95 C
40 - 10m 4-band vert. 6.52m tall 1kW. Can be used at ground level with earth stake. Ideal small gardens

Butternut Antennas

HF2V £229.95 C
80 / 40m high performance vertical. 1kW PEP 9.75m tall. Self supporting for ground mount use.

HF6V £299.95 C
6 band vertical 80-40-30-20-15-10m. 2kW. 7.9m tall. Use own radials or ground mount.

HF9V £349.95 C
9-band 80 40 30 20 17 15 12 10 6m vertical 1kW 7.9m tall. Use radials or ground mount

Buddipole Products

HF Portable at its Best

W3-BP £199.95 B
40m - 2m adjustable dipole. 250W and max length of 4.65m. Packs down to 65cm approx.

W3-MBP £199.95 B
Sames as W3-BP but packs even smaller.

W3-BS £134.95 B
40m - 2m vertical is half a Buddipole. Ideal for QRP and rucksack - as used by Peter Waters G3OJV.

Peter Waters says: *I think these products are great. Superbly engineered and very efficient.* Options include adaptor for dipole to decorators pole £6.95, Field tripod £89.95, 2.45m telescopic mast £49.95, mini tripod for Buddistick.

Super Antennas

MP1-SA £139.95 B
Screwdriver style adjustable HF QRP whip 40m - 70cm. 150W PEP. Max extended 185cm approx

MP2-SA £199.95 B
Electrically tuned version of the above. Requires around 9V - switch control box not included.

MP-80M £29.95 A
Add on 80m coil to extend the LF coverage of the MP1 and MP2.

High Sierra Mobile Whips

HS-1800/PRO
£379.95 C

The ultimate mobile whip. Electrically tuneable 80m - 6m 1kW PEP Includes switch box and 12V cable. Massive 2" coil. Made in USA. Superb!!

SIDEKICK As used by Peter Waters G3OJV/M
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Get mobile on all bands from 80m to 6m in minutes. This compact screwdriver antenna comes with cables and control box. Designed to go on our 3-way magnetic mount (£39.95 extra) it is an amazing performer and only 1.37m maximum!

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RadCom
RADIO COMMUNICATION

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Notices to readers concerning errors and omissions and advertisements can be found at www.rsgb.org.uk/news/radcom.htm#notices

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No responsibility can be assumed for the return of unsolicited material (if in doubt, call us first!)

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RSGB MEMBERSHIP – Annual Rates

Home Corporate	£42.50
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Corporate (Senior Citizens) (Applications should provide proof of age at last renewal date)	£33.50
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Affiliated Societies (UK or Overseas)	£42.50

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P&P on RSGB orders: £1.75 for 1 item, £3.30 for 2 or more items. Overseas rates on request.

JUNE 2005

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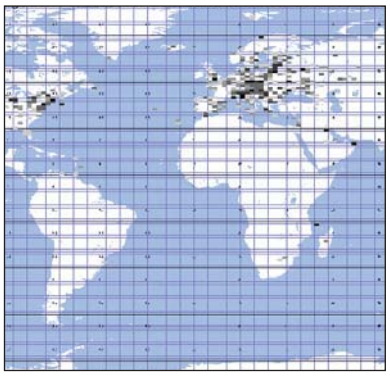

p18 – How many eQSLs are waiting for you to collect?

p43 – Three ZD8s – see 'HF'.

RADIO SOCIETY OF GREAT BRITAIN

THE NATIONAL SOCIETY WHICH REPRESENTS UK RADIO AMATEURS

Founded in 1913 incorporated 1926.
Limited by guarantee
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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Peter Kirby, FCMI, MISM, G0TWW

HONORARY TREASURER:
Position vacant

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Details of the Society's volunteer officers can be found in the RSGB Yearbook 2005

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RSGB matters

THANKS FOR "OVERWHELMING" RESPONSE

RSGB General Manager Peter Kirby, G0TWW, would like to thank the clubs and individual amateurs, both members and non-members of the RSGB, for the letters and e-mails in support of the RSGB's position on the future of amateur radio licensing. The response has been overwhelming and it is not possible to acknowledge or reply to each group or individual personally, but a record of the responses is being kept to pass to Ofcom. It is important that all amateurs continue to voice their views.

RSGB President Jeff Smith, MI0AEX, and General Manager, Peter Kirby, G0TWW, met Vic Brashko, Ofcom's Director of Operation, and Professor William Webb, the author of Ofcom's Spectrum Review consultation on 12 April to discuss the input that the RSGB had received from clubs and individuals. They discussed the concerns of amateurs over the future management of the radio spectrum and any policy changes in this area that will affect amateur radio operation. The future of amateur radio licensing also featured in the discussions.

The RSGB sought and received assurances from Ofcom that they would not introduce any policies that would affect the standing and status of amateur radio and radio amateurs in the UK. The RSGB welcomed Ofcom's acknowledgment of the contribution that radio amateurs continue to provide in the area of experimentation and innovation in radio communications, much of which is taken up commercially. Ofcom also welcomed the work that the RSGB was doing in the field of education and again acknowledged that this work was essential if the UK's skills base was to be grown and maintained to meet the requirements of the 'wireless' environment.

The future of licensing is still the key issue, and the Society welcomed the news that due to the RSGB's intervention, the Ofcom Board has asked for some revisions to be made to the 'Future Licensing Consultation Document'. These revisions we believe concern the area of deregulation. It is now expected that the consultation document will be published at the end of May.

CONGRATULATIONS!

Congratulations to the following RSGB members who successfully upgraded to the Intermediate licence by taking the exams on 21 February and 16 March:

Philip Robinson, M3AIR; Guy Randle, M3BGR; Steven Bradley, M3CND; Barry Cooper, M3FHU; Brian Porter, M3FHU; Paul Sweatman, M3FJK; John Park, M3FJP; Ian Fraser-Have, M3FRZ; Geoffrey Rigby, M3GXJ; Alan Bowness, M3GYO; Paul Hickman, M3HKN; Hugh Wright, M3HMW; Anthony Elliot, M3HQA; Michael Josi, M3HSX; Richard Gooch, M3HZK; Edwards Evans, M3IFW; Ian Jameson, M3IGQ; Mike Capper, M3IKG; Paul Laws, M3IKQ; Neil Foster, M3KIF; Gary Benson, M3LGB; Christopher Small, M3MTS; Robert Clifford, M3ORD; David Poole, M3PXD; Robin Humphries, M3RRH; Steven Beatie, M3SBF; Henry Alexander James, M3SIB; Henry James, M3TFR; Carl Ratcliffe, M3VMT; William Denison, M3WHD; David Lindsay, MM3IEB; Ellis Cohen, MM3IEC; Robert Tripney, MM3MMF; Andrew McIntyre, MM3USU; Lee Jessup, MW3HXU; James Davies, MW3IDG; Kevin Smith, MW3IJL; Mark Roynon, MW3IJY.

Also to the following members who upgraded to Full licence by taking the Advanced exam on 16 March:

Ralph Browne, 2E0ATY; Melvyn Lomax, 2E0AWX; Anthony Pegg, 2E0AXK; David Hamby, 2E0AXM; Roy Bonney, 2E0AXY; Martin Longbottom, 2E0AYK; Vernon Hocking, 2E0AZJ; Edward Simms, 2E0DDA; Roger Spensley, 2E0EUS; Christopher Pomfrett, 2E0FUH; Robert Faulkner, 2E0IAM; Ian Reichenfeld, 2E0IGR; Simon Meakin, 2E0MEA; Maurice Titcombe, 2E0MLT; Alan Watts, 2E0MZX; Richard Hawkins, 2E0RHS; Carlo Carrado, 2E0ZCC; Anthony Renshaw, 2E1IED; James Hume, 2M0GUL; Alex Crawford, M3HSK; Richard Stable, M3IFL; Neil Foster, M3KIF; Sophy White, M3TTM; Martin Harrigan, MI3GZX; Michael Crogan; Terry Brookes.

RSGB REGIONAL MEETINGS

The RSGB will be holding a number of Regional Meetings across the UK over the next two months. The full programme of the meetings' dates and venues will be published shortly.

RETIRING DRM THANKED

At the Poole Radio Society (www.qsl.net/g4prs) AGM on 8 April, members welcomed RSGB General Manager Peter Kirby, G0TWW. The main purpose of Peter's visit was to present a certificate of thanks to Phil Mayer, G0KKL, who had recently retired as the RSGB Deputy Regional Manager for Dorset. Phil has supported the RSGB locally and nationally for many years. The presentation came as a complete surprise, and for once Phil was at a loss for words. After thanking Phil, Peter Kirby updated members on the recent discussions between the RSGB and Ofcom on the future of amateur radio licensing.

CORRECTION CORNER

Apologies to Chris Whitmarsh, G0FDZ, who was referred to no fewer than three times as 'Dave' on page 14 of the May RadCom (Cray Valley club to visit Isles of Scilly).

IOTA CLUB PRESENTATIONS

Jim Kellaway G3RTE, RSGB Islands On The Air Committee member, has taken on the task of attempting to find speakers on IOTA for local club meetings in the UK. If your club would like a talk about this popular award and activity programme managed by the RSGB, or if you are an enthusiastic IOTA chaser and would be willing to give a talk (some basic Powerpoint slides can be provided) please contact Jim by e-mail at g3rte@tiscali.co.uk Jim would also like to hear from IOTA enthusiasts willing to help promote IOTA at rallies around the UK.

IARU VACANCY

IARU Region 1 wishes to appoint a person to the post of Coordinator, Information Programme for Handicapped Radio Amateurs (IPHA). If you are interested in volunteering for this position, please contact the General Manager, Peter Kirby, G0TWW, e-mail: gm.dept@rsgb.org.uk and ask for a copy of the terms of reference.

HQ STAFF VACANCY - RADCOM EDITOR

RadCom editor Steve Telenius-Lowe, G4JVG, is to retire shortly and there is a vacancy for a person to edit RadCom, the Society's journal and one of the most respected amateur radio publications in the world.

The work includes planning the content of the magazine, commissioning articles, sub-editing copy sent in by contributors and regular columnists, liaising with designers and the advertising agent, and ensuring the magazine is produced to a high standard and on time every month.

Applicants should have an excellent command of English, be computer literate, have a broad knowledge of amateur radio matters and be able to work to tight deadlines. A current UK amateur radio callsign would be a distinct advantage.

This staff position is based at RSGB headquarters in Potters Bar, Hertfordshire. The salary is negotiable depending upon relevant qualifications and experience.

If you are interested, please send an application and your CV to the General Manager, RSGB, Lambda House, Cranborne Road, Potters Bar, Herts EN6 3JE, or e-mail: gm.dept@rsgb.org.uk

QSL BUREAU NEWS

W N Sampson, M5WNS, has given up as RSGB QSL Bureau Sub Manager for the G0DAA - DZZ and G8AAA - ZZZ series due to ill health. The G0DAA - DZZ series has been taken over by Ian Hunnisett, G0RNF (QTHR); while the G8AAA - ZZZ series is now being handled by David Helliwell, G6FSP, 1 Beechfield Avenue, Barton, Torquay TQ12 8HU. Also, R E Quaintance, G0DIZ, is giving up as QSL Sub Manager for the G0EAA - EZZ and the G4EAA - EZZ series, also due to ill health. Jeff Pascoe, G4ELZ (QTHR), is taking over both callsign series.

RSGB members are reminded to inform the Society when they upgrade their licence and change their callsign. This is so that we are able to confirm that you are a member when you send your QSL cards to the bureau for distribution. Only current RSGB members may send their cards via the QSL bureau system. If you have recently changed your callsign it would help if you either quoted your membership number, which may be found on your RadCom wrapper each month, or enclosed the RadCom wrapper itself when you send your QSL cards for distribution.

RSGB SHOWS CONTINUING COMMITMENT TO MORSE AS MEANS OF COMMUNICATION

The Northern Ireland Morse Proficiency Team completed the first Morse Proficiency Tests at Downshire Community College, Carrickfergus, on Tuesday 20 April. The successful candidates were presented with their certificates by RSGB President Jeff Smith, MI0AEX.

Further test sessions are planned to take place in Greystone Community Centre, Antrim, on 4 June, 3 September and 3 December and at the Carrick Rally on 22 October. Advanced booking is necessary, 10 days prior to the test date. For further information and test bookings, please contact John Branagh, GI3YRL, tel: 028 9336 7208; e-mail: jbranagh@supanet.com or Jim Henry, GI0DVU, tel: 028 9266 2270; e-mail: jim.henry@ntlworld.com These test sessions are open to all persons interested in Morse, whether or not they are licensed amateurs, professional operators or just want to demonstrate their skills.

PHOTO: JOHN BRANAGH, GI3YRL

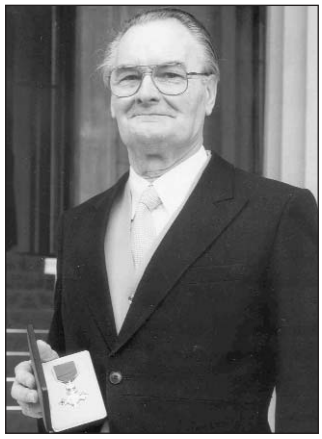
George McHugh, GI4SRQ (Morse tester); David Poots, MI0SRR (first candidate); RSGB President Jeff Smith, MI0AEX; Colin Williamson, GI0RQK (second candidate); Jim Henry, GI0DVU (Morse tester).

RON BROADBENT MBE, G3AAJ, SK

Ron Broadbent MBE, G3AAJ, died on 24 April at the age of 80. He was awarded the MBE for his services to amateur radio in 1995. Ron joined the RSGB at the age of 19 and had been a member for over 61 years. He became involved with amateur satellites in the 1970s and by 1978 was secretary of AMSAT-UK, a post he held for 16 years. He was made an Honorary Vice-President of the RSGB in 1994.

Ron's career was with Trinity House, attending to the UK's lighthouses and lightships. He retired in 1985 but thereafter worked almost full-time, 12 hours a day, seven days a week and virtually for free for the amateur satellite movement. One of his notable achievements was organising the AMSAT-UK Colloquium for over 10 years.

A summary of some of Ron's achievements can be found on the AMSAT-UK website (www.amsat.org/amsat/features/g3aajmbe.html).



Ron Broadbent, G3AAJ, receiving his MBE at Buckingham Palace on 14 February 1995.

RADIO COMMUNICATIONS FOUNDATION

Another new M3 licensee following GB4FUN school visit

Disbanding Packet Cluster group supports RCF charity

Left to right: Peter Hart, G3SJX; Nigel Cawthorne G3TXF (CDXC); Rob Ferguson, GM3YTS (GMDX Group), John Dunnington, G3LZQ (YCSG); Phil Catterall, G4OBK (YCSG); Fred Handscombe, G4BWP (RSGB DXpedition Fund); Bob Whelan, G3PJT (RCF).

The RSGB was delighted to receive a letter from Louis Ayres recently, stating that he had taken the Foundation course and was now licensed as M3UWG. Louis is a student at St Bedes School in Boston, Lincolnshire. GB4FUN visited the school in September 2004 and Louis was fascinated by what he saw. Without neglecting his school work, Louis spent as much time as he could in the GB4FUN vehicle and found out about a Foundation course that was being held locally. He took the course and was delighted to pass and later receive the callsign M3UWG.

When he heard of Louis's success, Board member Richard Constantine, G3UGF, the RSGB's Director of Education and Training, sent a congratulatory letter to Louis, saying, "This is just the sort of news that we like to receive, as GB4FUN is a big part of what we do at RSGB. Its work is supported by many RSGB members, both in this country and overseas. It's great to hear that new people are discovering and taking up the hobby, it just makes it all worthwhile."

This is the second time in the last couple of months that we have been able to report that a school visit by GB4FUN has led directly to a youngster becoming licensed. The first was Zac Ardern, M3INQ (see *RadCom* April 2005, page 8).

YCSG SUPPORTS RCF

When the Yorkshire Cluster Support Group (YCSG) decided to disband it was agreed that the assets be distributed to worthy causes within amateur radio. Two charitable organisations , the Radio Communications Foundation (RCF) and RAIBC have benefited. In addition, CDXC (Chiltern DX Club, the UK DX Foundation), the GMDX Group and the RSGB DXpedition Fund received cheques to help their support of DXpeditions. Finally, funds are being made available to the North Wakefield ARC to enable the expansion of its very successful training programme which brings new recruits into amateur radio.

The cheque presentations were made at the GMDX Group Convention, held in Stirling on 23 April. ♦

Supporters of the Radio Communications Foundation

We asked members when renewing their membership to include a donation to help to continue 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'

Yorkshire Cluster Support Group

H Walker, 2E0KOI
G Barak, EA7ESM
Dr D Gallagher, EI4DCB
P R Elms, G0IJU
R A Wells, G0RXH
P D Hart, G0THD
K D Hatcher, G0WCW
B T Thomas, G1ZZG
T H Harris, G2KF
J E Saunders, G3KAZ
R M F Inman, G3MYG
N Wright-Williams, G3UTE
C E Riley, G4JQX
C Greenwood, G4KAM
P E Biddle, G4LUX
M R P Hollinghurst, G4NOE
P Withall, G4ZSW
K I Gaunt, G7CIY
B Young, G7UAN
F W Gibbs, G7UUB
P W Barnett, G8BIZ
J L Simkins, G8IYS
M J R Wade, G8OGO
P J Buttery, G8PFP
F Hetherington, GM3UCN
A E Upcott, GW6HMJ
J H F Markham, GW6INF
B H Giles, M0BHG
S D Thirlaway, M0BZB
G Sturanovic, M0EAA
A Vine, M0GJH
J L Welford, M0JLW
M Lawson, M1MCL
R G Warren, M1RGW
A Roberts, M3GNP
T N R Horsfield, M3TNR
M Crozier, MI3GMI
P R Pugh, MW0PRP
G Waters, MW0SWR
A J M de Graauw, PA3GRR
P Hawker, RS188467
A Simms, RS96658
J A Rogers, VK7JK
D E Sawyer, W1PIE
G R Lengling, W9DHI

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.

Great Titles

£6.74
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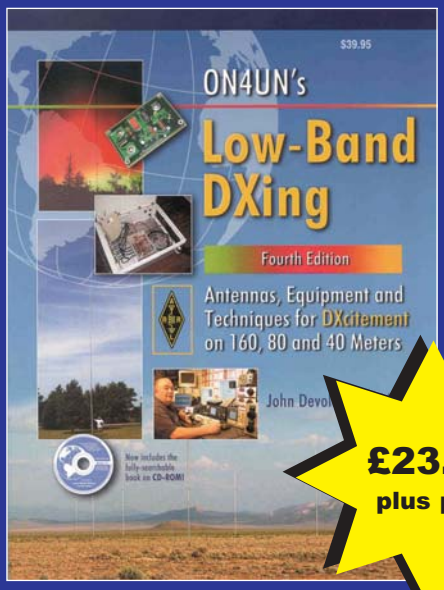
Air Band Radio Guide

By Graham Duke

For many thousands of aviation enthusiasts part of the fascination of their hobby is the ability to listen in to the radio transmissions made by the Air Traffic Controllers and the aircraft under their control.

The book examines in detail the technology involved, the equipment available, airfields, radio frequencies and much else. Individual chapters within the book examine topics such as the legal position, the nature of the transmissions that can be heard, the features of the equipment available and what to look for when seeking to acquire such equipment, antennas and high frequency radio. In addition, the book also includes comprehensive appendices that provide an airfield directory (which lists all the up-to-date frequencies for each of the airfields covered), the ICAO four-letter airfield codes for British and major overseas airports, the ATC reporting points and radio navigation aids, airline call signs and much more.

Size: 184mm x 120mm
ISBN: 07110 30758
Non members price £8.99 plus p&p



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Contesting in Africa

This is Roger Western's second book associated with HF DX and contesting. Roger is probably the UK's best-known CW DXpeditioner and contest operator. Together with some buddies from the USA and the UK he formed the 'VooDoo Contest Group', a loose formation of like-minded individuals who have operated the CQ World Wide DX CW contest from different locations in West Africa each November for the past 10 years. This book is not a series of DXpedition articles; rather it is a record of the group's combined wisdom gleaned through almost a complete sunspot cycle-worth of radio activity from the tropics. There are chapters on multiplier-hunting, logging accuracy and pile-up tactics.

190 pages, Size: 228 x 151mm, paperback.
ISBN: 0-9617577-4-4 Non members price £11.99 plus p&p

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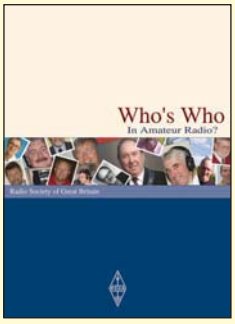

Operating Manual
This book provides a comprehensive guide to operating across the amateur radio spectrum. Packed with information and tips this book has long been a standard reference work found on the bookshelf of radio amateurs.
£16.99 members
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The DXCC Countries List (ARRL)
The official source of DXCC information! Record the DXCC Entities you've worked and QSLed! This new edition includes a complete listing of DX Century Club rules incl. the latest changes and clarifications.
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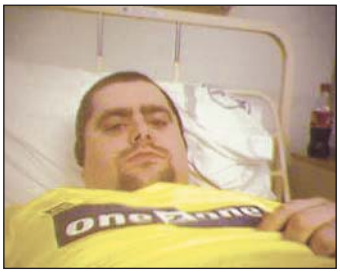
E&OE

2m call brings the emergency services

Amateur radio saves a life

Yet again, amateur radio has shown its worth in a life-or-death situation. On 21 April RSGB HQ received the following message from Kevin Johnson, M3RRL: "I am sending this e-mail via my mobile phone from my local hospital. I have had my M3 licence since October 2004. Whilst listening to a couple of mates on the ATV talk-back frequency I had very bad chest pains and collapsed on the floor in my shack and was unable to get help via my telephone. So I put an emergency call out on the ATV frequency and Mark, 2E1HOZ, and Chris, M1EEV, came back to me and contacted the emergency services and my partner. I just wish to say a big thank you to the pair of them who saved my life. Without them I would not be here now."



Mobile phone camera image of Kevin Johnson, M3RRL, in hospital. Get well soon Kevin!

Satellite logos

New satellite logos have been designed for the Amateur Phase 3 Express (P3E) and Mars Orbiter (P5A) satellites and are available for download from www.amsat-dl.org/logos/logos-p3e-p5a.htm for you to demonstrate your support of the projects.

P3E is scheduled for launch this autumn into a highly elliptical earth orbit. It will be in range for up to eight hours each orbit and will provide world-wide coverage using a transponder operating on either 70cm to 2m or 70cm to 13cm. Mars Orbiter should be launched into earth orbit in 2007, it will then fire its onboard motor to send it to Mars. It will be the first amateur satellite to go to another planet. There will be a beacon onboard operating in the amateur 10GHz band: the ultimate in DX!

There will be a presentation on these satellites at the AMSAT-UK (www.uk.amsat.org) Space Colloquium to be held at the University of Surrey in Guildford from 29 to 31 July (details from Jim Heck, G3WGM, tel: 01258 453959, e-mail: g3wgm@amsat.org)

New light-weight PSUs

There are two new small light-weight switch-mode power supplies from ML&S's own brand, MyDEL. The MP-250A is a desk-top power supply providing 13.8V DC at 22 - 25A which, despite its compact dimensions (5.75W x 4.5H x 6Din), features two large back-lit meters showing volts and amps. It costs £89.95. The second PSU is the MP-4128, a more usual 'slab' design without metering, retailing at £69.95.

Amateur radio out of this world

Members of the Norfolk Amateur Radio Club (www.norfolkamateurradio.org) are hoping for clear skies during the weekend of 25 / 26 June when GB6NAS takes to the air from Seething Observatory as part of the Norwich Astronomical Society (NAS) 60th anniversary celebrations. Not only will the event include SSB and CW operation on HF and VHF, but stations contacting GB6NAS on SSTV and ATV will be treated to live images from the telescopes in the observatory's two domes. Everyone contacting GB6NAS will receive an 'out-of-this world' colour QSL featuring some of the best work of NAS's astrophotographers.

Visitors are welcome, particularly on the Saturday night (bring warm clothes, just in case!) and members of NAS will be on hand all weekend to give guided tours and to answer astronomical questions. The observatory is near Norwich and full details are at www.norwich.astronomicalsociety.org.uk/info/finding.htm

Norwich Astronomical Society's 20ft telescope against Hale Bopp.

PHOTO: STEVE MOORE, NAS

Guinness recognises amateur radio record

Guinness World Records Ltd has awarded a certificate to Jukka Heikinheimo, OH2BR, for a record number of contacts made by an individual from one location in one year. Operating as VP6BR from Pitcairn Island, Jukka made 56,239 contacts between 25 January and 21 April 2000. Jukka's achievement was noted in the Finnish national daily newspaper *Helsingin Sanomat*.

CDXC Kenwood Challenge goes to G3XTT

Between 1 February and 31 December 2004, members of the 670-strong CDXC (Chiltern DX Club - The UK DX Foundation) were competing for the Kenwood Challenge. The aim was to work as many DXCC entities as possible on HF and 6m for the prize of a TS-480HX transceiver, generously donated by Kenwood UK. Top place went to *RadCom* 'HF' columnist Don Field, G3XTT, with a score of 330 made up of 267 entities on HF and 63 on 6m. The runner-up, John Butcher, G3LAS, scored 268 on HF and 51 on 6m.

NEWS BRIEFS

- Here's a great idea for all radio amateurs: your callsign in Morse code as your mobile phone ring tone. A new company called CW Ring Tones is the brainchild of RSGB member Tim Axtell, G4SVC, and business partner Simon Blampey. For details tel: 07854 922174 or visit www.cwringtones.co.uk
- The 2005 International Lighthouse / Lightship Weekend will run over the weekend of 20 / 21 August. Guidelines for the weekend can be found at http://illw.net/index.html Last year over 380 lighthouse stations were established in 52 countries (a full list is at http://illw.net/2004_list.htm).
- Rotary International is celebrating 100 years of Rotary in Chicago, Illinois, from 18 to 22 June. W9R, operated by the Rotarians of Amateur Radio (ROAR), will be on the air and a certificate will be available to all who contact the station. Look around 14293, 21310 and 28560kHz.
- The Royal Air Force ARS has booked stands at the following rallies: 12 June Elvaston Castle; 19 June Newbury Boot Sale;26 June West of England; 17 July McMichael; 7 August FRARS Hamfest; 4 September Telford; 11 September Lincoln Hamfest.
- James Hill, M0TJC, has set up a *Yahoo-group* for 4m enthusiasts. The address is http://groups.yahoo.com/group/anglian4m/ It is still only in its infancy, but membership is growing. All 4m operators are invited to join.
- The American equipment manufacturer SGC has launched a new website. It is at www.sgcworld.com

Probably the best sign-posted amateur radio society in the world, ever. Thanks to Laurie Margolis, G3UML, for sending in this photo. He says that despite the excellent directions, unfortunately the premises were empty when he visited recently.

News from ML&S

ML&S (www.HamRadio.co.uk) have announced that the Ten-Tec range of products has been added to their range of products. Martin Lynch attended the annual dinner of CDXC (Chiltern DX Club, the UK DX Foundation) in April, where *RadCom* equipment reviewer Peter Hart, G3SJX, gave an after-dinner talk on his 25 years of equipment reviews. He underlined just how good the Ten-Tec Orion is on receive performance. "It confirmed to me that we really needed to add the Ten-Tec Orion to our product portfolio", commented Martin. The Orion is available for demonstration at the ML&S Chertsey showroom, alongside the best from Yaesu, Icom and Kenwood.

CDXC is for amateurs with an interest in competitive activity on the HF bands (DXing, contesting and award chasing). Starting in June ML&S, in conjunction with 'the big three', Yaesu, Kenwood and Icom, are offering *free* CDXC membership to all who purchase an HF transceiver from the ML&S store during that month. Martin Lynch commented "The members of CDXC promote excellent operating standards throughout the HF bands and it was a pleasure to offer assistance in further recruitment. 10 out of 10 to the manufacturers for their help in sponsoring the idea too".

SOTA news

A gathering of Summits on the Air (SOTA, www.sota.org.uk) enthusiasts took place at the Dentdale Youth Hostel in the Yorkshire Dales, 15 - 17 April. The participants were 2E0NHM, M0YLS, G4BLH, G1INK, M1EYP, G7OZE, M3OZE, M0SGB, M3DNC, M0JJH, M3XIS, M0ZZO and the organiser of the event G6DDQ. A total of 29 activations on 15 summits took place during the weekend. There were many summit-to-summit contacts, including some to other SOTA regions such as North Wales, Southern Pennines and Scotland.

'SOTAwatch' has been developed by Jon, GM4ZFZ, to allow users to post their forthcoming activation plans, which are then sorted into date / time order for the convenience of the many avid chasers in the programme. SOTAwatch may be accessed via the SOTA website.

Myke, G6DDQ/P; Shirley, M0YLS/P; and Liam, G-21007/P, activating Great Knoutberry Hill, G/NP-015, for SOTA.

EH reception reports wanted

Tony Wells, G7IGG, has been experimenting with a home-made 'EH' antenna. The EH is controversial because of the claims of its designers as to its method of operation. However, its very small size makes the EH attractive to many amateurs, especially those with limited space. There is little independent evidence of the efficiency of EH antennas but Tony has collaborated with Charles Green, W1CG, to build a beacon that sends comparison transmissions from Charles's EH and a conventional Hustler 6BTV vertical. The beacon operates on 14102kHz. For licensing reasons, it is only operational in attended mode: a status page at www.tinyurl.com/6oh59 gives information on transmission times.

More signal reports are required to help in the research: please e-mail Charles, W1CG@qsl.net or for more information about the beacon system e-mail tony.wells@blueyonder.co.uk

The W1CG EH antenna. Elements are 6in long, 1in diameter, and the antenna is mounted 20ft ASL on the seawall at Bristol, Rhode Island. The Hustler 6BTV trap vertical with 12 buried radials is located 100ft away.

For Warrington and St George!

The Warrington ARC (www.warc.org.uk) will be operating as GB0SGI from St George's Island (also known as Looe Island) from 13 to 17 June. Babs Adkins, the owner of the island when the club visited in 1999 and 2000, has since died, and the environmental protection of the island has now passed to the Cornwall Wildlife Trust. Full details of the DXpedition can be seen on the club's website.

PHOTA?

First there was IOTA, then SOTA. Now two members have come up with the idea of a new interest group: PHOTA - 'Public Houses On The Air'. Dave Ollerhead, G4JMF, and Bruce Sutherland, M0CVP, (both QTHR) would like anyone with an interest in forming or running a group of this nature to please get in contact.

Coaxius polypropylenus?

After a long and painstaking study, John Sonley, G3XZV, is proud to announce the hybridisation of a genus of the humble apple tree with a low-loss coaxial cable. It must be stated that growth rate is still rather slow and the pictured example took approximately 15 years to develop to this state of maturity. To date there is little evidence of any fruiting bodies developing but the study will continue. [This gives a whole new meaning to the term 'propagation' - *Ed.*]

Club and regional news

1 Scotland South & Western Isles

COCKENZIE & PORT SETON ARC
4, Demo station at Port Seton Gala Day, King George V Park, Port Seton.
18, GB2MOF at 'Museum of Flight'. Bob, GM4UYZ, 01875 811723.
KILMARNOCK AND LOUDOUN ARC
14, CAT systems, Logbook of The World, Len, GM0ONX. Len, GM0ONX, 01563 534383 gm0onx@klarc.org
LOTHIANS RS
10, Union Canal dinner cruise.
13, AGM.
27, BBQ. Toby, MM0TSS, 07739 742367, tobysigouin@onetel.net.uk

2 Scotland North & Northern Isles

MORAY FIRTH ARS
24, Setting up for Maggie Fair.
25, Maggie Fair. Geoff, MM5AHO, 07770 726759, www.mfars.co.uk

3 North West

CHESTER & DARS
7, Video.
21, Talk by Bill Silversides.
28, Power supplies, Alan, G8OJQ. Derrick, M1SUM, 0151 356 1572.
STOCKPORT RS
7, RSGB video / bookstall, Dave & Kath Wilson, M0OBW & M1CNY.
21, Surplus equipment sale, Barrie, G6GUT. David, M1ANT, 0161 456 7832.
THORNTON CLEVELEYS ARS
6, On air.
13, BBQ at G4FRK QTH.
20, Table top sale.
27, Preparation for VHF NFD. Jack, G4BFH, jack.duddington@btinternet.com
WIRRAL & DARC
1, D&W The Saughall Massie Hotel.
8, Bring and tell.
15, Urenco visit.
22, Eileen Medley DF.
29, D&W Shrewsbury Arms Oxton. Tom, G4BKF, 07050 291850.

4 North East

GOOLE R & ES
8, On air from Barmby Tidal Barrage.
15, Contest planning.
22, Social, *Black Swan* Asselby.
29, Contest LWC Selby. Richard, G0GLZ, 01405 769894.
GREAT LUMLEY AR & ES
1, 8, 15, 22, 29, On air. Nancy, 0191 477 0036, 07990 760920, nancybone2001@yahoo.co.uk
GRIMSBY ARS
2, Construction night, John, M3WJA.
16, Packet radio via Telnet, Brian, G4DXB. Brian, G4DXB, 01472 231383.
HALIFAX & DARS
21, Pie & pea supper. Tom, M0TKA, 01484 715079.
HORNSEA ARC
1, Inter-club quiz , Hornsea v Scarborough.
4, NFD at Bewholme.
8, 'Foxhunt'.
18, Museum on air, Duncan, G3TLI.
22, Slide show, Ted, G4UOZ.
29, Activity night. Richard, G4YTV, 01964 562498, g4ytv@aol.com
KEIGHLEY ARS
30, St Kilda, Nigel, 2E0NJW. Kath, G0OSA, 01535 656155.
SHEFFIELD ARC
6, Portable at Whiteley Woods.
13, Planning for Museum weekend.
18, Museums Weekend, Sheffield Millennium Galleries, GB2SMG.
27, Planning VHF NFD. Nick, G4FAL, 0114 255 2893.

5 West Midlands

BROMSGROVE & DARC
3, Club 40th anniversary, GB4OBC.
11, 17, 24, GB4OBC on air. Chris, M0BQE, 01905 776869.
COVENTRY ARS
3, On air, novice class, CW practice.
10, 2m DF hunt.
17, On air, novice class, CW practice.
24, Night by the water. John, G8SEQ, 024 7627 3190.
GLOUCESTER AR & ES
3, NFD setting-up.
6, NFD post mortem.
13, On air, workshop.
20, Outdoors event. Tony, 01452 618930 (daytime).
HILLCREST ARS
2, Natter night.
16, 'Where did your luggage go?', John Pittwood. Stuart, M0SJV, 01384 232457, m0sjvstuart@supanet.com
MID-WARWICKSHIRE ARS
14, The ZK1 2005 story, Tim, M3SDE.
28, Picnic at Bidford on Avon. Bernard, M1AUK, 01926 420913.
SALOP ARS
9, Talk by Vic, GW3RME.
16, Junk sale.
23, 3rd 2m 'foxhunt'.
30, NFD preparations. Fred, G3NSY, 01743 790457.
STAFFORD & DARS
2, Open evening, Chetwynd Room.
9, Chat and shack.
12, PW 2m contest.
16, Intra-club challenge planning.
23, Intra-club challenge, Cannock Chase.
30, Portable mast MkII, Derek, G0EYX. Graeme, G4NVH, 01785 604534, graeme.boull@ntlworld.com
STOURBRIDGE & DARS
6, On air.
11, Foundation course.
20, MMSSTV master class, Wayne, M5LLT. John, M1EJG, 01562 700513, www.g6oi.org.uk
STRATFORD UPON AVON DRS
4, NFD.
13, 'Foxhunt'. 27, BBQ & on air. Terry, G3MXH, 01789 294387.
TELFORD & DARS
8, 6m contest planning.
15, Out and about with FT-817s.
18, 6m contest.
22, VHF NFD planning.
29, 'QRP and all that', George, G3RJV. Mike, G3JKX, 01952 299677, mjstreetg3jkx@aol.com

6 North Wales

CONWY VALLEY ARC
1, AGM.Wynne, GW6PMC, 01745 855068.
DRAGON ARC
6, 'Maritime reflections', John, GW3VVC. Leslie, 01248 470606.
NORTH WALES RS
2, 'How to make best use of TV & radio valves', Allan, GW0PYY.
4, NFD.
9, 16, Free evening, Foundation.
23, Simple fault finding, John, MW1FGQ. Ted, GW0DSJ.

7 South Wales

ABERYSTWYTH & DARC
12, Constitution Hill picnic, Eifion, MW0DEW. Ray, mwmg01@aber.ac.uk

8 Northern Ireland

BANGOR & DARS
1, BBQ.
19, Rally at Crawfordsburn Country Club. Mike, GI4XSF, 028 4277 2383.

9 London & Thames Valley

CHESHAM & DARS
1, General meeting.
8, On air.
15, Pedestrian treasure hunt, G3XZG.
22, Ecuador & Galapagos Islands, Terry, G0VFW.
29, On air. Terry, G0VFW, 01442 832169, terry.g0vfw@ntlworld.com
CRAY VALLEY RS
2, VHF NFD planning, G3JJZ, M3RCV, M3CVN.
16, DF hunt.
18, GB8OSJ, details G0WLF. Richard, G7GLW, 07831 715797, rcains@btinternet.com
CRYSTAL PALACE R & EC
3, Principles of printing, Nick, M3FUB. Bob, G3OOU, 01737 552170 or Victor, G1PKS, 020 8653 2946.
EDGWARE & DRS
9, Ferrites.
23, VHF NFD briefing. Rod, G0SQL, 020 8204 1868, g0sql@harrow-middx.demon.co.uk
HODDESDON RC
7, 'Components revisited', part 2, capacitors, Don, G3JNJ.
21, Topband in the old days, Fred, G3SVK. Don, G3JNJ, 020 8292 3678.
MILTON KEYNES ARS
13, DF 'foxhunt'.
18, Museums on air, GB2BP Bletchley Park & GB2MRL Milton Keynes Museum. Malcolm, 01525 874075.
READING & DARC
9, Tesla coils, James, G8XML & Chris, M1CYE. Pete, G8FRC, 01189 695 697.
SHEFFORD & DARS
2, NFD VHF planning.
9, Visit Sandy transmitter site.
16, History of TV tubes, Alan, G4LWA.
23, About my past, Joe, G3EUS.
30, VHF NFD planning. David, G8UOD, 01234 742757.
SILVERTHORN RC
10, G3XYK silent key sale.
24, On air. Les, G0CIB, 07980 275081.
SOUTHGATE ARC
9, ATV, John, G4DVG. Mike, M0ASA, 020 8366 0698.
STEVENAGE & DARS
7, Frequency counters & component analysers.
14, Video.
21, Rechargeable batteries.
28, VHF NFD preparation. Neil M0ARH, 01438 217077.
SURREY RCC
6, Construction contest.
13, VHF NFD meeting at G8IYS QTH. Ray, G4FFY, 020 8644 7589.
WIMBLEDON & DARS
10, Desert island radio.
24, Portable wire antenna workshop. Jim, M0CON, 020 8874 7456.

10 South & South East

BASINGSTOKE ARC
5, Tadley Treacle Fayre demo station.
12, ARDF, Micheldever Woods.
19, Newbury boot sale.
26, 'Foxhunt'. Frank, M0AEU, barc@2lo.info
FAREHAM & DARS
1, On air.
8, Wheatstone Bridge, Andrew, G0AMS.
15, The R1155, Steve, G7HEP.
22, Radio formulae, Mick, G4ITF.
29, Portable on Portsdown Hill. enquiries@fareham-darc.co.uk
FARNBOROUGH & DRS
8, Transistors, John, G3KND, and Alan, M5AMN.
22, Setting up a station. Alan, M5AMN, 01252 682447.
HARWELL ARS
14, 'The Promise of Fusion Power', Neill, G4HLX. Angus, G0UGO, 01235 522858.
HASTINGS E & RC
15, APRS. Gordon, 01424 431909, gordon@gsweet.fsnet.co.uk
HORNDEAN & DARC
28, 'Palmerston's Folly', Cdr Nicholls RN. Stuart, G0FYX, 023 9247 2846.
HORSHAM ARC
2, European satellite navigation, Wally, G3JKV. David, G4JHI, 01403 252202.
MID-SUSSEX ARS
3, QRP in the field demo, John, G6XTW.
10, Windmills evening.
17, Radio night.
24, At home with Alan and Stella.
29, Wednesday tank track clearance. John, G6XTW, 01273 588556.
SOUTHDOWN ARS
6, Internet linking, *Echolink*, Paul, M0LRE.
18, 144 QRP contest. John, G3DQY, 01424 424319, vaughdqy@aol.com
SWINDON & DARC
2, AGM.
9, BBQ.
23, Holiday DX in J3, Ian, G3YBY.
30, VHF NFD preparation. Mike, M5CBS, 01793 826465.
TROWBRIDGE & DARC
1, Working the ISS, Charles, G4JQX.
15, Natter night. Ian, G0GRI, 01225 864698 (evenings / weekends).
WORTHING & DARC
1, Computer problems part II, G8XIT.
8, PW contest planning.
15, Newhaven Fort Rally planning.
19, Rally at Newhaven Fort.
22, DF hunt.
29, Setting up and running your station. Roy, G4GPX, 01903 753893.

11 South West & Channel Islands

APPLEDORE & DARC
20, RSGB talk by SW managers. Brian, M0BRB, brian.jewell@ic24.net

CITY OF BRISTOL RSGB GROUP
27, Cheese & wine party. Martyn, G3RFX, 0117 973 6419.
CORNISH RAC
2, Main meeting.
5, Plymouth rally.
13, Computer section.
14, Skittles evening. John, G4LJY, 01872 863849.
EXMOUTH ARC
1, QRP, Vic, G4KEE.
15, Construction and operating night. Mike, G1GZG, 01395 274172.
FLIGHT REFUELLING ARS
12, Portable equipment check-up. Tony, G3PFM, 01202 622262.
HOLSWORTHY ARC
1, EMC, Les, G5HD. David, 01288 353561, m3eoq@hotmail.com
PLYMOUTH RC
4, Rooster breakfast.
5, Rally.
14, Rally wash-up. Frank, G7LUL, frank@foxonezero.fsnet.co.uk
SOUTH BRISTOL ARC
1, Computer and software clinic.
8, Treasure hunt.
15, Summer bring & buy.
22, On air.
29, VHF NFD planning. Len, G4RZY, 01275 834282.
SOUTH DORSET RS
14, *Echolink*, what's it all about? Mark, M5MKW.
18, Museums weekend. Carol, 2E1RBH, 01305 820400, carolonfraggle@tiscali.co.uk
TAUNTON & DARC
3, Isles of Scilly DXpedition, Tom, G0PSE; Dave, M0AOD; Bill, G3WNI. William, G3WNI, 01823 666234, g3wni@btinternet.com
THORNBURY & SOUTH GLOUCESTERSHIRE ARC
1, 'Foxhunt'.
8, On air.
15, Video.
22, On air.
29, Ofcom consultation discussion. Stan, G0RYM, stang@talkgas.net
TORBAY ARS
17, Fibre-optic comms, Mike, G4FON. Dave, G6FSP, g6fsp@tars.org.uk

12 East & East Anglia

BRAINTREE & DARS
6, Aerial clinic.
20, BBQ. John, M5AJB, 01787 460947.
CAMBRIDGE & DARC
3, NFD preparation.
10, Visit Mullard radio telescope, Ian, G4AKD.
17, Test 'foxhunt' equipment.
24, Construction, 80m portable aerial. Ian, G4AKD, 01954 782974.
CHELMSFORD ARS
7, Constructors' competition. Martyn, G1EFL, 01245 469008.
COLCHESTER RADIO AMATEURS
2, Datamodes, Colchester Institute. Keith, 01206 521330, keith@g3isk.fsnet.co.uk
DOVER RADIO CLUB
1, No meeting, net on GB3KS.
8, 'Foxhunting' talk & demo, Brian, G4SAU.
15, Operating and natter night.
22, 2m 'foxhunt'.
29, Operating and natter night. Brian, G4SAU, g4sau@bcuff.freeserve.co.uk
HARWICH ARIG
8, Egg race evening, Giles, M0CGE. Tony, G4EYE, 01255 886065.
HAVERING & DRC
1, Fire safety.
8, BBQ (partners / children welcome).
15, PW editor Rob, G3XFD.
22, Informal.
29, Building a 'Buddypole', Mike, M1MOG. Oliver, G3TPJ, 01708 746677.
LEISTON ARC
7, 'Foxhunt' & BBQ. Paul, M3MIG, 01728 746044, m3mig@aol.com
NORFOLK ARC
1, Briefing CW NFD.
4, CW NFD.
8, Norfolk Repeater Group AGM.
12, Elvaston Rally.
15, Friendly DF contest.
29, Barford Rally preparation. Reg, G0VDO, 01603 429269.
SOUTH ESSEX ARS
1, On air.
15, Travels in France, Alan, G7CDO. Dave, southessex.ars@btinternet.com

13 East Midlands

DERBY & DARS
7, Junk sale. Martin, G3SZJ, 01332 556875.
EAGLE RADIO GROUP
14, Maritime navigation systems, Colin, G3NRQ. Terry, G0SWS, 07979 733640.
HUCKNALL ROLLS-ROYCE ARC
3, Video: Elvaston Castle rally organisation, DF hunt.
10, Elvaston Castle rally preparation.
17, BBQ.
24, On air. Keith, G6NHY, 07929 916642, hrrarc@ntlworld.com
LEICESTER RS & CC
6, Club tidy up.
13, Planning for 'foxhunt', on air, video.
20, 'Foxhunt'.
27, Setting up a weather station, Stu Robinson. Tom, G1IUT, 0116 286 3949, tomchristmas@ukonline.co.uk
MELTON MOWBRAY ARS
17, Annual 'foxhunt', Alan, G7TVH. Phil, G4LWB, phil@croxtonkerr.fsnet.co.uk
SOUTH NORMANTON, ALFRETON & DARC
13, Summer party, antenna maintenance.
20, Junk sale.
27, On air. Mike, M0RMJ, 01949 876523, mike.jeffs@ntlworld.com
WORKSOP ARS
18, GB2LHM Laxton Heritage Museum. Clive, M0HHF.

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.

CLUB NEWS IN BRIEF

- **Mid Lanark** ARS will operate GB0SHP at Summerlee Heritage Park on 18/19 June in the International Museums Weekend. Visitors are welcome (details from Dennis, mm0dnx@yahoo.co.uk) The club recently held its first Intermediate course, with a 100% pass rate. The course was run by Simon Nash, MM0GBK; Gordon Hunter, GM3ULP, and Kenneth Cupples, GM1MMK, at Newarthill Community Centre. Foundation and Intermediate courses will be held as soon as numbers suffice.
- There's a new club in **East Sussex**: the Brede Steam Amateur Radio Society, M0NUC. Based in a nuclear bunker (part of the Brede Steam Engine Society, 8 miles NE of Hastings in the grounds of the Southern Water site), the club meets on the first Saturday of every month between 10.00am and 4.00pm and specialises in operating, education and contesting events. Further information from Steve Stewart, M0SSR, tel: 01424 720815.
- The South Staffordshire AR Tutors' Group was formed in 2004 from members and ex-members of Cannock Chase ARS and attracts radio course candidates from a wide area around **Cannock**, with a high percentage of passes in the Foundation and Intermediate exams. The frequent courses have been small but are now increasing in numbers so that a move from Cannock to Victoria WMC in Hednesford was necessary.
- RSGB Regional Manager Phillip, G4NZQ, and Deputy Regional Manager Trevor, M5AKA, gave a presentation to the **Barking** Radio and Electronic Society (www.barkingradio.org.uk) on the RSGB and the impact of the recent Ofcom consultation papers. The club meets at 1930 on Thursdays in the Parkside Community Centre, Goodmayes Lane, Ilford (details: Bill, G0IQK, tel: 0208 478 4758 or e-mail: billchewter@lineone.net)
- The **Bromsgrove** & DARC (www.g3vgg.thersgb.net) celebrates its 40th anniversary this year. GB4OBC will be on the air during June on HF and VHF during the day and during club meetings on Friday evenings. The celebratory month ends with a BBQ at the club shack at Avoncroft Arts Centre, Stoke Heath, Bromsgrove on 24 June (further details from Chris, M0BQE, on 01905 776869).
- Gary Lucas, M3EXE, runs a non-profit website (www.m3exe.net) which includes a forum to allow all amateurs to contact each other. It can be customised to allow sub-forums to be created under each region. Its main use is to allow radio clubs anywhere to have a free message forum to use however they wish. The URL is http://m3exe.net/v-web/bulletin/bb/index.php and access requires registering (free of charge).
- The Dragon ARC of **Anglesey**, GC4TTA, has received a grant of £3520 from the 'Awards for All Wales' organisation [see *RadCom* April 2005 p44 - *Ed.*]. The cheque is to be presented by Welsh Assembly Member Ieuan Wyn-Jones. An important function of the club is to provide training and the grant will enable the club to buy much needed training aids including IT equipment.
- The **Southgate** ARS (www.southgatearc.org) is making freely available its radio newsfeed, developed by Richard, G4TUT, in RSS format for amateurs and SWLs to incorporate into their website or receive on their own PC. Full details on the club website.
- Gordon Hunter, GM3ULP, gave a talk and showed the RSGB videos at the **West of Scotland** ARS on 22 April. Members of the club had an in-depth discussion on the benefits of RSGB membership and the current Ofcom situation.
- The **Plymouth** RC (www.parc.org.uk) is holding its first rally for eight years at Sparkwell Village Hall on 5 June, opening at 10.00am. There are still tables left and further information is available from Peter Connor, tel: 01752 837319.
- The **Keighley** ARS has a new meeting place: Pilkys Sports Club, Heber Street, Keighley. Further details from secretary Cath Wilkinson, G0OSA, on 01535 656 155.

Another successful Foundation course took place at the Dover Radio Club (www.darc.org.uk) on 16 April. L to r: David Harding, G0DQI (Lead Instructor); Sue Asling; Steve Asling; Barry Wise; Chris Loughran; Cecil Armstrong, G0OJZ (Senior Invigilator); Graham Cahill, 2E1ITE (Assistant Invigilator); Samantha Evans (age 9); Ben Sutton; Samantha Whitlock; Brian Joyner, G8ZYZ (Assistant Instructor).

The John Boyd show on Radio Leeds recently featured Nigel Wears, 2E0NJW (rear, left) and John Muzyka, G4RCG (rear, right) from the North Wakefield Radio Club who spoke for 10 minutes about amateur radio and how to become involved in the hobby. John Boyd was very interested and the club feels that the piece came across well to listeners. The interview featured a short extract of a CW QSO made by G4RCG.

SIMULTANEOUS INTERMEDIATE & ADVANCED COURSES

The Chelmsford ARS (www.g0mwt.org.uk) has for over three years run courses every Thursday evening (except during August). Despite that, there has been a problem in supplying enough course places to meet demand. To overcome this the club booked a second room in Danbury Village Hall to allow them to teach both Intermediate and Advanced classes at the same time. All teaching is by volunteers: thanks to their willingness to take on additional work the running of simultaneous courses proved very successful. The club is currently taking bookings for the summer Foundation evening course. Further information from Clive Ward, M0SIX, tel: 01245 224577; e-mail: training2005@g0mwt.org.uk

Christopher, G0IPU, demonstrates skip.

RSGB AT HAVERING CLUB

The following report has come from Martin Foster, G3VOF, the PR Officer of the Havering & District Amateur Radio Club:

"On Wednesday 23 March, Philip Brooks, G4NZQ, RSGB Regional Manager (Region 12), visited the Havering & District Amateur Radio Club, with Trevor Hawkins M5AKA, the Deputy Regional Manager. Many questions were asked by the club members about the Society and about Ofcom's Spectrum Review and the threat posed by the possible deregulation of the hobby. There was also an excellent video shown about the RSGB. It revealed the faces behind the scenes, and the day-to-day running of HQ, how *RadCom* is produced from a story to the printing of the magazine, and what the RSGB does for its members. The presentation that Philip and Trevor gave was excellent. The Q&A part of the evening was also extremely interesting, and very enlightening. The conclusion of the evening contained a very obvious, and overwhelming message, and that was, if our hobby is to continue as we now know it all radio amateurs in the UK must join forces, and all become members of the RSGB. At the Havering & DARC we strongly recommend that all radio clubs around the country are briefed by their own Regional Managers to be informed of the hobby's future, and what the RSGB is currently doing."

Lincolnshire Deputy RSGB Regional Manager Jim Stevenson, G0EJQ, received a warm welcome when he visited the Eagle Radio Group in April. The picture shows from left to right: Nevil, G3VDV; Jim G0EJQ; Charles, G0CBM, and Terry, G0SWS.

AMATEURS AID CONVOY

When the Hope and Aid Direct charity (www.hopeandaiddirect.org.uk) started aid convoys to Kosovo, they found the use of CB radio between vehicles was a key tool. However, reliability on the first few runs was a serious problem. The Maidstone ARS was called in to help. Maidstone club members set up CB rigs and antennas in a couple of 38-ton articulated trucks as well as 10 or 12 smaller vehicles for the charities' twice-yearly convoys to Kosovo. Permanent installations are impractical because the vehicles are rented or loaned by charity supporters., therefore club members meet the trucks at motorway service areas to install the radios and set up the antennas - properly.

Since the Maidstone club has been handling the installations, the effectiveness of CB has taken a quantum leap, and they come back in perfect working order. More pictures of the convoy are at www.g0var.pwp.blueyonder.co.uk

G4YTU and G3ZSU pre-tuning a mobile antenna prior to installation.

WISEWOOD SCHOOL SAYS, "GOOD MORNING AMERICA!"

Nearly 200 year 7 pupils from Wisewood Comprehensive School had the opportunity to listen to and speak via radio with students at the Indian Creek Elementary School in downtown Indianapolis, Indiana, recently, as part of National Science Week. The all-day amateur radio demonstration, involving all of Wisewood's year 7 pupils, elicited great interest from pupils and staff alike. Derek Green, Head of Science at Wisewood School, praised the event, saying "The children had a very enjoyable visit from the Sheffield Amateur Radio Club and were thrilled to speak with another school in the USA using radio."

Sheffield Amateur Radio Club member Colin Wilson commented, "Now that we've introduced the children to each other using radio, we believe that they'll keep in touch via e-mail."

Derek Green, Head of Science, and Rebecca Francis, year 7 Wisewood School, with Colin Wilson of the Sheffield Amateur Radio Club talking to pupils in Indianapolis, USA.

'HOMEBREW' IS ALIVE AND WELL IN THE SOUTH WEST

Visitors from Africa, America and Europe attended the Yeovil ARC 21st QRP Convention on 10 April. Over 200 enthusiasts attended the event which featured a mix of lectures, bring and buy stalls, traders specialising in radio bits and pieces, and a good deal of general socialising with friends old and new.

Tim Walford, G3PCJ, of Walford Electronics hosted the 'Somerset Supper' on the eve of the Convention. Tickets to dine were secured by guests bringing their own 'home-brew' creations. 18 original offerings were on display: Nicky Marriot, M5YLO, earned high praise and a bag of resistors for her original solderless MW receiver, while Ray Lawrence, G8AWB, received a bottle of champagne for his beautifully-made 2m driver for a satellite microwave transverter. The trophies were presented by Rob Mannion, editor of PW.

The entrants for the 'Somerset Supper'.

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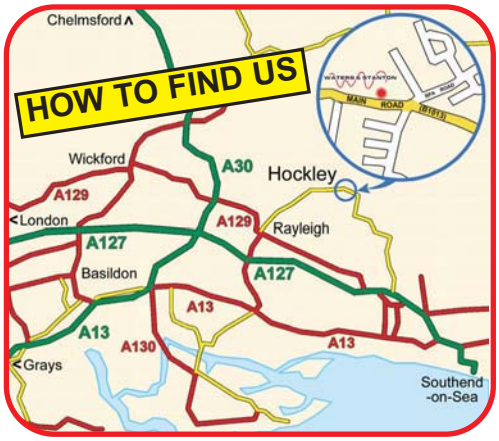

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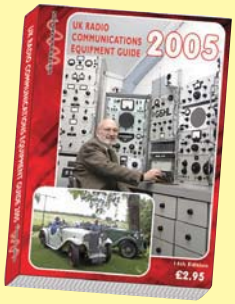

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An introduction to eQSL

Do you have a computer in the shack? Do you use it for logging? If so, why not see how many eQSLs you have waiting for you to collect? Tim Kirby explains how

Electronic QSLing has been discussed in *RadCom* before. Don Field, G3XTT, has covered many of the issues from time to time in his 'HF' column and in an article on the ARRL's 'Logbook of The World' (LoTW) in the April 2004 *RadCom* (p28).

