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The Radio Society of Great Britain Members' Magazine

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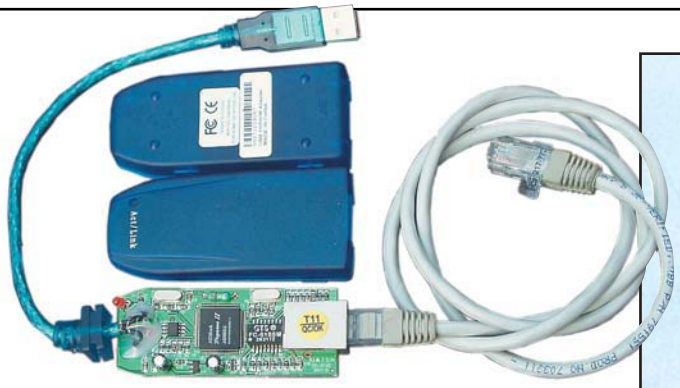
INSIDE



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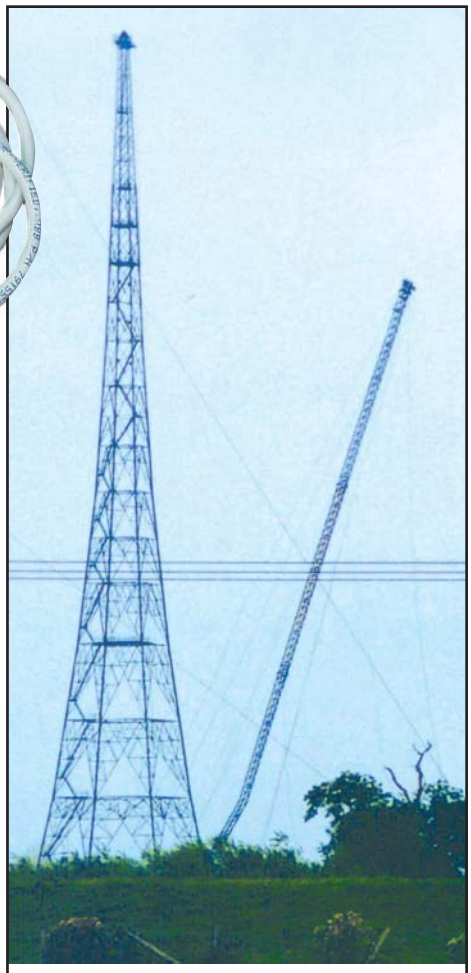

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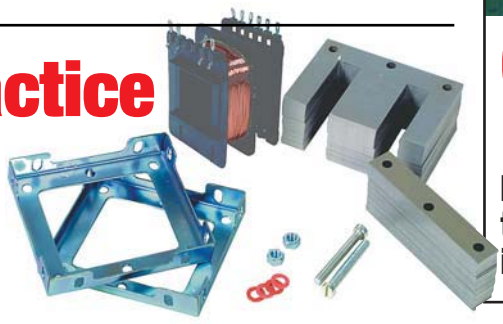

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DATA
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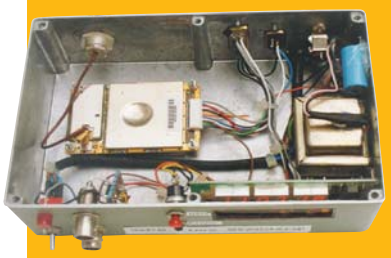

TECHNICAL TOPICS
Pat Hawker, G3VA, on the role of Brown, Kraus & Roberts in the evolution of the HF 'Yagi'

REVIEWS
We look at the Icom IC-703 and the Yaesu VX-7R transceivers
New RSGB books

RAYNET
'Raynet Tomorrow' concludes our trilogy of articles marking the 50th anniversary of Raynet

Do you understand impedance matching? Turn to **p60** to find out!

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NEW HIGH SIERRA SIDEKICK

80m to 6m 200W Mobile Whip
Motorised Tuning
Can Be 'Mag' Mounted*

The large diameter coil offers efficiency higher than any other similar antenna, in a very compact size. Band changing is a button press away!

In Stock **£259 B**

- 3.5 - 60MHz
- 200 Watts
- 15 in base unit
- High Q Coil
- 3ft whip
- 12V motor
- Control box
- DC cables
- 3/8" stud mount
- Made in USA

* Needs our 3-way magnetic mount

NEW YAESU FT-2800M

£159 B

*144-146MHz *FM *137 - 174MHz expanded Rx
*RF Pwr 65/25/10/5W *25/12.5kHz channel spacing
*High/Low deviation *Supply 13.8V DC

The FT-2800M is the latest model from Yaesu with 65 Watts High Power, rugged construction, excellent receiver performance and direct keypad entry.

HF TRANSCEIVERS

ICOM IC-756 PRO II £1999 C

Flagship of the Icom range of HF transceivers. HF & 50MHz, features large colour LCD with spectrum scope, auto ATU and 32-bit floating point DSP unit.

ICOM IC-7400 £1249 C

HF/VHF 100W transceiver. Features large LCD with spectrum scope, auto ATU and same DSP system as IC-756PRO II.

ICOM IC-703 NEW £599 C

HF/ 50MHz Transceiver 0.1-10W Portable, Mobile, Base-Station. (9-15.87V DC) Designed especially for the Foundation Licence/QRP. Built-in features auto ATU, DSP memory keyer. (5W when using 9.6V batts) Battery and Carry Pack to follow.

ICOM IC-706 IIG DSP £789 C

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

ICOM IC-718 £499 C

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

KENWOOD TS-2000 £1599 C

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

KENWOOD TS-870S DSP £1399 C

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

KENWOOD TS-570DGE £849 C

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

ICOM IC-910X with 23cm £1249 C

Icom's all mode VHF/UHF transceiver with 23cm. Large clear LCD with lots of facilities. 100W on VHF and 75W on UHF, 10W on 23cm. IC-910H version £1149

Base Model IC-910H £1129

HF TX / LINEAR AMPLIFIERS

YAESU FT-1000 MKV £2349 C

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

YAESU FT-1000 FIELD £1749 C

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

YAESU FT-920AF £1049 C

LAST FEW

100W HFplus 6m transceiver. 100kHz - 30MHz, 48 - 56 MHz Gen coverage Rx, 100 memories, Internal ATU with 100 tuner memories, large backlight LCD, Built-in memory keyer, 13.5V DC. Now includes FM unit and 6kHz AM filter.

YAESU FT-897 £989 C

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

YAESU FT-847 £1199 C

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

YAESU FT-857 NEW £799 C

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

YAESU FT-817 £539 C

bhi NE-DSP1061 Module available!

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

NEW DSP Module

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

TOKYO HY-POWER HL-50B £265.95 C

FT-817 VERSION !

This model has been specifically designed for the FT-817. Enjoy up to 50 Watts output

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VHF / UHF TRANSCEIVERS

ICOM IC-E208 NEW £319 C

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

ICOM IC-2725E NEW £309 C

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

ICOM IC-207H £249 C

Great budget price dual band FM 50W/35W transceiver. Simple band operation. Front panel detachable from main unit if required.

ICOM IC-2100H £229 C

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

YAESU FT-8900R NEW £349 C

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

YAESU FT-1500M £179 B

Remarkably small and compact, yet built like a Battleship!
Should last for years.
Look at the Price!

KENWOOD TMD-700E £449 C

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

KENWOOD TM-V7E £359 C

A lovely cool blue display, easy with 50/35W output. 50W/35W plus 280 memos and five storable operating profiles.

KENWOOD TM-G707E £289 C

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

VHF/UHF TX & HANDHELDS

YAESU VX-7R NEW £299 B

6m/2m/70cm

Available in Silver or Black

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

YAESU VX-150 £115 B

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

YAESU VX-110 £109 B

Combining the ruggedness of the VX-150 with the simplicity of 8-Key operation, the VX-110 is a fully featured 2m handheld ideal for the most demanding of applications. It has a die-cast case, large speaker and illuminated keypad.

ICOM IC-E90 NEW £269 B

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

ICOM IC-T3H £129 B

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

KENWOOD TH-D7E £319 B

DATA COMMUNICATOR

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

KENWOOD TH-F7E £259 B

WITH EXTRA WIDE RX COVERAGE

- 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.

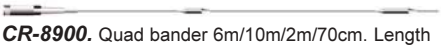
KENWOOD TH-G71E £199 B

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

VHF / UHF ANTENNAS

MOBILE ANTENNAS

DIAMOND ANTENNA (PL-259 base type) **NEW**



CR-8900. Quad bander 6m/10m/2m/70cm. Length 1.26m, max pwr 60W with fold over base. **£72.95 B**

WATSON ANTENNAS (PL-259 base type)

W-2LE	2m quarter wave 2.1dBi 0.45m	**£9.95**	A
W-285S	2m 3.4dB 0.48m (fold over base)	**£14.95**	B
W-77LS	2m/70cm 0/2.5dB 0.42m	**£14.95**	B
W-770HB	2m/79cm 3/5.5dB 1.1m	**£24.95**	B
W-7900	2m/70cm 5.6/7.6dB	**£32.95**	B
W-627	6m/2m/70cm 2.15/4.8/7.2dB 1.6m	**£34.95**	B
WGM-270 NEW	2m/70cm On glass 3.7m coax 50W	**£29.95**	B

MOBILE BASES

DIAMOND

K-600M. Deluxe boot mount SO-239, c/w 5m RG-58 & PL-259

AML	Gutter mount fold over type	**£15.95**	A
K-11	Universal gutter mount	**£24.95**	A
K-33	Adjustable hatch mount	**£23.95**	A
K-400	Adjustable boot mount heavy duty	**£26.95**	A
K-600M	Deluxe boot mount + cable	**£49.95**	B
DPK-TR	Stainless Steel boot mount (ECH)	**£18.95**	A

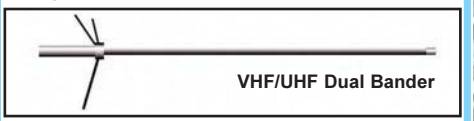
WATSON

WM-14B. Large diameter 14cm magnetic mount SO-239, c/w 5m RG-58 & PL-259

W-3HM	Adjustable hatch mount	**£14.95**	A
WM-08B	8cm mag mount, 5m cable PL-259	**£9.95**	A
WM-14B	14cm hvy duty mag mount+cable	**£12.95**	A
WSM-88V	BNC mag mount plus 3m cable	**£14.95**	A
W-3CK	5m 5D-FB cable assembly+pigtail	**£18.95**	A
W-ECH	5m standard cable kit assembly	**£12.95**	A

BASE STATION ANTENNAS

DIAMOND



VHF/UHF Dual Bander

X-200	2m/70cm colinear 6/8dB 2.5m	**£79.95**	C
X-300	2m/70cm colinear 6.5/9dB 3.1m	**£99.95**	C
V-2000	6m/2m/70cm 2.15/6.2/8.4dB 2.5m	**£89.95**	C

WATSON

W-300. Very popular dualband base antenna. Supplied with u-bolts for mast fixing.

W-30	2m/70cm colinear 3/6dB 1.15m long	**£39.95**	C
W-50	2m/70cm colinear 4.5/7.2dB 1.8m long	**£49.95**	C
W-300	2m/70cm colinear 6.5/9dB 3.1m long	**£64.95**	C
W-2000	6m/2m/70cm 2.15/6.2/8.4dBi 2.5m	**£69.95**	C

DIAMOND HFV5 NEW

NEW - DIAMOND HFV5 ULTRA COMPACT DIPOLE
40, 20, 15, 10, 6M. 100 WATTS 4M LONG!

This is a superbly engineered rigid dipole for portable or balcony use. Balun fed, it comes with centre mounting plate for up to 2" diameter fixing. Each band is indivudually adjustable.

NEW

* 40 - 6m
* 150 Watts
* 40m = 40kHz, 20m = 160kHz 15m = 200kHz,
* 10m = 340kHz, 6m = 1.3MHz * SO-239 Balun Fed
* 2" mounting bracket * 4m long / 1.95kg

HFV5 Compact HF Dipole 40-6m **£219.95 C**

WATERS & STANTON

PRICE MATCH

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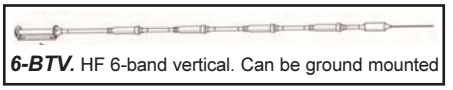
HF ANTENNAS

VERTICAL ANTENNAS

HUSTLER BASE ANTENNAS

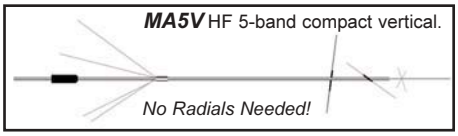


6-BTV. HF 6-band vertical. Can be ground mounted

6-BTV *NEW*	80-40-30-20-15-10m 1kW PEP	**£239.95**	C
5-BTV	80-40-20-15-10m 7.64m 1kW	**£209.95**	C
4-BTV	40-20-15-10m 6.52m 1kW PEP	**£169.95**	C

CUSHCRAFT BASE ANTENNAS

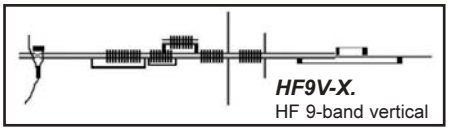
MA5V HF 5-band compact vertical.



No Radials Needed!

MA5V	20-17-14-12-10m 250W PEP	**£229.95**	C
R8	40-30-20-17-15-12-10-6m 1.5kW	**£529.95**	C
R6000	20-17-15-12-10-6m 1.5kW PEP	**£349.95**	C

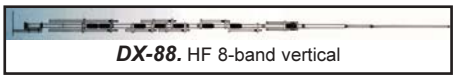
BUTTERNUT BASE ANTENNAS



HF9V-X. HF 9-band vertical

HF9V-X	80-6m 7.9m 1kW PEP	**£365.00**	C
HF6V-X	80-40-30-20-15-10m 7.9m 2kW	**£315.00**	C
HF2V	80-40m 9.75m (160m opt) 1kW	**£230.00**	C

HY-GAIN BASE ANTENNAS



DX-88. HF 8-band vertical

AV-640	40-6m 1.5kW, 300W 6m (PEP)	**£399.95**	C
AV-620	20-6m 1.5kW, 500W 6m (PEP)	**£299.95**	C
AV-14AVQ	40-20-15-10m 1.5kW PEP	**£179.95**	C
AV-12AVQ	20-15-10m 1.5kW PEP	**£139.95**	C
DX-88	80-10m 1.5kW, 250W 30m	**£395.95**	C

HORIZONTAL BEAMS & DIPOLES

CUSHCRAFT

Hurry Cushcraft prices increase in September!

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

X-7	20/15/10m 7 el. Yagi 2kW	**£699.95**	D

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

MA-5B	10-12-15-17-20m 4 el. Yagi 2kW	**£349.95**	D
A4-S	10-15 & 20m 4 el. Yagi 2kW	**£599.95**	D
A3-WS	12 & 17m 3 el. Yagi 2kW	**£399.95**	D
D-3	10-15-20m dipole element 2kW	**£249.95**	C

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

D-3W	12-17-30m dipole element 2kW	**£249.95**	C
D-4	10-40m dipole element 2kW	**£339.95**	C
D-40	40m dipole element 2kW	**£299.95**	C
TEN-3	10m 3 el. Yagi 2kW	**£219.95**	C
ASL-2010	13.5-32MHz 8 el. log periodic	**£799.95**	C

RADIO WORKS

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

CW-160	160-10m 76.8m long	**£139.95**	C
CWS-160	160-10m 40.5m long	**£134.95**	C
CW-80	80-10m 40.5m long	**£99.95**	C
CWS-80	80-10m 20.1m long	**£119.95**	C
CW-40	40-10m 20.1m long	**£94.95**	C
CW-20	20-10m 10.36m long	**£84.95**	C
CW-620	20-6m 9.7m (32ft) long	**£94.95**	C
G5RV PLUS	80-10m with balun 31m (102ft) long	**£64.95**	B

HF ANTENNAS

Super Antennas USA - Portable HF Ants

YP-2 Portable 2 el Beam Configure for 20m to 6m

* Tune to one of the six bands * 200 Watts * Full size on 10m and 6m. * Packs down into supplied bag, 36" long * Fits masts up to 1.5" * Ideal for portable operation. Weighs approx 3kg

YP-2 - Was ~~£399~~ Now £299!

MP-1 Portable whip for 40m to 70cms! Ideal for FT-817 etc.

£159.95

* Centre variable loading * 40m to 70cms * 150W pep * Total length extended 185cm approx. Packs down to pocket size * Includes universal table/fence bracket and radial wire * SO-239 socket on bracket.

MOBILE ANTENNAS

HUSTLER

Standard Resonator 400W (mast sections not included)

RM-10	10m 150-250kHz	**£19.95**	B
RM-11	11m 150-250kHz	**£19.95**	B
RM-12	12m 90-120kHz	**£19.95**	B
RM-15	15m 100-150kHz	**£19.95**	B
RM-17	17m 120-150kHz	**£24.95**	B
RM-20	20m 80-100kHz	**£24.95**	B
RM-30	30m 50-60kHz	**£26.95**	B
RM-40	40m 40-50kHz	**£26.95**	B
RM-80	80m 25-30kHz	**£29.95**	B

Super Resonator 1kW (mast sections not included)

RM-10-S	10m 250-400kHz	**£24.95**	C
RM-15-S	15m 150-200kHz	**£26.95**	C
RM-20-S	20m 100-150kHz	**£31.95**	C
RM-40-S	40m 50-80kHz	**£37.95**	C
RM-80-S	80m 50-60kHz	**£51.95**	C

Lower Mast Sections

MO-1	54" (FOLD @ 22")	**£33.95**	C
MO-2	54" (FOLD @ 27")	**£33.95**	C
MO-3	54" (NON FOLD)	**£26.95**	C
MO-4	27" (NON FOLD)	**£22.95**	C

Mobile Mount Accessories

SSM-1	Ball mnt stainless steel spring&stud	**£45.95**	B
SSM-2	Ball mount	**£28.95**	A
SSM-3	Stainless steel spring & stud	**£24.95**	A
HOT	Trunk lip mount	**£24.95**	A
RSS-2	Stainless steel resonator impact spring	**£10.95**	A
QD-2	Quick disconnect adaptor	**£19.95**	A
VP-1	Multi-band adaptor	**£7.95**	A

PORTABLE ANTENNAS

MIZUHO (FOR FT-817)

ATX-WBN	Walkabout 80-6m Whip 1.5mBNC	**£49.95**	B

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

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

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

AT-80	Single band 80m whip with BNC	**£24.95**	B
AT-40	Single band 40m whip with BNC	**£24.95**	B
AT-30	Single band 30m whip with BNC	**£19.95**	B
AT-20	Single band 20m whip with BNC	**£19.95**	B
AT-17	Single band 17m whip with BNC	**£19.95**	B
AT-15	Single band 15m whip with BNC	**£19.95**	B
AT-12	Single band 12m whip with BNC	**£19.95**	B
AT-10	Single band 10m whip with BNC	**£19.95**	B

ANTENNA TUNER UNITS

MFJ 989C VERSA TUNER V £379.95 C

High power tuner.*1.8-30MHz *3kW *6-way Antenna/ load switch *2 coax positions *Built-in 4:1 balun *X-needle meter *Peak & AV

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MFJ-259B	HF/VHF digital analyser	**£269.95**	B

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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WebPlus: Members-only web site **www.rsgb.org/membersonly** Use your callsign in lower case as the user name, and your membership number (see RadCom address label) as the password.

RSGB Matters

Fresh Approach to Spectrum Issues

Following WRC-03 and the recent licensing changes, the Society's Board has agreed to a new approach in dealing with issues concerning spectrum matters. Under the current arrangements, the Society has had three committees dealing with these issues: the HF, VHF and Microwave Committees. From 1 January 2004, spectrum matters will come under the umbrella of a new body known as the 'Spectrum Forum'. The Forum will have full responsibility for the frequency allocations, modes of operation, and band planning from 136kHz to 76GHz.

The Board believed that the time was right to take a fresh look at Spectrum matters in the light of the recent changes to licensing in the United Kingdom and the revision of the examination syllabus.

The Board envisages that the change will make the work in this area more transparent to the membership and make it less cumbersome in dealing with outside agencies such as the new telecommunications authority OFCOM.

TRAINING THE TRAINERS

The Society has been working towards the final stages of fully integrating the UK amateur radio examinations. In January 2004 the new Full licence syllabus will be released and will complement the current Foundation and Intermediate amateur radio licences. To this end, the Society will be training 35 instructors who will be teaching the Full licence as from 2004 during a residential course in Telford, Shropshire, over the weekend of 18 / 19 October.

WANTED: RAE LECTURER – FOR ALBANIA!

A radio amateur lecturer is required to help give a radio amateur course in the Technical University of Tirana, Albania, in November. The course will integrate amateur radio communications theory and practice into the University's normal study programme. The course is organised in coordination with the Ministry of Telecommunications in Albania, in conjunction with the IARU, and using RSGB documentation. Several agencies and companies are providing financial support. The applicant should have experience of teaching electronics and telecommunications at the amateur radio level in a UK setting. The course material is based on the UK RAE at the Full licence level and will lead to a CEPT-recognised qualification for the successful students. The successful amateur will help to coordinate the other visiting lecturers, and the assignment will take three weeks out of a six-week programme. This is a unique opportunity to join a multi-national amateur radio team helping to create a new group of telecommunication engineers to benefit the Albanian economy. It will provide a rich experience, not to mention the opportunity to operate ZA1A from the hotel in any spare moments! For more details,

NEW YEAR – NEW CHALLENGE

ARE YOU A **SELF STARTER?**
ARE YOU **WELL MOTIVATED?**
ARE YOU **BORED?**

IF YOU ARE: THEN YOU COULD BE JUST THE PERSON THAT THE SOCIETY IS LOOKING FOR TO CHAIR THE NEW: **'SPECTRUM FORUM'**

This is a new 'CHALLENGING' volunteer appointment in an area that is vitally important to the future of amateur radio in the UK. There are many threats, challenges and innovations for the new body to face, not least the introduction of PLT, spectrum pricing, introduction of Internet linking, protection of the current frequency allocations and the introduction of the new telecommunications authority OFCOM. The 'Forum' will be responsible to the Board for frequency matters, modes of operation and band planning from 136kHz to 76GHz.

If you believe you can meet this challenge, have the right personality and background, and are experienced in amateur radio matters, **apply in writing to** Peter Kirby, G0TWW, General Manager, enclosing an Amateur Radio CV. **Closing date** for applications is 31 October 2003.

please contact Roger Brown, G3LQP (QTHR), or e-mail g3lqp@aol.com

SETNET AMBASSADORS

The RSGB, as part of its GB4FUN schools programme, is exploring ways of working with the national Science, Engineering, Technology and Mathematics Network, SETNET. The President, Bob Whelan, G3PJT, would like to make contact with any RSGB members who are already Ambassadors in that programme, or who are involved with any of the regional SETPOINTs. Please e-mail Bob on g3pjt@whsmith.co.uk or president@rsgb.org.uk

NO QRO FROM 1950 TO 2000kHz

The Society has received confirmation from the Radiocommunications Agency that the apparent published power increase in the 160m band, subband 1950kHz to 2000kHz, is a printing error. This error is included in the recently-printed *BR68* and is also in the Gazette notice, which appears on the RA website.

The RA will also be placing an announcement on its website very soon to correct the mistake, and *BR68* documents will include an addendum sheet to this effect.

QSL BUREAU NEWS

Please note that there is now a new RSGB QSL Bureau Sub-Manager for the 'Q' cards (GQ, MQ and 2Q prefix callsigns used to celebrate the Queen's Golden Jubilee in June 2002). He is Robert Scott, M0CRY, 198 Slade Green Road, Erith, Kent DA8 2JG. The former sub-manager for these cards, Mike Evans, MW0CNA, is thanked for his service. Mike is still the QSL Bureau Sub-Manager for GB special event callsigns.

AROS TALKS

The RSGB Amateur Radio Observation Service (AROS) coordinator, Barry Scarisbrick, G4ACK, is giving talks on the work of AROS at the **South Bristol ARC** on **22 October** (details from Len, G4RZY, tel: 01275 834282); and at the **Leicester Repeater Group** on **30 October** (details from John Senior, G7RXS, tel: 0116 224 2598).

50 YEARS AGO... IN THE R.S.G.B. BULLETIN, OCTOBER 1953

The ***R.S.G.B. Bulletin*** for October 1953 reports the probable first public demonstration of SSB. A column entitled 'CQ Single Sideband', compiled by H F Knott, G3CU, reported: "For what is probably the first time in history, a single sideband station was operated in public during the Letchworth Jubilee Fair held at the beginning of September. The station (GB3LJF) worked on 3.5 and 14 Mc/s with a power input of 90 watts peak. Numerous contacts were made on both bands including sixteen two-way using single sideband. On 14 Mc/s many trans-atlantic contacts were established earlier and finished later than with the companion amplitude modulated station." It is interesting to note that GB0LGC was active on 6 / 7 September 2003 to celebrate the centenary of the founding of Letchworth, the world's first 'Garden City'.

The same 'CQ Single Sideband' column, having reported SSB activity from North America, Africa and Oceania (though not South America), says "With the arrival in Pakistan of GW3JET, complete with a suitably modified "S.S.B. Jr.," the possibility of a single sideband WAC [Worked All Continents – ***Ed***] now exists. He hopes to be active on 7 and 14 Mc/s at first and later on 3.7 Mc/s."

PHOTO: BOB WHELAN, G3PJT

The photo shows a meeting of RSGB Regional Managers which took place at the Telford Rally, at RAF Cosford near Wolverhampton, on Sunday 31 August.

MORE COUNTRIES DROP HF MORSE REQUIREMENT

More countries have announced that they no longer require a Morse code test for operation on the HF bands. In Norway, the three former licence classes, with LA, LB and LC callsigns, were combined into one on 19 August. In future, LA and LB callsigns will be heard on the bands, while those with LC callsigns will be allocated new LA calls.

In the Netherlands, the Dutch licensing authority announced on 19 August that from 1 September a Morse code test would no longer be necessary for operation on frequencies below 30MHz. The Dutch licence classes A and C, which correspond to CEPT Classes 1 and 2 respectively, will have the same privileges, although the two licence classes are to keep their separate callsign assignments for the time being. There are no changes to the Dutch Class N licence, which allows operation on 2m and 70cm only.

In Austria, the qrz.com website reported that the President of the Austrian national amateur radio society has said that the telecommunications authority will grant HF access for all CEPT Class 2 licences provisionally, starting "some time in September 2003", pending formal changes to the Austrian amateur radio rules.

qrz.com also reported that in New Zealand the Ministry there intends to remove Morse operating competency from the syllabus for the 'General' licence class. The change will be implemented as part of the next round of updates to the New Zealand Radiocommunications Regulations, which is expected to occur later this year. Until then, holders of the ZL 'Limited' licence class are still not entitled to operate on bands below 30MHz.

The list of countries no longer requiring a Morse code test for HF band access is (at the time of going to press): the UK, Switzerland, Belgium, Germany, Norway and the Netherlands, with Austria and New Zealand expected to follow suit shortly.

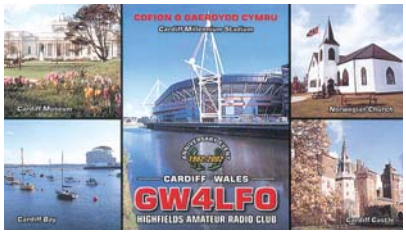
RISING TO THE CHALLENGE

We suspected when we published the Bangor & DARS's claim ('RSGB Matters', September 2003, p6) that theirs is the *only* UK club to have produced two RSGB Presidents, that other clubs would rise to this challenge!

Dick Atterbury, G4NQI, and David Proctor, F5VHI / G4JYW, both point out that Joan Heathershaw, G4CHH, and Peter Sheppard, G4EJP, were members of the Hornsea Amateur Radio Club. Since Joan was President of the RSGB twice (in 1985 and 1987) perhaps she should be counted twice?!

The Chelmsford Amateur Radio Society says it has produced three Presidents of national societies: Peter Chadwick, G3RZP, and Don Beattie, G3OZF (now G3BJ), both went on to become RSGB Presidents and Peter Naish, G3EIX, later VK2BPN, went on to become President of the Wireless Institute of Australia.

However, the only club (so far!) which claims to have provided three separate individuals who went on to become RSGB Presidents is the Highfields Amateur Radio Club in Cardiff. Tom Roberts, GW0WHT, the Chairman of the Highfields club, points out that Cyril Parsons, DFC, GW8NP, was in 1975 the first President of the RSGB from Wales; E John Case, GW4HWR, was President in 1991, while Clive Trotman, GW4YKL, was President of the RSGB in 1995. Can any other club beat this record?



The Highfields ARC, GW4LFO, is believed to be the only UK club to have produced three RSGB Presidents from within its membership.

Peter Naish, G3EIX (later VK2BPN), at his first station in September 1948.

RSGB EVENTS 2003

HFC 2003

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31st OCTOBER - 2nd November 2003

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THE WORLD'S PREMIER HF 6m & IOTA EVENT

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Package B Two-day package, as for 'A' but for two people.	£270.00
Package C One Night Package This includes admission to both days of the conference and one night's b&b accommodation for one person at the Country House Hotel on the Saturday the 1st November. Also included a choice on Saturday evening of the DX dinner or the UKSMG dinner.	£150.00
Package D One-day package, as for 'C' but for two people.	£160.00
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UKSMG Dinner on Saturday 1st November	£30.00

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Home Corporate	£42.50
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Special arrangements exist for blind and disabled persons. Details and membership application forms are available from RSGB HQ.

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p18 – Commonwealth Contest winner. Results and full write-up this month.

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Radio Amateurs Injured in Baghdad Bomb

Michael Dirksen, PA5M; Ghis Penny, ON5NT, and Robert Kasca, S53R, were at the United Nations building in Baghdad when it was bombed on 19 August. Both Michael and Ghis were injured and airlifted abroad for medical attention. Fortunately Robert was unhurt in the attack. At the time of going to press, Michael was still in hospital although Ghis had been released and was back home in Belgium, from where he says his wounds are healing well. He expected to remain at home for three weeks and then go on to Dubai. Robert, S53R, reportedly will remain working in Baghdad.

The incident at the UN HQ in Baghdad and the murder in July of International Red Cross aid worker Nadisha Yassari Ranmuthu, 4S7NR, near Baghdad, provide stark reminders that radio amateurs employed in humanitarian relief work often put their own lives in danger. There are many radio amateurs working for the UN, the World Food Programme, the Red Cross and other non-governmental organisations in Iraq and other danger zones – see www.hiciraq.org/services/FITTEST/index.asp Many pictures of the radio amateurs' work in Iraq can be seen at www.hiciraq.org/mediacentre/gallery/FITTEST/index.asp

The Kuwaiti Amateur Radio Society has been staffing the Kuwait UN radio room with volunteers since the beginning of the crisis six months ago. The Kuwait UN radio room is the key axis for all radio traffic for people travelling to the southern part of Iraq.

We wish Ghis and Michael a very speedy recovery from their injuries.

PHOTO: PETER CASIER, ON6TT

Michael Dirksen, PA5M, working on the roof of the UN building before the bombing.

GB2PBL Becomes Permanent SES

Members of the Portland Amateur Radio Club (PARC), with the support of Trinity House, successfully applied to make GB2PBL at Portland Bill Lighthouse a permanent Special Event Station. GB2PBL was on the air during the International Lighthouse/Lightship Weekend in August. In order to promote amateur radio to the general public, PARC now hopes to set up a permanent amateur radio display in the lighthouse visitors' centre. It is also intended for there to be an operational station permanently available on site, to allow visiting amateurs to activate the GB2PBL callsign.

Portland Bill Lighthouse, home of new permanent special event station GB2PBL.

With this in mind, PARC is looking for generous individuals, organisations, or companies to help it set up and run this display. Sponsorship might be in any form - loan of equipment or accessories for the station would be most useful, as would the provision of general introductory amateur radio promotional information. For more information tel: 01305 823373, visit the PARC website at www.portland-amateur-radio-club.org.uk, or e-mail GB2PBL@portland-amateur-radio-club.org.uk

Local Hero

The Chiltern DX Club (The UK DX Foundation) has awarded its prestigious 'Local Heroes' Award for 2003 to 'Tex' Izumo, 9M2TO. This annual award goes to an operator resident in a DX country who has provided excellent service to the DX community and who maintains a high standard of operating without the benefit of major sponsorship. The CDXC Committee recognises the commitment Tex has shown in providing very many contacts and confirmations with amateurs world-wide on all bands from 160 to 6m over a period of many years. The award carries a cash prize of £200 and a year's honorary membership of CDXC.

Can You Help LWT?

London Weekend Television (LWT), in conjunction with the registered charity London Film Archive, is putting together a new eight-part Sunday afternoon series called London's Home Movies. It aims to take you on a unique trip through the capital's last century using Londoners' very own home movie footage. The history of amateur radio is of considerable interest and LWT would love to find both old footage and people who would be willing to talk about amateur radio. If you can help please contact Kate Simpson by e-mail on Kate.Simpson@granadamedia.com

Terry Owen, G4PSH, operating the Sheringham control station G7RNN.

Raynet in the Running

Norfolk Raynet provided communications on behalf of the user services for the North Norfolk 58-mile Charity Walk from 0800 Saturday 2 August to 0200 on Sunday 3 August. A control centre was set up at Sheringham Youth Centre with checkpoint outstations along the route at Overstrand Cliff, Mundesley Hall, Bacton Beach, North Walsham Girl Guides, Erpingham Village Hall, Felbrigg Hall and Sheringham Hall. Despite the difficult terrain and distances involved, contact was adequately maintained between all participants.

Radio Amateur Mayor's Charity Appeal

The Mayor of Sandwell, West Midlands, Councillor Martin Prestidge, G2BXP, has been instrumental in setting up special event stations to raise funds for charity. Sandwell was formed when six boroughs were to form the new Metropolitan Borough. Six special event stations are being activated from the former boroughs: GB0MCS in Oldbury, GB2SMC in Tipton, and GB4SMC in West Bromwich on **5 October**, and GB5MC in Smethwick, GB6MC in Rowley Regis, and GB8MC in Wednesbury on **2 November**. Two different awards, showing the coats of arms of the former boroughs, are available for working (or SWLs hearing) any station on each of the days. The cost is £3.50 each plus a first class stamp and address label, and all funds will be divided between the Mayor's chosen charities, the Bradbury Day Care Centre in Oldbury, which offers care for the terminally ill, and the Sandwell branch of Diabetes UK.

AM Comms – on 5MHz

Vintage & Military Amateur Radio Society (VMARS) members received permission to have a special net on 5MHz using vintage AM military equipment. The net was organised as part of Royal Signals Corps Day in Blandford over the weekend of 28 / 29 June. The 5MHz operation gave many their first taste of AM from vintage sets on that band. For others it served to confirm the excellent performance of the band for inter-UK contacts, which is remembered well from days on the Cadet network in the early 1970s. Stations were scattered across the UK from Plymouth in the south-west, Sussex in the south-east up to Newcastle in the north-east with a number in between, and no difficulty copying any of them on a WS19 - on the Saturday.

Power levels varied widely, with some as low as 1 watt (eg from a WS62), but this did not appear to affect the readability of signals at Kemble and Blandford. The improvement in readability between signals on an 80m net and the later one on 60m was quite marked.

Though things went very well on Saturday, there were problems on the Sunday due to a propagation 'black out'. The VMARS Junior Operator in Blandford (see photograph) continued to try to get through despite this. Even an ATC station at Kemble running 100W SSB on 5MHz really struggled to make any contacts. Equipment in use included the WS19, C11, SR19 with HP amplifier and associated power supply, and an 'Aerial Tuning Unit J' to resonate the long wire antennas. Propagation returned in the afternoon, but by then most stations had given up. The weekend provided valuable experience of operating vintage equipment on AM and CW using NVIS.

One of the youngsters at the event tunes in using vintage AM equipment.

Jamboree on the Air

A reminder that Jamboree on the Air (JOTA) takes place over the weekend of 18 / 19 October. This is the event where Scouts and Guides use amateur radio to contact other Scouts and Guides throughout the world. Information packs will be available from RSGB HQ for all participants. Groups using GX or similar prefixes instead of a GB call are asked to inform Kelly Greenwood at RSGB HQ by Tuesday 7 October if they want details of their activity to appear in the information pack.

Win a Trip in 'the Icom Balloon'

If you have attended a balloon festival, airshow or fete, or if you bought the *RSGB Yearbook 2003*, you may have seen a hot-air balloon with a huge Icom logo emblazoned on it. The balloon is owned by Merlin Balloons, and Icom contributed towards its sponsorship. Merlin Balloons fly from various locations in Kent including Headcorn Airfield. Merlin Balloons approached Icom for sponsorship because it uses the IC-A3E handheld for aviation communications and the IC-A110 in its chase vehicle. If the thought of ballooning catches your imagination, visit the Icom UK website at www.icomuk.co.uk (click on 'Competition') and try your luck in the competition to win a flight for two people in the Icom balloon.

NEWS BRIEFS

- Mrs Vera Pemberton produces a newsletter for former RAF / WAAF personnel who attended Bolton Technical College for training as Wireless Mechanics during WWII. If you attended the College and would like to join the mailing list, please write to Vera Pemberton, 5 Tanglewood Coppice, Collington Lane West, Bexhill on Sea, East Sussex TN39 3SB, enclosing an SASE.
- Radio amateurs under the age of 30 who are interested in contesting may like to know about the World Wide Young Contesters website at www.wwyc.net The group now has around 300 members around the world, including many here in the UK.
- Radiosport has contacted *RadCom* to say that their show previously listed in November had not been cancelled, as it had never been scheduled then in the first place. The next Radiosport Show will be held in Stevenage on 15 February 2004.
- Roy Neal, K6DUE, has become a Silent Key. He died from complications on 15 August following heart surgery. For many years Roy was the NBC news Science Correspondent, covering the American space missions for US TV audiences. Through his many contacts, he convinced NASA management to fly amateur radio on-board the Space Shuttle. Later, he worked on the Amateur Radio on the International Space Station (ARISS) programme and provided much support to AMSAT and the ARRL on amateur radio space matters.

Dave Robinson, WW2R G4FRE (right), being presented with the Chambers Award by Kent Britain, WA5VJB. The award was given "In recognition of his outstanding contributions to VHF and UHF amateur radio" by the Central States VHF Society at its conference in Tulsa, Oklahoma, on 26 July.

Club and Reg

Club News is a service for clubs and societies affiliated to the RSGB. The announcements are intended to notify non-members and potential members of your club of specific events, therefore 'informal', 'committee meeting', 'natter night' and 'ragchew evening' etc will only be included if space permits. Basic, unchanged details about RSGB-affiliated clubs are published annually in the RSGB Yearbook.

Region 1: Scotland West & Western Isles

PAISLEY (YMCA) ARC
1, RFT = ZD. 15, 'How to drive a linear amplifier'. 29, Build your own HF transmitter. Jim, GM3UWX.

Region 2: Scotland East & the Highlands

COCKENZIE & PORT SETON ARC
5, Normal club night. 17, Video. 25, CQWW SSB contest. Bob, GM4UYZ, 01875 811723.

Region 3: North West

FYLDE ARS
2, AGM. 16, Quiz. Ken, G3RFH, 01253 823957, g3rfh@fsmail.net

MANCHESTER WIRELESS SOCIETY
7, 'Practical Propagation Predictions on VHF/UHF', Peter, G7FST. Ian, M0IPR, 0161 288 7301, www.g5ms.com

OLDHAM ARC
9, *PW*, Rob Mannion, G3XFD. Mike, 01706 367454.

THORNTON CLEVELEYS ARS
6, On air. 13, Technical talk. 20, AGM. 27, Open forum. Jack, G4BFH, jack@jdudding-ton.fsnet.co.uk

WARRINGTON ARC
7, Social evening. 14, 'Antennas & Propagation', Colin, G3SBI. 28, 'Using *Photoshop*', Gordon, G4SCI. John, G0RPG, 01925 762722.

Region 4: North East

GRIMSBY ARS
2, AGM. 16, Annual junk sale. Brian, G4DXB, 01472 231383.

HORNSEA ARC
19, Hornsea Radio Rally. 22, Hornsea Rally debrief. 29, On air. Richard, G4YTV, 01964 562498.

SHEFFIELD ARC
6, Club night. 13, VHF radio. 20, Talk TBA. 27, AGM. Nick, G4FAL, 0114 255 2893.

WAKEFIELD & DRS
7, Demo of synthesiser keyboards, Ian, M0BFO. 14, 'A Lifetime in Amateur Radio', Charlie, G2FKZ. 21, On air. 28, Surplus equipment & junk sale. Rick, G4BLT, 01924 255 515, www.wdrs.org.uk

THE RSGB REGIONS AND DISTRICTS

Region 1		**Scotland West & the Western Isles**	**RRM: Gordon Hunter, GM3ULP**
District	11	Central, City of Glasgow	DRRM: MM0BHX
	12	Lanarkshire, Renfrewshire	DRRM: GM4GZQ
	13	Ayrshire, Dumfries & Galloway	DRRM: MM0BRG
	14	Dunbartonshire, Argyll & Bute, Western Isles	DRRM: GM3UWX
Region 2		**Scotland East & the Highlands**	**RRM: Peter Thomson, GM1XEA**
District	21	Highlands	DRRM: GM3WKZ
	22	Aberdeenshire, Moray	DRRM: MM0JGP
	23	Angus, Perth & Kinross	DRRM: GM4ZNX
	24	Fife, Lothian, Borders DRRM: GM6CMQ	
	25	Orkney	DRRM: GM7GMC
	26	Shetland	DRRM: GM7RKD
Region 3		**North West**	**RRM: Kath Wilson, M1CNY**
District	31	Cumbria	DRRM: M0CRM
	32	Lancashire	DRRM: M1SMF
	33	Gtr Manchester	DRRM: G4YYB
	34	Cheshire, Merseyside DRRM: G7OBW	
	35	Isle of Man	DRRM: GD0TEP
Region 4		**North East**	**RRM: Geoff Darby, G7GJU**
District	41	Northumberland, Tyne & Wear, Cleveland, Co Durham	DRRM:G3ZRK
	42	North Yorkshire, East Yorkshire	DRRM: G0VRM
	43	West Yorkshire	DRRM: TBA
	44	South Yorkshire, NE Lincolnshire	DRRM: G3PTV
Region 5		**West Midlands**	**RRM: Roy Clarke, G8AYD**
District	51	Shropshire, Staffordshire	DRRM: G3FZW
	52	West Midlands	DRRM: G8SH
	53	Hereford, Worcestershire	DRRM: TBA
	54	Gloucestershire, Warwickshire	DRRM: G6RTV
Region 6		**North Wales**	**RRM: Liz Cabban, GW0ETU**
District	61	Flintshire, Wrexham DRRM: GW4GTE	
	62	Conwy, Denbigh	DRRM: GW4GTE
	63	Gwynedd, Ynys Môn (Anglesey)	DRRM: GW0ABL
	64	Powys	DRRM: GW0RJV
Region 7		**South Wales**	**RRM: Ray Ricketts, GW7AGG**
District	71	Pembrokeshire	DRRM: MW0CAB
	72	Ceredigion (Cardigan)	DRRM: GW3BV
	73	Carmarthenshire	DRRM: GW4RVA
	74	Vale of Glamorgan, Cardiff, Newport, Swansea	DRRM: GW0VSW
Region 8		**Northern Ireland**	**RRM: Jeff Smith, MI0AEX**
District	81	N Belfast, Co Antrim	DRRM: MI5JYK
	82	S Belfast, Co Down	DRRM: GI6ATZ
	83	Co Armagh, Co Fermanagh	DRRM: GI8RLE
	84	Co Londonderry, Co Tyrone	DRRM: GI4YWT
Region 9		**London & Thames Valley**	**RRM: Paul Berkeley, M0CJX**
District	91	London north of the Thames	DRRM: G3MCD
	92	Berks, South Bucks	DRRM: G0SJY
	93	Herts, North Bucks	DRRM: G5CL
	94	Surrey, London south of the Thames	DRRM: G4FKK
Region 10		**South & South East**	**RRM: Ivan Rosevear, G3GKC**
District	101	Oxfordshire	DRRM: M3JFM
	102	Wiltshire	DRRM: G0GRI
	103	East Sussex, West Sussex	DRRM: G4DRV
	104	Hampshire	DRRM: G0VEP
	105	Isle of Wight	DRRM: TBA
Region 11		**South West & Channel Islands**	**RRM: Barry Scarisbrick, G4ACK**
District	111	Cornwall	DRRM: G3VWK
	112	Devon	DRRM: G7SME
	113	Somerset, Bristol	DRRM: G0XAY
	114	Dorset	DRRM: G0KKL
	115	Jersey	DRRM: GJ0JSY
	116	Guernsey	DRRM: GU4YOX
Region 12		**East & East Anglia**	**RRM: Malcolm Salmon, G3XVV**
District	121	Cambridgeshire	DRRM: M0CNX
	122	Norfolk, Suffolk	DRRM: G4NZQ
	123	Essex	DRRM: M5AKA
	124	Kent	DRRM: TBA
Region 13		**East Midlands**	**RRM: Bryn Llewellyn, G4DEZ**
District	131	Leicestershire, Rutland	DRRM: TBA
	132	Lincolnshire, Nottinghamshire	DRRM: G3XZF
	133	Derbyshire	DRRM: TBA
	134	Bedfordshire, Northamptonshire	DRRM: TBA
Region	**14**	**Overseas**	

This listing shows the 14 RSGB Regions with their RSGB Regional Managers (RRMs) and, underneath each Region, the RSGB Districts, the areas making up those Districts, and their Deputy RSGB Regional Managers (DRRMs).
Breakdown of the RSGB Regions and Districts, with Regional and Deputy Regional Managers, as of 28 August 2003.

Region 5: West Midlands

BROMSGROVE ARS
14, Talk on digital broadcasting. 28, Quiz. Angus, G8DEC, 01527 875 573.

COVENTRY ARS
3, AGM. 10, 24, On air, novice class, CW practice. John, G8SEQ, 024 7627 3190, johng8seq@ntlworld.com

KIDDERMINSTER & DARS
7, Annual surplus equipment sale. Tony, G1OZB, 01299 400172.

MID-WARWICKSHIRE ARS
14, Programme planning meeting for 2004. 28, 'Bee Keeping', John, M0JDB. Bernard, M1AUK, 01926 420913.

SALOP ARS
2, Contest preparation. 5, RSGB 21/28MHz SSB Contest 0700 – 1900UTC. 9, Trophy presentations, Salop ARS EGM and AGM. 19, RSGB 2nd 50MHz Contest 0900 -1300UTC. 23, New chairman's discussion night. John, G0GTN, 01743 249943.

TELFORD & DARS
1, Open evening, on air. 8, 15, 22, 29, TBD. Mike, G3JKX, 01952 299677.

Region 6: North Wales

CONWY VALLEY ARC
1, Trip to Easter Island, Roger, GW3SMY. Wynne, GW6PMC, 01745 855068.

DRAGON ARC
6, 'Digital Synthesised VFO for Heathkit HW9', Stewart, GW0ETF. 20, Talk on DXpedition to Bardsey Island by members of the North Wales Radio Club. Stewart, GW0ETF, 01248 362229.

MEIRION ARS
2, Bardsey DXpedition presentation. Martyn, GW4XZJ, 01654 782619.

WREXHAM & DARS
21, Quiz. Mark, MW3MDH, www.qsl.net/wars

Region 7: South Wales

No club details received.

Region 8: Northern Ireland

No club details received.

Region 9: London & Thames Valley

BRACKNELL ARC
4, 5, '432 and Up' contest with Flight Refuelling ARS. secretary@g4bra.org.uk, www.g4bra.org.uk

BROMLEY & DARS
21, Table-top sale. Alan, G0TLK, 0208 777 0420.

COULSDON ATS
13, Experiments with laser communications, Derek Atter, G3GRO, & Alan Wyatt, G8LSD. Steve, G7SYO, 01737 354271.

CRAY VALLEY RS
12, GB6CW Crown Woods School. 19, GB6DC for JOTA. 26, CQWW SSB M8C. Bob, BRS32525, 020 8265 7735 after 8pm & weekends.

CRYSTAL PALACE R & EC
3, Club projects, technical discussions. 17, The Mosquito Aeroplane, Victor, G1PKS; German

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.

ional News

bomber design, Brian, G8DIU. Bob, G3OOU, 01737 552170 or Victor, G1PKS, 020 8653 2946.

ECHELFORD ARS
9, W&S plc, Mark Francis. 23, 'RF Circuits', Robin, G3TDR. Robin, G3TDR, 01784 456513.

RS OF HARROW
3, TBA. 5, GB2DHH operating day. 10, Informal. 17, Hungarian Evening (TBC). 24, Informal. 31, Newcomers' programme. Jim, G0AOT, 01895 476933 or 020 7278 6421.

READING & DARC
9, 'Nikola Tesla, Forgotten Father of Radio', Nick Field. Pete, G8FRC, 01189 695 697.

SILVERTHORN RC
31, AGM. David, G0KHC, 020 8504 2831.

SOUTHGATE ARC
9, EGM. Mike, M0ASA, 020 8366 0698.

STEVENAGE & DARS
7, Members' discussion. 11, 12, Foundation Course. 14, M3 tuition: operating. 21, Members' discussion. 28, Video. info@sadars.org

SURREY RCC
6, Autumn surplus equipment sale. 27, West London Radio & Electronics Rally, Kempton Racecourse. Ray, G4FFY, 020 8644 7589.

SUTTON & CHEAM RS
16, TBA. John, G0BWV, 020 8644 9945.

Region 10: South & South East

ANDOVER RAC
7, 'Eight go to Gatwick', Dave, G4YVM. 21, Licence conditions update, Ivan, G3GKC. 25, 26, JOTA at Andover, with Brian, M3CEB. Terry, G8ALR, 01980 629346.

BASINGSTOKE ARC
6, AGM. Peter, M1DGQ, 0118 983 6545.

FAREHAM & DARS
1, On air. 15, Planning permission: the Tennamast Adapt-a-Mast, Brian, G4IRG. 29, The Fareham Club 35 years ago, Mick, G4ITF (and anyone else old enough to remember!) Steve, G7HEP, 01329 663673.

HASTINGS E & RC
15, Club auction. R C Gornall, G7DME, 01424 444466.

HORNDEAN & DARC
4, Visit to Clanfield Observatory. 7, Social evening. 28, AGM. Stuart, G0FYX, 023 9247 2846.

HORSHAM ARC
2, Junk sale. David, G4JHI, 01403 252221.

ITCHEN VALLEY RC
10, First Aid for the radio amateur. 24, Outside events. Sheila, G0VNI, 023 8081 3827, sheila.williams@ivarc.org.uk

SOUTHDOWN ARS
6, Review of activities at Lighthouse and Camp X weekends. John, G3DQY, 01424 424319.

SWINDON & DARC
9, 'Modulation – Doing it with Digits', Ian, G8JHC. 23, 'A Brief History of Wood & Douglas', with demo of current products, Alan, G4EEE. Den, M0ACM, 01793 822705.

TROWBRIDGE & DARC
15, Personal account of DXpedition to Netherlands Antilles, Chris Parnell, G0HFX. Ian, G0GRI, 01225 864698, evenings/weekends.

WORTHING & DARC
1, 'The RSS and Y Sections', M3JLQ. 8, AGM. 16, Flying special missions. 22, DSP noise reduction systems. 29, Award-winning films. Roy, G4GPX, 01903 753893.

Region 11: South West & Channel Islands

APPLEDORE & DARC
20, The W3EDP Antenna, Terry, G4DHD. Brian, M0BRB, brian.jewell@ic24.net

BOURNEMOUTH RS
3, Construction by members. 17, AGM. Chris, M5AGG, 01202 893126.

CITY OF BRISTOL RSGB GROUP
27, Quiz. Clive ,G4NAO, 01275 851724.

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

FLIGHT REFUELLING ARS
4, 5, '432 and Up' contest with Bracknell ARC. 26, Table-top junk sale. Paul, M0EYT, c/o www.frars.org.uk

SOUTH BRISTOL ARC
1, Computer clinic. 8, 20th anniversary party. 15, Contest planning for 2004. 22, AROS presentation, Barry Scarisbrick, G4ACK. 29, On air. Len, G4RZY, 01275 834282.

WEST SOMERSET ARC
7, Deputy RSGB Regional Manager, Dick, G0XAY. Jean, G0SZO, 01984 633060.