A website known commonly as 'eQSL' (see 'Web search' below) offers another slant on electronic QSLing to LoTW. After a year or so of running in parallel it has become clear that the two are not competing, but in fact, offering rather different and perhaps complementary services. eQSL provides a unique awards programme as well as offering the opportunity for users to print out eQSLs either at their headquarters and have them posted, or on their own printers. LoTW does not of course, offer the ability to print out cards, but offers the user a convenient way of integrating electronic QSLs with their existing DXCC awards.

HISTORY

Let's look a little at the history of the eQSL site, in the words of Dave Morris, N5UP, who is the webmaster and founder of the project. "The eQSL.cc site was launched in April of 2000, and included about 1500 hams who had been part of an earlier experiment in an electronic QSL card exchange. The 'big' idea was that eQSLs should not be sent around from person to person via e-mail, but should be available at any time through a web-based exchange system and a central database.

"So, we used our 25 years of software development and database design experience to develop a site where each user could guarantee his identity with a scanned image of his ham licence, could lay out an eQSL card design using simple point-and-click forms, and could upload logbooks either one-at-a-time, or by uploading an entire ADIF format log file at once. The concept is such a breakthrough, we have patents pending on its technology.

"To retrieve one of these eQSL cards, the recipient only needs to enter the callsign, date and band of the QSO he wants to retrieve, and if the other ham has entered that QSO into the system, up pops the complete eQSL card, ready for printing on a local printer. Furthermore, if the recipient registers his callsign with us, he can get a listing of all incoming eQSLs, and can just point and click to print each card received. Sending a reciprocal card back is a matter of clicking a button!"

The eQSL website has been running for over five years now, and the usage of the system has grown astronomically. Over 80,000 users from 300 different countries have registered to date, and the awards programme has become keenly contested.

eDX AWARDS

The eDX award is available for those who have a minimum of 25 countries confirmed. As such, it is very popular with beginners. For the more experienced DXer, the eDX100 award is available which provides much more of a challenge. Over 1500 eDX Awards have been earned so far, with 147 of those being awarded to UK amateurs. 135 eDX100 awards have been earned, with five of those being to UK amateurs (G0TSM, G3VAO, G0BLB, G3MPB and G3LHJ).

Table 1: The top 'eDX' scores as at 23 January 2005

Callsign	Country count
ON7GB	209
4Z4DX	205
DK1MAX	187
DL4MDQ	187
YU1AB	183
SP3BGD	166
W2YC	156
F6GCP	155
OM7PA	155
OM7PY	154

Table 2: The top 10 UK amateurs' eDX100 scores

Callsign	Country count
G0TSM	124
G3MCS	123
G3VAO	120
G0BLB	119
G3SED	113
G3MPB	108
GM4CXM	105
G3LHJ	103
M5ACC	103
G4UJS	99

The top eDX scores as at 23 January 2005 are shown in **Table 1**. The countries worked count is rising rapidly as more and more people participate in eQSL, and just recently some major expeditions and DX operators, including D68C, YK9A and ON4WW have uploaded their logs to eQSL.

From the UK, a number of amateurs have amassed some great scores and for interest, the top 10 UK amateurs' eDX100 scores are shown in **Table 2**.

It's great to see Foundation and Intermediate licensees climbing the ladder too. M3RDX is the leading Foundation licensee with 84 countries confirmed and 2E1RDX is only just behind on 81.

Other awards are available, including eWAS where G3VAO is the only UK amateur to have all 50 USA states confirmed and his application approved (so far). Only two eWAZ (Worked All Zones) awards have been made so far, to 4Z4DX and DK1MAX.

GETTING STARTED

You need to register on the site. Simply go to www.eqsl.cc and follow the link to 'Register'. You will need to enter details of your callsign and e-mail address. Having done that, the site will then send a 'sign-up' code to your e-mail address which you will then be required to enter into the site. At that stage, you can finalise your signup, completing your profile information, which includes details such as your location, CQ and ITU zones and locator square. You'll also be assigned a password which you will use to sign into the site. That's all there is to the registration process.

You also need to design your eQSL. The site provides a number of ready-made designs, some basic, some humorous, maps and so on. These designs superimpose your profile information on to graphics, so that when people display your eQSLs they will see the design you created. If you make a small dona-

tion, to defray the cost of storing an image file, you can upload your own photographs to use on your eQSL, which allows you to customise what people see to a very fine degree. This is what I've done and you can see the results here. If you want some help making a very professional image to display your eQSL, you can contact a specialist in the field, Rich Drake, W3ZJ (see 'Web search' for details).

SENDING & RECEIVING eQSLs

What do you need to do to send eQSLs? Well, the simplest way is to create an export file from your logging program. eQSL uses a format called ADIF (Amateur Data Interchange Format). The vast majority of logging programs, both station and contest loggers, will be able to create this format. Export the file from your log and go to the page on the site which says 'Upload an ADIF file'. Upload your file and that's all there is to it. For each valid record in your ADIF file, an eQSL will be sent to each callsign that you've worked. Of course, not everyone subscribes to eQSL! If they don't yet, but subsequently come to the eQSL site and register, then they will see your eQSL waiting for them.

What if you don't have a logging program which creates ADIF files? Can you still use eQSL? Yes, though the process is rather more labour intensive. There's an option to input QSO data manually and create eQSL records. It's a lot easier using upload data though, and the vast majority of users use that method.

If you make a fair number of QSOs and upload your logfile regularly, you'll soon get some eQSLs coming in. In some cases, it happens within minutes of making the QSOs which adds to the fun.

You can log in to the site and go into your 'inbox' and select individual QSOs to view. Of course, there's no particular need to view each eQSL unless you want to. The credits are automatically calculated towards your awards, so you can quickly see which countries, zones or states you have confirmed.

If you've had more than one callsign, you will enjoy the ability to link different eQSL accounts together and combine the credits for the awards programme. For example, my Class B callsign was G6TTU. What I can do is to register G6TTU as an 'attached account' to G4VXE. Simply go to the 'My Profile' page and then follow the link to 'My Other Accounts'. At the bottom of the page, you will see an option to 'Register a New Attached Account'. This carries forward much of the detail from your primary account, so it's really quick to do. Having done that, the eQSLs that you've received for your attached account will be shown as credits to your main account, so if you worked anything choice with your other callsign that can count for your awards. Unlike the DXCC awards scheme, you may, -if you wish - link accounts from different countries together, so I could link together my G4VXE, GW4VXE/P and GJ4VXE/P accounts and combine the credits.

You can easily download and print out any cards that particularly interest you, or you can have them professionally printed and sent to you from eQSL headquarters. You should be mindful, however, that the cards that you have printed will not be eligible for DXCC purposes, as the ARRL does not accept them. Nevertheless, they still look good on the shack wall!

AUTHENTICITY GUARANTEED

In order to participate in the eQSL award schemes, you need to earn Authenticity Guaranteed (AG) status. The aim of this is to prove that the person uploading the QSO data is the holder of the licence, or someone acting on behalf of the licensee (in the case of QSL managers, for example).

The normal way of doing this is to scan a copy of your amateur radio licence, or if you don't have a scanner, take a digital picture of your licence and then upload it to the site, following the links to 'Authenticity Guaranteed'. This will then be reviewed by a volunteer (often myself, or Rich, W3ZJ), who will approve it.

If you already have a Logbook of The World certificate for that call, you can use the 'Authenticity Guaranteed via LoTW' method, as described on the eQSL site.

Once you have achieved AG status, your eQSLs can be used by other people to gain the different awards, such as eDX, eDX100, eWAS and eWAZ. And of course, you'll be in a position to apply for the awards yourself.

FIG 1

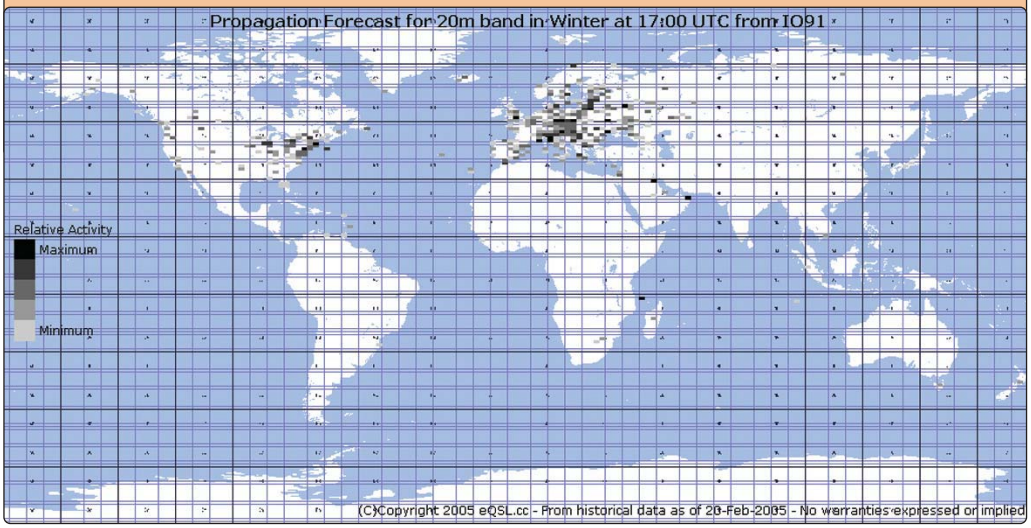

Fig 1 eQSL 'propagation forecaster' feature based on 20m log data.

OTHER FEATURES

Because the eQSL website's database provides a rich source of statistical information about propagation, site subscribers have the ability to analyse propagation from their location. For example, the image shown in **Fig 1** is based on the log data for 20m in the winter in IO91. It obviously doesn't reflect recent solar data, but nevertheless the results are useful.

Similarly, with real time uploads of QSO data being made to the site, the 'Who's on the air now' can make for some interesting reading.

So, in a nutshell, there you have it! Getting started with the eQSL system is very straightforward. It's fun to use. A recent mention of the eQSL system on GB2RS resulted in more than 100 UK stations signing up and using the service. If you've not tried the system so far, do give it a go. If you're active on the bands, you can be sure that there will be an eQSL or two waiting for you! ♦

WEB SEARCH

eQSL:	**www.eqsl.cc**
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- Size: 65 x 130 x 80mm
- Lead: 2m with 3.5mm jack plug fitted

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- Size: 120 x 120 x 40mm
- Lead: 2m with 3.5mm jack plug fitted
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SO259 fitting.....**£12.95**
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HF Yagi

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FREQ:10-15-20 Mtrs GAIN:8 dBd
BOOM:4.42m LONGEST ELE:8.46m
POWER:2000 Watts.....**£329.95**

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.....**£599.95**
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OPTIONAL 10-15-20mtr radial kit.....**£39.95**

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OPTIONAL 10-15-20mtr radial kit.....**£39.95**
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OPTIONAL 80mtr radial kit.....**£16.95**

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MTD-5 (5 BAND) FREQ: 10-15-20-40-80 Mtrs LENGTH: 20m POWER:1000 Watts.....**£89.95**
(MTD-5 is a crossed di-pole with 4 legs)

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1mtr RG58 PL259 to PL259 lead.....**£3.95**
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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)

ALL PICTURES ARE FOR REFERENCE ONLY

Just how legal is /M operation?

This 'Guest Editorial' by David Taylor was written as a result of the correspondence in 'The last word' in March and April (it was written before the May issue was published). David Taylor is a magistrate as well as being a radio amateur and a motorist, and here he poses the very serious question "just how legal is /M operation?"

In the letter from Geoff Darby, G7RTC ('The last word', March 2005), his analogy of the careless driving conviction in the 'apple case' is a good one - an apple being about the size of a radio fist mic. The assurance by Peter Kirby, RSGB General Manager, that legislation making it unlawful to use a hand-held mobile phone gives exemption to allow the use of mobile radio with a fist mic is correct. However, I think it's a mistake for amateurs who engage in this practice to believe that the exemption in itself gives them immunity from prosecution for careless or dangerous driving.

WHAT DOES THE NEW LAW REALLY MEAN?

The law was introduced because the use of mobile phones is distracting and is believed to have resulted in many accidents and scores of deaths. Department of Transport advice is that the use of *any* phone or similar device - hands free or not - is a distraction.

There is strong evidence that engaging in mobile phone conversations impairs ability to react to potentially hazardous situations, and that it is the *holding of the conversation* that increases this risk - not simply the *holding of the phone*. Indeed, research in Canada suggests that mobile phone use quadruples the risk of collision for the duration of the conversation, and that the enhanced hazard period extends for several minutes afterwards.

Thus, it seems likely that the use of mobile radio - hands free or not - poses similar risks. The majority of mobile radio use will not be by radio amateurs or CBers, but by emergency services and commercial users such as taxis. Their method of use differs greatly from that of radio amateurs - it will generally be for the brief exchange of necessary information in calls of short duration. Often, mobile (PMR) radio will be used at the beginning or end of a journey when the vehicle is stationary, to receive instructions or to announce arrival at, or departure from, a destination.

Amateur mobile radio operation is quite different. The objective is to establish contact with fellow amateurs and to maintain contact for as long as RF conditions allow, or until one or another party wishes to go QRT. QSOs through repeaters can be of long duration, covering long distances. Often such QSOs take place in heavy commuter traffic *en route* to and from work, with cyclists and pedestrians - including children, around.

On any objective view this must impair concentration and increase the risks of accidents. Although it isn't in itself an offence to use a fist mic, neither is it a specific offence to eat an apple, peel an orange, drink from a can, unwrap a sweet, use an electric razor, fiddle with the radio, push the buttons on a hands-free phone in a holster, and so on. A car is not a mobile café, office or shack, and all these activities can, and do, lay drivers open to a charge of careless driving, whether or not an accident ensues. Worse still, there may be tragic consequences.

Offences such as using a hand-held mobile phone or exceeding the speed limit are known as 'absolute offences'. That means that if you've done it, you've done it, and it is only necessary to prove that the offence has occurred, without any burden of proof that there was any loss of control of the vehicle, or that it actually endangered anyone in the particular instance.

However, in cases of careless or dangerous driving, it must be proved to the criminal standard of proof - beyond reasonable doubt - that the manner of driving meets the criteria of the offence. Each case must stand and fall on its merits based on the evidence.

The role of magistrates isn't to support the Crown Prosecution Service against the defendant, but to remain impartial, listen to the evidence from both sides, and conclude whether or not the case has indeed been proved 'beyond reasonable doubt'.

When considering allegations of careless driving a useful starting point that magistrates will have in mind is 'was the driver doing anything which - had they done it during their driving test would have caused them to fail? If so, had their standard of driving fallen to a point which amounts to careless driving?' In my view, the use of an amateur radio fist mic could fall well within that scope.

A HYPOTHETICAL CASE

I'd say that in most people's minds - including the public, police, CPS and magistrates (maybe many amateurs too) - an amateur using a hand-held mic has a close parallel to the use of a mobile phone, albeit simply using a hand-held mobile 'phone is an absolute offence, whereas if it is asserted that the use of a fist mic in a particular instance of alleged careless driving, it must be proved.

Consider the following hypothetical scenario of a police officer giving evidence. Put yourself in the place of the magistrates and ask yourself whether you would feel well disposed towards the defendant:

PC: "I was on patrol with my colleague in a marked police car when I saw the defendant with something in his hand into which he appeared to be talking. At first I thought it was a mobile phone, then I saw it

David Taylor, G4EBT

3 Crofters Drive, Cottingham, East Yorkshire HU16 4SD

E-mail: cotters@cotters.karoo.co.uk

was a fist microphone with a curly lead attached to it.

"The traffic was busy and there were lots of pedestrians around, including children. His journey necessitated changing lanes, stopping at traffic lights and pedestrian crossings then moving away. All the time he had the microphone in his hand, talking into it for several minutes at a time. Although he didn't lose control of the vehicle, I formed the view that he was not concentrating on his driving and didn't have proper control of the vehicle.

"He had to change gear and steer the car, and it occurred to me that the curly lead might become entangled during a manoeuvre. I considered that he posed a risk to himself and other road users. In short, I though it was an accident waiting to happen, so I signalled to the driver to pull over and stop, which he did. I asked him to explain what he was doing and he told me he was a licensed amateur radio operator, in radio contact with a fellow radio amateur while on his way to work. He said his understanding was that the law permitted the use of a mobile radio mic. I advised him that he would be reported for a possible prosecution for careless driving".

Taking the hypothetical case above, I think the hapless amateur would be up against it. What could he say in his defence? Not a great deal. Worse still if he was involved in an accident, when there'd be a risk that the use of the mic would be seen as an aggravating factor, if not the prime cause. The penalty for careless driving is a fine of up to £2500 plus 3 - 9 penalty points or a disqualification, plus prosecution costs, plus his legal costs if represented by a solicitor, not to mention higher insurance premiums.

"But it's amateur radio, officer, so it's perfectly legal!" (In reality, four members of the Liverpool University Radio Society, G3OUL, during rag week in 1981. Taken from *Amateur radio: the first 100 years*.)

ANY OPPOSING VIEWS?

I don't want to sound like a scaremonger, or a do-gooder killjoy with a down on fellow amateurs. These are my personal views, and I do not claim to speak for magistrates as a whole. In any event I would declare an interest and decline to adjudicate on a case of a radio amateur accused of careless or dangerous driving.

I doubt that fellow amateurs who enjoy mobile operation will be amenable to my comments and may assert that they have the ability to operate mobile radio and drive in today's demanding conditions at the same time, with no added risk to themselves or other road users. After 20 years of dealing with motoring offences I've long since concluded that the term 'accident' is a misnomer for 'incident', most of which occur not due to bad luck, but bad driving and a bad attitude to road safety.

As responsible members of society, I think we should reflect on the fact that careless driving offences are running at some 85,000 a year, and road deaths at 3500. Ten times as many people die on the roads as are murdered, and we surely have a part to play in not adding to that tragic toll. There are two parties to a QSO, and home-based amateurs that work mobile operators might also like to bear in mind the risks they're contributing to. ♦

Editorial note: It is the RSGB's view that, given the specific exemption allowing the use of two-way mobile radio with a fist mic, a radio amateur is very unlikely to be prosecuted under the 'mobile phone law', unless it could be shown that the use of the amateur radio equipment contributed to an accident or dangerous driving.

If any amateur who frequently operates /M while driving would like to write a short article expressing an opinion different to that of G4EBT, please contact the editor, c/o RSGB HQ, or e-mail: radcom@rsgb.org.uk

WEB SEARCH

Department of Transport mobile phones and driving, FAQs:
www.dft.gov.uk/stellent/groups/dft_rdsafety/documents/page/dft_rdsafety_025216.hcsp
Roadpeace - 'Is the law of traffic offences appropriate?'
www.roadpeace.org/articles/trafilaw.html
Department for Transport website on road safety:
www.dft.gov.uk/stellent/groups/dft_rdsafety/documents/sectionhomepage/dft_rdsafety_page.hcsp
RoSPA and road safety: www.rospa.com/roadsafety/
Home Office statistics on motoring offences:
www.homeoffice.gov.uk/rds/motor1.html

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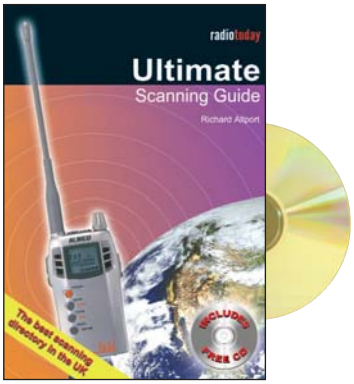
Book review



RADIO TODAY ULTIMATE SCANNING GUIDE (2nd edition)
Compiled by Richard Allport
Reviewed by HQ Staff

This month sees the return of a classic of its type, the *Radio Today Ultimate Scanning Guide*. There have been several different scanning directories and some have run to many different editions. When the *Radio Today Ultimate Scanning Guide* first appeared in 2001 it set new standards in that expected from such books. Not only did this directory claim to have a greater accuracy than other guides, it also contained for the first time a searchable CD of the frequencies. Time has moved on and this edition of the book has many new features.

Scanning directories provide a simple way to work out exactly who is transmitting on any given frequency. In the UK it is not legal to listen to transmissions which are not intended for general reception and this book provides clear guidance as to what can be listened to and what should be avoided. The current Ofcom advice on the subject is included.

As with the previous edition, well-known amateur radio writer and *RadCom* equipment reviewer Chris Lorek, G4HCL, provides a straightforward introduction to scanning. Moving further into the book the reader is provided with two sections. The first lists paired frequencies whilst the second lists single frequencies. So far this is much what all scanning directories provide, so what makes the *Radio Today Ultimate Scanning Guide* different? Firstly the author has spent much time deleting many *unused* frequencies and ensuring that the listing is as up-to-date as possible. Other directories have a reputation for adding new frequencies but not deleting old ones or deleting errors. This feature alone makes the *Radio Today Ultimate Scanning Guide* listing one of the most accurate available. The listings themselves are also carefully formatted so that they are easy to read and find. Frequency ranges have helpful tabs so you can flick easily between sections. Pages also have unobtrusive bands of grey behind the text which have the effect of making frequencies very readable.

We haven't, however, covered what makes the *Radio Today Ultimate Scanning Guide* easily the most valuable and unique of the scanning directories currently available. This book also contains a *free* searchable frequency CD. When this first appeared in the first edition of the *Radio Today Ultimate Scanning Guide* it caused a sensation and the new version is significant step forward. The CD is simplicity itself to use. It works directly after the CD is placed in the drive and although it takes a moment to load, the speed of searching is lightning quick and versatile. On starting, the program provides a clear and uncomplicated interface which provides straightforward search facilities. By simply clicking a 'radio button' the user can switch instantly between search types. However, not only can you search for single, mobile and base frequencies (with their pairs) a text search is also provided so if you want, say, a 'BBC' list you can view all their listed frequencies.

If you are interested in scanning, this book is an absolute must for your bookshelf - and the CD for the drive of your PC.

RADIO TODAY ULTIMATE SCANNING GUIDE (2nd edition)
Compiled by Richard Allport
560 pages, (240 x 175mm), paperback
ISBN: 1-905086-06-7
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(Non-members' price £19.99 + p&p)
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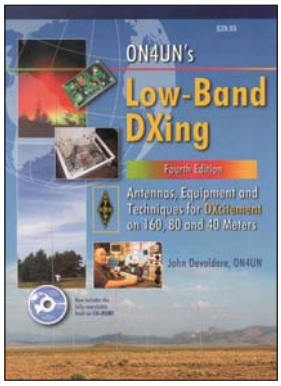
www.rsgb.org/shop



ON4UN'S LOW-BAND DXING (4th Edition)
By John Devoldere, ON4UN
Reviewed by HQ Staff

Most radio amateurs look forward to the years of solar maxima, when 28MHz is wide open all day long and well into the evening, and even 'the magic band', 6m, provides regular transcontinental openings. But a small group of dedicated enthusiasts look forward instead to the *decline* in the sunspot count. They look forward to the days when even 20m is dead as soon as the sun goes down. For these are the years when 'the low bands' - 40, 80 and 160m - really come to life. That there are now many more low-band DXers than 20 years ago is thanks in no small measure to the author of this book. John Devoldere, ON4UN, has almost single-handedly popularised the art and science of DXing on the low bands and over the last two decades his books on low-band DXing have become classics in their own time.

The ARRL has just released a new edition of *ON4UN's Low-Band DXing* and the timing is just right, as it becomes available at the onset of another low-sunspot number era. This fourth edition is a major revision of what has become *the* essential guidebook for low-band operators. Many new techniques have been developed since the third edition was published five years ago, especially in the area of receiving antennas and high-gain transmit antennas. These are dealt with in much greater detail than in the third edition; these chapters have been completely rewritten and now include methods for objectively qualifying receiving antennas.

As in the previous editions, you will find an amazing wealth of information springing from ON4UN's extensive hands-on experience and that of the many collaborators and contributors. He spent 18 months writing this edition, clocking up over 1500 hours of work. He personally visited a number of successful low-band DXers and contesters to try to unravel their secrets. The author himself has long been recognised for his outstanding achievements on the low bands as a highly successful contester and DXer. Newcomers and old-timers will both benefit from this vast store of practical information.

Bundled with the book is a CD-ROM containing the complete book including text, drawings and photographs (some in colour) in fully-searchable electronic form, using Adobe *Acrobat Reader*. The CD also includes some very useful software written by ON4UN and even a short video called *Amateur Radio Today*, which provides an introduction to amateur radio for newcomers to the hobby.

ON4UN's Low-Band DXing covers everything you want to know about 160, 80 and 40m, with a strong emphasis on antennas. ON4UN also presents solid ideas for the amateur with limited space, as well as for those fortunate ones who have the budget and the real estate to erect 'monster' antennas wherever they wish. It is a must-read for DXers, contesters and even casual operators who venture on to the 160, 80 and 40m bands.

ON4UN'S LOW-BAND DXING (4th Edition)
By John Devoldere, ON4UN
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SGC SG-211 and SG-239

American company SGC is well knows for its range of microprocessor-based automatic antenna tuners. Steve White reviews two models that were introduced into the SGC range relatively recently

Curiously, both the SGC SG-211 and SG-239 Smartuners™ retail for the same price, so why does SGC offer them both? And at £189.95 each, these two models cost a lot less than other Smartuners, so where has SGC compromised?

SG-211

The aluminium-cased SG-211 MiniSmartuner is primarily intended as a companion for low power transceivers such as the SGC SG-2020, the Yaesu FT-817 (and FT-897 if operated from its internal batteries) and the Icom IC-703, but it will work with any transceiver as long as the output does not exceed 20 watts continuous or 60 watts PEP. Four rubber feet are fitted for worktop use, and there are four holes in one end of the case, presumably for a carry strap or hooking it on to a vertical surface. The input connection is an SO239 and the output connections are wingnuts. The only external control is a toggle switch, used to prevent the tuner from repeatedly hunting to find a tuned position, and a single red LED for status indication. It is not weather proofed.

The tuner consists of a 4:1 step-down balun, followed by an L-network. The inclusion of a balun means it is ideal for dipole and loop antennas. Long wires and inverted Ls can be accommodated by strapping one of the output terminals to ground and employing radials or a counterpoise, SGC making a point of stressing this in the instruction booklet. They also mention that in some instances you may find a balanced antenna will work better when connected as unbalanced, and vice versa.

One plus point about the SG-211 is that it will tune up to 54MHz, making it ideal to snatch some 6m contacts with an antenna that other tuners can't handle. Another is the impedance range over which it will tune; 0.3 to 6000 ohms. Last - but by no means least - it requires no external power source, being powered from four internal penlight cells.

In the SG-211 SGC has employed latching relays, which means that once they have clicked into position no current is required to keep them there. The practical upshot of this is a tuner that draws no more than microamperes, except when it is actually in the process of tuning, hence SGC's claim that the internal batteries can be expected to last five years. The downside is that the average tuning cycle is longer than other models of SGC tuner when finding a new match (SGC quotes 2.5 seconds). Reverting to a previously tuned (and memorised) position takes less than 50 milliseconds.

The SG-211 MiniSmartuner is ideal for applications where power supply is at a premium, but its power handling capability is limited.

SG-239

The SG-239 is a little larger and heavier than the SG-211. It too is cased in aluminium. In contrast to the SG-211, the SG-239 employs a pi-section matching network. It does not incorporate a balun so is primarily intended to tune unbalanced antennas, but balanced antennas can be connected directly or via an external balun. It requires a minimum of 1.5 watts to tune and is capable of handling up to 80W continuous or 200 watts PEP. Once again it is not weatherproofed, SGC's suggested method of keeping the water out being to house it in a plastic food container or under an upturned plastic waste bin. All external connections are via screw-down terminals. At 0.2 to 5000 ohms it is intended to match antennas over a similar range of impedances to the SG-211.

The SG-239 does not use latching relays, so it requires an external power source of 12V DC at 230mA to operate. It offers approximately 125,000 tuning combinations, the same as the SG-211, but fewer than other SGC Smartuners which typically offer half a million combinations. The SG-239 is a dedicated HF tuner, covering 1.8 - 30MHz. SGC quotes the tuning time as under two seconds and the retuning time as under 10ms.

Unlike the SG-211, the SG-239 can be tuned manually. There is a slide switch to switch between automatic and manual operation, buttons to increase and decrease the values of capacitance and inductance of the matching circuit, and a button to store manually tuned settings in memory. There's also a number of miniature status LEDs, one of which can be extended back to the shack to indicate when a satisfactory match has been achieved.

INSTRUCTIONS

Each tuner is supplied with an instruction booklet. As you would expect, both explain the theory of operation and how to install them. The 48-page booklet for the SG-211 contains a good number of illustrations on how to connect various types of antenna, but most of them are nothing more than hand-drawn sketches. Those produced by a drawing package are unsophisticated, and the reproduction of photographs is grainy and lacks contrast. By contrast, the 36-page instruction booklet for the SG-239 is very nicely produced on glossy paper, with full circuit diagrams. However, it doesn't provide as much detail about connecting various types of antenna.

HOW THEY WORKED

I decided to test the tuners from home into my main HF doublet and in a portable type environment into single wire antennas that had been erected temporarily. What I wanted to do was determine the relative efficiency of the tuners, so I used an RF ammeter to measure how much current each one delivered into each antenna on each band. The results can be seen in **Table 1**. In all cases I was running 20 watts. At this point I need to stress that (1) the RF current measured should be looked upon only as a relative indication of efficiency, and (2) due to the nature of current distribution on antennas, one should expect quite different currents to be measured from band to band.

SG-211

Never having used a Smartuner before, I was curious to discover how they operated. I connected it to the first antenna in my test sequence (a 100ft-long inverted-L) and pressed the transmit button. After a brief pause the 16 relays started to chatter, indicating that tuning was under way. After several seconds the chattering

Smartuners

ceased and the SG-211's solitary LED lit for two seconds, indicating that it had finished and was satisfied with the result. When I changed bands and went to transmit, tuning to a new setting took anything from under one second to about eight seconds. When returning to a band where the tuner had previously memorised a setting, re-tuning generally took no more than a fraction of a second. The relays are operated sequentially when re-tuning, rather than all at the same time. This is a function of the SG-211's limited microprocessor capability and - presumably - the limited capability of the penlight cells.

Apparent re-tuning when reverting to a previously tuned band was sometimes noted, as was re-entering the tuning cycle after it had apparently finished. Both of these are mentioned in the instruction booklet, along with explanations. Having said that, the convenience of not having to tune manually soon had me hopping from band to band, checking the current that the tuner would deliver into the antennas.

At 1/8 million, the number of tuning combinations of the SG-211 is less than other SGC tuners (most offer 1/2 million tuning combinations). Consequently some residual reflected power can be expected, indeed "Typical match <2:1" is printed on the case. Some reflected power was indeed observed on some bands. Because of variations in antennas, the bands that I observed reflected power on would not be the same as anyone else would, but for the record I do indicate in the table with the letter "R" where noticeable reflected power was observed and "NT" (for No Tune) where the tuner could not find a satisfactory match.

SG-239

The SG-239 has the same number of tuning combinations as the SG-211, but typically it didn't take as long to find a match because the relays aren't self-latching and operate faster. Once again it is stated that it should achieve a match of better than 2:1. In some instances it still took up to about eight seconds to find a new match, but the SG-239 has 17 relays to switch back and forth. Returning to a previously matched and memorised setting was almost instant.

On a couple of bands where reflected power was noted after automatic tuning, I switched to 'manual' and tried to improve the match. The tuner ignored all presses of the buttons that change the values of L and C. By experimentation I discovered that it is necessary to switch to the 'manual' tuning position while *not* transmitting, then go to transmit, then press the buttons. I couldn't find anywhere in the instruction booklet that this sequence was described. Having determined how manual tuning could be accomplished, I found that the automatic function had already found a match that I couldn't improve on (although this may not always be the case).

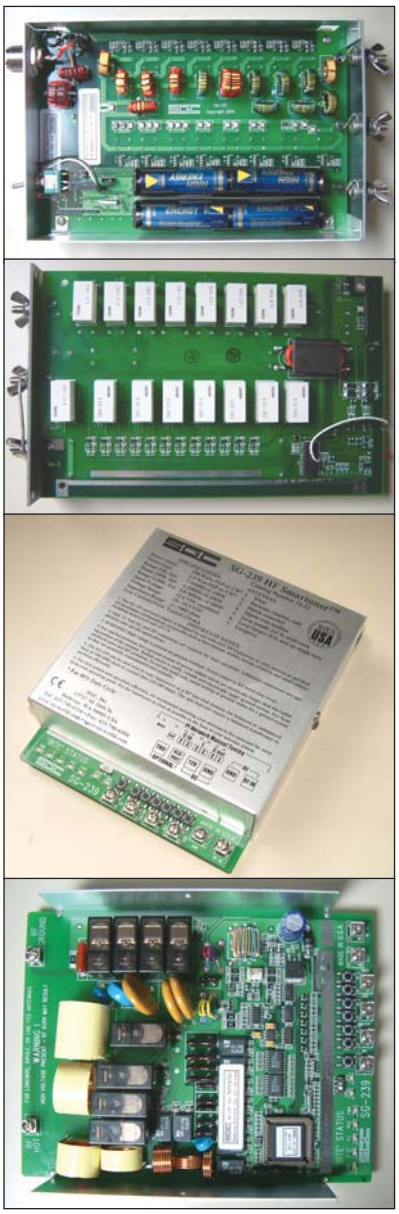
The SG-239 could not achieve a reasonable match with the 8ft wire on the lowest two frequency bands, but the shortest length of antenna that is recommended for this model of tuner is 40ft, so what was surprising wasn't that it *couldn't* tune, it was that it *could* tune such a short wire on all the other bands!

INTERPRETING THE RESULTS

The tuners delivered similar currents into the antennas, but general patterns of current delivery were noted:
1. On the low bands, the SG-211 would not tune a particularly long wire, whereas the SG-239 would not tune a particularly short wire.
2. Into a short wire, the SG-211 delivered more current on the high bands than the SG-239.
3. Into a long wire, the SG-239 delivered more current on the high bands than the SG-211.
4. Into the doublet there was no clear winner, but the SG-239 would not tune the doublet on 1.8MHz unless it was connected via a balun.

Table 1: Current delivered into various antennas by the tuners
('NT' = No Tune achieved, 'R' = residual Reflected power).

	100ft wire + counterpoise		30ft wire + counterpoise		8ft wire + counterpoise		200ft Doublet	
	SG-211	SG-239	SG-211	SG-239	SG-211	SG-239	SG-211	SG-239
1.9MHz	NT	0.31	0.22R	0.14R	0.18	NT	NT	0.48
3.6MHz	NT	0.24	0.39	0.34	0.28	NT	0.50R	0.60
7MHz	0.31	0.32	0.37	0.39	0.39	0.30	0.28	0.28
10.1MHz	0.21	0.23	0.27	0.29	0.37	0.41	0.28	0.32
14MHz	0.11	0.12	0.11	0.10	0.21	0.22	0.47	0.34R
18.1MHz	0.13	0.12	0.20	0.17	0.30	0.28	0.10	0.15
21.2MHz	0.23	0.24	0.27	0.15	0.28	0.20	0.14	0.15
24.9MHz	0.20	0.26	0.27	0.22	0.30	0.23	0.14	0.20
28.5MHz	0.12	0.16	0.21	0.14	0.31	0.21	0.21	0.16
50.15MHz	0.12	-	0.10	-	0.30	-	0.26	-



The side of the PCB you can see when you take the lid off the SG-211.

The side of the PCB you can't see when you take the lid off the SG-211.

The SG-239 budget Smartuner.

Inside the SG-239. There are no components on the reverse side. The board locates on four small lugs on the bottom half of the case and is attached to it with a single clip. When the top half of the case is fitted the board is simply sandwiched into place. Note the screw terminals, LEDs and manual controls, which protrude through the case.

CONCLUSIONS

The SG-211 is better suited to short- to medium-length antennas, whereas the SG-239 is better suited to medium to long antennas. Each tuner has its relative merits, the SG-211's lack of requirement for external power being counteracted by its lower power rating and relatively slow tuning cycle, the opposite being true for the SG-239. They both performed as per the manufacturer's specifications.

I would like to thank Waters & Stanton PLC (tel: 01702 206835) for the loan of the equipment reviewed. ♦

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E-mail: newcomers.radcom@rsgb.org.uk

Newcomers' news

Exams and contests are the themes of Steve Hartley's column this month...

In almost every radio examination you will find one or two questions that candidates feel are 'unfair'. This is usually put down to a gap in their knowledge, or perhaps there were two answers that were 'correct' but one was more correct than the other. However, in the March Intermediate exam there was a question relating to the maximum height for a 50MHz antenna that even had the gathered 'experts' (tutors and examiners) all scratching their heads. *BR68* was consulted – nothing. I thought I remembered something about restrictions when the band was opened up in the 1980s and gave an undertaking to do some digging.

I asked Trevor, G3ZYY, of the UK Six Meter Group for advice. He replied as follows: "The query made me chuckle for a moment, I can imagine the confusion over that question. As you guessed, there was initially a height restriction placed upon aerials for 50MHz in the belief that limiting the height would limit inter-European interference to Band 1 television. Mobile operation wasn't allowed either. In any event, both of these restrictions were lifted around 15 or 16 years ago! Hope this helps Steve."

Trevor's reply confirmed that I was not going batty so, armed with this information, I registered a complaint about the question and put a note on the RSGB tutors' e-mail reflector. Quick as a flash, another Trevor, M5AKA, pointed out that the restrictions *were* still to be found in the Intermediate schedule in BR68/I. It seems that the question was valid after all, even though the restriction should no longer apply!

Alan Betts from Ofcom has assured me that action is in hand to review the Intermediate question bank. He also asked that another plea be put out for more questions to be written for the Advanced exam. There is no prospect of examinations 'on demand' until the question bank is much bigger than it is at the moment. Question authors are paid for their efforts and further details and guidance can be had from Alan.Betts@ofcom.org.uk

MORE ON EXAMS

In March we held all three radio communications examinations in Bath but for the first time we ran them in the same room at the same time. Quite a feat! Ian Carter, G0GRI, and I were very pleased to make the arrangements for the 12 students who travelled from no fewer than six counties: Somerset, Wiltshire, Shropshire, South Gloucestershire, Devon, and Middlesex. However, it was more than a little disappointing to find that some of these students had come to Bath because they could not find any centres willing to accommodate them in their own areas. The majority were self-taught and only required assessments but several had been turned away from clubs who were not running courses at the time.

March exam candidates in Bath came from six counties (see 'More on Exams').

As a result I am putting out a request to all exam centres to open their doors to self-taught students. There is no compulsion to attend training courses and we should not be discouraging newcomers by making it difficult to find willing assessors and / or examiners and adding travel time and costs to the stress of being tested.

FAST-TRACK EXAMS

On a more positive note, I have been asked to arrange for all three levels of assessment and examination to be held over the weekend of the RSGB HF Convention in October. Last year we had two intrepid students who fast-tracked through all three with many others doing one of two.

There will be no tutoring available, other than the on-the-job coaching involved in the Foundation and Intermediate practical assessments, but there will be plenty of 'experts' around to give you some last-minute advice. There will also be a full programme of lectures at the Convention.

If you are interested in any or all of the exams, please get in touch with me and I will keep you informed as plans come together. The HF Convention has its own website and details will be posted in due course (see 'Web search' below).

NEW TO CONTESTS?

If you have never tried your hand at radio contesting this time of year gives you lots of opportunity. On Sunday 12 June there are two 144MHz contests running side by side. The RSGB Backpackers contest and the *Practical Wireless* annual QRP (low power) contest are run at the same time, the *PW* contest lasting an hour more than the RSGB version. Other than that the rules are much the same.

The following Sunday, 19 June, you could try your hand on the 50MHz Backpacker contest, much the same as the 144MHz contests but with the chance of working further afield if the propagation is favourable.

You don't need much in the way of kit to take part, just an SSB transceiver, some battery power, an antenna and a decent location - any high ground will get you contacts. These are good-natured events with lots of friendly stations to work on bands that often seem deserted of signals. I have a small prize for the first Newcomer to work me and to mention the column.

Rules for RSGB contests can be found on the RSGB VHF Contest Committee's website, and the *PW* rules can be found on, Neill Taylor's, G4HLX, website (see 'Web search'). ♦

WEB SEARCH

UK Six Meter Group	www.uksmg.org
RSGB VHF Contests	www.blacksheep.org/vhfcc/rules/05rules/frameindex.html
Practical Wireless Contest	www.contest.org.uk/
RSGB HF Convention	www.rsgb-hfc.org.uk

Ian Poole, G3YWX

5 Meadway, Staines, Middx TW18 2PW

E-mail: g3ywx@radio-electronics.co.uk

Receiver filters and their

A receiver serves to perform three main functions. It amplifies a signal, demodulates it to remove the information being carried, and thirdly separates the required signal from all the other interfering signals that may be present around it. Selectivity - the receiver's ability to select the wanted signal from all the others - is a very important function of any receiver. Ian Poole describes the sort of filters used in receivers today and how the different types of filter affect the all-important selectivity

FIG 1 (a) © RADCOM 479

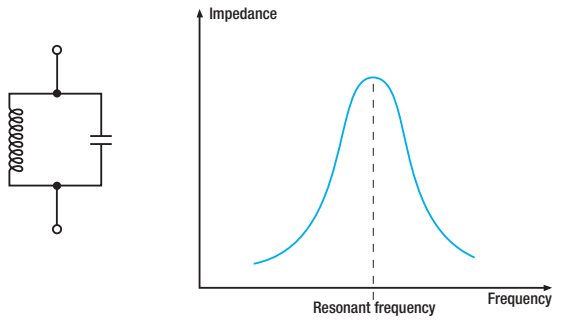

FIG 1 (b) © RADCOM 480

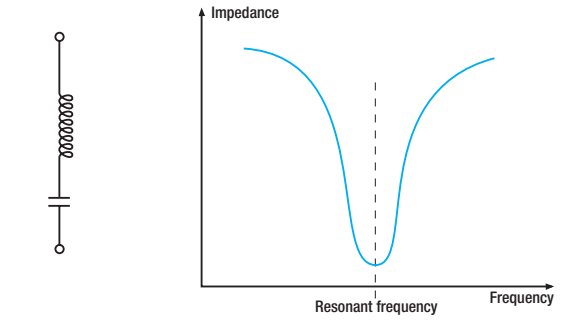

Fig 1
LC tuned circuits. (a) Parallel tuned circuit. (b) Series tuned circuit.

FIG 2 © RADCOM 481

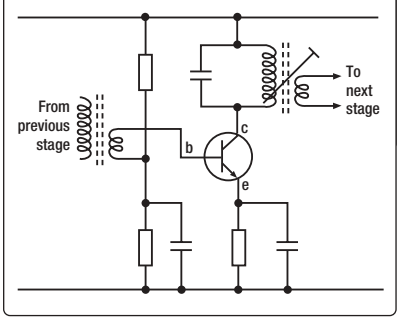

Fig 2
A circuit using an inter-stage IF tuned transformer.

There are several different types of filter that may be used in a receiver. The types used depend upon a variety of factors, including performance and cost. Here, we look at a few of the most commonly found sorts.

LC FILTERS

One of those commonly used is an *LC filter*. As the name indicates, this type of filter uses a combination of inductors (L) and capacitors (C). In its simplest form a single capacitor and a single inductor can be used. Together these form a *resonant circuit* that can either be in series or parallel (see **Fig 1**). At resonance, the inductive and capacitive reactances cancel each other out. In a circuit where the inductor and capacitor are placed in series (a series resonant circuit) the overall impedance of the circuit falls to a minimum, whereas in a circuit where they are in parallel (a parallel resonant circuit) the impedance rises to a maximum. Of these the parallel resonant circuit is found more commonly.

An LC type of filter may often be included in the inter-stage coupling transformers used in old valve or transistor radios. Here the transformer has tuning capacitors added to one or sometimes both of the windings to enable it to resonate at the required frequency. The final resonant frequency is normally adjusted using a threaded ferrite core in the transformer that can be adjusted by screwing it in or out of the winding and thereby changing the inductance (see **Fig 2**). A number of these transformers are normally used in a receiver, as there are several stages of amplification. Normally, each one is normally adjusted to a slightly different frequency so that the required bandwidth is obtained, as shown in **Fig 3**.

The advantage of these filters is their simplicity, but they also have some drawbacks. The first one is the performance. Although they are able to give a sufficiently high level of selectivity for applications such as broadcast receivers, they do not give the level of performance required for more demanding use, such as amateur radio or professional applications. Also they are relatively expensive when compared with the low cost types of filter that can be used today.

QUARTZ CRYSTALS

Where much greater levels of performance are required, such as in a high grade communications receiver, *crystal filters* are often employed, although they can be quite expensive. These filters are based around *quartz crystals* and they are able to offer very high degrees of selectivity.

Quartz is a form of silicon that occurs naturally, although today it is usually manufactured synthetically to give the required quality for electronic applications. In the manufacturing process, large crystals are grown and these are carefully cut and lapped to the correct shape and thickness. After this electrodes are plated on to the surface, and the whole assembly mounted in a can which is either evacuated or filled with an inert gas.

The operation of the crystal is based around the *piezo-electric effect*. When an electrical impulse is applied across the plates the crystal distorts. Conversely if the crystal is distorted slightly an electrical signal

specifications

will appear across the plates. In operation the crystal converts the signals applied to it into mechanical vibrations. These vibrations are then affected by the mechanical resonances of the crystal, which are then linked back to the electrical circuit by the piezo-electric effect. This results in a tuned circuit with a very high *Q* (see sidebar) - ie a very sharp response - far better than anything that can be achieved with an LC filter (see **Fig 4**).

When making a crystal filter, several crystals are normally used so that the required response and bandwidth can be obtained. Each crystal used in a filter normally has a slightly different frequency so that the required bandwidth is obtained. If they all had the same frequency, the filter would have a bandwidth that would be too narrow for most applications.

There are several circuit configurations that may be used, but one that is commonly found is shown in **Fig 5**. Further sections of the same basic circuit can then be cascaded on to this basic circuit to give improved performance. Often filters with six or eight crystals may be used.

CERAMIC FILTERS

Ceramic filters are widely used today because they are cheap, easy to produce and provide a performance that is between that of LC and crystal filters. They are particularly useful because they are small, and can be used very easily in conjunction with integrated circuits. As such they are widely used in a host of receivers from broadcast sets to cellular phones.

Like crystals, ceramic filters make use of the piezo-electric effect. These components consist of a complete filter on a single piece of ceramic. Although the performance of ceramic filters is improving all the time, and some offer quite high levels of performance, they are not yet able to offer the same performance levels as crystal filters. Many are designed to provide only 'reasonable' levels of selectivity, for use in applications such as broadcast receivers.

SPECIFICATIONS

One of the main features of a filter response is the *bandwidth* over which the filter allows through signals. This is normally termed the *passband*, and it is normally taken as the bandwidth between the points where the response has fallen by 6dB (not 3dB as used for the Q), ie where the voltage has fallen by half and the power to a quarter. When detailing a filter specification, the bandwidth as well as the amount by which the response has fallen should be quoted because in some instances a figure of 3dB may be used instead of 6dB. For example, the specification for the passband may be a bandwidth of 3kHz at -6dB. If a figure for the response is not given it is usually assumed to be -6dB.

Unfortunately a filter is not able to give an infinitively steep response like the 'ideal' response shown in **Fig 6**, and accordingly the response falls away as the frequency offset from the passband increases. An important factor of any filter is the level of rejection of off-channel signals. In view of this it is important to define what is termed the *stopband*, or the band outside which signals reach a given high level of rejection. A figure of 60dB is normally taken for this and the bandwidth where

FIG 3 © RADCOM 482

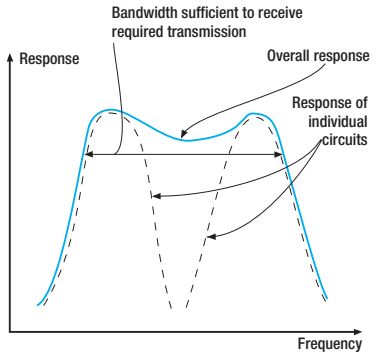

FIG 4 © RADCOM 483

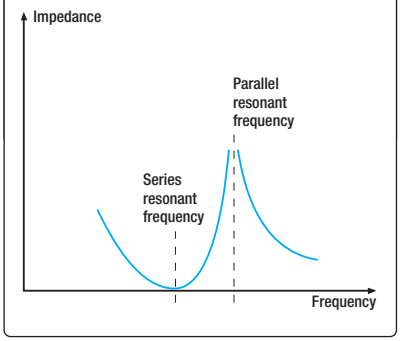

FIG 5 © RADCOM 484

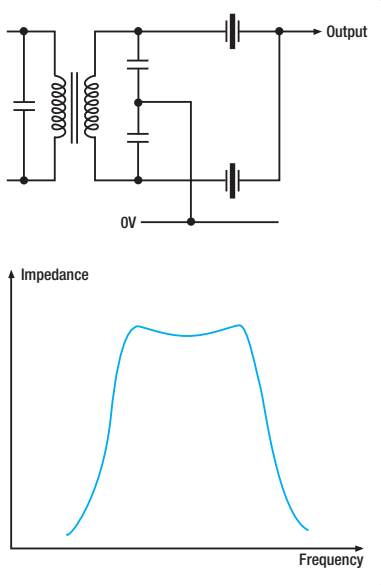

FIG 6 © RADCOM 485

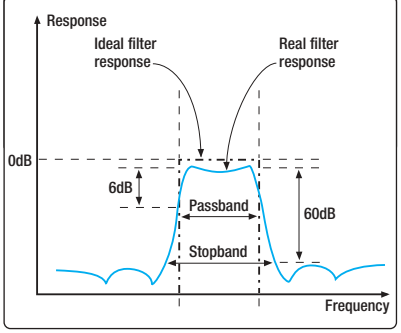

Fig 3
Effect of tuning each resonant circuit to a slightly different frequency.

Fig 4
Resonance curve of a typical quartz crystal.

Fig 5
A basic crystal filter circuit.

Fig 6
The response of a typical filter.

Q = QUALITY

The performance of a simple resonant circuit is normally defined in terms of its *'Q'*, or *'Quality'* factor. The sharpness of bandwidth of the circuit is very important, and the Q provides a figure that can be used to determine the essential qualities of the tuned circuit. A high-Q circuit will have a very sharp response, whereas a low-Q circuit will show a less defined response, as can be seen in **Fig 7**.

The Q of a circuit is defined as the resonant frequency divided by the bandwidth. This means that the narrower the bandwidth of the filter, the higher the Q. In mathematical terms this may be written as:

$$Q = \frac{f_{res}}{\text{bandwidth}}$$

where f_{res} is the resonant frequency of the tuned circuit and the bandwidth is the frequency band between the two points where the response has fallen by 3dB from the maximum. It is also equal to twice ?f, the difference in frequency between the centre resonant frequency and the lower or upper -3dB point, f_{low}, or f_{high}.(see **Fig 8**).

The Q of a circuit is normally used to determine the performance of a tuned circuit. This is a little more difficult to apply to a complete filter and other parameters are normally used to define the parameters that are required.

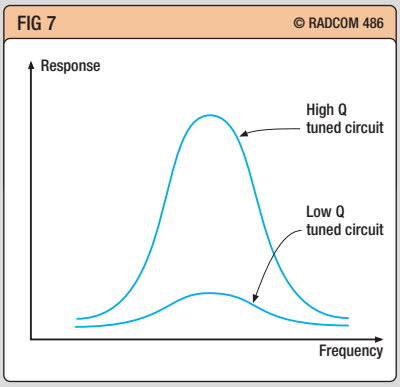

Fig 7
The difference between high and low Q tuned circuits.

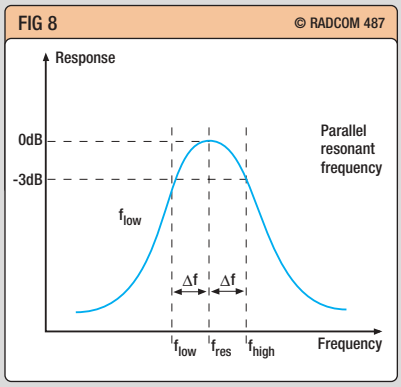

Fig 8
Q of a tuned circuit.

the signal falls to this level is given. Again, the stopband attenuation should be defined when quoting this, as occasionally stopband figures of 50dB may be used.

It is also useful to have a figure showing how quickly the response falls outside the passband. In an ideal world the sides of the filter would be infinitely steep, so that no signals would be received outside the passband. To gain an idea of the performance of the filter, a figure called the *shape factor* is used. This is simply the ratio of the passband and stopband bandwidths. In this way a filter having a response of -6dB at 3kHz and -60dB at 9kHz would have a shape factor of 3:1 at 6/60dB.

Looking at receiver and filter specifications it may be seen that the filters are also referred to as possessing a certain number of *poles*. The origin of this term comes from filter theory, but it can be seen that a crystal filter will contain one pole for each crystal. In other words a six-pole filter will contain six crystals and so forth. Also, the more poles the faster the response will fall outside the passband, reducing the levels of unwanted interference.

FILTER BANDWIDTHS

It is important that any filter that is used has the correct bandwidth. Different types of transmission occupy different bandwidths. If the filter is too narrow it will not let through the whole transmission and distortion will occur. If it is too wide it will allow unnecessary levels of interference through. It is for this reason that many receivers have switches to switch different filters for different types of transmission. In many cases these will be directly linked to the mode switch on the set.

Morse transmissions occupy a very small bandwidth, and filter bandwidths of 250 or 500Hz are often used. Narrower bandwidths may be used but tuning becomes more critical, and the filters start to 'ring', making listening less pleasant. Single sideband is normally received with filters having passbands of around 2.7kHz, and AM short wave broadcast reception may be accomplished using filters of around 6kHz.

For narrow-band FM a wider bandwidth is required, dependent upon the amount of deviation being used. Usually it is slightly less than the channel spacing - possibly around 12 to 25kHz. For wide-band FM broadcasts filters typically have a bandwidth of around 200kHz.

SUMMARY

In view of the high usage of the amateur bands and the resulting levels of interference, the performance of a filter in a receiver is of paramount importance, and as a result many people spend considerable amounts of money to ensure the filters in their receivers are as good as possible. While a filter will not be able to remove interference within the bandwidth of the wanted signal, it will certainly ensure that interference from signals that are off-channel are kept to a minimum. ♦

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One BIG Punch (OBP) is a custom add-on accessory for the Yaesu MH-31 microphone commonly used with many Yaesu amateur radios

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Speech Compressor for the Yaesu MH-31 mic and FT817 FT857, FT897. Improve the TALK POWER.

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Replace two filters in the space of one. OBF includes the two optional filters and fitting.

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for the Yaesu FT-817, 857 & 897.

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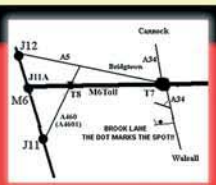

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Amateur radio museums

International Museums Weekend

International Museums Weekend (IMW) takes place this month. Like Science Week in March, this event provides an opportunity for individuals and clubs to put special event stations on the air to demonstrate amateur radio to the general public. Harry Bloomfield, M1BYT, provides an introduction to IMW and we take a more detailed look at two of the museums participating in this year's event

1
A Marconi professional receiver, 1918-1920.

2
The RSGB museum's second room includes an extensive display of valves some very nearly 100 years old.

3
Receivers from across the years.

4
A high-tension spark gap transmitter made by Maurice Child, 2DC, in 1909. It was powered by static charged thunder cloud to a potential of some 25kV!

5
In the post-WWII years, war-surplus equipment was used on the amateur bands. Here is an original R1155 receiver, a T1154 receiver, a modified 1155 and an HRO receiver.

6
Eddystone 888A.

7
Hallicrafters receiver.

8
The KW2000 transceiver presented to John Claricoats, G6CL, on his retirement.

You, your club and your local museum are invited to participate in the fourth International Museums Weekend. The event takes place on the third weekend in June - this year, on 18 / 19 June. The intention is to set up special event stations at as many museums as possible throughout the world. I would hope for an HF, VHF, and if at all possible, a *Ui-View* (APRS) packet station to be set up at each museum, but the scope of your station is entirely up to you. The choice of museum is also left very much up to you, however, aim for the largest and / or most unusual you can find.

During the first international museums event in 2002 over 80 museums from all over the world took part. They varied from tiny local village museums manned by a single lone operator, to some of the world's most prestigious ones. These were accompanied by a great number of military museum sites, such as *HMS Belfast* in London, the battleship *New Jersey* in the US and RAF museums. The event proved to be extremely popular and well supported, particularly amongst UK radio amateurs. It also went down very well at the museums used as the venues, and invitations have again been extended for 2005. It was a tremendous public relations exercise, as well as all of us having lots of fun over the weekend. It is hoped that more overseas museums will join in, as the number participating has fallen in recent years. However, this year the battleship *USS Missouri* in Honolulu has registered to take part for the first time.