Region 12: East & East Anglia

BRAINTREE & DARS
6, Planning for JOTA. 20, ATU clinic. John, M5AJB, 01787 460947.

CHELMSFORD ARS
7, AGM. David, M0BQC, 01245 602838.

FELIXSTOWE & DARS
6, Fish & Chip supper, *The Victoria*, Felixstowe Ferry, book with Herbie, M1DGY. 20, 'Two Eclipses in One Year', Paul, G4YQC. Paul, G4YQC, paul.whiting@bt.com

HARWICH AR INTEREST GROUP
8, Talk about her travels, by Sue Abbott. Eugene, G4FTP, 01206 826633.

NORFOLK ARC
1, Members' construction contest. 8, Informal, CW instruction. 15, Power supplies, pt2, Doug, G0UYC. 22, Informal and CW instruction. Reg, G0VDO, 01603 429269.

Region 13: East Midlands

EAGLE RADIO GROUP
14, Richard, M0RJP, with update on HF operations over the past 12 months. Terry, G0SWS, 01507 478 590.

LINCOLN SW CLUB
1, G5FZ on air. 15. Duchess of Sutherland Steam Train, Dave, G1WVO. 22, Surplus equipment sale. John, G1TSL, 01522 793751.

LOUGHBOROUGH & DARC
7, Bring & buy, books, radios etc. 14, AGM. 21, On air. 28, PSUs open forum. Chris, G1ETZ, 01509 504319.

NORTHAMPTON RC
2, RAE licence conditions. 9, RAE operating principles & practice. 16, RAE electronic principles & practice. 23, RAE receivers, transmitter & receivers; operating procedures. Phil, M0CTC, 01604 406887, northamptonradio-club@hotmail.com

SHEFFORD & DARS
2, Yaesu, Paul Bigwood. 16, Autumn junk sale. 23, The BBC presents the story of DRM. 30, 'The Excel Spreadsheet'. David, G8UOD, 01234 742757.

SOUTH NORMANTON, ALFRETON & DARC
6, Interclub quiz & buffet. 13, Sutton Observatory visit. 20, Junk sale. 27, Test equipment, Mike Jeffs. Russell, 01773 783394 or Mike, 01949 876523, www.qsl.net/snadarc

Coulsdon ATS Chairman Dave Young, G8VXB, being presented a plaque of friendship by Mark West, W6MW, the President of the Crescenta Valley RC.

Twin CATS

The Coulsdon Amateur Transmitting Society (CATS) has twinned with the Crescenta Valley Radio Club from Glendale, located just north of Hollywood, California. On 20 July Mark West, W6MW, stopped by on the last leg of his UK tour and presented CATS with a plaque, T-shirts specially printed by Mark Kanzler, KE6ZRP, entitled 'Hands Across the Water', and American flag lapel badges for every CATS member.

This friendship between the two clubs evolved using *Echolink* when Andy Briers, G0KZT, made contact with Mark, W6MW, and suggested twinning the two clubs. With the help of Mark and Terry Giles, G4CDY, providing the local links via the Internet Repeater Linking software, CATS and CVRC now hold a monthly net on the first Saturday of each month when the CVRC members meet for their breakfast meeting. Mark links the local 2m repeater to *Echolink* and members from both clubs exchange news, views and messages.

The main station at GB2NCL on board the North Carr Lightship.

Lightship Weekend 2003

The Dundee Amateur Radio Club took part in the International Lightship Activity Weekend on 16/17 August, activating GB2NCL at the North Carr Lightship. The station was set up in the lightship radio room and using a 20m dipole permanently installed at the aft of the ship. Many club members attended over the day, with most taking a spell on the mic. The opportunity was taken to test the refurbished beacon aerial on the ship to allow operation of a second station on 7MHz. However, although the antenna loaded up satisfactorily, the high level of noise generated by the main station prohibited use of two stations at the same time.

A notable first was pictures on the club website at www.dundee-amateur-radio.co.uk arranged by Martin Higgins, MM3AWM, which were announced over the air. In all, about 250 stations were worked, mostly in the UK and Europe, although one station in Alaska and one in Tunisia were also worked.

Further details about this active club can be obtained by e-mailing enquries@dundee-amateur-radio.co.uk

Edgware Activity Periods

Every year, the Edgware and District Radio Society organises the 'Edgware Activity Periods' (EAP). EAP is a series of friendly competitions that test your all-band capability. Activity is on CW between 1900 and 1930UTC and SSB from 1945 to 2015UTC on 7 October on 40m; 8 October on 10m, 10 October on 80m; 14 October on 15m; 15 October on 160m, and finally 17 October on 20m. The Edgware club station, G3ASR/P, operated by John, G3SJE, from Harrow, will be active for bonus points. The full rules can be found on the club's website at www.g3asr.thersgb.net

The Eagle Radio Group was recently visited at one of its monthly meetings by the Robot Wars 'Hells Teeth' team. Seen here is Nevil, G3VDV (centre), with well-travelled visitors at the meeting, David, VK3DVD (left), and Gunther, OE3PGW.

Yoshi M3 on the Key

Yoshihisa Katakuri, JF1GWT, a Japanese student at Manchester's famous Institute of Science & Technology, UMIST, recently joined the famous Manchester Wireless Society, G5MS, after viewing the club's website at www.g5ms.com The reason was to obtain a UK licence, as there is no reciprocal agreement between Japan and the UK. Yoshi sat the Foundation exam and passed with full marks. He intends to sit the final C&G RAE in December. Yoshi's favourite mode is CW and at present he is trying to improve his speed – he thinks he can go a little quicker than the 35+ WPM that he sends now. The members of G5MS think Yoshi is the first international M3 – please e-mail secretary@g5ms.com if you know different.

Anyone wishing to join Yoshi this December for the RAE or wishing to take Foundation or Intermediate courses can obtain details by calling Ian, M0IPR, tel: 0161 288 7301.

Courses for All Amateur Radio Exams at Manchester Club

Eight Manchester Wireless Society (G5MS) club members recently sat their Intermediate exam, after completing the Intermediate course which had been run over several Tuesday evenings and a weekend. Six of the eight candidates were successful. G5MS runs all the radio amateur examination courses at its club HQ on Tuesdays at the Simpson Memorial Hall. Moston Lane, Manchester. Details of all club events and courses are on the club's website at www.g5ms.com, or can be obtained by phoning Ian, M0IPR, on 0161 288 7301, or by e-mailing secretary@g5ms.com

The superb summer weather no doubt helped the size of the crowd at this year's FRARS Hamfest.

News from FRARS

The Flight Refuelling Amateur Radio Society's (FRARS) Hamfest 2003 in Wimborne, Dorset, proved to be the 'hottest' rally in the south, with soaring temperatures and a record number of field traders and radio car-booters. FRARS saw a massive number of people through the gates in the first few hours, no doubt helped by the good weather. The South Coast Beacon and Repeater group was also in attendance, publicising its microwave beacon cluster and raising funds for ongoing work, including the proposed 23cm ATV repeater in Poole. With the Longleat rally not being held, Hamfest 2003 was the largest rally in the south-west of the UK this year.

At present, club members are renovating the club house with the aim of installing PCB-making facilities, including a PCB CAD system. The club will soon be starting its Meon project, with members building 70MHz transverters, power amplifiers and suitable antennas.

FRARS will be holding a table top junk sale on **Sunday 26 October** at its HQ in Wimborne, Dorset. Everyone is invited to go along and look through the junk: there will be plenty of bargains and interesting items. The FRARS club house will be open from 7.30pm. For information on FRARS and locating the club house, please see our website at www.frars.org.uk

The latest success from the Falkirk Amateur Radio Society's Foundation Course: 11-year old Melanie Dutton, now licensed as MM3XMM, seen here with the club's senior instructor Ken Elliot, GM4NTX.

GB4FUN Gets a (Satellite) Bird's-Eye View on Tynwald Day

Once again, GB4FUN has been out and about around the whole of the UK, achieving some notable 'firsts' in the process.

In July, GB4FUN visited Christleton High School; the Isle of Man; Primary College 2003 in Crewe; the Ardingly (West Sussex) Vintage Vehicle Show (where it was operated by members of SCARF, the Southern Counties Amateur Radio Forum), Belfairs High School at Leigh on Sea, and the AMSAT Colloquium at the University of Surrey (see 'RSGB Matters', page 6, and '*RadCom* News', page 11, September 2003).

On its first visit to the Isle of Man, GB4FUN went first to the Jerby Air Show on 6 July. Members of the Isle of Man Amateur Radio Society were joined by Howard Long, G6LVB, to operate the station. Howard, G6LVB, of AMSAT (UK), was instrumental in providing much of the satellite equipment and antennas on board GB4FUN and he took the opportunity of providing contacts for satellite enthusiasts around the world. It is believed that this was the first time the Isle of Man had been activated on satellite and the station provided GD DXCC 'firsts' for many operators including Jerry Brown, K5OE, and Alejandro Ulibarri, XE1MEX. Both made QSOs via the AO-40 satellite (uplink on 435MHz, downlink on 2401MHz). Jerry, K5OE, was so keen to get his QSL card confirming GD on satellite that he took his own card in person to GB4FUN at the AMSAT Colloquium three weeks later!

After the Jerby Air Show, GB4FUN moved on to the Tynwald ceremony at St John's. Tynwald, the 1000-year old parliament of the Isle of Man, is the oldest parliament in the world in continuous existence and Tynwald Day, held on 7 July, is one of the most important days on the island. Tynwald Day is the occasion for promulgating the Acts passed during the last session of the parliament and for transacting other business. The colourful ceremony took place in front of HM The Queen and HRH The Duke of Edinburgh. GB4FUN was located in St John's Old School, overlooking the ceremony.

In August, GB4FUN went to the Windsor International Guides & Scout Camp ('WINGS 2003'); Neston Primary School, Wiltshire, for a scheduled contact with NA1SS on board the International Space Station (see '*RadCom* News' September); 'Wireless Waves Around the World' at Bletchley Park; Crewe and Nantwich Carnival in Cheshire; and finally the Peterlee Carnival in Sunderland.

GB4FUN IN OCTOBER

GB4FUN is already booked for several events this month, including 'Careers Wales' in Powys from 29 September to 3 October (dates TBC); Cambridge University Societies Fair on 7 October; the Preston Amateur Radio Society on 16 October, while on its way to Jamboree on the Air at Morecambe on 18 / 19 October; Askrigg VC Primary School in North Yorkshire on 20 October; and 'Intech' at Winchester (date TBC).

To book GB4FUN all that is required is to fill out the provisional booking form and return it to GB4FUN, Lambda House, Cranborne Road, Potters Bar, Hertfordshire EN6 3JE or by e-mail to gb4fun@rsgb.org.uk For school visits, all costs are covered (a donation towards running costs should be considered by all other organisations).

GB4FUN has its own website at www.gb4fun.org.uk, which is also linked from the front page of the main RSGB site at www.rsgb.org

A GB4FUN's-eye view of the Tynwald ceremony, framed by the station's satellite antennas.

GB4FUN gets the best possible guard: the Nijmegen Company Grenadier Guards, this year's Guard of Honour on Tynwald Day on the Isle of Man.

The GB4FUN Supporters' Honour Roll

We asked members when renewing their membership to include a donation to help to continue to finance the GB4FUN mobile amateur radio demonstration vehicle. 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 'GB4FUN', c/o RSGB HQ.

GB4FUN 'Big Hitters'
M J Williams, GW3VXC

P Martin EI2CA
J Sheehan EI5GM
D Grevett G0BCW
R T Hicks G0GJF
D J Marjoram G0JVT
P L Hunt G0REC
W Bannister G0RPT
M Creswick G0SVJ
G R Coultas G0TNU
G Merrills G0UQF
M J McGarry G0VYT
K G Seller G1GJK
L R N Mills G1HWR
L T Clarke G1LQB
G L Sanderson G2DBT
A Williams G2DQW
R F Fautley G3ASG
R B Miller G3CJI
Civil Service ARS G3CSR
J L Salter G3DQC
R A E Fursey G3FSO
F Watson G3HRE
P B Buchan G3INR
E R Tudor G3INY
J Harper-Bill G3IZM
A A Blythe G3LOJ
R Roberts G3MAK
F E Garrett G3MVZ
K A Heathfield G3SDO
G H S Jones G3VKV
K S Daniel G3ZJE
S W Taylor G4CKX
R White G4DOH
J P Ball G4DPI
P McKee G4EGJ
M W Cotton G4HBY
Dr J M Buckley G4HGL
K L Bird G4JED
A Rhodes G4KIJ
F R Harrison G4MJT
R N Byford G4MKR
F Cook G4MTW
J Muzyka G4RCG
E J Mills G4STA
M H Lemin G4UUB
B Crow G4UYJ
C Dawson G4UZS
G R Dymond G4VQL
E D Macpherson G4WMT
J N R Wiles G4WQZ
J S Tranter G4XFT
J Scriven G4YNU
P N Raynor G6EUF
S H Clark G6NUO
M R Law G6OKU
C A Jones G6ZEZ
K H Helgesen G7CVY
A Biggin G7DGE
G W E Johnston G7OZA
B R Forhead G7TUQ
G R Barber G8CHN
N R Atkins G8GRA
G W Punter G8IIG
G L Robotham G8KLH
D J T Burrell G8LUB
V H Eagles G8MCR
J J Troon G8NBM
A P Ball G8PSF
J E H Spencer G8UMA
G L Clarke G8XXV
S J Trott G8ZOE
J O'Hara GI0EFW
Dr A K L Chin GI0XAC
R T Sherrard GI3VAW
Mrs P J Mackenzie GM0HNV
W J H Eaton GM3KIG
R Brown GM4IKU
D Henry GU0HRY
J E Martin GU3YIZ
Dr C S Littlejohns GW0TQM
C P Griffiths GW1HCW
G A Parsons GW1RJU
C A Long GW4OJT
Conway Valley ARC GW6TM
G C May GW8TIX
G Sandsbraaten LA4EC
H Challis M0AHU
M Fitchett M0BMX
D E Francis M0CDV
J P Drummond M0CQW
M Neale M0DMN
D B Bilson M0IKE
P W Dowson M1DXF
A J Thornton M3AJT
Mrs C I Law M3OKT
D J Turner MW0DJT
E W Roberts MW3EWR
B H Benedict N8OBT
S Hurst ON9BKS
F J Shepherd RS17624
R Allen RS180797
H M S Cochrane RS39187
E W Beckett RS95550
I Dobnik S51DI
E D Moustakas SV1AN
M H Costa VE3MHC
J R Davis WA5RHF
B J Ryall ZL1AVZ

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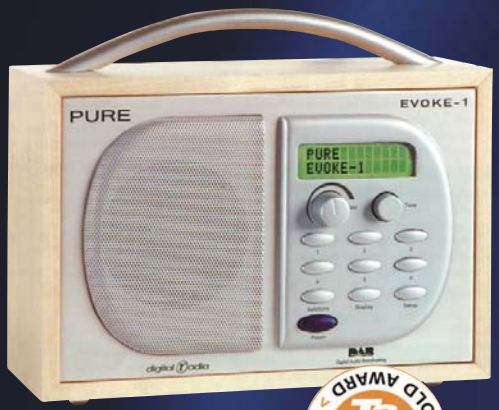

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- Stereo headphone output
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- USB connector for future software upgrades
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Left: George, 5B4AGC, winner of the Junior Rose Bowl. Right: View from the QTH of 5B4AGC. An unrestricted take-off for the restricted section winner.

The 66th RSGB Commonwealth Contest 2003

SOAP BOX

"Rig Elecraft K2 QRP 5W – antenna 60ft long wire at 20ft. This was a fairly casual entry with my intention just to work some new countries. I did not keep an eye on the clock and ended up with around 13 hours operating, hence this has to be in the Open section. But an enjoyable contest even though it was hard work for me at times", Dave. G3YMC.

"First time… I had a great time", VE3NBJ. "Excellent contest (my first time)", VE3OM. "This is my first time using an e-mailed log entry in .ADI format. Next year… a more ambitious effort. Enjoyable as always", Greg, VE3NXB. "Thank you for your time and effort in administering this contest", Jerry, VE3JCV.

"My second time and will do it again", Hans Kappetijn, ZS6KR (and please encourage some more ZSs, Hans).

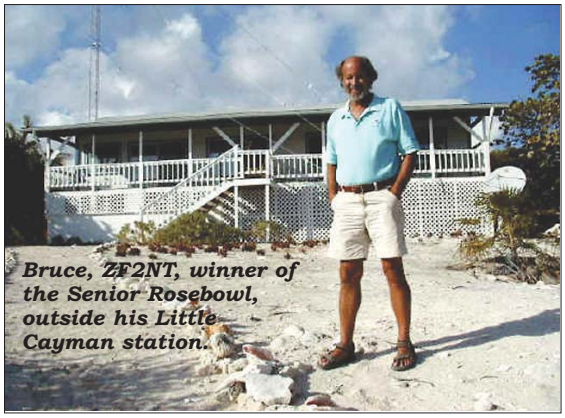
"Great to talk to old friends. What, no M3 calls on CW? Do they really exist?", David, VK2WHQ (VK2AYD). (Well David, M3NSB and MM3BRR were active.)

"Good turn-out from VK land, not so much heard from Africa. Nice to work some old and new friends", ZC4DW. "Thoroughly enjoyed myself and will definitely be a starter for next year's. Well done to the organisers!", Geoff, ZC4VG / ZC40VG / G0UVX.

"Thanks for organising an excellent contest. 'BERU' is one of my favourite events of the year, and this past weekend was the best running of this great contest I can recall", Bruce, ZF2NT (this year's Open winner).

Despite 2003 being on the downslope of solar activity, the 66th Commonwealth Contest managed to produce one of the highest-scoring contests of recent years. Coming at the end of winter in the northern hemisphere the second weekend of March often produces some good conditions. Taken with a steadily-increasing level of participation, the stage was set for some high-scoring performances by the leading stations.

With the two leading stations in the Open section, Bruce, ZF2NT, and Yuri, 9H1ZA, both exceeding the 10,000 point level, it is quite clear that some new standards have been set. If you want to win the Open section of this contest it looks as if you have to aim to exceed 10,000 points from now on.



Bruce, ZF2NT, winner of the Senior Rosebowl, outside his Little Cayman station.

OPEN SECTION

Congratulations to Bruce, ZF2NT, for securing first place in the Open category and winning the Senior Rosebowl. Yuri, 9H1ZA, came second, also with a score above 10,000. Bruce's margin over Yuri came about through more QSOs

By Derek Cox, G3KHZ, 18 Station Road, Castle Bytham, Grantham, Lincs NG33 4SB; and Bob Whelan, G3PJT, 36 Green End, Comberton, Cambridge CB3 7DY.

on both 80 and 10m. It has always been the case that it is the bands at the ends of the spectrum, where the openings are often short and selective, which make the difference between the leading stations. In third place came John, VE3EJ, always amongst the leaders. VO1AU came fourth, seemingly missing out on conditions on 15 and 10m. Dave, J88DR, was fifth and Brian, ZL6QH, and Kevin, VK6LW, tied for sixth place. When you realise that seven different countries from all parts of the world are represented in the top 10 it is clear that this year was hard fought.

Congratulations to Andy, G4PIQ/P – the highest-placed UK station in 8th place. He takes the Col Thomas Rose Bowl at his first attempt! He was closely followed by Dave, G4BUO, and Clive, GM3POI.

RESTRICTED SECTION

George, 5B4AGC, takes the Junior Rose Bowl with a comfortable win over his nearest rival, VE3DZ. George comments, "Good conditions on HF, but rotator stuck on Europe due to lightning strike!" The leading UK station was again Peter, G3LET, who wins the Ross Carey Rose Bowl. Peter paid great attention to operating times and propagation, which clearly paid dividends. A creditable performance, as he used a single wire antenna. The Restricted Section is showing steady growth in numbers, but there are nevertheless some suggestions for how this section might be improved. "Perhaps in the future recognition should be made for the lesser-equipped stations rather than just pure operating hours?" from Dave, G3YMC, and "Isn't it about time that restricted meant 100 watts?", adds ZC4DW. On the other hand, "The Restricted section is a great innovation", says VK6VZ.

HQ STATIONS

This year no fewer than six HQ stations were active from G, VE and VK. These stations create a lot of extra interest. They provide a great opportunity for a club multi-op effort or as a way of bringing new operators into contesting. GB5CC, operated by Chris, GM3WOJ, and Gavin, GM0GAV, led the section. Many thanks from all of the entrants to the operators who put on these stations. We would like to encourage more HQ stations in the future. And it can be fun too: "Did better with the HQ call than I did last year with my own call!", said Dave, VK2DYD.

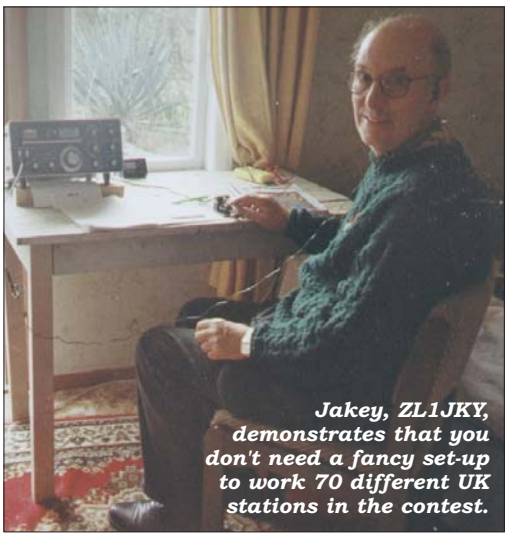
COMMONWEALTH MEDAL

This year the committee has awarded the Commonwealth Medal to Chris, GM3WOJ, for activating GB5CC over the past few years. Many thanks for the bonuses, Chris.

ACTIVITY PAST & PRESENT

Table 1 shows the number of entries and scores of each of the sections – Open, Restricted and HQ – from 1999 to the present. The Restricted section continues to gain in popularity. The overall number of entrants is still showing a healthy general trend upwards.

1300 different stations were in the logs this year but these included nearly 500 'uniques', corrupted calls and stations not in the Commonwealth. Just over half the active stations were from the UK. Here are the 55 call areas that were contacted during the contest: 3B8, 4S7, 5B4, 5X1, 5Z4, 7Q7, 8P6, 9H1, 9J2, 9M2, 9M6, 9V1, 9Y4, G / M, J37, J88, P29, T31, VE1, VE2, VE3, VE4, VE5, VE6, VE7, VK1, VK2, VK3, VK4, VK5, VK6, VK7, VK8, VK9N, VO1, VO2, VP2E, VP8, VU2, VY1, VY2,



Jakey, ZL1JKY, demonstrates that you don't need a fancy set-up to work 70 different UK stations in the contest.

2003 COMMONWEALTH CONTEST – RESULTS

OPEN SECTION

Pos	Call	80m Qs	80m Bonus	40m Qs	40m Bonus	20m Qs	20m Bonus	15m Qs	15m Bonus	10m Qs	10m Bonus	QSOs	Total Score	BCAs
1*+	ZF2NT	127	32	251	52	279	57	250	53	245	51	1152	10660	137
2*	9H1ZA	109	21	232	45	284	64	272	57	201	41	1098	10050	141
3*	VE3EJ	101	32	209	52	214	62	218	52	131	49	873	9305	159
4	VO1AU	126	28	229	50	238	57	211	41	180	35	984	9140	126
5	J88DR	88	20	151	29	289	54	211	44	193	27	932	8140	112
6=	VK6LW	23	17	139	48	261	55	147	50	150	37	720	7740	130
6=	ZL6QH	54	27	118	45	251	57	189	44	80	41	692	7740	117
8++	G4PIQ/P	47	28	89	57	120	67	103	65	76	56	435	7635	163
9	G4BUO	40	27	83	56	117	72	101	64	65	53	406	7470	172
10	GM3POI	58	40	93	54	98	69	78	58	66	48	393	7345	162
11	VK4EMM	22	19	158	42	252	46	139	45	108	43	679	7295	112
12	VK2BJ	23	21	151	44	190	56	182	45	75	42	621	7265	130
13	VE6JY	18	13	76	46	214	51	197	47	103	44	608	7060	124
14	G0IVZ	48	28	89	54	116	67	88	58	59	45	400	7040	157
15	G3AB	46	31	69	48	99	70	89	66	54	46	357	7005	158
16	5B4AGN	39	8	157	29	200	43	198	34	185	38	779	6935	98
17	VE3QAA	91	22	166	44	182	58	161	30	54	23	654	6810	130
18	G3BJ	47	34	67	47	96	66	86	59	55	46	351	6795	151
19	VK1MJ	26	21	139	45	224	53	75	34	65	41	529	6525	99
20	VE2AYU	65	19	180	38	192	49	161	26	41	26	639	6355	91
21	VE1OP	46	13	133	23	236	52	203	30	80	19	698	6230	80
22	VP2EN	90	21	163	23	156	42	95	25	133	31	637	6025	90
23	9M2/G4ZFE	9	7	74	24	196	44	165	43	136	38	580	6020	102
24	VE7CC	43	31	87	41	93	40	156	39	60	36	439	5935	68
25	ZC4VG	49	10	162	26	122	37	192	31	54	14	579	5255	82
26	ZL2AZ	33	23	90	43	108	43	55	36	48	34	334	5250	119
27	ZL2BR	20	12	49	32	176	56	75	36	43	32	363	5175	114
28	G3KHZ	19	19	42	38	72	51	54	45	51	45	238	5150	135
29	VA3DX	32	19	114	35	123	46	112	28	32	24	413	5105	108
30	5B4AHA	43	7	118	15	84	38	141	31	135	23	521	4885	66
31	G3IAF	26	24	48	35	69	55	50	40	32	31	225	4825	125
32	VE3VHB	9	9	60	36	95	38	89	43	46	37	299	4755	108
33	ZL1MH	17	16	67	32	114	47	51	34	39	30	288	4620	85
34	G3GLL	19	18	40	37	63	50	54	45	26	25	202	4510	120
35	GW0GEI	20	15	57	37	62	46	54	38	36	31	229	4485	112
36	G3JYP	18	16	35	30	54	48	44	37	28	27	179	4055	115
37	VA3NR	37	14	51	28	66	40	98	29	25	19	277	3985	98
38	G3WGV	19	19	31	29	56	47	52	38	20	20	178	3950	112
39	G3XTT	21	19	39	31	38	35	45	38	30	29	173	3905	113
40	G3WPH	23	21	39	31	46	41	44	38	21	20	173	3885	109
41	G4CZB	15	13	29	28	50	44	48	37	25	23	167	3735	101
42	ZL1JKY	7	7	44	29	106	46	63	36	10	10	230	3710	82
43	ZL1AIH	14	12	57	37	96	35	67	27	9	8	243	3595	76
44	9J2BO	0	0	14	11	78	39	94	23	162	19	348	3580	58
45	G3JJG	8	8	33	29	58	48	42	33	20	20	161	3565	101
46	VE7JKZ	9	6	47	30	33	21	82	38	35	30	206	3530	86
47	G4TSH	14	14	30	27	46	39	36	31	28	23	154	3450	101
48	GW4MVA	8	8	21	19	60	50	38	33	24	23	151	3415	80
49	ZS6KR	4	4	44	22	79	25	74	24	91	22	292	3400	98
50	G3ZRJ	7	7	26	23	62	52	37	32	17	17	149	3365	89
51	M0AJT	10	10	25	23	45	42	41	31	24	22	145	3285	86
52	G2HLU	12	11	22	20	37	34	43	35	28	26	142	3230	95
53	VE3HX	20	17	31	22	39	26	29	18	43	32	162	3110	78
54	VE3EZP	28	15	42	29	37	32	33	23	14	13	154	3010	82
55	G3MPB	4	4	24	22	38	36	41	35	20	20	127	2975	87
56	G2QT	4	4	21	19	59	45	21	18	25	25	130	2870	80
57	VE3OM	3	3	27	19	35	25	40	31	31	29	136	2820	77
58	G3KKP	6	6	15	15	47	43	32	31	15	14	115	2755	76
59	G3ZGC	8	8	23	23	30	30	32	23	23	22	116	2700	83
60	VU2UR	0	0	16	13	65	38	26	23	42	23	149	2685	74
60=	ZL2TX	0	0	47	27	92	42	26	24	0	0	165	2685	61
62=	G3VDL	12	12	18	18	40	39	28	22	14	14	112	2660	85
63	G3NAN	2	2	20	20	39	36	29	24	24	22	114	2650	75
64	VE3NBJ	13	12	17	13	53	30	59	28	8	8	150	2570	50
65	VK6AJ	0	0	19	11	64	35	25	20	28	15	136	2300	50
66	G0DCK	5	5	15	15	30	28	31	23	18	18	99	2275	65
67	VK2YN	10	10	16	16	40	26	18	19	8	8	92	2040	65
68	G3GMM	0	0	13	12	31	28	25	21	14	14	83	1915	57
69	G3HKO	5	5	18	17	26	24	29	18	8	8	86	1870	54
70	VE1LS	20	15	16	12	18	14	51	11	7	7	112	1740	43
71	GM4KGK	3	3	17	17	18	18	32	26	4	4	74	1730	57
72	VE1KB	6	5	26	13	32	16	23	16	13	9	100	1680	41
73	VK2EL	7	6	27	16	55	19	14	8	7	6	110	1650	52
74	G3ZDD	9	9	15	11	30	22	10	10	4	4	68	1460	25
75	G3YMC	0	0	10	10	20	20	21	17	10	10	61	1445	42
76	VA3IX	0	0	16	15	29	20	20	8	12	7	77	1385	44
77	VE1EP	6	6	11	11	15	15	12	12	7	7	51	1275	49
78	VE3BBM	6	6	10	6	7	6	24	20	0	0	47	995	25
79	VK5HO	15	14	13	12	5	5	4	4	0	0	37	885	27

+ = Senior Rose Bowl, ++ = Col Thomas Rose Bowl, * = Certificate of Merit

CC	Year	Open Nr	Open Score	Restricted Nr	Restricted Score	HQ Nr	HQ Score	Total Nr
62nd	1999	76	10451	45	4694	3	7503	124
63rd	2000	71	9410	51	5469	8	7410	130
64th	2001	81	9562	64	6644	3	8861	148
65th	2002	88	9882	69	7465	2	9203	159
66th	2003	79	10660	71	7195	6	8930	156

Table 1: Number of entries and scores of each of the sections – Open, Restricted and HQ – from 1999 to the present.

YJ8, Z24, ZC4, ZD9, ZF2, ZL0, ZL1, ZL2, ZL3, ZL4, ZL6, ZS1, ZS3, ZS6.

VIEWS FROM THE SOUTHERN HEMISPHERE

Bob Whelan, G3PJT, operated as VK1MJ and writes: "This year I had the chance to operate from VK1. People had said that this should be a good one for 'BERU' as VK1 was a rarish bonus. I operated from the shack of Mike, VK1MJ, and he allowed me to use his callsign and thus avoid the need to visit the ACA for licence purposes. Conditions were rather mixed, I thought, and were not helped by a big thunderstorm in the last few hours. This knocked a hole in my 15m score. Still it is very quiet during the day in VK –I could easily have had a few hours sleep. However, some keen competition from Kevin, VK6LW; Barry, VK2BJ, and John, VK4EMM, kept me awake. Some outstanding signals from the UK: Andy, G4PIQ/P, was very strong during the first few hours on 15m. As Mike, VK1MJ, does not operate CW many of his friends called in to congratulate him on his new-found skill! And thanks to all the VKs for great hospitality during our trip."

Steve Ireland, VK6VZ, comments, "Good conditions, but reflected the decline in solar activity – much shorter SP openings into the UK and no LP openings into UK on 10m/15m during VK6 night-time. However, 40m and 80m conditions were better, with a very nice opening into the UK on 80m around my sunrise which lasted for an hour. Great fun as always and a great weekend."

Bob continues, "Apart from myself, others went on DXpeditions and added greatly to the fun. Dave Cree, G3TBK, as J88DR, was very active again." Nigel Cawthorne, G3TXF, noted, "The call VP2EN was first issued to me 30 years ago and was re-issued in March 2003. Great fun doing BERU with 100W from Anguilla. Best bit was working over 50 UK stations on 80m with low dipole."

ADJUDICATION

Harold, G2HLU, retired last year from this post deserving a well-earned rest. He spent an enormous amount of time cross-checking QSOs, compiling results and producing the reports over many years. I know because, as your new adjudicator, I have burnt a very considerable amount of midnight oil working on this task for the first time.

Computerised cross-checking was carried out. This meant keying in over 40 paper logs and I am grateful for some help in this by G4CZB and G4DJZ. The cross-checking software did not convert all logs successfully and much manipulation using spreadsheets and some re-typing of logs was needed to get them all to the cross-checking stage.

As a result of the considerable work involved in getting all the logs to the standard required I would like to make a plea to those of you who intend entering next year's 'BERU'. If at all possible please seriously consider using the logging program *CTJ* written by Jeff Morris, 9H1EL. This is like *CT* and is designed for this contest (and others). It works extremely well with the cross-checking software. *CTJ* is free. The latest version 1.18 can be downloaded over the Internet from www.g3ab.net/ctj.htm But please send in your paper logs if you can't take advantage of this offer. We can sort 'em out! Finally thanks to those who sent in check logs. These can easily be included in the computerised cross-checking and are most welcome.

Also many forgot to enter their band-call area total in order to qualify for the special certificates. Next year we will only send you a certificate if you claim one on the summary sheet.

Derek Cox, G3KHZ

NEXT YEAR

The 67th Commonwealth Contest will take place on **13/14 March 2004**. You will need 67 band-call areas or more to qualify for a certificate. ◆

RESTRICTED SECTION

Pos	Call	80m Qs	80m Bonus	40m Qs	40m Bonus	20m Qs	20m Bonus	15m Qs	15m Bonus	10m Qs	10m Bonus	QSOs	Total Score	BCAs
1*	5B4AGC	34	15	105	21	203	53	217	54	184	31	743	7195	109
2*	VE3DZ	55	17	54	28	180	48	164	32	50	31	503	5635	111
3*	ZC4DW	34	7	123	31	118	37	169	28	105	23	549	5265	89
4	G3LET	22	20	46	38	77	58	56	47	33	30	234	5030	129
5	VK6VZ	48	22	126	41	190	30	44	22	78	10	486	4930	86
6	VE3FU	24	20	57	32	94	34	139	34	45	35	359	4895	106
7	G3LZQ	37	30	35	31	55	49	36	30	30	29	193	4345	114
8	G3TJE/P	12	12	32	24	84	56	61	41	31	27	220	4300	105
9	G3KZR	16	15	28	26	43	39	52	42	36	33	175	3975	113
10	9V1YC	0	0	9	9	175	38	130	38	28	25	342	3910	67
11	ZL2CD	7	7	50	31	77	42	61	31	28	27	223	3875	90
12	VK8AV	22	20	34	27	73	44	45	24	35	20	209	3745	84
13	GW3NJW	20	16	49	39	38	38	38	29	22	21	167	3695	98
14	G3LHJ	12	12	27	19	55	43	58	42	24	23	176	3660	95
15	VE3KP	13	10	44	19	104	28	98	26	46	23	305	3645	74
16=	VK4XY	13	12	39	28	54	39	54	36	17	17	177	3525	83
16=	VK5GN	13	8	25	20	166	35	73	12	40	22	317	3525	62
18	G4BJM	6	6	28	25	52	44	40	35	27	27	153	3505	102
19	5B4AHJ	0	0	0	0	86	30	165	35	83	22	334	3410	65
20	VE7VF	6	5	22	18	33	29	71	36	50	36	182	3390	76
21	VE4YU	19	17	26	19	52	35	49	24	32	29	178	3370	89
22	G3TXZ/P	12	12	25	22	42	38	49	40	20	19	148	3360	97
23	VE7UZ	8	8	51	37	13	13	53	31	46	34	171	3315	80
24	G4AZN	11	10	20	20	48	42	42	33	23	23	144	3280	99
25	GM3CFS	2	2	26	25	44	43	42	37	25	21	139	3255	96
26	G4CWH	18	16	31	28	35	30	34	30	22	22	140	3220	96
27	GW3HGJ	1	1	15	15	61	51	40	32	21	21	138	3090	82
28	G3RSD	8	8	23	22	45	42	41	34	14	14	131	3055	86
29	VE5SF	11	7	29	18	60	25	101	26	39	14	240	3000	54
30	VE6WQ	3	3	6	6	32	20	121	41	47	27	209	2985	64
31	GW3KGV	15	14	22	22	29	27	36	30	24	24	126	2970	88
32	G4XRV	11	11	17	17	29	29	39	35	26	25	122	2950	95
33	G2AFV	11	10	29	27	41	39	31	27	11	11	123	2895	79
34	G3UFY	15	12	44	35	47	37	12	12	15	15	133	2885	85
35	G3VYI	6	6	36	30	35	32	29	25	15	15	121	2765	80
36	VE2AWR	24	11	73	14	66	19	91	19	12	8	266	2750	53
37	G3XSV	1	1	31	27	45	38	28	26	15	15	120	2740	80
38	G3LIK	9	9	16	16	39	32	33	29	17	16	114	2610	67
39	G3JJZ	11	11	19	19	38	36	24	20	17	16	109	2585	79
40	G4GCI	5	5	17	15	36	31	37	30	13	13	108	2420	70
41	G3GMS	4	4	16	16	30	29	31	26	18	18	99	2355	63
42	VE3XN	5	13	35	27	14	12	20	15	27	21	111	2315	64
43	VE3JCV	16	10	29	18	36	25	28	20	13	11	122	2290	60
44	MU0FAL	0	0	23	19	22	22	39	30	9	9	93	2065	63
45	GW0ETF	1	1	13	13	41	39	22	17	11	11	88	2060	58
46	G0UKX	0	0	13	13	33	30	31	23	13	13	90	2030	61
47	G4IRN	3	3	10	11	23	23	30	27	15	14	81	1965	66
48	GW3KJN	0	0	21	16	34	29	23	17	12	12	90	1930	54
49	G3TEV	0	0	8	8	37	34	22	20	14	14	81	1925	56
50	VE3STT	2	2	26	10	41	16	47	17	18	15	134	1870	43
51	VE6LB	7	7	25	18	13	13	24	17	22	15	91	1855	51
52	G0MTN	6	6	18	18	17	17	23	22	10	10	74	1830	60
53	VE9VAR	5	5	9	6	110	17	20	9	15	10	159	1735	31
54	G3TVW	0	0	11	11	35	34	20	19	4	4	70	1710	50
55	G0IBN	0	0	11	11	26	26	15	15	17	16	69	1705	55
56	G3HAL	3	3	14	14	21	20	22	19	8	8	68	1620	51
57	VA3XRZ	8	8	27	18	29	20	12	12	2	2	78	1590	42
58	VE1AYY	0	0	0	0	155	33	0	0	0	0	155	1435	21
59	G3OLB	0	0	21	20	1	1	32	27	7	7	61	1405	51
60	G3HZL	8	7	12	10	19	17	21	16	4	4	64	1400	55
61=	G3ILO	1	1	9	9	25	22	12	10	11	11	58	1350	42
61=	G3XWK	0	0	8	8	16	16	23	23	7	7	54	1350	31
63	G3WRR	2	2	10	10	15	14	18	15	12	12	57	1345	39
64	G4SLE	0	0	8	5	26	18	21	16	8	6	63	1215	50
65	G4ZME	0	0	4	3	17	16	23	19	9	9	53	1205	35
66	VU2NXM	0	0	0	0	50	18	0	0	24	8	74	890	19
67	VE3IGJ	0	0	2	2	19	14	18	14	2	2	41	845	22
68	VK2CZ	0	0	8	8	11	11	10	10	4	4	33	825	28
69	G0VQR	0	0	1	1	13	13	16	14	4	4	34	810	28
70	VE3NXB	1	1	15	9	5	5	14	10	5	5	40	800	20
71	G0RDO	0	0	0	0	5	5	4	3	10	7	19	395	16

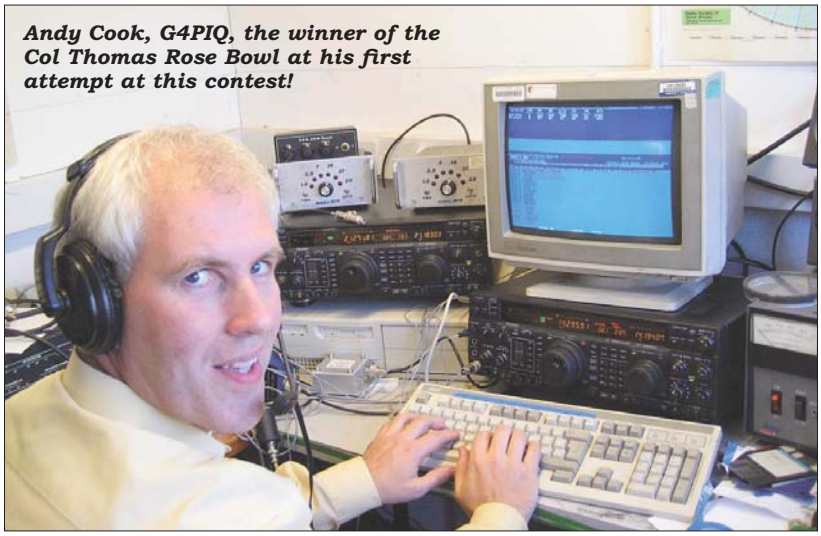
+ = Junior Rose Bowl, * = Certificate of Merit

HQ STATIONS

1	GB5CC	133	25	177	42	251	64	198	60	127	34	886	8930	142
2	VA3RAC	66	26	115	37	230	54	204	41	98	35	713	7425	117
3	VK2WHQ	18	16	55	34	188	44	116	37	45	29	422	5310	95
4	VK4WIA	14	12	26	22	144	47	52	30	63	34	299	4395	87
5	VE7RAC	0	0	4	4	23	16	105	37	30	24	162	2430	54
6	VK3WI	4	4	10	10	36	28	16	15	10	10	76	1720	48

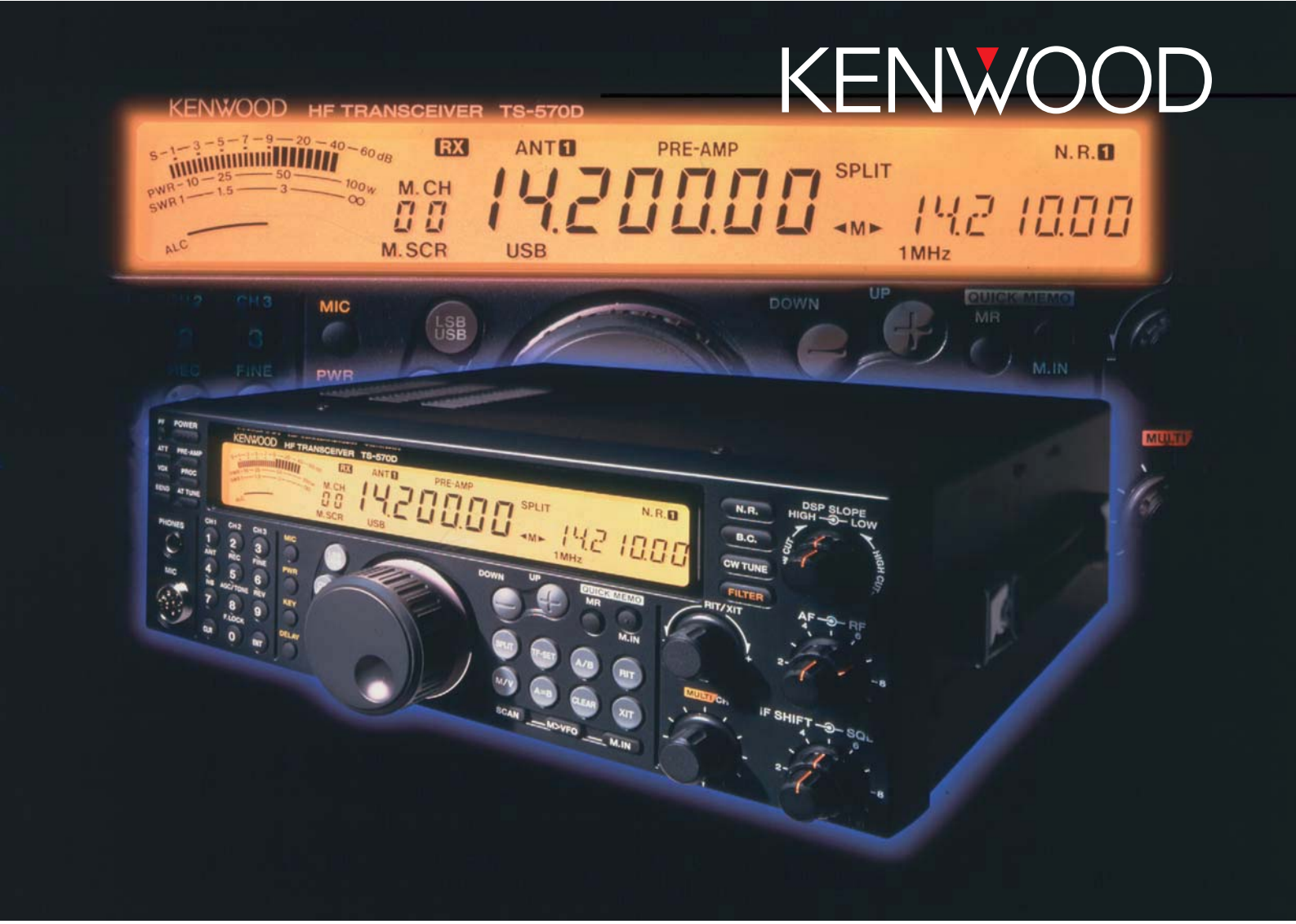
Check logs: G2FSR, G3RDQ, G3XNG, G4KNO, GW3SB, ZL1ALZ, ZS1AN.

BCAs = Band-Commonwealth Areas.



Andy Cook, G4PIQ, the winner of the Col Thomas Rose Bowl at his first attempt at this contest!

KENWOOD



STRONG FOUNDATIONS

To build your hobby you need to start from a strong foundation. No matter how new or how old your callsign is, the TS-570DG is the perfect mid-size rig for mobile or station operations. Designed to answer the call in any application, this heavy-duty HF transceiver boasts a large heatsink and improved heat dissipation characteristics for extra reliability. But most importantly, the TS-570DG incorporates Kenwood's own 16-bit DSP AF signal processing that enables it to provide you with extremely effective interference reduction plus high-quality TX and RX audio. Additionally, a central frequency control system offers high frequency stability while a large, positive-type LCD display ensures greater visibility for easy operation. Completely equipped with a preset auto antenna tuner and ideally sized, the TS-570DG is sure to become standard equipment for operators who demand the very best.

▮ 16-bit DSP noise reduction ▮ DSP filters ▮ DSP voice equalizer/speech processor ▮ Large LCD display ▮ S/PWR/COMP/SWL/ALC meters ▮ Preset auto antenna tuner ▮ CW auto tune ▮ Menu system ▮ 100 memory channels ▮ Quick memory ▮ 10-key direct frequency entry ▮ Operating guidance feature ▮ Mobile/station size (270 x 96mm) ▮ Heavy-duty design ▮ 5W QRP operation ▮ Built-in electronic keyer ▮ CW message memory ▮ CW reverse mode ▮ Full break-in and semi break-in ▮ High-speed 57600 bps PC control ▮ Dedicated packet port

HF TRANSCEIVER TS-570DG

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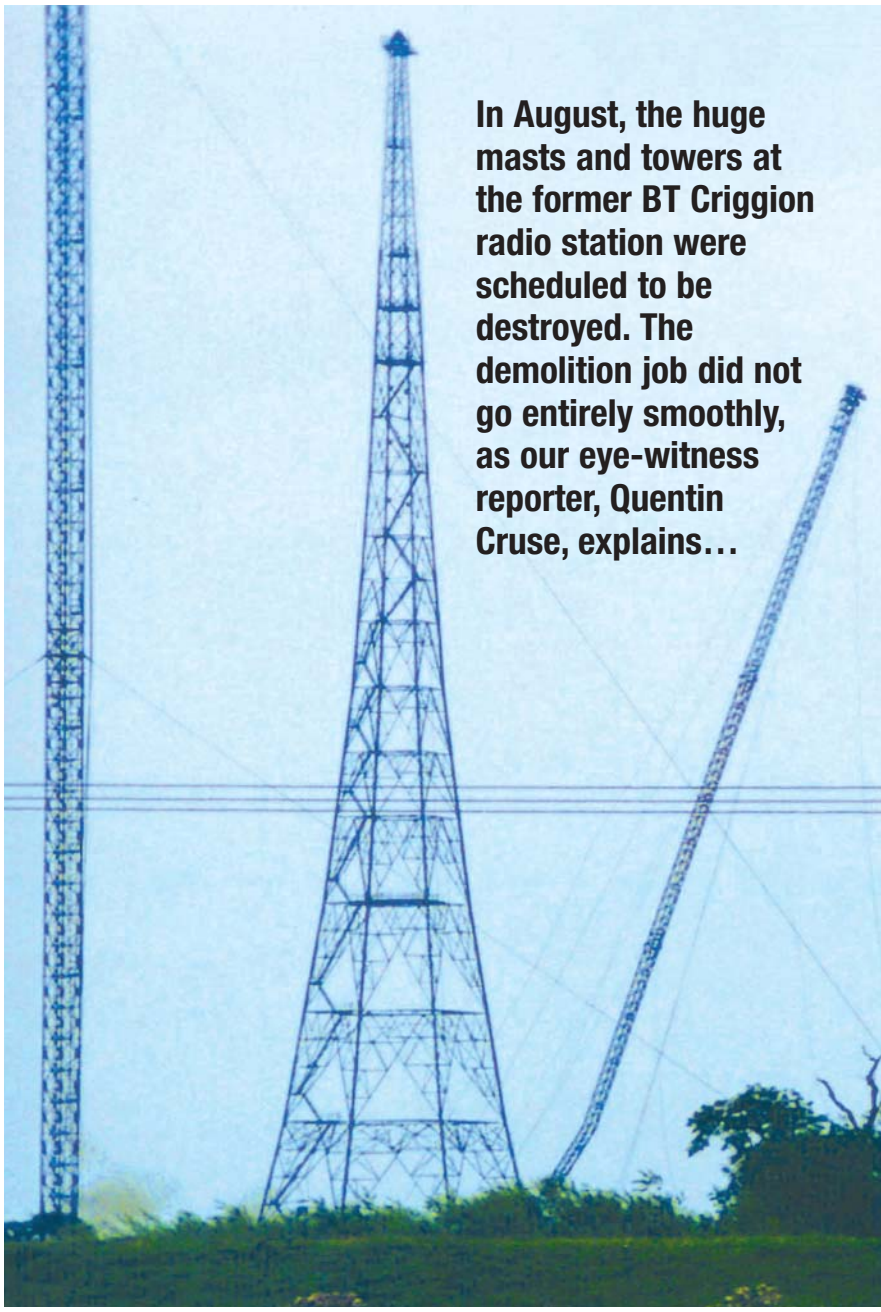
E-mail: comms@kenwood-electronics.co.uk

Criggion –

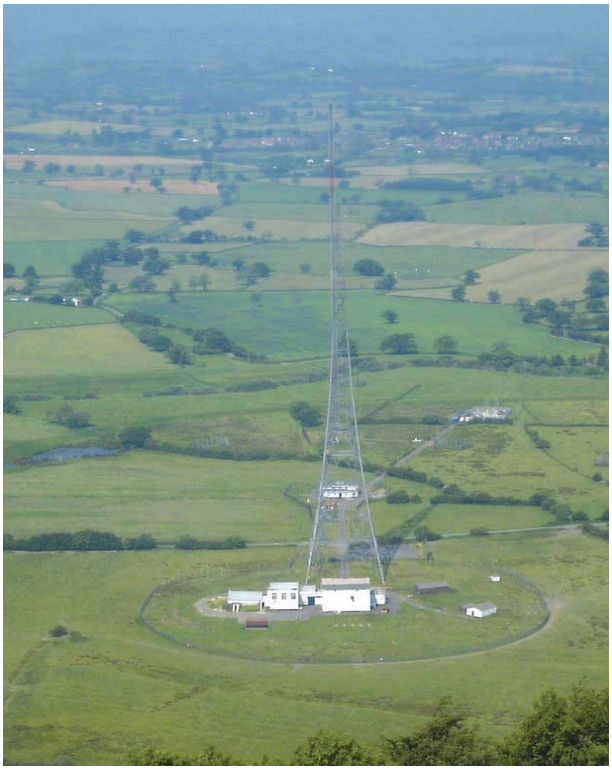
In August, the huge masts and towers at the former BT Criggion radio station were scheduled to be destroyed. The demolition job did not go entirely smoothly, as our eye-witness reporter, Quentin Cruse, explains…



The BT radio station at Criggion near Welshpool ceased transmissions on 31 March this year. The Criggion station was built during WWII as a backup to the Rugby site. The value of Rugby was such that if it was put out of action the defence of the country would be in danger. A search for a suitable site began and Criggion was selected. The site was flat and wet and nearby Breiddin Hill could be used as an additional antenna anchor point. Building of the station was not quite complete when Rugby caught fire. As it happened, it was not enemy action, but too much RF in the roof, and the ensuing blaze meant that Rugby was out of action. Equipment was salvaged, and Criggion rapidly became up and running as GBZ.

The three original masts were each 185 metres high. In 1969 improvements meant that three more masts, each 215 metres high, were erected.

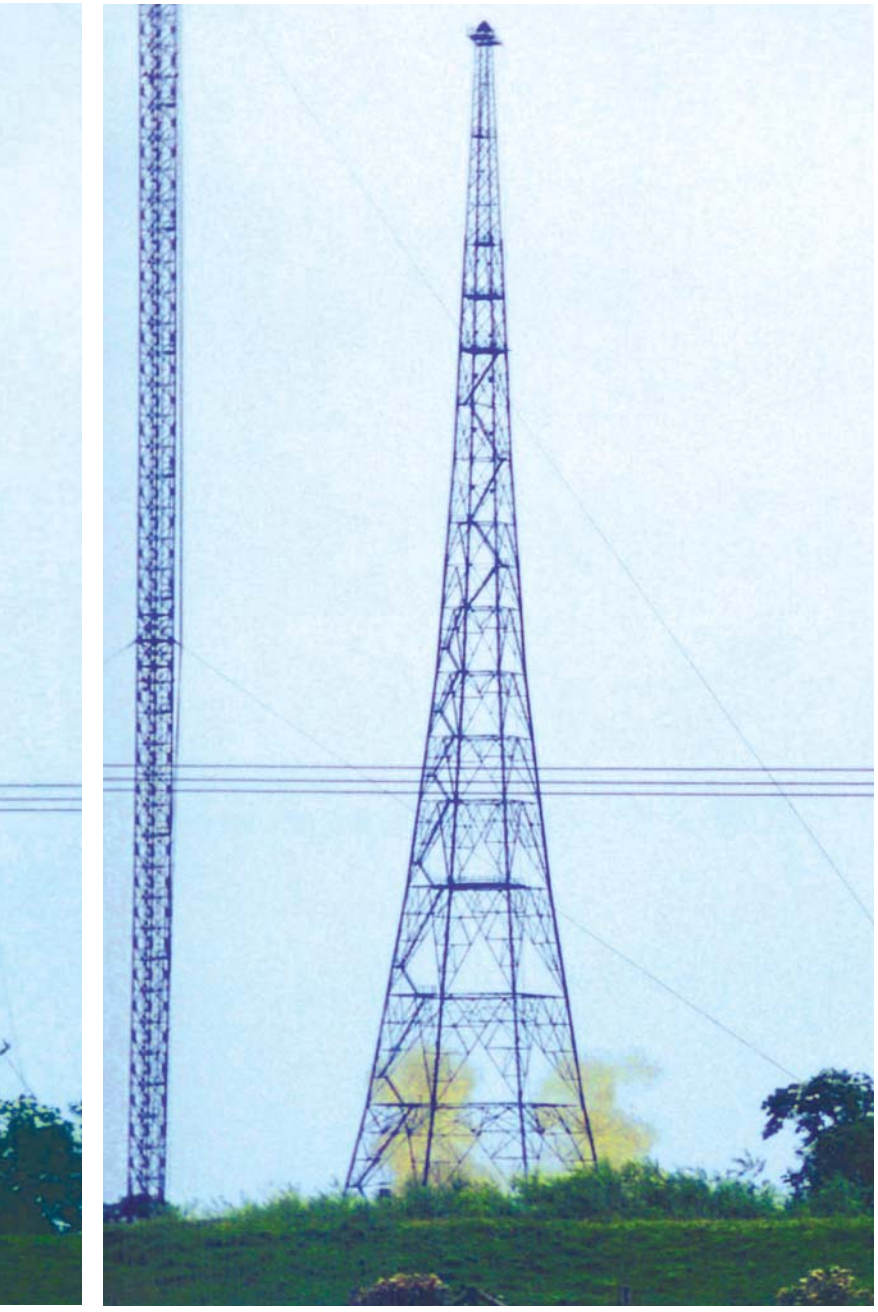
Criggion was run by the GPO and subsequently BT with the main customer being the MoD. The station mainly operated on VLF, between 16 and 25kHz, for communicating with submarines. Coded transmissions came into Criggion on landlines and these were transmitted on the appropriate frequency. The staff at Criggion never knew what they were sending or where it was going.



View of the Criggion station from Breiddin Hill.

By Quentin Cruse, GW3BV, 45 Brongwinau, Comins Coch, Aberystwyth, Ceredigion SY23 3BQ.

the End of an Era



Times change and, despite an upgrades in 1983 and 1991, Criggions days were numbered. When the contract for the work at Criggion came up for tender, Merlin Communications won and so Criggion was closed. At its peak the station provided work for 150 people, including many radio amateurs over the years, a few of whom were still there to decommission the site.

A number of radio amateurs from Aberystwyth, Kidderminster and Welshpool were shown around the site and I had the privilege of having had several tours. It was a sad place to visit: soon there will be nothing left and the land and buildings sold off. The equipment inside –coils, valves, switches and meters –has been scrapped. I was given an 'Aerial tune" meter which had been used in the VLF building as a souvenir by the staff. It now has pride of place in my shack.

Criggion has not gone without a fight, however. The masts and towers were due to be demolished in a 10-minute period on 17 August. Things did not go according to plan. The explosives on the first mast failed to move it at all but at the second attempt it collapsed. The next victim was a tower. An almighty explosion echoed across the valley, but the tower stood firm. It was left as it was as the demolition team had obviously made some fundamental miscalculation. The second mast was next. This time the explosion was followed by only half of the mast falling down. Laughter from the many spectators was heard all around. Another set of explosives and it hit the ground. The last mast gave up gracefully and hit the ground at the first attempt. At the time of writing two towers still stand tall: despite several attempts by the demolition experts they stubbornly remain.

It seems a terrible shame that those great monumental towers will soon be gone. The landscape will change and Criggion will be lost. Why do we allow our heritage to disappear in such a way? A testament to man's ingenuity and skill, a reminder of the darker days this country has seen and living proof of the adage 'necessity is the mother of all invention." RIP GBZ. ◆

Top left: "...at the second attempt it collapsed".

Top right: "An almighty explosion echoed across the valley, but the tower stood firm."

Bottom left: Inside the VLF building: rows of rather large capacitors.

Bottom middle: 'Any old iron?' Criggion is turned into a scrapyard by the demolition team.

Bottom right: Standing tall. One of the towers before the demolition attempt.

PHOTOGRAPHS BY BEN THOMAS; TIM WARD; C WRIGHT, GW7FYG; AND THE AUTHOR.

This is how the Criggion station used to look: the VLF and MF buildings are dwarfed by the towers.

ICOM

IC-703

It's... a Portable! a Mobile! and a Base-Station!

The IC-703 HF/50MHz Foundation Licence/ QRP Transceiver is at Icom Dealers NOW!

When you are out-and-about the IC-703 is the ideal QRP rig. It has an automatic antenna tuner and DSP built-in as standard, plus there is a newly-designed PA circuit to provide a clean 5W signal with 9.6V DC.

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- Built-in ATU
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- Auto-power scale meter
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Count on us!

Reviewed by Peter Hart, G3SJX, The Willows, Paice Lane, Medstead, Alton, Hants GU34 5PR;
and Tom Robinson, G0SBW, 2 Beacon Heights, Point Clear, St Osyth, Essex CO16 8JW.

The Icom IC-703 HF + 50MHz Transceiver

After Peter Hart had carried out his usual thorough lab measurements and tested the IC-703 in the shack, we sent Tom Robinson out and about with the transceiver and its portable accessories to try it in the field.

The IC-703 has been introduced by Icom to satisfy the growing interest in low power operation. It provides a fully featured HF + 50MHz transceiver with 5 or 10Ω output, tailored to the requirements of the Foundation Licence, and meeting the needs of the QRP enthusiast and the amateur who likes to operate portable. The outward appearance of the IC-703 is virtually identical to the well-established IC-706 series and operation and many of the features are very similar. However, under the bonnet the architecture, circuitry and layout are substantially different.

BASIC FUNCTIONS

The IC-703 is a compact radio measuring 167W x 70H x 235Dmm and weighing about 2kg (the manual has the dimensions incorrect). The front panel is detachable and may be operated remotely with an available separation cable. The microphone, which uses RJ telephone style connectors, may be plugged into either the front panel or the rear panel and an HM-103 electret hand microphone is provided as standard.

The radio is designed to operate with power supplies in the range 9 to 15.8V. Above 11V the transmitter provides 10W maximum power output. Below 11V, the transmit power is limited to 5W and power saving measures are automatically selected, principally by switching out the LCD backlight and button illuminations but also reducing the receiver current giving a lower dynamic range. Low current consumption has been a major consideration in the overall design of the radio and a power save mode which sequences to lower current with no signal is selectable. All power saving functions are user selectable. The transmit power output can be set to one of five maximum levels: 10, 5, 2.5, 1 or 0.5W and within these maximum levels the power output is fully adjustable down to less than 0.1W.

The receiver tunes continuously from 30kHz to 60MHz and the transmitter is enabled for segments around each of the amateur bands. LSB, USB, CW (normal and reverse), AM, FM and various data modes are provided. Data allows for both FSK and AFSK operation. FSK provides RTTY operation where the radio generates the tones from a digital input. AFSK is provided by SSB-data mode and is used for all audio tone interfaced modes.

Two main printed circuit boards contain the bulk of the circuitry. The lower board contains the power amplifier and output filters, auto ATU and controlling processor. The upper board contains all the remaining signal circuitry including DSP. The detachable front panel contains the control interface and display processors. Overall a rugged construction has been achieved without the need for a fan on transmit. A 6cm diameter speaker fits into the case top. A carrying handle is not provided but is available as an extra if needed, as is a mobile mounting bracket.

The receiver is a double superhet on all modes with IFs of 64.455MHz and 455kHz with the main selectivity being achieved using ceramic filters at 455kHz. One optional extra filter may be fitted from the available filters for narrow CW (250 or 500Hz), narrow SSB (1.8kHz) or wide SSB (3.3kHz). These are quite expensive but give excellent performance. A 500Hz CW filter was provided with the radio and was also useful on data modes. Note that the IC-706 is also double conversion on SSB/CW but with IFs of 69MHz and 9MHz and achieving main selectivity at 9MHz. Optional filters in this frequency range are cheaper.

Two multipin connectors on the rear panel allow interfacing to data terminals, linears and external auto antenna tuners. A 13-pin DIN plug with lead tails is provided, the other is a standard 6-pin mini-DIN. There is a separate connector for the Icom AH-4 tuner and set-up options allow appropriate control of external auto-tuners. The built-in tuner covers all bands from 1.8 to 50MHz for VSWRs up to 3:1 and adopts relay switched inductors and capacitors with memories for fast

tuning. The relays are latching types to minimise continuous power drain. The rear panel key jack accepts a keying paddle used in conjunction with the internal keyer, a straight key or an external keyer according to set-up options. The front panel headphone jack is switchable to provide external speaker output in addition to the external speaker jack on the rear panel. External computer control is included via the standard Icom CI-V serial interface which requires a level converter to RS-232C.

The radio is provided with a comprehensive 106-page manual but no technical description or circuit details are included other than the specifications. A basic operation section is included as a quick reference guide to assist beginners. Keep the manual to hand, as some of the more exotic functions are quite complex to use.

FEATURES

In addition to the usual dedicated controls and keys, four multi-function buttons below the display select most of the remaining functions of the radio. These functions are grouped into a number of scrollable menus. Two of these menus allow for user set-up and three access the wide range of radio features. The initial set-up mode, which accesses 43 of the set-up parameters, can only be accessed by turning off the radio, turning it on, setting the parameter, turning off and on again, which is a little long-winded.

The detented 40mm diameter main tuning knob has a friction adjustment lever but a somewhat dead feel. Tuning on SSB/CW/RTTY modes is in 10Hz steps / 3kHz per knob revolution or 1Hz steps / 300Hz per revolution with a faster and programmable tuning rate selectable. On CW and data modes it is possible to tune even slower at one quarter of the normal tuning rate. On AM and FM

The Field Trials

For the 'Field Trials', in addition to the IC-703 itself, Icom (UK) supplied the LC-156 multi-bag, BP-228 battery pack (and its 600mA charger) and OPC-581 separation cable. Because Icom's promotional literature states the IC-703 is partly aimed at Foundation licensees, all the field trials were conducted using SSB. In keeping with the IC-703's 'lightweight, go anywhere' ethos, all the equipment was easily carried to the sites by one person.

ACCESSORIES USED

The BP-228 9.6V 2800mAh NiCd battery pack weighs 1lb 9.5oz (715g) and took six hours to charge using the supplied charger. It performed well in the field, giving well over two hours of 75:25 receiving/transmitting and still allowed a further three hours of listening in the shack, at the end of which it still had spare capacity. During this period output was limited to 5W by the IC-703's effective power saving circuits. The supplied 100-240V battery charger has four interchangeable mains plugs; very useful for the world traveller. It has automatic charger circuits for both NiCd and NiMH packs and a button operated battery discharge function.

The LC-156 Multi-Bag is well made and well thought out. It has many features including a secure harness complete with chest strap and convenient hooks on the shoulder straps, front pouch, side pockets, controller case, six Velcro antenna fasteners, loops for holding the separation and power cables, padded area for the battery pack, and two, sealable, holes in the sides for running out leads to the antenna and the controller. It also has a built-in rain cover which folds neatly away when not in use. A minor criticism is that the Velcro antenna fastening straps are short. A 7/8in (22mm) diameter tube was gripped very securely but one of 1in diameter was not.

Close up of LC-156 bag with added antenna support frame.

FIELD TEST RESULTS

The field tests comprised two 'picnic table portable' and two pedestrian mobile (manpack) configurations.

The first test was also the most complex configuration: a W3EDP 84ft (25.6m) wire antenna plus counterpoises, 4:1 balun, 'curly tail' earth spike, 33ft (10m) and 18ft (5.5m) fibreglass support masts (conveniently sited trees are not available at the trial site), and a 7000mAh gelcell battery. The IC-703's internal ATU was able to tune this end-fed wire/counterpoise system on all bands from 80m to 10m via the balun. I measured the SWR band-by-band using an Autek RF1 analyser. The worst case SWR was 8:1 on 40m but the auto tuner effortlessly brought down the SWR to 1.3:1 or less, as measured with the IC-703's meter. This was a much better performance than I expected, given the specification's 3.0:1 SWR maximum.

Encouraged by this, I listened on the bands: 17m was almost dead and 20m not too lively. I heard a pile-up working JW6VJA (Svalbard) and gave him a call. He congratulated me on breaking the pile-up with 10 watts. A new DXCC country for me with my first IC-703 portable QSO! Contacts followed on 40 and 80m with favourable comments on the audio and signal strength. I tried 17m and worked VE9KEN in New Brunswick.

The DSP auto notch filter effectively eliminated 'tuner uppers' and the DSP noise reduction helped improve reception on 80m.

A more easily-erected 'picnic table' station used the Buddipole, a commercial coil-loaded dipole covering 40 to 10m supported on an 11.5ft (3.5m) fibreglass painter's pole fastened to an *in situ* wooden post. Again, the gelcell battery was used. The antenna was only 15ft above ground so I operated NVIS on 40m. The Buddipole does not require a tuner, but careful adjustment is needed to get a 1:1 SWR. The internal tuner on the IC-703 made light work of bringing an intentionally poorly adjusted Buddipole to less than 1.3:1.

The IC-703/Buddipole combination seemed to work as well as most of the other stations heard on 40m. 57 reports were typical from British, German, French and Russian stations and mini-pileups associated with special event stations and LX/PA1AT proved no problem.

For pedestrian mobile operation, the LC-156 multi-bag, OPC-581 separation

only a higher and programmable tuning rate is selectable together with 1MHz steps. At high tuning speeds auto speed-up is engaged fairly seamlessly. The receive frequency can be shifted independently of the transmit frequency using the RIT control on all modes except AM and FM over the range ±10kHz. Alternatively this control can be assigned to parallel the main tuning knob. Bands are selected by up/down buttons returning a single frequency per band.

The usual A/B twin VFOs are provided with split frequency capability, a check/set TX frequency and a quick split function. There are 99 regular memory channels and a further six for storing scan edge frequencies, and memories can be tagged with alphanumeric names up to nine characters long. There is a one press store and recall quick memory feature allowing five or 10 frequencies to be accessed rapidly providing the relevant menu line has been actively selected. Scanning features allow scanning between two programmed frequencies, across all non-empty memory channels or across selected memory channels. One memory channel can be designated as priority watch for repeated checking.

Receiver features include selectable RF preamplifier/attenuator, fast/slow AGC, IF noise blanker for ignition type noise and IF shift to move the receive passband away from interfering signals. Audio DSP provides a noise reduction facility and an automatic notch filter that has the capability of notching multiple and moving tones. Having incorporated DSP, it is surprising that more DSP features were not provided, eg audio filters. The DSP unit is fitted as standard in the UK but this is not necessarily the case in other countries. A combined RF gain/squelch control may be programmed to function as either an RF gain control or squelch separately on SSB/CW and AM/FM modes.

Transmit features include a speech compressor and VOX on SSB and full or semi break-in together with a full message keyer on CW. Keyer parameters are programmable and three message stores with up to 50 characters per store are provided together with contest serial number auto-incrementing and auto-repeat of messages.

For the FM operator, the radio is equipped with a CTCSS tone

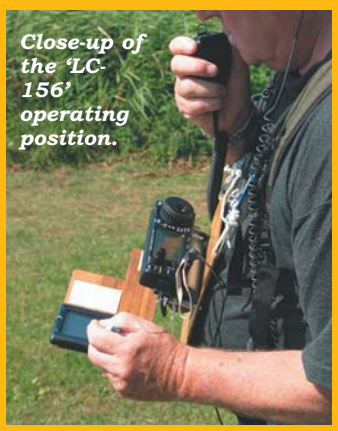
The 'Buddipole' portable site.

cable and BP-228 battery pack accessories were used, largely duplicating that shown in Icom's advertisement for this rig. QRP, coupled with small, inefficient antennas, is a recipe for disappointing pedestrian mobile performance so I decided to use my proven 13ft (4m) whip antenna. To support this adequately it was necessary to make a light frame and fasten it to the LC-156 using the bag's antenna fastening straps. While walking this bag/frame combination provided a stable antenna mount.

During an early morning seven-mile walk, 20m was open with lots of DX, including Hawaii. The best I could achieve though was a 56 from a station in Italy. The autotuner, again, had no problems tuning the whip. This configuration proved to be the lightest (12lb) and most comfortable pedestrian mobile backpack I have worn, and would provide a suitable arrangement for a dedicated QRPer. The breakthrough and RF feedback problem mentioned in Peter Hart's review did not occur on SSB but during a short CW test with the LC-156/BP-228 and short whip configuration feedback was noticeable.

One drawback of using the LC-156 in this way is that Icom suggests the IC-703's power output be limited to 5W, presumably to prevent the rig from overheating. However, I wanted to assess the rig's pedestrian mobile performance at its maximum 10W using a larger antenna. I therefore used my own ventilated backpack with its 15.25ft (4.65m) vertical antenna and the 7000mAh gelcell for the second pedestrian mobile trial.

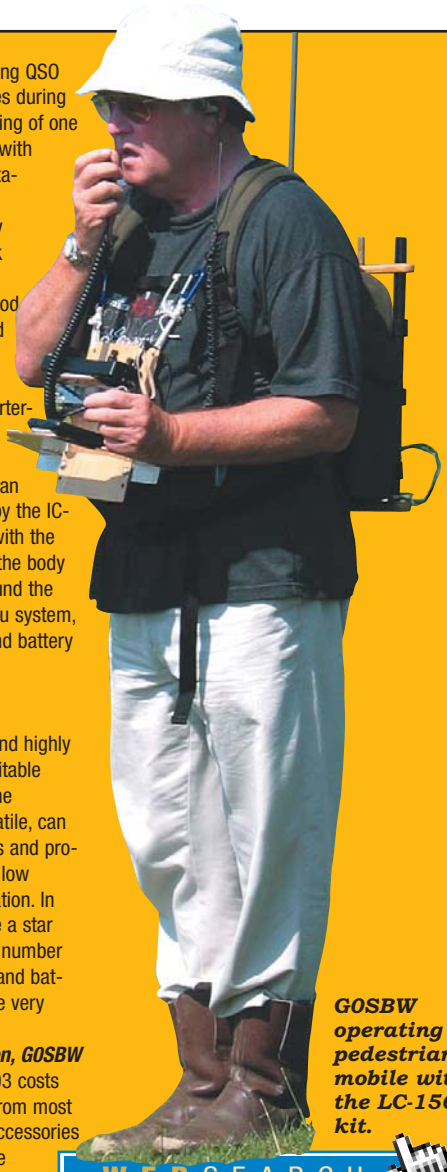
I was on parade at 0500UTC to catch the early morning DX. The internal autotuner worked faultlessly, tuning the whip/counterpoise system on all bands from 40m to 10m. The receiver managed to pull in weak signals from VK, ZL, South America, Alaska and USA West Coast. I did not manage to break any of the pile-ups so decided to put out my own CQ. I was surprised to have my call answered by VK5HK. The ensuing QSO lasted for more than 30 minutes during which he played back a recording of one of my transmissions. Contacts with Polish, German and local M3 stations followed.



Close-up of the 'LC-156' operating position.

In the evening I repeated my walk. 17m was open and weak DX was audible (Taiwan, USA), but not workable. I received good reports from Spain, Finland and Sweden, though.

Both the pedestrian mobile configurations used towed quarter-wave counterpoises and a 4:1 balun to complete the antenna systems. During these pedestrian mobile tests I was impressed by the IC-703's ergonomics. I operated with the control head on my chest and the body of the rig in the backpack. I found the large display, the sensible menu system, the auto tuner, SWR readout and battery voltage monitor a boon.



G0SBW operating pedestrian mobile with the LC-156 kit.

CONCLUSION

The IC-703 is a very capable and highly portable radio. Coupled to a suitable antenna it would be ideal for the Foundation Licensee. It is versatile, can be used in many configurations and provides an almost ideal basis for low power pedestrian mobile operation. In this respect the autotuner gave a star performance and there were a number of facilities such as DSP, SWR and battery voltage readouts which are very useful.

Tom Robinson, G0SBW

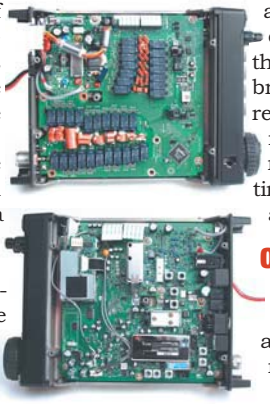
Editor's note: the Icom IC-703 costs around £599 and is available from most amateur radio suppliers. The accessories described by Peter and Tom are extra. Thanks to Icom (UK) for the loan of the transceiver and the auxiliary equipment.

WEBSEARCH

Icom (UK)	www.icomuk.co.uk
Buddipole	www.buddipole.com

encoder and decoder to provide repeater access and tone squelch operation. Repeater access makes use of the split frequency function and to avoid a complex set-up procedure each time a repeater is used, repeaters are best accessed from memory: memory channels store all necessary data.

Special features include a simple spectrum scope giving some indication on the LCD panel of signals on adjacent frequencies. The scan is programmable and the receiver muted whilst the scan is in progress. Antenna SWR can be displayed whilst on transmit. In addition, a simple plot of SWR against frequency can be made. The radio is fitted with a temperature compensated crystal oscillator (TCXO) as standard, which is an optional extra on most other radios. With a frequency stability of ±0.5ppm over the temperature range 0 to 50 °C negligible drift is guaranteed for the most critical digital modes.



IC-703 under bottom cover showing transmit PA and ATU. IC-703 under top cover showing signal circuitry.

ICOM IC-703 MEASURED PERFORMANCE

RECEIVER MEASUREMENTS

	SENSITIVITY SSB 10dBs+n:n		INPUT FOR S9	
FREQUENCY	PREAMP IN	PREAMP OUT	PREAMP IN	PREAMP OUT
1.8MHz	0.13µV (-125dBm)	0.35µV (-116dBm)	18µV	50µV
3.5MHz	0.13µV (-125dBm)	0.35µV (-116dBm)	18µV	50µV
7MHz	0.13µV (-125dBm)	0.35µV (-116dBm)	18µV	50µV
10MHz	0.13µV (-125dBm)	0.35µV (-116dBm)	16µV	45µV
14MHz	0.13µV (-125dBm)	0.32µV (-117dBm)	16µV	45µV
18MHz	0.11µV (-126dBm)	0.32µV (-117dBm)	16µV	45µV
21MHz	0.11µV (-126dBm)	0.32µV (-117dBm)	16µV	45µV
24MHz	0.13µV (-125dBm)	0.35µV (-116dBm)	16µV	50µV
28MHz	0.14µV (-124dBm)	0.35µV (-116dBm)	18µV	50µV
50MHz	0.1µV (-127dBm)	0.16µV (-123dBm)	6µV	18µV

AM sensitivity (28MHz): 0.8µV for 10dBs+n:n at 30% mod dept. **FM sensitivity (28MHz):** 0.18µV for 12dB SINAD 3kHz pk deviation. **AGC threshold:** 1.6µV. 100dB above AGC threshold for <+1dB audio output increase. **AGC attack time:** 5ms (see text). **AGC decay time:** 150-300ms (fast), 0.5-1s (slow). **Max audio at 10% distortion:** 1.0W at 13.8V, 0.7W at 9.6V. **Inband intermodulation products:** -26dB to -36dB

S-READING	INPUT LEVEL SSB	
(7MHz)	PREAMP IN	PREAMP OUT
S1	1.8µV	5µV
S3	2.1µV	5.6µV
S5	2.8µV	8µV
S7	5.6µV	16µV
S9	18µV	50µV
S9+20	100µV	250µV
S9+40	800µV	2.5mV
S9+60	2.2mV	5.6mV

MODE	IF BANDWIDTH -6dB	-60dB
SSB, CW, AM-N	2640Hz	4550Hz
CW-500Hz	550Hz	1720Hz
AM, FM-N	9200Hz	17.6kHz
FM, AM-W	16.5kHz	27kHz

	INTERMODULATION (50kHz Tone Spacing) PREAMP IN		PREAMP OUT	
Frequency	3rd order intercept	2 tone dynamic range	3rd order intercept	2 tone dynamic range
1.8MHz	+1dBm	90dB	+9dBm	90dB
3.5MHz	+5.5dBm	93dB	+13dBm	92dB
7MHz	+1dBm	90dB	+10dBm	90dB
14MHz	+2dBm	91dB	+10.5dBm	91dB
21MHz	0dBm	90dB	+8dBm	90dB
28MHz	-2dBm	88dB	+6dBm	88dB
50MHz	-15dBm	81dB	0dBm	88dB

	CLOSE-IN INTERMODULATION ON 7MHz BAND PREAMP IN		PREAMP OUT	
Spacing	3rd order intercept	2 tone dynamic range	3rd order intercept	2 tone dynamic range
3kHz	-28dBm	71dB	-19dBm	71dB
5kHz	-24.5dBm	73dB	-15.5dBm	73dB
7kHz	-16dBm	79dB	-7dBm	79dB
10kHz	-12dBm	82dB	-3.5dBm	81dB
15kHz	-6.5dBm	85dB	+2dBm	85dB
20kHz	-0.5dBm	89dB	+9dBm	90dB
30kHz	+1dBm	90dB	+10dBm	90dB
40kHz	+1dBm	90dB	+10dBm	90dB
50kHz	+1dBm	90dB	+10dBm	90dB

FREQUENCY OFFSET	RECIPROCAL MIXING FOR 3dB NOISE	BLOCKING PREAMP1 IN	BLOCKING PREAMP OUT
3kHz	70dB	-34dBm	-25dBm
5kHz	75dB	-33dBm	-24dBm
10kHz	84dB	-20dBm	-11dBm
15kHz	88dB	-12dBm	-3dBm
20kHz	91dB	-9dBm	0dBm
30kHz	96dB	-8dBm	+1dBm
50kHz	101dB	-8dBm	+1dBm
100kHz	108dB	-8dBm	+1dBm
200kHz	114dB	-8dBm	+1dBm

TRANSMITTER MEASUREMENTS

	MAX CW POWER OUTPUT			INTERMODULATION PRODUCTS	
FREQUENCY	13.8V	9.6V	HARMONICS	3rd order	5th order
1.8MHz	10W	4.9W	-70dB	-25 (-19)dB	-42 (-36)dB
3.5MHz	9.7W	4.8W	-72dB	-28 (-22)dB	-46 (-40)dB
7MHz	9.6W	4.7W	-70dB	-22 (-16)dB	-41 (-35)dB
10MHz	9.9W	4.8W	-60dB	-30 (-24)dB	-48 (-42)dB
14MHz	10.1W	4.9W	-70dB	-30 (-24)dB	-46 (-40)dB
18MHz	10.3W	5.0W	-66dB	-30 (-24)dB	-46 (-40)dB
21MHz	10.4W	5.1W	-65dB	-30 (-24)dB	-46 (-40)dB
24MHz	10.5W	5.1W	-64dB	-26 (-20)dB	-46 (-40)dB
28MHz	10.6W	4.8W	-62dB	-30 (-24)dB	-46 (-40)dB
50MHz	10.4W	4.1W	-70dB	-20 (-14)dB	-34 (-28)dB

Two-tone transmitter intermodulation product levels are quoted with respect to PEP, figures in brackets are with respect to either tone. **Carrier suppression:** 40dB approx. **Sideband suppression:** >60dB @ 1kHz. **Transmitter AF response at -6dB:** 280 - 2700Hz. **Transmitter AF distortion:** 1%. **Microphone input sensitivity:** 3mV. **FM deviation:** 5.0kHz (wide) 2.4kHz (narrow). SSB T/R switch speed: mute-TX 36ms, TX-mute 2ms, mute-RX 15ms, RX-mute 3ms. **Note:** All signal input voltages given as PD across antenna terminal. Unless stated otherwise, all measurements made on SSB with a 13.8V supply.

MEASUREMENTS

Measurements were made with the radio powered from a 13.8V supply unless indicated otherwise and are summarised in the table. The current consumption on receive measured around 570mA at 13.8V with no power saving measures selected, reducing to about 300mA at 9.6V with the default power saving settings. On transmit, the current consumption was about 3.0A at 13.8V and full power (10W), switching to 5W max with supplies less than 11.5V and a further reduction to 2.5W max when the battery voltage dropped below 9.55V. At 9.6V 5W output the current consumption was about 2A. The radio continued to function down to about 8V.

The receive sensitivity was excellent except at LF and rejection of all images and spurii better than 80dB, an excellent result. AGC decay times were fine but the attack characteristic had significant overshoot to over 100ms. Third order intercept and reciprocal mixing figures were typical and fairly reasonable for a radio of this type and the overall selectivity and adjacent channel results are shown in **Fig 1**. At 9.6V reduced current, the third order intercept measured some 2 to 5dB lower. However, second order measurements yielded a surprising result. With two input signals at 7.1 and 7.2MHz, a response at 14.3MHz was obtained with signals as low as -55dBm. This is some 20-30dB worse than most radios and is likely to cause breakthrough from 40m broadcasters on the 20m band. Front-end blocking tests indicated the front-end selectivity to be fairly flat between 6.5 and 16MHz on these bands.

Transmit SSB intermodulation products were average but poor on some bands. The presented figures are for 13.8V operation, the 9.6V figures were in general 1-2dB worse. CW keying was fairly clean on semi break-in with fairly sharp rise and fall times. Full break-in showed a 16ms shortening of the character length limiting effective speed to around 30WPM. This shortening was also observed on the first character in semi break-in mode. Transmit/receive switching on data mode showed a clean result but a rather long time for the transmitter to achieve full output.

ON THE AIR

Checking out the IC-703 on the home station antennas gave good overall results. The receiver was sensitive and lively and generally coped well with the full range of signals. The 40m breakthrough on 20m predicted from the measurements was significant after dark but not during daylight and generally only above 14.3MHz. Switching in the attenuator largely removed the problem but of course reduces sensitivity just when it may be needed. In other strong signal situations, the receiver coped well. The audio quality on headphones was really excellent, and on the internal speaker good all round communications quality. Broadcast AM performance was also very good, particularly on headphones or external speaker.

On transmit excellent audio reports were received. CW semi and full break-in were effective and a pleasure to use at reasonable speeds but I did have a problem with RF getting into the keying line latching on to key down when using my long wire antenna entering the shack. No problems on SSB or with antennas further from the house and maybe some added filtering is needed on the keying lines.

CONCLUSIONS

The IC-703 performs admirably as a fully featured lower power and highly portable radio. Generally a good performer but some strong signal problems may be seen on 20m at times and CW keys may need filtering.

Peter Hart, G3SJX

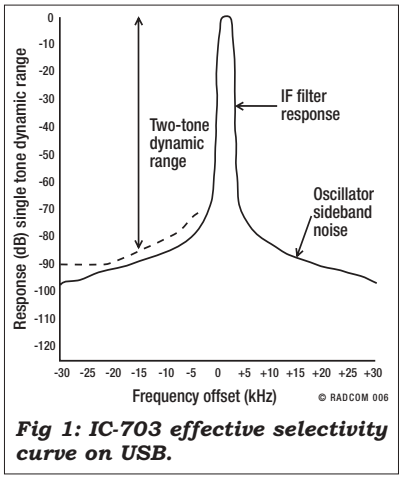


Fig 1: IC-703 effective selectivity curve on USB.

SUNDAY, 26th OCTOBER 2003

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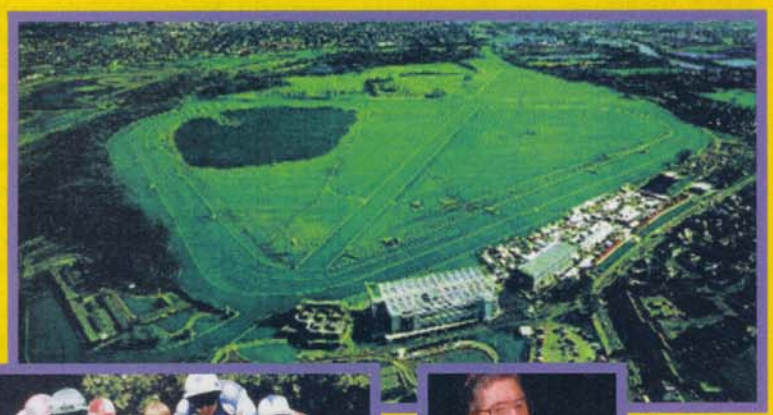

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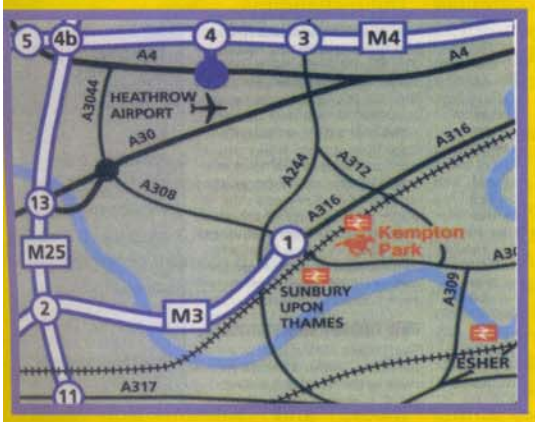

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Radio Fairs .... *Total commitment to the Hobby*

The Yaesu VX-7R 6m/2m/70cm Handi

Chris Lorek tests a triband handheld. His conclusion? "It's tough as old boots!"

The VX-7R with battery pack and charger.

When you take a look at Yaesu's VX-7R you can instantly see it's different from the 'run of the mill' handhelds. Its rugged appearance isn't just for show, because it really *is* tough. I've used it in a wide number of places and operating scenarios; on the water in the Solent as Maritime Mobile, in the pouring rain, in conditions where it's been splattered with mud as well as being dropped in it, up on a mountaintop, down in tunnels. It survived without a scratch, unlike the reviewer, who was sometimes a little worse for wear.

SUBMERSIBLE?

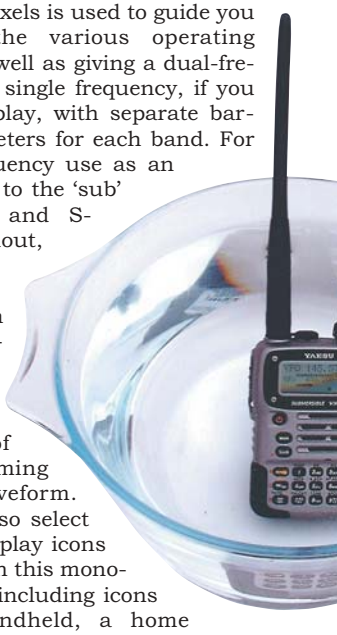
The VX-7R is possibly the first amateur transceiver to claim to be fully submersible. Waterproof connectors guard the speaker/mic and external DC/charge sockets, there's even a weatherproof VOX headset available for hands-free use. You might think "what's the use of it being submersible?" A couple of years ago I was doing the washing up in the kitchen sink when my cellphone dropped in the water. Despite it being carefully dried out, including the inner PCBs, it stopped working a few days later and never worked again. It easily happens, and I often have an amateur handheld in the kitchen.

POWER & MODES

The transmitter offers 5W output on 6m, 2m and 70cm, with three low power levels down to 50mW. As well as amateur band transceive, the receiver offers wideband coverage between 500kHz and 999MHz, and there are two digital VFOs offering simultaneous reception. So you can listen on, say, a 6m and 2m frequency at the same time, or even two frequencies on the same band. You can also set the transceiver to reduce automatically the audio level of one band while you're receiving a signal on the other.

The wideband receiver, with AM, FM, and WFM modes, operates on the 'Main' VFO. The 'Sub' VFO receives over 50 – 54, 137 – 174, and 420 – 470MHz, with transceive operation within the amateur band limits. Each can be selected for 'control' simply by using the 'Main' and 'Sub' push-buttons above the front numerical keypad. As well as allowing direct frequency entry, the keypad also provides a wide variety of other functions; in fact a 99-page user manual is devoted to the set's operation, giving you an idea of its versatility.

A backlit dot-matrix display with 134 x 64 pixels is used to guide you through the various operating menus as well as giving a dual-frequency (or single frequency, if you prefer) display, with separate bar-graph S-meters for each band. For single-frequency use as an alternative to the 'sub' frequency and S-meter readout, a simple 'spectrum scope' can be displayed, or an audio scope display of the incoming audio waveform. You can also select various display icons and fonts in this mono-band use, including icons like a handheld, a home 'shack', a broadcast radio etc. You can even create your own icons if you wish. A bright multi-colour 'strobe' LED next to the display gives indications of receive and transmit status.



MEMORIES

There are 450 main memory channels, each capable of storing frequency, mode, and sub-tone/DCS data, assigned into nine memory groups. A further 10 'one touch' memories help you store your most-used channels in a quick-access bank. Twelve 'Home' channels are added, which you can set

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

to your favourite operating frequencies, maybe as a starting point for tuning around using the VFO. As well as this, there are 40 programmable memory scan 'band limit' channels for you to store your lower and upper frequencies for searching to find new activity. In addition there are 89 shortwave broadcast memories, with popular station frequencies ready-stored for you. If that's not enough, there are also 280 receive-only VHF marine band channels pre-stored. Finally, 10 'hyper memories' let you store and recall complete sets of transceiver configuration information, like display type, scanning modes etc.

SUB-TONE & REPEATER ACCESS

As well as a 1750Hz toneburst for repeater access, CTCSS (sub-tone) encode and decode is available, together with DCS (Digital Coded Squelch) encode and decode for quiet monitoring between user groups. Using the DCS facility, Yaesu's 'ARTS' facility can be used to give a warning when you're out of communications range of other similarly-equipped stations in your net.

Yaesu's 'WIRES' repeater-interlink system can couple up to 10 repeaters together via 56k dial-up modem links, with outstation users needing to transmit a specific DTMF tone at the beginning of each of their transmissions. The VX-7R has an 'Internet' key for this, giving you an automatic tone with each PTT.

POWER

The VX-7R comes with a 7.4V 1300mAh lithium-ion battery pack, which clips to the back of the set with a sturdy fastening. A plug-in wall charger is supplied, and the external DC socket will also accept a 12V DC input to power and/or charge the transceiver.

The transceiver measures 60 x 90 x 28.5mm and weighs 260g.

ON THE AIR

Despite being rugged, the VX-7R was a convenient size and shape to hold, and a handy swivel belt clip was supplied as a carrying aid. I must say that I had to have a good read of the instruction manual before I could do even simple things like set the receiver squelch. I could select it, but how to alter it isn't obvious from the display's menu. A couple of 'up/down' logos on the front panel adjacent to the 'Main' and 'Sub' buttons, which are used for this in 'set' mode, wouldn't have gone amiss.

The transceiver comes with a set-top SMA connector which accepts the supplied 'rubber duck' antenna. This has two screw-on top sections: a short one (around 25mm long) for 2m and 70cm, and a longer 'chunky' section to act as top-loading for 6m use. I travelled over 3000 miles around the UK using the VX-7R, to give it a good test in a variety of locations. Mostly, using the set-top antenna, results were very impressive, and I had many contacts on all three bands as well as plenty of interesting listening using the wideband capability. In all cases, there was a very ample amount of undistorted audio from the built-in speaker even for use in noisy surroundings, and my transmitted audio was consistently described as excellent. The 'dual-mode' antenna performed very well on both transmit and wideband receive, the 6m top-loading also helping receive performance on the lower bands. But after a few weeks of travelling I managed to lose the 6m screw-on top, something I read another amateur also did.

At weekends, I sometimes help a friend out by being a motocross marshal. In dry weather you get covered in dust, in rainy weather as well as getting soaked you get splattered with mud. The VX-7R survived all this very well, even when I had to give it a quick 'wash' after each event! It still hasn't a scratch on it.

In 'quiet' radio locations, such as rural areas and even including some radio-less hilltops, all was well. But get into busy areas like central London, and even using just the set-top antenna the receiver often 'bowled over' with unwanted signals. For example, in Hyde Park (ie with few transmitters) there's little problem, but get to Waterloo with many close-in Private Mobile Radio (PMR) transmissions and it's a different story. Substituting an ex-PMR handheld on 2m or 70cm gave me interference-free results in the same locations. To be fair, the VX-7R is a multi-band rig combined with a *very* wideband receiver, so you do have to accept some compromises.

Middle: Completely submerged, but still working, the VX-7R gets a good 'soak test'.

CONCLUSIONS

The technical results show a reasonable performance in the lab, although the 2m and 70cm adjacent channel selectivity at 12.5kHz offsets were somewhat asymmetrical despite very good frequency accuracy. Operationally, the VX-7R really is a very versatile piece of equipment and magazine space simply doesn't allow me to extol all its virtues. It took me a while to learn how to use most of its features and as some people say "once you've tried it, you're hooked". If you want a simple-to-use transceiver this may not be for you, but if you want the ultimate in a 6m, 2m and 70cm handheld, coupled with a wide-band receiver for added interest, you should take a serious look at the VX-7R.

The VX-7R is currently available at around £299, and our thanks go to Yaesu (UK) for the loan of the review equipment. ◆

YAESU VX-7R LABORATORY RESULTS

RECEIVER

Sensitivity

Input signal level required to give 12dB SINAD

	50MHz	144MHz	433MHz
	0.14µV pd	0.13µV pd	0.14µV pd

Squelch Sensitivity

Level of signal required to raise receiver squelch

	50MHz	144MHz	433MHz
Threshold	0.13µV pd	0.12µV pd	0.13µV pd
Max	0.27µV pd	0.28µV pd	0.29µV pd

Adjacent Channel Selectivity

Measured as increase in level of interfering signal, modulated with 400Hz at 1.5kHz deviation, above 12dB SINAD ref level to cause 6dB degradation in 12dB on-channel signal

	50MHz	144MHz	433MHz
+10kHz	18.7dB		
-10kHz	34.9dB		
+12.5kHz	51.0dB	31.2dB	6.7dB
-12.5kHz	62.5dB	60.1dB	59.6dB
+20kHz	72.2dB		
-20kHz	69.6dB		
+25kHz	74.3dB	68.0dB	62.0dB
-25kHz	71.3dB	68.5dB	67.1dB

Blocking

Measured as increase over 12dB SINAD level of interfering signal modulated with 400Hz at 1.5kHz deviation to cause 6dB degradation in 12dB SINAD on-channel signal

	50MHz	144MHz	433MHz
+100kHz	83.1dB	84.3dB	74.5dB
+1MHz	90.8dB	92.7dB	87.6dB
+10MHz	98.7dB	96.7dB	94.5dB

Intermodulation Rejection

Measured as increase over 12dB SINAD level of two interfering signals giving identical 12dB SINAD on-channel 3rd order intermodulation product

	50MHz	144MHz	433MHz
25kHz spaced signals	56.2dB	67.8dB	>75dB
50kHz spaced signals	56.4dB	67.1dB	>75dB

Image Rejection

Difference in level between unwanted and wanted IF image signal levels, each giving 12dB SINAD on-channel signals

	50MHz	144MHz	433MHz
1st IF (47.25MHz) image	80.5dB	59.4dB	56.7dB
2nd IF (455kHz)image	86.5dB	88.6dB	53.1dB
Half IF rejection	116.9dB	82.7dB	89.3dB

Current Consumption

Standby (Power off):	0.37mA
RX on, squelch closed:	23.5mA
RX, mid vol:	120mA

TRANSMITTER

Power Output

Level	50MHz	144MHz	433MHz
High	4.44W	4.67W	4.59W
L3	2.28W	2.40W	2.40W
L2	0.95W	0.90W	0.95W
L1	50mW	50mW	50mW

Harmonics

	50MHz	144MHz	433MHz
2nd	-76dBc	-71dBc	-68dBc
3rd	-67dBc	-79dBc	<-80dBc
4th	-70dBc	<-80dBc	-78dBc
5th	-72dBc	<-80dBc	-
6th	-79dBc	-74dBc	-
7th	-80dBc	<-80dBc	-

Deviation

	50MHz	144MHz	433MHz
Half	2.68kHz	2.81kHz	3.45kHz
Full	5.21kHz	5.74kHz	6.21kHz

Frequency Accuracy

50MHz	144MHz	433MHz
+37Hz	+18Hz	-164Hz

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Book Review

INTERNATIONAL ANTENNA COLLECTION

Edited by George Brown, M5ACN
Reviewed by RSGB Staff

This new book from the RSGB stable is, at first glance, an interesting selection of articles about antennas originating from various parts of the world. On delving further, what emerges is an array of articles describing antennas for bands between 136kHz and 1.3GHz, transmitting and receiving, mobile and fixed.

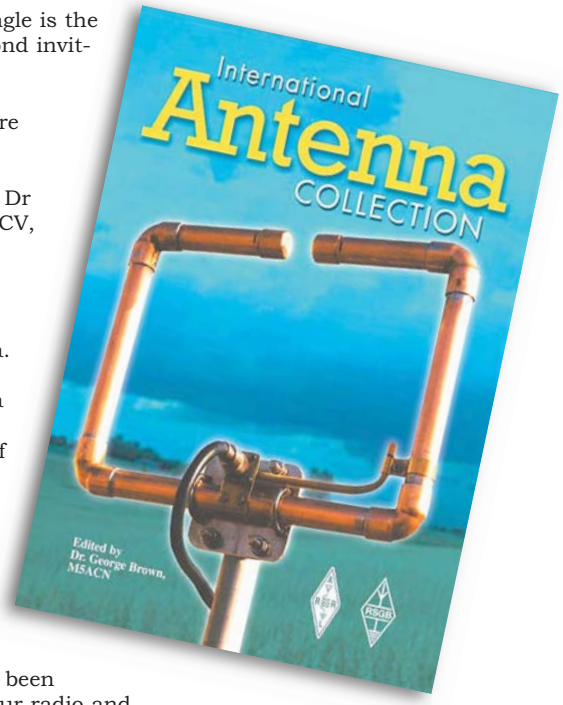
Some are very short and describe monoband antennas, while others are very long and may be more technical than practical. All are, however, packed with useful information on the design and construction of a multitude of antennas.

Have you ever picked up a book on antennas at a rally, and flicked through the pages trying to find, say, a design for a five-band HF antenna? It is usually a fruitless exercise; even if such an article is there, its title may not tell you that it is what you want. In this book, you can find such a design within five seconds as there is a very useful index at the back that lists all the articles and the bands covered by the antennas described in each article. This is a really useful idea that more books should adopt.

Readers will appreciate that it is by no means an exhaustive collection – how many articles *can* you cram into a small book? *International Antenna Collection* is unique in that the graphics within each article are taken (with permission) from the magazines in which the articles first appeared. Although the texts have been edited to a uniform style, the diagrams are the originals, and give the book an added flair when opened.

Two articles were specially commissioned for this book by the editor, Dr George Brown, M5ACN. The first, by Professor Mike Underhill, G3LHZ, of the University of Surrey at Guildford, UK, entitled 'The Truth About Loops', gives an exhaustive account of the performance of the much-maligned small loop, which also takes into account the loop's environment. His definition of a loop's 'performance' is based upon *measurements*, with theories being invoked to reinforce these measurements. Approaching the same problem from a completely different angle is the subject of the second invited article, 'A Brief Overview of the Performance of Wire Aerials in their Operating Environments', by Dr Jack Belrose, VE2CV, Radioscientist Emeritus with the Communications Research Centre Canada, in Ottawa. The premise of his article is that "... a detailed study of the performance of aerials in their operating environments... is best studied by *computer simulation*". Some of the results of these authors' work have already been aired in the amateur radio and professional press. What this book provides, for the very first time, is both arguments, *in full*, *in the same publication.*

This book may well become a best seller throughout the amateur world. It is not the tome that many antenna books tend to be, but its size belies its content.



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(non-members' price £11.99).

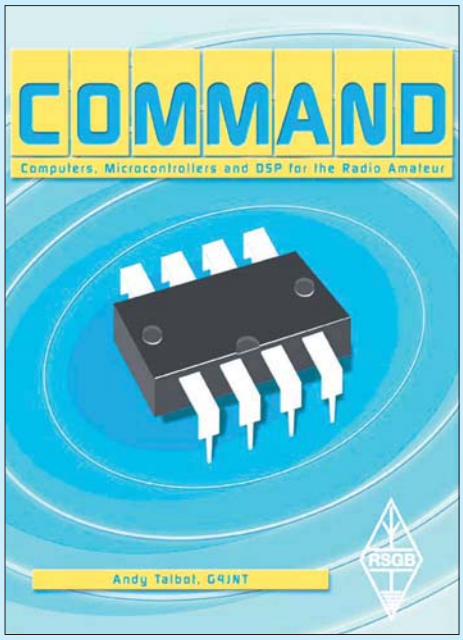
COMMAND – COMPUTERS, MICROCONTROLLERS AND DSP FOR THE RADIO AMATEUR

By Andy Talbot, G4JNT
Reviewed by RSGB Staff

This book is complementary, in many ways, to the other RSGB 'digital' book, Digital Modes for All Occasions. It has 10 chapters, the titles of which will give you a fair idea of the book's contents and the manner in which the text is presented. In order, then, the chapters are: The Personal Computer; Interfacing to the Personal Computer; Transceiver Control and Band Monitoring; Microcontrollers; Simple Projects Using the PIC; Remote Control and Telemetry; More Microcontroller Projects; Digital Signal Processing; Practical DSP Hardware; Interfacing the Sound Card Under Windows.

The book starts with a very gentle introduction to the subject and then proceeds to introduce operating systems, from DOS and PCDOS, via Windows to free software such as Linux. Familiarity with several programming languages is always a help, and some examples are given.