At least part of the intention is to present modern amateur radio to members of the public and to help us lose some of the stuffy 'anorak' image. What better place to do this than in the very public and well-visited areas of the many museums which can be found in most parts of the world?

Those clubs and museums which decide to take part should please use the free 'Registration' facility on our website. Registration is simply to assist us in administration of the event and to provide participants with an indication of how many museums are taking part and where they are located.

Harry Bloomfield, M1BYT (Organiser, IMW)

RSGB NATIONAL AMATEUR RADIO MUSEUM

The RSGB Council first proposed a museum of amateur radio equipment in 1970. There was no room at HQ at that time, so it wasn't until 1995, when three rooms became available at the new HQ at Potters Bar, that it was possible to have a comprehensive display of equipment. In order to show the greatest range over the years it was decided to restrict the artifacts to amateur radio sets that were either commercially made, government surplus that could be modified, or well constructed home brew. Many of the latter are constructed from designs published in the *Bulletin*.

EARLY DAYS

The first room of the museum is devoted to the early days of wireless. There is a spark transmitter, a brass key, a coherer receiver, and a Marconi magnetic detector. These are from the Maurice Child, G2DC, collection, which also includes a Marconi aerial tuner from 1903, and a Morse inker from 1900.

There are several examples of valve TRF receivers made in the 1920s and two self-excited transmitters, one for 45m and one for 90m. There is also a crystal set made from a kit supplied by Gamages in 1924.

From the 1930s an Eddystone *Everyman* four-valve TRF SW receiver built from a kit of parts is exhibited. There is a one-valve transmitter made by the late Len Newnham, G6NZ, using an American '10' valve, popular at this time. George Jessop, G6JP, donated a replica four-valve transmitter for 5m used in 1934 for air-to-ground tests. These transmissions were received by amateurs all over London and proved the effectiveness of VHF transmissions from aircraft.

WWII VINTAGE

In the second room most exhibits are from the days of AM and CW. A National HRO with a set of six coils is on display, together with Hallicrafters receivers: the Skyrider 23, SX16, SX24 and SX28, all popular with amateurs just before WWII. As well as complete equipment, there is a large collection of radio valves ranging from a 1908 DeForest 'Audion' to more recent miniatures.

The 1940s were the heyday of government surplus and we have on display an AR88LF from RCA. There is a typical transmitter to go with the AR88, as used just after the war. This is a 40W crystal-controlled CW and AM transmitter made by Webbs Radio. This transmitter is rack mounted, is still in working condition and operates on 40m, giving 30W from its single 807 valve.

An 1154 transmitter and an 1155 receiver are on display, together with a BC348 receiver, all war-surplus equipment, bought in their hundreds by post-war amateurs.

COMMERCIAL EQUIPMENT

In the 1950s, Labgear, a British company, made a transmitter called the LG300. This was built into two large cabinets, one housing the transmitter and the other the modulator and power supply. The transmitter has an 813 valve in the PA and gives 100W output on AM and CW. The modulator has a pair of KT66s and four enormous transformers. A Minimitter 150W AM / CW transmitter is on display with a typical working shack from this period using a Panda Cub AM / CW transmitter, an HRO receiver, and a BC221 wavemeter.

In the third room, there are Eddystone general-coverage receivers S640, 740, 670 and 888A, all in working condition and an Eddystone EA12, built in Birmingham. One of the first receivers designed to resolve SSB, it is an amateur bands only receiver in nine bands with linear calibration, an illuminated long dial and flywheel tuning.

Also from the 1960s are a transmitter and receiver pair designed by the late G R Thornley, G2DAF. These are specifically for amateur SSB and feature low-drift VFOs, narrow-band crystal filters and high image rejection in the receivers. These designs were published in the *RSGB Bulletin*, putting many amateurs on the air with SSB signals for the first time.

A donation to the museum is a KW2000 transceiver, manufactured by KW Electronics. This was presented to RSGB Secretary John Clarricoats, G6CL, on his retirement in 1963.

A small section of the museum is devoted to VHF and UHF equipment and comprises converters and trans-

Amateur radio museums

mitters for 4m, 2m, 70cm and 23cm. Bill Scarr, G2WS, made these, and the designs were published in 'the Bull' in the 1960s to encourage more activity on those bands.

The 1970s are represented by a transceiver for five HF bands, giving about 100W PEP of SSB and CW. This is the Heathkit HW101, which could be built from a kit. It was manufactured in the USA and sold in the UK by Daystrom of Gloucester for about £100. Also designed and built about this time, and kindly donated by Rowley Shears, G8KW, is a very rare KW2000D transceiver with digital frequency readout, one of the last British-made HF transceivers.

Late additions to the museum are a Heathkit 'Pawnee' 2m transceiver which was used as the ZB2VHF beacon in the '60s, a Collins KWM-1 transceiver, a DST 100 receiver, a Codar AT5 transmitter and an Eddystone EC10 transistor receiver.

The 1980s are represented by the introduction of all-solid-state transceivers, eg IC-720A, and the 1990s entered the digital age with a PK232 packet radio TNC.

Most of the exhibits have been restored to working order and can be demonstrated by the Curator upon request. The museum is normally open Mondays and Thursdays 10.00am - 4.00pm. It is planned to put some of the working equipment on the air during the International Museums Weekend.

John Crabbe, G3WFM (Curator, National Amateur Radio Museum, RSGB Honorary Historian)

Left
Operating GB2OWM from Orkney Wireless Museum during International Museums Weekend.

Above
The 'normal' amateur radio display at the Orkney Wireless Museum.

Left
Just some of the vast collection of old domestic and war surplus receivers and transmitters at the Orkney Wireless Museum.

ORKNEY WIRELESS MUSEUM

The late Jim MacDonald, GM8BFG, was an electrician who had opportunity during WWII to visit military sites in Orkney plying his trade. He realised that it was a time of rapid development in things electronic and he began to collect items, particularly old wireless sets. He was prompted by Jack Twatt, GM3CCK, to make his collection, showing the development of domestic, maritime and military equipment over the years, available for public inspection. In April 1983 Orkney Wireless Museum was formally opened, originally at his parent's home on South Ronaldsay, by Kim Gee, GM4LNN, the daughter of the by then deceased GM3CCK. The local Minister dedicated the amateur radio part of the display - an operating desk, B28 (CR1OO) receiver and the log book, all the property of GM3CCK, to his memory. Jim died in April 1988, and in order to safeguard the collection a Charitable Trust was set up.

The first amateur radio transmitting station was set up for the opening of the season in April 1989 using the callsign GB2OWM. Over the winter of 1996 / 97 the museum was moved into its present venue at Kiln Corner, Kirkwall. The present 'normal' amateur radio display in the museum consists of the B28 (CR1OO) together with a Trio JR-500S (the property of silent key Andy, GM3MTS, who for many years was one of the volunteer custodians). Both radios function. In addition there is GM3CCK's old logbook, a QSL display, great circle map, binder of certificates gained by the museum and a working Morse key and oscillator. Anyone successfully sending their name in Morse can claim a certificate; this is very popular with children and ex-service operators. Next to the display is a working crystal set receiving BBC Scotland from Burghead or, if retuned, a Norwegian station.

Alas there is not enough room for a permanent transmitting station so when we wish to exercise GB2OWM (Marconi Day in April, International Museums Weekend in June, and Orkney Science Festival in September) we move all these displays to make room for a larger table with transceiver (usually an FT-101ZD) ATU etc.

The museum is sited near the harbour front in Kirkwall, surrounded by tall buildings and hotels, but the sloping wire aerial - centre fed using slotted twin feeder to a Z-match ATU - is remarkably effective, probably because we are within 100 yards of salt water horizontally, and because at high tide the water table is 10ft or less below our feet! The museum is open every day from April to September and is staffed by volunteers, several of whom hold amateur radio licences.

Bill Wright, GM3IBU (GB2OWM station manager)

WEB SEARCH

RSGB National Amateur Radio Museum	**www.rsgb.org/society/muslib/museum.htm**
International Museums Weekend	**http://ukradioamateur.org/imw**
Orkney Wireless Museum	**www.owm.org.uk**

NEW

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This forth compilation of the pages of Technical Topics covers the five years from 2000 to 2004. It includes all the words, pictures and line drawings from the most popular column in the RSGB's magazine RadCom. Pat Hawker's blend of clippings from other publications and contributed material is linked byhis own unique commentary, enriched by a lifetime of fascination for the technical aspects of radio, bothprofessionally and as a radio amateur.The pages are presented exactly as they appeared in RadCom. An index has been added for your convenience. This invaluable collection of experiemental antennas, circuit ideas and radio lore is a must for anyone keen on radio and electronics.

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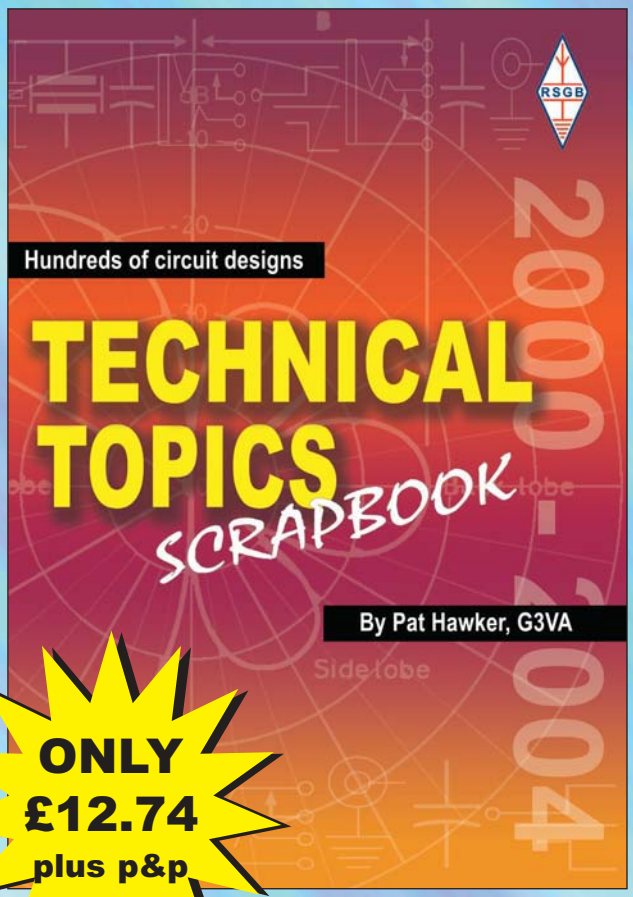

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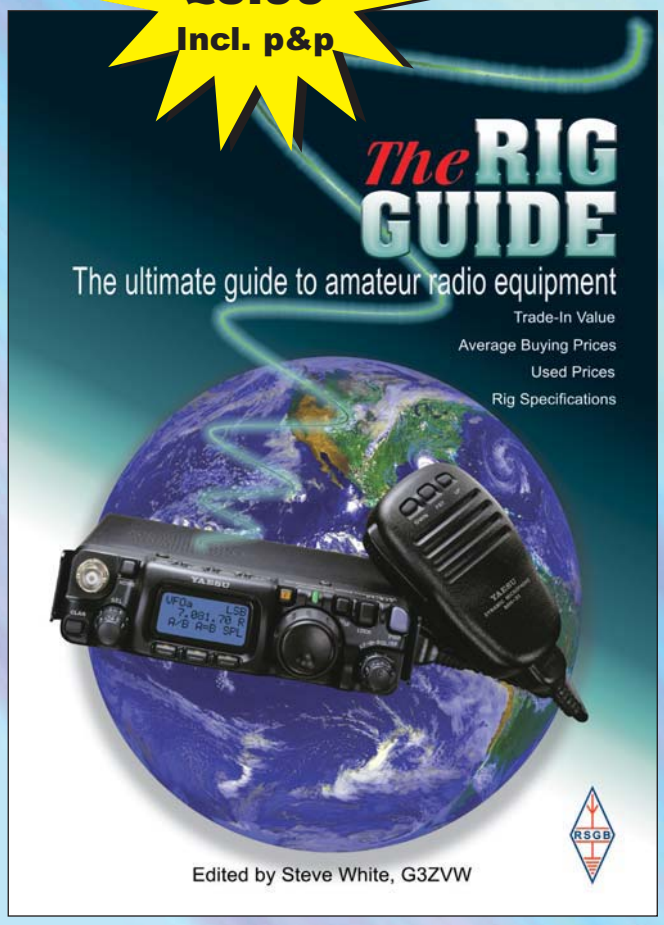

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Region 1 EC meeting in Switzerland

Don Beattie reports on the recent meeting of the IARU Region 1 Executive Committee in Davos, Switzerland

The annual meeting of the Region 1 Executive Committee (EC) was held in mid-April 2005, in Davos. The EC normally has at its meetings observers from the other two Regions and also from the Administrative Council. At the Davos meeting, we welcomed the recently-appointed IARU Vice-President, Tim Ellam, VE6SH, as well as representatives of Regions 2 and 3.

As is usual, in a year when a Region 1 General Conference is scheduled, the EC visits the Conference location to conduct in-depth planning meetings with the host society (in this case USKA), and to review the Conference venue. For its Conference this year, IARU is privileged to have the use of the Davos Conference Centre (where, amongst other events, the World Economic Forum is held each year). The facilities are excellent, with plenty of space for the many meetings that take place during Conference week, and outstanding audio-visual and IT facilities, as befits a 21st century Conference venue.

The EC also reviewed all the papers that had been submitted for consideration at the Conference. The Executive Committee itself is also submitting papers, mainly concerning improvements to the way IARU Region 1 operates. At its meeting, the EC formally approved these for submission to Member Societies. Nearly 50 countries have registered for the Conference, and by the time this column appears in print, the papers for the Conference will have been distributed to participating societies.

Apart from the necessary planning for the September Conference, the meeting in Davos was also a normal working session of the EC. The Agenda extended to nearly three days of in-depth discussions on matters affecting amateur radio in Africa, the Middle East, Europe and North Asia.

The finances of the Region always need careful consideration. IARU is funded by fees paid by member societies in the Region, and the EC is very conscious that it should be looking for every opportunity to minimise the burden on its societies. One paper going to the September Conference will concern the future strategy for fee levels, given the general improvement in finances in Region 1 over the last three years. A number of other initiatives were considered to save money, including changing the Swiss registered office of the Region from Geneva to Zug, giving significant tax benefits.

In addition to the EC itself, there are three 'Permanent Committees' in Region 1. These cover HF matters, VHF / UHF and Microwave matters, and External Relations - mainly dealing with national and international administrations. Recently the Chairman of the HF Committee relinquished the post because of business pressures and the EC appointed Colin Thomas, G3PSM, as Interim Chairman, until the General Conference in September can make a permanent appointment. Colin is now working to prepare for the Conference, as it will be his role to drive the work of one of the main Conference streams.

PHOTO: RODNEY STAFFORD, W6ROD

Members of the Region 1 EC and guests. L to R: W6ROD, DF5UG, G3BJ, LZ1US, 6W1KI, VE6SH, LA2RR, PB2T, 5Z4MR, HB9JOE, 9V1US.

SUPPORT FOR DEVELOPMENT OF THE AMATEUR SERVICE

An important part of the EC meeting concerned the support that can be given to member societies in countries where amateur radio is not yet fully established. There is a number of countries where most amateur radio activity is by visiting expatriates, and where activity ceases after that individual leaves. IARU seeks to provide help and assistance in creating an indigenous amateur radio presence in such countries. In many cases this constitutes help with training and equipment. In some areas, however, it is more a question of working with the national administration to create an understanding of what amateur radio is and the benefits that an active amateur radio population can bring to a country. The EC reviewed the plans for the next three years in this area, noting particularly the work that had been done recently with a workshop for Arab countries, held in Cairo.

The EC considered a number of issues relating to individual member societies in the Region, and again noted that in some countries there have been challenges to the appropriateness of the current IARU-recognised society to represent amateurs in that country. This seems a particular problem where there are significant ethnic or historical divisions in the country, and the EC tries to use its tact and diplomacy to resolve such conflicts. The IARU Constitution specifically allows only one member society per country to be in membership of IARU, and this makes for some interesting discussions.

The EC meeting reviewed again the implementation of the agreements made at WRC03, and also spent some time looking forward to WRC 2007 (possibly 2008) and the key issues which would form the IARU agenda at that Conference. The EC also noted with pleasure the thinking that was developing in Region 1 on possible areas for further international harmonisation of the regulatory environment for amateur radio, some of which could lead to improved roaming facilities for some amateur licensees. The EC also considered and approved proposals to undertake a far-reaching review of the future direction of amateur radio, and the implications of changes in the environment (technical, economic, political etc) for its future direction. This will be a topic at the forthcoming General Conference.

The EC also considered how it could improve the way in which the work of IARU and the importance of the Amateur Radio Service is projected to both amateur and non-amateur audiences. IARU has a presence at a number of high profile public and governmental events and the EC agreed that work was needed to create a new set of tools to covey the key messages about IARU and amateur radio to its key audiences. Work was initiated on this.

The EC also noted with great concern the report from the RSGB concerning its discussions with the UK regulator, which suggested that the regulator was giving consideration to de-regulation of amateur licensing in the UK. The EC felt that any move in this direction could have the most profound and serious implications for the Amateur Service.

As is always the case, it is difficult to summarise in a few hundred words the content of a three-day meeting. The EC meets again briefly at the Region 1 Conference in September, but in the meantime the full minutes of the April meeting can be read by going to the Region 1 website and clicking on the relevant tab. ♦

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HF

A round-up of interesting HF happenings to take place in June, and band reports from members, compiled by Don Field, G3XTT

Above left: Paul, G3SXE, operating the BY1BZH club station, with 'Sunny', BD1SUN (left) and student Shi Yang.

Above right: Three ZD8s: Jim, ZD8Z (N6TJ); Glenn, ZD8A (K6NA); and Martin, ZD8ZA (G3ZAY), at the April Visalia DX meeting.

Band conditions continue to be fairly disappointing and activity seems to have dropped as a consequence. And if you were hoping to catch the Glorioso expedition in April you will just have to wait as this one has been postponed until later in the year. I did put the news up on my website, but it came too late to correct the May column. The postponement is at the request of the French military for "security reasons", but it is hoped that the expedition can be mounted sometime in October or November.

The Microlite Penguins DXpedition Team sent out a wrap-up press release following their FT5XO (Kerguelen Island) DXpedition. The operation lasted 11.5 days and netted almost 68,000 QSOs. The breakdown was as follows: CW 45,687 (68%), SSB 19,903 (29%), RTTY 2358 (3%) and EME 6. European contacts accounted for 53% of the total. By band, they made 1189 QSOs on 160m, 4535 on 80, 12,577 on 40, 10,299 on 30, 8979 on 20, 7809 on 17, 9207 on 15, 7910 on 12 and 5443 on 10. These are quite telling, showing how effective both 40 and 30m are at this stage of the sunspot cycle.

DX NEWS

An expedition to **Rockall** (IOTA EU-NEW) will leave the Orkney Islands (over 300 miles away) on 11 June arriving in the area of Rockall around 14 June and remaining there until 21 June. It will include an amateur radio team led by Dave, MM0ALM, assisted by Jim, MM0CWJ. They hope to put up a small tent on a tiny ledge a few metres square. An all band operation will be primarily on SSB as MS0IRC/P. QSL via G0HXN. Few people have ever landed on this isolated rock, which is beyond the range of normal rescue helicopters. More on the web page.

Sweden has some special prefixes for 17 May to 7 June to mark 100 years since Norway and Sweden separated. SM stations may sign SE prefixes, SA stations may sign SF prefixes, SK (club stations) may sign the SJ prefix, and SL (military ham stations) may sign the SG prefix.

YL740C, YL740M and YL740T are special calls active until 28 June to celebrate the 740th anniversary of the **Latvian** city of Jelgava (former Mitaw, the Capital of the Kurland Duchy in the 17th century).

I am pleased to report on behalf of the Five Star DXers Association that logs for 9M0C, D68C and 3B9C have now been posted to Logbook of The World (LoTW) and that all direct, bureau and e-requests received to date for 3B9C cards have been answered. Over 82,000 3B9C QSOs have now been confirmed.

Ian, G8WVW, operating as ZD8I (**Ascension Island**), has been issued with a 60m permit and is believed to be the first African station operational on this band. First contact was made with Joe, W1JR, on 22 April with the first UK station contacted being David, MM5DWW, on 27 April. Signals have so far proven to be very weak but moderately low noise levels and total lack of QRM has helped establish contacts from around 2200 onwards. QSL Manager is G4LTI.

TT8M and TT8AMO (see last month) have had their tour of duty in **Chad** extended and now expect to be there until August.

It appears that the ITU has allocated the callsign block E5A-E5Z to New Zealand for use in the **Cook Islands**. However, at the time of writing Cook Islands stations are still using the ZK1 prefix. A quirk of the decision, from a DXCC point of view, is that Palmerston Island will move from the DXCC entity of South Cooks to North Cooks.

Bob, K7LAY, and his son Harry, K7LAZ, will be active as VP5/homecall from the **Caicos Islands** (NA-002) from 12 to 24 June. They plan to operate mainly CW on 10 - 160m. QSL via their home calls.

Johan, ON4IQ, is planning three expeditions for 2005. First, he will join K5AND and W7XU starting at the end of June for two weeks in **Grenada**, J3. In late September, Johan will join ON4QX in an operation from FS, **Saint Martin**. The third weekend in September they will move to PJ7, **Sint Maarten**, the Dutch side of the island.

Finally, the *CQ* WPX CW Contest takes place at the end of May. A number of expeditions have already been notified including D4B, P40A, V25O, VP9/N0JK, VQ5EA (=VP5), WP3C and YI9VCQ. In addition, your scribe will be in Ghana for the contest, hopefully signing 9G5DF.

CORRESPONDENCE AND TABLES

Peter, G3JFS, reports that the WPX SSB contest helped him to add to his SSB totals while he was pleased to catch FT5XO on 40, 30 and 10 CW, 30 RTTY and 40 SSB. He was also delighted to catch Mike, VK6HD, on 80 CW. David, M0CNP, also benefited from the WPX contest, mentioning C38CL, HS0/IK4MRH, OX3RZ and 8P9A on 20; ZD8Z, ST2T, BP0A, J7A, and D4B on 15; and OD5WPX on 10. Cris, GM4FAM, singles out what he describes as the "great operation from FT5XO!" which he worked on five bands. TZ6U (20 and 30 CW) was an all-time new one for him, and he provides a long list of other DX worked on most bands and modes, more than I can list here, but examples include 5V7BR, FT5XO, ZD8Z (12 CW), 4S7EA, 8Q7DV, 8R1RPN, 9M2TK, BX3AC, C56M, FT5XO, TT8AMO, XW3DT, YI9CVQ, ZD8Z (15 CW), 8Q7DV, 8R1RPN, 9G5SP, 9V1CW, A52JO, A6/ON5NT, C56M, FT5XO, HZ1EX, RU3HD/ANT, S9SS, TS3A (=3V)

COUNTRIES WORKED, 2005
(starting 1/1/05, sorted this month by Datamodes totals)

CALL	CW	SSB	DATA	MIXED
G3JFS	132	105	125	170
GU0SUP	0	0	87	87
MM0BQI	31	40	73	95
G4OBK	119	12	68	138
M0CNP	7	42	68	84
G4WFQ	163	40	60	181
G3LHJ	109	52	60	129
G6CSY	0	37	55	59
GM8OEG	45	8	36	56
M0BKV	61	97	24	121
MM3AWD	65	85	18	93
G3TBK	149	24	10	152
G4DDL	56	33	1	62
G4PTJ	125	119	0	203
GM4FAM	144	69	0	169
G0KBL	159	0	0	159
G4KFT	145	0	0	145
GM0EGI	86	83	0	136
MU0FAL	111	78	0	125
G3YMC (QRP)	118	0	0	118
G0RTN	111	18	0	114
GM0TGE	54	98	0	110
G4WXZ	60	64	0	101
G3HQT	92	0	0	92
G1UGH	0	88	0	88
G4NXG/M	0	83	0	83
M5GUS	0	82	0	82
G4FVK	24	73	0	80
M0BVE	79	0	0	79
G0LGJ/M	0	65	0	65
G4RQI	59	0	0	59
G7CLY	0	34	0	34
G1VDP				57

9 BAND TABLE No 54

MIXED MODE

CALL	1.8	3.5	7	10	14	18	21	24	28	TOTAL
G3KMA	259	303	329	325	334	330	335	324	332	2871
G4BWP	254	306	333	323	335	329	335	317	326	2858
G3XTT	240	283	320	292	334	321	333	304	314	2741
GW3JXN	201	268	303	297	329	322	324	300	305	2649
G3SED	244	275	302	296	320	301	307	281	291	2617
G3GIQ	153	249	305	271	334	322	333	310	328	2605
G4OBK	199	239	292	300	330	313	320	307	303	2603
G3TXF	145	249	307	306	329	309	327	290	306	2568
G3TBK	151	248	291	285	333	313	324	297	299	2541
G3SNN	188	246	295	254	333	304	326	286	305	2537
G3LAS	123	218	273	282	323	311	320	303	303	2456
G3YVH	149	184	271	295	326	316	318	282	287	2428
G0JHC	64	162	255	291	291	310	319	300	309	2301
G4PTJ	53	204	264	229	327	284	324	276	305	2266
GM3PPE	148	211	257	280	320	271	282	248	229	2246
G3AKU	116	175	247	258	303	271	278	268	276	2192
G5LP	76	234	287	237	312	254	286	196	257	2139
G3VKW	50	176	244	154	329	253	325	266	310	2107
G4WFQ	55	179	238	224	265	230	240	186	204	1821
G4OWT	64	132	217	131	315	177	303	135	274	1748
G4BGW	29	95	207	190	238	215	239	177	223	1613
G4NXG/M	29	62	150	0	298	241	293	204	255	1532
G0PSE	52	74	149	147	222	146	187	160	191	1328
GM4FAM	48	87	125	150	200	177	193	172	158	1310
MU0FAL	26	32	164	162	167	109	210	154	167	1191
G0LRX	11	107	128	0	242	73	262	86	237	1146
G4FVK	44	82	115	66	193	109	198	87	177	1071
2E1RDX	41	51	102	38	189	117	200	129	87	954
M0CNP	11	59	92	16	173	110	163	80	125	829
M3CVN	16	55	94	0	129	63	103	41	0	501
M5AEF	0	22	13	7	69	92	72	30	34	339
AVERAGE	**104**	**170**	**225**	**197**	**276**	**235**	**270**	**219**	**242**	**1939**

CW ONLY

G3KMA	253	284	326	325	334	325	332	312	322	2813
G4BWP	234	242	311	322	313	311	314	288	270	2605
G3XTT	231	260	308	292	314	306	311	286	290	2598
G3TXF	145	246	305	306	324	307	322	289	298	2542
GW3JXN	198	251	290	297	316	308	313	280	280	2533
G4OBK	191	224	284	299	315	304	300	290	287	2494
GM3POI	225	255	300	291	314	282	293	253	264	2477
G3SED	243	262	297	296	293	275	279	241	234	2420
G3YVH	148	184	265	295	317	302	301	266	272	2350
G3SXW	99	211	268	277	319	292	304	265	287	2322
G3LAS	122	163	254	282	287	292	292	268	269	2229
G3AKU	116	175	247	258	294	263	268	253	259	2133
G5LP	76	230	286	237	302	254	277	195	250	2107
G3NOH	52	124	213	265	304	292	301	260	272	2083
G4PTJ	51	158	243	229	289	267	295	260	269	2061
G0EHO	16	159	210	212	284	229	279	225	245	1859
G3VKW	44	120	200	153	256	202	280	213	223	1691
G4WFQ	53	175	232	222	211	198	187	154	133	1565
G4BGW	29	94	200	190	189	205	213	167	196	1483
G4OWT	58	126	195	130	255	127	245	108	223	1467
G0PSE	52	74	148	147	213	145	181	157	184	1301
GM4FAM	48	87	123	150	190	164	182	166	145	1255
MU0FAL	26	21	161	162	147	103	190	131	120	1061
AVERAGE	**118**	**179**	**246**	**245**	**277**	**250**	**272**	**232**	**243**	**2063**

NEXT DEADLINE 8 July 2005. PREPARED BY G3GIQ henry@topdx.com

(17 CW), 5T5AFF, 5Z4DZ, 8Q7DV, 9J80IARU, 9K2MU, 9N7JO, FT5XO, VI5PN (OC-220) and XW3DT (30 CW).

Mike, G4DDL, makes a welcome return, his recent e-mails apparently having gone astray. Despite some holiday trips and orienteering weekends his low power activities have netted some useful totals, though Mike comments that he really needs to get some LF antennas organised. Alan, G4NXG/M, managed FT5XO on 12m, but most of his DX this year has come from the *CQ* WPX SSB contest, during which he worked 74 DXCC entities. David, G4FVK, also added some new ones during the contest (D4 and 3V on 80, plus D4 and TI on 40) but regrets the fact that operation below 7040kHz seemed to bring out deliberate QRM, apparently from CW operators upset that SSB was encroaching on 'their' part of the band. It is always unfortunate when this happens. 40m is our narrowest band and while I don't condone infringing the bandplans (albeit they are voluntary in most countries) a modicum of flexibility seems sensible at busy times. The amazing thing is how the bandplans are actually followed closely for most of the time, which says a lot for amateur discipline. The good news is that more and more countries are gaining access to the 7100 - 7200kHz band segment, which will ease the congestion; it was great to hear UK and other European stations working the US co-channel during the WPX contest.

Owen, G0PHY, reports, "The FT5XO operation was a non-event at this QTH. I only heard them very briefly once." Owen is curious as to what antennas were used by other contributors. Well, I've already mentioned that Alan, G4NXG, worked them from his car, and Cris, GM4FAM, reports that his 40m QSO was with a temporary wire thrown across the roof, but it may well have been a case of being in the right place at the right time. In the WPX contest Owen worked ZD8Z, 9G5OO, 8P9AM, ST2T, D4B, PJ4Y and 8R1K (a new one) on 15, plus P40A, 9Y4W, VP9I (a new one) and 8Q7DV on 20. Stan, G0KBL, says "The DX magic for me was provided this time by FT5XO coming briefly out of the noise on 80m one afternoon in late March, easily workable from SW London with a modest wire aerial." Phil, GU0SUP, reports RTTY QSOs with HZ1IK on 12 and 17, already confirmed via LoTW. Derrick, G3LHJ, says he keeps missing the deadline, but got it right this time. He comments that 30m has been one of his best bands, with FT5XO, KL7J, ZL7/AI5P, 4S7NE and others.

Peter, G3HQT, joins the fray for the first time although he was licensed back in 1951. He is using 100 watts (TS-930S) to a 20ft helically-wound vertical which is self-resonant on 80m but can be tuned for the higher bands with an SG-230 ATU. This brought him contacts with FT5XO on 40 and 30, as well as TT8M, PJ5NA, BV4CT, VR2UW on 40; C56M, 4S7NE, YB0/HA2VR, 9M2FB, KL7J on 30, and 5Z4DZ on 17. David, G4RQI, has been using an inverted-L on 40m (20ft up, 14ft out in a 35 x 15ft back yard) and has been pleasantly surprised at how much difference it made recently when he improved the radial system. A lesson for all of us, perhaps. His best moment was when a KH6 (Hawaii) came back to a CQ call. His other recent DX on 40 includes FM/DF5WA, JA6GCE, KL7J, P43E, PJ4/OM1ATT, V31JP, VP9BO and plenty of W, VK and ZL stations. All this with 100 watts.

Mark, G0LGJ/M, now has 194 all-time from his car, which is quite an achievement. Recent DX (all SSB) includes C39DR on 40, WH8/F6EXV, HS1OVH, VU2PAI on 20; 3V8SF, YB0/HA2VR, 8Q7NB on 17, and ZD8Z on 15. Many folk would be happy to work those from their home station!

Damian, M0BKV, wasn't around to chase FT5XO until quite late in the operation and had something of a struggle but appears to have made it on 20, 15 and 30 (all CW). Other recent DX includes 5U7JB, JT1BV, (20 SSB); 5Z4DZ and 9G5OO (15 SSB). John, EA5ARC / G3OLU, writes that his Spanish call was granted in February and so far he has amassed 94 countries CW and 43 on SSB. Graeme, G6CSY, has been working some new ones on RTTY in the EA and SP RTTY contests. Contacts included CX7BF, LO2F, PS7KC, LU4DX, KP4JRS, ZC4LI (15m); TA1FA, NL7V, EA9IB, 8P2K (20) and ZC4LI (40). George, G4PTJ, returns to the tables after a couple of years'

QTH Corner

600CW:	Silvano Borsa, I2YSB, PO Box 45, 27036 Mortara (PV), Italy or via the bureau to M5AAV.
9G5SP:	Siegfried Presch, DL7DF, Wilhelmsmuehlenweg 123, Berlin, Germany 12621.
A52JO:	Stig Lindblom, 9N7JO, Regional Telecoms Officer, UNICEF Regional Office for South Asia (ROSA), PO Box 5815, Lekhnath Marg, Kathmandu, Nepal.
DL7CM:	Hans-Rainer Uebel, Hartmannsdorfer Chaussee 3, 15528 Spreenhagen, Germany.
DM2AYO:	Siegfried Blechschmidt, Brassenpfad 66, 12557 Berlin, Germany.
J20FH:	Yves-Michel Collet, F5PRU, 7 rue du Moulin, F57100 Thionville, France.
ZK1APX:	Richard H Harris, AI5P, 200 South Bradley, El Dorado, AR 71730, USA.
ZL7/AI5P:	As ZK1APX.

absence. He notes that his totals are well down compared with the same stage in 2002, probably due, he comments to declining sunspots, fewer DXpeditions and maybe less effort on his part!

Terry, G1UGH, reports (all SSB) OX3KQ, HS0/IK4MRH, HZ1IK on 20; CO8LY, EP4HR, YI9/KC4XX, V25OP on 17; 9G5OO, 5U7JB, ZD8Z, YB1HDF on 15 and 5Z4DZ on 12. Scott, MM3AWD, says he managed to put lots of new ones in the log, but the ones that stand out include V31LZ and CO8LY on 20 CW, plus 9G5OO, P29LR and ST2T on 15 SSB. He has also found that 40m has been good to Asia for the past month.

Dave, G3TBK, writes that his last trip to J8, which ended up being six weeks in all, netted 10,500 QSOs, of which 6400 were in the two legs of the ARRL contest. His elderly SB200 linear failed early on, so most contacts were made at the 100 watt level. Nevertheless, Dave managed to work some UK stations on 160m, and was also active on SSTV and RTTY. He will be back in the Caribbean by the time this appears, but shuttling between islands, so was not planning to be active on the bands.

Paul, G3SXE, writes that on a recent visit to China he found it quite easy to get a "certificate to operate" which allowed him to operate any club station. Unfortunately the main CRSA (equivalent of RSGB) club station was out of commission. Eventually he tracked down what appeared to be the only club station operational in Beijing, at the No.8 High School, and run by Sun 'Sunny' Ya Qin, BD1SUN, head of the electronics department. Paul was made very welcome and was able to operate the BY1BZH station, at the same time having to explain to the students about amateur radio in the UK. Unfortunately propagation did not favour any G contacts, but obviously a great experience!

Joe, W1JR, dropped me a line to say that his totals are way behind the same time last year, with 238 worked to date. He reports that the FT5XO and 6O0CW operations were tough from the US East Coast on 160m.

Jim, MM0BQI, says he hopes band conditions will improve for his trip to the Treshnish Isles from 3 to 6 June. He will be active 80 - 10m all modes and the camp will be on Lunga Island EU-108, IOSA NH17, callsign MM0BQI/P. Check his web page for further details.

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 **August** issue by **25 June**. ♦

WEB SEARCH

MM0BQI	www.qsl.net/mm0bqi/eu108.htm
Rockall	www.rockallisland.co.uk/

HF F-Layer, Propagation Predictions for June 2005

Compiled by - Gwyn Williams, G4FKH

	3.5MHz	7.0MHz	10.1MHz	14.0MHz	18.1MHz	21.0MHz	24.9MHz	28.0MHz
Time	000011111220	000011111220	000011111220	000011111220	000011111220	000011111220	000011111220	000011111220
(UTC)	246802468020	246802468020	246802468020	246802468020	246802468020	246802468020	246802468020	246802468020
*** EUROPE								
Moscow	1.....66	73.....2577	65.....5667	.165442566 5.	.....6..			
*** ASIA								
Yakutsk			21.....12332	355554456665	...22111....			
Tokyo			.....1...	.....111..	.....11....			
Singapore		.....231.	.....22.1	.....11...	.....1....			
Hyderabad		233	4666	35554	..3223263...	..1111.2....		
Tel Aviv	6.....566	76.....5787	.531..147876	..321113773.	...1..1....			
*** OCEANIA								
Wellington								
Well (NZ) (LP)		15.....1.	461.....164	22.....55	11			
Perth		.....1.1	.....1.1					
Sydney		.....12..	.....12..		.....2.			
Melbourne (LP)			..1.....		1			
Honolulu				..111.....	....1.....			
Honolulu (LP)					.....1...			
W. Samoa				...111.....	....1.....			
*** AFRICA								
Mauritius		1221	.....221.	.....1...				
Johannesburg	45.....155	46.....6776	7211	..1....34...	..11..12....	...1..11....	...32223....	
Ibadan	2.....11	65.....456	774.....5787	..74..147874	..883234885.	...8....67..		
Nairobi		3.....333	11.....1444	.3.....14551	..32112456..	..13223561..	...1.1114...	.....1...
Canary Isles	65.....166	775.....1677	7731...14667	2.61...46677	...76465777.	...3....58..	.....2..	
*** S. AMERICA								
Buenos Aires	22.....	773.....27	431.....46	11.....153	1674	.....165.	.....4..	
Rio de Janeiro		43.....25	21.....155	342	....1..12875	....1.11275.	.....26..	.....3..
Lima		321.....2	211.....13	21	263	.....1..124.	.....1..	
Caracas		22.....2	332.....13	..2.....33	.....113.	.....21.		
*** N. AMERICA								
Guatemala		221.....	111.....1	1				
New Orleans		21.....	221.....1	2	.....11146.	.....2.		
Washington	1.....	541.....1	7651.....14	2...111112 56	1111162	.....2.		
Quebec	4.....	761.....5	521.....13	1....1..1245	.....37.			
Anchorage				11111	.....2.			
Vancouver					.....11.			
San Francisco								
San Fran (LP)								

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 April 2005 issued by the Sunspot Data Centre, Brussels, was 24.4. The daily maximum / minimum numbers were 37 on 30 April, and 9 on 24 April respectively. The predicted smoothed sunspot numbers for June, July and august are respectively: (SIDC classical method - Waldmeier's standard) 23, 22, 20 (combined method) 29, 28, 27. 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.

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Contest

Although sport purists would probably disagree, amateur radio contesting can be considered to be a sport, in the same way that motor racing, snooker, darts and even bridge are sports. Tim Kirby discusses 'sprinting for beginners', without even breaking into a sweat!

Hilton, MW0OPS, wrote saying how he'd enjoyed the EU CW Spring Sprint and how it made a good contest for beginners. Indeed it does. For the older hands, it takes considerable effort not to send an RST report, as that's not required (I always found ARRL's Sweepstakes difficult for the same reason!) But the exchange format (serial number and first name) is fun and Hilton noted that the requirement to QSY after each contact, if you are calling CQ, means that it's easier for smaller stations to get involved. It's very pleasing to see more and more UK stations taking part in this event.

WORLD WIDE YOUNG CONTESTERS

It's been good to chart the rise of a successful new contest club over the last few years. First formed in 1999 between a few teenage radio friends, the World Wide Young Contesters club is increasingly a force to be reckoned with. There are currently nearly 600 members of the club.

What's young? Well, anyone under 30 is welcomed as an active participant, though older contesters may join the mailing list and contribute to the club's activities. Club members have interest in both HF and VHF contesting, so it's not a club dominated solely by HF activities. The membership list shows a healthy number of familiar UK calls. You can find WWYC on the web at www.wwyc.net and the newsletters available there have some very interesting articles. Have a look at the website and get involved.

CONTESTS THIS MONTH

National Field Day, NFD, is the highlight of the month for HF CW operators. There's a place for experienced and budding operators alike. If you're new to CW contest operating go along and join your local club team, I'm sure you'll learn plenty and have a great time into the bargain - it's on 4 / 5 June. The All Asian DX CW event takes place on 18 / 19 June. Remember the exchange is your age - unless you're a YL, when you don't have to say! ARRL's Field Day takes place on 25 / 26 June and contacts outside the US are welcomed. The same weekend it's the SSB leg of the 'His Majesty The King of Spain Contest'.

VHF operators have a busy time too. On 12 June there's the 2nd 144MHz Backpackers Contest, co-ordinated with the ever-popular *Practical Wireless* 144MHz QRP event. On 18 / 19 June there's the 50MHz Trophy Contest and with any luck, there will be plenty of Sporadic E propagation around that weekend. The 1st 50MHz Backpackers event takes place on the 19th. ♦

RSGB HF Contests Committee Chairman Justin Snow operating as G4TSH/P from G4GSC in the 2005 80m AFS SSB contest.

Contest calendar

HF Contests

Date	Time	Contest	Mode	Bands	Exchange
4/5 Jun	1500-1500	RSGB National Field Day	CW	1.8-28	RST+SN
6 Jun	2000-2130	RSGB 80m Club Championship	DATA	3.5	RST+SN
11 Jun	0000-2359	Portugal Day	SSB	3.5-28	RS+SN
11/12 Jun	0000-2359	ANARTS WW RTTY	DATA	3.5-28	RST+UTC+ CQ Zone (eg 14)
15 Jun	2000-2130	RSGB 80m Club Championship	CW	3.5	RST+SN
18/19 Jun	0000-2359	All Asian	CW	1.8-28	RST+Op's Age
23 Jun	2000-2130	RSGB 80m Club Championship	SSB	3.5	RS+SN
25/26 Jun	1800-2100	ARRL Field Day	ALL	ALL (exc WARC)	See ARRL Web
25/26 Jun	1800-1800	His Majesty The King of Spain	SSB	1.8-28	RS+SN

VHF Contests

Date	Time	Contest	Mode	Bands	Exchange
7 Jun	2000-2230*	RSGB 144MHz Activity & Club Championship	ALL	144	RST+SN+Locator
12 Jun	0900-1600	PW 144MHz QRP	ALL	144	RST+SN+Locator
12 Jun	0900-1300	RSGB 144MHz Backpackers	ALL	144	RST+SN+Locator
14 Jun	2000-2230*	RSGB 432MHz activity	ALL	432	RST+SN+Locator
18/19 Jun	1400-1400	RSGB 50MHz Trophy	ALL	50	RST+SN+Locator
19 Jun	1100-1500	RSGB 50MHz Backpackers	ALL	50	RST+SN+Locator
21 Jun	2000-2230*	RSGB 1.3GHz/ 2.3GHz activity	ALL	1.3G /2.3G	RST+SN+Locator
28 Jun	2000-2230*	RSGB 50MHz activity	ALL	50	RST+SN+Locator

* = Local time

2nd 1.8MHz CONTEST, 2004

Sixty-eight logs and two checklogs were received for the second topband contest 2004, which was one more than the entry from 2003. All but two of them arrived by e-mail. Overseas stations are again reminded that they should work UK stations only. The DXCC country list is used for Bonus claims so only one American bonus can be claimed even if you worked more call areas.

Congratulations to Frank Claytonsmith, GM3JKS, winner of the Victor Desmond Trophy for leading UK station, just ahead of John Linford, G3WGV. Winner of the Maitland trophy for best Scottish entrant over the two contests in 2004 is myself, GM4SID, the only GM station to enter both contests! The Overseas Section was won by Dennis Andrews, F5VHY, ex-G3MXJ.

Congratulations to the winners and thank you all for taking part, I hope you enjoyed the contest.

Sid Will, GM4SID

UK Stations

Pos	Callsign	QSOs	Bonus	Points
1	GM3JKS	194	83	985
2	G3WGV	194	74	949
3	G4TSH/P	193	78	946
4	G3SQX	184	76	929
5	G4OBK	185	75	927
6	GU4YOX	184	74	894
7	G4RCG	179	70	879
8	G3XTT	165	72	843
9	G3GLL	170	70	841
10	G3KLH	165	70	836
11	GW3NJW	146	68	764
12	G4ERP	158	62	755
13	G3VYI	148	65	741
14	G4CWH	148	62	734
15	M0AJT*	135	62	715
16	G3OLB	125	67	702
17=	G3RSD*	124	59	667
17=	GM4SID	127	59	667
19	G3KNU	125	58	650
20	G0VQR	119	57	631
21	G4EBK	117	59	621
22	G3YEC	113	56	603
23	G3PSM	110	56	598
24	G4FAL	108	59	594
25	G3JJG	103	56	580
26	G4FNL	97	52	548
27	G3SWC	97	52	526
28	G3LIK	84	46	465
29	G3ZGC*	79	45	462
30	G3IZD	75	48	457
31	G0DCK	73	44	425
32	G3YAJ	70	44	405
33	G0ADH	70	42	395
34	G3GMS	54	37	344
35	G3BFP	45	34	289
36	G3ZRJ	37	29	240
37	GJ4CBQ	37	29	237
38	G4SLE	37	29	205
39	G3NKS*	25	18	165

Overseas Section

Pos	Callsign	QSOs	Bonus	Points
1	F5VHY	71	49	447
2	YL2PQ	68	46	430
3	S57DX	61	42	385
4	LY3BA	59	42	384
5	PA0MIR*	44	31	287
6	DK3UZ*	42	29	271
7	OZ4O	38	28	251
8	PA0BWL	36	27	232
9	RY9C	34	27	223
10	SP3KWA*	32	23	211
11	EI7GY*	28	19	179
12	SP2EXN	37	27	178
13	UT1FA	25	20	167
14	EV6M	26	20	162
15	SM6IQD	23	18	156
16	SP7FGA	25	18	154
17	RV9SV	25	20	151
18	SN5J	24	17	143
19	RV1CC	21	17	140
20	OK2PBM	20	15	127
21	NN1N	20	14	116
22	RZ3VA*	15	13	110
23	DJ3GE*	13	13	104
24=	LA7SI	14	11	97
24=	UA6BAE	15	12	97
26	DL1LAW*	12	10	86
27	PA1W	10	8	62
28	UR7EQ	8	8	56
29	PA0FAW	7	6	43

* = Error-free log. Checklogs from OY1CT, LY3UM.

21/28 MHz CW, 2004

Chris, G3SJJ, was a clear winner in the UK Open section this year, with John, G4RCG, following. Open and Restricted section QSO totals were remarkably similar, the usual run of DX stations available to only the Open section guys mostly absent this time around. A mixture of perseverance and understanding of the nature of high band propagation was the key to success. For example, several entrants were pleased to work a Seychelles station on 28MHz, who appeared to be at that time the only person on the band! P3J was able to make QSOs on 28MHz for most of the contest, but was still elusive to many. Well done to all who battled on, and were rewarded with those vital extra few QSOs and multipliers to climb to the top of the tables.

In the Overseas Open section, I commiserate with Alexander, RA3XO, who found the highest number of UK stations on 21MHz, but didn't find any 10m propagation. This left Alan, 5B4AHJ, operating as P3J, to take the victory. RA3XO thought the contest sounded just like it was in the 1970s: there were plenty of G3s and G4s in evidence, but very little from G0 or M0 stations. What can we do to improve this? Mention must be made of yet another win by Rumen, LZ2RS, operating QRP, who made a score better than 90% of the Open and Restricted guys.

Looking at last year's results as a comparison, there were both more entries, and more UK stations active in the 2004 event, despite the 28 MHz propagation being decidedly worse. So the overall scores are reduced, but the average number of QSOs made on 21MHz are higher. There were many comments made about the propagation, and also about clash with the all-band all-mode WAG contest which attracts more support. The HFCC is considering the future of this contest and the feedback is useful and welcome.

Lee Volante, G0MTN

UK Open Section

Pos	Callsign	21Q	21M	28Q	28M	Score
1 *	G3SJJ	152	49	7	6	26,235
2 *	G4RCG	108	37	2	2	12,870
3 *	GM4SID	82	33	1	1	8,466
4	M0AJT	75	31	1	1	7,296
5	G3KNU	54	27	0	0	4,374
6	G4HZV	50	18	4	3	3,402
7	G4FAL	50	19	2	2	3,276
8 (M)	G3JRM	39	20	0	0	2,340
9	G4BJM	34	15	2	2	1,836
10	G0ADH	27	7	1	1	672

UK Restricted Section

Pos	Callsign	21Q	21M	28Q	28M	Score
1 *	G4ERW	100	32	5	5	11,655
2 *	GM3CFS	85	29	1	1	7,740
3 * (M)	G0TSM	71	26	5	4	6,840
4	G3RSD	65	27	1	1	5,544
5	G4EBK	58	21	1	1	3,894
6	MU0FAL	56	23	0	0	3,864
7 (M)	M0CYB/P	52	20	3	2	3,630
8	G3LIK	52	19	0	0	2,964
9	G3YEC	46	18	2	1	2,736
10	G3VYI	41	18	2	2	2,580
11	G3ZRJ	43	16	0	0	2,064
12	G3BFP	22	12	1	1	897
13	G4DDX	24	9	0	0	648
14	G3KKQ	16	9	1	1	510
15	GW4HBK	17	8	0	0	408
16	G0RDO	16	8	0	0	384
17	G3VQO	14	7	0	0	294
18	G3WRR	10	7	0	0	210
19	G0MTN	12	5	0	0	180
20	G4XPE	13	3	0	0	117
21	M0CMQ	7	3	0	0	63
22	GW3SB	5	4	0	0	60

UK QRP Section

Pos	Callsign	21Q	21M	28Q	28M	Score
1 *	GM4HQF	14	7	0	0	294
2 *	G4DBW	19	3	0	0	171
3	G4FDC	9	6	0	0	162
4	G3HKO	5	4	0	0	60

Overseas Open Section

Pos	Callsign	21Q	21M	28Q	28M	Score
1 *	P3J	73	46	42	28	25,530
2 *	RA3XO	96	57	0	0	16,416
3 *	LZ1NG	85	54	0	0	13,770
4	UT7LA	70	45	0	0	9,450
5	US9QA	63	40	0	0	7,560
6	W1RM	57	36	5	4	7,440
7	K3ZO	40	31	0	0	3,720
8	EX2X	34	26	0	0	2,652
9	VE2AWR	32	26	0	0	2,496
10	UU7JN	31	24	0	0	2,232
11	JF3BFS	21	18	0	0	1,134
12	W4/G4BUE	20	15	0	0	900
13	VK8AV	17	13	0	0	663
14	EW6DO	16	13	0	0	624

Overseas Restricted Section

Pos	Callsign	21Q	21M	28Q	28M	Score
1 *	RA3UT	71	44	0	0	9,372
2 *	EA8BIE	39	30	15	11	6,642
3 *	UA3QG	54	40	0	0	6,480
4	UY5TE	52	37	0	0	5,772
5	UX5TQ	50	38	0	0	5,700
6	RW3AI	42	34	0	0	4,284
7	UA3DOM	37	28	0	0	3,108
8	LZ1EP	33	26	0	0	2,574
9	UA6ADC	32	24	0	0	2,304
10	RZ3DIM	25	19	0	0	1,425
11	WB2AA	23	18	0	0	1,242
12	W1END	19	18	0	0	1,026
13	RA3XEV	21	16	0	0	1,008
14	RW6AH	17	13	0	0	663
15	YU1EQ	15	14	0	0	630
16	RV3MI	14	10	0	0	420
17	UN7EX	13	10	0	0	390
18	UK/JI2MED	12	9	0	0	324
19	VE3WG	9	9	0	0	243
20	RA4FJV	6	4	0	0	72

Overseas QRP Section

Pos	Callsign	21Q	21M	28Q	28M	Score
1 *	LZ2RS	82	54	0	0	13,284
2 *	YO4AAC	30	24	0	0	2,160
3	RV3DBK	23	18	0	0	1,242
4	LZ1IQ	22	18	0	0	1,188
5	UA3VFI	19	14	0	0	798

Overseas SWL Section

Pos	Callsign	21Q	21M	28Q	28M	Score
1 *	RA3-847	19	15	0	0	855

* = award winner. (M) =Multi-operator station.
RW4FX is thanked for his useful checklog.

21/28 MHz SSB, 2004

From a high during the 2003 Contest, conditions plumbed the depths for the 2004 Contest. This was reflected in the numbers taking part, down 16 from the previous year. Most stations complained about the poor conditions, especially on 28MHz, and many logs showed not a single QSO made on that band. It seems almost bizarre to award the Powditch Transmitting Trophy to a station that made only 11 QSOs on 28MHz.

In 2004 there were 14 logs in the UK Open, 26 in the UK Restricted and 7 in the UK QRP. There was a total of 43 logs received from overseas stations, most of whom only made a handful of QSOs. The UK Open Section Single Operator winner is M0BBB who receives both the Whitworth and Powditch Transmitting Trophies.

The UK Open Section Multi-Operator Section winner is GD0EMG operated by G3NKC and G4XUM. Dave and Martin used an 8-element on 10m and a 5-element on 15m to make 65 and 481 QSOs respectively. Some people say the GD prefix is worth an 'S' point: give me the aluminium any day!

The UK QRP section was hotly contested between relative newcomers M3TBK and M3CVN both making 100 QSOs on 15m but Edward edged it on multipliers.

The Overseas Open Section winner is SV2AEL, the Restricted Section Winner is UR5MNZ and the QRP Section winner UA3QJJ.

No logs were received from UK Short Wave Listeners and just two from Overseas Listeners. It was decided that no receiving awards would be made.

Those taking part in the Contest next year are asked to include in their Cabrillo file details of their transmitted power and antenna system as this determines which section of the Contest they are entering.

Tom Wylie, GM4FDM

UK Open

Pos	Callsign	21Q	21M	28Q	28M	Score
1	GD0EMG Op: G3NKC, G4XUM	479	104	64	33	223173
3	M0BBB	272	60	12	9	58788
2	G4IRC/P Op: G4BAV, G0DVJ, G0TCP, G8LBS	278	50	4	4	45684
4	G3MGW	233	52	3	3	36764
5	G5XV/P Op: M3ZGC, M3KIE, 2E0LRC, 2E0SEL, 2E0BJM, 2E0ZYQ, G1SSL, G7PVX	158	37	0	0	17538
6	GW4CC Op: GW4HSH	106	38	4	3	13530
7	G4IUF	115	36	0	0	12204
8	GW4BLE	115	31	0	0	10695
9	G3YBY	106	30	2	2	10368
10	G0FHT	103	31	0	0	9579
11	G3JRM Op: G4CKH, G4RLS, M1TES	81	29	0	0	6960
12	G3VYI	24	9	0	0	648
13	M0LET	21	10	0	0	630
14	G2BKZ	0	0	11	8	264

UK Restricted

Pos	Callsign	21Q	21M	28Q	28M	Score
1	M5ARC/P Op: M0CKE, M0CHK	144	47	9	6	24327
2	G0TSM	87	31	5	4	9660
3	M0DDT	56	24	7	7	5859
4	M0GJH	50	21	3	3	3816
5	G4ZVB	54	22	0	0	3564
6	G3ZRJ	49	22	1	1	3450
7	G0WXJ	44	15	4	3	2592
8	G4DBW	37	18	3	3	2520
9	M5ACR/P	37	13	7	6	2508
10	G4NXG/M	43	16	2	2	2430
11	G6HOU	33	17	0	0	1683
12	M0CNP	32	15	1	1	1584
13	G4TMI	31	12	4	3	1575
14	G3RSD	29	14	0	0	1218
15	G3RSD	29	14	0	0	1218
16	G4DDX	28	11	0	0	924
17	G3NXT	22	9	2	2	814
18	M0SGB	23	10	1	1	792
19	G0TLA	24	9	1	1	750
20	G0MTN	18	9	1	1	570
21	G4XPE	15	9	0	0	405
22	MU0FAL	14	9	0	0	378
23	M1VHF	12	7	0	0	252
24	M0WTD	12	5	0	0	180
25	G6CSY	7	3	0	0	63
26	MM0BQI	5	4	0	0	60

UK QRP

Pos	Callsign	21Q	21M	28Q	28M	Score
1	M3TBK	100	49	0	0	14700
2	M3CVN/P	100	38	0	0	11400
3	G3XWH	39	18	0	0	2106
4	GM4HQF	21	9	0	0	567
5	M0DHP	20	9	0	0	540
6	M1HOG	17	9	0	0	459
7	2E1GUA	15	7	0	0	315

Overseas Open

Pos	Callsign	21Q	21M	28Q	28M	Score
1	SV2AEL	230	88	0	0	60544
2	LZ9V	226	87	0	0	58725
3	N4UH	151	77	0	0	34881
4	K3ZO	147	72	0	0	31752
5	UA6ADC	131	71	0	0	27903
6	UA4NCI	100	56	0	0	16800
7	LZ9R (LZ3YY)	66	46	0	0	9108
8	EX2X	58	40	1	1	7257
9	PT2ND	30	29	1	1	2883
10	A45WG	30	24	0	0	2160
11	JA5GPJ	23	20	0	0	1380
12	YO6BHN	23	19	0	0	1311
13	JG1IGX	18	17	0	0	918
14	RA3UT	15	15	0	0	675
15	JA3LEZ	15	15	0	0	675
16	JE2OTM	14	14	0	0	588
17	VE3VHB	12	11	0	0	396
18	SM6IQD	3	3	0	0	27
19	OZ4O	3	3	0	0	27

Overseas Restricted

Pos	Callsign	21Q	21M	28Q	28M	Score
1	UR5MNZ	90	57	0	0	15390
2	RW3AI	88	54	0	0	14256
3	UW5U	67	44	0	0	8844
4	UY5TE	42	33	0	0	4158
5	RZ9OW	39	32	0	0	3744
6	YO3CZW	44	26	0	0	3042
7	RA6AAW	26	24	0	0	1872
8	RW4FX	26	22	0	0	1716
9	RA9MX	26	20	0	0	1560
10	LZ35ZF	18	16	0	0	864
11	LZ1EP	18	16	0	0	864
12	UA0APP	15	15	0	0	675
13	UA9FGJ	15	14	0	0	630
14	UT5MB	14	14	0	0	588
15	9A5KV	37	30	0	0	330
16	KV2M	6	6	0	0	108
17	EA7HE	5	5	0	0	75
18	JA9SCB	4	4	0	0	48
19	JA1XPU	3	3	0	0	27
20	SP5MXZ	3	3	0	0	27
21	VA3IX	3	3	0	0	27

Overseas QRP

Pos	Callsign	21Q	21M	28Q	28M	Score
1	UA3QJJ	120	69	0	0	21240
2	PY2XC	0	0	25	19	1425
3	YO4AAC	19	18	0	0	1026

SWL

Pos	Callsign	21Q	21M	28Q	28M	Score
1	R3A-847	112	74	0	0	24864
2	US-I-666	6	6	0	0	108

Checklog: G3VQO.