The ASCII code is described, and a quick course on using binary numbers, both positive and negative is given. Were you always confused by Mantissas and Exponents? Now is the time to put that right!



The book then proceeds in earnest with interfacing, both serial, USB and parallel, and covering the ISA bus and games port.

Having introduced microcontrollers, the PIC chip becomes the subject of many projects, illustrating that the use of these devices is almost universal. Detailed description of a telephone-line remote-controller for a repeater or beacon is given, together with a hand-held, low-power, RF controller, with mention being made of the RadCom series of articles by Peter Rhodes, G3XJP, on his PicATUne system. There are many more also. The book rounds off the subject with detailed coverage of the principles and practice of DSP. A long, detailed, chapter on sound card interfacing under Windows completes the book. The chapter is necessarily complicated, as the author takes the reader from the procedural model of programming to the event-driven model before he goes on to discuss ways in which Windows can be used with the sound card to the benefit of radio amateurs wanting to utilise the new digital modes in everyday use on the bands.

Not a book for the beginner, but datamodes enthusiasts and all those who wish to get the most out of their computers will find its contents absorbing and useful.

COMMAND – COMPUTERS, MICROCONTROLLERS AND DSP FOR THE RADIO AMATEUR
By Andy Talbot, G4JNT
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Raynet Tomorrow

To conclude the trilogy of articles marking the 50th anniversary of Raynet and coinciding with the RSGB Emergency Communications Convention in Birmingham, Steve Richards looks at recent advances that could enhance the role of the Amateur Service in disaster relief

Until recently, the typical Raynet response to a request for help would be to establish speech networks, probably at VHF/UHF. However, a key factor in successful operations is 'diversity', the ability to use more than one method to pass the information. In this respect, radio amateurs have an enviable arsenal of choices at their disposal – frequency bands, speech and data modes – but not all of these have been easy to deploy in the field. In recent times, though, there have been some remarkable advances in communications technology that have given rise to some exciting new possibilities in the field of emergency communications, further diversifying the Raynet response.

A FRESH LOOK AT HF

The use of HF for amateur emergency communications in the UK has thus far been underdeveloped. Several factors have recently come into play that could renew interest. Equipment, particularly HF transceivers, is getting smaller and more easily portable, being suitably robust and stable for use in the field. Output powers across the board are increasing and receivers now boast many facilities to combat noise, man-made and natural interference. Battery life in hand-held equipment has also improved dramatically.

Former Class B licensees now have full access to the HF bands, bringing with them a wealth of emergency communications experience from VHF and UHF operations. At the same time, important changes to Article 25 of the ITU *Radio Regulations*, which encourages the establishment of *international* amateur communications for disaster relief, has given a tremendous new impetus to explore afresh the potential of HF for such purposes.

UK amateurs currently also have the privilege of access to frequencies at 60m (5MHz), a part of the spectrum that can offer excellent UK-wide coverage for much of each day and lends itself to NVIS (Near Vertical Incidence Skywave) effects. Raynet is already actively experimenting with these techniques (see photo). If 60m is intelligently used alongside 80m and the expanding 40m band, a true national service is achievable.

To determine whether a path exists at a given frequency at any given moment, commercial Automatic Link Establishment (ALE) software has already been adapted for amateurs by Charles Brain, G4GUO. This technique automatically tests whether a particular path is 'open' for communications and permits text transfer at the same time. Charles has also experimented with various military specifications such as STANAG 4285, designed for extremely robust data performance at HF, and digital speech techniques. If you look at his website [1] you begin to realise the expertise that radio amateurs can offer.

Hardware and software already exist to link HF and VHF nets together – another area to explore. Seamless transition of voice and data between the two means that the integrity of the information is assured, a vital factor for emergency communications.

NEW TECHNOLOGIES, NEW IDEAS

A significant change in most people's lives has been the arrival of affordable, powerful computers. The innovators of the amateur world have been quick to see the possibilities. The advent of Digital Signal Processing (DSP) within the home computer has enabled great advances in the control of the sound spectrum. Principally, the techniques of audio signal manipulation and filtering have moved from external mechanical devices to software control directly within the computer, using the standard sound card to interconnect with radio equipment.

In the digital environment, accuracies that were previously impossible to realise in practical terms are now easily attainable. For example, minute differences in frequency/phase relationships are detectable and band-pass filtering of extremely high 'Q' can be exploited. Highly efficient data communications techniques, that occupy very small bandwidths, are a reality.

Such advances have led to the development of several new datamodes for radio amateurs, many of which use complex DSP techniques to optimise performance over the vagaries of HF radio links while keeping bandwidth to a minimum. Much of the new software is easily obtainable, simple to operate on modest computers and free to non-commercial users.

It would seem clear that these modern datamodes could find an application in amateur emergency communications. Today, the HF radio spectrum has become much more viable and offers significant attractions. For example, it may be possible to provide national coverage from just a few well-appointed amateur stations. Because of the comparative ease and speed with which an HF data receiving facility can be established within a problem zone, national access to information using this method (few trans-

WEB SEARCH

[1] G4GUO's website:	www.chbrain.dircon.co.uk
[2] Nino Porcino, IZ8BLY, datamodes software:	www.kwarc.org/digital/sld032.htm
[3] MIXW program:	www.mixw.net
[4] Narrow Band TV:	www.qsl.net/hb9tlk
OTHER USEFUL SITES:	
RSGB Emergency Communications pages:	www.rsgb.org/emergency/index.htm
Raynet HF Team:	www.Raynet-hf.net/
Data mode reference site:	www.qsl.net/zl1bpu/
WLAN:	www.taurus2.plus.com/gb7imk/wlan_diary.htm

By Steve Richards, G4HPE, 6 Heathfield, Royston, Herts SG8 5BW. E-mail: steve@g4hpe.freeserve.co.uk

Left: The NVIS mobile installation used for the Longmynd Hike by M5WJF/M. Note the deliberately horizontal whip designed to optimise F2-layer near-vertical reflection back down into neighbouring valleys.

mitters, many receivers) might be an achievable goal for the Amateur Service.

NEW DATAMODES

Initially, amateur emergency communications at both HF and VHF used RTTY. This mode is termed 'unconnected' or 'broadcast', in that there is no electronic interaction between the transmitting and receiving ends of the radio link: no error-correction techniques are applied. To minimise errors in reception (caused by fading, man-made or natural interference) it is necessary to create the best possible path between stations and it may be necessary to repeat doubtful portions of the information. This mode is also quite slow, which could lead to a backlog of data. Despite being a somewhat blunt tool, though, RTTY was often remarkably effective in Raynet use.

When hardware moved from dedicated mechanical units to modern computers, the use of the AX25 Packet protocol and derivatives began to dominate the field and in many Raynet operations still does. With this mode, small 'packets' of data are transmitted from the sender to the recipient. These modes are often described as 'connected', meaning that information is fed back from the recipient to the sender that verifies whether the data has been correctly received. The more accurate term for such modes is Automatic Repeat Request (ARQ). Using ARQ, only data that is completely accurate is displayed at the receiving end.

Connected modes also lend themselves to routing across networks of stations, where paths to the intended recipient may exist by several simultaneous routes and the routing software is capable of automatically testing and allotting a quality to each route on a continuous basis. Packet modes tend to be used via VHF/UHF FM transmissions where audio bandwidths can be higher (leading to a greater data transfer rate) and where propagation and interference effects are not really a factor. Packet at HF is far less successful because of these issues and in order to succeed within a practical bandwidth it is necessary to reduce dramatically data rates.

The advent of the computer has allowed the introduction of very powerful, multiple error-correction systems, meaning that non-ARQ methods can now offer remarkably high accuracies over HF paths. Some of the newer modes that are freely available and which could have benefits for emergency communications over HF radio paths are:

Non-ARQ or 'Broadcast' modes:

BPSK31 and **QPSK31**: use very low bandwidth and encode data by changing the phase relationship of audio frequencies. Sophisticated error correction systems are used. More than 20 separate PSK31 transmissions can occupy the same space as one HF SSB speech channel (see **Fig 1**). Furthermore, because the full audio spectrum can be saved as a .WAV file, the waveform can be played back into the receiving software over and over again at will, decoding a different data stream each time.

MFSK16: uses 16 audio tones to encode the data. There are versions that use a greater or lesser number of audio tones, with the relative effect on bandwidth and data rate. Forward Error Correction (FEC) and Interleaving techniques are employed and it is extremely effective under poor HF band conditions. **Fig 2** shows a typical MFSK generator.

MT63: encodes the data using 63 audio tones, usually across an audio bandwidth of 1000Hz. This mode utilises both spectral and time-based interleaving as well as FEC to provide more than one opportunity for the data to be received. Versions using higher or lower audio bandwidth, together with variable interleaving parameters, are available. MT63 is thought by some to be a bit antisocial on a crowded amateur band due to the bandwidth employed, but it is worth noting that this mode is extremely robust against both man-made and atmospheric effects. If 2000Hz of bandwidth is available, the data rate can reach an amazing 20 characters per second.

ARQ modes:

AmTOR: developed for amateur use from a long-range commercial system, now generally replaced by:

PacTOR: a packet radio system specifically designed for HF use. It employs similar FEC techniques to VHF packet.

Q15X25: an upgraded HF packet system not unlike MT63.

Part of the consideration of the most suitable data transmission system must be to decide what value is placed on the various merits of each mode. In no particular order: data rate, accuracy (error correction), tolerance to interference, ease of operation, radio-frequency bandwidth, robustness, reliability, adaptability, availability and even legality must all be assessed. A specialist group of 5MHz NoV-holders are looking at just these issues now and have already reached some preliminary recommendations for choice of datamode under different propagation conditions.

It is worth noting that most of the newer modes will continue to work satisfactorily right at the noise floor – check the higher HF bands when they are considered to be 'closed' for speech traffic and you will find data communications carrying on regardless.

For an excellent guide to datamodes both old and new, I highly recommend the RSGB publication *Digital Modes for All Occasions*, by Murray Greenman, ZL1BPU. Via the Internet, there are several software packages, many of them freeware, which can be downloaded for use. For example, *DIGIPAN* and *HAMSCOPE* are popular choices. In particular, the suite of programs by IZ8BLY [2] and the excellent *MIXW* [3] are multimode and therefore offer many protocols to try within the one program. *MIXW* is shareware and can be used for a free trial period prior to registering for a modest fee.

From an emergency communications perspective, it is unfortunate that the message handling interface presented with much of the software is rather basic. Raynet will need to go beyond simple typing of text 'live' at the keyboard – the data rate is too fast for this to be efficient and, in any case, the User Services will probably present large amounts of data already in the electronic domain. Ideally, what is needed is a standardised interface for e-mail and attachments which would be suitable for Raynet use in the field with all of the popular

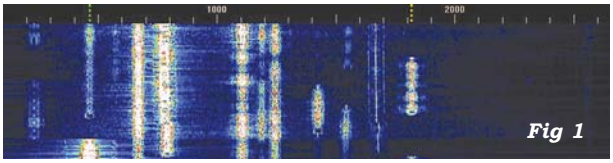


Fig 1: The 'waterfall' display at G4ATX showing many PSK31 QSOs within a single speech channel.

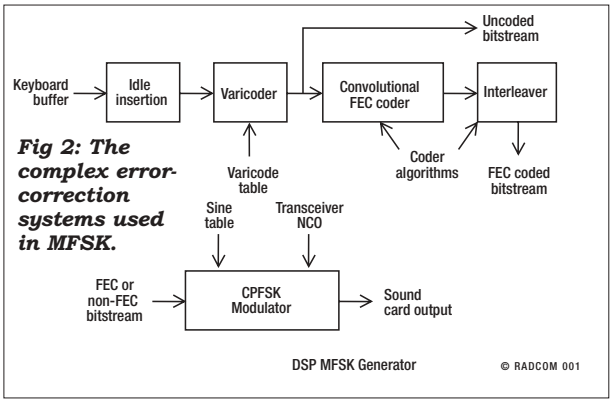


Fig 2: The complex error-correction systems used in MFSK.

communications programs. So, there is an interesting challenge for the software gurus!

PICTURES

Thus far, we have concentrated on new means of sending textual information. As the saying has it, though, "a picture is worth 1000 words". Just as datamodes have taken full advantage of the power of the PC, so too have visual modes. Several Raynet groups have experimented with sending computer-based slow-scan TV (SSTV) pictures on behalf of their users. Also, using the emergent data compression techniques, Digital Narrow Band Television (NBTV) offers greatly improved picture quality [4]. Software is already under development meaning that it should soon be possible to send high definition fast-scan, or real-time digital pictures from incident sites via amateur radio links.

APRS, UiVIEW and WLAN

APRS (Automatic Packet Reporting System) and its UK equivalent, UiView, utilise the existing packet radio network to provide continually updated positional information from GPS receivers. This is being used for tracking the progress of widely-spread events, such as for long-distance walks and rides. This software also provides the facility to disseminate mass data, for example weather bulletins, as well as direct screen-to-screen text 'conversations'.

WLAN is an interesting development that allows for wideband data links within suitable parts of the amateur spectrum, eg 2.4GHz. For localised co-ordination at incident sites, this concept could find many applications. See 'Websearch' for a link to G0TWN's very interesting Amprnet experiments.

As can be seen, a good number of technological advances are upon the voluntary emergency communicator. Almost too many perhaps, because clear guidance from the User Services is going to be needed to define the future role of Raynet and to create a development strategy that focuses on the facilities most required from us.

The RCVS National Co-ordinator role will be important in this, harmonising groups and individuals towards a common goal. By making known the potential new technologies we can offer, interest and support from the User Services will be perpetuated. Closer working relationships at national level will allow Raynet to integrate more effectively at an electronic level with the Users' existing systems. It will be important not to oversell what we can practically achieve and there is much hard graft in training and project work ahead if we are to take full advantage of the greater flexibility that new tools are bringing us.

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

HF

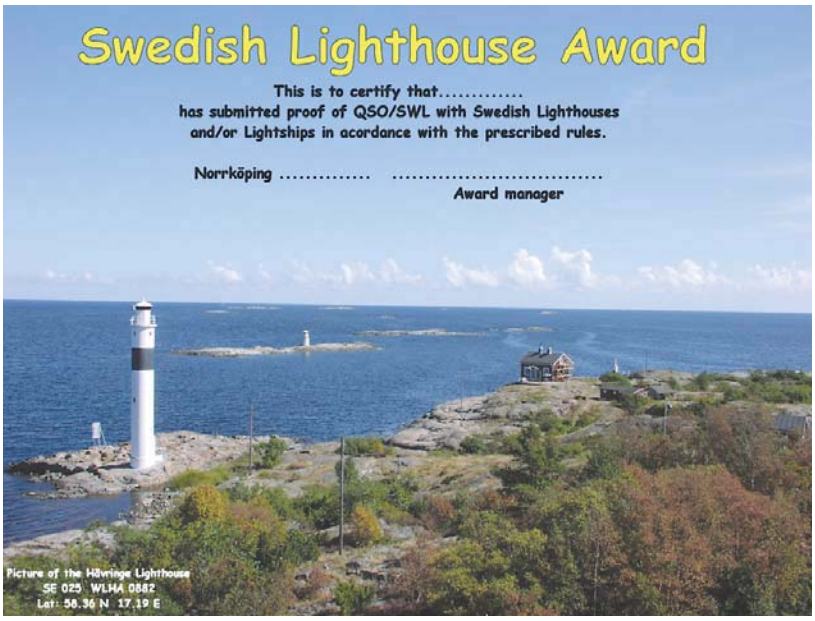
Roy, G3LNM, writing in 'The Last Word' (June) raises the suggestion that HF SSB operation might benefit from being channelised. It might be worth pondering this suggestion for a moment, particularly as Roy clearly believes this would improve spectrum utilisation. There are certainly users on HF who believe they already have channels assigned, if one considers some of the regular nets, the 'broadcasts' by K1MAN, or even the supposed meeting frequencies of special interest groups (IOTA, QRP, SSTV, etc.). I suppose a good starting point is to ask why we don't have channelisation at the moment, and the accurate answer is almost certainly that in the early days of HF operation channelisation would have been quite impossible. Frequency readouts and VFO stability were nowhere near good enough to allow this. For some amateurs in developing countries this may still be the case, though I do note that most photos of stations from the former Eastern Bloc now seem to show modern commercially-manufactured transceivers.

So would channelisation help? Roy has suggested 4kHz spacing, which on the SSB end of 40m, for example, would by my calculations give around 14 channels (55kHz in all). I rather suspect those of us who have invested in cascaded 2kHz SSB filters for our transceivers would feel this was a criminal waste of spectrum. Roy says "Choosing a free channel would be much simpler than the current situation of having to try and squeeze in between other stations". This is no doubt true where a clear channel is available, but what happens otherwise? Do you have to wait and twiddle your thumbs until a channel becomes free? It's an interesting conundrum. It also doesn't deal with the HF phenomenon of changing propagation so that, for example, a G group and DL group are both working on 7080 as darkness falls and they start to interfere with each other. Who concedes the channel? It's already a problem, but I suspect would become a bigger one if only certain channels were 'allowed'.

And what would happen during the serious competitive activities that many people enjoy on HF, namely DXing and contesting? Would channelisation make for a more orderly situation, or a less orderly one? Especially when the channel you have been happily using on 14160 suddenly becomes the focus of attention of US multi-multi W3LPL when they swing their beam towards Europe, having already been on that channel for several hours working the USA? Again, these problems already arise, but are usually solved by sliding the VFO up or down until a reasonably clear spot is found. But the chance of finding a clear 'official' channel to move to in such a situation strikes me as rather wishful thinking.

So why does channelisation work on 5MHz? My guess is that it's because overall occupancy is much lower, and there is no serious competitive activity. This is certainly why channelisation of VHF/UHF FM seems to work but also, I suspect, why no attempt has ever been made to channelise the SSB portion of the VHF bands.

Anyway, having nailed my own colours to the mast, I look forward with interest to any feedback from readers. I am always happy to reconsider in the light of a well-reasoned argument!



DX NEWS

Annobon Island (3C0) is due to be activated this month by a predominantly Spanish group. It looks as though the operation will start around 27 September and run to around 10 October, with activity on all bands and modes. The team has been allocated individual callsigns, so look our for 3C0A, 3C0F, 3C0R and 3C0V. Annobon was last activated in 1999 and hasn't, to my knowledge, been on the WARC bands. A more recent planned operation had to be cancelled at the last minute due to administrative difficulties. Let's hope this one is more successful. QSL via DJ9ZB.

Willy, ON5AX, will be active as FR/ON5AX (**Reunion**) from 20 to 23 October, then as S79AX (**Seychelles**) 24 October to 4 November and 3B8/ON5AX (**Mauritius**) 6 to 15 November. QSL all to his home call.

Mike OM2DX, will be based at the Slovak embassy in Baghdad for the next three years, and is operating as YI/OM2DX, but has also obtained the special contest call YI2X. He will be

active on all bands and modes. There has also been a lot of recent activity from Iraq by UN personnel. Ghis, ON5NT; Michael, PA5M, and Robert, S53R, were in the vicinity of the UN building when it was attacked by a terrorist bomb in mid-August, but survived the experience, although Ghis was airlifted to Jordan and Michael back to Germany for attention to injuries received.

Don, N1DG, will be in **Dubai** from 6 to 11 October, and expects to do some guest operating from A61AD's station (Don is A61AD's QSL Manager). Activity will be on SSB, CW and RTTY.

Jaak, ES1FB, hopes to sign XU7ACV from **Koh Poah Island** (AS-133) from 21 to 23 October. He is also planning a trip after the CQWW contest to Vientiane, **Laos**, where he will probably be assigned XW1FB. Look for this activity from 30 October to 4 November. QSL to his home call. Keep an eye on his web page.

Reports suggest that the remaining unnumbered **Vietnamese** IOTA group will be activated some time this month with the callsign XV3C. No other information at the time of writing.

Pratas Island (BV9P) will be activated again this month, with activity expected from 9 to 16 October.

Jim, W7UG, and Tom, K7ZZ, are heading to the Pacific. They'll start off in **Palau** with the call T88ZX from around 1 October and be there for one week. Next they will move to Yap in **Federated States of Micronesia** with the call V63ZT and again stay for one week. Operations will be on SSB and CW on 10 to 80m.

DJ5IW, DM5TI, DL2RMC and DL8LAS will operate as VK9XW from **Christmas Island** 4 to 11 October, then as VK9CD from **Cocos (Keeling)** 11 to 23 October. Incidentally, the mention of Christmas Island always seems to cause confusion as there are two of them! This one lies to the north-west of Australia in the Indian Ocean. Perhaps the better-known one (due to its historical links with nuclear testing) lies in the Pacific Ocean, and has the amateur radio prefix T32.

Jacky, ZL3CW/F2CW, is heading back to Raoul Island in the **Kermadec Islands**. He will be using the call ZM8CW starting about 11 October for about 10 days. QSL via ZL1AMO.

Pablo, HK8RQS; Victor, HK8JEH; and Albaro, HK8HIX, will be on from **Morro Island** (SA-040) from 11 to 14 October.

CE0Y/SP9PT and CE0Y/SP9EVP will be active from **Easter Island** from 17 October 17 to 1 November 1, 80 – 10m CW with some PSK, RTTY and SSTV. Afterwards they will also operate from the mainland of Chile. A large Chilean group will activate **Damas Island** (SA-086) from 17 to 19 October, signing 3G2D. They will have three stations running, round the clock. QSL to XQ1IDM.

CQWW PHONE CONTEST

The CQWW Phone Contest (strictly, not the CQWW SSB, as it predates the introduction of that mode by many years!) is, along with its CW counterpart, the pre-eminent contest of the year for many operators. Although the world and continental winners truly are the 'master athletes' of amateur radio, in terms of operating skill and endurance, there is scope for everybody to take part and have fun, similar to running a marathon, for example. As always, rare countries are 'booked' well in advance, with individuals and teams heading off to give out interesting multipliers. As well as operations already mentioned, I know of the following (though there will undoubtedly be more): 5I3A (Tanzania) multi-op by K1XM, KQ1F and others; 5J0X (San Andres) by large US team; 5W0UU (Samoa) by OH3UU, C21 (Nauru) by W4WET; C5 (Gambia) by German team; CN2R (Morocco) single-op by W7EJ; D44TD (Cape Verde) by I4UFH; FS/AH8DX (St Martin) by AH8DX; HQ9R (Roatan Island, Honduras, IOTA NA-057) by WQ7R; IH9P (Italian Africa, Zone 33) by large international team; J49Z (Crete) by Italian group; JW5E (Svalbard) by various JW operators; P40W (Aruba) by W2GD; PJ2T (Netherlands Antilles) by large US group; PZ5A (Suriname) by PZ5RA and US operators; S79AX (Seychelles) by ON5AX; TI5N (Costa Rica) by large US group; TO5A (Martinique) by NH7A; V47CA (St Kitts) by VE3BW; VK9XD (Christmas Island) by VK2CZ; VP5T (Turks & Caicos) multi-multi by large US group; XU7ACE (Cambodia) by ES1FB; YJ0X (Vanuatu) by Australian team; YN2EJ (Nicaragua) by US operators. You can always find an up-to-date

COUNTRIES WORKED, 2003

(sorted this month by SSB totals)

CALL	CW	SSB	DATA	MIXED
M0AWX	0	212	30	213
M3RDX	0	170	93	187
G3XTT	215	156	107	228
GM0TGE	132	156	0	202
M3CLY	0	152	0	152
G4WXZ	147	140	0	192
M0CNP	12	138	35	139
G3YVH	190	136	0	215
M5GUS	0	127	0	127
GU4YOX	121	123	0	167
G0GFQ	0	115	0	115
MU0FAL	129	97	0	144
G0LGJ/M	0	97	0	97
G4FVK	59	93	0	105
GI0NQC	1	70	69	102
G4WFQ	196	66	97	218
G3LHJ	161	60	89	177
M5AEF (1W)	27	52	0	59
ZC4VG	131	34	57	134
M3NPB	46	21	0	56
G4OBK	127	20	61	138
G3TXF	210	14	0	211
G4UCJ	124	10	24	126
G4DDL	68	9	21	70
G4ZPL	0	2	87	87
G3SXW	222	0	0	222
G0NXX	200	0	0	200
G3VDL	180	0	0	180
G4KFT	177	0	0	177
G4IRN	165	0	0	165
G0ARF	0	0	159	159
G3ZRJ	156	0	0	156
G4EDG (QRP)	150	0	0	150
G3YMC (QRP)	131	0	0	131
M0BVE	117	0	0	117
GU0SUP	0	0	116	116
G4IFB	115	0	0	115
GW4ALG (QRP)	74	0	0	74
G3URA	0	0	53	53

WEB SEARCH

ES1FB	http://www.hot.ee/xu7ace
G3XTT	www.g3xtt.com
NG3K	www.cpcug.org/user/wfeidt/index.html

listing on the NG3K web pages. In many cases these contest stations will be active before and after the contest weekend, frequently opting for CW or the non-contest bands (12, 17, 30m) so as to avoid diluting contest 'demand' for their country.

AWARDS

To celebrate its 20th anniversary, the Bavarian Contest Club (BCC), a member of the DARC, in co-operation with the local Landshut chapter (U08), is sponsoring the Worked All BCC (WABCC) award (see page 38), which is available to both licensed amateurs and SWLs. To qualify, they must work (or hear/log) members of the BCC during the period 1 October 2003 to 30 September 2004. I can provide full details on request.

I have also received details of the Swedish Lighthouse Award (page 37), the International Pharmacists Ham Group awards, the Polish RTTY Award, the Worked Croatian Prefixes and the Croatian Islands awards. As always, I can provide details if required, and will also try to post information on my web page (follow the *RadCom* links).

CORRESPONDENCE AND TABLES

This month sees the Annual Countries Worked table ranked by SSB standings, and it's good to see an M3 licensee so close to the top. It just shows what can be achieved with enthusiasm and perseverance. My own major activity this month has been collating entries for the RSGB IOTA Contest, which took place in late July, and it's good to note the number of ex-Class B licensees who jumped in feet-first (that was the weekend they gained access to the HF bands). I look forward to having some HF reports from some of you soon.

Norman, G3FPK, vacates his VHF spot for a moment for two reasons. The first is to comment on some of the atrocious signals his friend F5VBY (also known as G3TZH) has been hearing emanating from the UK on the HF bands. When challenged, it is clear that not all of these stations are running high power; the problem is more often one of over-driving their transceivers. Norman mentions that several of the recent offenders have been ex-Class B licensees, perhaps not used to driving their HF radios yet? It is certainly all too easy to make excess use of speech processing, or simply to over-drive the final amplifier and, I suspect, solid-state power amplifiers are rather less forgiving than valve PAs of years gone by. The so-called 'monitor' facility in most radios doesn't actually monitor the final output, so can be misleading. The best bet is to get someone else to listen to your transmissions while you make adjustments. Norman's other point is to take me to task for my deprecating remarks in the August column about DSP compared with mechanical filters. Norman believes that modern DSP technology, even in amateur transceivers, is equal to or better than mechanical filters, with their inherent limitations and inevitable leakage. I rather suspect there is no simple answer to this, as I hear strongly conflicting views from different users and I rather think it comes down to the manufacturer and, no doubt, to the price of the transceiver concerned.

Colin, MU0FAL, writes that the IOTA contest made a huge difference to his CW totals and he really enjoyed the experience of being a sought-after island station. He would be delighted to work ex-Class B licensees on CW, and is more than happy to adjust his CW speed as appropriate.

David, M0CNP, writes that he will be in Bermuda from 14 to 28 October, and hopes to be active as M0CNP/VP9. Over the Lighthouses weekend he was one of the operators at GB2BML (Blakeney Mariners Light lighthouse) where they made 921 contacts, mainly on 80, 40 and 20. He comments that at times the bands were completely dead. ◆

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 **December** issue by **20 October.**

HF F-Layer, Propagation Predictions for October 2003

	3.5MHz	7.0MHz	10.1MHz	14.0MHz	18.1MHz	21.0MHz	24.MHz
Time	000011111220	000011111220	000011111220	000011111220	000011111220	000011111220	000011111220
(UTC)	246802468020	246802468020	246802468020	246802468020	246802468020	246802468020	246802468020
*** Europe							
Moscow	77.....5456	774....27667	..621125761.	..6555667...	...89999....	...99998....	...1564.....
*** Asia							
Yakutsk	.........11.	2332	1.2112457776	..55552.....	...55.....	...66.....	.....
Tokyo	.....	.....1232.	.....12321.	....1.111...	...12.....	...11.....	...2.....
Singapore	.....	1111	.....3411.	.....253...	.....1562...	.....1551...	...11353....
Hyderabad	.....	1	2.....13333	.....4541.	..2112677...	..3445773...	...77788....
Tel Aviv	35.....2122	665.....6556	8.71...37678	..3633577.3.	...64356....	...35542....	.....
*** Oceania							
Wellington	.....	.....156...	...434667...	...666746...	...2332.1...	...1221.....	....22.....
Well (NZ) (LP)	.....	..7.....	138.....	5471.....232	...51....53.	...5.....5..	.....
Perth	.....	.....111.	.....1211.	.....11...	.....1332...	.....221....	..1234.....
Sydney	.....	.....121..	.....2321..	.....432...	....26752...	....3562....	...3666.....
Melbourne (LP)	.....	...7.....	..181.....	...86.....	...75.....	...53.....	.....
Honolulu	.....	...1.....	..1511.1....	...211.21...	.....1...	.....	.....
Honolulu (LP)	.....	.....	.....	.....12...	..1.....61..	..11111.62..	...222..6...
W. Samoa	.....	...1.....	...54222....	...36652....	....464.1...	....253.....	....131.....
*** Africa							
Mauritius	.....	1.....111	1.....1111	.....221..	.....42...	.....31...	.....2....
Johannesburg	45.....12	88.....1577	76.....5677	221....27654	..1....462..	..11112661..	...566787...
Ibadan	.....	.11.....	446.....1212	..82....12..	..8863345...	...886666...	...998885...
Nairobi	.....	.....	.1.....	21.....12	..2....111..	..52...12...	..2421232...
Canary Isles	234.....322	6761....2656	7664...14466	3..63223574.	...2777747..	...7777774..	...566667...
*** S. America							
Buenos Aires	.....	433.....24	1112.....11	...4.....	...72...12..	...5411121..	....42223...
Rio de Janeiro	.....	.....	.....	...1.....	...631.1341.	...5522352..	....53345...
Lima	.....	.....	.....	.....	.....1.....	.....3111...	.....4222...
Caracas	.....	.....	...1.....	.....	....2.....	.....1.....	.....6555...
*** N. America							
Guatemala	.....	.....	...1.....	.....	.....	.....	.....1111...
New Orleans	.....	.....	1..1.....	.....	.....65344..	.....26661..	.....777...
Washington	.....	3331.....13	51.11.....35	.....1...22.	.....53345..	.....65562..	.....1555...
Quebec	443.....34	6663.....76	...21....12.	...111.113..	.....77777..	.....7788...	.....6888...
Anchorage	.12.....	3551.....1	1.2.....11	.....11..	.....2...	.....	.....
Vancouver	.....	.....	.....	.....	.....241..	.....4...	.....3...
San Francisco	.....	.....	.....	.....	.....221..	.....12...	.....22...
San Fran (LP)	.....	.....	.....	.....5....	.....72...	..1....73...	.....73...

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 August 2003 issued by the Sunspot Data Centre, Brussels, was 72.7. The daily maximum / minimum numbers were 95 and 49 on 28 August and 1 August respectively. The predicted smoothed sunspot numbers for October, November and December are respectively: (SIDC classical method - Waldmeier's standard) 57, 55, 54 (combined method) 62, 58, 55. Longpath predictions are shown with (LP) following the path name. Higher input power and superior aerials have been used for these predictions; less well-equipped stations may find the longpath predictions somewhat inaccurate.

Contest

The opening up of the HF bands to Class B licensees has been anticipated for a long, long time and it is good to see it having finally happened. On the weekend of the RSGB IOTA Contest it was great to hear a number of former Class B licensees getting stuck in to working the contest. In fact we noticed for the first hour or so of the 144MHz Backpackers Contest on the Sunday that we didn't work a single Class B callsign: perhaps everyone was busy on HF!

For the DX and contest orientated Class B, HF provides a great deal of interest and it is to be hoped that UK entries to domestic and international contests alike will be bolstered considerably. Which RSGB contests should benefit? Club Calls, SSB AFS, SSB Field Day, 21/28MHz Phone and IOTA all spring to mind. For the more experienced, the Phone sprints should provide an enjoyable experience. And there could be some serious competition to the established contest stations on HF. I know from personal experience that there are a good few Class Bs who have built exceptional VHF stations and I have every confidence that they will be doing the same on HF. Perhaps we shall see some new callsigns in the leader boards over the next year or so.

RTTY and data contests should benefit from the changes too. I have seen an increasing amount of RTTY and PSK activity from Class Bs over the last few weeks and am hoping to see this reflected in contest activity and entries.

Naturally, a challenge for the RSGB's HF Contests Committee will be to provide contests of interest to the new group of HF users and contesters, so if you have any ideas on how the HF contests programme could be enhanced, do contact the committee: e-mail hfcc.chairman@rsgb.org.uk

Top: Pulu, D44AC, up his antenna mast.

Bottom: The station of Pulu, D44AC, in the Cape Verde Islands. Pulu, who recently celebrated his 50th birthday, helped Alex, 4L5A, to set up the D4B contest station which will almost certainly be heard in this month's CQ World Wide DX phone contest.

PHOTOGRAPH: HENRYK KOTOWSKI, SM0JHF.

REVIEWING CONTEST RESULTS

How many of you review your contest results in detail after publication? Some are of course just happy to see their callsigns in print following the event. Others make a detailed analysis of what changes in their QSO / Multiplier and Points total occurred following the adjudication. This of course gives some useful feedback on how accurate your logging and operating skills are. Adjudicators are often very helpful in pinpointing where errors occurred and thus helping you to try to avoid making the same mistake again! If you do ask the adjudicator, remember to ask nicely and a 'thank you' for their efforts will always be appreciated.

CONTESTS THIS MONTH

The highlight of the month on HF, of course, is the *CQ* World Wide DX SSB Contest on 25 / 26 October. As ever this contest sees great activity and makes an ideal way for non-contesters to improve their country totals. Enterprising QRP operators have shown that great contacts can be made during these big contests. I'm looking forward to hearing how the former Class Bs enjoy this one for the first time. Domestically, we have the RSGB 21/28MHz Phone and CW events on 5 and 19 October respectively. These could be challenging this year, if conditions don't improve but, in many respects, that can make the contest more interesting. The excellent EU Sprints take place on 4 and 11 October (phone and CW respectively). Last year, we saw great UK participation in the autumn sprints and we hope that there will be the same again this year.

At VHF, as well as the regular activity contests, there is the 432MHz to 248GHz IARU Contest on 4 / 5 October which provides an excellent chance to test microwave gear on the higher bands, as well as some increased activity levels on the other bands. The 1.3 and 2.3GHz RSGB trophies run coincidentally with this contest. Finally, on 19 October is the RSGB 50MHz contest. ◆

AFFILIATED SOCIETIES (AFS) CW CONTEST, 2003

With over 80 clubs and 270 stations participating in almost 39,000 QSOs, AFS CW kicked off the RSGB 2003 contest year with a huge burst of activity. Conditions were not wonderful, but it was hard to find a vacant frequency and even more difficult to keep it, particularly if, like me, you were running QRP. As one entrant put it, "I never thought there were so many CW stations still active!" Another commented, "Had to do more search and pounce than normal. Worked my first M3 (actually MM3) on CW!". Other comments included, "Good to see the band so full of CW stations. An excellent contest". A few stations had a tail of woe to tell, but everybody seems to have enjoyed the contest again this year.

It was good to see a varied mixture of both old and new callsigns again, including some recently-licensed M3 calls. Reports on the band conditions varied, but I think that the general consensus was that they were not at their best. However, more European stations joined the contest this year with lots of DLs, LYs and HB9 stations appearing in the logs.

As well as the new M3s, other older stations entered for the first time this year, while other contestants experimented with different antenna configurations in the hope of overcoming the limitations of their geographical location. Lot of folks took the plunge into computer logging for the contest, with varying degrees of success. This was also one of the first contests where the new Cabrillo format was accepted and lots of stations opted to submit their final logs in this format, which seemed to go smoothly despite the teething troubles with the e-mail reflector which initially decided to reject every log it was sent!

As can be seen from the tables, the Lichfield ARS A team beat off strong competition from Mid Beds Contest Association and De Montfort University ARS to take the honours this year, with less than 200 QSO separating to the top five stations and less than 400 for the top 10.

As a closing thought, after you have spent the time setting up the station and working the contest, spend a couple of minutes checking your log before you send it off for adjudication. Almost all log types can be opened in Notepad where you can check that the file is not corrupted, the sent and received serial numbers look okay and it is actually the correct log for the contest!

My thanks to those who stations who provided check logs and to M3MLG for assistance in entering the paper logs. ***Ray Goff, G4FON***

AFFILIATED SOCIETIES (AFS) CW CONTEST, 2003

INDIVIDUAL SECTION

Pos	Callsign	Points	Pos	Callsign	Points
1	G3SJJ	2730	45	GM3POI	2160
2	G4BJM	2680	46	G0OPB	2130
3	GW3YDX	2680	47	G3RXP	2130
4	G4BWP	2620	48	G3PDH	2120
5	G4BUO	2610	49	G3WZT	2120
6	G3OAY	2570	50	G4IFB	2120
7	G4PIQ	2570	51	G4EOF	2110
8	G3NKC	2520	52	G4ERP	2110
9	G4XUM	2470	53	GW4VEQ	2100
10	M0TTT	2460	54	G3ZGC/P	2090
11	G3NKS	2450	55	G3SVW	2080
12	G3VHB	2430	56	GW0GEI	2080
13	G3TBK	2420	57	G3GLL	2070
14	G0CKP	2410	58	G3LET	2040
15	G0IVZ	2410	59	G3LIK	2040
16	G3RIR	2410	60	G4RGK	2030
17	G3SJX	2400	61	M0CDX	2030
18	G0MTN	2380	62	G3GWB/P	2020
19	G3WUX	2380	63	G3OOK	2020
20	G3WVG	2380	64	G3YXX	2020
21	G4MRS	2380	65	G4OGB	2020
22	G3LZQ	2370	66	GM3WOJ	2020
23	G5LP	2350	67	G3RWL	2010
24	G4ALE	2330	68	G3PJT	2000
25	G3ZVW	2320	69	G3PSM	2000
26	G3KHZ	2300	70	G3YAJ	1990
27	G3XTT	2290	71	G4ERW	1990
28	G4RCG	2290	72	M0BEW	1990
29	GW3SQX	2290	73	G4DRS	1980
30	G0KBL	2280	74	GM6NX	1970
31	G4ARI	2250	75	M0MAT	1970
32	G3RVM	2240	76	G3TKF	1960
33	G3UFY	2240	77	G3WPH	1960
34	G3RQZ	2230	78	GM4SID	1950
35	G4TSH	2220	79	G3KTZ	1920
36	G3RSD	2210	80	G3SEK	1920
37	G3KKQ	2200	81	GW3XEJ	1920
38	G6PZ	2190	82	G4CWH	1910
39	GM3JKS	2190	83	G3SHF	1900
40	G3SWH	2180	84	G4WJS	1880
41	G0WKW	2170	85	G3TJE	1870
42	G3KLH	2170	86	G3OGP	1860
43	G3XSV	2170	87	G4KZD	1850
44	G3VYI	2160	88	G3BFP	1840

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

Pos	Callsign	Points
89	G3IZD	1840
90	G4KGG	1840
91	GM4AFF	1840
92	G3JJZ	1820
93	G3MCK	1810
94	G3ZBE	1790
95	G0EFO	1780
96	G4EYE	1760
97	M0AJT	1750
98	G3XZG	1740
99	GM3YTS	1730
100	G0IBN/P	1720
101	G3HEJ	1710
102	G4EBK	1700
103	G0DVJ/P	1690
104	G3WSC	1690
105	G3YHV	1680
106	G3LVP	1660
107	G4ENA	1630
108	G4IUF	1630
109	G0VQR	1610
110	G3LRS	1600
111	GM0CLN	1600
112	G3LHJ	1560
113	G4XRV	1560
114	GM4CXM	1550
115	G3LDI	1540
116	G3VRY	1540
117	G4AHK/P	1510
118	G0ORH	1480
119	G3TQD	1480
120	G3UNA/P	1480
121	G4IRN	1460
122	GW3VVC	1460
123	G3RZF	1450
124	G4BGW	1410
125	G3SWC	1360
126	G4IUZ	1360
127	G3VPW	1350
128	G3ZDW/P	1340
129	G3RLF	1320
130	G3SET	1320
131	G3JKY	1300
132	G4DDX	1290
133	G4SFO	1290
134	G3ZBU	1260
135	G4WFQ	1260
136	G3MEH	1250
137	G3LUW	1240
138	G3YMC	1240
139	G3LCS	1230
140	G3MA	1230
141	G3VQO	1230
142	G3AWR	1220
143	G4FON	1220
144	GM3CFS	1220
145	GM4ZRR	1210
146	G0WHO	1190
147	G2HLU	1190
148	G3ICO	1190
149	G0RDO	1180
150	G3GC	1180
151	G3HJF	1180
152	G3JYP	1180
153	G3NVO	1180
154	G0UJK	1170
155	M0BZU	1170
156	G3IGU	1160
157	GW4BLE	1150
158	G0WBC	1140
159	LY3BA	1140
160	G0MBQ	1130
161	G3HZL	1130
162	G3JJG	1120
163	G0HFX	1110
164	G3TTH	1090
165	G3RFX	1080
166	G0WAL	1070
167	G4NSZ	1070
168	GW3PRL	1070
169	G4DYC	1050
170	M0CTC	1050
171	M0GMT	1050
172	GW3LEW	1040
173	G3JSR	1020
174	G4SLE	1000
175	GW3HCL	1000
176	G0LHZ	990
177	G3GMM	990
178	GW3SB	990
179	MM3BRR	980
180	GM3UM	970
181	G4KXG	960
182	G4YJQ	960
183	G3LVW	950
184	G3VKW	950
185	GW4HBK	930
186	G4FBS	920
187	G4FTP	910
188	G0KDL	900
189	G3TTB	900
190	GM0SHD	900
191	G3DCZ	890
192	G4BJQ	890
193	M0BPQ	890
194	G4POF	880
195	G4HLX	850
196	M0PTR	850
197	G4KTI	840
198	MM0BQI	830
199	MM0WPM	800
200	G0VYR	780
201	G3BBR	780
202	G0MRH	770
203	G3CQR	730
204	G0HUZ	720
205	G3TWG	720
206	G3ZDD	720
207	M0BOX	700
208	GM3XGX	690
209	G3JBR	680
210	M0BYJ	680
211	G8TB	670
212	G3SNN	640
213	G3YOL	620
214	GM3YBQ	620
215	G0LZA	600
216	G4CWN	600
217	M0APB	600
218	G3EAO	590
219	G3IFB	590
220	G3SNU	590
221	LY2BH	590
222	G4AGE	550
223	G4AQZ	550
224	2E0NPB	530
225	G0DCG	480
226	M0CUL	480
227	M0BEX	460
228	G3JUL	430
229	G3TQF	420
230	GM0VIT	420
231	G0UHM	400
232	G0OSR	370
233	G3PZX	360
234	G4ZGP	350
235	GM4UYZ	350
236	G4TTY	330
237	M0TIF	330
238	G0HUC	320
239	GM0UZM	310
240	M5ALG	300
241	G3BEC	250
242	M0DDT	250
243	M3MYK	250
244	M0CGE	240
245	G0THY	230
246	G0RPX	210
247	G0SCP	180
248	G3FIJ	170
249	G0HIP	160
250	G0SWO	160
251	GM0VFD	160
252	G4DJR	150
253	G0VBT	120
254	M0BZK	120
255	G3RJW	100
256	G3UYV	100
257	M0BQE	100
258	G4FCH	90
259	M0ANS	90
260	M3NSB	90
261	G4DDW	50
262	M0CQN	50
263	G3DMQ	40
264	G3GVY	30
265	G3MPZ	30
266	M0DEH	30
267	G3BXF	20
268	G3NOH	20
269	G3HKO	0
270	G0CGF	0

CONTEST CALENDAR

HF CONTESTS

Date	Time	Mode	Contest	Bands	Exchange
3 Oct	1900-2030	CW	RSGB Slow Speed Cumulative	3.5	RST + Name
4 Oct	0000-2359	PSK	TARA PSK Rumble	3.5 - 50	Name + Prefix
4/5 Oct	0800-0759	SSB	Oceania DX	1.8 - 28	RST + SN
4 Oct	1500-1859	SSB	EU Sprint	3.5, 7, 14	SN + Name
5 Oct	0700-1900	SSB	RSGB 21/28MHz	21/28	RST + SN + District
11 Oct	1500-1859	CW	EU Sprint	3.5, 7, 14	SN + Name
11/12 Oct	0800-0759	CW	Oceania DX	1.8 - 28	RST + SN
19 Oct	0700-1900	CW	RSGB 21/28MHz	21/28	RST + SN + District
25/26 Oct	0000-2359	SSB	CQ WW DX SSB	1.8 - 28	RST + CQ Zone

VHF CONTESTS

Date	Time	Mode	Contest	Bands	Exchange
4 Oct	1300-2200	ALL	RSGB 1.3/2.3GHz Trophies	1.3/2.3G	RST+SN+Locator
4/5 Oct	1400-1400	ALL	RSGB 432MHz - 248GHz	432-248G	RST+SN+Locator
7 Oct	2000-2230	ALL	RSGB 144MHz Activity	144	RST+SN+Locator
14 Oct	2000-2230	ALL	RSGB 432MHz Activity	432	RST+SN+Locator
19 Oct	0900-1300	ALL	RSGB 50MHz	50	RST+SN+Postcode
21 Oct	2000-2230	ALL	RSGB 1.3/2.3GHz Activity	1.3/2.3G	RST+SN+Locator
28 Oct	1900-2130	ALL	RSGB 50MHz Activity	50	RST+SN+Locator

AFFILIATED SOCIETIES SECTION

Club	Station 1	Station 2	Station 3	Station 4	Station 5	Totals
Lichfield ARS A	G3NKC	G3SJJ	GW3YDX	G4XUM	G0MTN	12780
Mid Beds Contest Association	G4BJM	G4BWP	G4PIQ	G5LP	G4MRS	12600
De Montfort University ARS	G3OAY	G3RIR	M0TTT	G4EOF	G4ARI	11800
Chiltern DX Club A	G4BUO	G0CKP	G3XTT	M0CDX	G4IFB	11460
Addiscombe ARC A	G3JJZ	G3RQZ	G3SJX	G3UFY	G3VYI	10850
Bristol Contest Group A	G3XSV	G0WKW	G3SWH	M0MAT	G3TKF	10450
Grimsby Amateur Radio Society	G3TBK	G3RXP	G3RSD	M0AJT	G4EBK	10210
Cheltenham ARA A	G3NKS	G4ERP	G4ENA	G3LVP	G4BGW	9260
Newbury & DARS A	G3RVM	G3KLH	G3ZGC/P	G0ORH	G4FON	9200
Hadley Wood Contest Group	G3ZVW	G3RWL	G3KTZ	G4KZD	M0BOX	8800
Horsham Amateur Radio Club A	G3WZT	G3LET	G3OGP	G3SWC	G3ZBU	8640
Echelford ARS A	G3KKQ	G4TSH	G0OPB	G4IRN	G3EAO	8600
Peterborough & District ARC	G3KHZ	G3MCK	G3PJT	G4KXG	G4WFQ	8330
RNARS Colchester	G0IBN/P	G3GLL	G3OOK	G3YAJ	-	7800
Dragon ARC	GW4VEQ	GW0GEI	GW3VVC	GW3PRL	GW3HCL	7710
Sutton and Cheam Radio Society	G0KBL	G4CWH	G4ERW	G3DCZ	-	7070
Maidenhead & DARC	G3LVW	G3RZF	G4RGK	G4WJS	G3TWG	7030
RAFARS Waddington A	G4KGG	G3ZDW/P	G3SET	G3TTH	G3IGU	6750
Contest Cambria	GW3XEJ	GW3SQX	GW4BLE	GW3LEW	-	6400
Torbay ARS A	G0IVZ	G3LHJ	G0RDO	M0APB	G3SNU	6340
Lichfield ARS B	G3VHB	M0BEW	G3ZBE	-	-	6210
Stirling & District ARS	GM6NX	GM3YTS	GM0CLN	MM0BQI	-	6130
Norfolk Amateur Radio Club	G3PDH	G3LDI	G4DYC	G0HUZ	G3PZX	5790
RNARS Rosyth	GM3CFS	GM3UM	GM3XGX	GM4SID	MM0WPM	5630
Guildford & DARC	G0EFO	G0HIP	G3YXX	G3ZDD	G0KDL	5580
Stockport Radio Society	G3SVW	G3SHF	G3GMM	M0CGF	M0BEX	5430
Weston-super-Mare Radio Society	G6PZ	G3TJE	G3YOL	-	-	4680
Horndean & DARC	G0MBQ	G0RPX	G0UHM	G3PSM	G4FBS	4660
Yorkshire CSG	G3LZQ	G4RCG	-	-	-	4660
Cheltenham ARA B	G3HJF	G4NSZ	G3JJG	G3SNN	G3IFB	4600
Bromsgrove & DARS	G4AHK/P	G3TQD	G3RLF	M0BQE	-	4410
Harwich ARIG A	G0SCP	G0DVJ/P	G4AQZ	G4FTP	G4YJQ	4290
Chesham & DARS	G3MEH	G3VRY	G3XZG	M0CQN	-	3960
Yeovil ARC	G3GC	G3CQR	2E0NPB	G3BEC	G3ICO	3880
Crawley Amateur Radio Club	G3WSC	G3VKW	G3BRR	G4TTY	-	3750
Edgware & District ARS	G3WUX	G4IUZ	-	-	-	3740
RNARS Birmingham	G3HZL	G3LCS	G4SFO	-	-	3650
Ripon & District ARS	G3UNA/P	G0HUC	G3GVY	G4IUF	-	3460
Farnborough & DARS	G3HEJ	G4BJQ	G0VYR	-	-	3380
Leicester Radio Society	G3LRS	G0WBC	G0LZA	-	-	3340
Harwell ARS	G3VPW	G4HLX	M0CUL	M0DDT	G0THY	3160
Strathmore Amateur Radio Club	GM0SHD	GM4AFF	GM0VIT	-	-	3160
Northampton Radio Club	G3GWB/P	M0CTC	M0ANS	G3MPZ	-	3100
Reading & DARC	G0LHZ	G0VQR	M5ALG	G3DMQ	-	2940
Flight Refuelling ARS	G4POF	G0WAL	M0PTR	-	-	2800
Surrey Radio Contact Club	G3BFP	G8TB	G4DJR	G3RJW	-	2760
Clifton ARS	M0BPQ	G0UJK	G0DCG	-	-	2540
3 As Contest Group	G3WVG	-	-	-	-	2380
Addiscombe ARC B	G4ALE	-	-	-	-	2330
Scarborough Amateur Radio Society	G3JBR	G4FCH	G4ZGP	G0WHO	-	2220
Orkney ARC	GM3POI	-	-	-	-	2160
RNARS Portsmouth	G3LIK	-	-	-	-	2040
Scunthorpe Steel Amateur Radio Club	G4OGB	-	-	-	-	2020
Sutherland and District ARC	GM3WOJ	-	-	-	-	2020
Harwich ARIG B	M0CGE	G4EYE	-	-	-	2000
Chiltern DX Club B	G3WPH	-	-	-	-	1960
Havering & DARC	G3JSR	G3TTB	-	-	-	1920
Vale of White Horse ARS	G3SEK	-	-	-	-	1920
RNARS Barrow	G3IZD	-	-	-	-	1840
Cockenzie & Port Seton ARC	GM4ZRR	GM4UYZ	-	-	-	1560
RAFARS Cosford	G4CWN	M0BYJ	G0VBT	-	-	1400
Colchester RA	G0OSR	G3FIJ	G4KTI	-	-	1380
RAFARS Sussex	G3JKY	-	-	-	-	1300
Stevenage & DARS	G4DDX	-	-	-	-	1290
Bracknell ARC	G3YMC	-	-	-	-	1240
RAFARS Devon	G3LUW	-	-	-	-	1240
Gloucester ARES	G3MA	-	-	-	-	1230
Horsham Amateur Radio Club B	G3VQO	-	-	-	-	1230
RNARS Newcastle	G3AWR	-	-	-	-	1220
Eden Vale RS	G3JYP	-	-	-	-	1180
Newbury & DARS B	G3NVO	-	-	-	-	1180
Glenrothes &DARC	GM0UZM	GM0VFD	GM3YBQ	-	-	1090
Worthing & DARC	M0GMT	-	-	-	-	1050
Meirion ARS	GW3SB	-	-	-	-	990
Isle of Barra	MM3BRR	-	-	-	-	980
Kettering & DRS	G4KXG	-	-	-	-	960
Blackwood ARS	GW4HBK	-	-	-	-	930
Bolsover ARS	G4AGE	M3MYK	-	-	-	800
Stratford-upon-Avon & DRS	G0MRH	-	-	-	-	770
Rugby ATS	G3BXF	G3TQF	G4DDW	M0DEH	-	520
Echelford ARS B	G3JUL	G3NOH	-	-	-	450
Milton Keynes ARS	M0BZK	M0TIF	-	-	-	450
RAFARS Waddington B	G0SWO	G3UYV	-	-	-	260
Torbay ARS B	M3NSB	-	-	-	-	90

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MLP32 TX & RX 100-1300MHz one feed, S.W.R. 2:1 and below over whole frequency range professional quality (length 1420mm) **£99.95**

MLP62 same spec as MLP32 but with increased freq. range 50-1300 Length 2000mm **£169.95**

MOBILE HF WHIPS (with 3/8 base fitting)

AMPRO 6 mt **£16.95**
(Length 4.6' approx)

AMPRO 10 mt **£16.95**
(Length 7' approx)

AMPRO 12 mt **£16.95**
(Length 7' approx)

AMPRO 15 mt **£16.95**
(Length 7' approx)

AMPRO 17 mt **£16.95**
(Length 7' approx)

AMPRO 20 mt **£16.95**
(Length 7' approx)

AMPRO 30 mt **£16.95**
(Length 7' approx)

AMPRO 40 mt **£16.95**
(Length 7' approx)

AMPRO 80 mt **£19.95**
(Length 7' approx)

AMPRO 160 mt **£49.95**
(Length 7' approx)

AMPRO MB5 Multi band 10/15/20/40/80 can use 4 Bands at one time *(Length 100")* **£69.95**

VHF/UHF MOBILE ANTENNAS

MICRO MAG 2 Metre 70 cms Super Strong 1" Mag Mount (Length 22") **£14.95**

MR700 2m/70cms, 1/4 wave & 5/8, Gain 2m 0dB/3.0dB 70cms Length 20" 3⁄8 Fitting **£7.95**
SO239 Fitting **£9.95**

MR 777 2 Metre 70 cms 2.8 & 4.8 dBd Gain (5⁄8 & 2x5⁄8 wave) (Length 60") (3⁄8 fitting) **£16.95**
(SO239 fitting) **£18.95**

MRQ525 2m/70cms, 1/4 wave & 5/8, Gain 2m 0.5dB/3.2dB 70cms Length 17"
SO239 fitting commercial quality **£19.95**

MRQ500 2m/70cms, 1/2 wave & 2x5/8, Gain 2m 3.2dB/5.8db 70cms Length 38" SO239 fitting commercial quality **£24.95**

MRQ750 2m/70cms, 6/8 wave & 3x5/8, Gain 2m 5.5dB/8.0dB 70cms Length 60" SO239 fitting commercial quality **£39.95**

MRQ800 6/2/70cms 1/4 6/8 & 3 x 5/8, Gain 6m3.0dBi/2m 5.0dB/70 7.5dB Length 60" SO239 fitting commercial quality **£39.95**

GF151 New low price **£29.95**

SINGLE BAND MOBILE ANTENNAS

MR 214 2 Metre 1⁄4 wave (3⁄8 fitting) **£3.99**
(SO239 fitting) **£5.00**

MR260S 2 Metre 1⁄2 wave 2.5 dBd gain Length 43"
SO239 fitting **£24.95**

MR 258 2 Metre 5⁄8 wave 3.2 dBd Gain (3⁄8 fitting) (Length 58") **£12.95**

MR 650 2 Metre 5⁄8 wave open coil (3.2 dBd Gain) (Length 52") (3⁄8 fitting) **£9.95**

MR268S 2 Metre 5⁄8 wave 3.5dBd gain Length 51" S0239 fitting **£19.95**

MR280S 2 Metre 6⁄8 wave 5.8dBd gain Length 58" SO239 fitting **£29.95**

MR 614 6 Metre loaded 1⁄4 wave (Length 56") (3⁄8 fitting) **£13.95**

MR 644 6 Metre loaded 1⁄4 wave (Length 40") (3⁄8 fitting) **£12.95**
(SO239 fitting) **£15.95**

SINGLE BAND END FED BASE ANTENNAS

70 cms 1⁄2 wave, length 26", gain 3.5dB **£24.95**
2 metre 1⁄2 wave, length 52", gain 3.5dB **£24.95**
4 metre 1⁄2 wave, length 80", gain 3.5dB **£34.95**
6 metre 1⁄2 wave, length 120", gain 3.5dB **£44.95**
6 metre 5⁄8 wave, length 150", gain 5.5dB **£49.95**
(All above end fed antennas are DC grounded, so are radial free!)