70MHz TROPHY 2004

Despite the change of date this year, brought about by the re-scheduling of the 144MHz and 432MHz Low Power Contests, entry level was up by one on last year, but with more multi-operator and fewer fixed station entries. Activity was good with over 200 different callsigns logged, though sadly, as last year, some had only one QSO, apparently just coming on to give points away to their friends. The Five Bells Contest Group turned in a very creditable performance from their new site, averaging 366 points per QSO.

This year Bryn Llewellyn, G4DEZ, won the Single Operator Fixed section with Roger Piper, G3MEH, again taking second place. Andy Kissack, operating GD0TEP/P, on behalf of the Northern Lights CG, won the Single Operator Others section and takes the Four Metre Cup, with Peter Croucher, G4YPC/P, in second place. The Multi-operator section was won by the Five Bells CG operating GM4SIV/P, who also take the VHF Manager's Trophy, with Lothians RS as runners-up. Dave Hook, M5ADF; Nick Garbett, M1DDD/P, and the Midlands CG operating M5HDF/P, are awarded certificates for being the highest-placed stations in their sections using 25W or less and a single antenna. ***Roger Piper, G3MEH***

Pos	Call	QSOs	Mults	Score	Best DX	Dist	Ant	Club or Group
Section SF								
1 *	G4DEZ	74	58	956942	GM4SIV/P	442	8el	-
2 *	G3MEH	64	50	518300	GM4AFF	573	2x5el	-
3	G3JYP	42	42	427686	G1EHF/P	454	15el col	-
4	G8SRL	45	38	323570	GM4SIV/P	615	7el	-
5	G4OBK	34	35	297430	G2KF	479	5 el	-
6 *	M5ADF	33	31	177041	GM4SIV/P	543	6el	-
7	G4CZB	30	32	176160	GM4SIV/P	463	3el	-
8	G2KF	24	25	166050	GM4SIV/P	523	4el	-
9	GM4AFF	18	21	153195	G4ZAP/P	688	8el	-
10	G3IKR	27	29	150481	GM4AFF	511	4el	-
11	G4AFJ	23	26	115752	GM4SIV/P	414	8el	-
12	G3FIJ	15	19	65094	GM4SIV/P	577	4el	-
13	G3VQO	1	2	98	G4YPC/P	49	3el vert	-
Section SO								
1 *	GD0TEP/P	102	72	2188368	G1EHF/P	515	2x8el	Northern Lights CG
2 *	G4YPC/P	78	63	1187046	GM4AFF	680	8el	-
3	G3UUT/P	54	44	451616	GM4SIV/P	539	6el	-
4 *	M1DDD/P	52	43	350966	GM4AFF	404	21el LPY	-
5	GW4EVX/P	55	42	335580	G1EHF/P	378	3el	-
6	G1KHX/P	41	37	281792	GM4AFF	613	5el	-
7	G0OVA/P	29	32	182976	GM4SIV/P	554	3el	-
8	G6GVI/M	23	24	94488	GM4SIV/P	480	2el	-
9	GM4VVX/P	6	9	19359	G4DEZ	604	6el	-
Section M								
1 *	GM4SIV/P	94	67	2305939	G1EHF/P	652	2x9el + 1x6el	Five Bells CG
2 *	GM3HAM/P	84	65	1810055	G1EHF/P	549	11el + 6el	Lothians RS
3	GW3TCU/P	120	75	1652400	GM4VVX/P	564	4x6el	-
4	GI4GTY/P	73	55	1220725	G1EHF/P	598	6el	Lagan Valley ARS
5	G4ZAP/P	80	56	1118152	GM4AFF	688	8el + 5el (FM)	A1 CG
6	G1EHF/P	62	50	735050	GM4SIV/P	652	6el	EHF & SJH
7	G0VHF/P	60	51	662847	GM4SIV/P	561	2x5el	Colchester CG
8	MM0CPS/P	48	45	640755	G4ZAP/P	582	8el	Cockenzie & Port Seton ARC
9 *	M5HDF/P	23	25	93650	GI4GTY/P	323	4el	Midland CG
10	G4ADV	9	11	23760	G1EHF/P	440	7el	Newquay & DARS

CLUB CALLS CONTEST, 2004

This year has seen increased support for club-oriented events in general and the Club Calls Contest was no exception with 10% more entries than last year. A further 50+ stations were active (including some well-known club calls) but did not submit logs.

Logs were received on paper (hand-written, printed, photo-copied pages from the station log etc), and on disk and by e-mail in every conceivable format. Electronic standardisation proved to be impracticable and, eventually, all the logs were printed out and every QSO was checked by hand - a very time-consuming business!

The callsign of one station operating portable was recorded by 15% of his contacts without the '/P'. A callsign error is normally taken to be the fault of the receiving station but, in this case, it was obvious that the sending station was to blame and he was penalised accordingly. It was also obvious that many stations were not consistent in giving out their club name and this was taken into account in the checking.

The scoring for this event may not be the simplest, but it still came as a surprise to find that 31 of the 119 logs contained arithmetic errors (all logs are re-scored by the adjudicator as a matter of course). The majority of these resulted in the log being underscored, in some cases by as many as 400 points!

In first place, and winner of the Ariel Trophy, was the Newbury & DARS station G5XV/P, operated by 2E0BJM, 2E0LRC, G1SSL and G3ZGC. In second place, representing Cheltenham ARA and just 61 points adrift, was the leading individual club member, G4ERP. The final podium place was taken by the Wigtownshire ARC station, GM4RIV/P, operated by GM3JKS and GM3MOU. The David Hill G4IQM Memorial Trophy, for the highest five-station aggregate score, was won by Cheltenham ARA with 6866 points, by a comfortable margin over second-placed Horsham ARC with 6123 points. The certificate for the highest-scoring non-club-member goes to Mike Price, G6HOU. ***Steve Knowles, G3UFY***

Pos	Callsign	Club	Status	QSOs	Score
1+*	G5XV/P	Newbury & DARS	C	130	1824
2*	G4ERP	Cheltenham ARA	M	134	1763
3	GM4RIV/P	Wigtownshire ARC	C	170	1677
4	G3SJJ	Lichfield ARS	M	138	1614
5	G3WOR/P	Worthing & DARC	C	152	1607
6	G0RAF	RAF Waddington ARC	C	156	1603
7	GX4NOK	North Wakefield RC	C	149	1601
8	GX3WAS	Lichfield ARS	C	147	1582
9	GC4CC	Swansea ARS	C	124	1580
10	M5ARC/P	Wisbech AREC	C	148	1574
11	G4CZB	Northampton RC	M	119	1563
12	GX3YRC	Great Yarmouth RC	C	125	1485
13	G4MRS	Martlesham RS	C	128	1453
14	G3SSN	Cheltenham ARA	M	105	1421
15	G4ENA	Cheltenham ARA	M	105	1386
16	G0RGH	Harwich ARIG	C	103	1367
17	G4UDU	Worthing & DARC	M	112	1358
18	G3ZYV	Maidstone ARS	M	78	1339
19	G4LRP	Horsham ARC	M	84	1303
20	G3ZBU	Horsham ARC	M	90	1294
21	GX8LED/P	Northampton RC	C	97	1281
22	M0GJH	Horsham ARC	M	90	1263
23	G3GWB/P	Northampton RC	C	87	1252
24	G4PDQ	Cheltenham ARA	M	95	1225
25	GJ3DVC	Jersey ARS	C	79	1214
26	G3SWC	Horsham ARC	M	85	1206
27	G0MTN	Wythall RC	M	70	1187
28	G3YAJ	Colchester Radio Amateurs	M	71	1167
29	G3SVL	Chiltern DX Club	M	75	1150
30	G3HEJ	Farnborough & DRS	M	74	1148
31#	G4SJX	Leicester RS	M	65	1140
32	G3SNU	Torbay ARS	M	82	1089
33	GX3TRF	Maidstone ARS	C	68	1083
34	G3TA	Cheltenham ARA	M	69	1071
35	G3SAD/P	Stevenage & DARS	C	77	1060
36	G4TPO/P	Horsham ARC	M	78	1057
37	G4ADV	Newquay & DARS	C	76	1047
38	GX7EAR/P	Echelford ARS	C	72	1038
39	GX3JRM	Lowestoft & D & Pye ARC	C	64	1001
40	G5RR	Hucknall Rolls Royce ARC	C	96	959
41	G4FRS	Farnborough & DRS	C	64	958
42	G4AYM	Gloucester ARES	C	67	945
43	GX5FZ	Lincoln Shortwave Club	C	82	936
44	G3VER	Verulam ARS	C	61	894
45	G0LHZ	Reading & DARC	M	64	892
46=	G3NEO	Bolsover ARS	M	41	872
46=#	G0DZB	Colchester Radio Amateurs	M	44	872
48*#	G6HOU	-	N	47	856
49#	G4FBS	Horndean & DARC	C	46	848
50	G3ZKN	Cheltenham ARA	M	58	837
51	G4VTO	Torbay ARS	M	46	824
52	G4AGE	Bolsover ARS	M	50	818
53	G0VYR	Farnborough & DRS	M	45	752
54=	G0ECW/P	Worthing & DARC	M	53	748
54=	GX3CNX/P	Grimsby ARS	C	50	748
56	G3NPF	Horsham ARC	M	50	744
57	G0VDZ	Echelford ARS	M	50	741
58	M0DDT	Newbury & DARS	M	46	736
59	G4FQR	Horsham ARC	M	42	720
60	G3CO/P	Colchester Radio Amateurs	C	44	685
61	G0WRS/P	Warrington ARC	C	73	676
62	M0COP	Wythall RC	M	41	672
63	G3VTS	Cheltenham ARA	M	39	659
64	G3ZHE	Warrington ARC	M	40	640
65	G0AQH	Worthing & DARC	M	38	636
66	M5AMN	Farnborough & DRS	M	36	635
67	G3JIR	Warrington ARC	M	42	624
68	MJ3JBQ	Jersey ARS	M	30	610
69#	G3ZME	Telford & DARS	C	31	608
70	G4HRS/P	Horsham ARC	C	35	604
71	MX0EEE	Reading & DARC	C	41	584
72	G0YYY	Farnborough & DRS	M	29	560
73=	G4SLE	Worthing & DARC	M	47	552
73=	G6PMT	Echelford ARS	M	30	552
75	G4IGN	Cheltenham ARA	M	29	548
76	G3NDJ	Worthing & DARC	M	34	544
77	G2HS	Echelford ARS	M	29	528
78	G5BK	Cheltenham ARA	C	31	515
79	G4MRH	Worthing & DARC	M	34	512
80	G3IFB	Cheltenham ARA	M	30	484
81=	G3RVM	Newbury & DARS	M	27	480
81=	G8XIT	Worthing & DARC	M	26	480
83	M1ECY	Stevenage & DARS	M	24	464
84	M3VUU/P	Lincoln Shortwave Club	M	23	440
85=	G4DDX	Stevenage & DARS	M	22	428
85=	G3GLL	Colchester Radio Amateurs	M	22	428
87	M0WTW	Maidstone ARS	M	28	424
88	G3EAO	Echelford ARS	M	23	416
89	G3NFB	Warrington ARC	M	29	400
90	G4GPW	Worthing & DARC	M	20	384
91#	M3GSJ/P	Lincoln Shortwave Club	M	15	352
92	G4MVO	Cheltenham ARA	M	19	320
93	G3OFA	Farnborough & DRS	M	18	312
94	G0THF	Bolsover ARS	M	14	296
95	G3EUE	Worthing & DARC	M	19	284
96=	G4TWK	Worthing & DARC	M	25	256
96=#	G0JSH	Echelford ARS	M	12	256
98	G0JUS	Maidstone ARS	M	16	244
99#	G0WMG	Worthing & DARC	M	17	236
100	M5ACR	Reading & DARC	M	12	228
101	G8WWI	Stevenage & DARS	M	15	222
102	M3RFK	Stevenage & DARS	M	16	212
103#	G0UHM	Horndean & DARC	M	8	204
104	M3GZY	Echelford ARS	M	24	196
105#	G1BHR	Northampton RC	M	7	176
106	M1HOG	Stevenage & DARS	M	10	172
107	M3EKB	Worthing & DARC	M	21	165
108=	G0UVA	Worthing & DARC	M	12	152
108=#	M0ADY	Worthing & DARC	M	9	152
110	G3JUL	Echelford ARS	M	11	148
111=	GW3KDB	Lichfield ARS	M	10	144
111=	G4EDP	Cheltenham ARA	M	9	144
113	M3BHF	Worthing & DARC	M	13	140
114	G1OCL	Worthing & DARC	M	12	120
115#	G3XMM	Cheltenham ARA	M	6	108
116#	M0OKT	Bolsover ARS	M	5	100
117#	G3VQO	Horsham ARC	M	6	88
118#	GX4RSB/P	Bolsover ARS	C	5	55
119	MJ3MBQ	Jersey ARS	M	1	0

C = Club call, M = Club member, N = Non-member.
+ Ariel Trophy, * Certificate of merit, # Error-free log.

ML&S martin lynch & sons

Suppliers of Communications Equipment

Outline House
73 Guildford Street
Chertsey
Surrey KT16 9AS

KENWOOD

Four Good Reasons to Operate HF using Kenwood Products this Summer including FREE CDXC Membership!

- **TS-2000E** - Kenwood's HF Flagship Radio. 100W on 6m & 2m, 50W 70cm, 10W 23cm (optional)
  TS-2000E: £1299
  TS-2000X: £1599
  (with 23cms)

- **TS-480SAT** - A superb HF/6m mobile & base transceiver, 100W with ATU. 200W version also available without ATU (TS-480HX)
  From £899

- **TS-570DGE** - Still the bench mark for good easy to use HF operation. G6/G7/G8 queue here.
  Only £799

- **TS-50S** - It's been around 10 years but if you want an HF rig in a compact package with excellent performance then buy one of these. As used by the recent DX-pedition FT5XO to Kerguelen Island.
  Only £595

Buy any Kenwood HF Radio from ML&S this month and receive a FREE one year subscription to world famous CDXC - the Chiltern DX Club. This offer is sponsored by Kenwood UK.

The aim of the club is to promote HF operating in Amateur Radio and to encourage excellence, particularly in DXing and contest operating. CDXC approach this through mutual assistance, by the support of DXpeditions, by the issuing of achievement awards and by whatever other means are deemed to be appropriate.*

* This is only for UK customers who are not already a CDXC member.

Important Announcement

ML&S + Ten-Tec

ML&S are pleased to announce their appointment for the sale of the famous Ten-Tec 565 Orion Transceiver.

Aimed at the user who wants ultimate RF performance, when Peter Hart commented the Orion is a one horse race when it comes to close in dynamic range performance at a recent CDXC dinner, we knew we had to add this important transceiver to our product range.

Available in two different versions (with and without the internal auto ATU), we currently have one on demonstration in our main showroom.

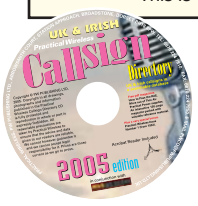
Ten-Tec 565 Orion Transceiver
With ATU: £2799.00
Without ATU: £2499.00.

Available from stock.

Or £99 deposit & 36 x £98.10 p/m.

Trade-ins a pleasure.

Please see our web site for full details and list of accessories.



FREE PW CD with EVERY order placed during June !

Order a rig or accessory from ML&S during June and receive the latest UK & Irish Callsign CD from PW Publishing.
(Whilst stocks last)

Apply now for your very own ML&S Store Card

see centre pages for more details

Call us 6 days a week, mon-sat 9.30-5.30

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The ML&S Ham Radio Top Sellers, Antennas &

No.1 ★★★★★★★★★
NEW Yaesu FT-60E
Latest Twin Band 5W Handie from Yaesu.
Only £169!

No.2 ★★★★★★★★★
NEW VX-6R
New Handie with CW Trainer!
Coming soon...

No.3 ★★★★★★★★★
Yaesu FT-847 + MFJ-993 Bundle!
The famous HF+6+4+2+70 Transceiver is now even better value. Buy a new FT-847 with a new matching MFJ-993 Auto Tuner. **Bundle Price Only £1210**
(Rig only: £989)

No.4 ★★★★★★★★★
Yaesu FT-1000MP mkV
Still the flagship of the Yaesu HF Range. 200W and put the CDXC IOTA crew on the map.
RRP: £2599, MLS: £2099
NEW LOW PRICE!

No.5 ★★★★★★★★★
Yaesu FT-1000MP mkV Field
Ditto mkV but 100W and built in PSU.
RRP: £1999 ML&S: £1699
NEW LOW PRICE!

No.6 ★★★★★★★★★
Yaesu FT-857+ATAS-120
OFFER EXTENDED!
Still our best selling HF mobile set-up. See pictures on our website
£779 for both
(Rig only: £579)

No.7 ★★★★★★★★★
Yaesu VX-7R
The U.K's best selling Triple Band Handie.
Only £249 or 24 x £12.48

No.8 ★★★★★★★★★
Yaesu VX-150
Built on the commercial VX-400, simple to use rugged 2m Handie, supplied with Nicads & Charger.
RRP: £149, ML&S: £99.95 or 'Twin Pack' only £199

No.9 ★★★★★★★★★
Yaesu FT-817ND
Latest Version
The latest FT-817ND comes complete with HF+6+2+70 and Metal-hydride batteries, charger, mic & antenna.
Call for best price
(FT-817ND-DSP Version available)

No.10 ★★★★★★★★★
Yaesu FT-897 + FC-30 Auto Tuner
For the start of 2005 we have bundled together a brand new FT-897 Transportable Base rig with HF/6/2/70, all mode with the FC-30 Auto Tuner. This literally bolts on to the side of the FT-897 making it a very compact HF package.
Only £849 for both
(Rig only: £649)

No.11 ★★★★★★★★★
Yaesu FT-7800
Bar make the tea it'll give you 2m/70cm- @ 50W/40W.
RRP: £239, ML&S: £239

No.12 ★★★★★★★★★
Yaesu FT-8800
Similar to the FT-7800 but can receive on 2 & 70 simultaneously.
RRP: £289, or 48 x £8.26 p/m

No.13 ★★★★★★★★★
Yaesu FT-2800M
2M brick-built 65W rig.
RRP: £179, ML&S: £159
FREE MLS-100 Yaesu Mobile speaker

No.14 ★★★★★★★★★
Yaesu VX-2E
Micro Handie 2/70 with scanner. Complete withLi-Ion battery, charger & antenna.
NEW LOWER PRICE
Now only £119

No.15 ★★★★★★★★★
Yaesu FT-8900 with FREE YSK-8900 Remote Kit!
One-stop solution to high-power FM on 10m, 6m, 2m & 70cm. When your local repeater is busy, slip onto 10m & work DX!
Only £339

No.16 ★★★★★★★★★
Kenwood TS-2000E
Just superb on all bands 160m-2m with optional 23cm (X-Version).
RRP: £1699, ML&S: Call

No.17 ★★★★★★★★★
Kenwood TS-2000X
As above but with 23cm fitted.
RRP: £1999, ML&S: Call

No.18 ★★★★★★★★★
Kenwood TS-480SAT
The best selling Kenwood H.F. Can be used mobile or base. Includes ATU.
RRP: £1099 ML&S: £CALL

No.19 ★★★★★★★★★
Kenwood TS-480HX
As TS-480SAT but 200 Watts, no ATU.
RRP: £1199, ML&S: £999
or 48 x £29.56 p/m

No.20 ★★★★★★★★★
Kenwood TS-570DGE
Still the ideal choice if you are keen on H.F. and want an easy to use radio.
RRP: £999, ML&S: £799
or 48 x £23.64 p/m

No.21 ★★★★★★★★★
Kenwood TMD-700E
The unique 700E is not only a dual-band FM rig but has APRS and TNC built-in.
RRP: £519, ML&S: £439
or 48 x £12.99 p/m

No.22 ★★★★★★★★★
Kenwood TH-F7E
2/70 Handie with Gen Cov RX. If you must have SSB RX on your dual-bander then buy one!
RRP: £289.95, ML&S: £249

No.23 ★★★★★★★★★
Kenwood TH-D7E
A 2/7- Handie with TNC and APRS capability. **RRP: £359, ML&S: £299**
or 48 x £8.85 p/m

No.24 ★★★★★★★★★
NEW Icom IC-756Pro mkIII
The latest in the IC-756Pro Series
RRP £2495 ML&S £2099
or 36 x £76.31
Package deal: IC-756ProIII, SM20 Microphone, SP-23 New Base Speaker with filters.
RRP £2768, ML&S only £2299
(Rig only: £2099)

No.25 ★★★★★★★★★
Icom IC-7800
The worlds best H.F. Transceiver? Probably.
No silly freebies, just the ultimate understanding and support you deserve when making an investment of this magnitude. To discuss the new HF+6M Super Rig from Icom, call the ML&S Sales team today.
RRP: £6400.00

No.26 ★★★★★★★★★
Icom IC-7400
HF/6M/2M DSP Base Transceiver with ATU & 100W.
RRP: £1699, ML&S: £1299 with FREE SP-21 & SM20
(whilst stocks last)

No.27 ★★★★★★★★★
Icom IC-706mkIIG
Final batches are trickling through. This was the radio that started compact all band mobile operation 10 years ago. We are offering the last few at a very special price. Please call or see our web site.
NEW MODEL ARRIVING SOON!

No.28 ★★★★★★★★★
Icom IC-703
10W Portable/Base HF Transceiver with built-in ATU.
RRP: £703, ML&S: £449

No.29 ★★★★★★★★★
Icom IC-718
Basic ready to go 100W HF Transceiver supplied with Microphone & DC Lead.
RRP: £649, ML&S: £449
or 48 x £13.29 p/m

No.30 ★★★★★★★★★
Icom IC-910X
The best 2/70 & 23cm dedicated all mode base. 23cm included.
RRP: £1675, ML&S: £1239
or 48 x £36.66 p/m
Basic Version (without 23cm) also available £1089 or 48 x £31.93 p/m

PLUS: £50 credit against your next Icom purchase!

No.31 ★★★★★★★★★
Icom IC-E208
2/70 mobile 50/55W Transceiver with host of additional features. Remote head leads included.
RRP: £365, ML&S: £239

NEW! MyDEL Power Supplies

A new rage of PSU's from MyDEL. The neatest smartest looking desk top power supplies that money can buy. Ideal for powering any main rig or accessory requiring 13.8V DC at up to 25 Amps.

MyDEL MP-250A

25 Amps maximum, 22Amps constant, ideal for most modern HF Transceivers
Only £89.99 incl VAT!

- Variable Voltage 9-13.8VDC
- 110-234V input
- 2 x outputs: 25A Binding Posts, 7A Cigar Socket
- Fan cooled, speed variable to voltage supplied
- Two huge back-lit meters, Volts/Amps
- Fully protected, supply shut off if more than 25A is drawn, re-setable by switching off for 25 seconds.
- Only 5 3/4"W x 4 1/2" H x 6" D in size
- Less than 35mV peak-to-peak ripple under full 25AMP load
- Full exchange warranty for 2 Years

MyDEL MP-4128
Another new switch mode PSU from MyDEL. Similar in spec to the MP-250A but without meters or cigar lighter o/p. 22-25 AMP output with heavy duty binding posts on the front panel and push on terminals for lower current output on rear. Fully protected. **£69.99**

Yaesu FP-1030A
25 Amp power supply **£179.00**

Tigertronics Sound Card - Radio Interface

For all available Digital modes, the SignaLink SL-1+ also supports the latest Voice modes such as Internet Repeater Linking (EchoLink, VOIP, etc.), Remote Base, and Voice Keyer operation. We sell four versions of the enhanced model the SL-1+8R with 8-pin round mic. connector, the SL-1+RJ45 with RJ-45 mic. connector, the SL-1+RJ11 with RJ-11 mic. connector and the SL-1+6PMD with 6-pin mini Din Data Port connector SL-1+8xxx Interface with rig lead (you specify! **£69.95**

Extra leads
£14.95 (8-Pin, RJ-45, RJ-11, 6-pin mini DIN) **£19.95** (SL-CAB-13I 13-Pin Icom), (SL-CAB-13K 13 Pin Kenwood)

Apply now for your very own ML&S Store Card

Conditions. All applications subject to a simple credit check. A decision is usually within minutes so you can buy straight away. Minimum first spend is £75. Spend Up to £200 - Interest Free Period 56 days. Spend Over £200 - Interest Free Period 90 days. Spend Over £300 - Interest Free Period 4 months. Spend Over £400 - Interest Free Period 5 months. Spend Over £500 - Interest Free Period 6 months. Like a credit or debit card you will receive a detailed monthly statement & your own personal ML&S Store Card. Any outstanding balance due after the above period will be charged at 29.8%. For further details see our website.

Buying from ML&S has just got easier! By using the ML&S Store Card you can purchase any product & pay no interest for up to 6 months. There's no lengthy forms to fill in and you can use it whenever you like. Keep all your Ham Radio purchases separate making it easier to manage your spend *and* get interest free - what could be better?! Conditions apply.

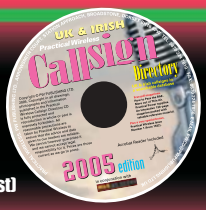
"Classic" Finance example: Kenwood TMD-700E. RRP: £519. Payment illustration: Zero deposit and 48 payments of £12.99 per month. Total amount payable: £623.52. APR: 19.9%. ML&S is a licenced credit broker. Finance offered subject to status. Full written details on request. E&OE

Don't forget! ML&S are approved stockist for the following: bhi Ltd, Casio, Icom, Kenwood, Maldol, M

Call us 6 days a week, mon-sat 9.30-5.30
0845 2300 599
local call number
fax: 0845 2300 339
web: www.hamradio.co.uk e-mail: sales@hamradio.co.uk

FREE PW CD with EVERY order placed during June !

Order a rig or accessory from ML&S during June and receive the latest UK & Irish Callsign CD from PW Publishing. (Whilst stocks last)



Accessories - much more on show at the store

STOP PRESS...STOP PRESS...

BARENCO

ML&S are excited at being appointed the UK stockist of BARENCO antenna hardware in the UK.

For over 20 years BARENCO have been the only quality manufacturer for hardware associated with antenna installation. Our new premises allows us to stock their entire range, from chimney lashing kits to ground spikes for HF verticals and much much more.

More details next month, or see our web site under accessories.

STOP PRESS...STOP PRESS...

Yaesu FT-dx 9000 Range

ML&S will be the first to stock the range of FT-dx 9000 models.

- Initially the FT-dx 9000 D will be available with TFT Screen Estimated price £7k+
- Estimated delivery August 2005. (Cancel the holiday then)
- Two other versions available stripped down "Contest" & 400W "MP".
- Special low cost finance plan available
- Best trade-ins from ML&S

Call now to discuss this important new Flag Ship from Yaesu.

Daiwa Meters

Daiwa CN-101L: SWR/PWR Meter 1.8-150Mhz Power range: 15/150/1.5kW	ML&S only £59.95
Daiwa CN-103LN: SWR/PWR Meter 140-525MHz Power range: 20/200W	ML&S only £65.95
Daiwa CN-801H: SWR/PWR Meter 1.8-200Mhz Power range: 20/200/2000W	ML&S only £109.95
Daiwa CN-801V SWR/PWR Meter 140-525MHz Power range: 20/200W	ML&S only £119.95
Daiwa CN-801S SWR/Power Meter 0.9-2.5Ghz Power rating: 2/20 watts	ML&S only £139.95

Hustler 6-BTV Only £229.95

FREE GROUND EARTH ROD (THIS MONTH ONLY)

The best performing H.F. Vertical - ever!

We have literally sold hundreds of these with fantastic customer reports. At last a vertical that gives you REAL PERFORMANCE on 80m and 40m, as well as the other bands. No radials required. Just mount 18 inches above the ground, connect to a decent earth spike close by and operate.

6-BTV HUSTLER 80-10m Vertical 1kW.
6 Bands: 10, 15, 20, 30, 40, 80m. VSWR 1.6:1 or better. 10-40m Bandwidth up to 100kHz 80m. Power: 1kW

If you can't mount the Hustler 6-BTV on the ground then the only choice is the new VK5Jnr. It's so good we use one at our new H.Q.!

MyDEL MultiTrap

Forget the G5RV. Install a proper TRAPPED wire dipole MutiTrap for 80-10M Only 66'.Must be centre supported.

£99.95

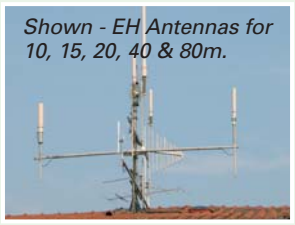
MyDEL MegaTrap

Same as Multitrap but 160m/80/40m, 105' long.

£109.95

Small Garden? No Garden?

Install an EH Antenna for HF today.



Introducing a new range of antennas from Arno Electronics. Available for any band 10m-160m, ML&S stock this exciting new product available for immediate despatch.

All antennas are beautifully built and pre-tuned at the factory. Supplied with fixing clamps & clear installation instructions. Easily fine tuned with outer ring sleeve. You will be totally amazed at how well they work. No ATU required. Just plug-in and work!

Cobra 10	28-29.8MHz,	2kW	90cm long	(500W RTTY/AM) £105.00
Cobra 12	24.890-24.990	2kW	90cm Long	(500W RTTY/CW) £105.00
Cobra 15	20.7-21.7MHz	2kW	90cm long	(500W RTTY/AM) £105.00
Cobra 17	18.068-18.168MHz	2kW	90cm long	(500W RTTY/CW) £105.00
Cobra 20	13.8-14.8MHz	2kW	90cm long	(500W RTTY/AM) £105.00
Cobra 30	9.9-10.3MHz	2kW	93cm long	(500W RTTY/AM) £105.00
Cobra 40	7-7.2MHz	2kW	93cm long	(500W RTTY/AM) £105.00
Venus 80	3.5-3.8MHz	2kW	248cm long	(500W RTTY/AM) £179.00
Venus 155	1.913-1.933MHz	2kW	248cm long	(500W RTTY/AM) £179.00
Venus 160	1.830-1.850MHz	2kW	248cm long	(500W RTTY/AM) £179.00

Delivery: Cobra £20, Venus £25. (England & Wales, phone for other destinations)

For more details on this fascinating design see our web site. Better still listen out for G4HKS or G0WTZ using one from the showroom!

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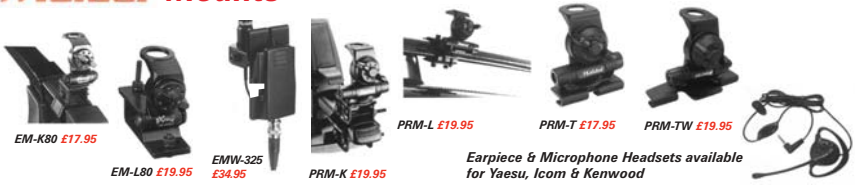

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LF

Dave begins with a roundup of signals received and contacts made, then welcomes newcomers to the band. He also advocates using 'normal' CW, whenever conditions permit

Conditions remained good in February, with ZL4OL copying WD2XDW, and G3AQC's signal being strong enough for Jay Rusgrove, W1VD, to report 'dogbones' on the *Argo* trace. This happens when the signal is so strong that the sidebands created by the keying at start and finish of a dot or dash can be seen, causing fattening of the line at each end, as the screen dump shows. The same evening, Jay caught some signals from YU7AR and DF6NM.

In the opposite direction, Ed Lesnichy, RU6LA, was seeing some traces from WD2XES and WD2XGJ, at a distance of nearly 8000km.

In March, Scott Tilley, VE7TIL, and Steve McDonald, VE7SL, pooled resources to try for a trans-Pacific QSO with ZM2E at Quartz Hill, near Wellington, New Zealand. They used Steve's location, special call VE7LF, and a QRO transmitter constructed by Scott. He built a Wilkinson combiner (see the photograph) to parallel two identical home-brew transmitters and got almost 1kW output. With Steve's good aerial, this setup should have produced about 1W ERP.

On 4 / 5 March, the tests were carried out between ZM2E, VE7LF and RU6LA at Machta, which is about 400km north of the Black Sea.

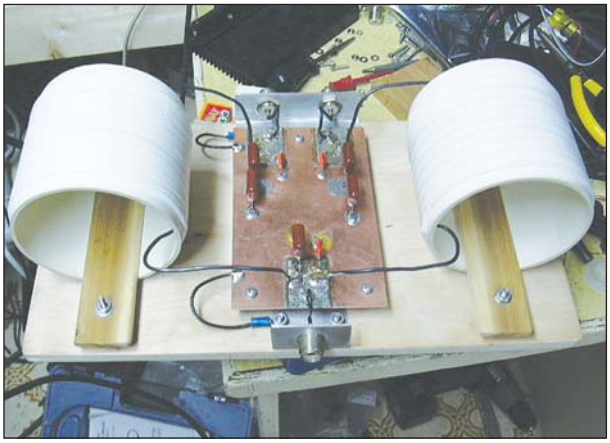
There were almost eight hours of mutual dark path between ZL and VE7, a distance of about 11,700km. ZM2E was to use FSK120 with 0.4Hz shift and send 'ZM2E ZM2E E', which would take 72 minutes. Note the use of 'E' instead of 'K' to speed things up a bit!

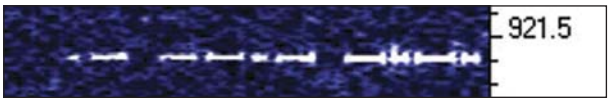
VA7LF would then reply, also using FSK120, and a contact would continue if any acknowledgement was received.

On the morning of 4 March, Scott and Steve saw ZM2E for about an hour, replied, but received no further signals, as it was then daylight. They revised the schedule slightly for the next night and tried again. The results were similar, with good signals from Quartz Hill as dawn approached, but no signals making it in the opposite direction.

ZM2E's signals were detected (just!) by Steve Dove, W3EEE, near the east coast of the USA and by Mitch, VE3OT, in London, Ontario.

The mutual dark path between ZL and RU6 was only three hours, and the distance about 16,500km, so this was a much more difficult prospect. ZM2E was to call RU6LA using FSK60 in order to compress the timescale. No readable signals were exchanged over this path, although some vestiges of Ed's signal were detected at Quartz Hill.





Top:
Scott Tilley's combiner using air-cored inductors.

Above:
G3AQC's 'dogbones' as received by W1VD.

ZM2E operators were Andrew, ZL2BBJ, Mike, ZL4OL, and Bob, ZL2CA. RU6LA was operated by RU6LA and UA6LV.

Well done to all those concerned. It's such a difficult task that even partial success is worth celebrating.

Early in April, a number of European stations tried for a grey-line path to ZL. YU7AR was the first signal to be identified, with the help of some detective work by DF6NM, who analysed the traces recorded at ZL2CA. Tests were continuing as we went to press.

NEW ON THE BAND

The PA0s are topping the newcomers' chart this time with William, PA0WFO, located at Oostvoorne (JO21BV), being the first on air. He uses a Ropex transmitter with 23m long aerial, 5m high.

Next in line is Dick, PA4VHF (JO32EH), who has put up a 16m high top-loaded vertical and built a 600W transmitter. He has been developing his system for some time and has finally made contacts with Holland, Germany and the UK as well as producing a few clouds of smoke!

Michael DK5NA hopes to be transmitting soon from his holiday home on the Danish island of Römö. Whether he'll be able to hear anything is debatable, though – the Sylt Loran station is only 40km away.

Oleg, EW6CM (KO45HN), announced that he is listening on the band with an inverted-L aerial, 110m long between 10 and 18m high. His ground system is a big metal cellar under his house! Presently he is receiving with an FT-817 and is "thinking about a transmitter".

Eduardo, EA3GHS, in Catalonia, has been having some success on receive, bagging signals from S57A and from RU6LA at over 3000km. He has posted a lot of his FFT plots on his website. See 'Web search'.

SOUTH OF THE BORDER

The wanderlust gripped Laurence Howell, KL1X, again in February, and he ended up on the Mayan Peninsular about 60 miles South of Cancun in Mexico. With his active aerial mounted on the car roof he copied his own beacon, WD2XDW, and saw traces of 'XGJ, 'XFX and, by no means least, WD2XES. It seems that he saw fragments of YU7AR's transmission too.

CW COMEBACK

Mal Hamilton, G3KEV, is a keen CW operator, and has recently been campaigning for more use of normal CW on 136kHz. For the past year or so, CW operation has been declining as stations turn to the more effective (but slower) QRSS and other computer-assisted modes. Mal has observed that, in many cases, he can hear the QRSS stations perfectly well, meaning that a CW QSO could have taken place.

To prove his point, he has been calling CQ regularly on CW and the results speak for themselves, with him working many DL and G stations, OH1TN and RA3YO in Bryansk (KO73DG) a distance of 2265km.

It also goes to prove the virtue of putting out a few CQ calls rather than just sitting and listening! ♦

WEB SEARCH

EA3GHS Long-Wave Logbook
http://usuarios.lycos.es/ea3ghs/vlf/logbook.html

Rev George Dobbs, G3RJV

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

E-mail: g3rjv@gqrp.co.uk

QRP

G3RJV reports on three interesting QRP feats: a new QRP miles-per watt receiving record; achieving 200 DXCC entities with an Elecraft K2; WAS with a Tuna-Tin transmitter. He describes a new transceiver subsystem from Cumbria Designs

Richard Fisher, KI6SN, QRP columnist for *WorldRadio* magazine, has reported a new QRP world receiving record - 20,221,893 miles per watt from the 3.5MHz beacon N2XE – on Monday, 17 January 2005. In an announcement on the N2XE beacon website, John Ceccherelli writes: "A radio signal with 2,000 times less power than it takes to light a digit on an alarm clock was successfully received by William Tippett, W4ZV, of New London, NC... he correctly copied the Morse code word 'GOLD' from the N2XE beacon transmitting with a peak carrier power of 27µW. Tippett confirmed reception of the beacon at 1153Z, 17 January, 2005. The precise distance between the two stations is 546.8 miles..." N2XE is located in Wappingers Falls, NY. For a complete rundown on the contact, visit **http://mysite.verizon.net/vze4z83c/id14.html**

200 ON K2

Dave Sergeant, G3YMC, built an Elecraft K2 QRP Transceiver in March 2002 and was recently very pleased when he took his countries score to 200 using the K2. Dave writes, "On 22 February 2005, I achieved my goal of working 200 DXCC countries with QRP CW, when I contacted V47Z in St Kitts on 15m. With patchy conditions over the recent months, it had become a struggle to achieve, with relatively few new countries being available to work. But I made it, and now must look forward to my next goal, 250!

"The location here is very far from ideal - a typical urban terraced house with a relatively small garden and surrounded on all sides by other houses. There is no scope for large antennas, towers are not really possible and the plot is too narrow for most of the small beam antennas. So I have worked most of my DX on a simple 60ft wire at around 30ft high."

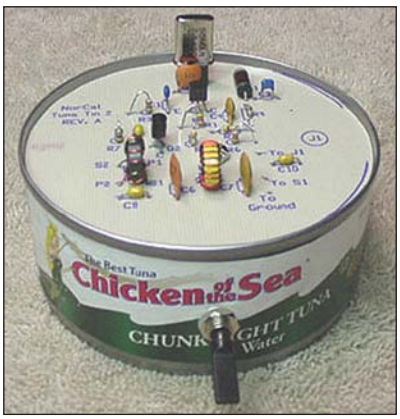
THE CUMBRIA DESIGNS T-1 SSB/CW TRANSCEIVER SUBSYSTEM

Penrith-based kit company Cumbria Designs has introduced a new kit to its range which will be of particular interest to constructors. The T-1 incorporates all of the stages, from mixer to audio, that form the core of an SSB/CW transceiver capable of operation from 140kHz to 400MHz. Similar in concept to the Plessey designs of the 70s and 80s, and more recently the Belthorn module, designed by Ron Taylor, G4GXO, of Cumbria Designs, and published in *RadCom* during 2000, the T-1 takes this integrated approach a step further by adding CW, filter switching, an improved IF filter scheme and incorporating all the signal and DC switching circuitry on the 160mm x 90mm PCB.

The broad-band design employs TUF-3 diode ring mixers, monolithic amplifiers and a discrete low-noise cascade JFET IF to deliver excellent sensitivity and strong-signal-handling performance. IF bandwidth is defined by crystal filters. The T-1 filter kit comprises two filter units; a dual 6-pole SSB/CW filter module at the input to the cascode IF stages and a 2-pole 'tail-end' filter after the IF to reduce wideband noise. While the PCB has been designed to accommodate the T-1 filter kit, it is possible to use commercial or home-made filters in the range 2MHz to 12MHz. Low-noise audio stages and an effective full-wave audio AGC system combine with the IF performance to produce good audio quality and a wide AGC range.

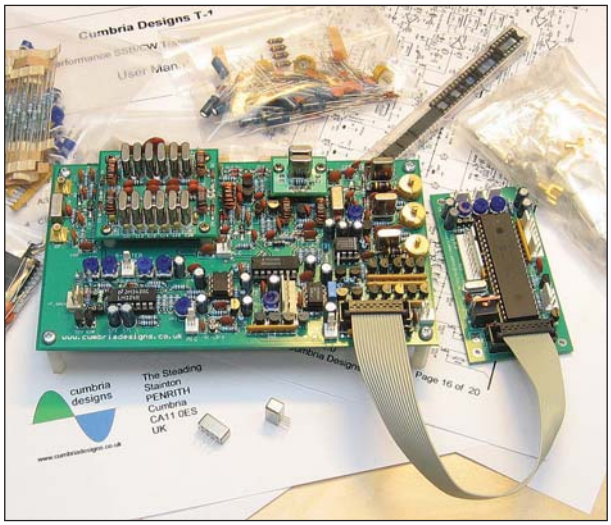
A unique feature of the T-1 is the access provided for controlling the internal signal routing and stage DC switching. A 16-way connector serves as the control interface for selecting functions and controlling transmit/receive operation. The interface has been designed to work over a wide range of levels allowing direct connection to logic devices or simple switch/relay control schemes at the nominal 12V supply. An optional PIC16F877-based controller kit, the C-1, exploits the flexibility of the T-1 interface to provide fast Tx/Rx switching, full CW break-in operation with adjustable hang time, hang AGC, and simple access for controlling the T-1 operational functions.

Cumbria Designs plans to introduce a companion synthesiser kit for the T-1 later this year. For more information and to view the T-1 manual, visit **www.cumbriadesigns.co.uk** or contact Cumbria Designs, The Steading, Stainton, Penrith, Cumbria CA11 0ES. Telephone 07973 894 450.



Right
The Tuna-Tin transmitter.

Below
The T-1 subsystem from Cumbria Designs. The PIC-based C-1 controller is seen on the right.



50 STATES ON A 'TUNA-TIN'

Bob Chapman, W9JOP/4, recently worked WL7WH in Anchorage, Alaska to complete his 50 USA states worked on a 250mW, crystal-controlled, Tuna-Tin 2 transmitter using a G5RV antenna at 50ft. The Tuna Tin 2 is a simple transmitter originally designed by the legendary author Doug DeMaw, W1FB. The TT2 was first published in the May 1976 issue of *QST*. Doug's intent was to offer a design for a low cost QRP transmitter that could be duplicated easily using parts obtained locally from Radio Shack stores.

The *ARRL Report* reads: "It took him four years, but a ham from Bealeton, Virginia, has become the first US amateur licensee to work all states using a flea-power Tuna-Tin 2 transmitter."

"Unfortunately, ARRL does not issue a certificate for WAS QRPP," he says. "Mine is endorsed with 'QRP-CW'." Bob, 71, says he actually used two Tuna-Tin transmitters to accomplish the feat. He worked and confirmed the contiguous 48 states with a classic Tuna Tin, which uses an inverted tuna can as a chassis. Not only was he running just 250mW ($^1/_4$W), he was crystal-controlled on 7043kHz! He says he bagged the last two states, Hawaii (KH6U) and Alaska (WL7WH) using a homebrew 20m Tuna-Tin, crystal-controlled on 14,060kHz and also running 250mW. "No QRO here," Bob says of his setup, "just a low-power, low-tech station with a G5RV wire antenna at 50ft and a 'TiCK' keyer." He uses a vintage Collins 51S-1 receiver. ♦

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SGC-239 Mini tower ATU (1.8-30MHz) £169.99
SGC-230 (HF-200W) ATU £319.99
SGC-237 HF+6m Tuner.....£269.99
SGC-231 HF+6m (Deluxe) £319.99

MFJ-993

NEW INTELLITUNER 300W, fully automatic. Will tune wires G5RVS, verticles, trapped dipoles, you name it.

OUR PRICE **£235.00**

MFJ-949E

● 1.8-30MHz 300W ATU ● Large cross needle meter ● 30/300W PEP power meter ● VSWR ● 3-way antenna selector ● Internal balun

£149.95

MFJ-259B

HF digital SWR analyser + 1.8-170MHz.

OUR PRICE **£229.95** P&P £7

Optional case.....£22.99
MFJ-269 160-70cm analyser.....£315.95
MFJ-969 HF + 6m ATU.....£179.95
MFJ-260C 300W dummy load (0-600MHz).....£39.99
MFJ-901B Superb versitile ATU £84.99
MFJ-784B DSP filter ~~£249.00~~.....£169.99

PSUs

NISSEI PS-300

Features: ★ Over voltage protection ★ Short circuit current limited ★ Twin illuminated meters ★ Variable voltage (3-15V) latches 13.8V ★ Additional "push clip" DC power sockets at rear. Dim'ns: 256(W) x 135(H) x 280(D)mm.

A truly professionally made unit **30 AMP/12 VOLT PSU**

SUPERB VALUE AT **£119.95** Del £10.00

NISSEI MS-1228

28A at 13.8V yet under 2kgs. (H 57mm, W 174mm, D 200mm approx). Fully voltage protected. Cigar socket & extra sockets at front/rear. Ultra slim. RRP ~~£79.95~~.

NISSEI HAVE BECOME RENOWNED FOR PUTTING QUALITY FIRST, YET MAINTAING A GOOD PRICING STRUCTURE. A TRULY SUPERB POWER SUPPLY UNIT

'Smallest version to date' now with cigar socket.

OUR PRICE **£69.95** Delivery £10.00

DIAMOND GZV-4000

Diamond quality power supplies/ switch mode. 40 amp version

Includes built-in speaker

£129.99

Model	Input voltage	Output voltage	Output current	Dimensions (W x H x D)mm	Weight	Price
GZV4000 (switching)	240V	5-15VDC variable	40A continuous	210x110x300	3.5kg	£129.99
GZV2500 (switching)	AC 240V	5-15VDC variable	25A continuous	210x110x220	2.5kg	£99.99

HF TRANCEIVERS

IC-756 PROIII

New model

Experience the most advanced DSP ever created for amateur radio.

OUR PRICE **£1949.99**

PS-125 matching PSU.....£249.00
SP-23 optional filtered speaker.....£99.95

YAESU FT-1000MP MkV

200 watts of shear delight from a radio that is without peer when it comes to performance and innovation. Limited stock available. Latest 2005 spec.

Optional extension speaker £119.99

OUR PRICE **£1999.99**

Yaesu FT-1000MP (Field) MkV (100W) £1649.00

KENWOOD TS-2000

New all mode multibander: HF/50/144/430 optional 1200MHz.

TS-2000 + PS-300 PSU £1379.00

OUR PRICE **£1299.00**

Matching PSU £229.00

ICOM IC-7400

HF+6m+2m, All mode, 32bit DSP for outstanding signal enhancing.

OUR PRICE **£1099.99**

D-7400 Duplexer for 7400 (6m + 2m) £39.99
SP-21 matching external speaker £79.99
DC-2 spare DC lead £20.00
SP-23 new filtered spkr (for 7400/756 III.....£99.99

YAESU FT-897D

HF + 6m + 2m + 70cm all mode. An amazing DSP Tcvr for base/mobile or portable use. Very little has been left out!

INCLUDES FREE HEADSET

CRAZY PRICE **£639.99**

FT-897D + MS-1228 bundle £699.99

KENWOOD TS-480SAT

New HF + 50MHz, 100W. Ideal for home or car use. Includes auto tuner.

INCLUDES FREE HEADSET

OUR PRICE **£849.99**

KENWOOD BARGAINS

TS-870S.....£1199.99 TS-408HX.....£979.00

YAESU FT-817 ND

100kHz-440MHz (with gaps). All mode transportable. Includes NIMH battery/ charger. Latest 2005 spec.

INCLUDES FREE HEADSET

£449.99

New – Headset for FT-817 (complete) £39.99

FT-817 ND + MS-1228 PSU £489.00

YAESU FT-857D DSP

The ultimate HF excitement in a small package. HF + 6m + 2m + 70cm. Incl's digital signal processor unit. Incl's optional DSP unit

Optional detatch kit £44.99

INCLUDES FREE HEADSET

£569.99

Special buy:- FT-897D + free headset £639.00

KENWOOD TS-570DGE

In our opinion, the best HF transceiver below £1200.

INCLUDES ATU

OUR PRICE **£749.99**

PS-53 matching PSU £229.00

Kenwood TS-480SAT .....our price £849.99

VHF/UHF RADIOS

KENWOOD TH-F7E

Transceiver & scanner 2m/70cm Tx (5W). Rx:- 0.1-1300MHz, all mode (incl SSB). Incls:- Lithium ion battery & charger.

Incl's free remote mic

OUR PRICE **£229.99**

Optional case £19.99
Optional cigar lighter lead.....£19.99
Optional battery box £19.99

ICOM IC-2725

Optional extended receive available which includes AM airband.

2m/70cm (50W/35W) dual receivers (true dual), D T M F microphone included.

OUR PRICE **£265.00**

ICOM BARGAINS

IC-E208.....£235.00 IC-910H £1075.00
IC-E90 .....£265.00 IC-910X.....£1199.00

ALINCO DJ-596

2m + 70cm Handie. Includes: (NIMH) Battery/Charger. Wide + narrow switchable. High power (4.5W) OP as standard. Alpha Numeric channeling.

Now includes free remote mic

£129.95

Optional case £16.99
Cigar lead.....£19.99
Dry cell box.....£17.99

YAESU FT-7800

Yaesu's latest high spec, low cost mobile. 2m/70cm (50W/40W) Includes DTMF microphone.

Rx:- 108-520/700-1000MHz

CASH PRICE **£219.00**

YAESU BARGAINS

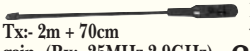
FT-8900.....£325.00 FT-2800M £149.99
FT-8800.....£259.00 VX-2E £110.00

SUPER-GAINER RH-9090

SMA 40cm flexible whip that is ideal as replacement. Tx:- 2m + 70cm. Rx:- 25MHz-2.9GHz

OUR PRICE **£26.95** P&P £1.50

SUPER-GAINER RH-9000



BNC 40cm flexible whip for the ultimate in gain. (Rx:- 25MHz-2.9GHz).

Tx:- 2m + 70cm

OUR PRICE **£21.95** P&P £1.50

NISSEI PWR/SWR METERS

RS-502 1.8-525MHz (200W).....£79.95 P&P £5
RS-102 1.8-150MHz (200W).....£59.95 P&P £5
RS-402 125-525MHz (200W).....£59.95 P&P £5
RS-3000 1.8-60MHz (3kW) Incls mod meter £79.95 P&P £5
RS-40 144/430MHz Pocket PWR/SWR .....£34.95 P&P £2
DL-30 diamond dummy load (100W max) ...£26.99 P&P £3

CUSHCRAFT BARGAINS *Delivery £12.00*

MA5B	Mini beam 10, 12, 15, 17, 20m	~~£389.00~~	£329.95
A3S	3 ele beam 10, 15, 20m	~~£499.95~~	£379.00
A4S	4 ele beam (10-20m)	~~£599.95~~	£449.99
R-6000	Vertical 6, 10, 12, 15, 17, 20m	~~£349.95~~	£315.95
R-8E	Vertical (40-10m) "special"	SPECIAL ~~£499.95~~	£399.99

CAROLINA WINDOM

CW-160S	(160-10m) 40m long	£129.95 P&P £8.50
CW-160	(160-10m) 80m long	£119.95 P&P £8.50
CW-80	(80-10m) 40m long	£89.95 P&P £8.50
CW-80S	(80-10m) 20m long	£109.95 P&P £8.50
CW-40	(40-10m) 20m long	£84.95 P&P £8.50

YAESU G-450C

Heavy duty rotator for HF beams, etc. Supplied with circular display control box and 25m of rotator cable.

OUR PRICE **£319.99**

G-650C	our price £359.99
G-1000DXC	our price £469.99
G-5500 (azimuth/elevation) rotator	our price £449.99
GC-065 thrust bearing	£48.00
GC-038 lower mast clamps	£25.00

AR788 *NEW MODEL*

Quality rotator for VHF/UHF. Superb for most VHF-UHF yagis, 3 core cable required. 3 core cable 50p per mtr.

OUR PRICE **£44.99**

AE-201 thrust bearing..£14.99

New station log books (A4) **£4.99** P&P £2.00
5 log books **£20.00** P&P £6.50

D-308B DELUXE DESK MIC

(with up/down). Many amateurs using this mic (over 4000) have expressed extreme pleasure with it's performance. Includes 8-pin round Yaesu mic lead.

£49.95 P&P £6.00

Yaesu	8 pin round to modular adapter (8 pin)	£19.99
Yaesu	8 pin round to 6 pin modular adapter	£19.99
A-08	8 pin "Alinco" round	£9.95
K-08	8 pin "Kenwood" round	£9.95
I-08	8 pin "Icom" round	£9.95
IM-08	Modular phone "Icom"	£9.95
KM-08	Kenwood modular lead	£9.95

MFJ-115

24 hour quartz clock. Major cities shown on rim. World map on face. "Know what time it is around the world".

SPECIAL **£19.99** P&P £5.00

U-120S

Superb handie speaker mic. Fits most Icom, Alinco, ADI, etc. Kenwood version also available. MS-107K £19.95

£19.95 P&P £2.50

TH-887 headset

ADAPTERS FOR MOBILE TCVRS AVAILABLE – PHONE

Superb headset for most handies.
887K (fits Kenwood) £24.95.
887 fits most twin socket-Alinco, Icom, Yaesu, etc.

£24.95 P&P £3

FIBRE GLASS POLES *Del £10.00*

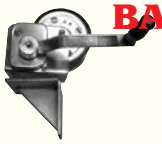
	1½"	1¾"	2"
1m	£8.50	£10.50	£12.50
2m	£16.00	£20.00	£24.00

Longer lengths available – phone

COPPER ANTENNA WIRE ETC

Enamelled (50m roll)	£16.95 P&P £5
Hard drawn (50m roll)	£16.95 P&P £5
Multi-Stranded (Grey PVC) (50m roll)	£13.95 P&P £5
Flexweave (H/duty 50 mtrs)	£30.00 P&P £5
Flexweave H/duty (18 mtrs)	£15.95 P&P £5
Flexweave (PVC coated 18 mtrs)	£18.95 P&P £5
Flexweave (PVC coated 50 mtrs)	£40.00 P&P £6
Special 200mtr roll PVC coated flexweave	£99.00 P&P £10
Copper plated earth rod (4ft)	£13.00 P&P £6
Copper plated earth rod (4ft) + earth wire	£18.99 P&P £6
New RF grounding wire (10m pack) PVC coated	£12.50 P&P £5

BARGAIN WINCH



500kg brake winch.
BARGAIN PRICE
£59.95 Del £8.50

Winch wall bracket	£19.99
Extra heavy duty "hanging pulley"	£14.50

MAST HEAD PULLEY

A simple to fit but very handy mast pulley with rope guides to avoid tangling. (Fits up to 2" mast).

£8.99 + P&P £2.50

NEW EASY FIT WALL PULLEY

Pulley will hang freely and take most rope up to 6mm. (Wall bracket not supplied).

PULLEY **£8.99** + P&P £2.50

Wall bracket, screws not supplied. Simply screw to outside wall and hang pulley on

WALL BRACKET **£2.99** P&P £1.00

COAX BARGAINS

Genuine high quality coax

MILITARY SPEC

RG-213 Mil spec x 100m.
NOW **£59.99** P&P £10

RG-58 Mil spec x 100m.
NOW **£25.00** P&P £10.00

Coax stripping tool (for RG-58) £4.50

COAX SWITCHES (P&P £4.50)

2 way CX-201 (0-1GHz) SO239	£19.95
2 way CX-201 'N' (0-1GHz) 'N'	£24.95
4 way CX-401 (0-500MHz) SO239	£69.95
4 way CX-401 'N' (0-500MHz) 'N'	£79.95

LOW LOSS PATCH LEADS £2.50 P&P

Connectors	Length	Price
PL-259 - PL-259	0.6m	£5.99
PL-259 - PL-259	4m	£9.99
BNC - BNC	1m	£6.99
BNC - BNC	5m	£10.00

MOBILE ANTENNAS *P&P £8.50*

DB-770M	2m/70cm (3.5 - 5.8dB) 1m PL-259	£24.95
DB-7900	2m/70cm (5.5 - 7.2dB) 1.6m PL-259	£39.95
PL-62M	6m + 2m (1.4m) PL-259	£21.99
PLT-20	20m mobile whip (56" long)	£24.95
PLT-40	40m mobile whip (64" long)	£24.95
PLT-80	80m mobile whip (64" long)	£24.95
PLT-259	PL-259 converter for above	£5.95

NEW NOISE FILTER!

A superb TDK 'snap fix' ferrite clamp for use in Radio/TV/ Mains/PC/Phone etc. *Simply close shut over cables and notice the difference!* Will fit cables up to 13mm diameter. Ideal on power supply leads/mic leads/audio leads/phone leads.

On thin cable simply wind cable round clamp 1-to-2 times. Simple yet effective!

OUR PRICE: **2 for £10** (p&p £2.50)

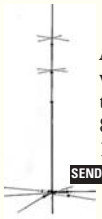
DOUBLE THICK FERRITE RINGS

A superb quaility ferrite ring with incredible properties. Ideal for "R.F.I". Width 12mm/OD35mm. 6 for £12.00
12 for £20.00 P&P £3.50
50 for £40.00 P&P 7.00

METAL WORK & BITS *P&P available on request*

2.4m/2" alloy poles		£19.99
2"	Mast base plate	£12.95 P&P £5
6"	Stand off	£6.95 P&P £5
9"	Stand off	£8.95 P&P £5
12"	T&K Brackets	£18.00 P&P £8
18"	T&K Brackets	£22.00 P&P £8
24"	T&K Brackets	£26.00 P&P £8
10mm fixing bolts (needs 8mm hole)		£1.40 each
U bolts (1½" or 2")		£1.20 each
8 nut universal clamp (2" - 2")		£5.95
2" - 2" cross over plate		£10.95
3-way guy ring		£3.95
4-way guy ring		£4.95
2" 3-way rotary guy ring		£29.99
2" mast sleeve		£9.95
Heavy duty guy kits (with wire)		£29.95 P&P £6
Ground fixing spikes (3 set) powdered coated		£24.00 P&P £8
30m pack nylon guy 4.4mm/B/load 480kg		£12.50 P&P £3
132m roll nylon guy (4.4mm)		£40.00 P&P £7.50
Self amalgamating tape (roll)		£6.50
'Nylon' dog bone insulators		£1.00 each
Chimney lashing kit		£12.99

DIAMOND CP-6



A superb (diamond quality) 6 band trap verticle antenna with trap radials – "rotary" trap system allows "flat wall" mounting. 80m/40m/20m/ 15m/10m/6m. 200W SSB, HT 4.6m

SEND SAE FOR DATA SHEET

OUR PRICE **£219.99**

Q-TEK PENETRATOR

"WE'VE SOLD 100S ALL OVER EUROPE"

★ 1.8 - 60MHz HF vertical ★ 15 foot high ★ No ATU or ground radials required ★ (200W PEP).

ONLY **£179.95** Del £10.00

SEND SAE FOR LEAFLET

DELUXE G5RV P&P on either full/half size £6.50

Multi-stranded heavy duty flexweave wire. All parts replaceable. Stainless steel and galvanised fittings.

Double size - 200ft (160-10m)	£84.95
Full size - 102ft (80-10m)	£42.95
Half size 51ft. (40-10m)	£36.95
Choke Balun — Inline balun for G5RV	£24.95 P&P £3

STANDARD G5RV

Full size	102ft	(now includes heavy duty 300Ω ribbon)	£28.95 P&P £6
Half size	51ft	(now includes heavy duty 300Ω ribbon)	£24.95 P&P £6

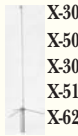
Q-TEK INDUCTORS

80mtr inductors + wire to convert ½ size G5RV into full size. (Adds 8ft either end) ..... £25.00 P&P £4.00 (a pair)

G5RV PARTS

Open wire dipole centre	£5.99
SO-239 dipole centre	£5.99
SO-239 to 300Ω joiner	£8.99
300Ω ribbon (Extra heavy duty)	£1/mtr

Q-TEK COLINEARS (VHF/UHF) *P&P £10.00*



X-30 GF 144/70, 3/6dB (1.1m)	£39.95
X-50 GF 144/70, 4.5/7.2dB (1.7m)	£54.95
X-300 GF 144/70,6.5/9dB (3m)	£69.95
X-510 GF 144/70, 8.5/11dB (5.4m)	special £89.95
X-627 GF 50/144/70, 2.15/6.2/8.4dBi (2.4m)	£79.95

BALUNS & TRAPS

1.1 Balun			£25.00 P&P £4
4.1 Balun			£25.00 P&P £4
6.1 Balun			£25.00 P&P £4
40 mtrs	Traps	(a pair)	£25.00 P&P £4
80 mtrs	Traps	(a pair)	£25.00 P&P £4
20 mtrs	Traps	(a pair)	£25.00 P&P £4

1kw Handling

TELESCOPIC MASTS

6 section telescopic masts. Starting at 2"/2" in diameter and finishing with a top section of 1"/4" diameter we offer a 8 metre and a 12 metre version. Each mast is supplied with guy rings and steel pins for locking the sections when erected. The closed height of the 8 metre mast is just 5 feet and the 12 metre version at 8 feet. All sections are extruded aluminium tube with a 16 gauge wall thickness.

8 mtrs **£109.95** 12 mtrs **£149.95** *Carriage £12.00.*

Tripod for telescopic masts £89.95

REPLACEMENT POWER LEADS

DC-1 Standard 6-pin/20A fits most HF	£20.00
DC-2 Standard 2-pin/15A fits most VHF/UHF	£10.00

YAESU REPLACEMENT MICS

MH-IC8 8 pin Yaesu mic (8-pin round)	£22.50
MH-4 4 pin fits older HF, etc. (4-pin round)	£15.00

CAR BOOT MAST SET

Once they've gone, they've gone! 5 section (15') 4.5m 1¼" slot together mast set. Collapsed length 0.92m (3') makes this ideal for travelling.

£24.95 Del £10.00

2 for £39.99 del £12.50 — 3 for £50.00 del £12.50

NEW 20' SLEEVED MAST SET

A heavy duty-sleeved, mast set that will tightly slot together. 4 x 5' (2" dia) 16 guage heavy duty aluminuim tubes. (Dimensions approx).

£49.99 Del £10.00.

TWO FOR £90.00 DEL £12.50

ALUMINIUM POLE CLEARANCE

We have sets of 4 (2") poles (3 of which are swaged) that slot together to make a (approx) 20' pole. Each section is approx 5' long – some have small dents in – some have been swaged slightly off centre – hence the price.

2 FOR £35.00 DEL £12.50

SCRAP PRICE **£19.95** Del £10.00

By Norman Fitch, G3FPK

40 Eskdale Gardens, Purley, Surrey CR8 1EZ

E-mail: g3fpk@compuserve.com

VHF/UHF

Norman Fitch takes a look at the content of some specialist VHF / UHF publications

The quarterly publication *VHF Communications* is now in its 37th volume and the Spring issue, 2005-Q1, includes several articles of interest to VHF/UHF enthusiasts. Gunthard Kraus, DG8GB, has a 12-page contribution on stripline low-pass filters, all copiously illustrated with photographs and computer graphs. He also edits the 'Internet Treasure Trove' column and has unearthed some interesting information covering antenna design software, LC filter design and cubical quad antennas - see 'Web Search'. This edition includes the index to last year's volume. Andy Barter, G8ATD, edits *VHF Communications* and you can e-mail him at andy@vhfcomm.co.uk for subscription details.

The quarterly *DUBUS* magazine is in its 34th volume and issue 1/2005 begins with a long article on the 'Thunderstorm effect on Sporadic E propagation in 144MHz' by Volker Grassmann, DF5AI, *et al.* This is a very thorough discussion of this phenomenon with observations by amateurs worldwide. Klaus von der Heide, DJ5HG, writes about 'Simulating Yagi Antenna Groups' using "the now aged *NEC2*" program, to use his description. Other items include 2m and 70cm EME news, tropo, FAI, 4m and 6m news, MS, TEP and aurora reports, beacon lists and a comprehensive meteor shower calendar. The UK agent for *DUBUS* is Roger Blackwell, G4PMK (QTHR), whose e-mail address is dubus@marsport.demon.co.uk

SOLAR AND GEOMAGNETIC DATA

The general level of solar activity continues to decline and in the 30 days to 12 April the 10.7cm radio flux averaged 87.8 units. It was over 100 on only four days, the peak value being 112 on 14 March and the minimum value 77 on the 31st. The maximum SESC sunspot number was 65 on the 25th and the lowest figure was 11 on the 30th when the sunspot area in millionths of the sun's visible disc dropped to just 10. Only nine new regions were recorded. There were 25 geomagnetic quiet days recorded at the middle latitude Fredericksburg Observatory with the A-index down to just one on 2 April. The peak value was 30 on the 5th and the estimated planetary A-index that day was 48. So our star is in a fairly benign state at this stage of the cycle and there have been no reports of any Es activity on 6m while what auroral activity there has been was confined to high latitudes.

DXPEDITION

Keith Tatnall, G4ODA, and Paul Bradfield, G1GSN, who operated briefly from Foula Island (IP80) on their way back from Iceland last summer, are making a return trip to Foula for the period 5-17 June, weather permitting. They plan to operate from a better site this time and the main effort will be on 6m and 2m tropo and Es plus some *WSJT* operation. They will also be QRV on 4m plus some higher bands if conditions merit it.

METEOR SCATTER

There are few reports of MS activity on 2m these days but Bryn Llewellyn, G4DEZ (JO03), had a QSO on 2 April with EA3TI (JN11) on random SSB with 26 reports exchanged. On the 4th he completed with two OH and one LA stations. Brian Oughton, G4AEZ, operating club station G8VYK (JO01), completed on FSK441 mode with DF5NK (JN59) on 22 March, with IW0UEI (JN40) and HA5LV (JN97) on the 23rd and with SM1BSA (JO97) on the 24th.

There are two reasonable meteor showers in June, the first being the Arietids. The OH5IY *MSS0FT* program predicts a peak at 1020 on the 7th ±12 hours with a ZHR of 60. This stream's radiant is above a mid-UK horizon for about 17 hours from 0100 and the reflection efficiency is over 50% of that at peak for about six days. The next shower is the Zeta Perseids, which should peak at 1000 on the 9th ±12 hours with a ZHR of 40. Reflection efficiency is over 50% of that at peak for three days and the availability is similar to the foregoing. There are about half a dozen other meteor streams in the latter half of June and they are listed on page 94 in the 1/2005 issue of *DUBUS* magazine.

MOONBOUNCE

Howard Ling, G4CCH (IO93), was QRV on 23cm over the 9/10 April weekend but strong winds prevented an activity on the Saturday. On the 10th he completed with RW1AW* for initial (#) 200, exchanging 559/569 with Alex who uses a 3.7m dish antenna and 180W. On the 12th W7UPF (RO/O and 559/449) was #201 and Don uses a 10ft dish and 200W. His 495 points in the 23cm SSB contest on the 19/20 February weekend earned him second place; see the May 'VHF/UHF' for a list of his contacts. He came second in the 23cm single operator section in the 2004 ARRL International EME Competition and not third as reported last month.

There are three reports from English operators in the April edition of *The 432 and Above EME News*, edited by Al Katz, K2UYH. Peter Blair, G3LTF (IO91), reports that most of his March CW activity was outside the normal weekends. On 70cm on the 12th he completed with G4ALH, G4RGK and OZ4MM and next day with S53RM #386 and PA3CSG. The 20th brought QSOs with I5CTE, DK3WG, N9AB and KL6M. On 23cm on the 13th he completed with G4CCH and IW2FZR #212, K9SLQ, ON7UN and LA9NEA; with K5JL on the 20th and on the 21st N2IQ, VE6TA and K9SLQ.

In the March activity weekend (AW) Peter Etheridge, G4ERG (IO93), was QRV on 70cm and completed random contacts with WA4NJP, NC1I, KL6M, N9AB, SV1BTR, DL9KR and PE1ITR a 2-Yagi station and #189. In skeds during the week he worked single-Yagi station WA6PY #190 and UT2EG #191. Peter is now running an array of 16 x 10-ele Yagis with polarisation rotation, a pair of 3CX800A tubes in his PA and an MGF1302 LNA. Paul Tomlinson, M0EME (IO93), running 100W to 4 x FO19 Yagis made his first EME contact in March. It was on CW with DL9KR on 70cm.

In a section in the *N/L,* as we call it, entitled 'EME Controversies' K2UYH writes about the controversies surrounding current EME operation since the arrival of *WSJT* digital modes (DMs). The main problem is whether DM contacts should be recognised during contests, for awards and initial counting bundled with CW and SSB QSOs. On the topic of so-called 'assisted contacts' Al points out that in ARRL VHF/UHF contests the use of the Internet for assistance is prohibited. But in the 2004 ARRL International EME Competition the ARRL accepted entries from stations that declared assisted QSOs.

This has resulted in hundreds of postings to the Moon Net group website ranging from those who think DMs and assisted QSOs should be allowed to those who seem to be vehemently opposed, refuse to have anything to do with them, inferring a dumbing down of EME operation. It seems to me that the obvious way to deal with these contentious matters is for the sponsors of contests and awards programmes to make up their minds whether to include DM contacts or put them in a separate category. We have separate CW, SSB and RTTY contests and awards, so why not separate DM events and awards? If sponsors organise all-mode contests or awards, let them make it quite clear what modes are permitted by the rules.

The following items are derived from the Moon Net. Bernd Mischlewski, DF2ZC, reports that Ernie Gray, W1MRQ, will be operating on 2m from the McMurdo Station on Ross Island, Antarctica (RB32ID) signing KC4/W1MRQ until at least August and can be found on N0UK's JT65 logger every now and then. He is

using 120W to an array of four DPM 144-5 Yagis, the estimated ERP being around 3.6kW. Joop Mutter, PA0JMV, says he will publish further details on his home page - see 'Web search'.

Joe Kraft, DL8HCZ, reminds us that the final section of the European Worldwide EME contest is on the 11/12 June weekend and will be for the 70cm and 6cm bands. There are new sections; CW only, Digital only and mixed with 'assisted' stations marked with an asterisk (*). Full rules are on a website - see 'Web search.' Ed Cole, has a new callsign, KL7UW - he was AL7EB.

Dave Blaschke, W5UN (EM23), reports that the first ever EME QSO from Macquarie Island was made at 0630 on 17 March when he worked Dave Taylor, VK0MT, on 144.133MHz using JT65B mode. VK0MT, who was due to leave the island at the end of March, was running 120W to a single 10-ele Yagi and went on to work KB8RQ. W5UN was grateful to Rex Moncur, VK7MO, for arranging the contact between to two Daves so that the sked could be set up and the necessary operating procedures explained. During the 9/10 April weekend Lance Collister, W7GJ (DN27), worked single Yagi stations G4IGO, G4PCI and G8BCG/P on 6m at UK moonset using JT65A mode.

Joe Taylor, K1JT writes, "Recently there has been some EME activity from Antarctica, using the callsign KC4/W1MRQ. KC4 is not supported as a DXCC prefix in version 4.9.6 of *WSJT* when using JT65 mode. Version 4.9.7 has been created to correct this deficiency. To be able to use a callsign like KC4/W1MRQ with full efficiency, both stations will need to upgrade to Version 4.9.7." The update file may be downloaded from the website - see 'Web search.'

He continues, "Version 0.8.0 of the program *SimJT* is available for download from the *WSJT* home page. *SimJT* was designed as an aid for testing the JT65 modes of *WSJT*. You can use it to generate JT65 test signals with specified message content, signal-to-noise ratio, and other parameters. For comparison purposes you can also generate Morse code messages with controllable parameters.

"The test signals can be played from one computer into another, or even back into the same computer, via the audio input / output ports. The signals can be saved as wave files for later analysis by *WSJT* or other means. The *SimJT User's Guide* is available at the website. It is included with the program distribution and I would be pleased to receive comments or suggestions relating to *SimJT*."

BAND REPORTS

50MHz

In his one-page March report Ted Collins, G4UPS (IO81), concludes, "Dreadful conditions. Longest period I can remember with no Sporadic E conditions." While he was making a dipole for 6m Ian Hogan, G6TGO (IO83), completed a contact with G6NVO (IO91) on 28 March. Running 100W into it at 6ft AGL he got an RS51-6 report. Niels Montanana, G8RWG (JO01), has put up a 5-ele Yagi for 6m in time for the forthcoming Es season in his first venture on to the 'magic band'. His transceiver is an old FT-726R and initially he'll be running 10W but hopes to pick up a second-hand amplifier later. Kevin Jackson, M0XLT (IO83), heard Portuguese beacon CT0SIX (IN50) for just over half an hour from 1025 on 7 March.

Don't forget the NACs - Nordic Activity Contests - now changed to the second Thursday of the month. The June date is the 9th and the time 1900-2300 CET, so 1800-2200 for the Brits. The Danish 6m group is maintaining its cumulative contest on the fourth Tuesday of the month, so the next dates are 24 May and 28 June. The RSGB Activity Contest is also on these days from 2000-2230 *local* time - see 'Web search' for the rules for these events.

144MHz

Tropo conditions were pretty dire for most of this month and those who check the Hepburn website - see 'Web search'-for tropo ducting forecasts will have seen many days when the charts for the British Isles were all dark grey signifying nil propagation by this mode. That said, John Goody, M1IOS, reports, "I have a small single band unity gain vertical, 0.75 metres long, for monitoring local marine, coastguard and rescue services traffic around the Islands of Scilly. This vertical is taped to one of the roof trusses inside the loft space. For this purpose I use a Yaesu 1500M. Usually I monitor frequencies around 156MHz, but always scan the amateur calling and the repeater section of 2m.

"On very rare occasions I hear the St Ives 2m repeater, and even rarer, have QSOd through the North Devon GB3DN, St Austell GB3NC and the North Cornwall GB3PL repeaters. On 19 March there was a remarkable opening from the Islands of Scilly into the EI7DAR Dundalk Repeater on R3. The opening commenced at 0900 and lasted well past 1800. During this period I had the pleasure of enjoying, that very rare experience for Scilly, superb FM QSOs with stations: for example, MI1DJW in Antrim; GW3XRM on Anglesey; EI9FEB in Leinster and VK3FPD/4/M, Dave from Brisbane, Queensland, Australia who had con-

Dave Taylor, VK0MT, who made the first EME QSO from Macquarie Island.

PHOTO: DMITRY DMITRIEV, RA3AQ, WEBSITE: WWW.VHFDX.RU

The VK0MT location on Macquarie Island.

PHOTO: DMITRY DMITRIEV, RA3AQ, WEBSITE: WWW.VHFDX.RU

LOCATOR SQUARES TABLE

Starting date: 1-1-1979

Call	50MHz	70MHz	144MHz	430MHz	1296MHz	Total
G3XDY	-	34	261	179	130	604
G4YTL	11	56	560	141	14	782
G4DEZ	691	42	232	103	49	1117
G6TTL	405	-	140	94	28	667
G8HGN	346	-	208	77	-	631
G8TOK	424	44	145	58	34	705
M5BXB	453	15	192	57	-	717
G3FIJ	278	29	108	51	23	489
G0FYD	724	1	296	50	17	1088
GW3LEW	436	14	232	42	4	728
GW3HWR	478	31	187	34	-	730
G4APJ	192	-	64	32	-	288
G0ISW	240	7	103	22	-	372
MM3ERP	91	3	83	22	-	199
G4VPD	457	14	231	16	-	718
G8VYK	67	4	131	16	-	218
M3GUA	17	-	20	14	-	51
G4OBK	469	28	79	11	-	587
M1DUD	294	1	54	10	-	359
MU0FAL	540	-	49	9	4	602
G4FUJ	111	20	28	6	5	170
M3CVN	249	-	46	5	-	300
G0JHC	1040	26	48	4	-	1118
GM4VVX	357	22	170	2	-	551
M0XLT	177	-	17	2	-	196
M1FEO	59	-	26	1	-	86
GW7SMV	684	-	260	-	-	944
G3IKR	340	52	45	-	-	437
EA7IT	209	-	108	-	-	317
G3FPK	30	-	246	-	-	276
M5MUF	155	23	70	-	6	254
G8RWG	1	-	130	-	-	131

No satellite, repeater or packet radio QSOs. If no updates received for a year entries will be deleted. Band of the month 430MHz.
Next deadline is 7 June.

nected through an Internet node. Interestingly, Gerry's, MI3GHW, signals were able to open the squelch on the input frequency.

"The weather was peculiar. There was an unusual temperature gradient between the relatively cold sea and the mild, predominantly southerly wind. This had produced high humidity, resulting in fog and for some days the local helicopter and small *Highlander* fixed wing services were grounded. I suspect propagation was super-refraction, where the propagation is not in a straight line and the K-Factor has a value greater than 1."

John concludes, "I also monitor the frequencies from 50.080 to 50.200MHz for both J3E and CW contacts, but again am limited by only having a vertical antenna. If there is an opening, and any one requires IOTA EU-011, WAB SV91, or Grid IN69UV, please try pointing your beam in my direction. I am also happy to try a schedule. Again, QSOs are rare with UK stations, but I do enjoy openings into Italy, Spain and Portugal (funny but I have never heard a French station on 6 metres)." m1ios@tiscali.co.uk is his e-mail address.

G4DEZ reports a tropo CW QSO on 3 April with SK7MW with RST559 reports at 874km under flat band conditions. On the 5th he was called by OZ1BEF (JO46) for a new 2005 grid. G6TGO worked M0FGH (JO01) on 15 March and on the 29th he contacted GW3RKD (IO72) getting a peak S8 report. The QRB is only 178km but the path is very obstructed by trees and hills.

G8RWG worked F4AZF/P (JN39) on 28 March and learned that Damon is moving to that location. On 2 April Niels contacted GM4IFC/P (IO85). On 18 March G8VYK had a QSO with OO2CYV (JO21), the special Belgian prefix. David Aknin, F5IHN (JN23), would like reception reports on beacon F5XAV (JN24GB) which he manages. It's known as the beacon of the Pont du Gard and is on 144.450MHz. His e-mail address is f5ihn@wanadoo.fr

430MHz

The only mention of 70cm activity was from G6TGO who contacted M0FGH on 15 March and who was running 70W to a 19-ele Yagi only 60cm AGL. Steve's signal was as strong as it was on 2m. Next day Ian contacted EI3GE (IO63) who was using 10W to a home brew 22-ele Yagi.

DEADLINES

The copy deadline for August is **14 June** when I hope there will be some decent tropo and Es to report. The September date is **12 July**. My telephone answering and fax machine is on 020 8763 9457 and my CompuServe ID is g3fpk ♦

WEB SEARCH

VHF Communications	www.vhfcomm.co.uk
Antenna design s/w	www.dxzone.com/catalog/Software/Antenna_analysis/
LC filter design	www-users.cs.york.ac.uk/~fisher/lcfilter/
Cubical quad antennas	www.softcom.net/users/kd6kds/quad.html
DUBUS	www.DUBUS.org
PA0JMV	www.planet.nl/~pa0jmv
EU WW contest rules	www.marsport.demon.co.uk/EMEcont2005.pdf
K1JT latest *WSJT* s/w	http://pulsar.princeton.edu/~joe/K1JT/UPD497.EXE
***SimJT* software**	http://pulsar.princeton.edu/~joe/K1JT
SimJT User's Guide	http://pulsar.princeton.edu/~joe/K1JT/SimJT_User_080.pdf
OZ 6m contest rules	www.qsl.net/oz7six/
RSGB 6m contest rules	www.blacksheep.org/vhfcc/rules/05rules/fullindex.html
Hepburn tropo forecasts	http://home.cogeco.ca/~dxinfo_tropo_new.html

HELPLINES

♦ G Tew, G8GZC, is looking for a manual for the Yaesu FR-50B receiver. G8GZC, QTHR. Tel: 01460 64376.

♦ John, GM4ACO, asks if anyone can tell him how to recover deleted channels in a Grundig digital TV model MW70-600 IRDT? Automatic or manual tuning does not restore them. GM4ACO, QTHR. Tel: 01592 874 719.

♦ Stuart, G0FYX, is trying to obtain an obsolete chip. It is a voice record/playback chip type ISD1020AP, as used in an MFJ-432 Voice Keyer. He has tried most of the 'usual sources'. G0FYX, QTHR. Tel: 023 9247 2846, or e-mail: g0fyx@msn.com

♦ Bob, G3VVT is seeking information about the Datong DF system that was available in the 1980s; in particular, the circuit of the head unit is needed to construct a replacement for a missing item. Failing this, has anybody got a head unit that they are willing to loan for circuit tracing? G3VVT, QTHR. Tel: 01539 720 789, or e-mail: g3vvt@aol.com

♦ Dave, G4FKI, is looking for a circuit diagram for the Microwave Modules 144/70 transverter (*not* the version with a 2N4427 drive). G4FKI, QTHR. E-mail: thorpe.319@ntlworld.com

♦ Wilf, GD0IFU, is looking for a circuit diagram for the main PCB (OS1400) of his Gould OS300 oscilloscope which has focus trouble. Expenses will be refunded. GD0IFU, QTHR. Tel: 01624 629 455.

♦ Bob, RS46829, is looking for a Leak Stereo 70 amplifier, and a cone for a Goodmans Audiom 70 loudspeaker. All expenses reimbursed. RS46829, tel: 01942 255 948.

♦ Eric, G4WMT, seeks help (manual, software, etc) to enable him to use his PacComm Tiny-2 Mk2 for AmTOR & packet with his FT-840 and computer. G4WMT, QTHR. Tel: 01405 817 447, or e-mail: ericg4wmt@telco4u.net

♦ Dennis, G3LLZ, has a poorly Datong ANF filter; it operates on 'manual', but will not search for tones. He would appreciate a circuit diagram or other offers of help. G3LLZ, QTHR. Tel: 01793 828 188, or e-mail: dennis.goacher@rwenpower.co.uk

♦ William, G8CMK, wonders if the Smith Chart is copyright, and if anyone knows a supplier of these charts 'wallpaper size'? G8CMK, QTHR. E-mail: g8cmk@beeb.net

♦ Anatoly, UR5HDE, has broken his Bencher BY-1 iambic key, and cannot get a replacement in the Ukraine. Has anyone an idle iambic key for him to use as a replacement? Anatoly Prokopovich, Ulitsa Mira 33-41, Grebionka, Poltavskoj, 37400 Ukraine.

♦ Gordon, G8MMM, is trying to trace an old friend, Lewis Illingworth, son of G8QG, formerly of Southport. Perhaps anyone who knows Lewis could contact Gordon? G8MMM, QTHR. E-mail: ordon.nicholas@btinternet.com

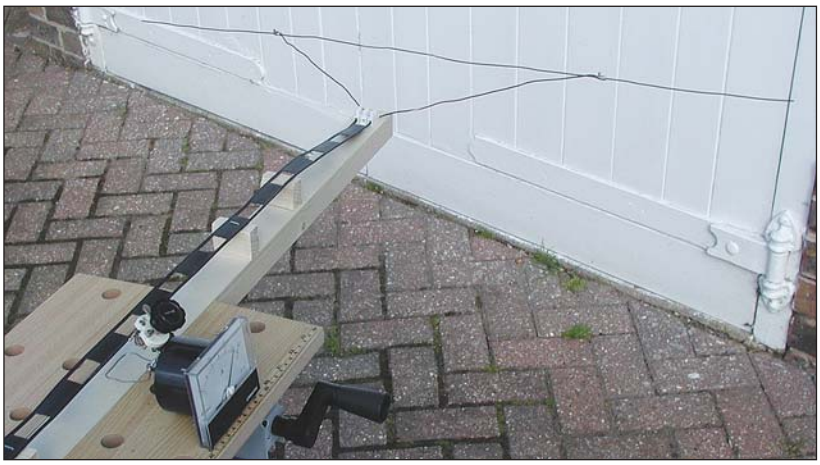
Peter Dodd, G3LDO

37 The Ridings, East Preston, W Sussex BN16 2TW

E-mail: g3ldo@ukonline.co.uk

Antennas

This month, G3LDO unravels some of the finer points of SWR – what it means and how it is measured



SWR test set-up.

When I first came to amateur radio back in 1955, most radio equipment was home-made and all radio equipment used valves. The most common method of matching the transmitter PA to the antenna via coaxial transmission line was the variable π-tank circuit as shown in **Fig 1**. This arrangement allowed the tuning and matching of quite a range of antenna impedances. Matching was achieved by first tuning the PA to resonance with C1, indicated by a sharp dip in the anode current. The value of C2 was then reduced causing the anode current dip to become less sharp at resonance as the loading was increased, and was set so the PA was operating at the correct rated anode current. The higher the feed impedance of the antenna and feeder the lower the value of C2. The dial of C2 could be calibrated using a number of dummy loads of different resistive values. At this stage I hadn't heard of the SWR meter.

WHY SWR AND VSWR?

So at what stage did SWR become the important measure of transmission line impedance matching - and why *V*SWR, as seen in some amateur radio literature?

The 1947 edition of the ARRL *Radio Amateurs' Handbook* shows that open wire transmission line was used to connect the transmitter (and receiver) to the antenna on the HF bands, connected to the transmitter PA via a coupling coil. Matching was achieved by varying the distance between the antenna coupling coil and the PA tank circuit, while observing the PA anode current at resonance, as described above. Commercial radio used the same technique and used open wire transmission line supported, on wooden poles, to connect transmitters to antennas.

Because commercial station antennas were often located some distance from the transmitters, the business of adjusting any matching circuit at the antenna could be a problem if no method of monitoring the transmission line/antenna matching was available. The solution was to monitor SWR.

When a wave, travelling along a transmission line from the transmitter to the antenna (incident wave), encounters an impedance that is not the same as the impedance of the line, some of the wave is reflected (reflected wave). Whenever two sinusoidal waves of the same frequency propagate in opposite directions along the same transmission line, as occurs in any system exhibiting reflections, a static interference pattern is formed along the line, as illustrated in **Fig 2**.

For the purposes of quantifying reflection, we are interested in the amplitude of the maxima and minima. Standing Wave Ratio (SWR) is defined as the ratio of the voltage or current maximum to the voltage or current minimum along a transmission line.

MEASURING ISWR

An interesting method of measuring SWR is described in [1]. It says: "The first step in matching the (antenna) array to the line is to energise the line and observe the stationary (SWR) wave. A suitable arrangement for this purpose is shown in **Fig 3**. It consists of a thermo-ammeter, reading 0-120mA, which is mounted in a loop circuit; this loop may be suspended from one of the conductors forming the transmission line. The size of the loop is suitable for an input into the line in the order of 1kW. The line is energised at a reduced input and the loop drawn along it, and the current reading observed, field glasses [binoculars] being of assistance in this process.

"The current maximum point nearest the array is then selected for particular observation and the power

FIG 1 © RADCOM 488

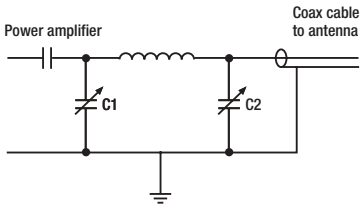


Fig 1
The π-tank circuit.

FIG 2 © RADCOM 489

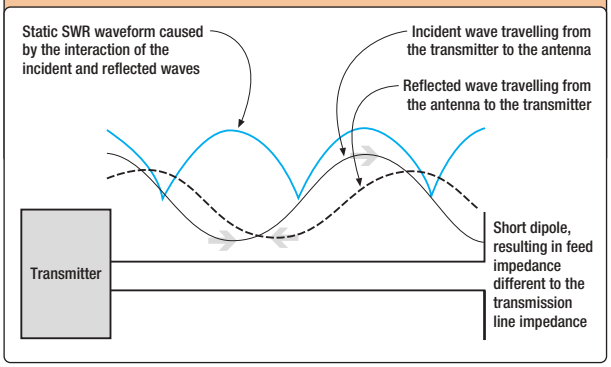


Fig 2
How a standing wave is created on a transmission line.

FIG 3 © RADCOM 490

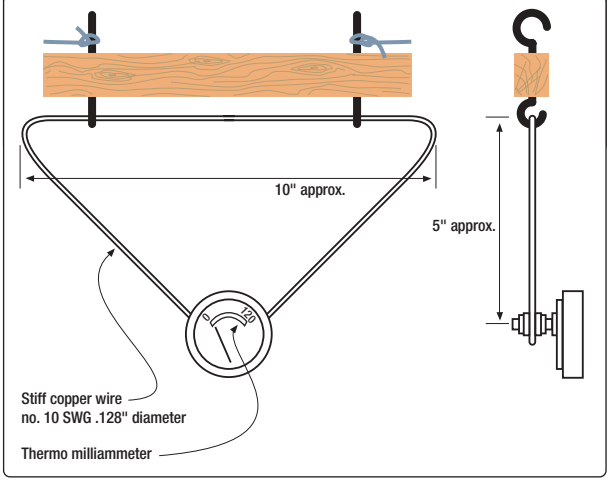


FIG 4 © RADCOM 491

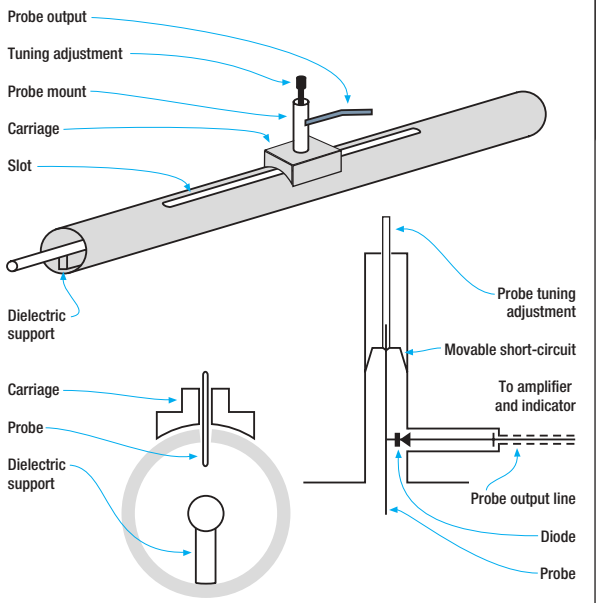


FIG 5 © RADCOM 492

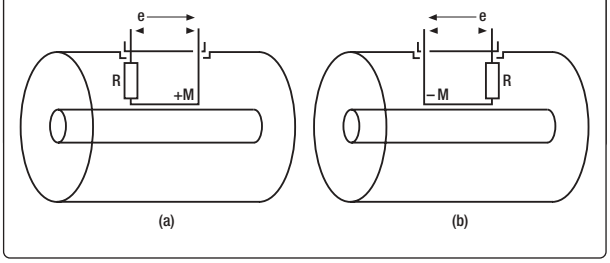


Fig 3
Construction of an instrument for measuring current SWR on open wire transmission line.

Fig 4
Details of a slotted line type of standing wave detector for coaxial line.

Fig 5
The directional coupler sensing circuit. At (a) mutual coupling is positive, at (b), negative.

increased until the ammeter gives nearly full scale deflection. The exact position on the line of the current measurement should be marked, and the actual scale reading, I_{max}, noted. The loop is then drawn along the line to the adjacent minimum, the current, I_{min}, being noted and the position marked".

The measurement method described above measures the current component of SWR and could be described as ISWR. I tried this method as shown in the photograph. The test setup comprised a length of 450Ω slotted line feeding a delta-matched dipole on the 2m band. The current probe consisted of a tuned single loop, a diode and a meter. This arrangement allowed SWR to be seen, but the test set up lacks the precision for any meaningful measurement. However, the dipole delta-match could be adjusted by placing the current probe at the maximum point and adjusting the dipole for minimum reading. An energising power of 0.5W from an FT-817 via a transformer balun was sufficient to make the measurement.

MEASURING VSWR

The voltage component could be measured on a length of twin-line feeder, using a neon tube or a probe sensitive only to the voltage component. I have used such a method of measuring SWR on the waveguide of 3cm H_2S radar while in the RAF many years ago. The test equipment comprised a small thin neon tube, with calibration marks on the side like a thermometer and was inserted into the slot of a short length of waveguide. When the transmitter was fired up the lower section of the neon tube was energised and glowed red, the height of the red glow in the tube varied as the tube was moved along the slot. The SWR (or VSWR in this case) was determined by comparing the maximum and minimum voltage levels.

A voltage probe for coax line is shown in **Fig 4**. In this case the instrument comprises a short wire probe, a coaxial resonant line and a diode. The voltage output is then measured on a sensitive electronic voltmeter.

THE DIRECTIONAL COUPLER

From the descriptions of SWR so far, it can be seen that two measurements are required at two different positions on the transmission line, but the SWR meters in use these days are located in one position in the line. They use a device called a 'directional coupler', also known as a 'reflectometer'. It works because the current and voltage of the incident wave (see Fig 1) are in phase while the current and voltage of the reflected wave are 180 degrees out of phase.

FIG 6 © RADCOM 493

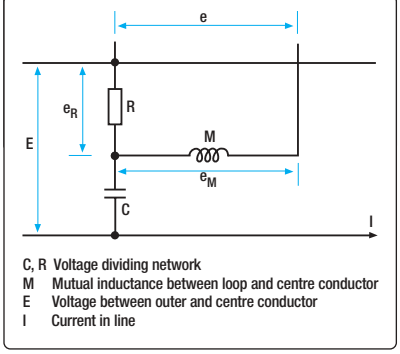


Fig 6
Basic sensing circuit.

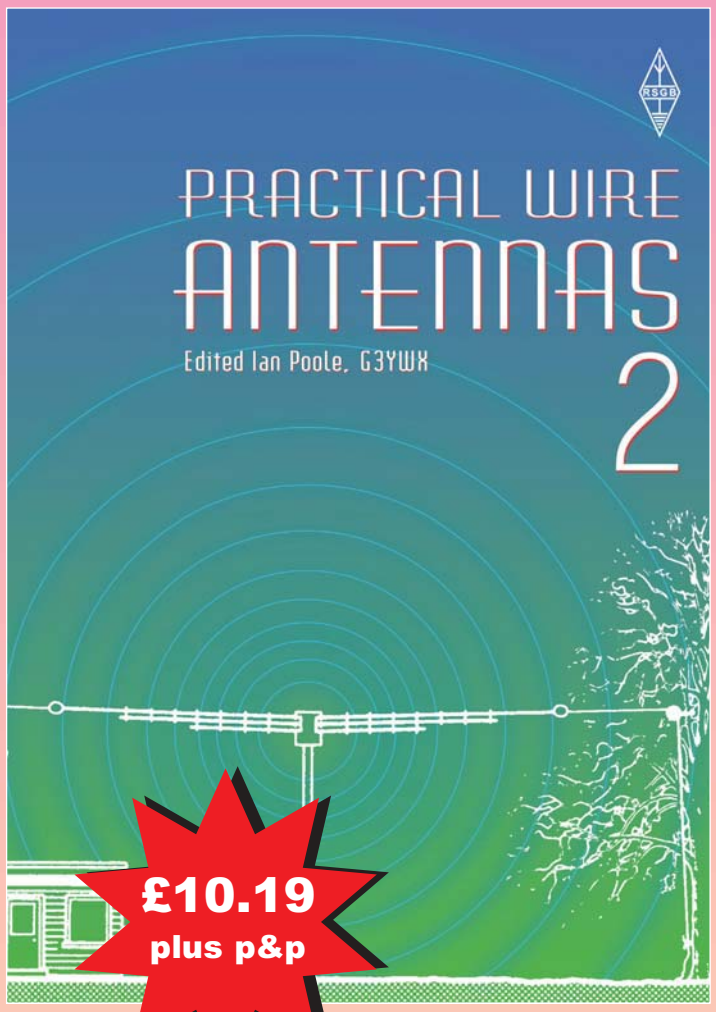
A simplified diagram of a directional coupler is shown in **Fig 5**. It comprises a small length of coaxial cable with a small loop of wire inserted running parallel with the centre conductor, one end terminated in resistance, R. **Fig 6** shows the equivalent electrical circuit. C is the capacitance between the loop and the centre conductor, M the mutual inductance between the two and E is the voltage between the outer and the inner conductors. I is the current in the centre conductor.

The loop and the centre conductor can be considered as a transformer with the induced current in the loop converted to a voltage across R. This voltage is summed with E to produce a vector, *e*. These currents and voltages are the components of the incident wave. The directional coupler has two loops, each with its own measurement meter or a meter that can be switched between them (or one loop whose direction can be switched). When the second loop is switched in, the current vector is 180° out of phase from the first reading (while the voltage phase is the same as the first measurement). These currents and voltages are the components of the reflected wave. This description is rather simplistic and a more in-depth mathematical description is given in [2].

The ratio of voltage and current measurements will be affected by the load at the antenna connection of the directional coupler and is calibrated in terms of SWR, although it doesn't actually measure SWR as described earlier. It could also be calibrated as RF power or any of the Smith chart radially-scaled parameters such as return loss or reflection coefficient. It still doesn't answer the question of why some people talk about VSWR when they are using a directional-coupler-type instrument to measure transmission line mismatch. ♦

REFERENCES

[1] *RAF Signal Manual,* Air Publication 1093. (1945).
[2] Reflectometers and directional power meters, M M Bibby, G3NJY, *RadCom* June 1968. Also in *HF Antenna Collection* (RSGB).



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Edited by Ian Poole G3YWX

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Whatever next

G3ZVW warns about the possibility of electronic identity theft, the User Interface of the 'ideal transceiver', and discusses the trends towards digital modes indicated by the 'joint business and technology alliance' of Icom and Kenwood in the USA

Biometric passport holders beware; the potential exists for the RFID chip in your passport to be accessed by an unauthorised reader in a process known as 'skimming'. The US State Department, which plans to start issuing biometric passports to its citizens later this year, says its critics are overstating the risks... but, according to Frank Moss, the deputy assistant secretary for passport services at the State Department, they are also adding technical features to prevent the chips in new passports from being skimmed. Unfortunately, the technical features don't include encryption of the data, which is another bone of contention to critics of the system.

Business travel groups, security experts and privacy advocates are looking to derail the government plan to insert remotely readable chips in American passports, calling them homing devices for high-tech muggers, identity thieves, kidnappers and even terrorists. In response, the US State Department says its critics are overstating the risks and that the chips will cut down on passport forgery, improve security and speed up border crossings.

THE NEXT GENERATION

In April, I detailed the transmitter and last month the receiver. Each employed some ideas we don't see in today's commercially-made amateur radio equipment. This month things get really novel!

THE USER INTERFACE

The front panel of a transceiver has always been an extremely important selling point... but is it any more? In fact the Stevenage delegates thought that the next generation transceiver should have a variety of detachable front panels that could be operated remotely. Once again, there should be options.

- You could have a fully-blown front panel, with controls for just about everything (a balanced mix of rotary controls and buttons were seen as better than all buttons or all rotaries). By necessity, this would be quite large, so it would be best suited to base station use.
- You could have a simpler and less-cluttered front panel, where access to infrequently-used controls would be via levels of menu. Such a front panel would be smaller and consequently ideal for mounting in a vehicle, but it would also be well suited to domestic environments where space is severely limited.
- The third option is extremely radical. The delegates want the protocols for controlling the transceiver to be an open-standard interface, so that third party manufacturers such as MFJ could make a front panel to go with it.
- Finally, just like the Kenwood TS-2000B, you could have no front panel at all, choosing instead to control the transceiver via computer.

Wouldn't it be nice to be able to unplug your transceiver from home, leaving the sophisticated front panel behind in the shack, then put it in your car where its more basic cousin lives permanently? Irrespective of whether a front panel was made by the transceiver manufacturer or someone else, the most important aspects were seen as a colour TFT display and a high-quality tuning control. With the advent of inexpensive portable DVD players, small TFT displays are now cheap. By contrast, good optical encoder/flywheel assemblies are expensive, but this was seen as something worth spending money on.

Next month, connectivity.

JOINING FORCES

Icom and Kenwood have teamed up in the USA in a joint business and technology alliance to develop a state-of-the-art digital communication technology for the business and industry sector. The two companies made a simultaneous announcement and showed working prototypes at the International Wireless Communications Exposition and Convention (IWCE) which took place in Las Vegas in April.

The engineering samples demonstrated a very narrowband 6.25kHz digital communications technology, using an FDMA 4-level FSK modulation method. **Fig 1** shows a plot of the spectrum of a 12.5kHz FM transmission, plus the new digital transmission, which offers 4800-baud data transmission, or simultaneous voice and slow speed data transmission (such as GPS data, despatch information, etc). The new modulation method meets the requirements of the FCC Emission Mask E for spectral efficiency. Interestingly, it doesn't require the use of 'linear' amplifiers, so the class-C amplifiers used for FM transmission will work just as well. Not only does this save on the cost of development, it also saves on the cost of migrating from one system to another. Both companies are also directly involved in the formation of efficient digital radio technologies in Europe (ETSI Digital PMR 446/DMR) and Japan. Moreover, they have committed to continue joint research and development.

Whilst not targeted directly at the amateur radio market, the technology underlines the trend of moving from analogue to digital modes, even for telephony. A transmitter using the new modulation technique would work perfectly well through an existing FM repeater or via the Internet, so it is possible that, in the future, we will start to hear the characteristic rushing sound of digitised data through our local repeaters. ♦

FIG 1

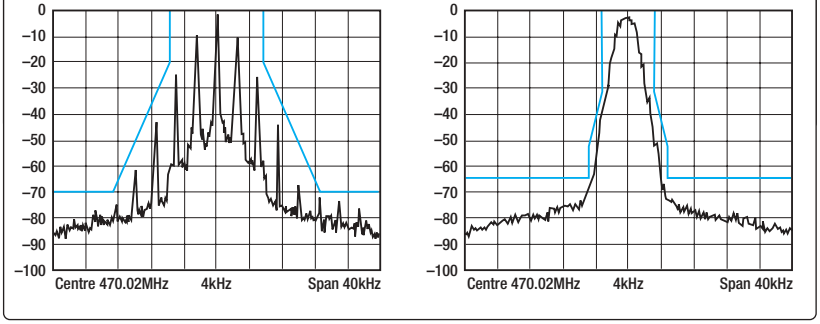

Fig 1
Spectrum display of (a) a 12.5kHz FM transmission, (b) the proposed 6.25kHz digital transmission.

WEB SEARCH

Biometric passport skimming threat	http://tinyurl.com/6nbzt
Icom-Kenwood 6.25kHz digital telephony	http://tinyurl.com/5a5ud

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E-mail: data.radcom@rsgb.org.uk

Using JT65 mode in *WSJT* updates

G4JNT comments on the lack of readers' feedback. Remember that this is a column for *you*, and Andy needs to know what *you* want! This time, he discusses updates to the WSJT program.

General feedback seems to have dried up! Apart from the regular copy of *Fourpack*, and the occasional newsletter from other packet groups, nothing else seems to be coming in from amateur radio data users. Even BARTG appears to have stopped sending me anything. So, unless you want this column to be solely a datacomms technical forum, let's hear what is actually going on out there! Lead time from writing to publication is typically 6 to 7 weeks, so there is a period of approximately two weeks from *RadCom* publication date to be sure your input will appear in the next 'Data', in two months' time.

JT65 AND THE MESSAGE CODING PROCESS

Since writing the last 'Data' column, there have been updates to *WSJT*, particularly in the use of the JT65 mode. In the last column, I mentioned that JT65 was difficult to implement independently of Joe's *WSJT* software, but since then he has published the full coding details for JT65. Apart from a detailed description supplied as a .pdf file, a full source code listing for a small standalone programme *JT65CODE.EXE* is available for download, along with the compiled version. This software illustrates the precise coding details and can also be used to generate JT65 code symbols.

The description of the mode and the software are available from Joe's website (see 'Web search'), and should remove most of the mysteries of this mode. The little standalone utility takes in a data message, and generates the symbols corresponding to the transmitted waveform tones, as numbers between 0 and 63. To transmit a JT65 message, for example for a beacon, these pre-encoded symbols can be stored, merged with the synchronisation sequence and used to control a frequency source such as a DDS to generate a JT65 transmitted waveform that can be received using the *WSJT 4.x* software suite.

The description of the coding is comprehensive and reasonably straightforward to understand, particularly when read in conjunction with the source code listings. Joe walks us through the inherent redundancy in most EME and weak-signal DX contact exchanges, and shows how this can be exploited to turn a typical transmission exchange, including callsigns and locator, into 72-bit messages of non-redundant information (shown as 12 6-bit symbols in the *JT65CODE* user screen). For example, all amateur callsigns can be broken down into a common format of letters and numbers, as can locators, which are then stored in a highly-compressed format. Then he shows how deliberate redundancy for Forward Error Correction is then introduced to give a very robust code, capable of surviving a poor transmission path, by adding 306 more bits of error correction. The resulting 378 bits are coded into 63 symbols, each capable of taking 64 different states (tones), effectively sending six bits per symbol. These symbols are interleaved by arranging them as a 7 x 9 matrix, then swapping columns and rows to spread them out over the signalling period. Joe now admits that this last interleaving stage is not necessary and was originally built-in due to an initial misunderstanding of FEC; he decided to preserve the interleaving in the interests of backwards compatibility. Finally, the generated symbols are merged in a pseudo-random pattern with another 63 synchronisation symbols sent as a 65th sync tone.

Encoding a message into JT65 symbols using the '*JT65CODE*' software

Note that the merging with the sync code is not included – this has to be done afterwards.

```
Message: test de g4jnt
Plain text.

Packed message, 6-bit symbols: 43 35  5 10 53 15 16 28 26  8 27 15

Channel symbols, including FEC:
 36  7 62  2 10 13 22 54  8 56  2 48 44 11 22 37 21 24  9  4 62
 52 51 28 39 62 18 18 49 27 21 23 53 23 50 23 27 52 37 15  5 46
 37  7 12 11 12 49 51  9 16  8 15 22 10 30 17 38 55 53 24 47  8
Decoded message: TEST DE G4JNT
```

The source code for *JT65CODE* includes separate listings for each stage of the encoding process from source coding/compression through to error correction and interleaving, most of it written in *Fortran*, apart from the Reed-Solomon FEC coding in the *C* language. As supplied, the source code is intended for compilation under *Linux*, but Joe may be prepared to assist with modifications for *Windows* operating systems. An example of the output from the program is illustrated in the panel – the 'Channel Symbols' are the numbers which would need to be stored in a beacon controller to be merged with the synchronisation code before transmission. The compressed source-coded symbols are re-decoded to test that the compression process has worked properly.

COMMAND PROMPT AND REDIRECTION

And now for an interesting little aside discovered when writing this column…

JT65CODE runs in a command prompt window on a PC, and there would normally have been no way I could have cut and pasted plain text from such a window into, for example, this *Word* document other than by doing it as a graphics dump – never a very satisfactory solution! Then I remembered the old *DOS* redirection facility, whereby the output from a (properly written) piece of software that would normally go to the screen can be sent to a file as text by appending the > symbol followed by a file name to the end of the command. It felt like clutching at straws, but amazingly worked straightaway! By typing 'JT65CODE "test de g4jnt" > zzzz.txt' the contents of the panel appeared in the text file rather than on the screen, which makes subsequent recovery of the coded symbols for cutting and pasting more reliable than having to re-type them - particularly so when recovering the data for incorporation into beacon controller software. In much software I have seen and written over the years for *DOS* and, later, command prompt usage, this old utility never worked as the software compilers often bypassed the old *DOS* BIOS routines for screen output, so removing the ability to use redirection. Joe's programme not only includes the correct programming to allow this, but even more amazingly, the redirection capability is even included within the *DOS* emulation on this *Windows NT* machine. Whether it will work with later operating systems such as *Win XP* is another matter… What other old and forgotten *DOS* utilities might still be available and undocumented? ♦

WEB SEARCH	
WSJT Software	http://pulsar.princeton.edu/~joe/K1JT/

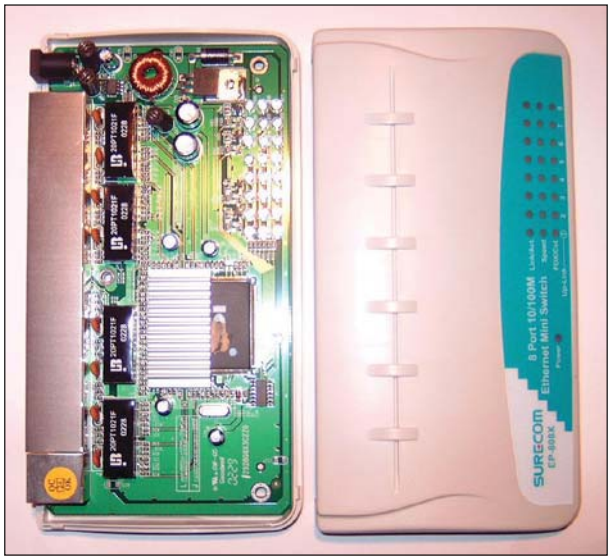
EMC

This month's 'EMC' includes an update on PLT, more on computer network switches and information about RF triggering of PIR security lights

An item in 'RSGB Matters' in May 2005 *RadCom* (p6), stated that Scottish and Southern Energy plc (SSE) will not be undertaking any further immediate roll-out of Powerline Telecommunications (PLT) in the UK and is unlikely to undertake further investment in 'Access' PLT technologies. Another article on p18 of May 2005 *RadCom* gave further information on the current status of PLT. In the UK, 'Access PLT' from the electricity substation to houses has only been used for a few small-scale trials and the news that no further 'Access' PLT is likely to be deployed is most welcome to radio amateurs and other users of the HF radio spectrum. Nevertheless, the use of 'in house' PLT for powerline networking within a building is another matter and the EMC Committee is keeping a close watch on this. An article in the IEE *Communications Engineer* magazine, April / May 2005 [1] extols the virtues (?) of powerline communications and mentions the HomePlug Powerline Alliance. It also mentions that Panasonic recently unveiled a powerline connection technology called HD PLC that is claimed to be capable of 90Mbit/s data rates via mains wiring in a building.

COMPUTER NETWORK SWITCHES

February and April 2005 'EMC' columns included items on reducing interference radiated by the cables of Ethernet type computer networks. Richard, G4LPD, reports a case of interference being emitted by the switch itself. For a while he had difficulty on the 144MHz band with 'birdies' (unwanted carriers on certain frequencies). The main problem was a rather loud one on 144.280MHz which gave an 'S' meter reading of S9 + 10dB. This frequency in the SSB portion of the band was one that Richard often uses as he can always hear a station there on the Tuesday night contests. He located the source of the unwanted signals to a 'Surecom', 8 port 10/100Mbit/s Ethernet mini switch, type EP-808X, which is used for his home computer network. As the rest of the family was always using the Internet, unplugging the network switch was not a popular solution. Recently, when Richard listened on the 6m band FM calling frequency (51.510MHz), he was surprised to find a rather large 'birdie' carrier at S9 + 60dB which also came from the network switch.