VHF/UHF VERTICAL CO-LINEAR FIBREGLASS BASE ANTENNA

SQ & BM Range VX 6 Co-linear:- Specially Designed Tubular Vertical Coils individually tuned to within 0.05pf (maximum power 100 watts)

BM100 Dual-Bander **£29.95**
(2 mts 3dBd) (70cms 6dBd) (Length 39")

SQBM100 Dual-Bander **£39.95**
(2 mts 3dBd) (70cms 6dBd) (Length 39")

BM200 Dual-Bander **£39.95**
(2 mts 4.5dBd) (70cms 7.5dBd) (Length 62")

SQBM200 Dual-Bander **£49.95**
(2 mts 4.5dBd) (70cms 7.5dBd) (Length 62")

SQBM500 Dual - Bander Super Gainer **£59.95**
(2 mts 6.8dBd) (70cms 9.2dBd) (Length100")

SQBM800 Dual - Bander Ultra Gainer **£129.95**
(2 mts 8.5dBd) (70cms 12.5dBd) (Length 200")

BM1000 Tri-Bander **£59.95**
(2 mts 6.2dBd) (6 mts 3.0dBd) (70cms 8.4dBd) (Length 100")

SQBM1000 Tri-Bander **£69.95**
(2 mts 6.2dBd) (6 mts 3.0dBd) (70cms 8.4dBd) (Length 100")

SQBM 100/200/500/800/1000 ***are Polycoated Fibre Glass with Chrome & Stainless Steel Fittings.***

SINGLE BAND VERTICAL CO-LINEAR BASE ANTENNA

BM33 70 cm 2 X 5⁄8 wave Length 39" 7.0 dBd Gain **£34.95**
BM45 70cm 3 X 5⁄8 wave Length 62" 8.5 dBd Gain **£49.95**
BM55 70cm 4 X 5⁄8 wave Length 100" 10 dBd Gain **£69.95**
BM60 2mtr5⁄8 Wave, Length 62", 5.5dBd Gain **£49.95**
BM65 2mtr 2 X 5⁄8 Wave, Length 100", 8.0 dBd Gain **£69.95**

MINI HF DIPOLES (length 11' approx)

MD020 20mt version approx only 11ft **£39.95**
MD040 40mt version approx only 11ft **£44.95**
MDO80 80mt version approx only 11ft **£49.95**
(aluminium construction)

ROTATIVE HF DIPOLE

RDP-3B 10/15/20mtrs length 7.40m **£99.95**
RDP-40M 40mtrs length 11.20m **£139.95**
RDP-6B 10/12/15/17/20/30mtrs boom length 1.00m. Length 10.0m **£199.95**

HF DELTA LOOPS

DLHF-100 10/15/20mtrs (12/17-30m) Boom length 4.2m. Max height 6.8m. Weight 35kg. Gain 10dB **£399.95**

HAND-HELD ANTENNAS

MRW-300 Rubber Duck TX 2 Metre & 70 cms RX 25-1800 Mhz Length 21cm BNC fitting **£12.95**

MRW-310 Rubber DuckTX 2 Metre & 70 cms Super Gainer RX 25- 1800 Length 40cm BNC fitting **£14.95**

MRW-232 Mini Miracle TX 2 Metre 70 & 23 cms RX 25-1800 Mhz Length just 4.5cm BNC fitting **£19.95**

MRW-250 Telescopic TX 2 Metre & 70 cms RX 25-1800 Mhz Length 14-41cm BNC fitting **£16.95**

MRW-200 Flexi TX 2 Metre & 70cms RX 25-1800 Mhz Length 21cm SMA fitting **£19.95**

MRW-210 Flexi TX 2 Metre & 70cms Super Gainer RX 25-1800 Mhz Length 37cm SMA fitting **£22.95**

All of the above are suitable to any transceiver or scanner.
Please add £2.00 p+p for hand-held antennas.

HB9CV 2 ELEMENT BEAM 3.5 dBd

70cms	(Boom 12")	**£15.95**
2 metre	(Boom 20")	**£19.95**
4 metre	(Boom 23")	**£27.95**
6 metre	(Boom 33")	**£34.95**
10 metre	(Boom 52")	**£64.95**
6/2/70 Triband	(Boom 45")	**£64.95**

CROSSED YAGI BEAMS All fittings Stainless Steel

2 metre 5 Element
(Boom 64") (Gain 7.5dBd) **£74.95**

2 metre 8 Element
(Boom 126") (Gain 11.5dBd) **£94.95**

70 cms 13 Element
(Boom 83") (Gain 12.5dBd) **£74.95**

YAGI BEAMS All fittings Stainless Steel

2 metre 4 Element
(Boom 48") (Gain 7dBd) **£24.95**

2 metre 5 Element
(Boom 63") (Gain 10dBd) **£44.95**

2 metre 8 Element
(Boom 125") (Gain 12dBd) **£59.95**

2 metre 11 Element
(Boom 185") (Gain 13dBd) **£89.95**

4 metre 3 Element
(Boom 45") (Gain 8dBd) **£49.95**

4 metre 5 Element
(Boom 128") (Gain 10dBd) **£59.95**

6 metre 3 Element
(Boom 72") (Gain 7.5dBd) **£54.95**

6 metre 5 Element
(Boom 142") (Gain 9.5dBd) **£74.95**

70 cms 13 Element
(Boom 76") (Gain 12.5dBd) **£49.95**

ZL SPECIAL YAGI BEAMS
ALL FITTINGS STAINLESS STEEL

2 metre 5 Element (Boom 38") (Gain 9.5dBd) **£39.95**
2 metre 7 Element (Boom 60") (Gain 12dBd) **£49.95**
2 metre 12 Element (Boom 126") (Gain 14dBd) **£74.95**
70 cms 7 Element (Boom 28") (Gain 11.5dBd) **£34.95**
70 cms 12 Element (Boom 48") (Gain 14dBd) **£49.95**

MULTI PURPOSE ANTENNAS

MSS-1 Freq RX 25-2000 Mhz, TX 2 mtr 2.5 dBd Gain, TX 70cms 4.0 dBd Gain, Length 39" **£39.95**

MSS-2 Freq RX 25-2000 Mhz, TX 2 mtr 4.0 dBd Gain, TX 70cms 6.0 dBd Gain, Length 62" **£49.95**

IVX-2000 Freq RX 25-2000 Mhz, TX 6 mtr 2.0 dBd Gain, 2 mtr 4dBd Gain, 70cms 6dBd Gain, Length 100" **£89.95**

Above antennas are suitable for transceivers only

HALO LOOPS

2 metre (size 12" approx) **£12.95**
4 metre (size 20" approx) **£18.95**
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G5RV Wire Antenna (10-40/80 metre)
All fittings Stainless Steel

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Heavy Duty Ali (1.2mm wall)
1 1/4" single 5' ali pole £7.00
1 1/4" set of four (20' total approx) £24.95
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1 1/2" set of four (20' total approx) £34.95
1 3/4" single 5' ali pole £12.00
1 3/4" single 5' ali pole (20' total approx) £39.95
2" single 5' ali pole £15.00
2" set of four (20' total approx) £49.95
(All swaged poles have a push fit to give a very strong mast set)

REINFORCED HARDENED FIBRE GLASS MASTS (GRP)

1 1/2" Diameter 2 metres long £16.00
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GUY ROPE 30 METRES

MGR-3 3mm (maximum load 250 kgs) £6.95
MGR-4 4mm (maximum load 380 kgs) £14.95
MGR-6 6mm (maximum load 620 kgs) £29.95

CABLE & COAX CABLE

RG58 best quality standard per mt 35p
RG58 best quality military spec per mt 60p
Mini 8 best quality military spec best quality per mt 70p
RG213 best quality military spec per mt 85p
H200 best quality military coax cable per mt £1.10
3-core rotator cable per mt 45p
7-core rotator cable per mt £1.00
PHONE FOR 100 METRE DISCOUNT PRICE.

CONNECTORS & ADAPTERS

PL259/9 ..... £0.75 each
PL259/6 ..... £0.75 each
PL259/7 for mini 8 ..... £1.00 each
BNC (Screw Type) ..... £1.00 each
BNC (Solder Type) ..... £1.00 each
BNC for 9mm (RG213) £2.50
N TYPE for RG58 ..... £2.50 each
N TYPE for RG213 ..... £2.50 each
SO239 to BNC ..... £1.50 each
PL259 to BNC ..... £2.00 each
N TYPE to SO239 ..... £3.00 each
BNC to N-type £2.50
SMA to BNC £3.95
SMA to SO239 ..... £3.95
SMA to PL259 ..... £3.95
SMA to BNC (male) £3.95
SO239 chasis socket round £1.00
N-type chasis socket round £2.50
SO239 double female £1.00
N-type double female £2.50
SO239 double female £1.00

10/11 METRE ANTENNAS

G.A.P.12 1/2 wave alumimum (length 18' approx) £24.95
G.A.P.58 5/8 wave aluminium (length 21' approx) £29.95
S27-3 3-element yagi. Freq: 27-28MHz. Length: 2.5mtrs. Gain: 8.5dB £59.95
S27-4 4-element yagi. Freq: 27-28MHz. Length: 3.8mtrs. Gain: 10.5dB £69.95

BALUNS

MB-1 1:1 Balun 400 watts power £24.95
MB-4 4:1 Balun 400 watts power £24.95
MB-6 6:1 Balun 400 watts power £24.95
MB-1X 1:1 Balun 1000 watts power £29.95
MB-4X 4:1 Balun 1000 watts power £29.95
MB-6X 6:1 Balun 1000 watts power £29.95
MB-Y2 Yagi Balun 1.5 to 50MHz 1kW £24.95

TRI/DUPLEXER & ANTENNA SWITCHES

MD-24 HF or VHF/UHF internal duplexer (1.3-225MHz) (350-540MHz) SO239/PL259 fittings £22.95
MD-24N same spec as MD-24 but "N-type" fittings £24.95
MD-25 HF or VHF/UHF internal/external duplexer (1.3-225MHz) (350-540MHz) SO239 fittings £24.95
MX2000 HF/VHF/UHF internal Tri-plexer (1.6-60MHz) (110-170MHz) (300-950MHz) £49.95
CS201 Two-way di-cast antenna switch. Freq: 0-1000MHz max 2,500 watts SO239 fittings £18.95
CS201-N Same spec as CS201 but with N-type fittings £28.95
CS401 Same spec as CS201 but4-way £49.95

ANTENNA ROTATORS

AR-31050 Very light duty TV/UHF £24.95
AR-300XL Light duty UHF\VHF £49.95
YS-130 Medium duty VHF £79.95
RC5-1 Heavy duty HF £349.95
RG5-3 Heavy Duty HF inc Pre Set Control Box £449.95
AR26 Alignment Bearing for the AR300XL £18.95
RC26 Alignment Bearing for RC5-1/3 ..... £49.95

MOBILE MOUNTS

Turbo mag mount 7" 4mtrs coax/PL259 3/8 or SO239 ..... £14.95
Tri-mag mount 3 x 5" 4mtrs coax/PL259 3/8 or SO239 ..... £39.95
Hatch Back Mount (stainless steel) 4 mts coax/PL259 3/8 or SO239 fully adjustable with turn knob £29.95
Gutter Mount (same as above) £29.95
Rail Mount (aluminium) 4mtrs coax/PL259 sutiable for up to 1inch roof bars or poles 3/8 fitting £12.95
SO259 fitting £14.95
Gutter Mount (cast aluminium) 4mtrs coax/PL259 3/8 fitting £9.95
SO259 fitting £12.95
Hatch Back Mount 3/8 4mtrs coax/PL259 ..... £12.95
Roof stud Mount 4mts coax/PL259 3/8 or SO239 fitting £12.95

ANTENNA WIRE & RIBBON

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

HF BALCONY ANTENNA

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

MISCELLANEOUS ITEMS

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

TELESCOPIC MASTS (aluminium & fibreglass options)

TMA3 3" to 1 1/4" heavy duty aluminium telescopic mast set, approx 40ft when errect, 6ft collapsed £199.95
TMA2 2 1/4" to 1 1/4" heavy duty telescopic mast set, approx 40ft when errect, 9ft collapsed £149.95
TMA1 2" to 1 1/4" heavy duty aluminium telescopic mast set, approx 20ft when errect, 6ft collapsed £99.95
TMAF-1 2" to 1 1/4" heavy duty fibreglass telescopic mast set, approx 20ft when errect, 6ft collapsed £99.95
TMAF-2 2 1/4" to 1 1/4" heavy duty telescopic fibreglass mast set, approx 40ft when errect, 9ft collapsed £189.95

HF YAGI

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

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

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

HF VERTICALS

VR3000 3 BAND VERTICAL
FREQ: 10-15-20 Mtrs
GAIN: 3.8 dBd HEIGHT:3.80m POWER:2000 Watts (without radials)
POWER: 500 Watts (with optional radials) £89.95
OPTIONAL 10-15-20mtr radial kit £34.95

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

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

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

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

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

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

TRAPPED WIRE DI-POLE ANTENNAS

(Hi Grade Heavy Duty Commercial Antennas)

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

PATCH LEADS

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

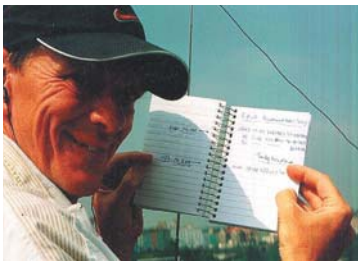
MILITARY SPECIFICATION LEADS
1mtr RG58 Mil spec PL259 to PL259 lead £4.95
10mtr RG58 Mil spec PL259 to PL259 lead £10.95
30mtr RG58 Mil spec PL259 to PL259 lead £24.95
1mtr RG213 Mil spec PL259 to PL259 lead £4.95
10mtr RG213 Mil spec PL259 to PL259 lead £14.95
30mtr RG213 Mil spec PL259 to PL259 lead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

COAX SWITCH SALE

CS201 Two-way 3 X SO239 £18.95
.....this month just **£12.95**
CS201N Two-way 3 X N-type £28.95
.....this month just **£18.95**
CS401 Four-way 5 X SO239 £49.95
.....this month just **£39.95**
Plus £6.00 P&P

By Bob Treacher, BRS32525, 93 Elibank Road, Eltham, London SE9 1QJ. E-mail: brs32525@compuserve.com

SWL



The author, pleased at logging V73MJ as his 200th DXCC entry.

Due to Internet problems which have so far been impossible to resolve, I have been unable to take account of any news sent by e-mail this time around. I hope that normal service will be resumed in time for next month's column.

200-UP!

Our holiday to Wales was a success in that I was able to take the total number of DXCC entities heard to 201! I am delighted to have achieved the landmark with a simple receiving setup, and not letting my listening intrude into our holiday too much. For the record, I was listening on a Sony ICF-SW7600G receiver with just its whip or its clip-on wire extension, or an 11m long wire.

With the DXCC total at 179 from our three previous holidays in Pembrokeshire, getting to the 200 milestone was always going to be a challenge as most of the 'easy' ones had already been heard. The hope was for some decent activity from Africa as there were well over 20 DXCC entities on the 'wanted' list. As new ones from Europe, South, Central and North America were largely reserved for such countries only likely to be activated by major DXpeditions, some real 'surprises' were needed to help achieve the goal.

The fact that we did achieve this tells you that there *were* some surprises – some quite good ones actually! Activity from Africa during afternoon listening sessions on the beach was the best during all our time in Wales.

So, what was heard? Turning the receiver on for the first time at our hotel on the first evening gave me No 180 – ZC4RAF. The next two new ones came into the surprises category – ET3AA and YK1AM. These were followed by V31MX and VP2MVU. The IOTA weekend was given over to Simon so that he could be active as MW3CVN/P, so any further new ones had to wait!

The wait was worth it, as CY9A, NG5L/YI and VP2VFM were added. These were followed by the DXpedition to 3DA0 – 3DA0WC, and a big surprise in the shape of 6O0A. With 10 days of the holiday left, nine were needed to achieve the 200 – the odds started to look favourable! Several blank days followed, but XT2ATI, ST2BSS, 5Z4RT, 3B9ZL, 3XY1L and EP3PTT made the target look possible again. Five days left – three new ones still needed! The XU expedition – XU7ACT - was heard for No 198. Then, two blank days so it was now two more in two days and the goal was, once again looking to be more of a challenge. A change in the listening pattern was needed. So, instead of listening during afternoons and evenings, the alarm was set a little earlier and it was decided to spend time listening during the morning. The plan worked perfectly. KH6FKG was No 199 and V73MJ brought up the 200. We celebrated with an expensive meal and a few drinks! Back at the hotel just before midnight, 200 became 201 when 6W1HM was heard.

Collecting the cards to claim SWL DXCC is proving to be a slow process, but I hope that we might achieve that before next year's holiday!

CQWW SWL CHALLENGE

It's that time of year again! Although entries to recent challenges have fallen, I will run the event again this year – but it may be for the last time. I say that as SWL contest activity seems to be on a downward slope, and HF conditions will not be at their best for the next five years. There is also the unenviable job of checking your entries! The weekend is, however, greatly enjoyed because of the tremendous band activity and the fact that SWLs can add to their DXCC totals by listening during the contest weekend and taking part in the event. The rules are the same as last year – they are re-printed here for ease of reference. ◆

CQWW SWL CHALLENGE 2003 - RULES

The aim of the challenge is to log as many countries as possible:
SSB: in the 48 hours from 0000UTC on 25 October 2003 to 2359 on 26 October 2003;
CW: in the 48 hours from 0000UTC on 29 November 2003 to 2359 on 30 November 2003. The rules are the same for both the SSB and the CW challenges.
Please read the rules carefully.

RULES
1. SWLs may listen at any time during the 48-hour periods.
2. Only one station from each DXCC country may be logged on each of the main amateur bands (28, 21, 14, 7, 3.5 and 1.8MHz).
3. There will be three sections:
A: Single operator
NOTE: SWLs entering Section A must include a declaration to the effect that only one listener used the station, only one receiver was in use and no use was made of the Packet Cluster or the DX Summit.
B: Multioperator, multi-receiver
C: Multioperator, single receiver
NOTE: Any single-operator SWL with access to Packet Cluster or DX Summit must enter Section C.
4. Points will be as follows:
(a) Countries in the SWL's own continent score 1 point on each band. Countries outside the SWL's own continent score 5 points on each band.
(b) The final score will be the total of the countries heard on the six bands multiplied by the total number of points from each of the six bands (for example, 400 countries x 900 points = a score of 360,000).
5. Entries must show (a) Date; (b) Time (UTC); (c) Callsign of station heard. The callsign of the station being worked is not required; (d) RS(T) of station heard at SWL's QTH. No station may be logged whose RS(T) is less than 33(9). Separate log sheets must be provided for each band.
6. A country multiplier check sheet must be provided. Only countries shown on the official DXCC List will count as multipliers. Each entry must have a cover sheet giving the claimed score.
7. Any entry not complying with all of these rules may be omitted from the results listings.
8. Any entry which is poorly presented or is not within the spirit of the challenge will be omitted from the results listings.
9. Logs should be sent to Bob Treacher, BRS32525, 93 Elibank Road, Eltham, London SE9 1QJ, England
10. Logs must be postmarked no later than:
SSB CHALLENGE – 26 November 2003;
CW CHALLENGE – 30 December 2003.
11. Entrants wishing to receive a copy of the results booklet must include £1, $1 or two IRCs to offset the cost of printing and postage. The results may also be published on the Internet.

CQWW SWL CHALLENGE RESULTS 2002

SSB

Single operator

Pos	SWL	MULTS	28	21	14	7	3.5	1.8	SCORE
1	ONL383	565	129	121	115	93	71	36	978,580
2	HG1-777	480	110	89	108	70	61	42	662,400
3	GM7VXR	477	105	101	83	78	63	47	626,301
4	BRS173787	453	101	101	97	75	52	27	592,977
5	BRS8841	438	99	72	94	82	49	42	545,748
6	NL-455	443	103	88	68	83	58	43	529,820
7	DE0RFE	431	96	86	87	67	54	41	520,217
8	OE-527	393	99	77	72	76	47	22	437,409
9	CX-N020	298	100	84	76	33	5	0	388,294
10	UA3-170-847	408	76	77	81	66	61	47	386,784
11	OH2-836	365	78	61	67	60	53	46	334,705
12	D05HCS	360	76	70	66	63	52	33	328,320
13	RS95258	336	58	72	72	45	51	38	309,120
14	OKL7	380	125	102	47	37	41	28	299,464
15	F-14846	328	65	57	80	49	48	29	274,208
16	CXA6-700	276	74	53	59	57	33	0	238,464
17	NL-290	252	31	47	39	62	44	29	161,280
18	G7RSK	265	31	62	48	52	43	29	160,325
19	DH2URF	233	33	40	39	45	39	37	117,665
20	SP-2300-LG	174	48	19	60	0	47	0	104,412
21	OE1-0140	134	29	30	34	24	17	0	29,346

Multi-multi

1	RS178500	699	154	145	145	108	93	54	1,601,409

Multi-single

1	BRS91529	530	115	108	107	84	63	53	836,340
2	RS88568	304	68	63	54	47	43	29	208,240
3	BRS25429	129	129	0	0	0	0	0	56,889

CW

Single operator

1	ONL383	592	123	118	105	107	89	50	1,078,624
2	DH2URF	434	87	88	66	83	60	50	501,120
3	OKL7	413	83	75	81	71	57	46	438,193
4	BRS8841	375	65	84	65	66	55	38	401,625
5	D05HCS	295	66	56	51	54	43	28	195,290
6	SM3-8055	203	48	48	45	25	25	12	83,433
7	ONL3997	183	55	47	41	30	4	6	75,213
8	NL455	156	10	13	29	33	37	34	43,680
9	G6OKU	69	37	12	13	7	0	0	11,109

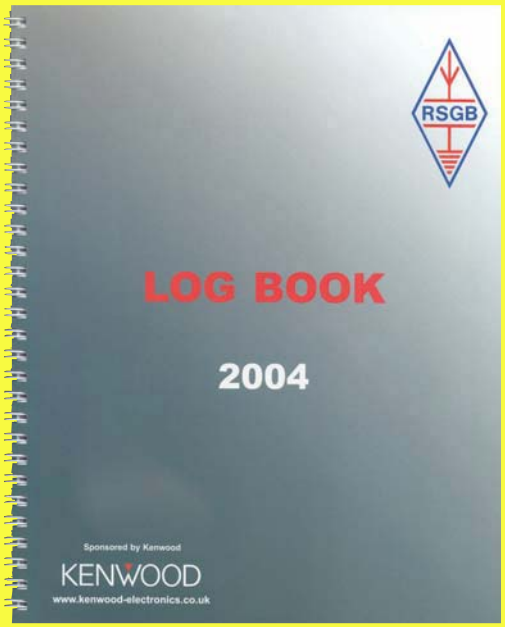
Multi-single

1	OK1-35042	484	110	104	89	83	58	40	706,640
2	YZ1KVA/SWL	401	95	79	66	76	45	40	412,629

NEW

Deluxe Log Book 2004

Available Now !



The Deluxe Log Book is back! Designed for those requiring more from their Logbook, we have produced the popular 2004 Deluxe Logbook & Diary. Containing far more than a standard Log book this edition has been thoroughly revised and updated. Amongst its many features is a new style DXCC prefix guide with an extremely useful twelve-band checklist. A 2004 diary section is included along with a brand new repeater listing. The book is spiral bound with generous 255x420 log pages yet folds neatly for storage (overall folded size is 255x210mm). The Deluxe Log Book & Diary 2004 benefits from the inclusion of:

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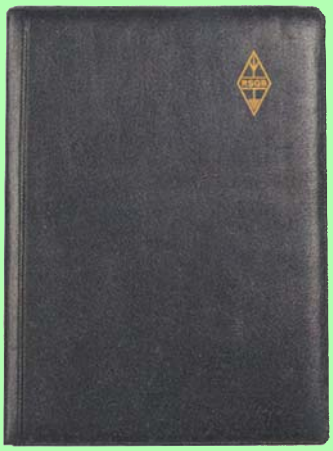

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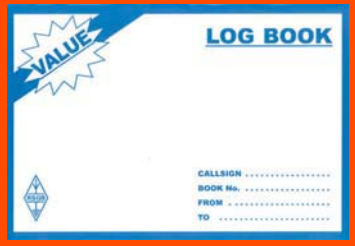

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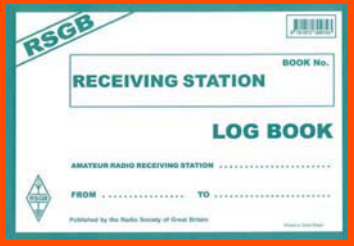

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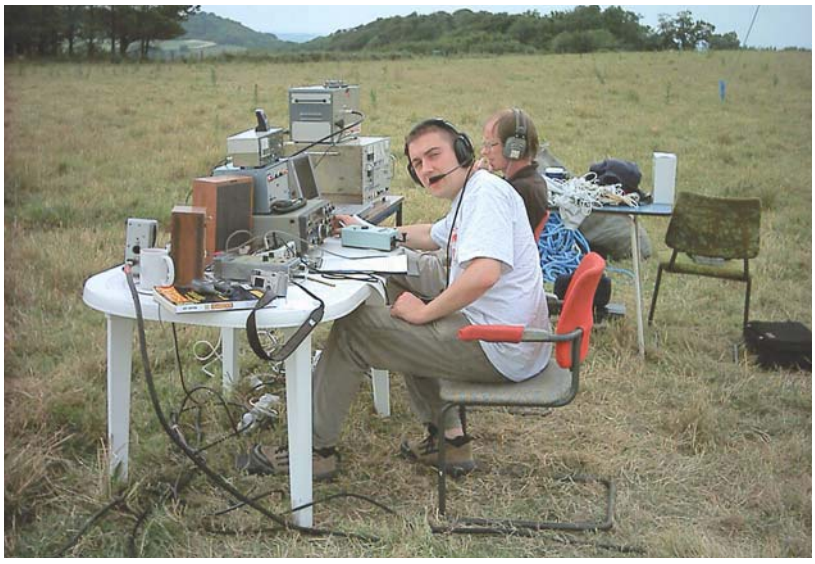
VHF/UHF



"And now for something completely different" – Paul, MOEYT, and Lauri, G6ISY, carry on operating on 4m at the Flight Refuelling ARS station to show what 'Field Day' is literally all about.

PHOTO: ANDY TALBOT, G4JNT, WWW.FRARS.ORG.UK

There have been some excellent tropospheric openings during this reporting period resulting in some record-breaking DX contacts being made. So it seems appropriate to make 'Records' this month's brief opening theme.

Practically all activities have archives of records, eg when the first heart transplant operation was carried out, when the first four-minute mile was run, when man first walked on the Moon, when Britain's first motorway was opened and so on. Then there are feats like the world land speed record and the highest train speed achieved.

So with amateur radio, where 'Firsts and Furthests' are the records we are most familiar with. Subscribers to DUBUS magazine appreciate the 'Toplists' listing the number of grids amateurs have contacted on the various bands from 50MHz-up with the longest distance (ODX) for different modes indicated.

The official keeper of VHF records for IARU Region 1 is Tommy Björnström, SM7NZB, who maintains an excellent website – see the list. If you think you can claim a record, first check his lists and if appropriate e-mail him at sm7nzb@svessa.se with full details of station worked, band, date, time, mode and distance (QRB).

THE BRENDAN TROPHIES

On 19 March 2002 Alexander Dutkewych, N2PIG (GN38LC), and his wife Debra, VA3PIG, operating from western Ireland (IO41UT), claimed to have completed a terrestrial 2m QSO across the North Atlantic using FSK441 mode. Their claim was submitted to the Brendan Trophies' sponsoring body, the Irish Radio Transmitters' Society. The Chairman of the Awards Panel, Sean Nolan, EI7CD, issued a press release on 14 August confirming the rejection of their claim which did not comply with the strict rules for the Brendan Trophies. The rules can be found on the IRTS website – see the panel.

THE TROPO OPENINGS

In an e-mail dated 10 August Bryn Llewellyn, G4DEZ (JO03), sums it up, "What an opening, nothing like it for 20 years. Strings of SP, OK, OZ, LA, SM, single OM and OE on 2m. 70cm, SM, OZ and LA. 23cm, OZ and SM. Must get some sleep sometime!" One highlight was the ducting down to EA8. David Hilton-Jones, G4YTL (IO91), worked EA8/DL6FAW who popped up out of the noise on 144.300MHz during the night of 9 August. The path had been open for a couple of days from Ireland and western parts of the mainland but these ducts rarely extend over land to the more easterly IO8x and IO9x grid columns.

Continuing the 2m story, Peter Blair, G3LTF (IO91), worked EB8AYA (IL18RI) at 2842km on 31 July and from then on until 13 August many EAs and southern French stations up to 1150km. John Lemay, G4ZTR (JO01), caught the opening to mid-Europe in the morning of 4 August working eight SPs, ODX being SP4MPB (KO03) at 1337km; SP1FJZ (JO84) was a new grid. Operating portable from Hail Storm Hill, 1565ft ASL in Rossendale (IO83UR) Myke Oldham, G6DDQ, worked EA8BPX (IL18SK), a QRB of 3075km, using just 2.5W to a 3-ele Yagi at 10ft AGL. Understandably he writes, "I was gob-smacked!"

Bob Harrison, G8HGN (JO01), noted that the more westerly stations had been working into Spain all day on 31 July but it wasn't until 1840 that the EA1VHF beacon got really loud. He contacted four EA1s in IN53, 63 and 73 and a couple of Fs in IN93 and 94. On 3 August there was a Spanish contest resulting in more QSOs into EA1 and EA2 regions. ODX was EA1FDI/P (IN52) at 1201km for a new grid. The 5th was a super day and from 0630 to 1020 he completed 36 QSOs with stations in 18 grids in JO field to the east, ODX being SP6HED (JO80) at 1142km.

In the UK Activity Contest that evening Bob made 89 QSOs with DL, F, G, GW, LA, PA, ON, OZ and SM stations in 31 grids, ODX being LA1T (JO59) at 1041km. The morning of the 10th brought another 13 QSOs into JN19, 49 and JO11, 31, 42 and 52.

Niels Montanana, G8RWG (JO01), worked 14 new grids in the recent good tropo. On 31 July he lists EB1EWE/P and EA1DDO (IN53), EB1DM (IN73), EA1BCB (IN63), F8BON (IN96), F6GPT (IN94) and F6DRO (JN03) and on 3 August DJ8MS (JO63), SM7FMX and OZ1PIF (JO65). Lee Jones, M0LEE (IO92), was QRV 0535-0800 on 5 August and made over 60 contacts with stations across the Continent including F1SA (JN28), DLs in JO30, 31, 33, 41, 43, 52-54, OZs in JO45 and 54, SP3SFM (JO71) plus ONs and PEs.

Members of the Lothians RS went out to IO85WV on the afternoon of 9 August to test out their portable club station GM3HAM/P. From a cliff edge 190m ASL a duct was visible and in six hours they made 230 contacts, mostly with DLs and PAs, plus a few ONs and OZs and an LX. ODX was SP1FJZ (JO84). Thanks to Pete Bates, GM4BYF, for this news.

Chris Bartram, GW4DGU (IO71), worked EA8BPX on 7 August for DXCC entity no. 41 and also worked EA8/DL6FAW all-time terrestrial ODX at 2814km and EB8AYA (IL18). Jamie Ashford, GM7SMV (IO81), lists 81 tropo QSOs in the 2-13 August period. Picking out the ODX contacts on the different days there are EA1FDI/P at 1064km on the 2nd, SK7MW (JO65/1143km) on the 3rd, DC6BB (JO33/756km) on the

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4th, DC0NAC (JO43/890km) on the 5th. Then LA6LCA (JO59/1198km) on the 8th, HB9RDE (JN37/860km) on the 9th, EA8BPX at 2803km on the 12th and F5LCN (JN03/956km) on the 13th.

Now to 70cm and the real DX started when Reg Woolley, G8VHI (IO92), worked EB8AYA on 31 July at 2966km breaking his own 1984 record with EA8XS when he was GW8VHI. However, on 8 August, Ian McCabe, G0FYD (IO83LS), contacted EA8BPX (IL18SK) on SSB to extend the record to 3021km. He used a TS-790 at 45W to a single 21-ele Yagi 17m AGL. On 31 July G3LTF worked EB8AYA after QSYing from 2m. Up to 13 August Peter contacted four EAs at 1000 to 1160km and on the 12th SK6HD/6 at 1230km. On 9 July Ken Punshon, G4APJ (IO83), worked F1RJ and F6GCT (JN18), ON4PS/P and GI4SNA. On 17 August he contacted OK1HBT (JN78), a grid he'd been seeking for some time.

In the evening of the 31 July, G8HGN worked EA1DAX (IN53) for a new grid and on 3 August Bob contacted F5JSD/P (JN08) at 0644 and DL3YEE (JO42) at 2213. On the morning of the 5th he worked DG0KW (JO64) for another new grid. He was QRV in the UK Activity Contest on the 12th completing 30 QSOs with stations in 15 grids, ODX being OZ9KY (JO45) at 782km. After the contest propagation was good to the southwest and he worked F8DBF (IN78) for another new grid. On 4 August Derek, G8TOK (JO01), worked his first new country and grid for years thanks to EI5FK (IO51).

GW4DGU put up a little 9-ele Yagi after VHF NFD and with 25W into a cable with 5dB loss worked EA1FDI/P on 2 August. On the 7th he used a prototype of the Yagi he expects to use later in a box of four or six for 'real' tropo work. He installed an old masthead preamp and his first QSO, with only 8W at the feed, was with EA8BPX. Chris worked DLs, PAs and an F on SSB and CW later that evening. The following evening he completed with EB8AYA at 2803km again for terrestrial all-time ODX. Conditions were good in the Activity Contest on the 12th and his ODX was OZ9KY (JO45) at 1035km.

In sporadic activity on 8 August Paul Higginson, GW8IZR (IO73), worked EA8BPX at 2941km at 1524 and a minute later EA8TJ (IL18) at 2990km. Then from 1927 that evening he made another 21 QSOs with DG, ON, OZ and PA stations in JO11, 21, 22, 31, 33, 43 and 45, ODX being DG3XA (JO43) at 943km.

Although propagation was good at times on 23cm there weren't many reports. G4YTL got going on the band at the end of last year. David built a DB6NT transverter, his first ever SMT project, and it worked first time. A Mitsubishi module gives 18W output and the antenna is a single 35-el M^2 Yagi with masthead preamp. He worked a couple of new grids in the tropo lifts, ODX being F9IE (IN86).

G3LTF lists QSOs with EA1CRK at 918km, F5VHX (JN04) at 732km, OZ1CTZ at 887km and OZ5KM at 906km. Mike Johnson, M5MUF (IO92), is now QRV on the band with 5W output and a 44-el Yagi was on its way when he wrote.

SPORADIC E

As expected, there was still plenty of Es about on 6m and John Palfrey, EH7IT, has been making the most of his Spanish resident's permit. On 2 July he worked C6A/W6JKV* at 1818 plus lots of Europeans bringing 18 new grids. He reminds holiday visitors that the CEPT licence does *not* allow foreign visitors to operate on the band.

Ted Collins's, G4UPS (IO81), report for the period 15–31 July shows Es activity up to the 28th. In the month 22 European beacons were copied plus CN8MC, OX3VHF, VO1ZA, 4X4SIX and 5B4CY. There was propagation to the Eastern Mediterranean on the 19th resulting in QSOs with 4Z5FC*, 4Z4KX* and 4Z4DX* (KM71) and 4X0IS (KM72) from 0911. At 1650 he worked SU1SK* (KM50). EH8s were copied in the evening. The evening of the 21st brought QSOs with UX7MX* (KN98), UR5LAK* (KN89) and UY5HF (KN66). From 1241 on the 22nd there was propagation to North America and Ted completed contacts with W4MYA* (FM07), W4DR* (FM17), K1TOL* (FN44), K2PS*, N3DB* (FM18) and K2ERG* (FN13).

G8HGN worked 4Z4LA (KM72) at 1222 on 19 July and heard HZ1MD at 1328. The 22nd was quite a day for Bob when he contacted NG4C (FM16) at 1249 and heard YM3KA (KM39). Shortly afterwards he made 10 QSOs with ER, YO and US (Ukraine) stations giving him six new grids and a couple more countries, ODX being YO4GJH (KN35) at 2133km.

M5MUF highlights QSOs with 4Z4LA, MU0FBO/MM and CN8KD (IM63), UW5W (KO50), OH8K (KP44), UX0IB (KN88), OH0RJ (JP90), K1SG (FN42), KI1M (FN31) and current ODX at 5335km worked with 10W and a Delta-loop antenna, 4U1ITU (JN36), EH9IB (IM85), EH2CAR/P (IM69) and OY4TN (IP62).

On 19 July GM4VVX worked CN8KD, EH8BPX (IL18), LA4SU (JP77) and GM4ENK (I099) for four new grids. Next day Clive got UA0HQ (KN79), UX0CX (KN59), UR4LL (KO70), 9H1AW (JM75) and SP8RHP (KO10), more new grids. The 22nd was a terrific day resulting in 326 QSOs all over Europe. OH5NYI (KP31), CT1EAT (IM68) and SM4HEJ (JO69) were more new grids. Next day brought T94CV* (JN83) for a new country and grid and finally GJ7DNJ (IN95) for yet another new country and grid.

AURORAL PROPAGATION

On 2m GM4VVX reports an aurora on 26 July resulting in QSOs with DL, G, GM, GW, LA, OH, ON, OZ and SM stations. Activity was low but signals were very strong. On the 29th there was an event for two hours bringing QSOs with Gs, GWs, LAs and OHs but again activity was low. Further weak events occurred on the 31st and on 2, 7 and 8 August. Denny Morrison, GM1BAN/MM3DHH (IO88), was QRV in the 2m event on 11 July and worked DL, G, GI, GM and LA stations in IO72, 82, 84. 87, JO33 and 59. GW4DGU was also QRV that evening and Chris contacted GM3UCN (IO85), SM5KNV (J088) and GM4ILS (IO87). In a strong event on 18 August, which came a long way south, the band was full of strong ONs and PAs in between which he worked OK1DFC (JN79), OK2PMU (JN99) at 1602km, S52EZ (JN78) at 1595km and S50C (JN76) at 1536km.

Steve White, G3ZVW (IO91), was QRV on 6m on 18 August with a beam heading between 0° and 40° and in the 1647–1738 period completed on CW with 14 stations in DL, G, ON and PA. Even stations in adjoining grids were fully auroral with no trace of a pure tone. David Whitaker, BRS25429 (IO93), heard 16 countries – including ES, SP and YL – and 42 grids in the period 1413-1730, so it was quite an extensive event. Martin Hall, GM8IEM (IO78), worked 17 stations on SSB in six countries on 2m on the 18th between 1531 and 1620.

70MHz

The great news about 4m is that Danish amateurs in OZ, OX and OY can now apply for authorisation to

LOCATOR SQUARES TABLE
Starting date: 1-1-1979

Callsign	50MHz	70MHz	144MHz	430MHz	1296MHz	Total
G3IMV	835	20	616	125	53	1649
G0JHC	1040	26	48	4	-	1118
G0FYD	717	9	294	48	17	1067
G4DEZ	658	28	173	75	37	971
GW7SMV	664	-	216	-	-	880
G1SWH	448	42	242	81	30	843
G4YTL	11	56	555	136	13	771
G8TOK	419	39	145	57	29	689
GM4JJJ	206	3	430	46	-	685
G8BCG	661	-	-	-	-	661
G6TTL	381	-	133	90	27	631
G8HGN	346	-	192	73	-	617
M5BXB	351	15	167	56	-	589
G3XDY	-	34	251	175	123	583
M3CLY	262	-	285	20	-	567
MU0FAL	503	-	28	9	3	543
G4OBK	435	25	64	7	-	531
G7KHF	510	-	18	-	-	528
GM4VVX	349	16	152	2	-	519
G3FIJ	278	29	108	51	23	489
G4ZHI	107	17	280	33	-	437
G1UGH	280	-	130	18	-	428
G0ISW	224	6	88	22	-	340
G8VHI	-	-	217	76	40	333
GW3EJR	313	-	-	-	-	313
G1EFL	231	-	67	2	-	300
M1DUD	244	1	32	1	-	278
G3FPK	30	-	246	-	-	276
G4APJ	184	-	59	28	-	271
GM6MEN	186	-	-	-	-	186
M5MUF	141	21	21	-	-	183
EA7IT	67	-	108	-	-	175
G4FUJ	99	20	26	6	5	156
G8RWG	-	-	108	-	-	108
MM1FEO	54	-	13	-	-	67
M3VAM	17	-	18	6	-	41

No satellite, repeater or packet radio QSOs. If no updates received for a year entries will be deleted. Next deadline is Friday 17 October.

operate on the band on 70.025, 70.050 and 70.100MHz. The spectral bandwidth is 10kHz and the maximum power is 25W, otherwise no geographical, antenna, mode or licence class restrictions. A beacon OZ1IGY is QRV on a nominal QRG of 70.021MHz and Heath Rees, GW3HWR, heard it for the first time on 22 July.

From the 4 metre website – see the list – the following 'firsts' are listed:
G3UVR/OZ3ZW 22/07/03;
GD0TEP/OZ3ZW 10/08/03;
GI4KSO/OZ3ZW 22/07/03;
GM3WYL/OZ2LD 21/07/03;
GW3HWR/OZ3ZW 22/07/03;
EI7GL/OZ3ZW 21/07/03;
GM4XRV/OY9JD 03/06/03;
S51DI/OZ3ZW 19/07/03 and S53X/OY9JD 19/07/03.

Thanks to Rupert Bullock, G4XRV, Jón Dam, OY9JD, is QRV with a 20W transverter and 5-ele Yagi and prefers 70.100MHz. A Swedish beacon, SJV900, has been licensed to operate on 70.3125MHz, the only QRG available unfortunately. More good news is that by the time you read this Croatian amateurs may be QRV on the band once the appropriate announcement is made in the Republic of Croatia's Official Gazette. They will have 70.000-70.450MHz on a secondary basis with 10W ERP in A1A, J3E, F1B and F2D modes.

GM4VVX's CQ on 21 July resulted in an Es QSO with S57UUD (JN65) but no others were heard although 6m was going great guns. On the 26th Clive completed auroral contacts with GM4WJA (IO87), GM4DIJ (IO85) and GI4KSO (IO64) and is very pleased with what 10W can achieve on 4m. M5MUF's major activity was in the Trophy Contest on 10 August in which Mike made 24 QSOs, the best being with GM4SIV/P (IO75), G4ADV/P (IO70) and GW3HWR (IO71). On the 17th he worked S51DI on FM during an Es opening.

FINAL NOTES

There is some sad news now. Johnny Stace, G3CCH, passed away on 30 July after several months in a nursing home. He was one of the pioneers of advanced techniques on VHF, especially MS and SSB, big antenna systems and EME.

The Six and Ten Report, edited and produced each month since June 1995 by Prof Martin Harrison, G3USF, and Dr Steve Reed, G0AEV, is now principally available as a free Internet newsletter in Adobe Acrobat format. These procedures started with the June issue and to register visit the website – see the list. For those without Internet access a paper version with a subscription charge will still be available. Write to G0AEV QTHR for details.

Thanks to Neil Clarke, G0CAS, for the copy of the June issue of *SunMag*. Apologies for the exclusion of the Moonbounce and Propagation sections due to lack of space. The deadline for the December issue is **Friday 17 October** and for the January 2004 edition – which seems a long way off compiling this in the August heatwave – it's **11 November**. My telephone answering and fax machine is on 020 8763 9457 and the CompuServe ID is g3fpk ◆

WEB SEARCH

IARU Region 1 VHF records	http://prime.d2g.com/~tommy/reg1/dxrec.htm
IRTS	http://www.irts.ie.htm
4m website	http://www.70mhz.org
OH5IY	http://www.kolumbus.fi/oh5iy
Six and Ten Report	http://www.6and10.org.uk
Flight Refuelling ARS	http://www.frars.org.uk

METEOR SCATTER

Ilkka Yrjölä, OH5IY, author of the popular MSSOFT software for MS operators, has moved his website – see the panel. oh5iy@sral.fi is his e-mail address. Andy Cook, G4PIQ, mentions another MS contest that runs in parallel with the BCC one. It is sponsored by the Radio Club of Salgotarjan (HA6KNB, HG6N) and runs from 2000 on 11 December to 2000 on the 15th and is for HSCW only.

G4YTL completed on 4m at 20WPM CW with OZ2LD on 27 July. Using JT6M he completed with OZ2M (JO65) on 3 August and with OZ1DJJ (JO65) on the 10th. On the 12th David completed with S51DI. In view of the popularity of Joe Taylor's, K1JT, efforts writing his JT44/FSK441/JT6M software, he writes, "I would love to see the RSGB recognising this achievement with some form of award."

On 2m on 27 July G8RWG completed random FSK441 QSOs with HA6ZB (KN07), I6BQI (JN72) and 9A3JH (JN75). G8TOK completed with GW3HWR on JT44 on 4m and Derek reckons 28 July was a super night when, using JT6M, he completed with OZ1DJJ to give Bo his first G station and himself a new country. On the 30th he worked GM4WJA (IO87) on FSK441 and, using JT6M, on 8 August GM6VXB (IO97) and OZ2M. Finally on the 12th GI4KSO (IO64) was another new country.

Back to 2m and during the Perseids using FSK441 GW7SMV completed with HA3UU (JN96) on 9 August; IW1BCV (JN44) and I6BQI (JN72) on the 10th; HA5UK (JN97) and ES6RQ (KO28WA) at 1969km for ODX on the 12th; LY2BAW (KO25) on the 13th and DH2UAK (JO71) on the 18th.

GW4DGU was also QRV on 2m FSK441 in the Perseids completing with LY/IK4PMB (KO25), HA75MS, HB9DFG (JN37) and LA8G (JP44). Chris feels that many people using FSK441 haven't read and understood the current procedures as agreed at the San Marino IARU Region 1 Conference last November (I hope to find space to discuss this next month).

During the Perseids M5MUF put JT6M mode to good use on 6m completing skeds with EI7IX (IO53), GM4WJA and OZ2M. Random completions were with F1JG (JN23), OM3BH (KN18 and 19), SM6CMU (JO57), IS0/F6IRF (JN41), HB0/HB9QQ (JN47), CT1CBI (IM59), SM3BIU (JP73) and OZ1P (JO65). Mike was using 50W to a Delta-loop antenna. His first Danish QSO on 4m was with OZ1DJJ, followed by OZ2M and S51DI.

HELPLINES

IMPORTANT NOTICE

Respondents to items in the 'Helplines' column are advised not to send original documents, but to copy them and send the copies. This is to protect your (often valuable) property in those very few instances where the originals are not returned.

- Peter, ON4UAP (formerly G3UAP), asks if anyone has a copy of the **December 1964 RAE paper**? He would willingly pay the costs for postage or fax of this document. Peter Parker, ON4UAP, Ave Kersbeek 116, 1190 Brussels. Tel/fax: 00322 332 0765.
- Alan, G3ESB, urgently requires manuals, circuits, WHY, for the **Airmec Wave Analyser type 853**, and the **Airmec Oscillator type 304A**. All costs will be met. G3ESB, QTHR. Tel: 01332 735 896, or e-mail joalan@onetel.net.uk
- Richard, G0WKL, is searching for the optional **CTCSS subaudible tone squelch unit FTS-8** for the **Yaesu FT-736R**. G0WKL, QTHR. Tel: 01703 825 630.
- Chris, G4ILR, would be most grateful if he could obtain a **Drake TR-4 sideband transceiver** instruction manual, please; he is trying to keep this old lady going, and with your help and a circuit diagram they shall grow old together. G4ILR, QTHR. Tel: 01603 7361 47 or e-mail chris.judi@virgin.net
- Ron, G3ZSJ, is hoping to repair a **Telequipment oscilloscope model D32** (battery-operated). He needs a circuit diagram and any useful information. All expenses reimbursed. G3ZSJ, QTHR. Tel: 01293 885 701.
- Thomas, G4ORF, is looking for technical or service information for a **Philips RM435 beacon monitor receiver**. Postage and photocopying expenses will be refunded, but please phone or e-mail first (plain text only) to avoid duplication. G4ORF, tel: 01794 514 057 or e-mail: g_4orf@amserve.net
- R V Wright, RS46829, would appreciate receiving a copy of the manual for the **Heathkit valve voltmeter model IM-13U**. All expenses will be paid. RS46829, tel: 01942 255 948.
- Johannes, W4/PA3DPO, is looking for a user manual for the **Nombrex 41**, Serial No 009367. W4/PA3DPO, e-mail: mostair@juno.com
- Ian, G3HGM, has failed to find a source of FETs type **MK-10(F)** and **2SK19GR** for the microphone amplifier in his **Sommerkamp FT-277**. One (or more) of each would be gratefully received. All costs would be met. G3HGM, QTHR. E-mail: jaewen@bigfoot.com
- Bill, GM0KMG, needs a sprung valve cover (12BE6) for the **Hallicrafters S38E**. All expenses will be covered. GM0KMG, QTHR. Tel: 0141 562 4571.
- Don, G0OOC, is looking for a circuit for a PA **linear amplifier, Anglian 1000L**, approximate date in or around the 1960s. He believes it is in the RSGB *Radiocommunication Handbook* with the blue cover (1960). If anyone has one and could copy the circuit to Don, he will be only too pleased to cover all expenses. G0OOC, QTHR. E-mail: g0ooc@aol.com
- David, G3PTU, needs the circuit of a **Marconi 6460/1 power meter and head**. The equipment is also known as **NATO CT596**. G3PTU, e-mail: valid@tesco.net
- Godfrey, G4GLM, poses the following questions. Many **cellular phones** have a 1.55V silver button cell soldered on their circuit boards. What happens when the cell runs out and what do you do then? Buy another? G4GLM, QTHR. Tel: 020 8958 5113.
- Paul, M3HFC, needs a user's / operator's manual for a **Standard C710 Tri-Turbo (tri-band handheld)**. He is willing to borrow or photocopy such a document. M3HFC, e-mail: m3hfc@ntlworld.com
- Bill, GW3DGT. needs the instruction manual for the **Solartron Oscillator type CO546.2**, having a range of 25Hz to 500kHz. He also requires a copy of a booklet, printed in the late 1940s, giving civilian valve numbers and their Armed Services equivalents, together with 4- or 5-pin and octal valve bases. GW3DGT, tel: 01834 831 369.

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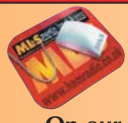

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IARU

In the August *RadCom*, I set out the organisation of IARU Region 1, and its current objectives. This month, I will cover the work of three of its Working Groups. I have chosen the External Relations Committee, EUROCOM and EMC working groups, all of which are working in areas which are very topical at the moment. A major part of IARU's work is with the various international administrations that govern the climate in which amateur radio has to exist.

EXTERNAL RELATIONS COMMITTEE (ERC)

The ERC is chaired by Hans Blondeel Timmerman, PB2T, and is responsible for the coordination of the Region 1 relations with non-amateur entities. The ERC keeps a watching brief, particularly on the work of CEPT and ITU, on matters of importance to the amateur services (eg spectrum organisation, licensing etc) and coordinates the group of Region 1 experts who are able to attend meetings/conferences of these entities. The ERC comprises relevant experts from a number of countries in Region 1 and conducts most of its work by e-mail. ERC members were very active in the run-up to WRC-03, and some were present in Geneva for part or all of the Conference.

EUROCOM

The EUROCOM Working Group (more fully, the 'IARU Region 1 Sub-Regional European Community Working Group') is chaired by Gaston Bertels, ON4WF. It was created some years ago to be a focus for IARU's interests in the European Commission. Today, more and more of the legislation and standards which will affect the environment in which amateur radio exists in the EU are being developed and defined in Brussels. It is therefore entirely appropriate that IARU Region 1 should not simply rely on the efforts of its national societies to influence the thinking of the legislators, but should also have a direct relationship with the European Commission. Being based in Brussels, Gaston is ideally placed to keep close to what is happening in the Commission. He keeps a watchful eye on any legislation which may affect amateur radio and works with other IARU Working Groups to ensure that amateur radio interests are properly advocated and represented.

EUROCOM has been successful in obtaining insertions and alterations in the text of EU Directives to the benefit of amateur radio. The EU has, in allowing such changes, shown that it understands the special position of amateur radio. More recently, EUROCOM has been effective in getting a voice for amateur radio in the various forums within the EU considering Power Line Telecommmunications (PLT), allowing members of the EMC Working group to present arguments to safeguard the radio spectrum. EUROCOM publishes regular newsletters to member societies in the EU, alerting them to developments and actions needed at a national level to support the interests of amateur radio.

EMC WORKING GROUP

Chaired by Christian Verholt, OZ8CY, the EMC Working Group is charged with monitoring developments in the EMC area, with particular reference to the technical, legal and regulatory issues. It is a group that meets once every three years at the IARU Region 1 General Conference, and informally at the annual Friedrichschafen Hamradio event each June, and also at the Zurich and Wroclaw EMC Symposiums. Most of the EMC WG work is done by e-mail, with a network of EMC experts around the Region contributing.

However, more recently, IARU Region 1 and the EMC WG have become more active in representing amateur radio in the ETSI/CENELEC Joint Working Group, the body charged by the EU with developing international standards for limits for emissions from telecommunications cables. It is in this forum that much of the work is being done to try to influence the emerging standards that will govern the operation of PLT systems.

The work to combat the threat from PLT is now moving into lobbying, and member societies in Europe have been asked to encourage their members to write to their electricity supply companies to ask for certain assurances, should the power company be considering the introduction of a PLT service.

REGION 1 WEBSITE

Finally, a reminder that the new IARU Region 1 website is now on-line. Thanks to work by the new webmaster, Nigel Peacock, G4KIU, we are now adding pages rapidly, with the objective of making it a useful reference source for both member societies in Region 1 and all radio amateurs. Take a look at www.iaru-r1.org ◆

Above, top: Gaston Bertels, ON4WF, Chairman of EUROCOM.

Hans Blondeel Timmerman, PB2T, Chairman of the External Relations Committee.

Above: Christian Verholt, OZ8CY, Chairman of the EMC Working Group.

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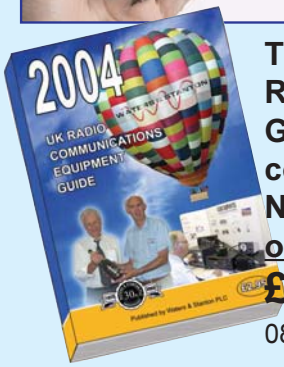

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By Steve Hartley, G0FUW, 5 Sydenham Buildings, Lower Bristol Road, Bath BA2 3BS. E-mail: newcomers.radcom@rsgb.org.uk

Newcomers' news

The piece about the G5IJ antenna in August's column brought a bumper post bag, so much so that I have had to hold the topic over for a while for a full analysis of your input.

1000 THANKS FROM M3CLQ

Dave Wall, M3CLQ, wrote to say that he would like to thank all the stations he has worked since gaining his Foundation Licence in February this year. He now has over 1000 QSOs (contacts) logged on the 7MHz band and all but one or two have been a pleasure to work.

Dave's station is located in a static caravan park in Helston, Cornwall, and comprises a Yaesu FT-920 transceiver and a CP6 vertical antenna on the top of a 12m pump-up mast. He says the owner of the site is quite relaxed about the antenna and the neighbours are all very interested to know where Dave has been in contact with. There have been no reports of breakthrough on television or radio on the site.

When I spoke to Dave he told me that he is keen to take the Intermediate Licence course soon and he hopes to gain a Full Licence in the longer term. A good step-by-step approach, Dave. With your Foundation success you should have no problems with the 'Operating Practices' sections of the higher exams. Keep it up.

PHOENIX CLUB TAKES OFF

A new radio club has been formed based in Gillingham, North Kent. The club's main aim is to develop the skills of its members but it also wants to help the wider amateur community.

The Phoenix Radio Club was the brainchild of John Turner, 2E1JVT; Phil Lots, 2E1TNT, and several other recently-licensed amateurs. The newcomers have been joined by some more experienced amateurs and they are already running Foundation and Intermediate courses. The club hopes to be running a pilot course and exam for the new RAE, which should be available early in the New Year.

The club's lead instructor is Brian Reay, G8OSN, who is keen to see development opportunities for amateurs at every level. The club has its own training website, where more and more Phoenix Club training material is being made available free of charge (see 'Websearch' below). Brian is keen to hear from others who have amateur radio training ideas to share.

For those without Internet access, Brian is willing to provide PC-based learning courses in return for a blank CD-R and return postage to Falcon Lodge, Spekes Road, Gillingham, Kent ME7 3RT.

VIDEO LESSONS?

The Bude Radio Club contacted me regarding video tapes or audio cassettes that could be used to support Intermediate Licence training. The club has 30 members, 20 of whom are Foundation Licence holders.

I have to report that I know of no such material available at this stage. Are there any clubs or individual instructors out there that have already made tapes? Is there a wider demand for tapes or even DVDs? If so I might see about getting an Equity card and slapping on the grease paint! What do you think?

The Bude club is hoping to secure itself an Intermediate instructor very soon and I have offered to help, as best I can. Perhaps there is a reader in the area that would like to get involved? Please contact me and I will patch you through.

IT'S A FAMILY THING

Nigel Bazley, G6AFB, sent me details of his 'little brood of radio amateurs'. The eldest three of Nigel's four children, and their mum, Emma, are all licensed. Young Anthony is only five but he likes to listen and has been know to pass the odd greetings message under Dad's supervision.

Laura, M3LJB (13), Ashley, M3TJH (11), Mathew, M3MLB (10), and Emma, M3MSA (over 21?), were all expertly tutored by Jim Banks, M0BAS, with Roy Molyneux, G0WNQ, seeing fair play as exam invigilator. Quite a house full of RF generators! I wonder if the queue for the shack is as long as the queue for the bathroom?

WHAT'S MY LOCATION?

All licensed radio amateurs should be well aware of the need to provide details of their location when operating from a portable site. One of the ways of complying with the licence requirement is to give your IARU Locator. You may also need to know your Locator for contest and award purposes.

However, when one bright Foundation Licence holder asked David Reynolds, G3ZPF, "how do you work that out then?", he realised that others may be asking the same question. David offers the following web-based solution (see 'Websearch' below for addresses).

First of all find out your postcode. If you don't know it you can look it up on the Royal Mail website, you have to register but it is free. Next find out your Latitude and Longitude from 'Streetmap'. You do this by entering your postcode, clicking on your house to centre the map and using the 'conversion' link to find out the Lat/Long. The conversion will also provide you with a Landranger ('LR') reference, note that too [the two letters and the first and fourth digit form your Worked All Britain (WAB) square – *Ed*]. The AmSat UK website has a Lat/Long to IARU Locator (grid square) converter that will help you identify your location and help others to collect 'your square'.

Thanks for that David. I have long used Ordnance Survey maps and a page from *Practical Wireless* that was published when the 'new' IARU locators came into popular use. I wonder if any readers have easy Locator finders for those without Internet access? ◆

Nigel Bazley, G6AFB, and his 'brood' (see 'It's a Family Thing').

WEBSEARCH

The Phoenix Club	www.phoenixradioclub.org.uk
Royal Mail	www.royalmail.com
Streetmap	www.streetmap.co.uk
AMSAT UK	www.amsat.org/amsat/toys/gridconv.html

IOTA – A Beginner's Guide

The arrival of many newcomers on the HF bands following changes to the licensing requirements makes it a good time to explain the basics of the RSGB IOTA Programme and the new world this opens up on operating.

YAESU, PRINCIPAL SPONSOR OF THE IOTA PROGRAMME

Among programmes that stimulate daily activity on the HF bands two stand head and shoulders above the others: DXCC for working countries, or 'entities' to use current terminology, and IOTA, for contacting island groups. The programmes are similar in character: both are international in coverage, both have a strong rule structure and neither is open-ended. Moreover, in practical terms they complement and strengthen each other because activity to promote one often provides valid contacts for the other.

IOTA, or the Islands On The Air Programme to give it its full title, continues to grow in popularity each year, not only among ever-increasing numbers of island chasers, but also among a rapidly expanding band of amateurs attracted by the possibilities for operating portable from islands. For both it is a fun pastime adding much enjoyment to on the air activity.

The basic building block for IOTA is the *IOTA Group*. The oceans' islands have been corralled into some 1200 IOTA Groups with, for reasons of geography, varying numbers of '*counters*', ie qualifying islands, in each. Only in very few cases do the rules of IOTA allow single islands to count separately, DXCC island entities, such as Barbados, being one. The number of Groups is now capped and further changes are expected to be minimal.

Each Group activated has been issued with an IOTA reference number, for example EU-005 for Great Britain. Part of the fun of IOTA is that it is an evolving programme with new Groups being activated for the first time. Currently some 1050 of the 1200 Groups have numbers.

The objective, for the island chaser, is to make radio contact with at least one counter in as many of these Groups as possible and, for the DXpeditioner, to provide such island contacts. A wide range of separate certificates, graded in difficulty, is currently available for island chasers as well as two prestigious awards for high achievement (see **Table 1**). Applicants may be any licensed radio amateur (or SWL on a 'heard' basis) who has had confirmed contacts with the required number of IOTA Groups listed.

Award	All Band Version	VHF (Above 30MHz) Version
IOTA 100 Islands of the World Certificate	100 Confirmed IOTA Groups including 1 from all 7 continents	100 Confirmed IOTA Groups including 5 continents
IOTA 200 Islands of the World Certificate	200 Confirmed IOTA Groups including 1 from all 7 continents	200 Confirmed IOTA Groups including 5 continents
IOTA 300 Islands of the World Certificate	300 Confirmed IOTA Groups including 1 from all 7 continents	-----
IOTA 400 Islands of the World Certificate	400 Confirmed IOTA Groups including 1 from all 7 continents	-----
IOTA 500 Islands of the World Certificate	500 Confirmed IOTA Groups including 1 from all 7 continents	-----
IOTA 600 Islands of the World Certificate	600 Confirmed IOTA Groups including 1 from all 7 continents	-----
IOTA 700 Islands of the World Certificate	700 Confirmed IOTA Groups including 1 from all 7 continents	-----
IOTA Plaque of Excellence (with shields for each additional 25 IOTA Groups)	750 Confirmed IOTA Groups including 1 from all 7 continents	300 Confirmed IOTA Groups including 5 continents
IOTA 1000 Islands Trophy (with shields for each additional 25 IOTA Groups)	1000 Confirmed IOTA Groups including 1 from all 7 continents	-----
IOTA Africa Certificate	75% of African IOTA Groups or 75 African IOTA Groups, whichever is the lesser number at the time of application	50% of African IOTA Groups or 50 African IOTA Groups, whichever is the lesser number at the time of application
IOTA Antarctica Certificate	75% of Antarctic IOTA Groups	50% of Antarctic IOTA Groups
IOTA Asia Certificate	75 Asian IOTA Groups	50 Asian IOTA Groups
IOTA Europe Certificate	75 European IOTA Groups	50 European IOTA Groups
IOTA North America Certificate	75 North American IOTA Groups	50 North American IOTA Groups
IOTA Oceania Certificate	75 Oceanian IOTA Groups	50 Oceanian IOTA Groups
IOTA South America Certificate	75% of South American IOTA Groups or 75 South American Groups, whichever is the lesser number at the time of application	50% of South American IOTA Groups or 50 South American Groups, whichever is the lesser number at the time of application
IOTA World Diploma	50% of the IOTA Groups in all 7 continents or 50 IOTA Groups for the continents where there are more than 100 IOTA Groups	-----
IOTA Arctic Islands Certificate	75% of the Arctic Island Groups	50% of the Arctic Island Groups
IOTA British Isles Certificate	75% of the British Isles Groups	50% of the British Isles Groups
IOTA West Indies Certificate	75% of the West Indies Groups	50% of the West Indies Groups

Table 1: The wide range of separate IOTA certificates and awards now available.

IOTA DIRECTORY

The IOTA 'Bible' is the *IOTA Directory*. This gives a far more detailed description of the Programme than is possible here. It also provides a full listing of the 1200 IOTA Groups together with the names of 15,000 qualifying islands. If you decide to participate in the Programme, either as an award applicant or DXpeditioner, or even as a 'closet' follower of the Programme, you will need to have access to a copy of either *IOTA Directory 2000* or the *11th Edition* [1]. Earlier editions do not include the significant changes made to the rules and the island listings in year 2000, so reliance on one of these is not advised. You can obtain the latest update information from either the IOTA Manager's or the RSGB IOTA websites.

APPLYING FOR AN AWARD

Award applicants may submit their applications electronically – for this, the preferred method, you need to obtain an IOTA Members Application Disk (*IOTAMEM*) from your *Checkpoint* – or on paper. Full details of the application process and a list of Checkpoints can be found in the *Directory* or on either of the two IOTA websites. When you have prepared your application, you should send it with your cards and the appropriate checking fee to your Checkpoint.

GETTING STARTED

New Licensees: You have everything to work! Follow the guidance in the *Directory* and you should be well on your way during your first year of activity. Remember you need QSLs for IOTA, so make sure to apply for them promptly.

Previous VHF-only Licensees: If you have been active for many years on VHF, you have probably already worked a large number of island stations that count towards the initial IOTA 100 Islands of the World Certificate (All Band). You may find that after just a few weeks activity on HF you can complete

RSGB IOTA PROGRAMME, PO BOX 9, POTTERS BAR, HERTS EN6 3RH; E-MAIL: IOTA.HQ@RSGB.ORG.UK

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

Left, top: Well-spotted by IOTA enthusiast Tom Taylor, G0PSE, on a visit to Louisiana. (Note the reference to "Iota's Mystical Gardens"!)

Left, bottom: The QSL of the recent XF2IH operation from Enmedio Island, a 'new one' for IOTA (NA-224).

the 100 IOTA Groups in seven continents requirement to achieve entry.

Old-Timers: Yes, we have heard the excuses "I don't have time at present", "I will get round to it one day", or "I don't like sending cards away". The only excuses we readily accept are "I don't collect cards", "I don't collect certificates" or "I don't have any money"! If the idea of searching through countless shoe-boxes of QSLs to find a card from every Norwegian or French IOTA is too discouraging, concentrate on the 100+ DXCC island entities that comprise just one IOTA group and then the 30 extras that cover two IOTAs. These are all listed, just for you, in the *Directory*! This will at least get you started. When you are really hooked, looking through those shoe-boxes will not present such a turn-off!

Once you have a record on the IOTA database, your score is entered into the Annual Listings published each year in the *RSGB Yearbook* [2]. You will remain listed so long as you update at least once every five years. In fact we find that many IOTA enthusiasts are just as interested in participating in these listings as in collecting the certificates!

ISLAND-CHASING

1000 or more IOTA Groups may seem an enormous target. If you are a long time DXer who has worked it all and are looking for something new, you will already have amassed a very respectable IOTA score from among your DXCC contacts. If, however, you are new to the bands or one of the many amateurs who adopt a more relaxed approach to their operating, you can take full advantage of a very high level of IOTA activity, comprising easy and semi-rare Groups, to launch you on your way. Well over 700 IOTA Groups are usually activated over a three-year period with, during a typical summer weekend, some 20 – 25 IOTA Groups being heard around the IOTA meeting frequencies. An enthusiast should be able to gain the IOTA Plaque of Excellence for working 750 Groups in about five years, operating mainly at weekends. This must be a reasonable target to go for – after all, how long does it take to get to the top of the DXCC Honor Roll?

OPERATING FROM AN ISLAND

Many amateurs are fortunate enough to live on an island and to be able to give out an IOTA every time they make a contact. Others are not so lucky. For both there is the lure of operating portable from a rare or rarer Group – the fun of being for a few days at the other end of a pile-up. Many islands lie within a few hours' reach and, subject to the availability of suitable equipment, could be put on the air relatively easily. Those amateurs lucky enough to be able to activate a rare or semi-rare IOTA Group can expect to generate huge pile-ups with thousands of contacts during even a short two to three day period. Rare Groups are not all remote and difficult to access. Even in Europe and North America there are many such that are needed by the chasers. For those interested, a list of most wanted IOTA Groups in each continent, ranked by rarity, can be reviewed on the RSGB IOTA website.

Thanks to the generosity of Yaesu, the principal sponsor of IOTA, the RSGB IOTA Committee has a number of portable stations that comprise a small Yaesu transceiver, lightweight switched mode power supply, microphone, keyer, and wire antenna, all boxed in a small splash-proof case. These stations can, subject to availability and a few very straightforward conditions, be loaned to anyone wishing to activate an island. Both the IOTA Committee and Yaesu are keen to introduce younger amateurs to DXpeditioning, so younger teams, particularly those from radio clubs, will get priority. Anyone wishing to borrow a portable station should contact Neville Cheadle, G3NUG, at g3nug@btinternet.com

IOTA ACTIVITY

IOTA stations tend to operate around the nominated meeting frequencies of 3755, 7055, 14260, 18128, 21260, 24950, 28460 and 28560kHz on SSB and 3530, 10115, 14040, 18098, 21040, 24920 and 28040kHz on CW. No specific frequency has been nominated for 7MHz CW but it is recommended that operations should include a frequency above 7025kHz when the band is open to North America.

Two main sources of upcoming IOTA activity are the RSGB IOTA website and the *425 DX News*, a weekly bulletin circulated by e-mail (for details on how to subscribe, see their website). These are not the only ones since, reflecting the Programme's popularity, many other websites have been set up with an IOTA focus – for a list, see the *Directory*.

The big event of the year for IOTA enthusiasts is the *RSGB IOTA Contest*, held on the last full weekend of July. This provides a great opportunity to work large numbers of rare and semi-rare IOTA Groups. Mark it in your diary and join in. In fact, why not go on your own IOTA DXpedition? ◆

WEB SEARCH

RSGB IOTA website	www.rsgbiota.org
IOTA Manager's website	www.g3kma.dsl.pipex.com
RSGB HF Contests website	www.rsgbhfcc.org
425 DX News website	www.425dxn.org

REFERENCES

[1] ***IOTA Directory*** 11th Edition, available from RSGB Sales.
[2] ***RSGB Yearbook*** **2004,** available from RSGB Sales.

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FT-1000mkV	£2,400.00	TS-2000X	£1,800.00	IC-756ProII	PHONE	DX-701	£629.00
FT-1000mkV-FIELD	£1,899.00	TS-2000	£1,550.00	IC-7400	£1,299.00	DX-70TH	£599.00
FT-847	£1,145.00	TSB-2000	£1,499.00	IC-910H	£1,100.00	DX-77	£499.00
FT-920	£1,049.00	TS-870S	£1,299.00	IC-706mkIIG	£789.00	DR-610	£369.00
FT-897	£985.00	TS-570DGE	£829.00	IC-703	£575.00	DR-605	£269.00
FT-857	£795.00	TS-50S	£599.00	IC-718	£449.00	DJ-G5E	£265.00
FT-100D	£599.00	TM-D700E	£429.00	IC-2725E	£299.00	DR-150	£259.00
FT-817	£549.00	TM-V7E	£375.00	IC-207H	£275.00	DJ-X2000	£449.00
FT-840	£499.00	TM-G707E	£279.00	IC-2100H	£225.00	DJ-X10	£249.00
FT-8900R	£339.00	TH-D7E	£299.00	IC-E90	£269.00	DJ-V5	£239.00
FT-7100M	£299.00	TH-F7E	£249.00	IC-T3H	£129.00	DR-M06	£229.00
FT-2800M	£179.00	TH-G71E	£210.00	IC-R8500	£1,199.00	DJ-C5	£189.00
FT-1500M	£159.00	RC-2000	£199.00	IC-R75	£599.00	DJ-195	£159.00
VX-7R	£299.00	PS-52	£229.00	IC-PCR1000	£329.00	DJ-193	£139.00
VX-1R	£115.00	PS-53	£229.00	IC-PCR100	£229.00	DJ-X3	£115.00
VX-150	£110.00	PS-33	£199.00	IC-R3	£369.00	DR-135	£229.00
VR-5000	£549.00	MC-60A	£110.00	IC-R10	£275.00	DJ-496	£175.00
VR-500	£199.00	MC-80	£69.95	IC-R5	£169.00	EDX-2	£299.00
VR-120D	£159.00	SP-31	£82.00	SM-20	£125.00	DJ-X2	£165.00
VR-120	£139.00	SP-23	£68.95	SP-21	£69.00	DR-140	£219.00
MD-200A8X	£225.00	SP-50	£27.95	AT-180	£329.00	DJ-596	£199.00
MD-100A8X	£99.00	YK-88C-1	£61.95	FL-100	£59.95	DJ-C1	£99.00
FC-10	£299.00	YK-88S-1	£61.95	FL-103	£59.95	DJ-C4	£99.00
FC-20	£225.00	YK-88SN-1	£61.95	FL-223	£59.95	DR-M03	£239.00
FC-30	£229.00	YK-88CN-1	£61.95	FL-232	£59.95	DM-330MVZ	£129.00

MFJ

MJF-16010	£56.95	MFJ-934	£189.95	MFJ-969	£199.95	MFJ-949E	£159.95	MFJ-948	£139.95	MFJ-941E	£129.95
MFJ-989C	£379.95	MFJ-924	£74.95	MFJ-914	£64.95	MFJ-910	£24.95	MFJ-903	£54.95	MFJ-901B	£85.95
MFJ-986	£349.95	MFJ-921	£74.95	MFJ-962D	£279.95	MFJ-906	£89.95	MFJ-945E	£119.95	MFJ-212	£79.95

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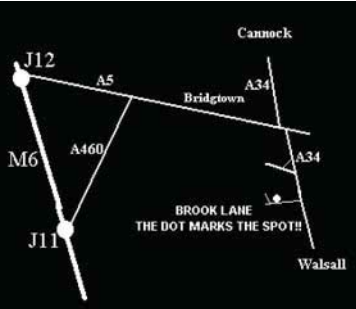

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SECOND HAND EQUIPMENT LIST

MAKE	MODEL	DESCRIPTION	PRICE
Accom	2000A	ATU HF Amp	£2,995.00
ADI	AT-600D	Dual band Handheld Transceiver	£129.00
AEA	MM-3	Morse Machine	£30.00
AEA	PK-232MBX	TNC	£125.00
AEA	PK-900	TNC	£200.00
AEA	PK-96	TNC	£90.00
AKD	6001	6m FM Transceiver	£135.00
ALAN	HQ-2000	2kW 26 - 30MHz SWR / Watt Meter	£25.00
Alinco	DJ-G5EY	Dual Band Handheld	£199.00
Alinco	DJ-X10	Wide Band Receiver	£200.00
Alinco	DJ-X3	Handheld Scanner	£99.00
Alinco	DR-150	2m Transceiver with Air-and Receive	£150.00
Alinco	DR-610	Dual Band Mobile Transceiver	£225.00
Alinco	DX-70	HF & 6m Mobile Transceiver	£399.00
Alinco	DX-70TH	HF & 6m Mobile Transceiver	£475.00
Ameritron	QSK-5	Amplifier Switch / Pre Heat	£200.00
AOR	AR-7030	Top Receiver	£550.00
AOR	AR-7030+	HF Receiver	£625.00
AOR	AR-8600mkII	Base Scanner / Receiver	£525.00
AOR	ARD-2	Decoder	£200.00
Bencher	YA-1	Low Pass Filter (1.8 - 30MHz)	£25.00
BNOS	12/40A	Top Quality 40 Amp Power Supply	£175.00
BNOS	LMP144-25-180	180 Watt 2m Amplifier	£200.00
Comet	CD-20		£40.00
Comet	CD-270D	SWR Power Meter	£49.00
Commtel	COM-510	Wide Band Scanner	£80.00
Daiwa	CL-22		£20.00
Daiwa	CN-103L	2m / 70cms Cross Needle SWR Meter	£40.00
Daiwa	CN-540		£20.00
Daiwa	DK-210	Electronic Keyer	£60.00
Daiwa	LA-20		£99.00
Datong	ASP	Automatic Speech Processor for FT-817, FT-77 etc.	£70.00
Datong	FL-2	Filter	£60.00
Datong	RFA	Broad Band Amplifier	£20.00
Diamond	SX-100	SWR & Power Meter - 1.6 - 60MHz	£65.00
Drake	R-7A	HF Receiver	£500.00
Drake	SW-8	World Band HF Receiver	£375.00
ERA	ERA	Microreader	£60.00
Fairhaven	RD-500VX	Wide Band Receiver	£525.00
Global	AT-2000	Manual Short Wave Tuner	£60.00
Grundig	SAT-100	Satellite Receiver	£400.00
Heil	ProSet 5	Headset HC-5 Insert Fitted	£75.00
Icom	AT-160	Automatic ATU	£175.00
Icom	AT-500	Automatic ATU	£275.00
Icom	CT-16	Satellite Unit	£80.00
Icom	IC-2100H	2m FM Mobile Transceiver	£150.00
Icom	IC-229A	2m Mobile Transceiver	£100.00
Icom	IC-2500E	70 / 23 cms Dual Band Mobile (RARE!!!)	£295.00
Icom	IC-2710H	Dual Band Mobile	£225.00
Icom	IC-271E	2m Multimode Transceiver - 25W	£299.00
Icom	IC-275E	2m Mobile / Base Transceiver	£245.00
Icom	IC-2GE	2m Multimode Transceiver	£60.00
Icom	IC-32E	2m / 70cms Handheld Transceiver	£99.00
Icom	IC-451E	70 cms Base AC	£299.00
Icom	IC-471E	70cms Multimode Transceiver	£299.00
Icom	IC-490E	70cms Mobile Transceiver	£250.00
Icom	IC-505	50 MHz Multimode Transceiver	£275.00
Icom	IC-575A	50 MHz Multimode Transceiver	£450.00
Icom	IC-706	HF / VHF Mobile Transceiver	£450.00
Icom	IC-706mkIIG	HF / VHF / UHF All Mode Mobile Transceiver	£675.00
Icom	IC-707	HF All Mode, General Coverage Transceiver	£375.00
Icom	IC-7100	25 - 2000 RECEIVER	£575.00
Icom	IC-71E	Receiver	£325.00
Icom	IC-718	HF Transceiver	£399.00
Icom	IC-720A	HF & FM Transceiver	£400.00
Icom	IC-728	HF Transceiver	£400.00
Icom	IC-735	Base Or Mobile Transceiver	£399.00
Icom	IC-740	HF Base Transceiver	£350.00
Icom	IC-746	HF / 6m / 2m Built In ATU	£875.00
Icom	IC-751	HF Base Station With Built In PSU, General Coverage	£425.00
Icom	IC-756	HF / 6M All Band Transceiver	£950.00
Icom	IC-756pro	High Class Transceiver	£1,400.00
Icom	IC-781	Icom Top Class Transceiver	£1,600.00
Icom	IC-821H	Dual Band Base - All Mode	£599.00
Icom	IC-910	2m / 70cms Base Transceiver	£999.00
Icom	IC-R100	100kHz - 1.85GHz Receiver	£199.00
Icom	IC-R2	Handheld Scanner	£99.00
Icom	IC-R7000	MINT CONDITION!!! Receiver	£550.00
Icom	IC-R71E	Receiver	£325.00
Icom	IC-R72	Receiver	£350.00
Icom	IC-T8E	Quad Band Handheld Transceiver	£175.00
Icom	IC-W2E	2m / 70cms Handheld Transceiver	£140.00
Icom	PS-55	Power Supply Matching IC-735	£100.00
Icom	RC-7000	Remote Control	£40.00
Icom	SM-8	Desktop Microphone	£75.00
Icom	SP-12	Speaker	£30.00
Icom	SP-20	External Speaker	£99.00
Icom	SP-3	MINT CONDITION!!! Speaker	£50.00
Icom	SP-7	Speaker	£20.00
Icom	WR-2000	SWR & Power Meter with 3 Modules	£99.00
JPS	NIR-10	Noise / Interference Reduction Unit	£99.00
JRC	JST-245	HF 50MHz 1500w AC Base Transceiver	£1,295.00
JRC	NRD-345N	HF Receiver	£275.00
JRC	NRD-525	HF Receiver	£375.00
JRC	NRD-545DSP	HF DSP Receiver	£975.00
JRC	NRD-L2000	1kW Linear Amplifier Solid State (VERY RARE!!!)	£1,600.00
Kamtronics	KAM	Multimode TNC	£140.00
Kent	RA	Morse Paddle Key	£40.00
Kenwood	DM-81	Dip Meter Including Coils	£55.00
Kenwood	MC-60A	Desktop Microphone	£70.00
Kenwood	MC-80	Desk Microphone	£40.00
Kenwood	PS-10	Power Supply for TR-9130 etc.	£40.00
Kenwood	PS-430	Power Supply	£100.00
Kenwood	PS-50	Power Supply	£145.00
Kenwood	R-5000	Receiver	£499.00
Kenwood	R-5000	Receiver With VHF Converter	£600.00
Kenwood	RZ-1	Wide Band Receiver - Car Radio Size	£130.00
Kenwood	SW-100E	SWR Meter	£25.00
Kenwood	SW-200A	SWR Meter	£60.00
Kenwood	TH-215E	2m Handheld Transceiver	£99.00
Kenwood	TH-235	2m Handheld Transceiver	£85.00
Kenwood	TH-47E	70cms Handheld Transceiver	£80.00
Kenwood	TH-79E	2m / 70cms Handheld Transceiver	£175.00
Kenwood	TH-F7E	Dual Band Handheld	£199.00
Kenwood	TH-G71E	Dual band Handheld Transceiver	£170.00
Kenwood	TL-120	Low Drive Linear Amplifier 100W HF	£150.00
Kenwood	TL-922	1 kW Amplifier	£899.00
Kenwood	TM-241E	2M Mobile Transceiver	£120.00
Kenwood	TM-251E	Mobile Transceiver	£140.00
Kenwood	TM-255E	2m Multimode Transceiver (Fair Condtion)	£299.00
Kenwood	TM-431E	70cms Mobile Transceiver	£110.00
Kenwood	TM-D700E	Dual Band Built In TNC	£299.00
Kenwood	TR-2400	2m Handheld Transceiver	£50.00
Kenwood	TR-751E	2m Multimode Transceiver	£250.00
Kenwood	TS-50S	HF Mobile / Base Variable Power	£425.00
Kenwood	TS-520	HF Base Transceiver	£99.00
Kenwood	TS-570DGE	Mobile / Base HF Transceiver	£675.00
Kenwood	TS-60S	6m 100W Mobile Transceiver	£450.00
Kenwood	TS-700	2m All Mode Transceiver	£199.00
Kenwood	TS-850SAT	HF Base Station with Built In ATU	£699.00
Kenwood	TS-940SAT	Mains HF Base Transceiver with Built In ATU	£599.00
Kenwood	TS-950SD	HF 150W DSP Base Station	£1,200.00
Kenwood	TS-950SDX	Kenwood's Flag Ship	£1,650.00
Kenwood	VC-10	VHF Converter	£99.00
Kenwood	YG-455CN-1	270Hz CW Crystal Filer	£100.00
Kenwood	YK-88C-1	500Hz CW Narrow Filter	£40.00
Kenwood	YK-88CN1	270Hz CW Filter 8.83MHz	£40.00
Kenwood	YK-88S-1	2.4KHz SSB Narrow Filer 8.83MHz	£40.00
Kenwood	YK-88SN	1.8K SSB Filter	£40.00
Kenwood	YK-88SN-1	1.8KHz SSB Narrow Filter 8.83MHz	£40.00
Linear Amp	6 METRE	6m Linear Amplifier	£550.00
Lowe	HF-225	HF Receiver	£150.00
MFJ	MFJ-1272B	TNC / Mic Switch	£20.00
MFJ	MFJ-1278	TNC All Mode	£175.00
MFJ	MFJ-207	HF SWR Analyser	£50.00
MFJ	MFJ-259B	HF / VHF Analyser	£175.00
MFJ	MFJ-722	CW / SSB Filter with 5 Watts Amp	£59.00
MFJ	MFJ-784DSP	DSP Tunable Filter	£140.00
MFJ	MFJ-921	VHF 200 Watt ATU	£50.00
MFJ	MFJ-962D	1.8 - 30MHz, 1kW Antenna Tuning Unit	£199.00
Microset	SR-100	Power Amplifier with Pre-Amp (100W Output)	£99.00
Microwave	28/144	28 / 144 MHz Transverter	£125.00
Microwave	MML-432/50	50 Watt 70 cms Amp, with Built-In-PreAmp	£85.00
Microwave	Pre-Amp	Low Noise RF Switched Pre-Amp	£25.00
OptoElectronics	MiniScout	Frequency Counter	£129.00
PacCom	TINY II	TNC	£99.00
PacCom	TNC-320	TNC	£90.00
PalStar	KH-6	6m Handheld Transceiver	£99.00
Pres. Lincoln	10 METRE	10 Metre Multimode	£175.00
Quantek	FC-2000	1MHz - 2.4GHz Frequency Counter	£30.00
RadioShack	Pro-60	200 Channel Handheld Scanner (30MHz - 999MHz, WITH GAPS)	£99.00
RevCo	RS-2000	60 - 519 MHz Home Base Scanner	£79.00
Revex	V-540	SWR Meter	£25.00
Sabtronics	8610B	Frequency Counter	£30.00
Sangean	ATS-909	World Band Receiver	£130.00
SEM	MultiFilter	MultiFilter	£20.00
SEM	SEM	QRM Eliminator	£20.00
SGC	SG-2020	HF Transceiver	£450.00
SGC	SG-231	Automatic Smart Tuner - HF / 6m	£275.00
SGC	SG-3030	All band Antenna	£200.00
Shure	444D	Desktop Microphone	£35.00
Signal	R-532	Airband Receiver	£99.00
Sommerkamp	FT-290R	2m Multimode Transceiver	£150.00
Sony	7600-D	Worldband Radio	£80.00
Sony	SW-100E	FM/SW/MW/LW Portable Receiver	£90.00
SSB Electronics	LT-23S	23cms Transverter	£450.00
Standard	C-156E	2m Handheld Transceiver	£125.00
Standard	C-500	Dual Band Handheld	£99.00
Standard	C-510	2m / 70cms Handheld Transceiver	£125.00
Standard	C-510E	Dual Band Handheld	£99.00
Swedish	Key	Straight Morse Key	£25.00
Timewave	DSP-599ZX	DSP Filter	£225.00
Tokyo	HL-30V	2m - 25W Amplifier	£75.00
Tokyo	HL-35V	2m Power Amplifier with Pre-Amp	£89.00
Tokyo	HL-37V	Linear Amplifier	£60.00
Tono	MR-150	150 Watt 70 cms Amplifier	£175.00
Tono	T-777	Communications Terminal	£120.00
Tono	4M-70G	60 Watt UHF Transciever, Including Pre-Amp	£119.00
Transverter	QM-70	28/144 Transverter	£100.00
Trident	TRX-200	Latest Scanner	£175.00
Trio	TM-201A	2m Mobile Transceiver (Complete with Detachable Front & Speaker)	£99.00
Trio	TR-9000	2m Multimode	£199.00
Trio	TR-9130	2m All Mode Transceiver	£250.00
Watson	W-DB30	Dualband Amplifier	£89.00
Welz	AC-38M	200W Mobile Matching Network	£50.00
Welz	CT-150	Dummy Load	£50.00
Welz	CT-300	300W / 1kW Peak Dummy Load	£65.00
Welz	SP-15M	SWR Meter	£35.00
WinRadio	WR-1550E	Trunking Software	£450.00
Yaesu	ATAS-100	Yaesu Active Tuning Antenna System	£175.00
Yaesu	FC-30	Automatic ATU - FT-897, FT-857	£189.00
Yaesu	FC-700	Tuner - AS BRAND NEW (BOXED)	£129.00
Yaesu	FEX-767-2m	2m Module for FT-767	£175.00
Yaesu	FEX-767-6m	6m Module for FT-767	£175.00
Yaesu	FL-2025	Amplifier	£90.00
Yaesu	FP-30	Power Supply - FT-897, FT-857	£189.00
Yaesu	FP-700	Power Supply	£100.00
Yaesu	FP-707	Power Supply Unit	£80.00
Yaesu	FP-757GX	Power Unit for FT-757	£300.00
Yaesu	FR-101	HF, 2m, 6m Base Transceiver	£399.00
Yaesu	FRG-8800	Receiver Including Converter	£399.00
Yaesu	FRT-7700	Antenna Tuner for FRG-7700	£60.00
Yaesu	FRV-7700	Converter for FRG-7700	£60.00
Yaesu	FT-100	HF / 6m / 2m / 70cms Mobile Transceiver	£499.00
Yaesu	FT-100D	HF / 6m / 2m / 70cms Mobile Transceiver	£539.00
Yaesu	FT-1000D	200 W HF Transceiver (MAINS)	£1,600.00
Yaesu	FT-1000MPmkV	200W DSP HF Transceiver	£1,800.00
Yaesu	FT-1000MPmkV-Field	Top HF Radio - AC (2 Months Old)	£1,750.00
Yaesu	FT-101B	HF Base Transceiver	£99.00
Yaesu	FT-101ZD	HF Base Transceiver	£275.00
Yaesu	FT-1500M	2m 50W Mobile Transceiver with DTMF Microphone	£129.00
Yaesu	FT-2600M	Mobile VHF / FM Transceiver	£120.00
Yaesu	FT-290RMKII	2m Multimode Mobile Transceiver with Amplifier	£250.00
Yaesu	FT-41R	Handheld Transceiver	£120.00
Yaesu	FT-50R	Dual Band Handheld	£150.00
Yaesu	FT-5100	Dual Band Transceiver	£199.00
Yaesu	FT-51R	2m / 70cms Handheld Transceiver	£199.00
Yaesu	FT-650AC	26-50MHz 100w Base Station Transceiver (MINT!!)	£525.00
Yaesu	FT-690RMKI	6m Multimode Mobile Transceiver	£199.00
Yaesu	FT-7100M	Dual band Mobile Transceiver	£225.00
Yaesu	FT-726R	6m / 2m / 70cms / HF Transceiver	£575.00
Yaesu	FT-726R	2m / 70cms / HF Transceiver	£475.00
Yaesu	FT-730R	70cms Mobile Transceiver	£120.00
Yaesu	FT-736R	2m / 70 cms Base Transceiver	£575.00
Yaesu	FT-736R	6m / 2m / 70cms Transceiver	£650.00
Yaesu	FT-747GX	HF Transceiver - General Coverage	£325.00
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Yaesu	FT-76R	70 cms Handheld Transceiver	£99.00
Yaesu	FT-790R	70cms Multimode Transceiver	£175.00
Yaesu	FT-790RmkII	70cms Multimode Transceiver	£250.00
Yaesu	FT-840	HF Base / Mobile Transceiver	£399.00
Yaesu	FT-847	HF 6m / 2m / 70cms Transceiver	£850.00
Yaesu	FT-920AF	HF / 6M Base Transceiver	£899.00
Yaesu	FTV-1000	200 W Transverter	£450.00
Yaesu	FTV-430MHZ	Module for Transverter	£99.00
Yaesu	FTV-707	2m Multimode Transverter Including Module	£125.00
Yaesu	FTV-901	Transverter including 2m Module	£165.00
Yaesu	FTV-902DM	Transverter	£225.00
Yaesu	FV-102DM	Digital VFO	£150.00
Yaesu	FV-901	Digital VFO	£175.00
Yaesu	G-650	Rotator	£300.00
Yaesu	KR-400	Rotator	£120.00
Yaesu	KR-600	Rotator	£140.00
Yaesu	MW-1	Remote Control Microphone & Infra-Red	£60.00
Yaesu	SP-55	Mobile Speaker	£15.00
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Yaesu	SP-980	Speaker with Built In Filters	£60.00
Yaesu	System 600	HF Commercial Radio	£600.00
Yaesu	VR-120	FM / WFM / AM Receiver	£99.00
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Yupiteru	MVT-3300	Handheld Scanner	£99.00
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Understanding Impedan

By definition, the background of many radio amateurs is completely unrelated to the engineering world. Explanations relying on mathematics and engineering familiarity can be quite incomprehensible to such enthusiasts. The author attempts an explanation suited to everyone.

There is no shortage of text books which explain the design of matching networks. Most of these originate from the professional engineering world and are aimed at technicians, engineers and students. As a consequence, many are difficult for the non-professional to understand. Some of the more understandable (better?) explanations are, in fact, in amateur radio publications, such as the RSGB *Radio Communication Handbook* and the *ARRL Handbook*. Many a professional R & D lab would have to admit to having copies sitting on their shelves!

In this article, I stay clear of difficult mathematics and anything other than the basic knowledge likely to be required to get a licence in most countries. Since they might not be covered in some licensing exams, I quote a few very simple formulæ which are required to do impedance transformation. At some points in the text, I refer to the matching of a transmitter to an antenna as a practical example.

Impedance matching is one of those subjects that builds on an understanding of a number of other things. It's like building a wall – unless you get the foundations right, you will never really get the job done properly. In this case the 'foundations' are the definitions of phase, resistance, reactance and impedance. Series and parallel conversion of impedance are also covered. But don't panic! You are likely to have covered most of this ground before, in the course of preparing for your licence exam.

It is essential that you do not carry on to the section on matching unless you are comfortable with the foundation items. The final section covers matching and comments on some real-life examples. If you stick with this article all the way through, I guarantee you will have a better understanding of the subject than a great many amateurs (and some professionals)!

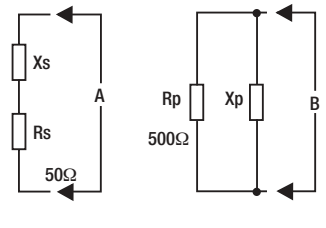

Fig 1: For every series impedance, there is an equivalent parallel impedance. If the values for RP and XP are calculated using the formulæ in the text, the impedance across A will be exactly the same as that across B.

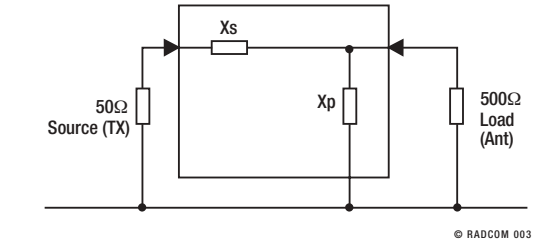

Fig 2: The L-match configuration.

THE FUNDAMENTALS

Phase – when an alternating voltage and its resulting current are not changing exactly in step, they are said to be 'out of phase'. A complete cycle is 360°, so 90° is a quarter-cycle.

Resistance – a pure resistance limits the flow of current through it when a voltage is applied across it. This voltage and current are always in phase. A pure resistance behaves in exactly the same way for both AC and DC.

Reactance – this can be thought of as 'RF resistance'. The current in a pure reactance, as a result of applying an alternating voltage, is always 90° out of phase with that voltage.

Reactance comes in two types, capacitive and inductive. In a capacitor, the current is 90° *ahead* of the applied voltage and in an inductor it is 90° *behind*.

Capacitive reactance increases when the value of a capacitor is reduced. Remember, capacitive reactance, X_C, in ohms, is given by

$$X_C = \frac{1}{2\pi fC}, \qquad (1)$$

where f is the frequency (in Hz), and C is the capacitance (in F).

Inductive reactance increases when the value of an inductor is increased. Inductive reactance, X_L, in ohms, is given by

$$X_L = 2\pi fL, \qquad (2)$$

where L is the inductance (in H).

Impedance – consists of resistance and reactance acting together. We can think of impedance as a resistance in series with a reactance or a resistance in parallel with a reactance. Depending on a particular load, the reactance part can be either capacitive or inductive.

Note that the phase difference (see later) between the applied voltage and the resulting current will be somewhere between the pure reactance cases (±90°) and the pure resistance case (0°). It depends on the ratio of reactance to resistance.

HOW MATCHING WORKS

An essential first step is to be comfortable with the concept of series-to-parallel conversion of impedance.

We need to appreciate that any antenna, however complicated, can have its feed-point represented as a load impedance consisting of one resistance and one reactance. That impedance can be represented either by a resistance in series or in parallel with a reactance. In the RF world, the convention is to use the series form for impedance measurements.

The value of the impedance presented by any antenna, at a given frequency, is due to its physical attributes, such as wire diameter, shape, height, proximity to other objects etc. It is important to realise that nothing we can do by way of external circuitry or adjustments can change the feed-point impedance of an antenna. That is why it is so misleading to refer to antenna 'tuning' units. Such units transform or 'match' the impedance at one connector to a different impedance at the other. They do not 'tune' the antenna. [Not all engineers would agree with this, however! – *Ed.*]

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ce Matching

For every series impedance there is an equivalent parallel impedance

For example, assume that the resistance and reactance, connected in series to form a series impedance, happen to have values such that the current through them is 45° out of phase with the RF voltage applied across them. They can be replaced by a parallel combination of resistance and reactance, which also results in the voltage and current being 45° out of phase. See **Fig 1**. [This could be described as a 45° *phase difference*, the terms 'out of phase' and 'phase difference' being synonymous – *Ed.*]

We can get a feel for this intuitively. Take the case of a resistor in series with a capacitor, (ie a series impedance where the reactance is capacitive).

Imagine increasing the value of the capacitor so that it is very large. The reactance of the capacitor will then be close to zero at RF (see equation (1)). The circuit now becomes very close to being a pure resistance because the capacitor looks much like a short circuit. In other words, the current is almost in phase with the voltage, ie close to 0° phase difference.

The opposite happens if we make the capacitor very small. The reactance value becomes very large compared with the resistance value and the phase difference gets close to 90° because the circuit looks like an almost pure reactance.

When we varied the capacitive reactance, the phase difference between the voltage and the current changed from almost 0° to almost 90°. We can do the same exercise with a parallel resistance and capacitor, which will also allow us to vary the phase from 0° to nearly 90°

Since values can be set in both the parallel and series cases to give any phase differences between almost 0° and nearly 90°, does it not follow that, for every series case, values can be found for a parallel combination, which will result in exactly the same phase difference between the voltage and the current? However, note that, in the parallel case, the actual values of the resistance and the reactance are *different* values from those in the series impedance case.

A form of notation is used for the series impedance which indicates whether the reactive part of an impedance is capacitive or inductive; it also reminds us that we cannot add resistive ohms directly to reactive ohms. While we don't have to understand this for the purposes of this explanation, we will often see series impedance written in this shorthand manner – series impedance is written as $R + jX$ or $R - jX$. R represents the resistance and X represents the reactance, the plus sign meaning that the reactance, X, is inductive, the minus sign meaning X is capacitive. The operator 'j' is a reminder that the R and X are out of phase, and we *cannot* add them directly.

If we recall the AC theory from our licence exam, this is really just a way of writing down the resistance and reactance vectors, which we drew graphically to solve impedance problems.

SOME UNAVOIDABLE MATHS

The following two formulæ are needed to convert a series impedance to an equivalent parallel impedance.

$$R_P = \frac{R_S^2 + X_S^2}{R_S}, \text{ and}$$

$$X_P = \frac{R_S^2 + X_S^2}{X_S},$$

where R_S is the series resistance, and X_S is the series reactance in the series impedance circuit.

In the equivalent parallel impedance circuit which we are calculating, R_P is the parallel resistance and X_P is the parallel reactance.

The next two formulæ do it the other way round, ie from a parallel impedance to an equivalent series impedance.

$$R_S = \frac{R_P}{1 + R_P^2 / X_P}, \text{ and}$$

$$X_S = \frac{R_S + R_P}{X_P}.$$

It is not essential, but if you want to understand where these formulæ come from, see the box.