A Surecom EP-808X 10/100Mbps computer network switch.

The photograph shows Richard's network switch with the cover removed. It has a 50MHz crystal oscillator which Richard reports is slightly off-frequency. It can be seen that although the RJ45 sockets for the network cables are screened, the circuit board itself is in an unscreened plastic case. The inductor wound on a ring core in the top left hand corner looks like part of a switching regulator and there are two chokes wound on six-hole ferrite beads which are probably to reduce radiated RF emissions from the DC power supply cable. The product is CE-marked and contains a statement that it conforms to FCC rules part 15.

Richard's solution to the 'birdies' on VHF amateur bands was to buy a new network switch, a Netgear model FS608. As with all electronic products sold in Europe, this is CE-marked. It contains a statement that it conforms to EN 55 022 Class 'B' (CISPR22). Richard describes the new Netgear switch as 'super quiet' and reports that all the 'birdies' on the 50, 144, and 432MHz amateur bands have gone.

Some general advice for VHF operators buying an Ethernet switch for a home computer network would be to select one that has a metal case rather than plastic. All electronic products sold in the EU should be CE-marked, but check that they are specified as conforming to EN 55 022 Class 'B', not Class 'A' which allows levels of interference 10dB higher than Class 'B'. The US FCC Part 15 standards also have Class 'A' and Class 'B' limits that are similar to the EN 55022 radiated emission limits but are not identical. Even the 'B' limits allow emissions that are large in relation to weak signals on VHF amateur bands however.

PIR SECURITY LIGHTS

Rob, G2BKZ, bought a 'Truro'-style outdoor lantern with Passive Infra-Red (PIR) sensor from B & Q for £14.95. He found that it turns on every time he transmits on various frequencies, using 100W to a quad aerial on a tower at least 50ft away from the lamp. The two frequencies that mainly affect it are 14MHz and 18MHz, but transmitting on 7 or 21MHz sometimes turns on the lamp when using 200-300W. Rob also has two 150W PIR-operated floodlights which are unaffected by any of his transmissions. He has spoken to a manager at the store where he bought the lamp and the manager suggested that Rob should contact B & Q Customer Services. Rob asks the EMC Committee for any suggestions. In my experience of cases like this, if a supplier answers an enquiry about EMC performance of a product, the reply is normally that the product meets all required standards. This may well be the case, but the RF immunity standard for lighting products is not particularly demanding. Nevertheless, it is worth reporting the matter to the manufacturer or importer in writing or by e-mail.

RF triggering of PIR sensors is a known problem for some types of alarm PIRs and security lighting PIRs. PIR security lighting has been featured in EMC previously in Jun 1989, Dec 1993, Apr 1994 and Apr 1996 *RadCom*. As PIR-operated security lights are relatively inexpensive nowadays, replacing one that suffers RF triggering with a more immune type may seem like the best solution, but there is a problem of how to find a new light with better RF immunity. Technically-minded radio amateurs can try to improve RF immunity of their own PIR security lights by modifying them, but this should not be attempted on a neighbour's light and attention must be paid to electrical safety, particularly with outdoor electrical wiring.

A ferrite ring on the power cable to the light can improve RF immunity to HF transmissions, although it is unlikely to be effective at VHF. The

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ring should be located close to the light and should be wound with 10 – 12 turns of the thinnest three-core mains cable that has a suitable current rating for the lamp. The ring and any connecting block to join cables must be adequately insulated and must be in a waterproof housing if it is exposed to weather. If a PIR light is a double-insulated type with an all-plastic body and it does not require an earth wire, an alternative to a ferrite ring is to use a small mains filter in a suitable housing. This is only suitable for a light that does not require an earth wire because most types of mains filter do not filter the earth wire.

Another approach involves modifying the control circuit of the light. The DC supply for the electronics is not normally isolated from the mains, so the lamp must be completely disconnected from the mains before dismantling and it must be properly re-assembled before testing. The photograph shows the control board from a typical PIR-operated lamp. There is a dual element infra-red sensor with optics that focus the heat alternately onto one element then the other when a warm object moves across the field of view. The sensor gives a very small output voltage at around 1Hz, so it requires an amplifier with a very high voltage gain of about 25,000. This amplifier may also be sensitive to RF signals, particularly the constantly-changing amplitude of SSB and CW signals. Screening the electronics is not normally a practical option, so improving RF immunity usually requires extra capacitors on the infra-red sensor itself and also on the amplifier.

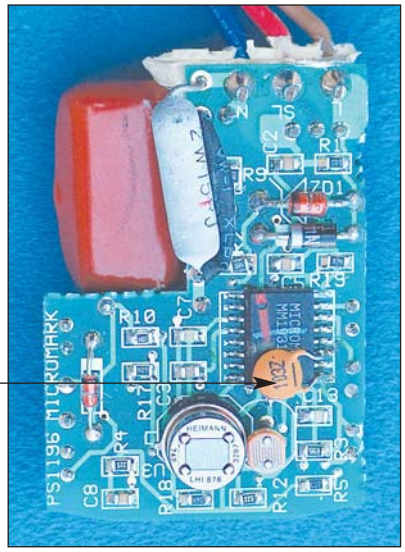
Three capacitors should be fitted on the infra-red sensor, in a triangle across the three pins, as shown in the photograph. Leaded devices can be used if space permits, but surface-mounted devices (SMD) will be more effective at VHF. A suitable value is 10nF, and a suitable size of SMD is 1206 or 0804 (12 by 6, or 8 by 4 thousandths of an inch). The photograph shows one 1206 and two 0804 types. If PCB tracks run between the pins of the sensor, the capacitors should be mounted slightly above the board. The easiest way to handle these SMD capacitors is to solder a piece of thin wire temporarily to one side of the capacitor and use this to pick up the capacitor. A good magnifier and a steady hand are required!

For the amplifier, earlier models of PIR light used standard dual or quad operational amplifier chips such as LM358 or LM324, which are prone to detecting RF. If you find one of these devices, it is worth fitting a capacitor of about 10nF between the inverting and non-inverting inputs of each amplifier on the chip. That is, between pins 2-3, 5-6, 9-10 and 12-13 on an LM324 or pins 2-3 and 5-6 on an LM358. Normally, only one extra capacitor is required in the amplifier, that is on the first stage amplifier, but fitting capacitors to all amplifiers in the chip saves tracing out the circuit diagram.

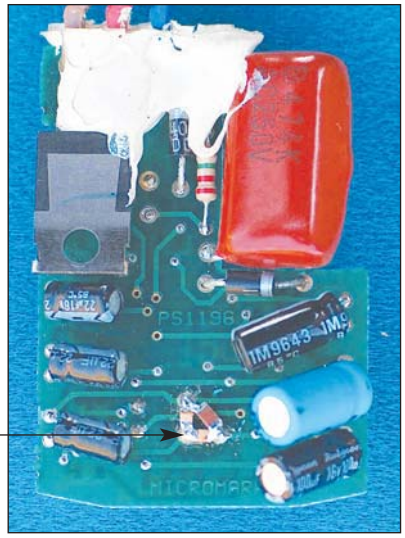
Controllers for modern PIR lights like the one in the photo normally use a custom chip, in which case it is not normally possible to get the data sheet to find out where to put capacitors. In this case, follow the PCB track from the centre pin of the infra-red sensor to the controller chip. This should be the input pin. The pin of the infra-red sensor that is furthest from the tag is normally the ground pin. Follow the PCB track to the controller chip. This should be the ground pin. Fit a ceramic disc capacitor between the input pin and ground pin on the controller chip, as shown in the photo.

TVI - A NEIGHBOUR'S VIEW

About 20 years ago, when I first had a Class B amateur radio licence, my parents in St Albans had an intermittent problem with their TV. This was an ex-rental Philips G6 valve colour TV that was 15 years old. Reliability was not its strong point and neither was RF immunity. From the description of the problem, it could have been a fault in the TV or it could have been breakthrough from the radio amateur across the road but it never happened when I was present. A log was duly kept for two weeks showing the exact times when the problem occurred. I then visited the radio amateur to ask him to check his station log and see whether the times coincided. His wife answered the door and I explained that I wanted to speak to the radio amateur about suspected TV interference. She said, "Well, it can't be him because he's not in" and before I could explain about the log, she closed the door. The following week, I fitted a high pass filter and 'braid breaker' to the TV set and this appeared to solve the problem. Whether it was RF breakthrough or an intermittent fault in the TV remains a mystery as the TV was replaced soon afterwards.



A typical controller board for a PIR-operated security light with an additional RF filtering capacitor (arrowed)



The underside of a typical controller board for a PIR-operated security light with additional RF filtering capacitors on the sensor (arrowed)

Nevertheless, this does illustrate a point about 'public relations' when dealing with enquiries from neighbours who suspect that your amateur radio transmissions are affecting their TV, stereo system, etc. Even if your transmissions aren't the cause of the problem, it is worth being helpful and giving the neighbour advice on solving the problem. Promoting good relations can pay dividends in the future if the neighbour really does have a problem that is caused by your transmissions. ♦

REFERENCE

[1] 'Down the Line', J Walko, IEE *Communications Engineer*, April/May 2005, pp12 – 15, **www.iee.org/communications**

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TT

Pat considers the first software-defined HF transceiver, some handset folded antennas and a 50MHz halo. He assesses the 7360 beam-switching mixer, and ends with the Navy receiver model CJA/CJC

DEBUT OF SOFTWARE-DEFINED HF TRANSCEIVERS

The April *QST*'s 'Product Review' (pp73-78) by Steve Ford, WB8IMY, claims to open a new chapter in the history of Amateur Radio. WB8IMY who is the journal's Editor writes: "I'm not indulging in hyperbole, by making such a statement – it is a fact. For the first time in ham history, you can purchase 'off the shelf' an HF and 6m transceiver that uses software to define its functionality – a *software-defined radio."*

The new product is the FlexRadio SDR-1000, available in various options, including the Model SDR-ASM/TRA (fully assembled transceiver with 100W RF amplifier and RF expansion board) priced at $1325 or as the SDR-ASM/TR with 1W output and RF expansion board priced $875. It is also available in partially-assembled form, with or without enclosure.

The long review makes it clear that the transceiver is still in the course of refinement and may already have additional features, etc. But, before rushing to take advantage of the low cost compared with conventional HF transceivers, remember that it can only be used in association with a PC equipped with a good soundcard, etc. As *QST* puts the 'Bottom Line': "The SDR-1000 may mark the beginning of a new generation of amateur radio equipment, but the pioneers who take it up may need a bit of frontier spirit!" From the review it becomes clear that, at least at this stage, this is equipment that requires a good knowledge of computer and information technology if full advantage is to be taken of the potential advantages and flexibility of this first SDR transceiver to reach the amateur radio marketplace.

As WB8IMY explains, the SRD-1000 is not just a software product: "it most definitely has hardware. If you purchase what I like to call the 'full Monty' version with the 100W PEP RF amplifier and RF expansion board, you are presented with a nondescript 19 x 8$^1/_2$ x 4 inch black box. On the front there is an on/off rocker switch, a four-pin microphone connector and a cooling fan. On the back, you'll find ports for computer connections, DC power unit and, of course, an antenna."

The SDR-1000 Software-Defined 100W HF/VHF transceiver – a truly 'black box' rig with only an on-off switch and microphone socket on the front panel, controlled and defined by software run on a PC. It offers potential for further great flexibility and functionality by updating or developing the software. (Source: www.flex-radio.com)

The box contains a few circuit boards. The receiver is an advanced direct-conversion design using direct digital synthesis. It converts RF directly to audio. Separate in-phase and quadrature signals are fed to the computer soundcard for digital signal processing using an innovative in-phase and quadrature (*I and Q)* image-reject approach. For transmission, the hardware is designed to take processed audio from the soundcard and convert it to RF. As WB8IMY puts it: "The true heart is *not* within the black box. *Data* is the lifeblood of this radio; the hardware is just a portal between the analogue and digital worlds... The hardware is like unformed clay on the potter's wheel, waiting for the hands of the artist to shape it into something meaningful. The art – and the artistry – is in the software that runs on your computer. The SDR-1000 software – known as *PowerSDR* – determines how a received signal will be demodulated. It also creates the transmitted signal according to the mode you wish to operate. The SDR-1000 is a software-defined radio in the most literal sense of the term... Don't confuse it with microprocessor-controlled radios that offer firmware updates. The changes implemented by a firmware update are limited in scope because the inflexible hardware defines (and constrains) what can be done... With a software-defined radio, you can make very large changes indeed.

"The SDR-1000 software architecture is completely open. This means that anyone with enough computer savvy can modify the software (and, hence, the radio) to suit his / her individual needs. It also means that hams throughout the world can pool their collective genius and create new software for the SDR-1000. So, rather than a static box full of hardware, the SDR-1000 will evolve through the years as clever hams take up the 'clay' and create new works of engineering art."

The *QST* review is based on the software as it existed in January 2005, and it is pointed out that further facilities were likely even before the review was published. As reviewed, the SDR-1000 receiver had a frequency range of 0.01 to 65MHz with a switchable pre-amp and able to transmit on all amateur bands from 1.8 to 50MHz. Modes with then-existing software included SSB, CW, AM, FM and Digital Radio Mondiale (DRM), although it is pointed out that the CW performance required further refinement. The ARRL Lab measurements indicate that it is capable of good performance although falling some way short of current top-of-the-range conventional transceivers.

It is stressed that the soundcard used in the user's computer is the engine that enables the SDR-1000. "In particular, the dynamic range and distortion performance is *direct-*

ly related to the quality of the soundcard. At the time of this writing, FlexRadio Systems officially supported only the SoundBlaster Audigy 2ZS, Audigy 2, Extigy, MP3+ and the Turtle Beach Santa Cruz soundcards. This is not to say that other sound cards cannot be used, but the radio may not perform as specified. And if you run into trouble with a non-supported card, FlexRadio may not be able to help you. In addition, not all soundcards have the separate line input, line output and microphone jacks necessary to work with the SDR-1000. They may also lack mixer controls with independent level adjustments for the line input and microphone input.

"In addition to a quality sound card, you'll need a quality (read 'fast') PC. The minimum requirement is an 800MHz Pentium computer. In our tests, an 800MHz system was *just* adequate. Stepping up to a machine with a clock speed greater than 1GHz makes a substantial difference." At present the SDR-1000 cannot be used with a lap-top computer.

It is clear from the detailed review that the true challenge for a user begins when you install the software: "My first step was to download the latest version of *PowerSDR* from the FlexRadio website (**www.flex-radio.com**). The file is less than 1MB in size, so that step went quickly. When I ran the setup program to install the software, however, it came to an immediate halt and informed that I didn't have the Microsoft 'Net Framework' installed on my PC. Oops!" This was only the first of several problems encountered before the rig came into operation.

To quote briefly from some of WB8IMY's final impressions: "The receive performance of the SDR-1000 was at least comparable to a traditional transceiver in its $1300 price class. Of course, the crucial difference is that it will undergo continuous updating and improvement for years after the initial purchase. A hardware rig remains essentially the same for ever... Is the SDR-1000 a radio for all hams? At this point, probably not. The current incarnation is best suited to the amateur who knows his or her way around a computer. It takes a ham with intermediate or advanced computer skills to get the most out of an SDR-1000 with the least amount of frustration.

"But this is just the first step into a new era. As the SDR-1000 evolves, new versions are likely to emerge that will be 'friendlier' and well within the understanding of any amateur. The manufacturer reports that it plans to offer a turnkey soundcard and radio solution, including a CD with driver and calibration routines by the time you read this. If so, that will be a real plus. With the collective intelligence of the global amateur radio community at work, the potential of the SDR-1000 is almost limitless."

SDR-1000 manufacturer is FlexRadio Systems, 8900 Marybank Drive, Austin, Texas, TX 78750, USA.

I must confess that as a computer illiterate and someone who still uses a PC primarily as a word-processor, I do not see myself as a potential SDR customer. But, for the computer-cum-radio enthusiast, it opens up interesting new possibilities, although stand-alone HF transceivers with front-panel controls are likely to be still with us for the foreseeable future.

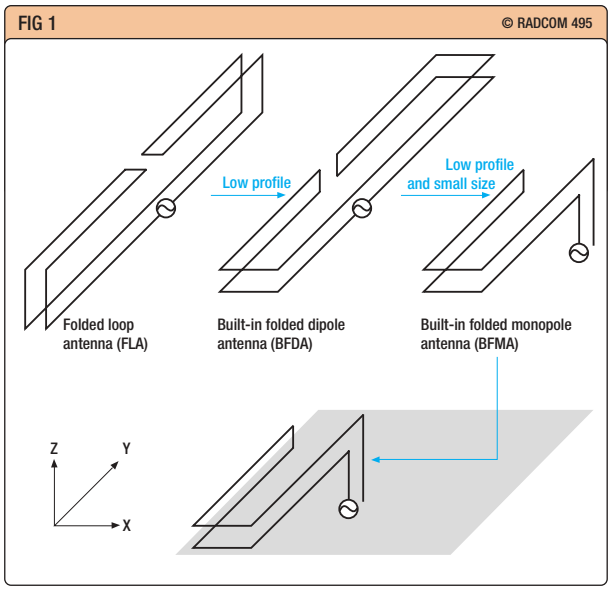


Fig 1 Development of the antenna structure leading to the built-in folded monopole antenna for handsets developed by Japanese engineers (Source: Electronics Letters)

HANDSET FOLDED ANTENNAS & A 50MHz HALO

Much of the current professional research into antennas is keyed to improving the performance or appearance or convenience of UHF cellular handsets operating at 900 or 2300MHz. But the basic structures can be used at much lower frequencies by scaling up the dimensions. Some of the structures can then be used for amateur mobile operation, etc.

Fig 1 comes from 'Built-in Folded Monopole Antenna for Handsets', in *Electronics Letters,* 25 November 2004, pp1514 – 5, by S Hayashida and colleagues at the Japanese National Defense Academy.

The synopsis reads: A built-in folded monopole antenna (BFMA) for handsets is introduced and investigated. The characteristics of the BFMA are compared with those of a planar inverted-F antenna (PIFA) which is one of the conventional handset antennas. As a result, it has been confirmed that the BFMA has smaller size and wider bandwidth compared with the PIFA."

In the text, it is noted that a folded loop antenna for handsets (FLA) has already been introduced and shown as one of the balance-fed antennas for handsets, and is very effective in mitigating antenna performance degradation due to body effect. To meet the requirements for the latest handsets, the antenna is modified to have small size and low profile and the performance is analysed. Low profile is achieved by folding a loop element sideways so that the antenna can be placed closely on the ground plane. Small size is achieved by it consisting of half of the built-in folded dipole antenna (BFDA) which has a structure of a folded loop with elements sideways. The antenna characteristics such as VSWR, the current distribution and radiation patterns are compared with those of the PIFA. As a result it has been confirmed that the BFMA has smaller size and wider bandwidth. The Japanese authors describe and analyse a BFMA designed for use at 2250MHz.

Paul Danzer, N1II, in *QST,* September 2004, draws on a 30-year-old *ARRL Handbook* (1975) design (**Fig 2**) to present constructional details of a practical 'Six-metre Halo' antenna for fixed or mobile operation. The 'halo' antenna comprises a half-wave resonant dipole bent into a circle and in this case gamma-matched. N1II lists the following reasons for making this an obvious choice: "Inexpensive (okay... cheap); omni-directional; horizontal polarisation to be able to work locals; only one trip to the nearby home supply store; no exotic components to be ordered; easy to tweak with 6m test equipment."

Wider bandwidth should be obtainable by using the folded dipole configuration shown for the FLA in Fig 1.

THE 7360 BEAM-SWITCHING MIXER

The February 'TT' mentioned briefly the RCA beam-switching valve type 7360 that was for many years recognised as capable of coping with extremely strong signals, of the order of volts rather than millivolts. But how does its overall performance compare with state-of-the-art solid-state mixers such as an H-mode mixer using the FST3125?

First, a little history. The 7360 was introduced by RCA in 1960 for use as a high-level balanced modulator for SSB transmitters, a receiver product detector or phase splitter. It subsequently attracted considerable amateur interest for use in receivers as a switching mixer (balanced or unbalanced) and for product detectors, soon gaining the reputation of being able to handle extremely strong signals and providing high gains when used as a product detector. I recall the late Reg Cole, G6RC, showing me how well the 7360 per-

formed when he used one to modify his Hammarlund Super-Pro receiver.

Its use as a front-end mixer in a factory-made receiver occurred in 1963 with the Squires-Sanders SSR-1 communications receiver. Unfortunately, William Squires, the designer, died in an air crash after just a few models had been produced and I am not aware of any ever reaching the UK. Several designs using the 7360 in home-built receivers were published, for example by W2PUL and by W1DX in his novel 'Miser's Dream' design (*QST,* May 1965, noted with front-end circuit-diagram in 'TT' and subsequently in later editions of *Amateur Radio Techniques*).

The low-cost 'Miser's Dream' featured an unbalanced 7360 mixer with no RF stage, but with an RF *Q*-multiplier (6C4 triode) to sharpen up the characteristics of the signal input circuit to reduce image response, a 2.8kHz crystal lattice filter immediately following the mixer, plus a 250Hz filter for CW in the subsequent IF stage. This remains a valid approach, even today, particularly as a hybrid design with solid-state devices used for all stages other than the mixer. Costs could be reduced by the use of a home-built crystal ladder filter, a little-known filter technique at that time, and would compensate for the current high cost of a 7360 - if one can be located.

The 7360 was the best, but not the only, RCA beam-switching valve. The earlier lower-cost 6AR8 and the later 6JH7 were developed primarily for use as synchronous demodulators in colour TV receivers but also formed excellent mixers and product detectors. Brian Mitchell, G3HJK (QTHR), used two 6AR8 valves in a unique version of the G2DAF receiver that was built in two separate units. He later sold this receiver to J A Cox, G4AQD who subsequently became a silent key. As a result, G3HJK lost track of the receiver but believes it still exists and is probably somewhere in the Cheshire area. He would welcome any information as to its present whereabouts and ownership.

Beam-switching valves were not the only valve-mixers capable of handling inputs above 1V. Peter Chadwick, G3RZP, writes: "My RCA tube manual lists the 7360 as producing -40dB IMD for 2.8V RMS input in balanced mixer service. One half of a 12AU7 double-triode will produce this level of IMD for 2.1V input, according to Pappenfus *et al* of Collins Radio. There are no figures given for the 7360 noise [see below-*G3VA*]: it's probably fair to assume a noise figure equivalent to a tetrode, since there will be partition noise. This gives an equivalent noise resistance (ENR) of 2500ohm, or about 0.34µV in a 3kHz bandwidth, if you assume the transconductance from deflector plate to anode is the correct term to use. If you use the main transconductance, it becomes around 17kohm, or 1µV in 3kHz. The 12AU7 double-triode, again according to Pappenfus, is about 20dB worse than the first figure and 10dB worse than the second, so overall is between 12.5 and 22.5dB worse in dynamic range than the 7360. On the other hand, 12AU7s can [still] be purchased without paying an arm and a leg! You will remember the naval receiver that McCormack of GEC described at the 1963 HF Conference at the IEE, which used a 12AU7 mixer and another one as a cascode

Table 1: Intermodulation measurement 7360 mixer

Measurement	Rk	Vg1 (V)	Vg2 (V)	Ig2 (mA)	Iat (mA)	Gain (dB)	IP3 (dBm)	CP (dBm)	Noisefloor BW=2.5kHz (dBm)	3rd order Dynamic (dB)
1	47	–0.6	105	2.8	10	18	–11	–25		
2	470	–2.9	178	1.2	4.7	19	–2	–17		
3	170	–1.6	140	2.0	7.4	20	0	–15	–135	90
4*	170	–1.6	140	2.0	7.4	14	6	–15	–131	91.3

* In measurement 4 the grid connection is tapped halfway at the input parallel circuit

Table 2: Intermodulation measurements ECF 80 mixer

Measurement	Rk	Iatr (mA)	Vg2 (V)	Ig2 (mA)	Iap (mA)	Gain (dB)	IP3 (dBm)	Noisefloor BW=2.5kHz (dBm)	3rd order Dynamic (dB)
1	300	10	190	0.8	4.2	4	6	–113	79.3
2*	300 + 100uH	9.2	170	1.3	5.8	2	21	–113	89.3

* In measurement 2 the result is strongly dependent on oscillator level

Table 1
PA0KDF's intermodulation measurements on the 7360

Table 2
PA0KDF's intermodulation measurements on the ECF80

FIG 2 © RADCOM 496

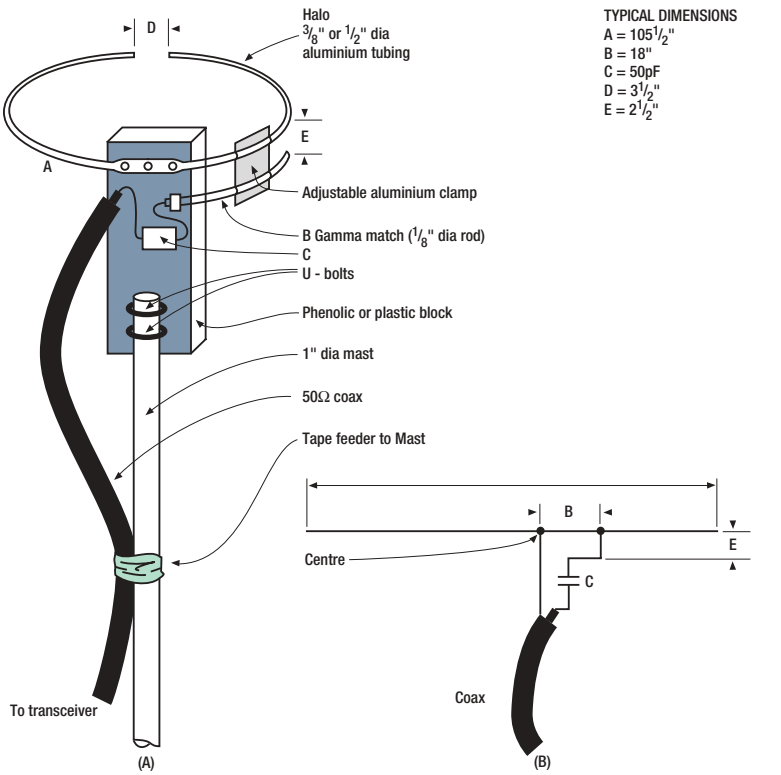


Fig 2
50MHz halo antenna as described in the 1975 ARRL Handbook, but recently revisited by N1II in QST, September 2004.

FIG 3 © RADCOM 497

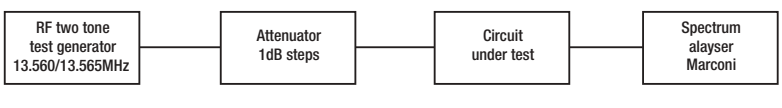
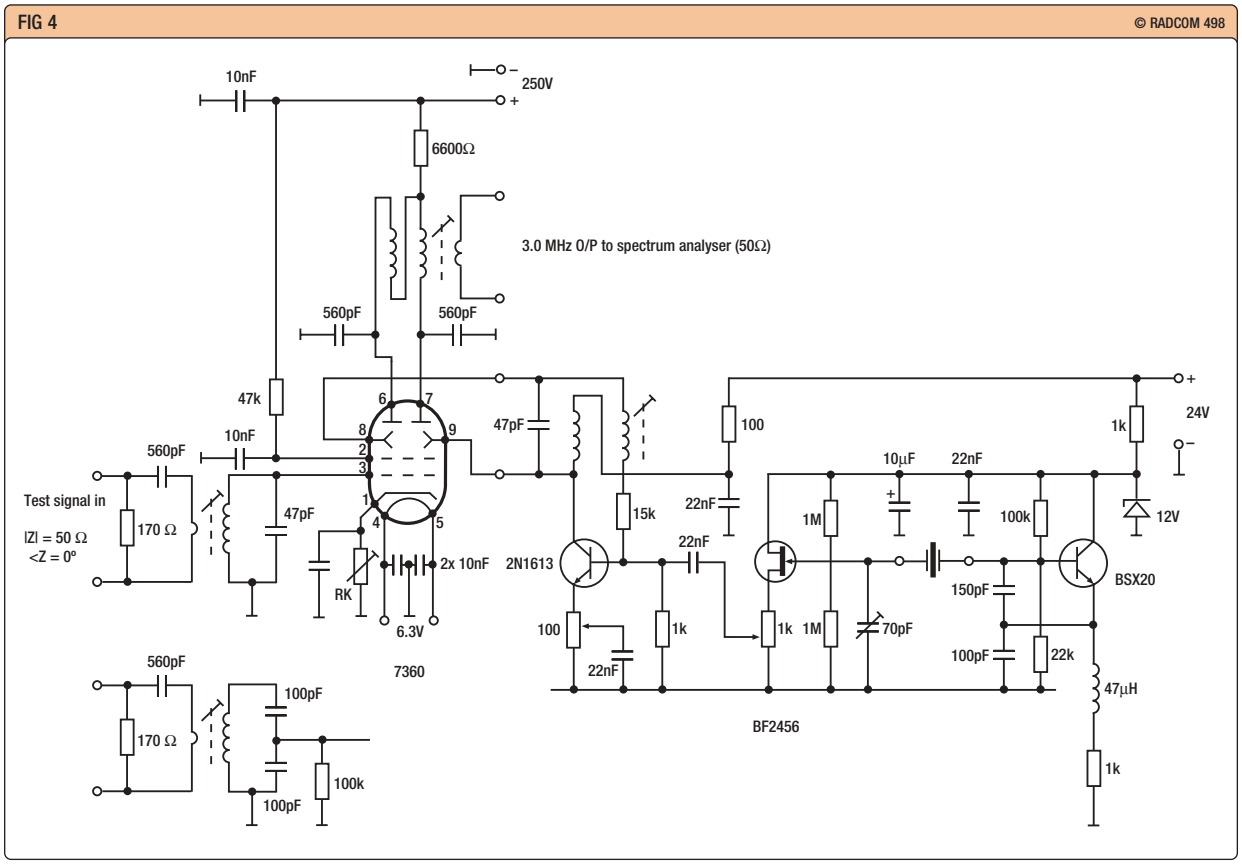


Fig 3
Test set-up used by PA0KDF in 1984 to measure the intermodulation performance of the 7360 beam-switching mixer (see Table 1) and an ECF80 triode-pentode mixer (see Table 2).

Fig 4
Circuit diagram of the tested 7360 mixer with alternative signal input circuits as published in Electron, April 1984.



RF amplifier." See opposite page.

Koos Fockens, PA0KDF, has also responded to the request for information on the performance of the 7360, comparing it with that of an ECF80 triode-pentode mixer. He writes: "In 1984, I carried out a series of measurements on the IP3 and other relevant characteristics of the 7360 and the ECF80; the results were published in Dick Rollema's column 'Reflecties Door PA0SE' (*Electron*, April 1984). I used a test generator specially developed for intermodulation measurements in the arrangement shown in **Fig 3.** This was in connection with an anti-shoplifting system that I developed professionally in the late 1970s that depended on the detection of intermodulation produced by a security tag. The relevant test circuits are shown in **Figs 4** and **5.**

"The test generator provided two signals: 13,560 and 13,565kHz, each at 0dBm with its own intermodulation products lower than –90dBm, so its IP3 was >45dBm. Measurements for the 7360 are shown in **Table 1**, and for the ECF80 in **Table 2**

"My conclusion is that the 7360 beam-switching mixer was indeed a very good mixer compared with other valve mixers, but lags far behind the best current semiconductor mixers [for example the H-mode mixer – G3VA].

"Incidentally, I used a 7360 as a second mixer in a double-conversion 144MHz converter I built in 1968; this converter was used at PI4THT for some years.

"Finally, I would draw attention to the following: Very often a third-order dynamic range is specified without specifying the receiver bandwidth. Such a specification is useless since because the noise-floor of the receiver is dependent on the bandwidth, the dynamic range will be too. Therefore a third-order dynamic range must specify the receiver bandwidth."

HERE & THERE

With reference to the 'TT' April item '2V/300V DC-to-DC Converter', shown (Fig 3, p81) powering a 5W CFL (compact fluorescent lamp), Alan Floyd, G3PNQ, points out that fluorescent lamps do not like working on DC as one end of the lamp will blacken and burn out, considerably reducing the service life of the lamp.

Andrew Holme of Brentwood read with interest my comments about the Wadley loop in the April 'TT' but adds: "However, I am not convinced that it offers a phase-noise advantage over PLL designs. Surely the first VFO in the RA17 has phase noise? According to John Wilson's review in *SWM.* December 2000, it may have quite bad phase noise. The question is does the loop cancel the phase noise? The loop cancels slow drift on the first VFO, why not fast 'drift' (phase noise) also?"

Andrew shows diagrammatically that with a Wadley loop, you increase rather than decrease the phase noise, noting that "You cannot remove phase noise by mixing it with itself. It just spreads twice as wide. I am inclined to think that phase noise *is* a problem with a Wadley loop."

Godfrey Manning, G4GLM, remains doubtful about the short-range 'Micro-Power AM 'Transmitter" ('TT', February 2005, p74). He writes: "I'm not sure about [its] function. The microphone, applied to control pin 5 of the 555 timer IC varies the internal reference for the comparators that determine the threshold for switching the output. Normally, the timing capacitor has to charge and discharge by fixed proportions of the supply voltage, triggering a change in the output state as it does so. Altering the internal reference voltages means that the thresholds are reached at a different proportion and so the output state flips over either sooner or later than normal, depending on which way the control pin is pulled. So this would appear to modulate the frequency and not the amplitude, but slope-detection means that a domestic MW broadcast receiver could still resolve the signal if slightly off-tune. Also, as a transmitter, the square-wave output would be the most efficient harmonic generator possible! Very stringent low-pass filtering is needed and the

insertion loss would reduce the radiated [micropower] signal." G4GLM would be interested in any thoughts or experience that proves or disproves his views.

According to a report in *New Scientist* (12 March 2005, p17), gigantic solar storms destroyed nearly 60% of the ozone above the Arctic during the spring of 2004 with ozone levels remaining low into July 2004. The ozone which shields us from harmful ultraviolet radiation lies mostly in the lower and mid-stratosphere. Man-made chemicals such as the CFCs have been mainly responsible for the depletion of the ozone layer. Now Cora Randall at the University of Colorado at Boulder and colleagues have shown that a record barrage of charged particles from the sun in October and November 2003 also destroyed large amounts of ozone to a level never before seen in the northern hemisphere. My Kiel beacon records show that in November 2003 the KA ratings exceeded 150, with further strong magnetic storms in July (>120) and November 2004 (>140). An article in the following issue of *NS* (19 March, 2005, p10) 'Superflares Could Kill Unprotected Astronauts', noted that the most powerful solar flare ever recorded was observed by British astronomer Richard Carrington in September 1859. It easily surpassed the monster eruption of March 1989 which knocked out the power grid in Quebec, Canada. The powerful flares of November 2003, July 2004 and November 2004 all had major effects on HF propagation.

THE GEC NAVY RECEIVER MODEL CJA/CJC

The GEC 1960s naval receiver was briefly noted in 'TT' and in many editions of *Amateur Radio Techniques.* It has been identified by G8MOB as the massive Royal Navy type CJA with its separate GEC frequency synthesiser, also massive, as type CJC. In a letter to *Radio Bygones,* (No 94, April/May 2005, pp34 – 35), Ted Minchin, ZL1MT, reports that he is the fortunate (?) owner of a pair of these receivers and their accompanying synthesisers. Mounted in their rack cabinet, the whole makes an assembly in excess of 1000lb: "Just as well my workshop floor is reinforced concrete!" He adds "the performance of this pair is impressive in SSB. I use a reference signal derived from a rubidium source for the synthesiser and it is possible, using this to tune these receivers to a SW broadcast station and receive it in ISB mode (gives an interesting 'stereo' effect to the recovered audio if you listen to both channels simultaneously, and the receivers stay locked and in perfect sync for days... But it is easy to see why the Navy needed squadrons of technicians to maintain these receivers, it can be a time-consuming job keeping them in tip-top order... I have enjoyed owning them and don't hesitate to say to someone with the room and expertise 'go for it'. They are a lot of fun!"

The 1963 Conference paper stressed three main design features for a high quality receiver: (1) there should be maximum selectivity before the first non-linear stage; (2) The valve [or semiconductor] stages must be designed for maximum linearity; (3) The signal level must be maintained at as low a level as is practicable until the maximum selectivity has been achieved.

The CJA was a single-conversion superhet with an IF of 1.6MHz designed to cope with extremely strong local signals. To achieve satisfactory image response, six tuned circuits are employed before the mixer in the form of three coupled pairs, separated by two RF stages. The gain of these stages is only just enough to maintain the signal above noise level. The design of the RF stages was the result of a study of many different valves and circuits. A cascode amplifier employing a B329 double-triode (equivalents 12AU7, ECC82) was chosen as this gave the best overall compromise between linearity and noise factor. The mixer circuit also uses the B329 with the two halves connected in push-pull forming a single-balanced mixer. The result was such that, when the selectivity required to give the necessary image rejection was achieved, no other spurious response was significant."

The CJA covered 2 to 30MHz with an overall noise factor of 10dB ±2dB. Response to a signal on the image frequency is better than –130dB. Response to a signal at 800kHz (half IF) above wanted frequency: an antenna EMF of 3V will give an output equivalent to an antenna EMF at wanted frequency of less than 0.2µV. Third-order intermodulation: signals to give 0.2µV equivalent antenna EMF – (a) signals near on-tune: 12mV; signals 10% and 20% off-tune 1.7V. IF breakthrough: with receiver tuned to 2MHz, the response to a signal at 1.6MHz will be better than –130dB relative to the wanted response.

It was designed for shipborne use, where several transmitters are likely to be operated simultaneously, and where very small separation between receiving and transmitting antennas is possible, resulting in strong unwanted signals at the input to the receiver. A major requirement is thus extremely good spurious response performance and circuits that give a very wide dynamic range. ♦

FIG 5 © RADCOM 499

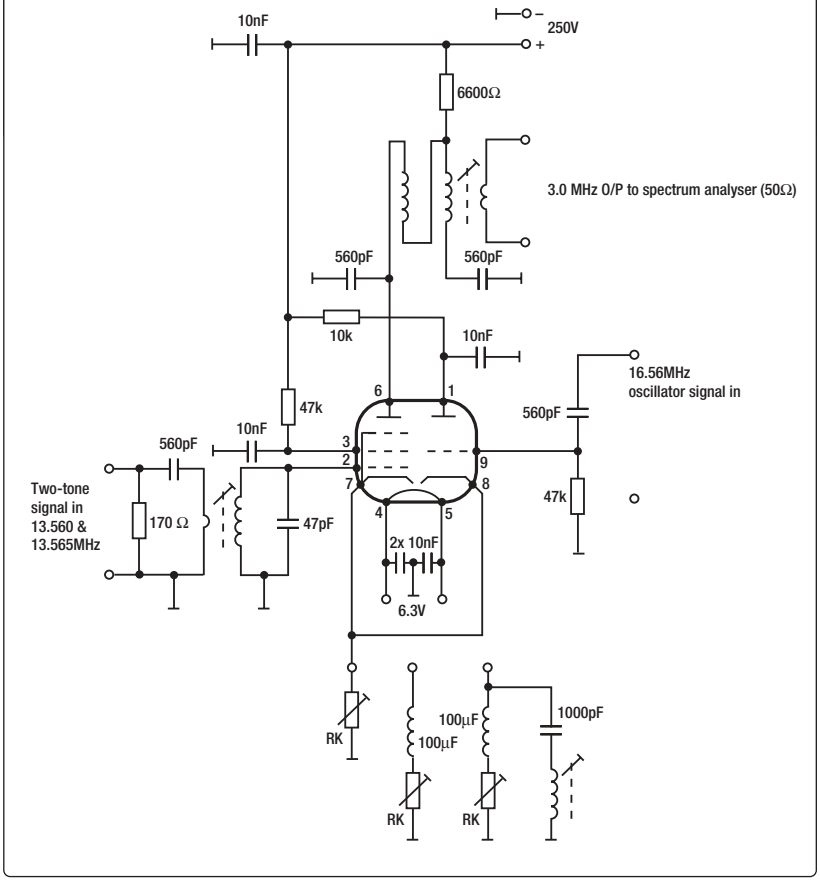


Fig 5
Circuit diagram of the tested ECF80 mixer with alternative cathode-bias arrangements as published in Electron, April 1984.

In practice

'Takeoff angle' ♦ Antennas and Araldite

MYTHS OF THE 'TAKEOFF ANGLE'

Q What is the 'takeoff angle' of an antenna?

A 'Takeoff angle' is one of those ancient amateur radio terms that has come to mean more than one thing; and most of those meanings don't stand up to close examination.

One meaning of 'takeoff angle' is the vertical angle at which radio waves must leave a specified location, in order to reach some particular destination. The geometry of the propagation path depends on the mode of propagation, and in every case it is a complicated function of several variables. An obvious example of variability of takeoff angle is on 80m in the daytime: if you are in a net, transmitting to a number of stations across the UK, you will be using several different takeoff angles simultaneously, depending on the distance to each station (**Fig 1**). For another example, if we look at the 20m path from the UK to the US Midwest, the daily cycle of variation in the height and ionisation density of the F-layer causes the most likely propagation mode to flip between two hops (F-F) and three (F-F-F). **Fig 2** (not to scale) shows how the takeoff angle flips accordingly, between about 5° for F-F and 13° for F-F-F [1]. This is purely a geometrical effect, determined by the number of reflections, the height of the F layer and the distance to be spanned. A more detailed statistical analysis paths from the UK to all parts of the USA (**Fig 3**) shows that takeoff angles are likely to vary widely over the range of propagation conditions likely to be encountered over an entire solar cycle [2]. However, you can still see that certain ranges of angles are more favoured than others, because of the geometrical requirement to make the hops fit the path distances, as in Fig 2. The most likely angle is also the lowest at about 4°, and a cumulative plot of the same data shows that on 90% of occasions the takeoff angle will be no higher than 23°.

When 'takeoff angle' is used in the sense I have been describing so far, it is entirely a property of the propagation path. Propagation sets the requirements for takeoff angle, and antenna engineering is then about trying to meet those requirements.

Turning to antennas, the other sense in which people commonly use 'takeoff angle' is to mean the vertical angle of radiation from the antenna itself. But when you start to ask a few innocent questions, you find they don't actually mean what they say. For example, when people talk about certain types of antennas as 'having a low angle of radiation', they don't mean that it only radiates at one angle. Every antenna has *some* radiation at *all* vertical angles, so when you press people to say what they really mean, they'll probably start to talk about the antenna's *best* angle of radiation. Yet even that figure is misleading. **Fig 4** compares the vertical radiation patterns of two different antennas, a quarter-wave (λ/4) vertical and a horizontal dipole. The vertical is fed against a very good ground mat of 60 λ/4 radials; the horizontal dipole is at a height of 0.5λ; and both antennas are modelled over fairly realistic ground of 'average' conductivity [3]. In azimuth (viewed from above) the vertical is omnidirectional; the pattern of the dipole is plotted at its best angle, broadside-on. Notice the following features:

- The dipole shows gain over the vertical at *all* vertical angles.
- Both radiation patterns are strongest at about the same angles of 27 – 28° (though mostly by coincidence).
- Both radiation patterns are undercut at low angles. This is a feature of all real-life antennas, because ground conductivity is never infinite; but it is a particular problem for vertical antennas.
- Both antennas have quite poor gain at the important low angles (10° and below – see Fig 3) but unless the ground conductivity of the whole area is extraordinarily good for many wavelengths all around, the horizontal dipole will always be the better option.

However, the picture will change again if you increase the wavelength to say 40m, where it becomes much more difficult to put up a horizontal dipole a half-wavelength above ground. Compared with a dipole at a lower height, the vertical now noses ahead at low angles.

These examples illustrate the pitfalls of attempting to do antenna engineering using labels, slogans and one-liners – such as 'a vertical is a low-angle radiator', or 'a dipole is a high-angle cloud-warmer'. They can easily mislead you into the wrong choice of antenna. Antenna engineering is *always* more complex than we think.

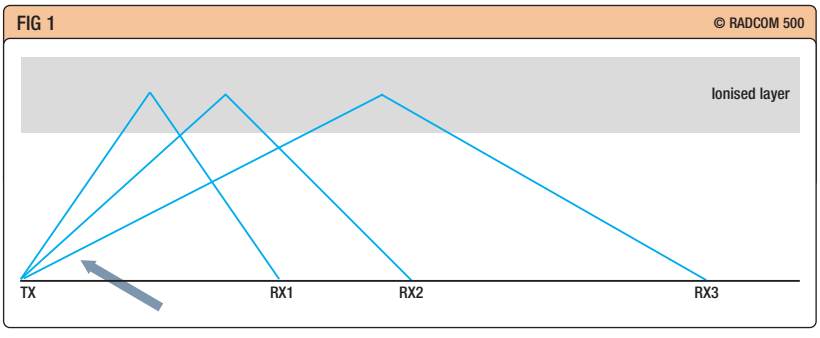


Fig 1
Takeoff angle depends on the geometry of the propagation path.

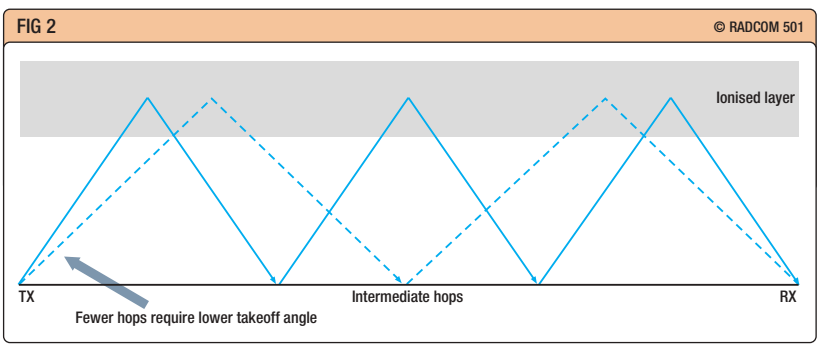


Fig 2
For fixed end-points, only certain takeoff angles will fit the geometry for different numbers of hops.

ANTENNAS AND ARALDITE

Q The question from G4BYV about losses in Araldite, followed-up by G3HRH, has brought further comments from a number of sources.

A You may recall that G4BYV reported a test on the antenna range at the

c/o RSGB HQ.

E-mail: gm3sek@ifwtech.co.uk
Website: www.ifwtech.co.uk/g3sek

East Suffolk Wireless Revival: a UHF Yagi was showing mediocre gain results, but improved when the Araldite sealant was removed from around the feed-point. On the other hand, G3HRH reported that a Yagi with the feed-point was sealed with Araldite gave good performance in a professional point-to-point TV link.

That short summary raises several points. Above all, it is extremely difficult to know exactly how well your antenna is *really* working – and this problem affects professionals and amateurs alike. If signals are strong enough, almost any antenna seems to be working well. More accurately, it will seem to be working well if the signal-to-noise ratio (SNR) is very high… but that also means a shortfall of several decibels can pass completely unnoticed. Without a standard of comparison, there are too many variables to be certain of anything.

The report from the antenna test range is more persuasive, because this was a direct A/B comparison using *the same Yagi*, which eliminates most of the variables. G4BYV noted a loss in measured gain due to the Araldite (or rather, an increase when the Araldite was removed). But does that mean an epoxy resin such as Araldite is a 'lossy' material? Not necessarily at all, because 'loss' is another of those slippery terms that can have more than one meaning. When applied to a material, 'loss' has the specific meaning that RF energy is converted into *heat*. However, there can be many other kinds of loss in RF systems that would also translate into a failure to achieve the expected gain on an antenna range.

Probably the most likely is a mismatch loss due to a change in feed-point impedance when the sealant was applied or removed. Since any solid material will have a higher dielectric constant than air, encapsulating the feed-point will increase the stray capacitances. At UHF and above, this could easily have a significant effect on the impedance match, which would translate into a loss of gain compared with the correctly matched situation. What you see there is a *mismatch loss* or *reflection loss* which is totally unrelated to any RF energy being converted into heat. Although the introduction of the dielectric material may indirectly cause a mismatch loss, it would not be fair to blame that on a 'lossy' material.

FIG 3 © RADCOM 502

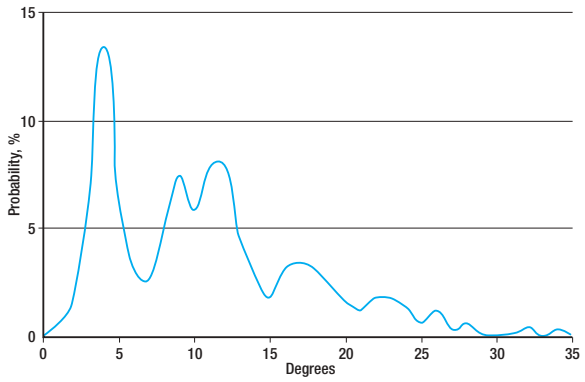


FIG 4 © RADCOM 503

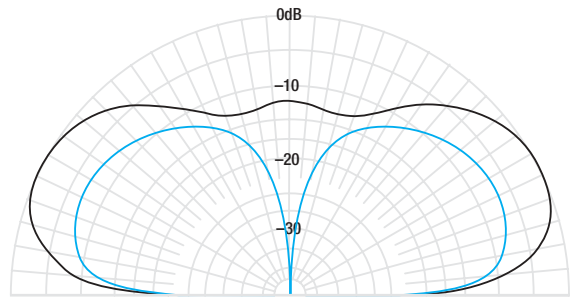


Fig 3
Long-term statistical analysis of takeoff angles for paths from the UK to the USA on 20m (ARRL *Antenna Handbook*).

Fig 4
Radiation patterns of vertical and dipole antennas (see text for details). Contrary to the usual slogans, the dipole has the stronger low-angle radiation.

A rough but revealing test for RF losses in insulating materials is to place a selection of samples in a microwave oven and see how much they heat up. Nothing is calibrated, so the numerical temperature rise doesn't mean much, but it is a valid comparative test. To find out more about Araldite, I mixed a complete twin-pack of the '24-hour' variety and cast it into a single slab. After a few days to ensure complete curing, this sample was tested on the turntable of the microwave oven, together with a polypropylene hot-melt glue stick for comparison, and a half-glass of water to provide a dependable RF load for the magnetron.

After two minutes, the water was boiling and the Araldite was getting quite warm in places – not hot, no smoke or flames, but distinctly warm. Based on this and previous similar comparisons, it indicates that Araldite is somewhat lossy, but certainly not dramatically so. This is consistent with the widespread experience with glass-reinforced epoxy PC board at low microwave frequencies, except in applications such as high-*Q* resonators that require very low dielectric losses. This suggests that the problem reported by G4BYV may have been due to a combination of dielectric effects and material losses.

However, the hot-melt glue stick came out of the microwave oven with no perceptible temperature rise. PTFE is generally regarded as the 'gold standard' for a low-loss RF insulator, and this amorphous polypropylene material is definitely in the same league. That confirms hot-melt glue as my best bet for general-purpose sealing for coax feed-points and other outdoor RF applications. It lasts very well outdoors without any sign of cracking or discoloration – which is more than can be said of Araldite – and once you have bought the glue gun, hot-melt glue is also much cheaper.

Stan Brown, G4LU, reminds us that this is actually old technology. In *Short Wave Magazine* about 40 years ago, Stan described how he made moulded polyethylene centre insulators for a 144MHz Yagi array. Some machining skills were needed to make the two-piece mould, which also acted as a jig to hold the dipole elements and feed-line in the correct relative positions. The mould was then heated to a high enough temperature to melt polyethylene quickly and easily, and pieces of insulation from scrap coax were fed in until the molten plastic filled the cavity and emerged from all the exit holes. When everything had completely cooled, the mould was disassembled and the excess material trimmed away to leave a very neat finished product. If you have the necessary workshop skills, this kind of home plastic moulding is still a very practical proposition. ♦

NOTES & REFERENCES

[1] Calculated using *W6ELProp*, a free download – follow the links from the 'In Practice' website.
[2] *ARRL Antenna Handbook*, 20th Edition (available from the RSGB).
[3] Modelled using the *EZNEC* free demo version: www.eznec.com

by Ben Witvliet, PA5BW & Erik van Maanen, PA3DES

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Elevation angle measurements for NVIS propagation

Using a professional HF radio direction-finder, elevation angles of some 200 signals from amateur radio stations 10 - 100 miles away were measured. The results and conclusions of this initial measurement exercise can be used to improve understanding of Near-Vertical Incidence Sky-wave propagation. This, in turn, may lead to better NVIS antenna designs

Part of the DF antenna array.

Near-Vertical Incidence Sky-wave propagation, or NVIS, is getting a lot of attention these days. This is not surprising, as this propagation mechanism is very suitable for HF emergency communications. Using NVIS, an area with a radius of a few hundred miles can be covered with excellent signals, even when using a modest radio station. Surprisingly little experimental evidence is available, however, to reinforce the many theories about this phenomenon.

We decided to do something about this. The results and conclusions of our experiment are presented here.

WHAT IS NVIS?

When we were young, local radio contacts on the 80m and 40m amateur radio bands were commonly referred to as 'ground-wave' contacts (**Fig 1**). However, this common belief was contradicted by the fact that, in general, horizontal antennas were used. Vertical polarisation would have yielded a much stronger ground-wave.

These days, we know that, over short distances, most HF radio contacts (from 3MHz to 10MHz) use the ionosphere. Even over a mere 100 miles, sky-wave is the dominant propagation mode. To cover those relative short distances using sky-wave, radio waves have to be radiated at very steep elevation angles, typically 70° to 90°. They hit the ionosphere almost perpendicularly, hence the name 'Near-Vertical Incidence'. When the frequency is low enough, the signal will be reflected, as **Fig 2** shows, and will arrive in an area close to the transmitter, with excellent signal strength.

"These days, we know...". Do we really *know* this? Little experimental information on NVIS is available. How can we be sure that we understand correctly the mechanism involved, and that we are not merely following another popular (but unproved) theory?

The solution is as always: define an experiment, collect measurement data and analyse the results. Wouldn't it be good if we had some means to measure accurately if the signals we receive came in via ground-wave, or via sky-wave? Or even more so, if we could accurately measure the elevation angles involved? But not many radio amateurs have the equipment to do just that.

When a new Rohde & Schwarz RF direction-finder was installed at the Dutch Radiocommunications Agency (where we both work), we couldn't help experimenting with it, trying to find out what it could do. In doing so, we soon discovered it would not only make accurate azimuth measurements, it would also give elevation information with good precision. This feature was originally provided to enable 'single station location'. Using information about the actual height of the ionosphere, one could calculate the distance to the transmitter and hence locate it without the need for a second direction-finder elsewhere.

This was interesting! When tuning across the 15m band, we could easily pick out the DX stations from the Europeans, simply by looking at their elevation angles. Suddenly HF propagation theory became more meaningful than ever before!

We suddenly realised that we had something on our hands that not many radio amateurs could afford, and felt we had to do something with it. After some discussion, we were given permission to use this exquisite piece of equipment for our own experiments outside working hours.

THE RF DIRECTION-FINDER

The direction-finder we used here is a Rohde & Schwarz DDF0xM. The system consists of nine antennas and three identical receivers, followed by DSP on the IFs of the receivers. [A basic description and photographs of this equipment can be found on the Rohde & Schwarz website: **www.rohde-schwarz.com** – *M5ACN.*] Each of the nine antennas (see the photograph) consists of two vertical loops, erected perpendicular to each other and connected 90° out of phase. That way, an omnidirectional antenna is created.

Polarisation is circular at steep elevation angles, and vertical for shallow angles and ground-waves. The nine antennas are erected in a circle of diameter 165ft in a field near the monitoring station of the Dutch Radiocommunications Agency; see the photograph.

One of the antennas is permanently connected to one of the receivers, serving as a reference. The other antennas are connected to the other two receivers. The DSP is used to correlate the incoming signals and calculate the phase differences relative to the reference antenna. Knowing the geometry of the array, azimuth and elevation angles can then be calculated from these eight values. Also, a quality factor can be determined.

The location is Nederhorst den Berg, near Hilversum, in the centre of the Netherlands.

ELEVATION ANGLE MEASUREMENTS

We decided to try it during the Dutch PA Trophy contest. This is a national contest in which Dutch stations con-

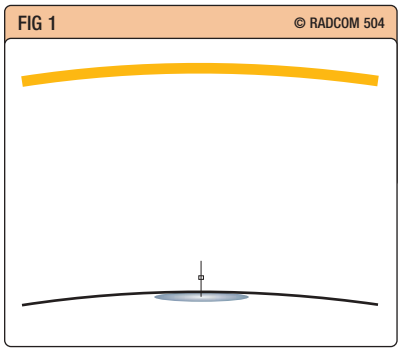


Fig 1
Ground-wave propagation.

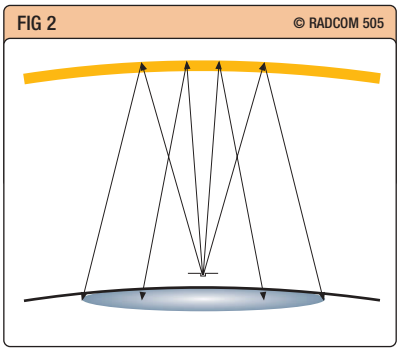


Fig 2
NVIS propagation.

tact only other Dutch stations, using the 80m and 40m bands. Activity is focused into three hours, from 0900 to 1200UTC. The CW section of the contest was on a Saturday, the SSB section on Sunday.

We tried to collect azimuth and elevation readings from as many different stations as possible. This was especially successful in the CW contest. About 200 measurements were made, evenly distributed over both bands. During the SSB contest, it proved much more difficult to get good elevation readings. The wider bandwidth and the lower average power of the SSB stations made it much harder to get accurate readings on the very short contest transmissions, and conditions were much worse that day. Therefore, only the CW measurements have been processed.

After making the measurements, we looked up the location of each station on a map, and calculated azimuth and distance. We then compared the calculated and measured azimuth angles. They generally compared very well; only a few stations were really 'off'. We knew a couple of these 'rogue' stations, and phoned them to ask where they operated during the contest. Both of them used temporary locations! After correcting this, and after ensuring that this time the measured azimuths corresponded, these stations also entered our database. We then plotted the acquired measurement data in a set of graphs.

NVIS OR GROUND-WAVE PROPAGATION?

To begin with the most remarkable results: on 40m, essentially *all* Dutch signals came in via sky-wave! The elevation angles of most stations were between 75° and 85°. Even PA3FZV, only 20 miles away, came in by sky-wave – a result we did not expect. **Fig 3** shows the distribution of all measured elevation angles. For comparison, a couple of stations from other countries were measured shortly after the contest.

On 80m, some of the Dutch stations arrived by sky-wave, others by ground-wave. The sky-wave signals came in with elevation angles between 65° and 85°, peaking at 80 – 85°. There were some unexpected observations at angles between 30° and 55°, of which the cause is not yet known. **Fig 4** shows the distribution of all measured elevation angles.

ELEVATION ANGLE VERSUS DISTANCE

Of course, we also wanted to know whether there was a relationship between distance and the dominance of sky-wave or ground-wave. We therefore plotted all elevation angle measurements against the distance from observer to source. The results are shown in **Fig 5**.

Again, we see that only a few nearby stations were received via ground-wave. Most stations came in via sky-wave, even very nearby stations! Elevation angles reduced with distance, which corresponds with the theory. On 80m, the situation was a little bit different, although the general picture remained the same. See **Fig 6**.

As we see in this graph, the distinction between stations coming in by sky-wave and by ground-wave is less sharp on 80m. Ground-wave and sky-wave exist side-by-side up to 25 miles. After that, sky-wave is dominant.

The elevation angle measurements are rather more widely spread. This can be caused by the smaller dimensions of the direction-finder antenna array in terms of wavelength, on 80m. This causes smaller phase differences in the

FIG 3 © RADCOM 506

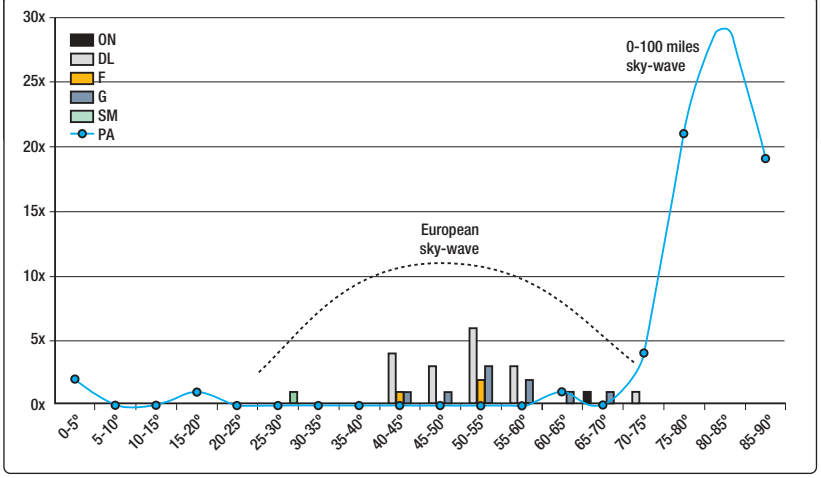


Fig 3
Number of contacts as a function of elevation angle, on 40m.

FIG 4 © RADCOM 507

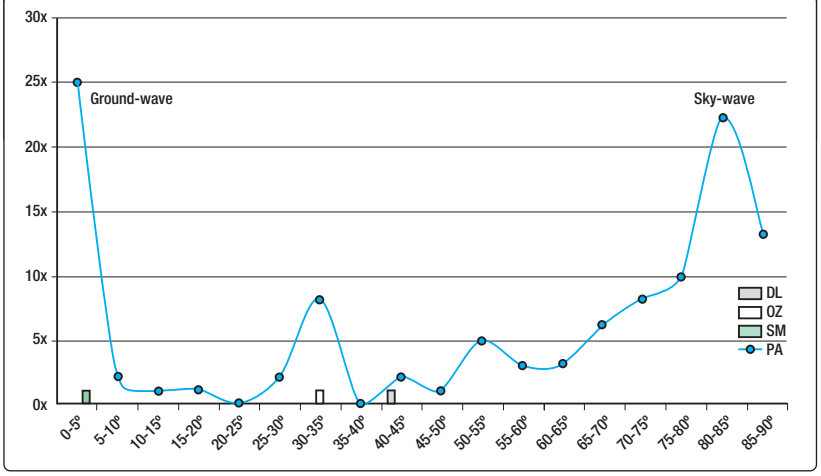


Fig 4
Number of contacts as a function of elevation angle, on 80m.

FIG 5 © RADCOM 508

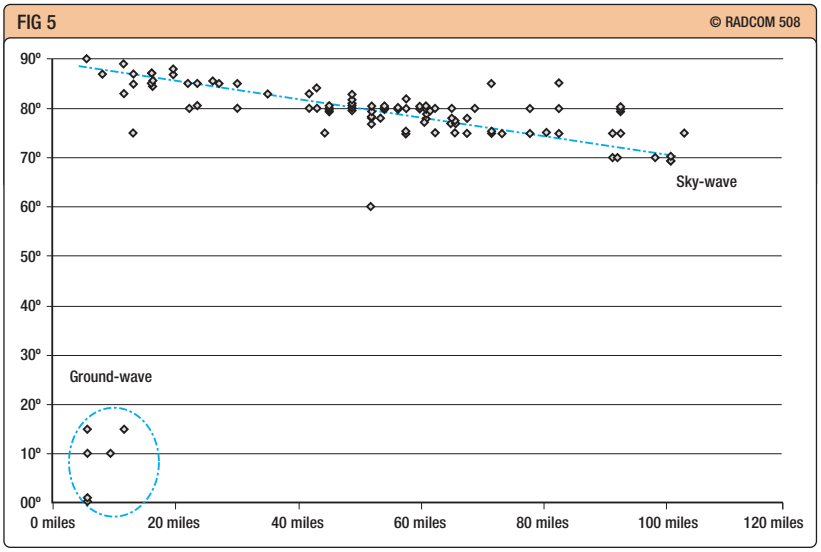
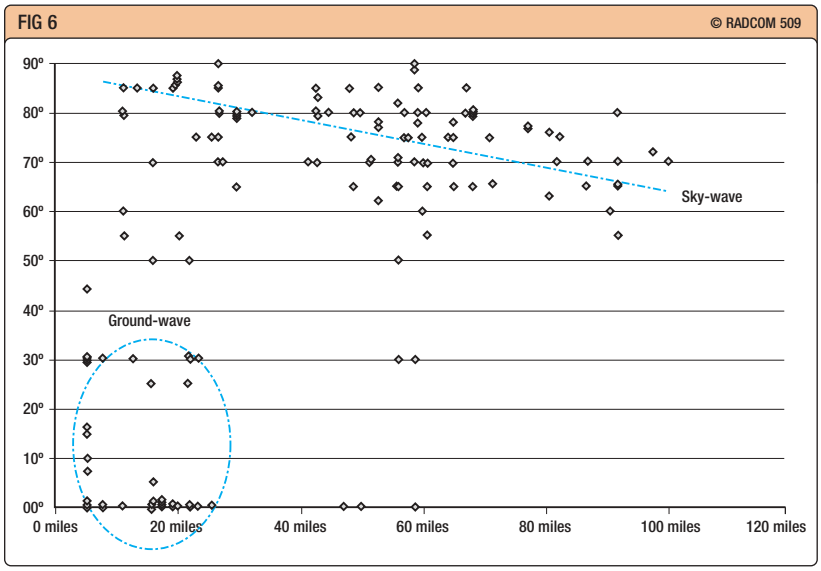


Fig 5
Elevation angle versus distance, on 40m.

Fig 6
Elevation angle versus distance, on 80m.



array, reducing the accuracy of the calculations.

CONCLUSIONS

The results above clearly indicate the dominance of NVIS on 40m, and the importance of NVIS on 80m. On 80m, NVIS competes with ground-wave for the first 25 miles, and is the dominant mode between 25 and 100 miles.

Elevation angles are very steep, interfering signals from other countries coming in at much lower elevation angles. Antennas favouring very steep angles and discriminating against elevation angles at which signals from neighbouring countries arrive, will increase reception quality for NVIS communication.

EPILOGUE

These measurements were made one weekend in November 2001. The results were first published in two Dutch amateur radio magazines in 2002. Only recently, as interest in NVIS is picking up, we decided to translate the article into English.

Of course, as with all research, these initial results trigger new questions. For example – are these results time-invariant, or do they vary with the time of day, season and sunspot number? If the transmitting station uses a vertical radiator, will the ground-wave indeed reach further, as theory predicts?

The results seem to indicate that, at the receive end, an emergency net control station could improve signal-to-noise ratio by exploiting an array of small receive antennas that has a deep null at the elevation angle where the signals of an interfering station may come in.

Also, we think that too little attention is being paid either to circular or to non-polarised antennas for reception; a horizontally-polarised signal may come down on a horizontal receive antenna at right angles, causing a 20dB signal loss due to cross-polarisation. So far, we do not know of experiments in this area.

Have you become curious too, and started experimenting again, or started building that special antenna for emergency communications? Or for that ear-shattering signal in your local contest? We'd like to hear from you. Our e-mail-addresses are given on the first page. ♦

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Electrically-Small Transmitting Loops

PART TWO

by John S (Jack) Belrose, VE2CV, *RadCom*, July 2004, pp88 – 90

In my case study concerned with determining the loop's series resistance (R_{as}) inferred from measured bandwidth (p89 middle column), Dave Gordon-Smith, G3UUR, pointed out that if I wish to determine the antenna system *Q*-factor from measured bandwidth (BW), I have to measure the -3dB BW (VSWR = 2.618:1). The BWs I have shown (see Fig 7) are the generally-referenced BWs (VSWR = 2:1), BWs of operational interest.

I have also had detailed discussions with Alan Boswell, G3NOQ. Alan has drawn my attention to a very useful equation (**Equation 12**) from which I can determine the *Q*-factor for any electrically-small antenna for any arbitrary choice of VSWR (recently published in IEEE *Antennas and Propagation*, April 2005) [13]. *FBWv* is the fractional match VSWR bandwidth, and *s* is the arbitrary choice of VSWR.

Equation 12

$$Q = \frac{2\sqrt{\beta}}{FBWv}, \sqrt{\beta} = \frac{s-1}{2\sqrt{s}}$$

Equation 13

$$BW\ (-3\text{dB}) = \frac{f}{Q}$$

Using this expression, I can calculate the *Q*-factor for the loop from the measured BW, and so determine the BW (-3dB) as in **Equation 13**.

Christian Käferlein, DK5CZ, has published [6] measured BWs (VSWR = 2:1), for all his AMA loops, using a network analyser. The BWs for his AMA 1.7m diameter loop at 7, 10 and 14MHz are 4.3, 12 and 17kHz, respectively. Using Equations 12 and 13, I can calculate the BW (-3dB), for comparison with the bandwidths calculated by *NEC*. The measured BWs (-3dB) are 6, 17 and 24kHz, respectively.

The BWs computed by *NEC-4D* (with R_{as} values according to *NEC-4D*, *Q*-factors determined from Equation 9, and BWs from Equation 13) are 6, 12.5 and 25.6kHz.

This revised analysis is *independent of the source impedance* (a concern discussed earlier), since the measured bandwidths were derived from input impedance measurements to the coupling loop plotted on a Smith Chart, and Equation 12 is based on wave reflection from the load.

NEC-4D has correctly predicted the antenna system *Q*-factor for the 1.7m diameter AMA loop but, for electrically-smaller loops (1.3m and 0.8m diameter), measured and predicted *Q*-factors can differ. As the electrical size of the loop decreases, losses become increasingly important (since R_r is very small). *NEC* predicts *Q*-factors that are greater than measured, and this difference increases with decrease in the electrical size of the loop. A loss parameter not discussed so far is the quality factor for the tuning capacitor. For my analysis of the 1.7m loop, a lossless capacitor was assumed but, for the smaller loops, an acceptable loss for this capacitor may need to be taken into account, since this loss can account for differences between measured and predicted *Q*-factors. The measured BW determines the resistance (R_{as}), and so choosing for the *NEC* analysis a loss resistance for the tuning capacitor so that computed and measured antenna system resistances are the same, *NEC-4D* can then accurately predict performance (gain and VRP). ♦

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The G3HBN portable magnetic loop

For many years, a portable magnetic loop has been in use at G3HBN for holidays and special events. The design was a simple loop of RG-213 braiding slid over a piece of half-inch water hosepipe and supported by pieces of bamboo which formed a pear-shape. The whole was manually tuned and supported on a photographic tripod. It was time to upgrade this loop. The recent articles in *RadCom* inspired a new design

The requirement was to improve the performance and increase the operating bandwidth, if possible. Looking at some aerial history, the old Cage Dipole came to mind. The Cage Dipole was designed to increase the bandwidth and help with the matching of it for commercial broadcasting purposes. In those stations, very long open-wire feeders from the transmitter to the aerial were customary. Aerial tuning units were not used and the feeder was coupled directly into the transmitter with either a link or a π coupling circuit. Such aerials would have a bandwidth of say 2.5 to 5.0 or 5.0 to 10.0MHz.

THE LOOP

The element of this loop is constructed along the lines of the cage dipole outlined above, but only a single cage element is used. This element consists of 12 cables of stranded plastic-covered hook-up wire connected in parallel. The inner core of wire is about 1mm diameter. The overall diameter of the cage is 50mm. The element, when constructed, is placed on an hexagonal wooden frame. A tuning capacitor of 525 + 525pF with slow-motion drive is used to bring the loop to resonance at the desired frequency. The tuning range is from 6.9 to 32.0MHz. The loop is fed with a Faraday link coupling made with RG-213 coax, the braiding of which is open for 2.5cm at the centre. The photograph shows the completed loop on a tripod mounting. One of the problems of magnetic loops is the very narrow bandwidth. **Table 1** illustrates the comparison between a 1m, 22mm copper tube element and the 1m, 50mm caged element.

A worthwhile bandwidth increase has been achieved. This represents an overall improvement in performance and is reflected in the results. The outer diameter of the loop at the diagonals is about 105cm. When the length of the conducting element becomes greater than λ/4, the loop ceases to operate properly and becomes difficult to couple. It is desirable, therefore, to try to keep the overall conductor length to about 0.24λ or less at the highest frequency of operation. Although the model described here will operate on 29MHz, the element is really just a little too long.

Table 1: Bandwidths of the two designs.

Portable loop 12-wire cage	Centre Frequency	Fixed loop 22m copper tube
21	7015	11
30	10115	16
50	14050	30
75	18100	45
110	21100	60

Notes: All values in kHz.
Measurements were taken at VSWR of 1.3:1 points with a Welz SP-300 VSWR / power meter.
Both loops had a VSWR of 1:1 at the centre frequency.

Table 2: Parts list.

3	old CDs glued together to form the centre core
2	plastic 3cm plumbing nuts glued together
7	plastic till-roll spools or similar rigid plastic tube that fits the dowels
6	dowelling spokes, 12mm, for the hexagon
5	plastic 10mm or 15mm wall-mounting water pipe clips
4	2.5cm (1in) rubber tap washers
5	3 x 40mm bolts with nuts and washers
5	water pipe saddles to strengthen centre mountings
12	55mm plastic discs.
4	packets of 10m of 6A (24/0.2mm) hook-up wire (Maplin)
	Connectors to suit termination to the capacitor
1	525pF + 525pF variable capacitor
1	suitable plastic box or non-metallic container
1	slow motion drive 6 or 7:1 reduction.
1	well-insulated tuning knob, or plastic coupler and knob
1m	RG-213 Coax
5	Terry clips, 10mm
	Portable and rotary mounting

CONSTRUCTION

Most constructors seldom follow exactly what is described in an article but, listed in **Table 2**, are the items that went into making this particular model.

The assembly is fairly obvious from the photographs and **Fig 1**. There are several points that are not so obvious. The overall diagonal measurements from the centre to the outer cables should not be less than about 105cm. If the hexagon is smaller than this, with the cable specified, the loop might not quite tune to 7MHz. With this measurement, the loop should tune from 6960kHz to 32MHz.

The dowelling should be cut into five lengths of 47cm and inserted into rigid plastic tubes (eg till-roll inners) at the centre hub. The sixth length is measured to fit whatever mounting box can be found. The seventh plastic support should be mounted to the tuning box and then the sixth spoke measured and cut. The five white plastic pipe clips are screwed to the ends of the five 47cm spokes.

The spacers are made with the 12 plastic discs cut from about 1mm thick plastic. A 3-litre food container was cut into flat pieces which were scored with 55mm circles. A further circle of 50mm diameter was scored inside each one. Marks should be made every 30° on the 50mm circle for drilling the holes for the cables. A centre hole should be drilled for the fixing bolts and rubber washers.

The capacitor should be mounted and some suitable terminals used. PL-259/-239 plugs and sockets were used in the example, but ordinary spade terminals would be easier and just as good. The capacitor is wired to the connectors and loop using *only the fixed vanes*, the rotor being left unconnected or 'floating'.

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E-mail: g3hbn@freeuk.com

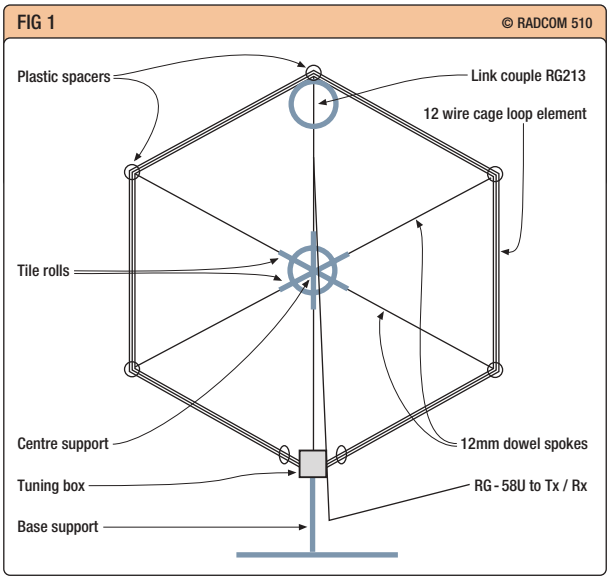


Fig 1
The magnetic loop – for dimensions, see text.

This halves the capacity but doubles the working voltage. Further, it has the advantage of there being no moving contacts involved in the RF path. A well insulated knob, or plastic shaft coupler and knob should be used for tuning.

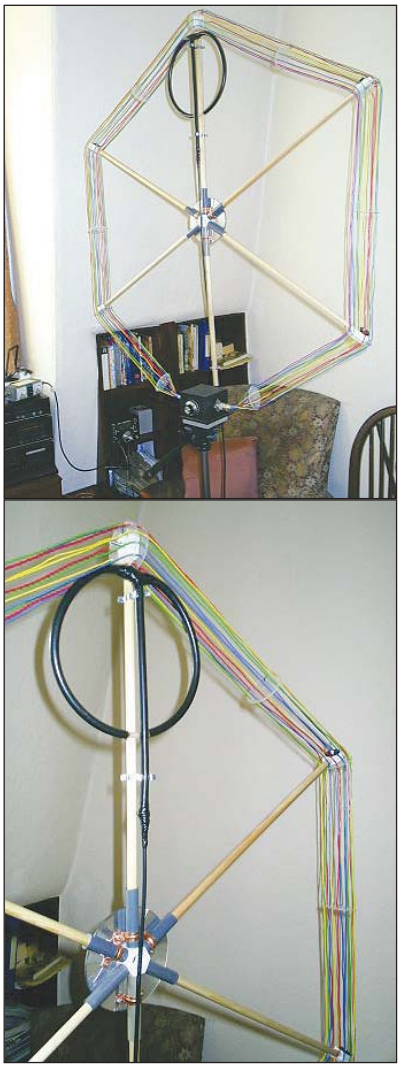
When the whole framework is assembled, the loop can be wired. Because the conductor is formed in a cage, the cables forming this cage will be of different lengths. Each wire must be threaded through the holes in the plastic spacers *on the frame*. The 12 wires can be cut roughly to length with plenty to spare for termination (coloured wires are a great help here) or from a reel of cable. But, in either case, each wire must be run separately, like stringing a musical instrument. Start with the cables nearest the centre and work outward to the top. Terminate all 12 cables at one end first and solder them to a lug or terminal or PL-259 etc. Connect this end to the tuning box. The other end is more difficult, because the wires need to be reasonably tensioned to form the cage. If they are a little slack, the rubber washers holding the spacers to the spokes provide some adjustment for this purpose. Once the loop element is finished, don't forget to mark which is the top of the cage on the plastic spacers!

Great care must be taken with *all* soldered connections to minimise any DC resistance.

The coupling link is made with RG-213. Many trials were conducted to optimise the coupling but, with the 'fatter' conductor for the loop element, it was found that the coupling link also needed to be 'fatter'. To form the link, strip about 4cm off the cover, expose the inner conductor for 2.5cm and solder the braiding to the inner. From the tip of the join, measure 60cm of cable. Strip about 3cm of cover to expose the braiding and solder the shorted end to the exposed braiding. This will form the coupling link of about 19 to 20cm diameter. At the centre of the link, cut the braiding for about 2.5cm to expose the inner core as illustrated. Bend the remaining coax from the join to run vertically through the centre of the link and join it to the desired length of RG-58U. The mountings for the link are made with two Terry clips bolted back-to-back which clip neatly over the centre spoke and the RG-213.

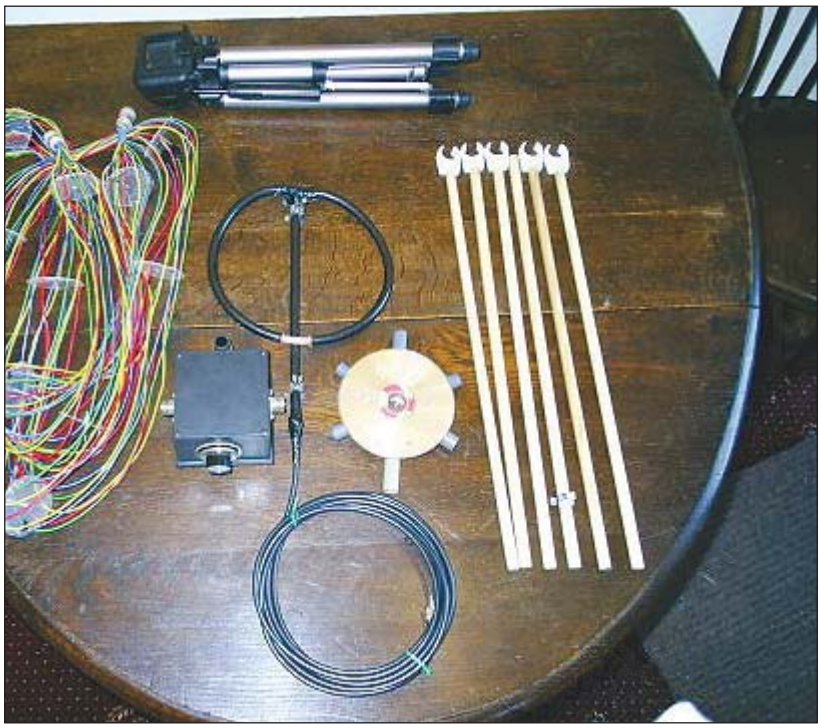
The loop in use at G3HBN.

Detail of the loop centre and link.



OPERATION

The first step in tuning the loop is to peak it for maximum aerial noise and/or signal strength on a receiver. If an aerial analyser is available, a quick check can be made for all the bands to observe the VSWR. A 1:1 VSWR should be obtainable on all bands from 7 to 29MHz. If 1:1 cannot be achieved, the aerial should be rotated, observing the VSWR at the same time. Adjacent objects in a room can unbalance the loop and, under these circumstances, it might not be possible to obtain the necessary VSWR. A VSWR/power meter is



Left
Ready for packing.

Below
The tuning box.

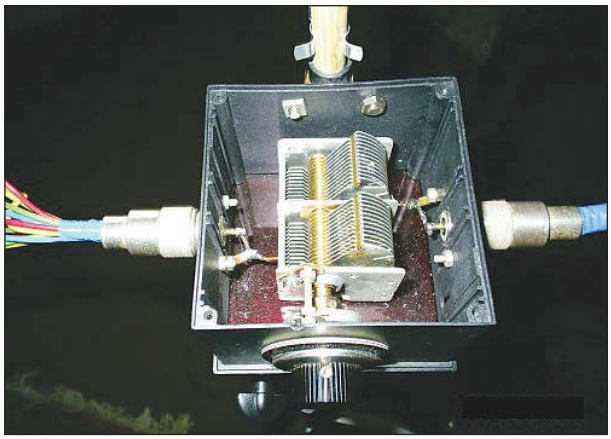
an asset, but the loop can be tuned with a simple field strength meter, tuning for maximum signal. Remember that maximum field strength radiation will be in the plane of the loop. On receive, this will be quite marked and a null will be obtained when the aerial is broadside to the signal. However, this does not always seem to be the case. Often very strong signals are received broadside to the loop and the same signal path seems to be effective for both transmission and reception. This may be due to building reflections, another illustration of where the loop needs to be easily and quickly rotated. This is particularly useful when operating low power (QRP).

At the lower frequencies, the tuning of the loop is very sharp and it is essential to have a slow-motion drive fitted to the tuning capacitor. On the higher bands, the tuning is not quite so sharp, but it is still beneficial to tune the loop 'on the nose'. Hand-capacity has not proved to be a problem with this design. On the lower frequencies, the tuning capacitor is large and therefore any hand-capacity is insignificant. On the higher frequency bands, where hand-capacity is noticeable, it is still not too serious a problem because, at those frequencies, the usable bandwidth is much greater. There is, of course, absolutely no requirement for an ATU, if one is fitted to the equipment it should be either de-selected or tuned to a 50Ω load before using the loop.

This model is not built for high power, but it will comfortably handle 20 – 25W. Normally, any indoor aerial used in a built-up area should not really be used for high power, since the problems of RFI (Radio Frequency Interference) can become critical. The loop should be placed as far away from the operator as is practicable.

RESULTS

Tests were carried out in CW (Morse) from the location pictured, in London, and a seaside cottage in Folkestone, with power levels of 5W and 20W. The majority of contacts made were at the 5W level. The overall feel of the aerial was quite amazing, with signals over two S-units stronger than with the original 80cm loop, particularly on the lower-frequency bands. Comparison tests were made between the portable loop and the octagonal loop of 1m diameter on the roof. The roof aerial was, in the main, about 1 S-unit better, but the reports were that QSB (fading) was more prevalent with the indoor loop. Signal reports received varied with conditions, but reports of RST 579 and 589 were not unusual. Throughout the three-month trial period, frequent contacts were made with most European countries, Asia and North America. With 20W, the reply rate to stations called was between 70 and 80%; with 5W it was about 60 to 70% This is about the norm for QRP operation. Calling CQ was not very profitable and seldom is with QRP. Many two-way QRP contacts were also made, one notably on 30m with GM3OXX (1W RST 579), G3HBN being in Folkestone (5W RST 599), the loop being at ground level in the sitting room, about 20m above sea level. This was a very long ragchew. Conditions throughout the test period have been at an all-time low and extremely difficult for making reliable evaluations. However, several DX stations were worked with QRP and that in itself was most gratifying. No tests were made for RF feedback when using a microphone.



CONCLUSIONS

The object of improving the original loop has been achieved with greater success than expected. It seems the application of a multi-cable radiating element for the loop has brought with it more benefits than originally anticipated. The increased bandwidth is far greater than expectations and the improved overall performance in the liveliness of the aerial was a pleasant surprise. The next move is to replace the octagonal loop on the roof with a weather-proofed multi-conductor version. The results obtained here also open the door for further development in the general approach to the magnetic loop as an aerial in its own right, not necessarily to be compared with other aerial types. It is a radiator that has many characteristics that would seem not yet to have been fully exploited. ♦

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Design and construction of the 5MHz beacons GB3RAL, GB3WES and GB3ORK

part one

The 5MHz beacon project has now been running for some months, and many UK readers will by now have heard the transmissions on 5.29MHz [1]. The beacons are intended, and have been designed, for propagation monitoring, and so transmit several types of modulation to assist reception by as wide an audience as possible. In part one of his two-part article, G4JNT looks at the design history of the project, beginning with GB3RAL, and continuing with the initial work on GB3WES and GB3ORK, which will be concluded next month

Three transmitters make up the system, GB3RAL in Oxfordshire, GB3WES in Cumbria and GB3ORK in the Orkney Islands; each transmits for one minute in every 15. They are timed such that GB3RAL transmits exactly on the hour then at 15, 30 and 45 minutes past, GB3WES one minute after that, with GB3ORK sending its sequence at 02, 17, 32 and 47 minutes. Timing is controlled by a GPS receiver at each station and is accurate to within 1 microsecond. Software has been written by Peter Martinez, G3PLX, to allow automatic unattended monitoring of these beacons. The first panel gives more details of this.

AUTOMATIC BEACON MONITORING

Peter Martinez, G3PLX, has written a piece of software for automated monitoring of these beacons. The audio output from a receiver is connected to a computer's soundcard input; the software digitises the audio, then uses the resulting data to derive the signal-to-noise ratio for each of the three beacons by measuring signal strength and background noise in a 1Hz effective bandwidth. The computer's internal clock is used to differentiate between the three beacons, and to identify the 25- to 30-second period when full carrier is being transmitted. Any drift in the computer clock is tracked and taken into account, as is any frequency or tuning error to within ±20Hz

Measured data for all three beacons are shown on screen for the previous 40 hours, and can be automatically logged to a file in a format suitable for direct inputting to the 5MHz Working Group's monitoring database. A screen plot from this software is shown in **Fig 1.**

The software can be downloaded from [1]; look for the compressed file 5mhzbcns.zip.

Each beacon transmits a (nearly) identical sequence, shown graphically in **Fig 2.**

The first 7s are taken up by the callsign, followed by a short period of plain carrier at full power.

From 7s to 15s, the power is reduced in steps of 6dB per second, to a final level of -48dB. This final level corresponds to transmitted power level of just 160µW. A 100ms gap at the beginning of each new power level setting makes the individual steps easier to detect by ear. The power steps are designed to aid aural estimation of signal-to-noise ratio by counting (and logging) the number of steps that can be heard before the lower-power steps have disappeared into the noise.

The power steps are repeated for the interval 16s to 24s.

From 25s to 30s, a period of full-power carrier allows automatic logging software to measure the received signal.

The remaining 30s are taken up with a sequence consisting of precisely timed 500µs-wide pulses, at full power, with a 40Hz repetition rate. This part of the waveform sounds like a low pitched buzz and is designed for ionospheric sounding experiments, enabling measurements of delay and multipath propagation to be undertaken.

GB3RAL – THE FIRST 5MHz BEACON

The first beacon to form part of the chain was GB3RAL at the Rutherford Appleton Laboratory near Didcot, Oxfordshire, which went on air in the middle of 2003. The hardware for this was put together by Mike Willis, G0MJW, who used an off-the-shelf synthesiser as the frequency source, followed by a 100W broadband power amplifier, then later an amplifier that, because of its obsolescence, had been made available to the project by Yaesu (UK). The Yaesu PA just needed a couple of simple modifications to hardwire it for single-band operation, and would be operated well backed off at 10W output, giving good linearity. The power steps were generated by a commercially-made stepped attenuator – a piece of laboratory equipment (sometimes seen on the surplus equipment stands) and controlled from 0/5V logic level signals. This had six stages of attenuation giving 0 to 63dB of attenuation in binary steps of 1dB. Mike made up a custom PIN

FIG 1

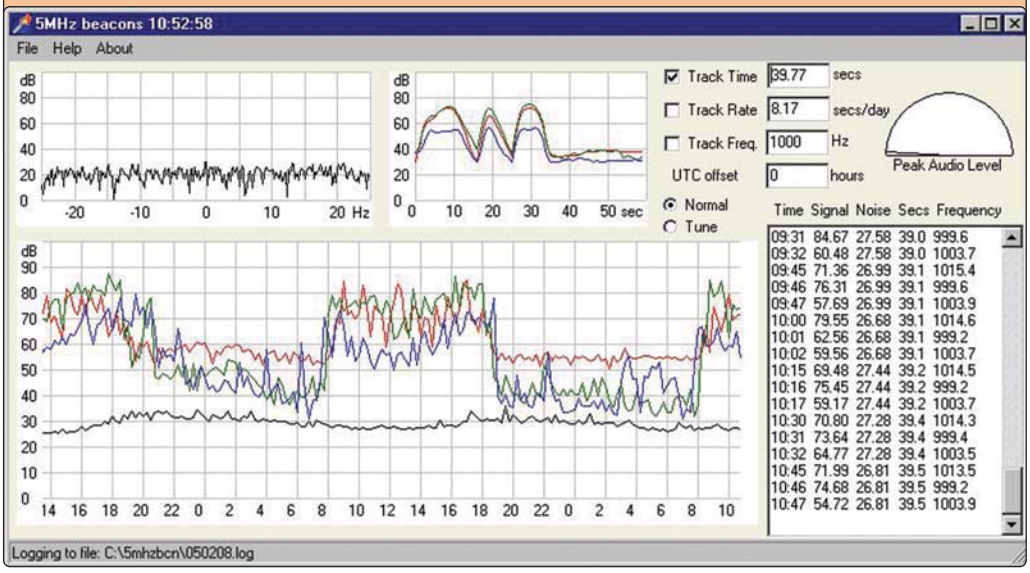


FIG 2 © RADCOM 511

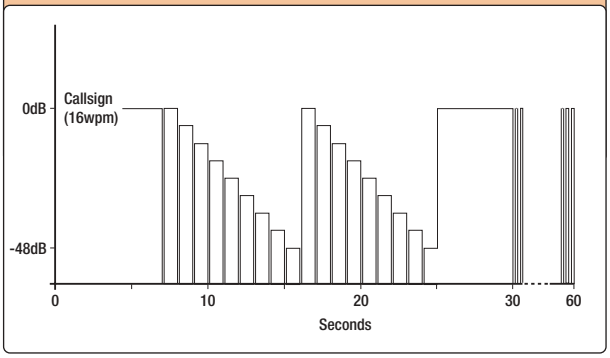


Fig 1
Screen display of automatic monitoring program.

Fig 2
Beacon keying sequence.

diode keyer that could allow the RF to be switched on/off fast enough to transmit the sounder sequence and the CW keying. It achieved 80dB of on-off isolation, but needed a negative supply to achieve this. A Garmin GPS receiver module was to hand to supply timing pulses; a 23A power supply had been donated by SMC, and the only remaining item was the hardware needed to control all this lot!

CONTROLLER DESIGN

I was approached to design a microcontroller (PIC)-based unit for the project. Initially, we planned to use the GPS timing to deliver just a one pulse per second (1pps) signal to the controller, which could then count these seconds pulses to determine the correct 15-minute starting point, and issue the appropriate signals to the keyer and attenuator; a separate signal to activate the power amplifier was also required.

Manual setting of the correct start time would be necessary for this timing method, and it was realised that a nicer automatic time setting scheme is possible when using GPS receivers. As well as the logic level 1pps timing signal, the GPS receiver outputs the time and date together with navigation information and receiver and satellite status. The data is sent as a simple textual string on a serial interface using stop-start, or RS-232-type signalling once per second (immediately *after* the one second pulse to which the data refers). The data format is shown in the second panel.

So now, the microcontroller no longer has to keep track of time itself, since it can read this data from the serial interface and set itself to the correct time. As the data are sent after the 1pps to which they refer, this has to be taken into account in the software.

The PIC software was written and a small PCB produced that allowed all the input / output lines from the PIC chip to be sent off to their destinations. Mike wired this into the rest of the hardware and initially put the assembly on air from his home as an attended personal beacon, sending its sequence every 15 minutes. When the licence for GB3RAL came through, the beacon was transferred to its proper location, the callsign re-programmed and (after solving a few EMC problems with the installation) the whole lot went on air permanently.

GB3WES AND GB3ORK

After the successful launch of GB3RAL, the RSGB 5MHz Working Group applied for, and received, licences for two more beacons in the chain, GB3WES and GB3ORK.

DATA FORMAT FROM GPS MODULES

All off-the-shelf GPS modules give a binary data output on a serial interface. As supplied, this is usually in some proprietary binary format, and software has to be customised to each different manufacturer's module to be able to understand it. However, most modules can also be programmed to give their data in a standard, text based, manner. The format has been standardised by the National Marine Electronics Association and is applicable to all maritime navigation equipment, not just GPS. The format is referred to as NMEA-0183 and data are supplied in a variety of text-based 'sentences', these differing in type depending on what information is contained and the uses for which they are intended. The data rate is defined as 4800-baud, 8-bit stop-start signalling and is compatible with the RS-232 (more properly IEA-232) format as used on all computers' serial ports. Some level shifting and polarity conversion is usually required, as the GPS modules usually output 0/5V logic signals - usually solved with a single chip such as the MAX232.

A typical string of data as sent from the Garmin GPS25 module, once per second, looks like this.

```
$GPRMC,212132,A,5054.5876,N,00117.4041,W,000.0,000.0,141202,003.5,W*7B
$GPGSA,A,3,,11,14,,28,31,,,,,,,3.7,2.4,2.7*38
$GPGSV,2,1,06,03,23,146,,11,64,276,40,14,33,083,44,20,21,215,36*74
```

For our purposes, the first sentence beginning '$GPRMC' is the most useful; this is the NMEA Recommended Minimum Specific GPS (RMC) sentence. The other sentences shown here include space vehicle status data and satellite visibility Data items of the RMC sentence are separated by commas as follows.

The first item is the time, here 21:21:32 – this refers to the seconds pulse that has just happened.
The 'A' indicates a valid position and time fix; if not present, the data may be in error.
The longitude, in the format DDMM.MMMM, with leading zeros suppressed, here 50° 54.5876' N.
The latitude, in the same format, here 1° 17.4041' W.
Speed over ground, knots (zero).
Course over ground, degrees.
Date, in the form DDMMYY, here 14/12/2002.
Magnetic variation, here 3.5° W.
* indicates the end of the data, followed by a checksum in hexadecimal, and terminated with a carriage return / linefeed pair, [CR][LF].

FIG 3 © RADCOM 512

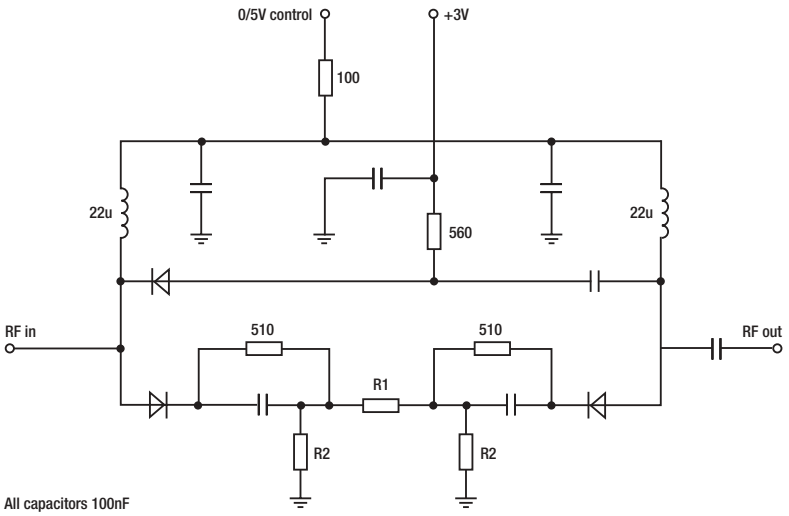
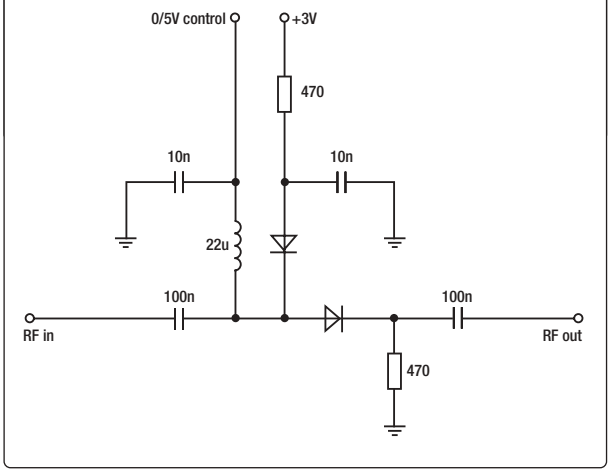


FIG 4 © RADCOM 513



Thanks should go to both the RSGB and Ofcom for the swift processing of these licences, which only took a few weeks from initial submissions to receipt. Beacon keepers were identified who would be prepared to host the beacons at their homes, so all that remained were two completely new sets of beacon hardware to be built.

I already had most of the hardware to hand. The controller already existed, the RF source could be adapted from a standard DDS module [2] and a second Yaesu power amplifier had already been donated. By a piece of timely serendipity, I just happened to have a third identical PA to make up the complement! This was all that remained from a scrapped FT-747 transceiver of some years ago.

We would have liked to include a high-stability GPS-locked frequency standard. There is an excellent GPS Disciplined Oscillator [3] that makes use of the 1pps signal from a GPS receiver to lock a high-stability reference oscillator. However it, and the oscillator/oven needed, would have proved too costly, so a simple temperature-compensated oscillator (TCXO) was used on its own to drive the DDS reference clock. These can usually achieve a frequency stability within 2ppm, so ought to keep the beacons within 10Hz of nominal. There is a GPS receiver module, the Connexant/Navman Jupiter-T model, which includes a 10kHz output intended for straightforward locking of oscillators – and would have proved absolutely perfect here. However, the Jupiter-T is difficult to program to give NMEA data outputs and, when it can be persuaded to do so, these are typically one or two seconds late. As timing is so important here, this otherwise-ideal module couldn't be used.

All that remained to be built was a keyer circuit and a programmable attenuator. We contemplated buying a suitable attenuator from Minicircuits but, at over £50 each (and two would have been needed in each beacon for the complete 48dB power step range), decided this was too extravagant. So a programmable attenuator had to be built from scratch.

ATTENUATOR AND KEYER DESIGN

Several hundred surplus and obsolete PIN diodes suitable for switching HF were sitting in my loft looking for a good home, so this was the obvious route to go. As we wanted 6dB power steps and I was going with a custom attenuator design, it seemed pointless staying with the 1/2/4/8/16/32dB steps of the original lab attenuator. Instead, a four-stage attenuator was built with steps of 6/12/12/24dB. This would allow all attenuation values from 0 to 54 dB in 6dB steps to be selected by switching in selected stages. The circuit diagram of one of the four attenuator stages is shown in **Fig 3**. A π resistor network is switched into circuit by a pair of PIN diodes; when that stage is not needed these are switched off and a third PIN diode activated to bypass the resistor network. As PIN diodes need to be reverse-biased to turn them off properly, a 3V reference line derived from a Zener diode goes to each attenuator stage to facilitate proper forward / reverse biasing with just 0/5V logic drive levels. The values of resistors R1 and R2 for each attenuation setting are shown in **Table 1**.

The four cascaded stages gave measured attenuations, for each setting, from 0 to 54 dB, that were accurate to within 1dB, and the final design using surface mount construction worked satisfactorily from 3.5MHz up to 200MHz. Initially, it had been hoped that the attenuator could also perform the keyer function, switching in 54 or 0 dB for off/on, respectively. However, in order to achieve the accurate attenuation settings, considerable decoupling is required on the PCB, and two 0.1µF capacitors shunt each control signal line coming from the PIC. These meant that extra high-current buffering would be needed if the attenuator was to be driven at the sounder pulse repetition rate. Even the CW keying would tax the PIC output driver stages unpleasantly. The solution was either to install high-current drivers on each logic line, or to build a separate keyer. As PIN diodes were plentiful, the latter solution was taken and the keyer circuit can be seen in **Fig 4**. One PIN diode on its own could be persuaded to give a little over 30dB attenuation, but it is always nicer to do a job properly and the final version shown, using a pair of diodes, achieved over 50dB on/off ratio with no trouble. It could be driven with 500µs-wide pulses, reliably, directly from the PIC.

Fig 3
Circuit diagram of attenuator stage.

Fig 4
Circuit diagram of keyer.

NEXT MONTH

The project concludes with a description of the GPS module, the new PA, the overall assembly and considers the lessons learned from the venture. ♦

Table 1: π-attenuator resistor values.
| | means 'in parallel with'. Values in ohms.

Attenuation dB	R1 (series)	R2 (shunt)
6	37.5 (75 || 75)	150
12	93.8 (120 || 430)	82
24	399 (430 || 5600)	56

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[1] RSGB 5MHz group
www.rsgb-spectrumforum.org.uk/beacon_reporting.htm
[2] AD9850 DDS Module
G4JNT, *RadCom*, November 2000
[3] GPS Disciplined Oscillator
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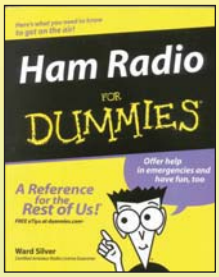

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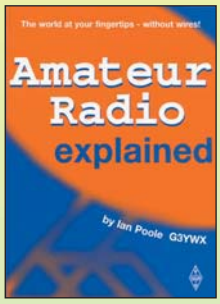

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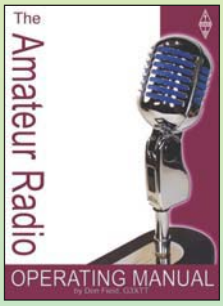

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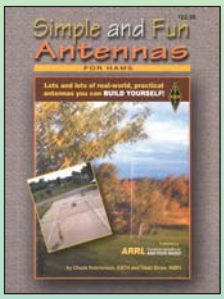

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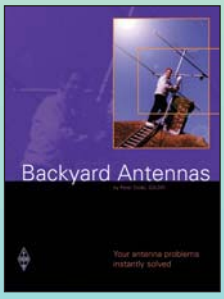

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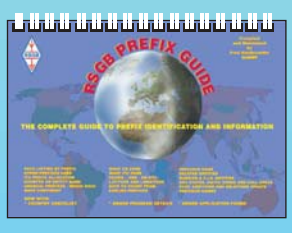

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Members' ads

FOR SALE

100W gen cov tcvr, Icom IC-735, fully serviced, £375 delivered. Alinco DX-70TH inc EDS4, just serviced & tested, £375. 4-ele 6m Eagle Yagi , £50. Trev, G2KF, 07974 892 179 (Cornmwall).

ALINCO DX-70 HF & 6m tcvr complete, boxed, man, as new, bargain, £295 ono. Buyer collects, or pays postage. G0HXD, QTHR, 01606 75165, 07949 133 888 (Cheshire).

ALINCO DX-70 HF bands tcvr + 6m, gen cov rcvr. 100W SSB, CW, AM, FM, £325. Geoff, 01634 891 017 (Medway).

ANTENNA – Tennadyne T7 18 – 32MHz log periodic (17m – 10m). In mint cond. This 7-ele antenna has a forward gain of 6.2dB, F/B 15-25dB,18ft boom and weighs only 33lb. Longest element is 29ft and has a turning radius of 16.5ft. Comes complete with balun, and instruction man,£200 ono. Prefer buyer collects. G3XFA, QTHR, 01832 273 123 (nr Oundle).
E-mail: g3xfa@aol.com

BC348, £120. Tokyo antenna coupler model HC200, £40. Meteor 600 frequency counter 5Hz to 600MHz, £35. Alinco dual-band h/h tcvr as new in original packing c/w mains charger model DJ596E, £85. All plus carriage. G3RUB, QTHR, 01773 603 005 (Alfreton).
E-mail: stanhine@onetel.com

CLOSING DOWN – Homebrew KW Vanguard. Geloso VFO, 807 PA. Two 807 mod. UM3 mod transformer. Geloso rcvr. G-209R with man. BC-221 wavemeter, 1191A. Various transformers, chokes, valves, odds and ends. Offers? G3MZZ, 01329 286 478.

SILENT KEYS

We regret to record the passing of the following radio amateurs:

RS188500	Mr G David	01/05
2E0VGS	Mr M R Verguson	17/08/04
G0USV	Mr B H Neep	02/05
G1VFI	Mr B S Smith	28/03/05
G3AAJ	Mr R J C Broadbent	24/04/05
G3CRJ	Mr B J Shaw	03/03/05
G3CRR	Mr A E Glozier	03/05
G3FOP	Mr R G Barrell	13/02/05
G3IVZ	Mr W E Stephen	27/03/05
G3JSB	Mr S B Jeffrey	21/04/05
G3NBB	Mr R D Lyder	01/04/05
G3VML	Mr B E F Pallett	04/04/05
G4KRL	Mr W A Prince	
GU0PYO	Mr C J A Petit	
GW0IZR	Mr A E Thompson	22/04/05
GW3KYA	Mr R B Davies	07/03/05
M1EFF	Mr B A Sutton	06/03/05
M5LXU	Mr T J Burke	18/04/05

DISH 1.4m dia aluminium prime focus on stand, £25. Valved comms rcvrs, Hammarlund SP600, £45; GEC BRT-400, £45, both with mans. QRO linear RF (50MHz) and PSU components – please phone. Buyer inspects and collects. G3TKQ, QTHR, 01953 605 072 (Norfolk).

FT-1000MP with INRAD IF mod, just serviced, £925. INRAD filters 400Hz and 2.1kHz (455kHz), 2.1kHz (8.2MHz). Yaesu XF-110CN 250Hz (455kHz), suit FT-1000MP, £275. Buyer collects rig. 07770 542 338 (Cheshire). E-mail: g3wpf@beeb.net

GOING QRT, mobile rig TS-120S, mag mount, ants for 5 bands, £100. TS-430S. PSU. SWR power meter. ATU. All in gwo, £200. 3-ele triband beam by Weston, £50. G3QD, QTHR, 0115 925 7197 (Nottingham).

HEATHKIT grid dip meter mod GD1-U with man, £15 + postage. G3JNY, 0113 286 3058 (Garforth, Leeds).

HENRY Radio 1kW linear amps 2m and 6m. Offers above £450 each, both in exc cond. TS-790E tcvr 2m, 70cm complete with 23cm unit. Good electrical cond, but has a few scratches, £350. Buyer inspects and collects. Marilyn, G0GMB, 01908 560 026 (Stony Stratford).

KENWOOD TL-922 linear amp. An excellent example of this high quality amplifier. New 3-500ZG (RF Parts) graphite tubes fitted recently. Only repair, replacement dial lamps! Complete with original packing and instruction man, £800 ono. Prefer buyer collects but could arrange courier delivery at cost. G3XFA, QTHR, 01832 273 123 (nr Oundle). E-mail: g3xfa@aol.com

KENWOOD TS-2000 + ARCP-2000 control software, used on rx only. Mint cond, boxed as new, £1080. John, G0PRF, 01422 375 375 (Huddersfield).

KENWOOD TS-850S-AT, CW filter, PS-52 PSU, SP-31 spkr, MC-60 desk mic, HS-5 headphones, Bencher key. All vgc. Mans, boxes, buyer inspects, collects, £495. Don, G0PAN, 01132 670 598 (Leeds).
E-mail: g0pan@dsl.pipex.com

KENWOOD TS-870S DSP good cond, £800. Trio HF tcvr TS-930S good cond, £400. Kenwood SP-820 speaker good cond, £50. Buyer collects. M0DNU, 01608 652 493 (Moreton in Marsh).

KENWOOD TS-930S inc auto ATU, recently overhauled, with MC-43S fist mic and operator's and workshop manuals, GWO, £350. Henry 2KD Classic desk-top HF (inc WARC bands) linear amplifier, 2 x 3-500Z valves, 2kW input, absolutely loafs along at 400W out, with manual, GWO, £700.

Heathkit SA-2040 80-10m roller-coaster ATU, balanced & unbalanced inputs, rated 2kW PEP/1kW CW, with manual, £100. Yaesu MD-100 desk mic (for FT-1000MP etc), brand new in original wrapping, never taken out of box! £80. Cue Dee (Swedish-made) 15144A 15-ele 2m Yagi, vy good cond, £60. PacComm Tiny-2 MkII packet TNC from Siskin, as new, with manual, cables, original box, cost new £143, now £50. Lunar Electronics 2M10-80P 12V 2m 'brick' linear amplifier, 10W in, 80W out, GWO, £40. Massive 5-gang ceramic switch, ideal for linear project, brand new, £35. BC-221 frequency meter with built-in mains PSU, very clean condition, £25. Jaybeam UGP/2m base station folded ground plane vertical, unused, still in original box, £15. Altai headset with boom mic and large footswitch attached, ideal SES/contest use, £10. Micrometer in wooden case, £5. Yaesu YH-77ST stereo headphones, neads new foam muffs £5. Bantex 2m 5/8-wave mobile whip on mag mount with coax, £5. All ONO, plus carriage, buyer collects or may deliver at cost. Steve, G4JVG, 0870 904 7373 ext 35 daytime (Herts).

NATIONAL HRO-60 complete with boxed coil set, all with band-spread, man and original spkr, £400. Postage and insurance extra. This is a heavy item – see photograph. Pascal, GI0SFT, 028 7135 2804 (Londonderry).
E-mail: pascalmcd@aol.com

NATIONAL NC-183D, £250, Lowe HF-225, £175. HF-125, £150. Heathkit RA1, £40. Trio 9R59, £30. All plus carriage. G4HHZ, QTHR, 023 8027 0785 (Eastleigh).
E-mail: tony@nicholrd.fsnet.co.uk

QRO roller-coasters, oil filled caps, vacuum variables, air variables. G4SGV, QTHR, 01527 545 304 (Redditch).

SIEMENS sender & rcvr level meter units 10kHz – 17.2MHz, 130dB range, 200Hz – 12kHz bandwidth, good CW rcvr, spares kit, probes, cords, mans, arrange carriage, £50. G3KAG, QTHR, 01335 324 393 (Ashbourne). G3kagroston@yahoo.co.uk

SILENT Key. Kenwood TS-570D HF tcvr, SP-3 extension speaker, 25A Watson PSU, £450. MFJ-945C ATU 300W, £30. EK-150 keyer, £25. Hanson 300W SWR meter, £20. MC-80 Kenwood mic, £30. Kenwood TM-241E 10/25/50W, £85. Kenwood 10W PSU, £10. FDK 800D FM 25W 2m mobile, £35. All with mans, no boxes. G4LFB, QTHR, 01707 329 756 (Welwyn Garden City).

CONGRATULATIONS

to the following, whom our records show as having reached 70, 60 or 50 years' continuous RSGB membership:

70 years	
G2CIL	Mr G A Hook
G8KW	Mr R G Shears, BEM
60 years	
G3BPG	Mr J H Richards
G5GC	Mr G A H Eckles
50 years	
G3KLL	Mr B Mercer
G3KLZ	Mr D G Enoch
G3RSB	Mr R Scaife
GM3OYO	Mr T I Kennedy

T&R BULLETINS, property of the late G6NQ. Volumes 9 - 12 (1933 - 1937), hard-bound. £30 the lot + carriage. Stephen Parks (son), 01922 626 200 (Walsall, W Mids). E-mail: stephen.parks.me.uk

TWO 10ft sections of strong aluminium lattice tower. Easy carry on roof rack. Offers? G3OCA, 01332 720 976 (Derby).