MATCHING

Let's look at a simple form of matching circuit, the 'L-match', shown in **Fig 2**. This consists of two reactances. One, X_S, is in series between the source and the load and the other, X_P, is either across the load to ground or across the source to ground. We will consider the case where the parallel reactance is across the load.

Suppose we want to match a load of 500Ω to 50Ω. It helps to view the matching circuit we are going to produce as being in a box, like an antenna matching unit. If we then 'look' into the low-impedance side of the box, we are trying to make it look like 50Ω as far as the 50Ω source (our transmitter) is concerned. At the same time, we want to make the high-impedance side 'look' like 500Ω to the load (our antenna).

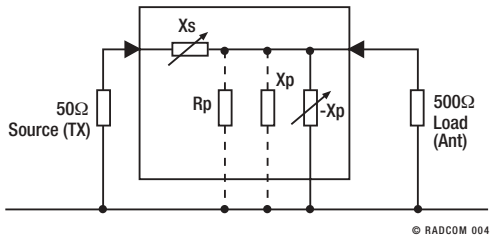

Fig 3: The matching process – vary XS until RP is 500Ω and accept the value of XP that results. Then cancel XP with a parallel reactance of the same value but of opposite type (ie inductive for a capacitive reactance, or capacitive for an inductive reactance).

Recalling the series-to-parallel impedance conversion, if we vary the value of the series resistance or reactance, the values of the equivalent parallel circuit would obviously vary as well, wouldn't they?

Let's start putting the matching components inside the box. Starting at the 50Ω side, if we connect a reactance in series with the 50Ω source, this will result in some particular values for R and X in the parallel equivalent impedance. What if we then adjust the value of our series reactance so that the R part of the parallel equivalent is 500Ω? Obviously the parallel reactance will change as well, but ignore that for now.

The parallel equivalent of the 50Ω resistance in series with the reactance value we set, is now 500Ω in parallel with a reactance, X. That is, we now have a resistance of the value we want, but it has a reactance, X, across it (the one we ignored). The trick now is to cancel the X by simply connecting across it a reactance of the same value but of the opposite sign. For example, if it is a capacitive reactance, put an inductor in parallel; if it is inductive we need a capacitor. Looking into the box from the antenna side it now looks like 500Ω. See **Fig 3**.

Hey Presto! We've made an L-match to transform (or match) our 50Ω transmitter to the 500Ω antenna. In this case, the two controls we adjust in our L-match are actually the reactance in series with the 50Ω and the reactance across the parallel equivalent resistance.

In other words, what we are doing in a real-life matching unit is adjusting one control to make the resistance on the antenna side look like 500Ω and the other to cancel the unwanted

parallel reactance across the 500Ω.

Obviously, the whole procedure is possible in reverse. We can do the same exercise by varying the parallel reactance to get the required equivalent series resistance. We would then cancel the unwanted series reactance produced, by inserting a series a reactance of opposite sign.

Unfortunately, in real-life, the two controls interact during the adjustment, which is why we have to do it iteratively, getting closer each time. However, if we mark the controls, at our next attempt we can set them correctly first time from then onwards.

Note that continuously-variable reactances are usually capacitors. It is not so easy mechanically to make inductors variable; Variable inductors are usually in the form of 'roller coasters' but are inclined to be lossy. More common are semi-variable inductors with switched taps.

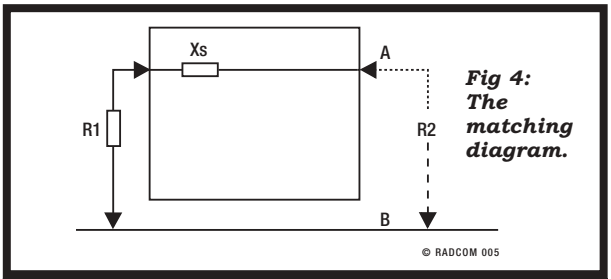

Fig 4: The matching diagram.

MATHEMATICAL DERIVATION OF THE L-MATCH ELEMENTS

With reference to Fig 4, the impedance across AB is Z_{AB}, such that

$$Z_{AB} = R1 + jX_S. \quad (A)$$

The admittance, Y, across AB is $1/Z_{AB}$ such that

$$Y_{AB} = \frac{1}{R1 + jX_S}. \quad (B)$$

Multiplying by the complex conjugate, $R1 - jX_S$:

$$Y_{AB} = \frac{R1 - jX_S}{R1^2 + X_S^2},$$

(expressing the admittance in terms of the series elements).

Separating this admittance into real and imaginary parts:

$$\frac{R1}{R1^2 + X_S^2} - j\frac{X_S}{R1^2 + X_S^2}. \quad (C)$$

Looking now at the admittance across AB from the R2 side – if we want the real part of the admittance in (C) to be R2:

$$\frac{1}{R2} = \frac{R1}{R1^2 + X_S^2},$$

$$\therefore R1^2 + X_S^2 = R1 \times R2,$$

$$\therefore X_S^2 = R1 \times R2 - R1^2, \quad (D)$$

$$\therefore X_S = \sqrt{R1 \times R2 - R1^2}.$$

Similarly, looking at the admittance across AB for the R2 side – if we want the imaginary part of the admittance in (C) to be X_P:

$$\frac{1}{X_P} = \frac{X_S}{R1^2 + X_S^2}.$$

Note: since we are dealing with the imaginary part only, we can drop the 'j'.

$$\therefore X_P = \frac{R1^2 + X_S^2}{X_S}. \quad (E)$$

Equations (D) and (E) are the equations required for the reactive matching elements.

Now let's do the calculation for the example I used. Remember, R_S = series resistance and X_S is the series reactance. R_P = parallel resistance and X_P is the parallel reactance.

The source is 50Ω and we want to match it to an antenna which happens to be 500Ω at its feed-point.

What do we know already? We know R_S – it is 50Ω and we know we want R_P to be 500Ω. For the moment we don't care what X_P is.

We don't know the value of X_S, which is the series reactance we want to put in series with the 50Ω source, R_S, in order to make R_P equal to 500Ω. But we can work it out from the formula for the parallel resistance if we juggle it around a bit.

Remember the formula for the parallel resistance part is

$$R_P = \frac{R_S^2 + X_S^2}{R_S}.$$

Rearranging to make X_S the subject:

$$R_S^2 + X_S^2 = R_P \times R_S,$$

then $X_S^2 = R_P \times R_S - R_S^2$.

Finally, $X_S = \sqrt{R_P \times R_S - R_S^2}$.

In this formula, if we put our source value, R_S = 50Ω, and the desired parallel value, R_P = 500Ω, we get:

$$X_S = \sqrt{500 \times 50 - 50 \times 50}$$
$$= \sqrt{25000 - 2500}$$
$$= \sqrt{22500}$$
$$= 150\Omega$$

So we need to insert a reactance of 150Ω in series with the 50Ω source. This will result in the necessary parallel resistance, R_P, at the antenna side. But what about the reactance, X_P, which appears in parallel with R_P? We need to know its value as well.

Now that we know both the values for the series impedance on the source side of the circuit, a straightforward application of the formula for calculating X_P should give us the answer!

Remember the formula for the parallel resistance part is

$$X_P = \frac{R_S^2 + X_S^2}{X_S}.$$

We know R_S is 50Ω and we have calculated X_S as 150Ω, so

$$X_P = \frac{50^2 + 150^2}{150}$$
$$= \frac{2500 + 22500}{150}$$
$$= \frac{25000}{150}$$
$$= 166.67\Omega.$$

We now have the reactance values for our L-match design! The series reactance connects straight from the input to the output and the parallel reactance goes straight across the load. Remember, if X_P is positive it is an *inductive* reactance so we need a *capacitive* reactance to cancel it.

To make use of the calculated values on a particular frequency, we simply work out the value of inductor or capacitor that has the required reactance at that frequency. Use the standard formulæ (1) and (2).

Note that, because we cancel X_P with the opposite form of reactance, we will normally end up with one inductor and one capacitor in our matching circuit. It does not matter which one is in which position, as long as the reactance values are correct for the series and parallel elements, the match will be correct. However, there may be practical reasons for favouring one arrangement, such as grounding one side of the capacitor. We would then have to make it the parallel element.

WHEN THE ANTENNA IS REACTIVE

But what if the antenna impedance is not a nice 500Ω resistive value? It could have been a series impedance of 500 +j200Ω. No problem! Before we start the matching process, we simply connect a capacitive reactance of the same value in series with load. This cancels the 200Ω inductive reactance, leaving a 500Ω resistive load. This reactance just becomes another element of the matching network. Sometimes this element can be absorbed, for example; if it results in two elements being in series then they will simply add or subtract depending on whether they are the same type or not.

If you have really grasped the series-to-parallel impedance conversion concept, you can also deal with the case where the additional 200Ω reactance element does not conveniently end up in series with a matching element. Simply convert the 500 +j200Ω load to its parallel equivalent and put a cancelling reactance across it. This reactance will be in parallel with the matching network's parallel element and can be absorbed into it. To be successful in dealing with impedance matching problems, you do have to be entirely happy with frequent changes between series and parallel equivalents. That is why I emphasised it at the beginning.

The L-match is the basic building block for most other matching circuits; π-networks or T-networks can be constructed from L-networks. The overall *Q* of more complex networks can be controlled by limiting the ratio of the impedances in the L-match configurations used to construct the network. But that is another story. ◆

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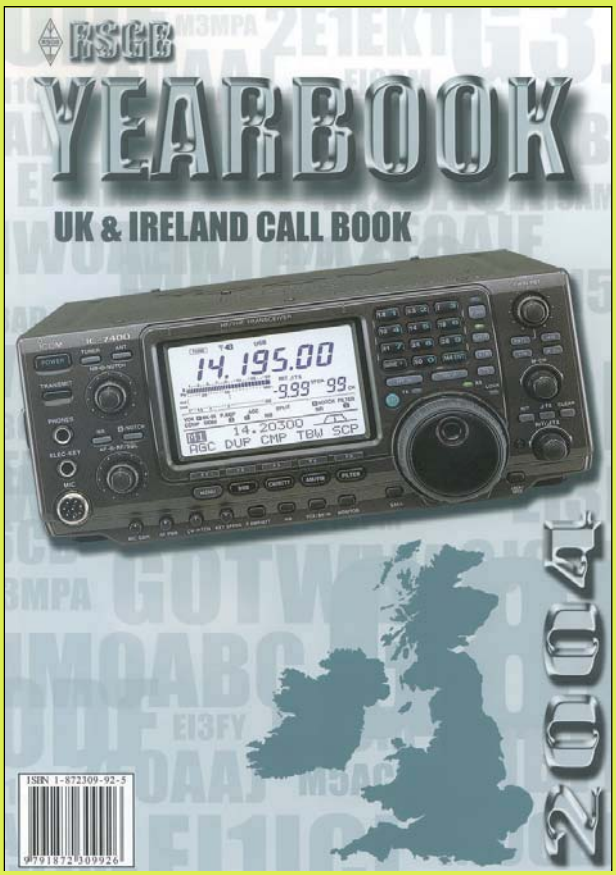

Edited by Steve White, G3ZVW

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PIC-A-STAR

PART 15 SOFTWARE TRA

STAR has more useful facilities than most home-brew designs – and getting a feel for their value may well determine if this is the project for you. The user interface is also detailed this month – with explicit adjustment and use instructions packaged with the software.

Those who don't have these facilities refer to them as 'bells and whistles'. Those of us who do just grin – and keep ringing them bells and blowing them whistles! Always assuming they are underpinned by a rock-solid base receiver performance, that is.

SSB/CW MODE MANAGEMENT

Switching between SSB and CW – and transmit and receive for that matter – are non-trivial design problems if the result is to be user-friendly. So some background discussion is helpful in understanding what follows. See also ref [1]. You may also care to compare critically the behaviour of commercial transceivers. If I can find anything friendlier than STAR, I will simply change the design until it isn't. I have, as I write, already invested in the architectural infrastructure to make all this possible.

CW OPERATION

In days of old, especially with 'separates', it was easy, reliable – but a bit tortuous. You would zero-beat an incoming CQ on your receiver, then zero-beat your transmitter – and finally move your receiver off to get a comfortable beat note.

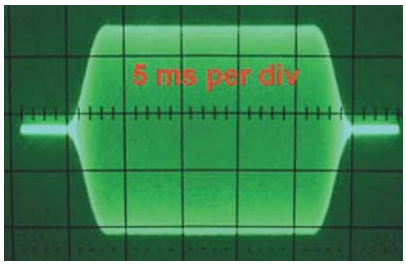
With modern filters there is a snag. You can't hear anywhere near down to zero beat, so this process produces totally unacceptable errors.

However, it does establish two critical principles, namely: both stations must *transmit* on the same frequency – and both must operate 'split' if they are to hear a beat note. CW is inherently a 'split' mode.

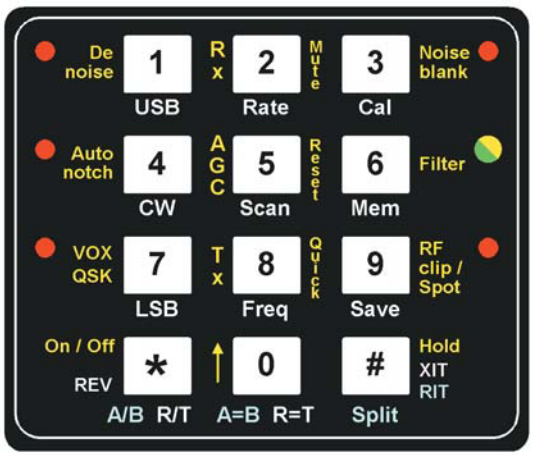
With a multi-mode transceiver, you must either explicitly operate 'split' for CW – or the design must take care of it transparently.

PIC-A-STAR is in the latter category. If you are in SSB mode and hear a CW station you want to work, when you switch to CW mode the received pitch will not alter and you will not have to retune. And *vice versa* if starting out from CW mode.

While on the topic of CW, take a look at the photograph of STAR's transmitted waveform. You won't find better.



Right, top: The STAR CW waveform from David, G4HMC, photographed off-air on 80m from my STAR.



Right, bottom: Fig 30: Keypad allocations and corresponding status LEDs. This is to scale and may be used as a keypad overlay. Note that this reflects recent developments.

SSB OPERATION

When you change sideband, neither your indicated nor actual frequency should alter. This is common currency nowadays. There are some, but not many, occasions when this matters – given that we don't usually operate on the 'wrong' sideband. If you operate via *OSCAR* or into a transverter or on 60m, it is critical.

This point also reinforces a principle which should be obvious – namely that if a given feature is critical to a minority interest, provided it is not imposed on the majority – then there is no good excuse for not providing it.

Pic 'N' Mix also gives you the option to switch between high- and low-side injection. Since this implies a sideband inversion, the software puts in an equal and opposite change of sideband – and you end up on the same net frequency.

But be aware that many band-pass filters are optimised for injection from a preferred side. The STAR front-end is optimised for use with high-side injection; the optional filter in the LO line also assumes high-side injection on the higher bands.

PTT AND KEY BEHAVIOUR

PIC-A-STAR uses the simple conventions that, on CW, the microphone audio is ignored – and on SSB the key is ignored.

If on CW and you merely key, you will produce only sidetone. This is for CW practice since, to transmit in earnest, you either need to switch QSK on – or hold down the PTT line for non-QSK operation.

If on SSB, you must either switch on VOX – or hold down the PTT line – before anything will happen.

AT POWER-ON TIME

The display shows your chosen start-up frequency, but flashing. You then have four structurally-different options:

- Upload DSP code from Pic 'N' Mix to the DSP Assembly. This is normal every-day operational use. The Status board LEDs flash strangely so you know something is happening.
- Run the DDS without loading DSP code. This is mainly a diagnostic mode.
- Enter a DDS reference clock frequency from your PC. A useful utility.
- Download a new (or your first) DSP software release – via the Internet to your PC – and thence to Pic 'N' Mix. This latter process takes several minutes. During this period the incoming bytes are counted on the display – albeit faster than the eye can follow – much like money on a petrol pump. Unlike petrol it gives you a warm feeling you are getting good value – and the fact that it is counting at all signifies that it is working. Once the new code and the default control values are all in, you can then proceed to upload them to the DSP Assembly thereafter.

By Peter Rhodes, G3XJP, Danvers House, Wigmore, Herefordshire HR6 9UF. E-mail: g3xjp@qsl.net

[redacted]-STAR

[redacted]NSMITTER AND RECEIVER

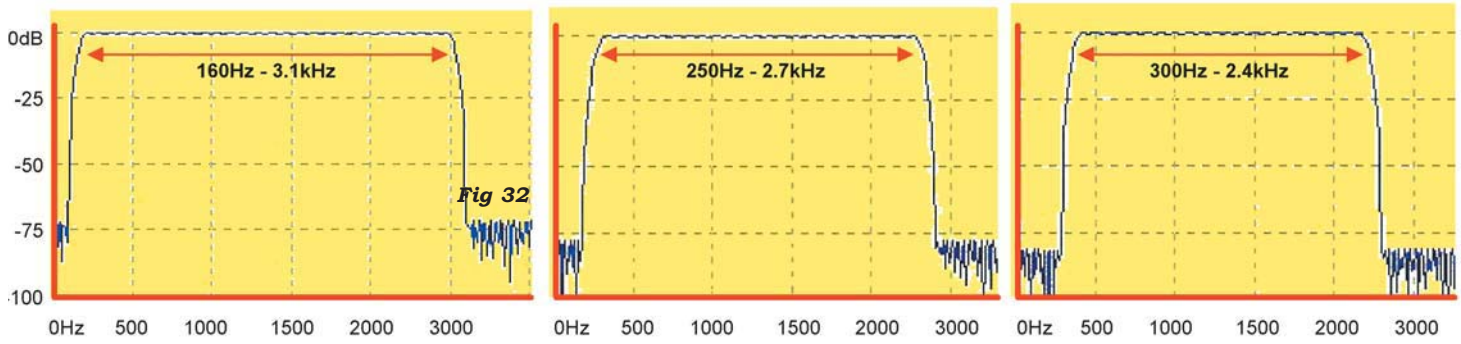


Fig 32

KEYPAD/DISPLAY MODES

There are now two main modes, namely 'DDS mode' and 'DSP mode'. The former was outlined last month. The latter lets you tune *all* of the STAR DSP controls.

Fig 30 shows a suitable keypad overlay with the DSP legends in yellow; the DDS ones in white or blue. But before we get to that...

SPLIT OR XIT/RIT

This is a new sub-mode choice for DDS use. One of these is always enabled – and your choice is retained at power-down. Both give you the potential to transmit and receive on different frequencies. See also [2] for a general discussion.

Split mode is unchanged from Pic 'N' Mix – but with enhancements. It operates on the two independent VFOs, 'A' and 'B'.

Conversely, XIT/RIT operates on either *one* of the VFOs – and that choice determines the initial Tx and Rx frequencies. But, thereafter, the Tx and/or the Rx frequencies can be independently changed – and retained throughout an XIT/RIT session. Meanwhile, the 'other' VFO remains uncontaminated – and available.

What are the differences between Split and XIT/RIT? Split can be cross-band and/or cross-mode and 'rests' on your Rx frequency when off. Conversely, the XIT/RIT tuning range is the current band, current mode. It 'rests' on your Tx frequency when off – thus providing an RIT on/off capability – which Split doesn't give you.

SPLIT AND XIT/RIT USE

Besides pure transceive when switched off, both modes have the following options:

- Tune only the receive frequency while your *transmit* frequency remains fixed (ie RIT). If you call CQ and a station answers off-frequency, this option (in either mode) is the answer. However, in a net with one station off-frequency, XIT/RIT mode is better since you can turn XIT/RIT off when the offending station is not transmitting.
- Tune only the transmit frequency while continuing to monitor your *receive* channel (ie XIT). To call a DX station who is operating split, use in either mode to tune your Tx quickly to the specified DX listening frequency – while not missing a word on your receive channel.
- Tune the transmit frequency while monitoring what is about to be your *transmit* channel (ie REV XIT). Use this to check for a quiet spot before calling.

You can do any of the above – independently – in any order using merely one key-press to define your choice. On receive, the frequency displayed will be that which you are changing – and on transmit, always your Tx frequency.

Further utility options let you swap the two VFO frequencies – or initialise them as the same. Likewise for the XIT/RIT frequencies. Initialisation is done for you in XIT/RIT mode should you change VFO – or band – or frequency by more than 2.5kHz while on pure transceive – on the grounds that any difference must then be irrelevant.

DDS/DSP MODE SWITCHING

As supplied, the DDS mode is permanently engaged and you would be unaware that there is any other. This is deliberate in order that you can check out the DDS functionality after first commissioning – without distraction.

Once you are happy here, the DSP mode becomes available following the first time you download DSP code from your PC to Pic 'N' Mix. The remainder of this discussion assumes that this has happened.

In normal use, STAR 'rests' in DDS mode and displays frequency. The key to switching to DSP mode is the *duration* of the *first* key press. A quick press on a key activates DSP mode; whereas a longer press invokes the 'business-as-usual' DDS function. The resultant displays are quite different, so it will only take you a few minutes to get the 'feel' ingrained.

The DSP functionality is given this priority because most DSP functions are needed quickly in real operating conditions. For example, turning the auto-notch on when that tuner starts up is a more immediate issue than, say, changing bands.

Certainly a 'quick press' need not be tentative, merely not overtly sustained. Once the mode has been determined by the duration of the first key press, the duration of subsequent key presses is unimportant.

The very deliberate exception is the bottom row of keys – which act to give vital DDS functions – and which therefore have no DSP functionality as the *first* key-press.

Once you are in DSP mode if you neither press a key nor alter a value

Fig 32: Plot of wide, medium and narrow Rx SSB filters. Other filters in the DSP receiver give a further theoretical 30dB of ultimate stop band. The pass-band ripple in all cases is less than 0.2dB. Because STAR is not a mere audio add-on, these widths are actually achievable – and usable.

for about three seconds, PIC-A-STAR will revert to DDS mode. You can prevent this by pressing the **#** key – which toggles holding the display in DSP mode. This is invaluable when setting up the DSP control settings.

USING THE DSP MENU

The DSP controls are grouped to form a menu, as shown in **Fig 31**. This menu detail *will* change over time, but not the intrinsic structure. Project without end, right?

MENU GROUPINGS

The menu is ordered with the more commonly-used controls near the 'top' of each menu group – and rarely-used ones near the 'bottom'. In practice, some of these latter items can be regarded as presets.

STAR display in DSP mode

There are no sub-menus, so the system is inherently limited to 99 controls in nine groups times two modes – a limitation I, for one, can live with.

The menu is intrinsically SSB/CW modal in the sense that if you are in SSB mode then you simply can't get at controls which are unique to CW – and *vice versa*. These controls are annotated 'SSB only' or 'CW only'. Some controls share one common value for both modes and are annotated 'both'. Two controls, namely 2.2 and 8.1, have different values per band.

Conversely, all other menu items that are *not* peculiar to mode have different settings stored for SSB and CW. For example, different AGC time constants, Denoiser settings and so on can be set up, varied – and retained independently for SSB and CW. This applies also to the on/off switch settings.

All this is designed to foster a 'set-and-forget' philosophy.

HOW TO PIC FROM THE MENU

Immediately after you (quickly) press a 1-9 key, the display will switch to DSP mode. For example, a dab on the **7** key will show '7.1 13' where 7.1 denotes the first control in that menu group, namely VOX/QSK hang time – and 13 is its present value. See also the photograph.

If you want to move on to the second control in the same group, press the **7** key again – and so on. If you want to move back up through the group, press **0**. If you want to move to a completely different menu group, simply press the corresponding key.

CHANGING VALUES

After you have selected a control, if you want to change its value, turn the knob – clockwise for more, anti-clockwise for less.

There are maximum and minimum values for each control – and the rate of change is proportional to the range.

ON/OFF SWITCHES

To switch a DSP feature on/off, press the corresponding key (1, 4, 7, 3, 6, 9) followed by ✳. The adjacent LED will change to provide visible status thereafter.

For example **7**✳ will switch VOX on/off if in SSB – and QSK on/off if in CW mode.

In fact, irrespective of which menu item in a group you are addressing, the ✳ key will toggle the associated switch and you will revert immediately to DDS mode.

MUTE

2✳ near-mutes the receiver and suspends VOX operation. This is the 'panic' button for unexpected interruptions eg when the phone rings. Any subsequent key press or knob turn restores your pre-panic state.

QUICK SWITCH OPTION

8✳ toggles the quick switch facility. When engaged, any one of the 1, 4, 7, 3, 9 keys – when pressed – simply toggles its respective DSP switch. Because you are thereby *not* presented with the values for those menu groups, you would not want to use this option until those groups are set up. Conversely, once the values are tuned and you have gained familiarity, I *think* this is the mode of choice. It is for me, anyway.

RESETTING CONTROL VALUES

5✳ resets the control values (both SSB and CW) to those that you last downloaded from the PC – with the exception of RF Gain and Tx Drive – the latest per-band values of which are retained. All the DSP values are remembered across a power-down, but not switch settings – which initialise to off but with the DSP filter on – and in SSB mode.

DSP FEATURES DESCRIPTION

A few words are in order for some of the more esoteric features you may not have met before. In roughly menu order:

DENOISER

This is rather more a comfort feature than a performance one. It acts to reduce background white noise – and when working well, is not unlike squelch on FM. It is especially effective on CW and very useful if just monitoring a quiet (albeit noisy) channel. The 'right' combination of settings is somewhat subjective and can occasionally vary from one signal to another – and certainly by mode. It is best with the RF gain turned up and with longer AGC hang times. Experiment!

Both the Denoiser and Autonotch (see later) are essentially as implemented in DSP-10 by Bob Larkin. See also references [3–6] for the pioneering work and the theory.

RF GAIN

This comes right at the front of the DSP receiver chain and is used to set the SNR for different conditions. It should normally be turned well up so that AGC action produces constant audio output – and the best possible SNR. This also contributes to clean VOX operation.

STEREO EFFECT

This gives body and presence to signals and warrants a decent stereo audio amplifier and speakers. Some folks report an increase in readability on weak signals. Personally, I just love it! For me, it completely transforms the listening experience.

STEREO BALANCE

Values above 100 decrease the right channel output; those below 100 decrease the left channel output. Another scratchy pot saved.

NOISE BLANKER

As opposed to the Denoiser which acts on white noise, this acts on impulse interference – eg ignition noise, thermostats, electric fences and the like.

AUTO NOTCH

This removes an interfering heterodyne – and, in many circumstances, several. It works best on pure tones and especially lower-pitched ones. It has exactly one use in CW mode, namely for monitoring key clicks ie what's left after removing the tone. One very popular commercial transceiver shows up here every time.

Auto notch is applied *after* the filter bank and is *outside* the DSP AGC loop – to avoid strong-signal overload of the DSP.

CW OFFSET

This is your preferred beat note and may be pre-set (when you download from your PC) to 5, 6, 7, 8 or 900Hz. The centre frequency of the CW filters is changed to match.

If you are interfacing with other

REFERENCES

[1] 'In Practice', by Ian White, G3SEK, *RadCom*, Feb 2003.
[2] 'HF', by Don Field, G3XTT, *RadCom*, June 2003.
[3] 'A DSP-Based Audio Signal Processor', by Johan Forrer, KC7WW, *QEX*, Sept 1996.
[4] 'Low-Cost Digital Signal Processing for the Radio Amateur', by D Hershberger, *QST*, Sept 1992.
[5] 'DSP – An Intuitive Approach', by D Hershberger, *QST*, Feb 1996.
[6] 'Using the LMS Algorithms for QRM and QRN Reduction', by S E Reyer and D Hershberger, *QEX*, Sept 1992.

than Pic 'N' Mix, you will need to adjust your Tx/Rx mixer injection frequency by mode. So, for the record, the following are the exact DSP IFs (in kHz) used by PIC-A-STAR:

LSB Tx = Rx = 16.35
LSB CW Tx = 16.35, Rx = Tx + CW offset
USB Tx = Rx = 13.65
USB CW Tx = 13.65, Rx = Tx – CW offset

There is also a Reverse CW option and if set:

LSB CW Tx = 16.35, Rx = Tx – CW offset
USB CW Tx = 13.65, Rx = Tx + CW offset

SIDETONE FREQUENCY

Not to be confused with CW Offset, this is the tone you hear when *sending* CW. The QSK experts tell me it can be useful to have this at a different pitch from an inbound signal – so you can intuitively tell the difference between you and the station being worked when using fast break-in.

To enhance this effect, the sidetone comes from one speaker only, the inbound signal from both. The pitch may be excessively varied between 10Hz and 2.54kHz in 10Hz increments – this extended range being useful should you need it to double as an instant audio signal generator.

CW TONES 1 OR 2

This allows two-tone testing. The two tones are 700Hz and 600Hz. If you have not used a two-tone test for linearity checking before, be aware that the duty cycle is very high – so use only short or pulsed bursts.

AGC HANG TIME

This can be set anywhere between very short and very long. I understand that most people usually only change this per QSO for CW work – and so you can vary the CW setting without altering the SSB setting. A value of 0 turns DSP AGC off.

While actually changing frequency, the hang-time is set to short to avoid annoying hangs after tuning across large signals.

FILTER WIDTH

This allows you to set the receiver filter width by turning the knob (or on/off using **6**✳). There are six filters currently provided, three each for SSB and CW (though any one *can* be used in either mode) – see **Figs 32** and **33**. The status LED is tri-colour and corresponds to wide, medium, narrow – or off.

Turning the filter off is a useful way of checking if a signal has stopped transmitting or has just slipped out of the pass-band since, when you switch the filter back on again, it reverts to the previous filter width.

FILTER DEPTH

This concept was inspired by yet another conversation with Bill Carver, W7AAZ. In traditional analogue terms, it allows a controlled leak past the filter. For CW operation it is in many ways more useful than controlling the filter width. In use, having tuned a wanted signal to the centre of the pass-band, you simply increase the filter depth (ie the stop-band rejection) until the QRM is reduced to any level with which you feel comfortable. Putting it another way, you come up to periscope depth to find a target – centre it up – and then go down again so the nearby destroyers can't get you.

VOX AND QSK

The hang time is the duration spent on transmit after you have stopped speaking (or keying) before PIC-A-STAR reverts to receive. If you have a relay-free T/R system, then there is no need to set other than a very low value here. With relays, any greater setting will minimise the number of rattling occasions. It is adjusted to allow the *trailing* edge of your transmission to pass before switching to receive.

The Rx-Tx pre-delay is the time your signal is delayed by DSP to allow for relay settling when switching to transmit. It is adjusted so that the *leading* edge of a transmission is not truncated – just.

The Tx-Rx blank time is the duration of DSP receiver blanking immediately after reverting to receive. It should be set to the minimal value possible, consistent with no objectionable click coming from the receiver after the transition. With a full STAR configuration, this is simply zero.

The above three parameters are separately set for SSB and CW. For SSB only, VOX and anti-VOX gains may also be set. See Part 4 for further discussion.

TX DRIVE

This is the power-setting control. When on transmit, the S-meter reading corresponds to Tx drive level – and is therefore modal.

MONITOR LEVEL

On SSB this control sets the level at which you monitor your own voice – after all VOX processing and filtering. If, for example, you turn the Rx-Tx pre-delay up high, you will – somewhat disconcertingly – hear your *very* delayed voice. And you will hear leading or trailing edge truncation if the timing is not set up properly. For operational use, however, the level should be kept low to avoid any feedback; or worse, confusion of the VOX software.

On CW, this control sets the sidetone level; you do *not* hear a delayed signal – since this would play havoc with your sending.

MICROPHONE GAIN

In conjunction with the Mic Gain preset on the IF board (RV5), this should be set to provide adequate input to the software VOGAD. The latter will hold the audio amplitude at a substantially constant level even in moments of excitement.

BASS AND TREBLE BOOST

These act independently to tailor the transmitted audio profile.

RF CLIPPING

I have always found this the most effective form of SSB processing – as opposed to audio compression. It increases the average power while holding the peak power steady. In mechanical engineering terms, it increases your transmitted signal's power-to-weight ratio. So it also increases the strain on your power supply, linear and ATU.

Use it only sparingly and when necessary (and *not* because it is there), bearing in mind that any form of processing – by definition – introduces distortion.

CW SPOT LEVEL

A 'spot' tone (equal in frequency to your CW offset) may be injected into the receiver output. As you net onto an incoming CW signal you will hear it beat with the 'spot' tone – and when they are on the same frequency, you are indeed netted.

This control alters the *minimum* amplitude. However, the amplitude is also increased automatically with the strength of the incoming signal. This is done because it is easier to beat two notes of similar amplitude – especially when the 'spot' tone amplitude tracks the inbound keying.

FINALLY...

Check with me for the latest changes, please. Project without end, right?

Next month, we start on the front-end, the determinant of that rock-solid base receiver performance.

PLEASE NOTE

In Fig 22 (August issue), IC1 should be a TDA2822M, as is correctly shown in Fig 21. ◆

Fig 31: DSP menu structure

1✳ Denoiser ON/OFF	
1.1 Denoise beta	
1.2 Denoise decay	
2✳ Mute Rx and suspend VOX	both
2.1 AF gain	both
2.2 RF gain (per band)	both
2.3 Stereo effect (ie amount)	both
2.4 Stereo balance	both
3✳ Noise blank ON/OFF	
3.1 Noise blank threshold	
4✳ Auto notch ON/OFF	
4.1 Auto notch beta	
4.2 CW tones, 1 or 2	CW only
4.3 CW offset frequency	CW only
4.4 Sidetone frequency	CW only
5✳ Reset downloaded values	both
5.1 AGC hang time	
6✳ Filter ON/OFF	
6.1 Filter width (1 – 6)	
6.2 Filter depth	
7✳ VOX/QSK ON/OFF	
7.1 VOX/QSK hang time	
7.2 Rx – Tx pre-delay	
7.3 Tx – Rx blank time	
7.4 VOX gain	SSB only
7.5 anti-VOX gain	SSB only
8✳ Quick Switch ON/OFF	both
8.1 Tx drive level (per band)	
8.2 Monitor level	
8.3 Mic gain	SSB only
8.4 Tx Top boost	SSB only
8.5 Tx Bass boost	SSB only
9✳ RF clip/Spot ON/OFF	
9.1 RF clip ON/OFF	SSB only
9.1 Spot level	CW only
# hold DSP mode ON/OFF	both

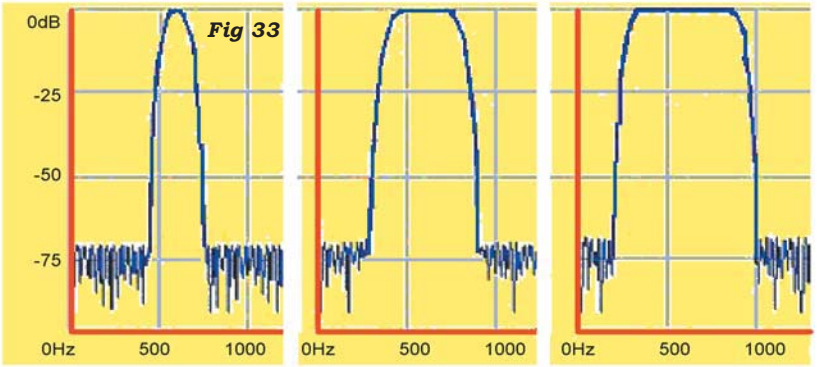


Fig 33: Plot of the Rx CW filters. This is the bank centred on 600Hz – and those on different centre frequencies are otherwise similar. Their widths are approximately 200Hz, 500Hz and 750Hz but this absolutely depends on where you measure them. This filter shape gives less ringing than a 'brick wall' type. Other filters in the receive path give a further theoretical 30dB of ultimate stop band.

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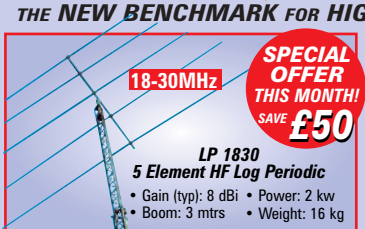

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- Power for tuning = 7-20W
- 13.8V DC ±10% op Voltage

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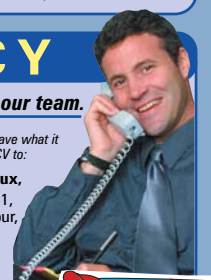

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Icom Sp21 £50		Trio Ts520 HF Base	£175
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Yaesu FT902DM HF Base	£325	Yaesu Frg7700 Hf Receiver	£195
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By Pat Hawker, G3VA,
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EVOLUTION OF THE HF 'YAGI' – THE ROLE OF BROWN, KRAUS & ROBERTS

Like many other readers, I read with great interest the extensively-researched two-part article 'Evolution of the Beam Antenna', by Peter Dodd, G3LDO (*RadCom,* July & August, 2003). But I must admit that I was surprised to find no appreciation that the HF rotary 'Yagi' beam owes much more to the theoretical work of Dr George Brown (and its application to practical amateur antennas by Dr John D Kraus, W8JK, and Walter Van B Roberts, W3CHO) than to Professor Yagi and his student S Uda. It was Uda who carried out the pioneering work reported in the 1926 IRE paper.

But it is important to realise that the original Yagi concept posited on a spacing between the parallel driven and parasitically-excited elements of one-quarter wavelength. This, in effect, made it impractical for the vast majority of amateurs to build rotary Yagi-type beams for any HF band, except possibly 28MHz (see, for example, the enormous antenna erected by GM6RG described in G3LDO's article).

The problem for Peter must have been that the practical designs of antennas using narrow spacing by W8JK and W3CHO were described first in the long-defunct West Coast *Radio* magazine, rather than *QST*, and neither, quite understandably, made any reference to Yagi. The fact is that the modern HF rotary beam antenna is *not* based on the work of Yagi/Uda but on the theoretical work of Dr George Brown.

I gave an outline of just part of the story in 'TT', 'The Roberts/Brown /Yagi Array', January 1979 and 'The 8JK Revisited…', September 1990, with both these items now republished in *Antenna Topics* (pp137/138 and pp264/265). My interest in what I find a quite fascinating story arose from my having a single pre-war copy of *Radio* and from having written, while at the IBA, an article 'Using Directional MF Transmitting Antennas', for *International Broadcast Engineer (IBE).* Several MF multi-mast broadcast directional antennas had been erected for the then new Independent Local Radio stations. I had written: "The design and setting-up of directional [broadcast] antennas was likely to involve a need for expertise not readily available outside North America, where a long tradition, often involving specialised engineering consultancies, had been established in the decades following the publication in 1937 of the classic work by Dr George Brown on the directional characteristics of vertical radiators."

This article came to the attention of Dr Brown of RCA, who is equally well-known for his work on ground systems, his invention of the Ground Plane and [broadcast] Turnstile antennas, and later as RCA Director of Research for RCA's development of (NTSC) colour television. I was greatly surprised when he sent me a reprinted (personally signed) copy of his *Directional Antennas* 68-page treatise (*Proc IRE,* January 1997, pp78 – 145), though I found it formidably mathematical! We later corresponded on questions of television history, leading to a London lunch meeting with him, his wife and Tony Bridgewater, a Baird Company, then BBC, television pioneer. After George Brown's death, I received from Ken McKee (RCA's London Representative) a copy of his autobiography "and part of which I was – Recollections of a Research Engineer". I was astonished to find that he had included the above excerpt from my *IBE* article!

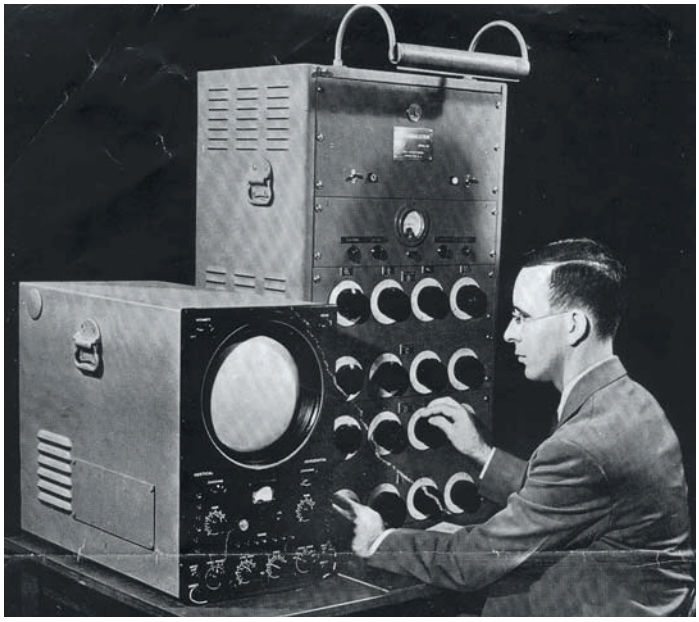
Brown's 68-page IRE paper is highly mathematical, has no direct connection with Yagi's work, deals primarily with driven- and parasitically-excited vertical monopole broadcast antennas. But, as he describes in his autobiography, "A few months after publication, I was asked to speak to an amateur radio club on the subject of the '8JK' antenna. I had to confess ignorance of this device and asked for enlightenment. It was explained that John D Kraus (Ohio State University) in Ann Arbor, Michigan, was an amateur radio operator with call letters W8JK who had concocted a beam antenna which was outperforming any other antenna used in 'ham' circles. Some ham operator had been heard to say that Kraus had made his contribution after reading my paper… I did speak at the club but not on the '8JK' antenna, since I had not learned any of its construction details or performance.

"John Kraus in his book *Big Ears* (1976) tells of the excitement in amateur circles: 'Then one day in January 1937, I received my copy of *PROC IRE*. An article by George H Brown of RCA… caught my eye. It was a long paper loaded with mathematical equations, figures and graphs… I calculated all the dimensions carefully and gathered the wire, insulators, wood and rope I needed. The last Saturday in January (1937) I braved the freezing weather to assemble the antenna and pull it up between two poles in place of one of the Bruce antennas…' The 8JK beam antenna was a new concept. The design was unprecedented. It was the first of a new breed of antennas with close spacing. Most everything about it was entirely different from older, more conventional antennas …."

Dr Kraus (who was later responsible for the folded dipole, the horn antenna and other developments) described his new bi-directional 'flat top' antennas in a series of articles during 1937 in *Radio.* Although I have never seen these, his designs were soon taken up around the amateur world: **Fig 1.** They were usually implemented as fixed wire beams slung between two support masts but, within a year, rotary single-section versions were being described by American amateurs in *Radio.*

The theory of close-spacing had come from Brown: the relevant section, just six pages (103 – 108) of the 68-page paper, was in Section VI 'A Single Parasitic Reflector – (a) The Transmitting Case'. The key feature is that this section showed quite explicitly that 'a spacing of one-quarter wave is not an optimum value for either maximum forward or backward radiation. Much smaller spacings are preferable'. This finding was regardless of whether the elements were driven (as in 8JK's flat-top arrays) or how many were parasitically excited. The 8JK is never regarded as a Yagi antenna.

In his book, Dr Brown points out: "Ironically, the particular portion of my paper which John Kraus used so effec-



Wendell Morrison at the controls of the RCA Antennalyzer in use with an RCA Type 327A oscilloscope. It was possible for a non-technical assistant to design an array of up to five vertical masts to meet a required radiation pattern by simply using the control knobs.

tively was a small paper which I submitted to the IRE in 1932 [this would have been before he joined RCA and was still a research graduate at the University of Wisconsin – *G3VA*] only to have it rejected by a reviewer who denied its validity. When I prepared *Directional Antennas*, I tucked this older material on close-spaced antennas into the middle of this bulky manuscript on the assumption that the reviewer would not notice it."

So far so good. But this was still not a rotary unidirectional antenna of the type we have traditionally, if incorrectly, regarded as an HF 'Yagi' beam. Such a design, however, was to appear 12 months later, again with acknowledgement to Brown's *IRE* paper and no mention of Yagi-Uda.

The lead article in *Radio*, January 1938, pp19 – 23 was 'The Compact Unidirectional Array' by Walter Van B Roberts, W3CHO, who was working in RCA's Patent Department and clearly aware of pages 103 – 108 of Brown's paper which he fully acknowledges. The article describes a 28MHz two-element array with a close-spaced director (shown by Brown to give slightly more gain than a reflector element: **Fig 2**) complete with a mast-mounted driving motor to rotate the array. W3CHO also erected an experimental 14MHz version requiring auxiliary supports.

W3CHO quotes some of the conclusions reached by Brown: "In the case of a single parasitic reflector, it is found that the mysterious 'something' that is supposed to happen when the spacing is one-quarter wavelength fails to materialise. Closer spacings are found to be desirable in both the transmitting and receiving cases. It is found that the parasitic antenna functions equally well as a director or a reflector".

Fig 3 shows the constructional details of the 1937 W3CHO array. To quote: "It is unusual in that the radiators are aluminium tubes sufficiently stiff to be supported at the centre only and, since the centres are voltage nodes, no insulators are required. The dipoles in our antenna each consist of a 12ft piece of 1in-diameter hard aluminium tubing with a 3ft piece of $^{3}/_{4}$-inch tubing telescoped in each end to permit tuning..." It will be seen that this 1937 beam antenna used the form of construction later known as 'plumber's delight' that G3LDO failed to trace before 1947!

After my earlier (January, 1979) piece on the 1938 article by Walter Roberts, W3CHO (later W2CHO), I was delighted to receive a letter from him, relocated in his winter home in Florida where he was still active as K4EA. He wrote: "Our mutual friend Richard [Thurlow], G3WW, has sent me a copy of 'TT' January, 1979. It was a pleasant surprise that my old article in *Radio* had been dug out of limbo. I doubt if anyone here remembers it... You cover the facts accurately and all I have to say is that I am most pleased to be given some recognition in England.

"The only other time I have been on the receiving end of feedback from G was less welcome. I had been talking to an amateur in London and ill-advisedly asked him to call my cousin Harry Crookshank and pass along a quite unnecessary message about family matters. But Harry was at the time your Postmaster General and he got most annoyed at me for having made him party to breaking his own rules about amateur messages. But his argument that such messages deprive the Post Office of revenue was hardly convincing in this case, for my messages caused five trans-Atlantic cables to be sent to clear the matter up...

"Another of my antenna articles 'Input impedance of a folded dipole' (*RCA Review*, June 1942) will tell you more than you probably want to know about the subject..."

My copy of the 1942 edition of *The 'Radio' Handbook* includes details of a three-element 28MHz unidirectional close-spaced array, again in the form of an 'all-pipe' version (**Fig 4**), as well as design details of various 8JK flat-top designs of up to four sections, and rotary versions. The index contains *no* entry for Yagi!

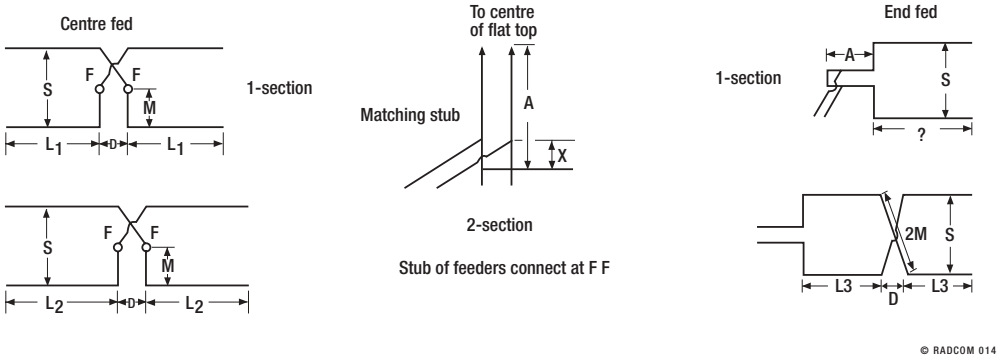
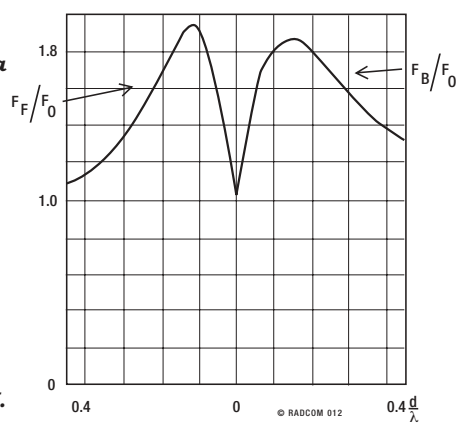


Fig 1: An extract from the 1942 edition of The 'Radio' Handbook of the 8JK 'flat-top' beam design data as developed during 1938 by Dr John D Kraus, W8JK. Data are presented for up to four-section arrays with spacings (S) of 0.125, 0.15, 0.20 and 0.25λ. Note that a one-section array for 14MHz can be used as a two-section array on 28MHz provided the feed is reversed from current to voltage. For 14MHz with 0.15λ spacing: S = 10ft 5in; L1 = 17ft; L2 = 25ft 3in; M = 5ft 4in; D = 2ft.

Fig 2: A diagram from Dr Brown's 1937 Proc IRE paper in which he showed that a spacing of one-quarter wave [as in the original Yagi/Uda antennas] is not an optimum value for either maximum forward or backward radiation. Much smaller spacings are shown to be clearly preferable, where the second element can be either driven or parasitically excited. The diagram shows the maximum increase in forward and backward signal as a function of spacing between the antenna and 'reflector'. Note that where the second element is used as a director, it provides slightly more forward gain than when acting as a reflector. In practice, a close-spaced two-element array can approach 5.2dB forward gain – see HF Antennas for all Locations by Les Moxon, G6XN.



THE RCA ANTENNALYZER

Walter Roberts concluded his February 1979 letter: "Finally you may be interested in a brief description of a most ingenious machine built long ago by George Brown (whom I still run into once-in-a-while in Princeton, NJ) which displayed on a 'scope the radiation pattern from any number (up to about five) of vertical antennas located arbitrarily. Each antenna was represented by two dials, one for amplitude of current therein and the other for phase. The interesting thing was that he could tell a girl assistant who knew nothing about it to twiddle the dials until the scope showed a desired pattern. She could do this in a few minutes by trial and error..."

This 'machine' called 'The Antennalyzer' (developed in conjunction with Wendell Morrison) is illustrated in George Brown's autobiography and comprised a large cabinet about 4ft in height, with 16 large knobs, a meter and some switches, sitting alongside an oscilloscope, possibly all of early post-war vintage. In effect, it was a form of analogue computer devised many years before the development of the NEC Method of Moments and PCs. I have an eight-page RCA brochure on the Antennalyzer in the form of a preprint of an article for *Broadcast News*, Vol 43. It is described as "A new device with which it is possible to observe on an oscilloscope the total radiation patters of two-, three-, four- or five-tower antenna systems."

Dr George H Brown died on December 11, 1987, aged 79. Walter Roberts, K4EA, is also now a silent key.

KWIK-SORTA TRANSISTOR TESTER

I recently received a request from Australia for details of the ZL2AMJ Kwik-Sorta Mk 2 transistor and diode tester. Details of this still-useful device were given over 20 years ago in 'TT' December 1979 based on the original article by Fred Johnson, ZL2AMJ, in *Break-In*, October 1974. It reappeared in *Amateur Radio Techniques*, 7th edition but, as this is now out of print, it may be time for it to be revisited.

This little test set (**Fig 5**) provides a quick 'go/no-go' check of the status of bipolar transistors and diodes. It also sorts unknown devices into pnp/npn types, identifies lead connections, etc. In 1974, ZL2AMJ wrote: "The value of this unit as a checker and time saver cannot be over-emphasised. It is my observation that people who scoff at its simplicity do not understand its purpose, or appreciate the wide application and useful result that can be obtained from it. I firmly believe that every home constructor would find it invaluable."

It is not meant to be a laboratory instrument but rather to give a straightforward 'yes/no' indication for finally testing a device before it is popped into circuit. It is always advisable to make such a test whether using new or used devices. ZL2AMJ claimed that he makes it a rule that all bipolar transistors and diodes are checked in this way before being mounted in any new circuit. Even new components, he noted, can be found to have been improperly marked, or packed in wrong boxes, or have newly-changed pin connections. Devices rejected should not immediately be thrown away, since they may be FETs or UJTs, and faulty bipolar transistors may still form useful diodes if one good junction can be located using the Kwik-Sorta.

While small signal transistors and diodes simply plug into the socket provided, power transistors and power diodes can be checked using wander-leads and croc-clips or by wiring single-strand leads to the device pins and then plugging these into leads in the test socket. Alternatively, separate 'e', 'b' and 'c' (emitter, base, collector) test sockets can be fitted in addition to the usual test socket.