WELZ SP-200 power/SWR meter, £30. Tech TE-18 GDO with set of plug in coils, £15. Icom IC-202S 2m SSB/CW tcvr with Microwave Modules linear – 25W, £100. G3ZQF, QTHR, 020 8776 2060 (Kent).
E-mail: svcarpe@yahoo.co.uk

YAESU complete station. Comprising FT-102 hybrid tcvr (WARC bands). 240W PEP with AM/FM. New relays, serviced. FV-102DM digital scanning memory VFO. FC-102 ATU fitted with slow-motion drives. SP-102 audio filter spkr. All immac cond. MD-1 scanning mic, spare 6146s. Leads, mans, boxes. Carefully used and cosseted for 22 years, super rig, £595 ono. Possible delivery or meet half-way. G4GXM, QTHR, 01462 453 001 (Hitchin).
E-mail: electra@whsmithnet.co.uk

YAESU FT-1000AC tcvr, Vine noise reduction sensitivity board, one owner, £1000 ono. G4LFB, QTHR, 01707 329 756 (Welwyn Garden City).

YAESU FT-757GX, 100W tcvr, HF all-mode, built in CW filter (600Hz), paddle key, manual, vgc, £300. Paul M0DSL, 01785 851 386 (Stafford).

YAESU FT-767GX tcvr HF, VHF and UHF. All modules fitted, (6m, 2m, 70cm). Internal ATU & PSU. Complete base station. Good cond. Buyer collects, £475 ono. MFJ-1276 packet – pacTOR 1 data controller, with mans, £50, selling up. Al, G4ORJ, 01945

780 661 (Wisbech).
E-mail: abj2002uk@yahoo.co.uk

YAESU FT-817 DSP, mic, charger, ant, man, yellow ref book, cables, mint, boxed, £450. Carriage extra. John, G4CVA, QTHR, 01262 400 127 (Bridlington).
E-mail: jawardle@fish.co.uk

YAESU FT-817 multi-mode tcvr, PSU, battery pack, case, man, boxed, mint cond, £370. G4TDR, 01386 710 089 (Pershore).

YAESU FT-920, £650. FT-270R 2m, £50. FT-780R 70cm all-mode, £100. Desk mic MD-100A8X, £75. Icom IC-290D 2m all-mode, £100. Rexon 2m h/h, £30. ERA Morse Tutor, £90. PacComm. Tiny-2 TNC, £70. Altai rotator (new), £45. Buyer collects. Sheila, G0VNI, 023 8081 3827 evenings (Southampton).

EXCHANGE

AHOY all moon bouncers, approx 4ft dish with adjustable focal point, fully trainable, free standing, 12VDC motorised system, can be dismantled. Will exchange for WHY? G8IDE, 01752 366 597 (Plymouth).

WANTED

CUSHCRAFT MA5B 3-ele 5-band beam. Details to GM3KJZ, QTHR, 01383 411 909 (Fife). E-mail: elangeo@ferry15.freeserve.co.uk

FT-736 23cm module, FEX-736-1.2 (B). Will pay up to £275. Frequency counter to 600MHz or higher, quality bench type. Microwave power meter with sensor/head unit of HP 84XX series sensor and cable. G0EWN, 0114 246 8463 (Sheffield).

KATSUMI electronic single-paddle memory keyer or similar type in good cond. G8IKW/G4WLI, 0161 643 1671.
E-mail: ashtree02@boltblue

KENWOOD AT-150 auto-ATU c/w interface cable for TS-50. Must be mint. Sensible price please. G4MJA, 0191 389 2822, 07840 894 823 (Durham).

MORSE keys wanted please. Early brass keys, especially by Marconi, GPO etc, but all considered. John, G0RDO, 01626 206 090 (Newton Abbot). E-mail: john@morsemad.com

RACAL 9302 RF millivoltmeter. Instruction/service man required, buy or borrow. Prefer original version, but copies considered. Tony G3NXC, QTHR, 0121 706 3109 (Birmingham). E-mail: tony.plant@iee.org

RACAL RA17or similar old hulk wanted by retiree for renovation and private use. Duncan, G8ATH, 01704 571 086 (Southport).

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

YAESU FT-290R Mkl mint cond – only mint and unscratched Mk1s please, preferably with original packing, instructions and case. Contact John, 01603 483 783 (Norwich). E-mail: g055@uea.ac.uk

RALLIES

TI - Talk-In; **CP** - Carp Park; **£** - admission; **OT** - Opening Time - time for disabled visitors appears first, eg (10.30/11am); **TS** - Trade Stands; **FM** - Flea Market; **CBS** - Car Boot Sale; **B&B** - Bring and Buy; **A** - Auction; **SIG** - Special Interest Groups; **MT** - Morse Tests; **MA** - Foundation Morse Assessments; **LB** - Licensed Bar; **C** - Catering; **DF** - Disabled Facilities; **WIN** - orize draw, raffle; **LEC** - LECtures/seminars; **FAM** - FAMily attractions; **CS** - Camp Site.

5 JUNE 2005

PLYMOUTH RC Rally – Sparkwell Village Hall. OT 10am. Frank, G7LUL, 01752 263 222, 07702 456 401, frank@foxonezero.fsnet.co.uk

SPALDING & DARS Annual Rally – Sir John Gleed Technical School, Halmer Gardens, Spalding. OT 10am. CP free, TI on 145.550MHz, TS, C, DF, CBS. Ambrose, M0DJA, 07989 636 520, or John, 07946 302 815. [www.sdars.org.uk]

WEST MANCHESTER RC 9th Red Rose QRP Festival – Formby Hall, Alder Street (off High Street), Atherton, Manchester. OT 11am, £1.50. TS, Clubs, RSGB, G QRP low-cost B&B, CP free, DF, C, LB, TI on 145.550MHz. Les, G4HZJ, 01942 870 634, or g4hzj@ntlworld.com

12 JUNE 2005

36th Elvaston Castle National Radio Rally – Elvaston Castle Country Park, Elvaston, Derby, on the B5010 between the A6 and A52, 5 miles SW of Derby. OT 9am, CP £6. Radio, computers & electronics, FM, B&B, RAFARS, crafts, FAM, C, etc. Les, G4CWD, 01332 559 965, secretary@elvastonrally.co.uk [www.elvastonrally.co.uk]

19 JUNE 2005

BANGOR & DARS Summer Radio Rally – Crawfordsburn Country Club, nr Bangor, Co Down. OT 12 noon. Radio & computer TS, B&B, etc. Norman, GI3YMY, 028 9146 6557, nornewell@beeb.net [www.bdars.com]

East Suffolk Wireless Revival (Ipswich Rally) – Suffolk Showground, Bucklesham Road, Ipswich. OT 9.30am. CBS, B&B, RSGB bookstall, CP, TI via GB4SWR on 145.550MHz from 8am. Iain, G0OZS, 01206 396 419, or John, G3XDY, 01473 717 830.

NEWBURY & DARS Car Boot Sale – Ackland Memorial Hall, Cold Ash, nr Thatcham, Berks. RAFARS. Kevin, G6FOP, g5xv@ntlworld.com Directions and map on website. [www.nadars.org.uk]

WORTHING & DARC Rally – Newhaven Fort, midway between Brighton and Eastbourne, well-signposted. OT 10.30, £2.50, incl access to all fort facilities. FAM. Jim, G4XRU, 01273 473 505, g4xru@aol.com

24 – 26 JUNE 2005

Hamtronic Friedrichshafen – [www.messe-friedrichshafen.de]

26 JUNE 2005

West of England Radio Rally – The Cheese & Grain, Market Yard, Frome. Follow signs for Town Centre & Tourist Information Office. OT 10am, £2, accompanied under-14s free. Half-price admission after 1pm. DF, TS, RSGB, RAFARS, clubs, CP free, TI in on 145.550MHz, C, Shaun, G8VPG, 01225 873 098, rallymanager@westrally.org.uk [www.westrally.org.uk]

3 JULY 2005

NORFOLK ARC Barford Radio Rally – Barford, 9 miles SW of Norwich, near A11 and A47. OT 10am, CP, TI, CBS, B&B, C, TS. David, G7URP, 01953 457 322 or 01953 458 844, radio@dcpmicro.com [www.norfolkamateurradio.org]

YORK RC Rally – York racecourse. Arthur, G8IMZ, 01904 413 342, 07841 120 738. [www.yorkradioclub.net]

10 JULY 2005

CORNISH RAC 42nd Cornish Rally – Penair School, Truro. OT 10.30am. C, B&B, MA, demonstrations, etc. For the first time in 16 years, the rally has returned to a Sunday! John, G4LJY, g4ljy@dsl.pipex.com, Ken, G0FIC, ken@jtarry.freeserve.co.uk

16 / 17 JULY 2005

PORTLAND ARC Rally – Southwell Business Park, Southwell, Portland, Dorset. Well signposted from the north of the island. OT 10am both days, admission free to rally, but charge for steam show. CP, TS, SIG, C, LB, DF, FAM (steam show), WIN, CS, TI. [www.portland-amateur-radio-club.org.uk]

17 JULY 2005

McMichael Amateur Rally & Car Boot Sale – Reading Rugby Club, Sonning

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: 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?

1 Jun	GB0MAC: Macmillan Nurse. LHV (G1ZBU)
	GB4OBC: Old Bromsgrove Club. TLH27 (M0BQE)
	GB4VED: Victory in Europe Day. Colerne, Wilts. TLHV27 (GW4XKE)
	GB4VJD: Victory in Japan Day. Colerne, Wiltshire. TLHV27 (GW4XKE)
	GB60VED: Victory in Europe Day. Colerne, Wiltshire. TLHV27 (GW4XKE)
4 Jun	GB8WSF: Wolverhampton Steam Fair. LH27 (M0MSG)
6 Jun	GB2ECR: Elvaston Castle Rally. Elvaston Castle, Derbyshire. L27P (G4JGA)
7 Jun	GB2LUN: Lundy Island. LHV (G0WUP)
10 Jun	GB2BSG: Bexon Scout Group. Sittingbourne, Kent. LH2 (G0AXQ)
11 Jun	GB0BWC: Bishops Waltham Carnival. Bishops Waltham, Hants. (G0JLX)
	GB6NTH: National Trust Hughenden. High Wycombe, Bucks. 27 (G6NPQ)
12 Jun	GB0BCF: Ballintoy Church Festival. Ballycastle, N Ireland. (MI0JAY)
13 Jun	GB0SGI: Saint Georges Island. N50:20:75 W04:26:75. LH2 (M0ACK)
17 Jun	GB5JCT: Jacinta. Fleetwood, Lancs. TL2 (G3UCA)
	GB8CC: Conisbrough Castle. LHV27 (G8LGC)
18 Jun	GB0FP: Fort Paull. Hull, East Yorks. (G4ASA)
	GB0MLM: Midlanark Museum. Coatbridge, Lanarkshire. TLHV27PS (MM0DNX)
	GB0MOC: Museum of Communication. Fife. LH2 (GM0REZ)
	GB0NOP: Nil Obstare Potest. Waterbeach, Cambs. L (G4KCF)
	GB0NVR: Nene Valley Railway. Wansford, Peterborough. LH2 (G4PYR)
	GB0SBM: Spirit of Brooklands Museum. LHV2P (M5DND)
	GB2BTN: Blissworth Tunnel North. TLHV27 (M0DMD)
	GB2BTS: Blissworth Tunnel South. TLHV27 (G1UQF)
	GB2GTM: Grampian Transport Museum. Alford, Aberdeenshire. LH2 (GM4JLZ)
	GB2HAM: Harrington Aviation Museum. Northants. TLH2 (G7CZZ)
	GB2LHM: Laxton Heritage Museum. Newark, Notts. LH27 (M0HHF)
	GB2MMA: Maritime Museum Appledore. Appledore, Devon. LH2 (M0BRB)
	GB2MOF: Museum of Flight. LH (GM4UYZ)
	GB2NSA: Norfolk Aviation Museum. Flixton, Suffolk. TL27 (M1TES)
	GB2PPS: Papplewick Pumping Station. Ravenshead, Notts. L2 (G0UYQ)
	GB2SMF: Shorwell Midsummer Fair. Shorwell, Isle of Wight. L2 (G0NTH)
	GB2SMG: Sheffield Millennium Galleries. LH27 (G4FAL)
	GB2TC: Tamworth Castle. Tamworth, Staffs. LH2 (G7IGC)
	GB2TIN: TIN mine Museum. Penzance, Cornwall. LH2 (G3UUZ)
	GB4SMH: Signals Museum, Henlow. RAF Henlow, Bedfordshire. LH27PS (G3USE)
	GB5TD: (RAF) Tynwald Downs. Heathhall, Dumfries. LH2 (GM4NAB)
	GB8OSJ: Order of St John. Dartford, Kent. LH2 (G0WLF)
19 Jun	GB2WMN: Wallaston Museum North'mshire. Wollaston, Northants. LH (M0LXT)
	GB4NBS: Newbury Boot Sale. Thatcham, Berkshire. (G7DXC)
20 Jun	GB0SNI: Sea Northern Island. Belfast, Northern Ireland. LHP (GI4XFR)
	GB5AWR: Amateur Wireless Reserve. Blandford Forum, Dorset.. LH2 (G0SWY)
24 Jun	GB6NAS: Norwich Astronomical Society. Thwaite St. Mary, Norfolk. TLHV27P (G7URP)
	GB6NAS: Norwich Astronomical Society. Thwaite St Mary, Norfolk. TLHV27P (G7UVY)
25 Jun	GB1WSS: Wilson Stuart School. Erdington, Birmingham. LH27 (G7MWD)
	GB6EOH: End Of Hostilities. H2 (M0HHF)
30 Jun	GB2FOS: Festival of the Sea. TLHV27 (G3LIK)

Lane, Sonning, Reading, Berks. OT 9.30am. RAFARS. Min, G0JMS, 01189 723 504, g0jms@radarc.org [http://go.to/mcmichael rally]

24 JULY 2005

COLCHESTER RAC Rally–St Helena School, Sheepen Road (off Avenue of Remembrance), Colchester. OT 10am, TI, C, CP, DF, TS, B&B, FM, RSGB, IOTA station. Gary, M0JJH, 01621 818 620, m0jjh@despammed.com, or James, M0ZZO, 01255 242 746, james@mcginty.net

Horncastle Radio Rally – Horncastle Youth Centre. OT 10.30, £1. C – famous Horncastle bacon butties. Tony, G3ZPU, 01507 527 835, g3zpu@hotmail.com

29 – 31 JULY 2005

AMSAT-UK Space Colloquium – University of Surrey, Guildford. GB4FUN, beginners' sessions. Jim, G3WGM, 01258 453 959, g3wgm@amsat.org [www.uk.amsat.org].

30 JULY 2005

Martin Lynch & Sons' Summer Barbecue & Boot Fair – Guildford Street, Chertsey. sales@hamradio.co.uk [www.hamradio.co.uk]

6 AUGUST 2005

RUGBY ATS Annual Radio Rally – Stanford Hall, Lutterworth, Leics. T M Humphries, G0OLS, 01455 552 519, thumph3426@aol.com

7 AUGUST 2005

FLIGHT REFUELLING ARS Hamfest – RAFARS. Mike, M0MJS, 01202 883 479, hamfest@frars.org.uk [www.frars.org.uk]

KING'S LYNN ARC 16th Great Eastern Radio Rally and Car Boot Sale – Foster's Sports Field, Clenchwarton, King's Lynn. andyjackson@2e1klp.freeserve.co.uk

LORN ARS Radio Rally – Crianlarich Village Hall, 12 miles N of Loch Lomond at jn of A82/A85. OT 10.30 / 11am, £1. Shirley, GM0ERV, gm0erv@dsl.pipex.com or John, GM8MLH, 01838 200 304. [www.gm0lra.freeuk.com]

12 AUGUST 2005

COCKENZIE & PORT SETON ARC Annual Junk Night – Cockenzie & Port Seton Community Centre, South Seton Park, Port Seton. OT 6.30, £1, proceeds to British Heart Foundation. DF, WIN, C. Bob, GM4UYZ, 01875 811 723, bob.gm4uyz@btinternet.com

28 AUGUST 2005

MILTON KEYNES ARS Annual Rally – St Paul's School, Chaffron Way, Leadenhall, Milton Keynes, 3 miles from jn 14, M1. OT 9am. TI on 145.550MHz. Dave, M0BZK, 01908 647 662, rally@bletchley.net [www.mkars.org.uk]

TORBAY ARS Communications Fair – Churston Ferrers Grammar School, Greenway Road, Churston, Devon. OT 10am, £2. CP free, TS, C, WIN, no B&B, but a free sales notice board. Colin, G4FCN, 01803 812 117, or Peter, G3VTO, 01803 864 528. [www.rally@tars.org.uk]

29 AUGUST 2005

HUNTINGDON ARS Bank Holiday Monday Rally – Ernulf Community College, St Neots (near superstore on A428). OT 10am, £1.50. C, CBS on hard standing, TI on 145.550MHz. Peter, M5ABN, 01480 457 347 (between 6pm and 10pm), peteherbert@aol.com

4 SEPTEMBER 2005

SUFFOLK DATA GROUP Five Ss Rally – Peter, G8HUE, 01473 631 313, peter@sdgrally.org [www.sdgrally.com]

Telford Rally – ***** Temporary change of venue ***** – West Midlands Agricultural Showground, Shrewsbury. RAFARS. Mike, G3JKX, 01952 299 677.

10 SEPTEMBER 2005

W&S @ Lowe Open Day – Matlock Shop, 01629 832 375.

10 / 11 SEPTEMBER 2005

50th Weinheim VHF Convention – df1gw@amsat.org

11 SEPTEMBER 2005

LINCOLN SWC Hamfest – Roger, 01522 693 848, hamfest2005@mail.com

30 SEPTEMBER / 1 OCTOBER 2005

Leicester Amateur Radio Show – Geoff, G4AFJ, 01455 823 344, geoffg4afj@aol.com [www.lars.org.uk]

7 – 9 OCTOBER 2005

RSGB HFC2005 – Gatwick Worth Hotel, Sussex. 0870 904 7373. hfc@rsgb.org.uk [www.rsgb-hfc.org.uk]

9 OCTOBER 2005

BLACKWOOD & DARS Rally – George, 2W1JLK, 01495 724 942, or Dave, GW4HBK, 01495 228 516.

GREAT LUMLEY AMATEUR RADIO & ELECTRONICS SOCIETY Rally – Nancy, G7UUR, 0191 477 0036, 07990 760 920, nancybone2001@yahoo.co.uk

15 OCTOBER 2005

W&S @ Jaycee Open Day – Glenrothes Shop, 01592 756 962.

15 / 16 OCTOBER 2005

JAMBOREE ON THE AIR (JOTA)

16 OCTOBER 2005

HORNSEA ARC Annual Rally – G4YTV, 01964 562 498.

22 / 23 OCTOBER 2005

HAMEXPO 27ème Salon International Radioamateur – Auxerre. [www.ref-union.org]

23 OCTOBER 2005

GALASHIELS & DARS Annual Open Day & Rally – Jim, GM7LUN, 01896 850 245, mail@gm7lun.co.uk

5 / 6 NOVEMBER 2005

NORTH WALES RS 19th North Wales Radio, Electronics & Computer Show – Jenny, MW0BET, 01492 549 413. [www.nwrs.org.uk]

13 NOVEMBER 2005

West London Radio & Electronics Show – Paul, M0CJX, 01737 279 108, m0cjx@radiofairs.co.uk [www.radiofairs.co.uk]

26 NOVEMBER 2005

Reddish Rally – John, G4ILA, 0161 477 6702, john@mckae.freeserve.co.uk

3 DECEMBER 2005

Martin Lynch & Sons' Christmas Hog Roast & Boot Fair – Guildford Street, Chertsey. sales@hamradio.co.uk [www.hamradio.co.uk]

RSGB Annual General Meeting – venue TBC. 0870 904 7373.

4 DECEMBER 2005

BISHOP AUCKLAND RAC Rally – Mark, G0GFG, 01388 745 353, or Brian, G7OCK, 01388 762 678.

RSGB MEMBERS' ADVERTISEMENTS

RSGB members wishing to place an advertisement in this section should use the official form printed in *RadCom* each month and send it to 'Memads', *RadCom*, RSGB, Lambda House, Cranborne Road, Potters Bar, Herts EN6 3JE. No acknowledgement will be sent. Ads not clearly worded, or which do not comply with these conditions will be returned. If an ad is cancelled no refund will be due.

An advertisement longer than 60 words will be charged *pro rata*. **The RSGB believes that it is inappropriate for members trading in whatever way in radio equipment to place members' advertisements. We therefore regret that we are unable to take such advertisements, although we do welcome these in the 'Classified' advertising section of *RadCom*.** The editor reserves the right to refuse any advertisement for any reason. In such matters, the editor's decision is final.

The RSGB accepts no responsibility for errors or omissions, or for the quality of goods for sale or exchange. Each advertisement must be accompanied by the correct remittance, as a credit card payment, cheque or postal order made payable to the Radio Society of Great Britain.

Please note that because this is a subsidised service to members, no correspondence can be entered into. Members may submit *one* photograph of equipment being sold / wanted at an additional cost of £5.00. This *must* be a .jpg or .gif file and the file name *must* be included on the Order Form. The photograph may be e-mailed to radcom@rsgb.org.uk or sent on a floppy disk or CD.

Licensed members are asked to use their callsigns and QTHR, provided their addresses in the current edition of the *RSGB Yearbook* are correct. RS members will have to provide their names and addresses or telephone numbers. Please include your town and phone number in the free boxes provided to assist readers. Advertisements will be placed in the first available edition. Please do not send Members' Advertisements to Danby Advertising (advertising agents). The closing date for copy is the first day of the month prior to publication, e.g. the deadline for the May issue is 1 April.

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***

The Members' Ads order form is published below. 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. 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 way.

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 *Radcom*

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Signed _____ Date _____

Section: ☐ FOR SALE ☐ EXCHANGE ☐ WANTED

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The last word

Letters published in 'The Last Word' do not necessarily reflect RSGB policy. 'Last Word' letters may be e-mailed to radcom@rsgb.org.uk Please note that letters submitted for 'The Last Word' may not be acknowledged. The RSGB reserves the right to not publish any letter, with no reason being given. It is a condition of publication that all letters may be edited for grammar, length and / or clarity. Due to the limited space available, please keep letters as short as possible. Additional letters may be published on the RSGB members-only website at www.rsgb.org/membersonly/lastword

Correction

A letter in the April 'Last word' ('GB2RS headlines') was attributed to Geoff Gott, G3MUO. The letter was written by Richard Lorenzen, WA0AKG. Apologies to Richard Lorenzen and Professor Gott for this error.

Deregulation

From: Jonathan Kempster, M5AEO

Following the article on page 7 of the May edition of *RadCom*, I have sent a letter to my MP and would urge all members to do the same. Just a short letter including the points made in the editorial could help. There is no doubt that deregulation by ignorant civil servants and MPs would be the death of our hobby.

From: D A Shepherd, C Eng IEE, G3LCS, A61AA, VS1HQ

...Words fail me! What on earth can Ofcom be thinking of? They should change the name to CHAOS! For that is what will surely happen if their proposals are allowed to come to fruition. Imagine tens of *thousands* of screaming idiots on the bands. Everyone causing chaotic QRM with everyone else. (Imagine ARRL DX weekend 500 times over, all at once, to get some idea of the density). CW will be gone for ever (there will be no room). The current structured occupancy of the bands will be gone for ever. Joe Bloggs will lose his UHF TV link with John Jones, which he has had for years each Sunday morning. Who is going to monitor the bands and ensure no-one 'strays' outside the band edges? No-one will pay any heed to QRX, QRT or QSY pleadings.

The Ofcom report must be carefully answered by the RSGB and the necessary objections raised. It is equally important for *all* RSGB members to let Ofcom know their feelings about this matter. Once it has happened - it will *never* return to the current state.

From: Phil Mayer, G0KKL

...In the consultation process on the future regulation of the radio spectrum the word "deregulation" has been somewhat loosely used. If CB or amateur radio were to be deregulated this would not mean that anyone could transmit with any power on any frequency they wished. There would presumably still be rules governing what the CBer or amateur could and could not do; the only difference would be that, instead of paying for a licence to tell you what the main rules are, you would have to find them (and any changes to them) for yourself or risk prosecution because ignorance of the law is no defence.

Unless the Wireless Telegraphy Acts were to become unchangeable like the laws of the Medes and Persians, the 'licence for life' would have a similar defect to some degree. If issuing annual licences for £15 is a loss-maker, perhaps a five-year licence for £50 would be more economic. (However, many successful Foundation examinees might then prefer to continue operating under supervision, and delay getting licensed until they had passed the Intermediate exam - unless up-grading were free or very cheap.)

But the real problem is not licensing but enforcement, which would still be necessary - deregulation or not - and could not be privatised. The Ofcom field force is now so thinly spread that only serious infringements that affect the TV public or official services can get noticed or dealt with. The long overdue revision of the *BR68* family (written by lawyers for reading by other lawyers) could recognise this by limiting the main text to general principles (like "identify your station at frequent intervals" or "keep a record of the time and nature of your transmissions") and the Notes used for guidance as to what would be regarded as frequent intervals, etc - if this were considered necessary. (Ofcom are not going to prosecute an amateur who gives his or her callsign only at 20 minute intervals.) General rules would simplify what has to be learnt, and be more readily observed because their purpose would be clearer.

From: Gideon Riddell, GM7IKB

...As a member of the RSGB I note with interest that the RSGB has objected to Ofcom's proposal for an amateur radio licence for life. In whose interest are the RSGB operating, themselves or their members? The renewable licensing is almost entirely an expensive and unnecessary bureaucratic exercise. It is of little use in tracking down the few who contravene the Radio Telegraphy Acts, and is a disincentive to the hobby in that by having to continue to pay the fee, it encourages amateurs to drop their licence and leave the hobby. The RSGB benefits from it by a getting a list of potential members to target, and revenues from publishing the *Yearbook*. The proposal is a radical idea, but it seems to be a good one.

[RSGB General Manager Peter Kirby, G0TWW, replies: Whose interests is the Society representing? That is the question that GM7IKB raises in his letter. First and foremost the RSGB is a representative organisation. It is run by radio amateurs for radio amateurs. It is not a commercial organisation. Like the IEE we produce a magazine and publish special interest books for our members, these activities supplement our subscription income which enables us to provide a wide range of services to our members and support the amateur radio community. In principle the RSGB does not object to the Ofcom proposal for a 'lifetime' licence. The RSGB's concern is the motive behind the proposal and is centred on Ofcom's refusal to issue a statement that they do not intend to deregulate amateur radio some time in the future. While they continue to issue statements in which they link a 'lifetime' licence with the question of deregulation the RSGB will remain concerned about their long term objectives for the amateur radio service. The RSGB would also be happier if this proposed 'free' lifetime licence was going to be available to all radio amateurs, not just those who own and are

familiar with computers and have access to the Internet. Amateurs who do not own a computer, who do not have access to the Internet or who are not familiar with computers, will continue to have to pay a fee. The RSGB's aim is to protect the long term future of amateur radio, but not at the expense of short term gain.]

RadCom reviews

From: G Mack, M0CUS

With reference to the letter by Ray J Howes, G4OWY ('The last word', April), all I can say is what a load of rubbish. I thought the article on the 10-element Yagi was great and made a refreshing change from the never-ending QRP in a matchbox with a resonant cocktail stick or wind enough wire around your house until it becomes a transformer type of review. I for one want to read reviews on 20-element beams, 10kW linears and top of the range all-singing all-dancing radios, whether my funds or my garden (I was going to say neighbours but they don't pay my mortgage) will allow has nothing to do with it, nor does the fact I am only allowed 400W (70MPH would not stop me buying a Ferrari if funds allowed). 10kW linear and 10-element Yagis, bring it on.

I agree that most of us cannot put up such a beast but if we could I bet most of us would like to try it out. Anyway you can still work QRP with the latest Kencomesu 9000sdftdx; just drop the drive to minimum, unplug the antenna and stick a long Allen key in the antenna outlet - hey presto, QRP. I operate a 2-element 5-band home-brew quad and only space stops me building a 6-element version or even a 6-over-6. I did consider building a Buddypole for all of about 10 seconds then came to my senses.

More of the big stuff reviews please. Any HF quad reviews coming up?

'Y Group' DF network

From Ant Astley, GW0AJA (e-mail: hut-aja@t8o.org)

Apparently the 'Y Group' direction finding network had an outpost near Perton Aerodrome, near Wolverhampton. It occurred to me that someone reading this might be able to tell me more about it?

April best issue yet?

From: Eddi Ramm, DK3UZ

Even though I don't speak Welsh, I appreciate seeing minority languages in print in *RadCom* (page 7, April). Would be interesting to compare it with Gaelic.

Please can we have more articles on restoring real radios (valved equipment one can repair oneself, and which is EMP-proof to boot) like that from VK6VZ in *RadCom*? In similar vein I always enjoy G3VA showing both old and new technology and not shying away from demonstrating that new and modern doesn't automatically mean better.

This April issue of *RadCom* was one of the most interesting since I joined the RSGB in 1975, also because of the new 'QSL' column. May it serve to increase my virtually non-existent QSL card return rate from G-stations!

Icom UK website

From: Ian Lockyer, M3INL, Marketing Manager, Icom UK

I was so pleased to read the feedback on our website on page 66 of the May 2005 *RadCom*. I invest a lot of time in trying to provide a service for all visitors. However, if anyone wanted to visit our website from this positive feedback they would be directed to the wrong address: our website is www.icomuk.co.uk and not .com

As part of a revamp, Icom UK is pleased to offer clubs and associations the opportunity to promote their own website from a special page on Icom UK's site. Icom UK's link section has now been divided into various market sectors: Marine, Avionics, Commercial and Amateur Radio. Each section is further subdivided to give various bodies the opportunity of highlighting their services. Each link will give an organisation the opportunity to put its name and a brief description of their activity. All you need to do is submit your details via an e-mail to marketing@icomuk.co.uk If it is deemed appropriate and suitable for its audience the link will be uploaded (Icom UK reserves the right to decline links to sites it deems are inappropriate).

Mobile safety: another view

From: Russell G Luckock, G3VDX

I note that there are letters in the May issue of *RadCom* concerning mobile amateur radio. These readers seem to disbelieve that the human brain is incapable of doing more than one thing at once. If you were to extend their collective view of safety, they would be busily lobbying the government to ban all forms of radio from vehicles, as changing channels, let alone listening, would be a distraction. Similarly, CDs and cigar lighters would be made illegal, for I am sure they would also take the view that these would also disturb concentration.

50 years ago, practically all buses, and many lorries, had driving cabs separated and isolated from the rest of the vehicle, in order for the driver to concentrate on the matter in hand. What a lot of nonsense! I have been driving for over 50 years, without prosecution, listening to radio in all its forms, talking happily to other amateurs, without the slightest problem with control.

In point of fact, amateur radio is a great benefit to concentration, for, on long journeys, it keeps you alert, whilst debating subjects of mutual interest. This is no more restrictive than lighting a cigarette, or eating a sweet.

We are living in an over-regulated society, which seems to wish to eliminate all sorts of risk. This is not good for the human race, and I look forward to many years of happily pursuing my main hobby, unregulated by bureaucrats, and those undisturbed by bees in their bonnets.

[See also the article on pages 22 / 23 of this issue - Ed.]

Morse practice

From: Norman Mackenzie, GM3WIJ

It is good to see a regular column about Morse code and in May's *RadCom* valued information on learning sending and receiving. Dave, G4BUO, has explained the correct method of holding and using a straight key whilst sending. However, I disagree in one important detail, that "Dots are made by a tap with the forefinger whereas dashes are made by a downward movement of the wrist". This is wrong, the downward wrist movement is used for *both* dots and dashes.

All professional Morse teachers will tell you that this wrist movement will enable you to send for long periods accurately with a minimum of fatigue, enabling the sender to progress up to higher manual sending speeds. Many straight key operators will successfully use other methods but will struggle to achieve and maintain accuracy at higher speeds. Keep practising!

From: Peter Martinez, G3PLX

…I suspect that the "dit di-di-dit dit, dit dit" ending on CW contacts remembered by G0SER ('The last word', May 2005), has its origins well outside the field of wireless communication. My father, who was born in 1908 and had no connection with radio, often used to vocalise this rhythm, usually sung to the musical notes "C GGA G, C C", and there were sometimes nonsense words that went with it, but I cannot recall them. Maybe others with memories that go further back than mine will be able to identify the origin, which might perhaps have been a catch-phrase from early music hall or broadcast radio. However, I am almost certain that the use of "dit di-di-dit dit, dit dit" in Morse code did-

n't come from a particular RAF instructor in the late 40s.

From: Wil Wilshaw, G3MPX
Nice to see 'Best bent wire' from G0SER ('The last word', May 2005). I wonder if he remembers 'Best beef essence'?

DX courtesies

From: John Saunders, EA5ARC / G3OLU
After some years away from radio and moving to Spain I have received my Spanish call and returned to amateur radio and my old interest of HF DX hunting. I am now coming to terms with a host of new prefixes for new countries but I am having a hard time accepting what appears to be 'the norm' regarding accepted operating practice and the outlandish behaviour of many DX chasers.

What has happened to the courtesy and consideration for others that I recall? I was in a CW pile-up listening to FT5XO who gave specific instructions after each contact for stations to call 'up' in frequency. Two stations dropped carriers on the DX transmit frequency to jam proceedings, resulting in various comments such as "idiot" (and worse!) There was then the breaker calling "DX call?" and "?" on the DX frequency. When listening to a DX station to identify his operating pattern, clarify his call and listen for any instructions I now hear stations calling *whilst the DX station is still transmitting*. This is followed by the inevitable response of "QSY" or "split" as others in exasperation try to move the offending station. However, the worst behaviour and a deplorable tactic in my book has to be those wanting to contact the DX station and calling him *whilst he is in contact with another station!* Is this the behaviour they would welcome when they eventually establish contact with the DX station and he does not get their call correctly for example, due to those behaving as they do?

Why is it that members of IARU do not publish strict rules on operating procedures so their member societies can use and implement them by training and regulation? It appears they just permit their licensees to cause havoc and ill will by these bad practices.

Meanwhile, for my part, I propose to behave as I would wish others to.

Lack of activity?

From: Richard Newstead, G3CWI
I read with interest and some amusement Norman Fitch's editorial in *RadCom* (May, p58) about the lack of activity on 2m. Obviously the north-south divide runs deeper than just economic issues in the UK. Up here in the north west, Summits on the Air (SOTA) activators are often accused of using up all the available frequencies on 2m FM. This is never the case in reality although the channels can sound quite congested at the weekends. What has certainly happened is that over the years some amateurs, living in isolated valleys, have got used to monitoring quietly the FM calling channel and never hearing anyone. SOTA has put pay to that as they now hear stations every weekend - it seems that one cannot win?

Incidentally, the SOTA Management Team has been trying to encourage people to use other bands and modes over the years with some limited success. There is now some regular 2m SSB activity and 5MHz SSB has become extremely popular - even 4m gets used quite regularly by one intrepid activator. For my own part I designed a 2m aerial that allows SOTA activators to try SSB very easily (the SOTA Beam).

Curiously, there are several hills in the south east that 'count' for SOTA, so 2m SSB devotees down there might like to dust off that old portable gear and set off for the hills. Announce your activations on the SOTA reflector (link at www.sota.org.uk) and who knows where you might manage to contact? With 3000ft peaks being activated most every weekend up here and into Scotland, some pleasant surprises may be in store!

What a howler

From: David Sumner, G3PVH
I am writing in the hope of saving readers (particularly newcomers to the hobby) time and frustration when building receivers using IC audio amplifiers, such as the LM386 and TDA7052. A number of receivers I built using such devices suffered from audio instability, and none of the usual 'cures' seemed to have much effect. At last I discovered that these audio ICs radiate radio frequency noise, which is then picked up by the aerial circuit. The problem gets worse as the frequency is lowered and is especially severe for a long-wave receiver using a ferrite rod.

If you have a stand-alone audio amplifier using an IC, try feeding it with music, then bring a long wave radio close to it. You will hear the noise modulated with music. A spacing of about a foot is needed to avoid the effect. When such an IC is placed inside a receiver it is almost impossible to prevent the modulated RF noise of the IC from being picked up on the ferrite rod or aerial coil by magnetic coupling, thus forming a complete feedback path which causes the receiver to howl.

Whilst especially severe in the long-wave band I have also experienced problems with topband (160m). Perhaps a toroidal aerial coil would avoid the problem? Alternatively, an op-amp seems satisfactory for driving a pair of earphones and does not suffer so much from instability problems.

A radio amateur's ode

From: Jimmy Sneddon, MW0EQL, RSGB Deputy Regional Manager, Region 7(5)
This little ode was composed by David Mead, MW0MWL, and sent to me so that I may forward it on:
"CQ CQ you hear them call,
Radio amateurs one and all
With rig switched on and mic in hand
Speaking to people from foreign land
A wireless enthusiast I will always be
Also a member of Highfield ARC."

What's in a name? (1)

From: John B Armstrong, GW3EJR
Bruce Fleming, KI7VR, writes an interesting letter on the G3UUR aerial ('The last word', May 2005) but perpetuates that oft-quoted misconception regarding the G5RV aerial, stating that with balanced feed it would not be a G5RV. Quite wrong - let me quote from the article by Louis Varney, G5RV, in the *RSGB Bulletin* for July 1958: "Two versions were tested, one using open-wire tuned feeders, and the other using a 34 feet open-wire stub, fed at its base by 72 ohm coax or 72 ohm twin-feeder." Construction: "Open-wire feeder may be employed from the centre of the aerial right back to the transmitter or ATU." On 21 and 28Mc/s: "Here again, results are better using tuned feeders, to minimise losses". Again: "When using tuned feeders, it is recommended that a suitable aerial tuning unit be employed".

So although it may have been more convenient for many operators to use the version with the 300 ohm stub, with a coax feed to the transmitter or ATU being perhaps easier to route through to the shack, either version would work as Louis intended, with the balanced feeder having the superior performance.

What's in a name? (2)

From: Pol Parrott, G3HAL
I saw a BMW parked in a motorway car park carrying a number plate bearing the registration G3NNA flanked by two Welsh dragons. When the owner came along I suggested to him that the plate should read GW3NNA.

Blank look. I explained.

"Oh no" he said. "It's a girl's name; Genna". Exit G3HAL, abashed. ♦

CLASSIFIED

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-PATENTS - TRADE MARKS - DESIGNS. Kings Patent Agency (Est 1886).J.B.King (G5TA) Regd. Patent & Trade Mark Attorney, 73 Farringdon Road, London, EC1M 3JQ. 020 7404 7788 www.kingspatent.co.uk

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BUSINESS CARDS

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Sony Digital Camera's

FREE 64MB MEMORYSTICK WITH ALL THESE CAMERA'S!

Part Exchange welcome (Hockley only)

SONY DSC-P120

5.1 MegaPixel, 3x Optical Zoom, Carl Zeiss Lens, with direct print capability and a 1.8" LCD. Special Edition with bag & extra batteries

~~£329.95~~ £269.95 C save £60

SONY DSC-P150

7.2 MegaPixel, 3x Optical Zoom, Carl Zeiss Lens, a very compact camera with real imaging processor technology and a 1.8" LCD

~~£399.95~~ £329.95 C save £70

SONY DSC-P43

A Compact 4.1 MegaPixel point & shoot camera with real imaging processor. STAMINA power allows you approx 3h15m battery life(390 shots).

~~£179.95~~ £129.95 C save £50

SONY DSC-P73

4.1 MegaPixel, 3x Optical Zoom with real imaging processor. STAMINA power allows you app. 3h30m battery life (420 shots).

~~£199.95~~ £149.95 C save £50

SONY DSC-P93KIT

5.1 MegaPixel, 3xOptical Zoom with direct print capability & real imaging processor. The kit also includes a bag and extra batteries.

~~£279.95~~ £189.95 C save £90

SONY DSC-T3

A Super Compact 5.1 MegaPixel Camera with 3x Optical Zoom, Carl Zeiss Lens, and a massive 2.5" clear photo LCD

~~£369.95~~ £279.95 C save £90

Fast Ni-MH Charger

V-1000

Ni-Cds in 1 hour
Ni-MH in 2 hours
230V AC
Car 12V adaptor.
£10.95 A

Microprocessor controlled with bad battery detection and reverse polarity protection. . Takes 4 x AA cells. Free 12V DC lead included.

NXC-4AA Packs of 4 x Ni-MH AA cells £5.95 A

Power Stations

FD-7021 Self-contained power station output 12V at up to 12 Amps plus 1A outputs for 3 / 6 / 9V. Built in lamp. Includes AC & DC charger.
£24.95 B

CH-1-150 Power station with built-in 150W inverter. * 12V out up to 15A, * 230V out up to 150W, * 200K candle power spot, * dual fluorescent lantern * Cigar socket * blinking warning light * cartridge fuse * AC wall charger.
£32.95 B

Adonis Desk Microphones

ADONIS AM-708

**Electret condenser mic.*
**FM/SSB quality selection*
**2 transceiver operation*
**Electronic PTT & latch*
**Analogue level meter*
**Up/Down Buttons*
**500 - 100k Ohm match*
**2 x AA cells or ext. 5-9V*

£129.95 C

AM-308 £69.95 C
Electret Condenser Mic with built-in preamp

AM-508 £79.95 C
Electret Condenser Mic with compressor amp

Watson Desk Microphones

WM-308 £59.95 C
Base Mic with built-in pre-amp

Kenwood Desk Microphones

MC-60A £117.95 C
Moving Coil Cardoid Mic with built-in preamp

MC-90 £187.95 C
Wired Dynamic Mic for DSP radios

Yaesu Desk Microphones

MD-100A8X £116.95 C
Base Mic suitable for SSB & FM transceivers

MD-200A8X £254.95 C
Desk Mic for high fidelity SSB operation

Icom Desk Microphones

SM-6 £69.95 C
Desk Mic for all Icom base stations

SM-20 £144.95 C
600 Ohm 8-pin deluxe base station desk mic

Heil Desk Microphones

HEIL CLASSIC MIC

The Heil Classic mic, an exact replica of the 30's RCA 74B broadcast mic. Inside it has modern technology, two inserts are provided, one for broadcast studio quality and a choice of one other Heil insert (HC-4, HC-5 or HCLiC).

£199.95 B

GM-4 £109.95 B
Goldline Hand Mic with HC-4 insert

GM-5 £109.95 B
Goldline Hand Mic with HC-5 insert

ICM £74.95 B
Hand Mic with studio insert for Icom users

HHSM £129.95 B
Heritage Professional Studio Mic, 50's style

HCLP £209.00 B
Heil Classic Pro Mic RCA design

PR-20 £109.95 B
High Quality Professional Hand Mic

Condenser Desk Microphones

B-1 £109.95 C
Professional Large Diaphragm Condenser Mic

Watson Headsets

WATSON HP-100

Excellent lightweight communication headphones with tailored response ideal for the modern transceiver or receiver.
**8 Ohms 200-9,000Hz*
**Adjustable headband*
**3.5mm stereo plug *1/4" stereo adaptor.*

£19.95 B

HP-200 £22.95 B
Superb headphones with padded earpieces

WEP-501(K,M,Y) £24.95 A
Versatile Earpiece with boom mic

WCT-321(K,M,Y) £19.95 B
Clip over earpiece & clip on lapel mic

SAFE-2-WAY £89.95 B
Mobile mic system for the car

Heil Headsets

HEIL PROSET PLUS

Top quality headphones with boom microphones. Choice of mic. elements, HC-5 ideal for "rag chewing" or HC-4 for DX communications. Icom models fitted with IC element. Choice of AD-1 (£16.95) interface leads for most makes of rigs.

£155.95 B

PRO-SET-PLUS-IC £169.95 B

PRO-SET £109.95 B
Headset with boom mic, choice of HC-4 or HC-5 insert, please state when ordering

PRO-SET-IC £119.95 A
Headset with boom mic with IC insert

HST £79.95 B
Heil Traveler for mobile use, single earpiece with mic, available for IC-706, Icom 8pin, Kenwood 8pin, Kenwood mod, FT-817.

PRO-SET QUIET PHONES

Latest from Heil, boom mic headset with acoustic noise cancelling headphones to exclude outside noises & improve received sound. Choice of HC-4, HC-5 or Icom elements, Icom el. at addtional cost.

£189.95 B

PSQP-IC £199.95 B

QUIET PHONES

Ambient noise reduction headphones, all external noise below 400Hz is gone! 1/8" headphone connector allows use with minidisc, cd or mp3 and 1/4" adaptor allows use with amateur radio transceivers. In-line battery holder uses 1xAA cell.

£89.95 B

bhi DSP Equipment

bhi NES10-2 MkII

NES10-2 Combined speaker and programmable DSP unit. Offers dramatic noise reduction, even reduces annoying heterodynes. Power On/Off switch with audio bypass, 8 Ohms, 8 filter settings, 3.5mm plug, 12-24V DC.

£99.95 B

NES-5 £79.95 B
DSP Speaker Basic Plug & Go model

NEIM-1031 £129.95 B
Noise Eliminating In-Line Module with DSP

1042 £19.95 A
Switch box allowing up to 6 items to connect to one bhi speaker/module.

NEDSP-1061 £89.95 B
Small DSP PCB modulefor retrofitting into rigs

NEDSP-1062-KBD £89.95 A
Amplified DSP module to insert in speaker path

NEDSP-1062-KBD £99.95 A
As NEDSP-1062 but with small keyboard

NCH £34.95 B
ANR Noise Cancelling headphones

SGC DSP Equipment

SGC ADSP-2-EXT

Speaker with built-in ADSP noise filters. 3 modes selectable.
1)no reduction
2)original ADSP
3)New ADSP2 noise reduction.

£69.95 B

ADSP-2-LLK £89.95 C
ADSP2 Low Level (70-11) Audio Power Kit

ADSP-2-HLK £89.95 C
ADSP2 High Level (70-12) Audio Power Kit

Graphic Equalisers

BEHRINGER UB-802A

Dual Mic graphic equaliser with dual **variable 60dB pre-amps** plus 2 x mon/stereo line inputs.Configure to adjust both tx & rx audio and monitor both through phones. Professional quality features low-mid-hi, tape in/out, 1/4" jack and XLR sockets, 48V for condenser mics etc. **Plus FREE AC adaptor.**
In/out adaptor sets for 8-pin mics: K-802, Y-802, I802 £19.95

£54.95 B

W2IHY W2-EDGE

The W2IHY is an 8-band graphic equaliser, plus noise gate specifically designed with radio communications in mind. The graphic equaliser covers 8-bands between 50Hz and 3200Hz - the typical range for SSB. This enables you to finely adjust the audio response to improve your mic and match your radio.

£229.95 B

Carriage Charges: A=£2.75, B=£6, C=£10

LOWEST PRICES

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Freephone Orderline 0800 073 7388

Watson Power Supplies

WATSON W-25XM

*9.7 - 17V DC (13.8v notch) *Input 230V DC or 115V AC *25 Amps peak, 22 Amps cont. *Fan cooled *Dual output terminals *Dual metering volts & current *Over voltage & current protect *Removable AC lead *Illuminated metering *Protection warning light *1.65kg *170w x 180d x 65h mm

£99.95 C

W-3A £22.95 B
Output 3A, 13.8V DC, supply 230V AC

W-5A £29.95 B
Output 5A, 13.8V DC, supply 230V AC

W-10AM £59.95 C
Output 10A, 0-15V DC, supply 230V AC

W-25AM £89.95 C
Output 25A, 0-15V DC, Dual meters

W-30AM £119.95 C
Output 30A, 0-15V DC, Dual meters

W-25SM £79.95 B
Output 22A (25peak), 13.8V DC, supply 230V / 115V AC

PS-122 £21.95 B
Output 2.2A, 13.8V DC, supply 230V AC

Manson Power Supplies

MANSON EP-925

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

£99.95 C

Diamond Power Supplies

DIAMOND GSV-3000

*Output voltage: 1 - 15V DC *Output current 30A continuous *Built-in cooling fan *Supply 230V AC 50Hz *Size 250 x 150 x 240mm *Weight 9kg

£149.95 C

GZV-2500 £119.95 C
Output 25A, 5-15V DC, supply 230V AC Switch mode over volts protected. 21 x 11 x 22cm

GZV-4000 £159.95 C
Output 40A, 5-15V DC, supply 230V AC Switch mode over volts protected. 21 x 11 x 30cm

GZV-6000 £299.95 C
Output 60A, 1-15V DC, supply 230V AC Switch mode over volts protected. 21 x 11 x 36cm

Travel DC Supply 1 Amp Output

£9.95 C SMP-1000A
3 - 12V DC out
AC 100 - 240V in

Ideal for travelling around. Stabalised voltage out 3 4.5 5 6 9 & 12V. Lightweight switch mode design. Inc 6 reversable connectors of different sizes.

West Mountain DC Distribution

RIGRUNNER 4008

The *RIGrunner* 8-way 13.8V DC distribution system with Over voltage, Normal and Under voltage indicators. Nine pairs of outputs in four groups - 25A, 10A, 5A and 1A all individually fused. Requires 13.8V DC power source either from battery or mains power supply with current rating up to 40A.

£89.95 B

RR/4012/C £99.95 B
12-way 13.8V DC (25A,10A,5A,1A)

RR/4005/C £59.95 B
5-way 13.8V DC (25A,10A,5A,1A)

Watson Power Meters

WATSON W-220

*1.6 - 200MHz *0-5W / 0-20W / 0-200W (max power 200W) *SO-239 *50 Ohms *Size 190 x 85 x135mm *Weight 790g *Accessories: DC lead for 12V illumination

£49.95 B

W-420 £49.95 B
118-530MHz, 0-5, 0-20, 0-200W, SO-239

W-620 £89.95 B
1.6-530MHz, 0-5, 0-20, 0-200W, SO-239

Avair Power Meters

AVAIR AV-201

Ideal for HF and VHF operation. It features high power handling up to 1kW * 1.8-160MHz * 5W, 20W, 200W, 1kW * Av or PEP

£49.95 B

AV-400 £49.95 B
140-525MHz, 5W, 20W, 200W, 400W

AV-601 £69.95 B
1.8-160MHz(S1), 140-525MHz(S2)

AV-1000 £79.95 B
1.8-160MHz, 430-450MHz, 800-930MHz, 1240-1300MHz. 5W, 20W, 200W, 400W

AVAIR AV-20

*3.5-150MHz **(AV-20)** *Impedance 50 Ohms *Power 0 - 15W / 0 - 150W switched *Measures forward / reflected power + VSWR *Sensitivity 3W for full scale deflection *Accuracy 10% at full scale *Sockets SO-239 *Size 85 x 87 x 95mm *Weight 280g

£29.95 B

AV-40 £29.95 B
144-470MHz, power 0-15W/0-150W switched

MFJ Antenna Analysers

MFJ-269

*Frequency Coverage 1.8 to 470MHz *Antenna Analyser *Frequency Counter *SWR & impedance or SWR Bargraph *VSWR Meter *Signal Generator *LCD readout, analogue meters

£349.95 B

MFJ-259B £259.95 B
1.8-170MHz, Freq Counter, VSWR meter

Watson Frequency Counters

WATSON HUNTER

*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

£49.95 B

FC-130 £59.95 B
1MHz-3GHz, 10 digit readout

SUPER SEARCHER £99.95 B
10MHz-3GHz, 7 digit readout

SUPER HUNTER £149.95 B
10Hz-3GHz, 10 digit readout

Optoelectronics Frequency Counters

OPTOELECTRONICS SCOUT

The Scout automatically stores frequencies as it locks onto them, and logs the number of hits for any one channel. It incorporates both digital filter and auto capture. The Scout can also Reaction Tune various receivers with a suitable optional cable. RT-8200 for AR8200 Series-2 and SAC-8000 for AR8000.

£299.95 B

CUB £129.95 B
Mini Counter 1MHz-2.8GHz, 9 digit readout

MFJ Coax Switches

MFJ-1702C

*2-way *Connectors SO-239 * < 0.2dB loss *SWR < 1.2:1 *Isolation 60dB at 300MHz 50dB at 450MHz

£28.95 A

MFJ-1704 £69.95 B
4-way, Connectors SO-239 or 'N'

MFJ-1700C £89.95 B
6-position antenna swirtch, SO-239

MFJ-1701 £52.95 B
6-way, range 1.8-30MHz, SO-239

Watson Coax Switches

WATSON CX-201

*2-way *Connectors SO-239 *Power 2.5kW *Range DC - 600MHz *Impedance 50 Ohms *Loss 0.1dB

£18.95 A

CS-600 £12.95 A
2-way, Connectors SO-239, Power 2.5kW

MFJ-260C 300W Dummy Load

Every station needs one!

A convenient way of testing your rig and measuring power etc. Just plug into output sock of radio. SO-239 socket. 600MHz **MFJ-260CN** "N" socket **£44.95B**

£37.95 B

Duplexers

DIAMOND MX-72

*1.6MHz - 150MHz 400W PEP *400MHz - 460MHz 250W PEP *Max loss 0.3dB *SO-239 to 2 x PL-259 *Cable length 200mm to plug *45 x 42 x 25mm approx.

£32.95 B

DIAMOND MX-62M £49.95 B
Port1: HF + 6m Port 2: 2m + 70cm

DIAMOND MX-610 £54.95 B
Port 1: HF Port 2: 6m + 2m + 70cm

WATSON WD-25 £24.95 A
Port1:HF+6m+2m Port2:70cm, SO-239 sockets

WATSON WD-24 £22.95 A
As WD-25, SO-239 and dual PL-259

WATSON WD-24N £24.95 A
As WD-25, SO-239, PL-259, N-type

Diamond Triplexers

DIAMOND MX-2000

*1.6 - 60MHz 800W PEP Loss 0.15dB *110 - 170MHz 800W PEP Low 0.2dB *300 - 950MHz 500W PEP Low 0.25dB *SO-239 socket & 3 x PL-259 plugs *Cable length 300mm to plug. *65 x 85 x 23mm approx.

£59.95 B

MX-3000 £56.95 B
Port1:HF+6m+2m Port2:70cm Port3:23cm

Superb DCI Band Pass Filters

Razor Sharp Professional Filtering

DCI-145-2H £119.95 B
144 - 146MHz 68dB @ 136MHz / 55dB @ 155MHz. Less than 1dB loss. 200W. 30 x 8 x 13cm SO-239

DCI-145-2HN £129.95 B
144 - 146MHz 68dB @ 136MHz / 55dB @ 155MHz. Less than 1dB loss. 200W. 30 x 8 x 13cm N socket

DCI-435-10C £139.95 B
430 - 440MHz 47dB @ 415MHz / 50dB @ 455MHz. Less than 1dB loss. 200W. 30 x 8 x 19cm N socket

DCI-145/435-DB £199.95 B
This has similar performance to above 2m and 70cm individual filters. 200W Duplexer inside. N socket. Designed for single coax dual band operation.

Antenna Rotators

CREATE RC5-1

Vert load:	400kg
Horiz. load	800kg
Torque	80kg/m
Stub size	48-63mm
Weight	5kg

£369.95 C

Lower mast clamps needed for mast mounting. MC-2 **£59.95**

Create

RC5-3	Medium needs 7-core cable	£449.95C
RC5A-3	Heavy needs 7-core cable	£649.95C

Yaesu

G-450C	Light/medium c/w 25m cable	£299.00C
G-650C	Light/medium c/w 25m cable	£379.00C
G-1000C	Med/heavy c/w 25m cable	£449.00C
G-1000DXC	Heavy duty c/w 25m cable	£459.00C
G-2800DXC	Heavy duty c/w 25m cable	£999.00C

Hy-Gain

CD-45II	Light/med needs 8-core cable	£399.95C
AR-40X	Light duty needs 5-core cable	£299.95C
HAM-IVX	Med duty needs 8-core cable	£549.95C
HAM-VX	Med duty needs 8-core cable	£929.95C
T-2XX	Med/heavy with digital display	£639.95C
HDR-300AX	Heavy duty with digital display	£1499.95C

NOTE: Many of the rotators are for tower mounting and require a lower mast clamp for mounting on a pole.

Carriage Charges: A=£2.75, B=£6, C=£10

THE WAITING IS OVER ...

FT DX 9000 MP

FT DX 9000 CONTEST

FT DX 9000 D

FT DX 9000 RANGE

Discover the new dimension in amateur radio

In the fifteen years since it was born, the FT-1000 series has been recognised as the pinnacle of performance among elite-class HF base stations.

Now experience the evolution of the renowned FT DX series, bearing the electronic DNA from the FT-1000D, advanced by far more than just one generation.

The FT DX 9000 HF/50 MHz Elite Class Transceiver.

The only Amateur HF Transceiver that provides full duplex capability when operating on two different HF bands.

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- 3-BAND PARAMETRIC MICROPHONE AUDIO EQUALISER WITH XLR AND 8-PIN MICROPHONE CONNECTORS
- 200-WATT AND 400-WATT VERSIONS
- SMART MEMORY CARD
- NEW MU (μ) NARROW-BANDWIDTH HIGH-Q RF TUNING UNITS

...The radio

The features on the FT DX 9000 are available in a variety of configurations depending on specific model.

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