Basically, since the power supply is AC, any diode under test will conduct only when the polarity is appropriate and when this agrees with the polarity of one or other of the two LEDs. If a test diode is removed from the socket and the connections reversed the other LED glows; if the diode is open-circuit neither LED glows; if short-circuit, both LEDs glow.

Transistors behave similarly, except that to make them conduct a base current is needed, and this is supplied through R2 which is normally kept in the high-resistance position and then advanced until one or other LED begins to glow. An indication of transistor 'gain' is provided by comparing the point on R2 travel where the LED first starts to glow. Since it is possible to treat a transistor as two separate diodes, devices with unknown connections can be sorted out to find base, emitter and collector connections.

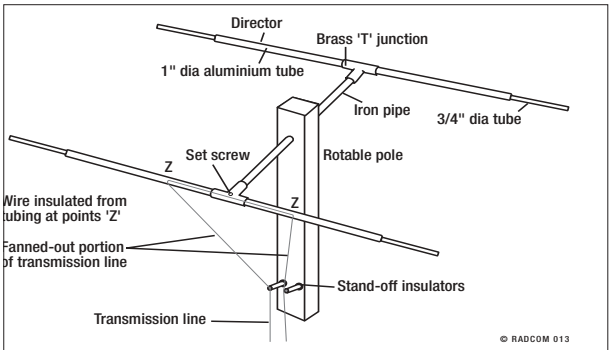


Fig 3: The first close-spaced 28MHz rotary unidirectional array as described by W3CHO (later K4EA) in the January 1938 issue of Radio and based on the 1937 paper by Dr G H Brown. Note this pioneer antenna used the 'plumber's delight' system with an iron pipe boom.

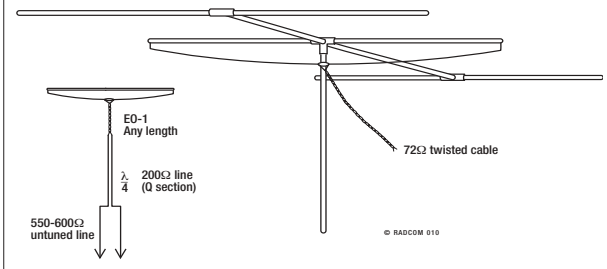
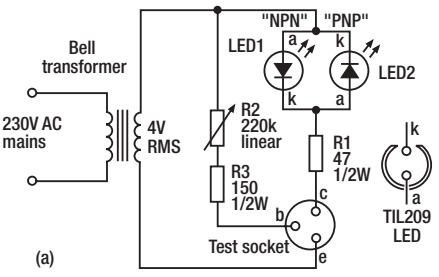
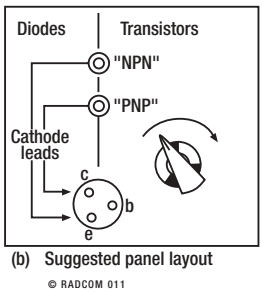


Fig 4; An all-pipe three-element close-spaced 28MHz array using all-pipe construction as described in the 1942 edition of The 'Radio' Handbook. Although by this time, co-axial cable was beginning to be used, the EO-1 was low-loss rubber-insulated twisted flex with outer braid popular in the States. On 14MHz it had a loss of about 1.5dB/100ft and on 28MHz about 3dB/100ft when first installed.





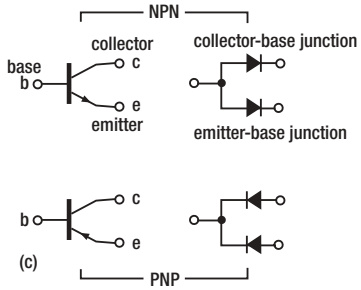


Fig 5: The ZL2AMH Kwik-Sorta Mk 2 bipolar transistor and diode tester, originally described in 1974 but still deemed to be a useful device.

Device	R2	'pnp'	'npn'	Conclusion
		LED	LED	
Diode to 'e' & 'c' pins	–	On	Off	Good unit, Anode at 'e' pin
		Off	On	Good unit. Anode at 'c' pin
		Off	Off	Faulty unit. Open circuit or faulty connection
		On	On	Faulty unit. Short circuit
Transistor (known pin connections to 'e', 'b' & 'c' pins)	Max	On	On	Faulty. Probable s/c to emitter
	Max	Off	Off	Normal. Proceed to rotate R2
	Decreasing R2	Brightens	Off	A good pnp device
	Decreasing R2	Off	Brightens	A good npn device

Table 1: Kwik-Sorta Test Procedures

Note: With practice, other indications, such as correct pin connections of an unknown transistor can be sorted out, or 'gains' can be compared by noting position and effect of R2 on the brightness of the LED.

Table 1 gives an idea of how to use the tester but, in practice, after a bit of experience, further operations are likely to become second-nature to the user.

ANTENNAS – WIRES, INSULATION, ROPES & KNOTS

The questions raised in the August 'TT' item on the losses introduced into the total radiation of HF from antennas due to the type of wire, whether bare or insulated and related topics have brought in a number of comments, ideas and suggestions. Although I have yet to see any qualitative measurements of the possible loss of power due to the use of a conductor enclosed in lossy (to RF) plastic or rubber insulation. One could devise a laboratory experiment in which a bare wire element is then bound over part of a current maximum with several turns of various PVC, PTFE etc tapes and the temperature rise of the tapes measured when the element is energised at high power

Godfrey Manning, G4GLM, has carried out the microwave oven test. He writes: "Whether or not your telephone-cable loop antenna is lossy may depend on manufacturer. Having got fed up with repeatedly buying small quantities for individual jobs, I ordered a drum at bulk prices. There is no maker's name and the outer sleeve [near white] is unusually shiny – a fact that got me out of trouble when drawing the cable through a tight hole. It slipped through more easily than another cable taking the same route.

"To test for loss, I dangled a sample of the sleeve (wires removed) from the microwave oven's (plastic) stirrer attachment for one minute at 800W. This means that no conducted heat could give a false result. It got noticeably very warm indeed, not hot enough to burn, but safe enough to touch to one's heat-sensitive lips to confirm a very marked temperature rise… I wouldn't use it as part of an antenna system myself."

Dick Biddulph, M0CGN, notes: "Plasticised PVC is a poor RF insulator, but I cannot find any data in either the *Handbook of Chemistry and Physics* (the Chemist's 'Bible') or in Kaye and Laby's *Tables of Physical and Chemical Constants*. I know that the plasticiser amounts up to 50% of the whole and that esters do not have a good loss factor. Plasticisers are either all organic, eg di-octyl phthalate or partly inorganic eg tri-cresyl phosphate, now obsolete". This seems to bear out the August 'TT' remarks that some types of PVC drainpipes, etc make good coil formers while other are very poor.

Dick adds: "For my ATU, I use a pill bottle which carries on its base a symbol for polypropylene, for recycling purposes. Of course nothing will stick to it so I wound the coil on a layer of 'Kleenex', covered it with another layer and soaked the lot in polystyrene dope. I screwed the pill-bottle-top to the chassis and clicked the coil into place.

"Regarding the failed wartime attempt by GM3AVA to use Army field-telephone wire for a long-wire antenna. I believe this came in two sizes Don 8 and Don 3. Both had a copper core surrounded with steel wire; D3 had a single copper conductor of about 30SWG; and D8 had three copper wires of the same gauge, both surrounded by nine or more high-tensile steel wires which I believe were tin-plated, although I am relying on memory of my school days in the JTC!

"Aluminium wire is fine for short-term use *but* is very subject to metal fatigue. Incidentally, the tarnish on silver is usually silver sulphide which is a fair conductor: 1.5 x 10^{-3} ohm-metres compared with 1.5 x 10^{-6} ohm-metres for pure silver."

Peter Pitts, G3GYE/A4XGC /VP8JP, comments: "I have often wondered what is the loss of radiation due to insulation. The PVC-covered (yellow/green) copper wire used for domestic 'earth' wiring is economical and hence has been put to use for antennas. Solid copper conductor about 1.36mm diameter (about 17SWG, overall diameter about 2.8mm). I have noticed on many occasions the length for resonance is less than for bare copper (dielectric loading?). But I have never had a chance to check radiation efficiency compared with bare copper.

"I have also used stranded copper with a small percentage of cadmium and thin transparent plastic covering. This is very strong and proved to have long life when used for long V-beams in the saline air in Oman, where I spent my last 10 working years. Approximately 3mm diameter (overall). Economical in bulk (100m for £20, that is 20p per metre). Effect on radiation not known." [The sample looks as though this type of conductor should prove excellent for wire antennas – *G3VA*.]

A letter with enclosed samples has come from Dave Porter, G4OYX. He writes: "I have recently had occasion to change my W3DZZ trap-dipole antenna after some 20 years service… During these changes, I discovered the ageing processes that had occurred on the nominal 6mm orange-coloured support ropes. My Ludlow QTH is not an industrial area where deterioration would be greater.

"My first example is a section of end-support rope situated in the shade at the northern side of the house. Both the recently-cut ends and the section around the ceramic insulators have kept their colour and, despite its 20 years service, the wire has kept its flexibility and (presumably) strength. On the end of this section is an example of the knot illustrated in **Fig 6**.

"The second example is a section of the same rope, but this has been in position over the tiles of the house and has been exposed, particularly on the upper side, to the ravages of Ultra Violet (UV) radiation from the sun. The degradation is considerable and the material seriously weakened and crumbly. From the ground, using binoculars, it was not apparent that the material had UV-degraded so badly**.**

"The third section is some readily-obtainable blue polypropylene rope. During 2000 I used this to replace some of the orange rope at the scaffold-pole end away from the house, to try out a new pulley arrangement. The UV is already taking its toil and it seems certain that this type would not have the longevity of the orange type.

"For my new antenna I was faced with not being able to purchase any more of the orange type. My wife has an electric fence for equine control and I spotted a possible replacement in the Rutland Electric fencing range of control ropes. As my fourth example, the plastic material from which it is made looks and feels very similar to the orange type. However, the prospective user needs to be aware of the three stainless steel wire threads running through the rope. [Avoid resonant lengths in guys/support ropes etc, and probably unsuitable for efficient 'clothesline antennas' (see 'TT' May 1999) – G3VA.]

"For amateur radio support applications the use of substantial dog-bone-type insulators is advisable. I would not recommend small egg-type insulators as the stray capacity/voltage-breakdown may be too poor. The rope costs about £36 for 100m and would be a worthwhile investment for amateur radio clubs to sell to their members. I have some 80m available if required (QTHR)."

The knot shown in Fig 6, recommended by G4OYX for antenna guying, is described in detail (including six step-by-step illustrations) in *The Century Guide to Knots* by Mario Bigon and Guido Regazzoni, translated from the Italian by Maria Piotrowska, (Century Publishing, 1983). It is presented as a knot recommended for fastening any type of hook to any type of line, giving an excellent grip. A few checks with string, cord and plastic-covered wires confirm that this form of slip knot should find a number of applications for antenna work, particular if, as in G4OYX's example, the end is bound to the cord with twine. ◆

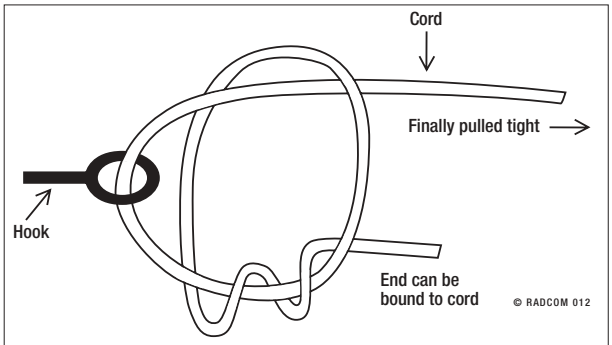


Fig 6: G4OYX finds this (slip) knot useful for fastening guy wires. It is described in detail in The Century Guide to Knots (Century Publishing 1983) as 'a compact knot which is fairly universal. It can be used with any kind of hook and any type of single line and gives an excellent grip'. Once tightened, the end can be bound to the main cord with some twine.

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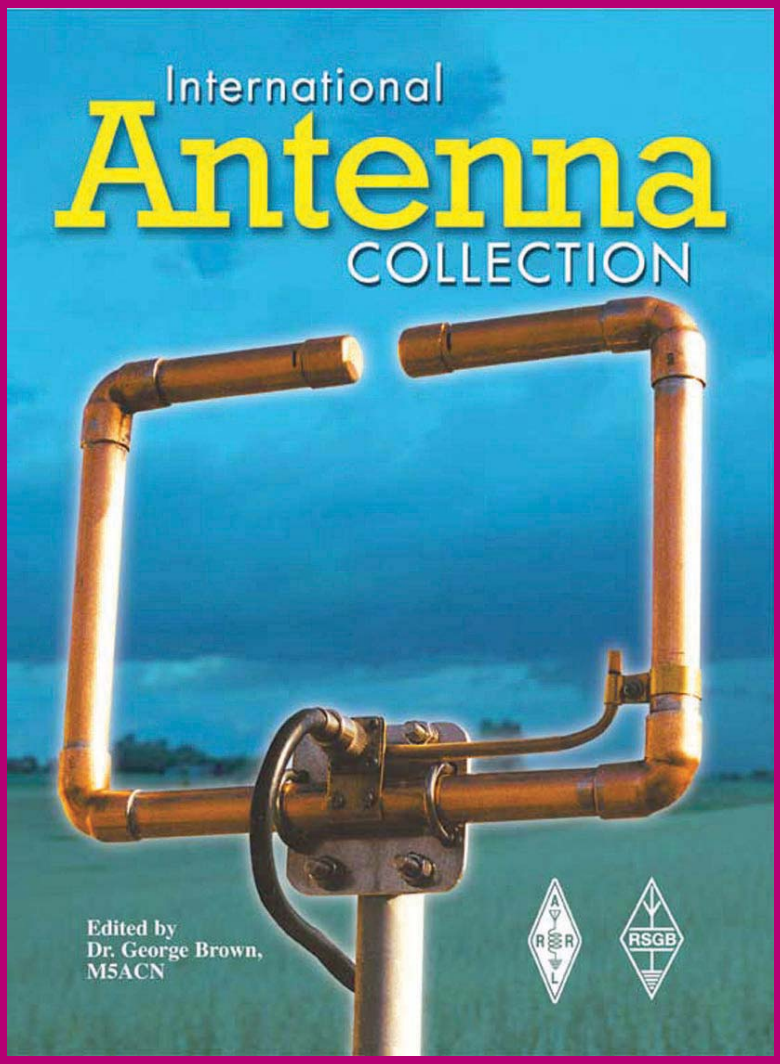

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By Steve White, G3ZVW, 31 Amberley Road, London N13 4BH. E-mail steve.white@rsgb.org.uk

Whatever next

This month, we look at surfaces which are switchable from being transparent to being opaque at certain radio frequencies, and at how Germany intends to harness satellite navigation systems to its rail network.

FREQUENCY-SELECTIVE SURFACES

There is high demand these days from industry, commerce and consumers for high-speed digital communication systems. Enormous amounts of data are now transmitted without wires and there is an ongoing need to increase capacity. With only a limited amount of the frequency spectrum being available for the purpose, one of the most significant problems is that adjacent wireless LANs can interfere with each other, significantly reducing network throughput. Electromagnetic radiation of a wireless LAN outside of its intended area of coverage can also open the door to hackers, so it makes sense to limit coverage for security purposes as well. Of course it is possible to screen a building, but then such things as broadcasts and mobile phone signals can't be received inside.

Several companies are currently developing Frequency-Selective Surfaces, materials that reflect certain frequencies but allow all others to pass through. You can look upon them effectively as band-stop filters built into the walls.

Earlier this year, Culham Electromagnetics and Lightning were awarded a contract by the Radiocommunications Agency to lead a research programme to investigate and demonstrate the use of FSS, 'to enhance the efficient use of the radio spectrum inside buildings'. The programme of work includes the development of FSS screens that are 'transparent' at most frequencies but not at LAN and Bluetooth frequencies (around 2.4GHz). Fixed and tunable FSS will be developed, and a detailed study undertaken into the implications of incorporating FSS into both existing and new buildings.

Meanwhile, Qinetiq, the company formed two years ago from the majority of the UK Government's Defence Evaluation & Research Agency (DERA) has been working with a team at the University of Kent to develop a similar kind of thing. According to an article in *Land Mobile* magazine, 'Further research into switching a wall's electromagnetic properties on and off is also showing great promise. A room can be made to change from electromagnetically transparent to electromagnetically isolated at the flick of a switch'. **Fig 1** shows the response of an active frequency-selective box in its 'on' and 'off' states. With over 20dB of attenuation at wireless LAN and Bluetooth frequencies, computer networks in close proximity could be expected to have greater throughput and data security would be enhanced. According to Dr Alan Smith, Qinetiq's Strategic Marketing manager, "The research programme into frequency-selective surfaces and active materials was initiated for defence purposes and related to the design of new types of antenna and radomes for communication and radar applications.

"This connection was not envisaged when we started the research and we are confident that taking advantage of this technology for office and domestic environments will help in the realisation of environmentally-friendly and electromagnetically-secure buildings."

SATELLITE NAVIGATION... FOR TRAINS

A demonstration took place in Austria in June to show how satellite navigation could make rail traffic operations safer. In a project called 'Integrail', which is funded by the European Space Agency, three German companies showed a system that uses satellite-based navigation information for railway traffic management and signalling.

The navigational data came from the European Geostationary Navigation Overlay Service (EGNOS) – yet another satellite navigation system. Integrail enables autonomous and reliable determination of train position, velocity and heading under practically all environmental conditions, and it supports railway traffic management.

The unit installed on board the train included a Global Positioning System (GPS)/EGNOS SatNav receiver, standard interfaces to the train's power supply and odometer, supplementary sensors to allow dead-reckoning positioning when GPS/EGNOS was masked, a digital track database, a communication unit, a processing unit and software.

The demonstration took place very soon after the inauguration in Germany of the first Master Control Centre (MCC) for EGNOS, which marked an important step in the advancement of Europe's own satellite navigation system. EGNOS is Europe's first step into satellite navigation, paving the way for Galileo (see 'Whatever Next', *RadCom*, September 2003). EGNOS works by sending correction signals and indications of how trustworthy GPS signals are, which results in a navigational accuracy of down to 2m, compared with the 15–20m provided by standard GPS. The EGNOS signals are transmitted by three geostationary satellites, AOR-E, Artemis and F5. These are existing 'birds', AOR-E standing for Atlantic Ocean Region East, which is an international marine satellite (Inmarsat).

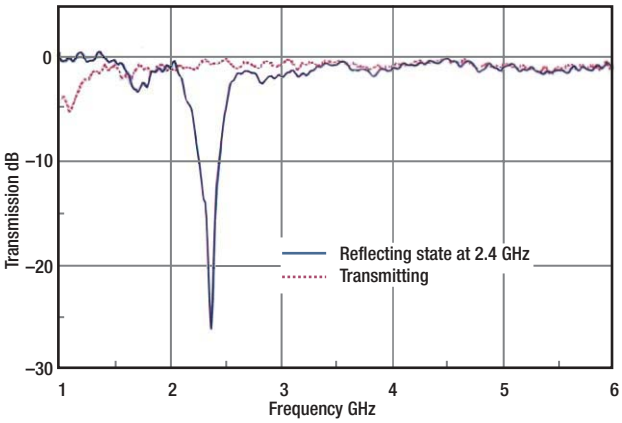

Fig 1: The blue line indicates the deep null in the response of an active frequency-selective surface in its 'on' state, while the red line shows minimal attenuation in its 'off' state.

The elements that make up the EGNOS system include:

- Ranging and Integrity Monitoring Stations (RIMS), which pick up GPS signals.
- Master Control Centres (MCCs), which process the data delivered by the RIMS.
- Uplink stations that transmit to the geostationary satellites, which relay it back to the ground to the users.

The first MCC is located in the German Air Navigation Services facilities in Langen, near Frankfurt (Germany). Further MCCs are planned for Torrejon (Spain), Ciampino (Italy) and Swanwick (England). Presumably the latter will be co-located with the new Air Traffic Control Centre. So far 12 RIMS have been deployed, with 22 more to follow.

EGNOS was primarily developed for civil aircraft navigation, but it is interesting to note that a second use has immediately been found for it. It is also being suggested that EGNOS could be used for fleet management and even helping the blind to get about safely and accurately. ◆

WEB SEARCH

Frequency-selective surfaces	www.culham.com and www.qiniteq.com
EGNOS	www.esa.int/export/esaCP/Pr_34_2003_p_EN.html and www.esa.int/export/esaSA/SEM89KXO4HD_navigation_0.html

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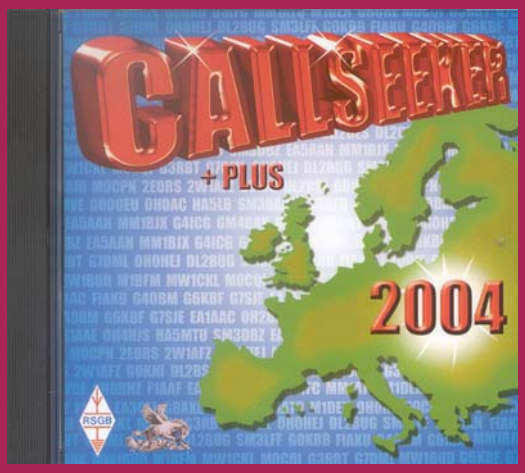

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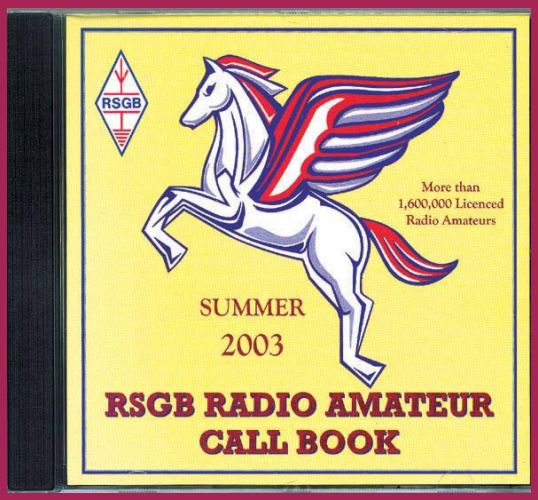

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In practi

Q1 I need to supply a valve heater with 12.6V AC at 2.9A, but the transformers in the catalogues only have 'standard' voltages like 12V and 15V. How can I obtain the correct voltage?

Q2 Me too! I need 8V AC at 0-3A, and the catalogues only show 6V and 9V.

A There are several ways to do this. Let's see which are the best options for the two applications above.

Option 1. Adjust primary voltage taps

This is a time-honoured way of obtaining a different voltage, by connecting the 230V AC mains to the 'wrong' primary tap... that's assuming the transformer has at least one primary tap in addition to the start and finish of the winding. However, the scope for variation is not large, and there can be safety implications. For example, if a transformer is marked as 6.0V AC and it has primary taps at 210-230-250V (**Fig 1**), you could connect the 230V mains to the 210V tap and obtain 6.0x(230/210) = 6.6V AC. Connecting to the 250V tap would give you 5.5V AC. Note that the scope for varying the output voltage is usually only about ±10%. Note also that if you connect 230V to a 210V tap, you would be overrunning the transformer. Most transformers should stand this, but there is a risk of core saturation and overheating. Don't even think of connecting 230V to a 115V tap!

I don't recommend using a 'spare' secondary winding to add to the primary voltage or subtract from it. Modern practice is to keep the primary and secondary completely separate – often with the primary on its own fully insulated bobbin (see photograph). The insulation between windings on the secondary side of a low-voltage transformer may not be up to mains standards, and it's risky to rely on it.

Option 2. Series resistor in secondary circuit

This is one way of reducing the voltage for a valve heater – but only if the load is constant. **Fig 2(a)** shows how this can be done for the valve in Question 1, starting with a 15V AC transformer. That voltage at 2.9A represents 43.5VA, so you should be looking in the catalogues for a transformer with a 50VA rating. You need to drop (15 – 12.6) = 2.4V at 2.9A, so the resistance, R1, needs to be 0.83Ω and the power dissipation will be 7.0W. And there's your problem: 0.83Ω represents the *total* resistance of R1 plus the wiring, which may itself be a few tenths of an ohm. In order to obtain exactly 12.6V AC, right at the valve's heater terminals – which is the only valid place to measure – you'd probably have to experiment with power resistors of uncommonly-low values, or else make something out of resistance wire. There is a better way.

Option 3. Series resistor in primary circuit

At the primary side of the mains transformer, voltages are higher and currents are correspondingly lower, so the value of resistor R2 in **Fig 2(b)** will be much more convenient. You'd use the same mains transformer (230V primary, 15V secondary, rated 50VA). The easiest way to work out the resistor value is to do the calculation exactly as above, as if the resistor was going to be in the secondary, but finally multiply the R1 value by the *square* of the voltage ratio (230/15). So now R2 = 0.83Ω x $(230/15)^2$ = 195Ω. Interestingly, the power dissipation of R2 is exactly the same as R1: 7.0W.

R2 will still need some adjustment to allow for secondary wiring resistance, but now you're working with much more convenient values. The best approach is to use the next-higher preferred value, and shunt that resistor with higher values until the voltage at the valve heater terminals arrives once again at 12.6V. The next preferred value above 195Ω is of course 220Ω, and a good practical choice would be one of the metal-clad power resistors that bolts to the chassis, because this also provides the tags for mounting wire-ended shunt resistors. The shunt resistor, R3, needs to be... well, whatever value in parallel with 220Ω gives about 195Ω, so that would be

$$R3 = \frac{1}{1/195 - 1/220} = 1716\Omega$$

This is obviously not a preferred value, so once again we apply the same trick. Use the next-higher preferred value – 1.8kΩ or 2.2kΩ – and call it R3A. Then be prepared to add a second shunt resistor, R3B, if necessary. Since R3 is about 10 times higher than R2, the power dissipation will be less than 1W, so a 1W metal-oxide resistor will do fine for R3A. You probably won't have the correct resistors to hand, but at least you can buy these two components R2 and R3A with confidence. You may have to add an R3B as well, to get the voltage exactly right. If you do, you'll probably find the correct component in your stock of 0.25W preferred-value resistors. This approach is so much more convenient than trying to find suitable low-value power resistors for R1.

Note that in Fig 2(b), R2 and R3 (A, B...) are shown connected at the *neutral* end of the transformer winding. This is important, because the smaller

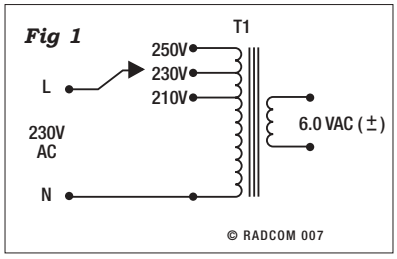

Fig 1: Using the 'wrong' primary tap will change the output voltage by a few percent.

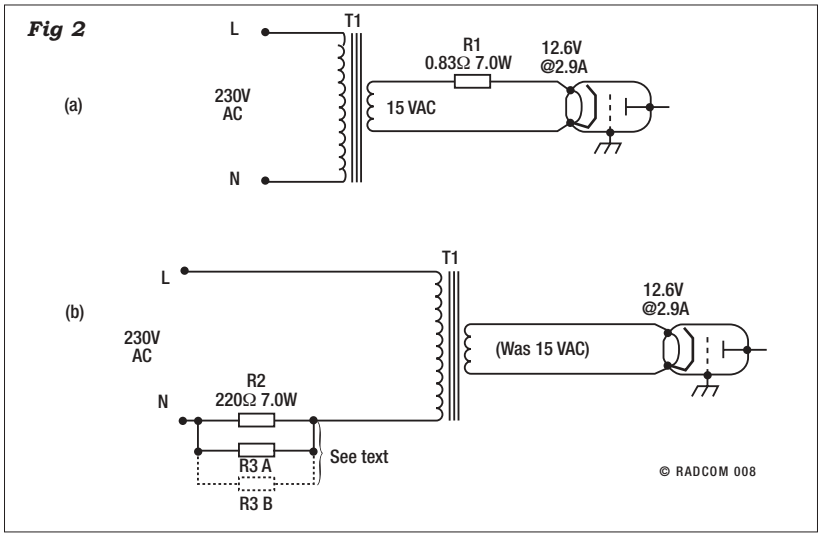

Fig 2: Reducing output voltage with a series resistor: (a) in the secondary, (b) in the primary.

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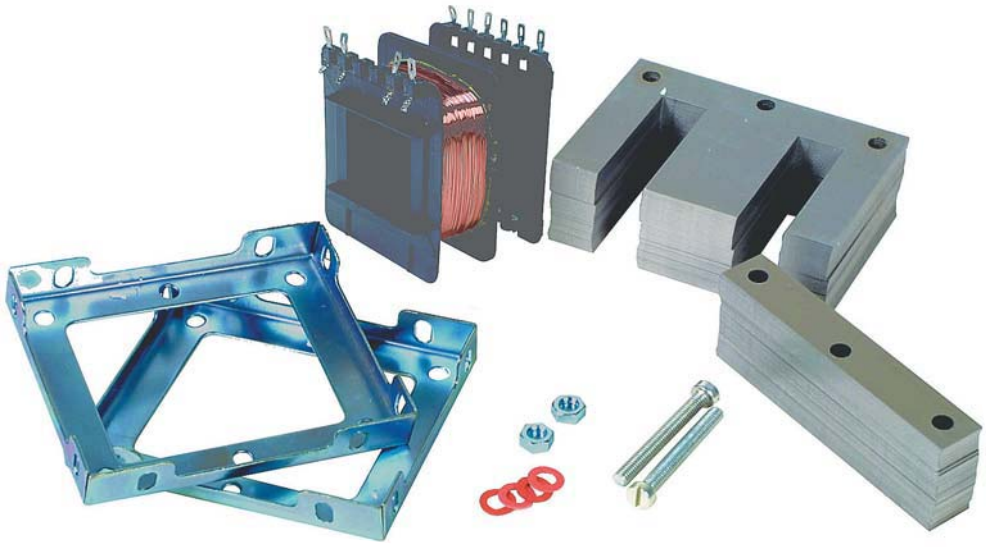


The Maplin transformer kit (insulation removed to show ready-wound primary).

metal-clad resistors do not have high-voltage insulation between the wire-wound element and the grounded metal case. The 10W range only have 165VAC rating, and even though you'd probably choose to buy the 15W range for only a few pence more, these are only rated at 265VAC. Having heard rumours about long-term deterioration of the insulation in this type of resistor, I'd always opt to give it an easy life.

A few small points to complete the answer to Question 1... Judging by the voltage and current, this looks like a transmitting valve with an indirectly-heated oxide cathode. The presence of the series resistor has two useful side effects. First, it reduces the switch-on current surge into the heater, when it is cold and its resistance is low (this is not critical for indirectly-heated valves, but it always helps to treat them kindly). Second, if you measure the voltage at the valve heater terminals with a high-resolution digital AC voltmeter, you can watch the voltage creep up very slowly, finally stabilising at the correct value. In effect, the heater is acting as its own resistance thermometer, as it brings the oxide cathode up to its correct operating temperature. This allows you to check the valve manufacturer's recommended warm-up time.

But the series-resistor methods of Fig 2 also have drawbacks. The added resistance makes the delivered voltage more sensitive to variations in mains voltage; and more seriously, these methods are suitable only for constant loads. This makes series resistance the wrong choice for the person who wants 8.0V at 0-3A from a 9V transformer (see Question 2 above). The voltage would only be 8.0V at maximum current, and at lower currents the voltage would rise *above* 9V because the secondary voltages are specified at full load. It would be so much better if the transformer really did have an 8V secondary. The next option allows you to make it so.

Option 4. Change the number of secondary turns

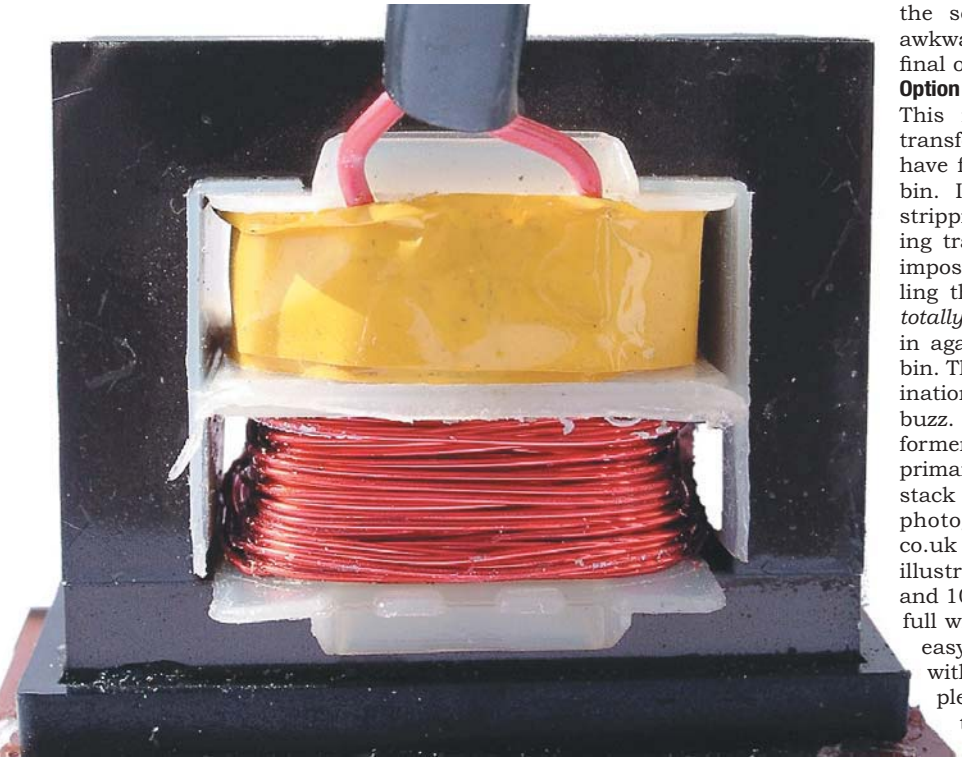
This is easier than you may think, especially if you pick the right kind of transformer to modify. A typical modern transformer will have its secondary winding on a separate bobbin, with some spare space around it. That space is all yours to play with – but leave the primary alone, and watch out for the mains voltage while experimenting.

The first thing to do is to estimate the number of volts per turn, usually by adding about five turns of insulated wire and measuring the voltage on this new temporary secondary winding. That will give you a fair estimate of how many turns to add or remove from the real secondary. If you're removing turns, you need to find which end of the secondary is the finish of the winding, where it's easy to remove the turns (Murphy's Law dictates that the end you want will always be the *second* one you try). If you're adding turns, use at least the same wire diameter as the existing secondary, take care not to kink or scratch the wire. Actually, another option to reduce the output voltage is to add more turns, but to reverse the connection of the new winding; but this also adds to the secondary resistance so it isn't always a good choice.

Threading or removing wire through the small 'window' around the secondary winding can be an awkward job, so this brings us to the final option.

Option 5. Wind a complete new secondary

This involves starting without the transformer laminations, so that you have free access all around the bobbin. I honestly cannot recommend stripping the laminations off an existing transformer, because it's almost impossible to do that without buckling the laminations... and then it's *totally* impossible to get them all back in again without damaging the bobbin. The result is a loose stack of laminations that will almost certainly buzz. Fortunately, Maplin sell transformer kits that have a pre-wound primary, and are supplied with a stack of new, flat laminations (see photograph). Go to www.maplin.co.uk and search for YJ63 – this will illustrate the three sizes (20VA, 50VA and 100VA) and you can also view the full winding instructions. It still isn't easy to make a secondary winding with neat, flat layers that completely fill the bobbin, but at least the Maplin kit gives you a sporting chance. ◆



Another transformer, showing the primary winding on a seperate bobbin, below which is the secondary.

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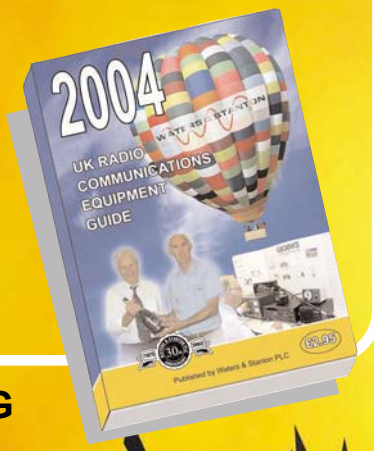

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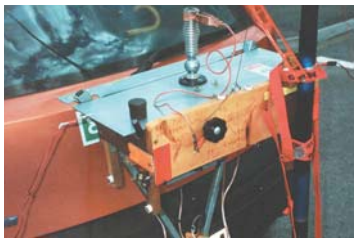
By Peter Dodd, G3LDO, 37 The Ridings, East Preston, West Sussex BN16 2TW. E-mail g3ldo@ukonline.co.uk

Serious mobile DX operating is best done when the vehicle is not moving, in which case there are a lot more options for the types of antenna that can be used. The vehicle installation of Stefan Larsson, SM6FLL, is an example of just what can be done.

Left: The SM6FLL clip-on antenna mounting panel and matching/loading unit fixed to the vehicle using a bicycle carrier frame mounted on the tow-bar.

Below: A closer view of the clip-on antenna mounting panel and matching/loading unit.



Antennas

For those of us living in accommodation that presents difficulties for amateur radio operation, one solution is to operate mobile or portable. Generally, mobile antennas are less efficient than fixed station antennas because of the mechanical requirements of a mobile installation.

The SM6FLL installation allows a selection of relatively high-efficiency antennas for HF mobile or portable operation in the frequency range 1.8 to 50MHz. The installation is centred around a clip-on antenna mounting panel and matching/loading unit fixed to the rear of the vehicle. All this is built into a box, which is mounted on bicycle carrier frame that sits on a tow-bar ball. The assembly is held against the vehicle with bungee cords and cushioned from the vehicle body with two plastic balls. The method of fixing the antenna assembly to the vehicle is shown in the photographs.

There are several antenna structures that can be used with the mounting panel. One is the home-made mobile antenna, which screws into the sprung mounting base most clearly seen in the close-up. This mobile antenna is made from a 2.1m length of aluminium tubing with a capacity hat and telescopic extension at the top. No loading coils are used in the antenna structure and loading is achieved in the matching unit.

Two other arrangements make use of a long telescopic plastic fishing pole and the method of fixing is clearly shown in the photographs. The plastic pole can be used simply to support a wire up to 9m long to make a 5λ/8 vertical antenna on the highest frequency bands. The wire can be extended to 13m with the use of a small kite. For the lower frequency bands, a large kite is used where the lower end is secured to the bicycle support frame. In all cases, the wire is fed by simply clipping it on to the sprung mobile antenna base unit, as shown. The ground system can be improved using several radials connected to antenna mounting plate and held down at the extremities with tent pegs. One of the radials is terminated with a metal plate, which is submerged in the sea when operating from a coastal site. This type of counterpoise has been found to be very effective on 136kHz, so will probably also be effective on the lower HF bands.

MATCHING/LOADING UNIT

The matching/loading unit, housed under the antenna mounting panel, comprises a roller-coaster variable inductor, with provision for adding an additional fixed inductor. A 250pF variable capacitance is used that can be connected either to the antenna or transmitter side of the inductor as shown in **Fig 1**. When the system is set up for mobile operation using the shorter mobile antenna, the variable capacitance is connected to the transmitter end. In this respect, the coil is being used as a variable base-loading inductor and the capacitance for transmitter impedance matching to the coil and antenna.

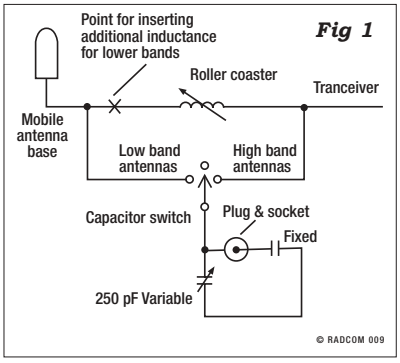


Fig 1: Circuit diagram of the matching/loading unit. A fixed capacitor can be connected across the 250pF variable capacitor with a plug and socket arrangement if required.

When the 250pF capacitor is switched to the antenna side of the variable inductor, the circuit becomes an L-section matching system and is used to match a range of varying impedances presented by all these experimental antennas. The capacitor can be switched out and the variable inductance set to zero for straight-through connection to a higher frequency resonant antenna.

GENERAL

What is really interesting about SM6FLL's travelling antenna farm is the ingenuity used to obtain an improved antenna performance from a mobile/portable location. Too often our ideas are restricted by what antennas are commercially available. The rear-mounting antenna mounting panel and matching/loading unit provides an excellent arrangement for experimenting with all manner of antennas.

If you do intend to do a lot of mobile/portable work from a fixed location, remember the battery is not being charged. A voltmeter to measure the state of the battery is a useful accessory. I now use a separate sealed battery inside the vehicle, which is charged from the cigar lighter socket when the vehicle is in motion. ◆

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FT-1000MP MK5	£2499
FT-1000MP FIELD	£1850
FT-847	£1129
FT-857	£789
FT-897	£959
FT-817	£549
FT-8900	£369
FT-1500M	£159
VX-7R	£319
VR-5000	£569
VR-500	£199

KENWOOD

TS-2000	£1539
TS-570DGE	£853
TM-D700E	£399
TM-G707E	£279
TH-F7E	£249

AVAIR

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By Andy Talbot, G4JNT, 15 Noble Road, Hedge End, Southampton SO30 0PH. E-mail: data.radcom@rsgb.org.uk

Data

A suggestion for signal reporting on PSK modes, and the implications of the universal availability of 1pps GPS-locked signals.

GPS-LOCKED SIGNALLING

The Global Positioning System (GPS) of satellites is by now well-known, and has become the system of choice for providing low-cost and precise navigation worldwide to anyone equipped with a suitable receiver. Less well-known is the fact that it also provides highly-accurate time-keeping. Several GPS receiver modules provide a one pulse-per-second signal, the rising edge of which is always accurate to less than a microsecond of UTC. Think what this means. Anyone, anywhere in the world, knows that if, for example, the pulse were used to trigger an oscilloscope, any other scope in the world will be triggered at exactly the same instant. If this edge triggered a transmission, as soon as the signal is received by anyone with a GPS-triggered scope monitoring the receiver output, the time of flight could be read directly. Of course, receiver filter delays would have to be taken into account, but they can be measured accurately.

So what can this do for data comms? Firstly, it can make clock and signal timing recovery redundant. For low-speed data modes as used on 137kHz, where symbol periods of several seconds are the norm, even the 70ms delay in transmitting half way around the world is a tiny part of the symbol interval. By signalling coincident with the UTC second and starting a message on a known boundary, for example the five-minute point, or the quarter-hour, the symbol periods are known exactly and do not have to be estimated from the recovered signal. This removes one of the greatest problems with weak-signal data comms, that of timing and clock recovery. But things can get even better still.

For coherent signalling modes like BPSK or QPSK, the very high accuracy of the GPS pulse can be used to define the phase of the carrier. The exact received phase obviously is unknown as we have no idea how long the signal has taken to get here, but we do know that, by using the GPS-derived UTC reference, the phase can be compared to itself at any other precise second marker before or afterwards. Provided frequency is accurately known and its drift is small compared to the signalling interval, absolute relative phase can be measured every second. So we now have a PSK signal with its precise timing known, with the message start point defined exactly, and by agreeing that the phase at the reference point corresponds to, say, a logic '1', we don't even have to resolve the usual PSK phase ambiguity. We have everything we need, right from the moment the transmission starts! All we have to do is to be able to compare the phase of the received signal, accumulated over several seconds of reception, with other intervals and we have our data immediately ready to use.

GPS receivers even make it simple to set the time automatically – each outputs the time as a data stream (along with navigation information) on a serial link which can be read automatically and used to adjust the symbol timing reference.

The one pulse-per-second signal can even be used to generate a highly-accurate frequency standard. Two such designs have been published in the amateur world: Brooks Shera, W5OJM, published a laboratory-quality GPS Disciplined frequency source in *QST*, July 1998; my own low-cost design, specifically for LF use, appeared in *RadCom* in October 2002.

But, first of all, we need a suitable GPS module. There are several types available of which the Garmin GPS25 (see photograph) and Motorola Oncore are popular types. There are others.

The Tucson Amateur Packet group can supply suitable modules, and they are also available direct from the suppliers and agents. GPS modules occasionally appear on the surplus market, and the older units – which are more than adequate for this purpose – can sometimes be obtained for just a few pounds (or dollars) each. ◆

PSK REPORTING

From Steve Seabrook, MOECS, comes this suggestion of an alternative signal reporting scheme for PSK signals. Full details are available from the website given below.

The RST method used for signal reporting on CW/SSB CW is fairly meaningless in respect of PSK, where tone never changes and bandwidth/overdrive is more relevant. InterModulation Distortion (IMD) reporting is useful, but only accurate for fairly strong idling signals. The authors propose a method as simple as RST (so it will fit your log book/logger software/QSL cards) but more meaningful. In essence, their suggestion is a report of Print/Strength/Bandwidth or PSB for short. The list shows the sort of 'scoring' that can be applied:

PRINT

P5	95% to 100% error-free
P4	75% to 95% error-free
P3	50% to 75% error-free
P2	25% to 50% error-free
P1	05% to 25% error-free

STRENGTH

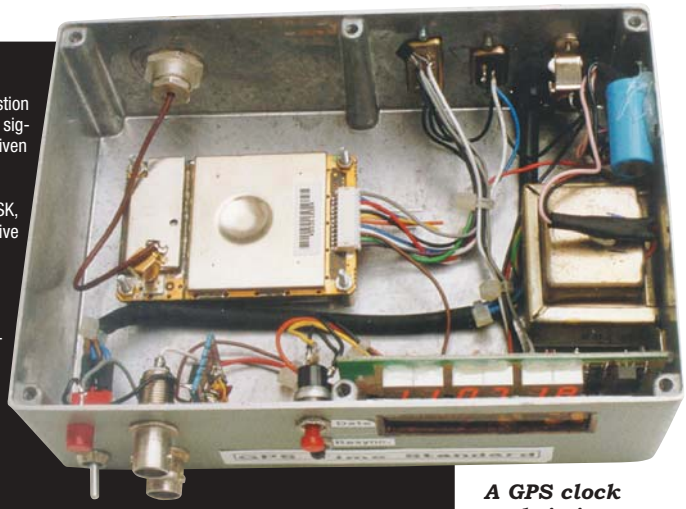
S9	Very strong trace
S7	Strong trace
S5	Moderate trace
S3	Weak trace
S1	Barely perceptible trace

BANDWIDTH

B9	Clean narrow signal approx 60Hz
B7	Perceptible broadening up to 100Hz
B5	Moderate broadening 100 to 300Hz
B3	Heavy broadening >300Hz
B1	Filling entire waterfall

So a perfect and very strong signal would give a report PSB 599. The authors suggest sending the report with some explanation in the following format (again, copied from the site): "Your signal, reported in the PSB format (Print, Strength, Bandwidth) is 575 575. Your signal appears 200Hz 200Hz wide 0M".

We would usually send this text via a macro. It would be useful to have another macro for additional explanation that could follow on if required. For example: "This is a new RST report called PSB (Print, Strength, Bandwidth) to help improve PSK31 signal reports – please see www.psb-info.net for further info".



A GPS clock and timing interface making use of the Garmin GPS25 module. The module itself sits at the left on the housing. A PIC microcontroller situated behind the 7-segment displays reads the time automatically and sets the clock. The 1pps signal is buffered and output to the front panel sockets.

WEBSEARCH

PSK reporting www.psb-info.net

There is a lot more information on the website, with a feedback section and a free newsletter subscription if you want to be kept up to date on PSB.

Tucson Amateur Packet group – for GPS modules www.tapr.org

By Mark Lewis, GW7KDU, 14 Hornbeam Close, St Mellons, Cardiff CF3 0JA. E-mail: rmcwales@ntlworld.com

Repeaters

"[Imagine] the problems that could potentially be caused by an unattended transmitter blocking something like national air traffic control radar."

PHOTO: BRIAN KENDALL, G3GDU

Recently the primary user of one of the bands also used by radio amateurs in the UK has indicated that for the time being they will not process any applications for amateur repeaters, beacons or packet radio nodes on the 70cm band. As radio amateurs we use many bands on what is described as a 'Secondary' basis. This is done with the consent of the primary user, which allows access on their bands in a controlled or restricted manner. When a request is made to place an unattended transmitter like a repeater in those bands other issues have to be considered.

CLEARANCE PROCEDURE

The clearance procedure for amateur repeaters is quite a complex one. After the application has been vetted by the RSGB's Repeater Management Committee (RMC) it is forwarded to the Radiocommunications Agency by the RSGB. It then goes through three specific stages, that of local RA office (in the repeater's area), Primary User and NFAP (National Frequency Assignment Panel). The stage that often causes the greatest delay is that of the primary user.

The definition of primary user and the control that they have over other band users is often misunderstood.

The amateur service has over the years developed a system of co-existence with the primary users and we do have a relatively good working relationship. However, it should never be forgotten that the primary user does reserve the right to remove all other access to their bands should they so desire and they can do this with minimal prior notice.

WHO ARE THE PRIMARY USERS?

The main primary users that as amateurs we have to exist with are the Ministry of Defence, Civil Aviation Authority, and the Home Office. The activities of these users on their bands range from public safety through to matters of national security. Their operations vary across the country resulting sometimes in a location versus frequency issue, eg you can transmit on a particular frequency in John O'Groats but not in Land's End!

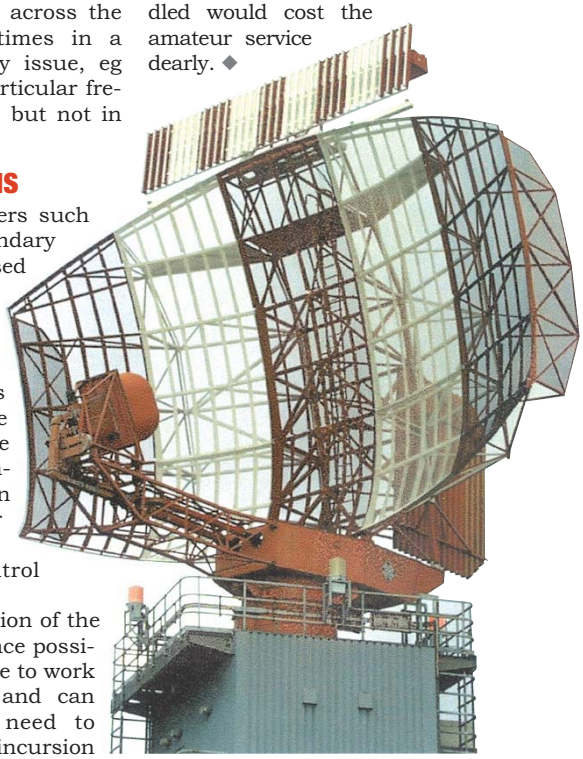
REPEATER APPLICATIONS

All unattended transmitters such as repeaters used on secondary bands must be authorised by the primary user during the clearance procedure. This is to ensure that no interference to an essential service takes place. It would leave little to the imagination of the problems that could potentially be caused by an unattended transmitter blocking something like national air traffic control radar!

Only with the co-operation of the primary user is co-existence possible. They do not undertake to work within any time frame and can take as long as they need to answer any request for incursion onto their bands. They can also change the operating parameters and the technical specification of any proposed transmitter! Ultimately they can refuse any access at any time. Where possible, the primary user does suggest an alternative frequency if the problem is only a frequency issue, but sometimes it is also one of location. The risk that is taken by the amateur service of insisting that the primary users operate within certain timescales is that it would be very easy for the quick answer to be a firm "no" to *all* requests.

In the last couple of years we have seen a larger amount of repeaters turned down by the primary users and there have been occasions were the groups concerned have demanded that their refused application is appealed! To date no appeal has been successful.

The implication of failing to comply with the primary users demands would be far reaching indeed. The informal response normally given when such matters are discussed is that there is the potential of losing amateur access to all of the secondary allocations - not just the repeater portions of the bands. This is not scaremongering but a statement of fact and one that if incorrectly handled would cost the amateur service dearly. ◆



WEB SEARCH

[1] RSGB Repeater Management Committee: www.coldal.org.uk/rmc

LATEST CLEARED REPEATERS

The latest clearance status can be obtained from the RMC website [1]. Please note that even though an application may have cleared it is beyond the control of the RMC as to when the keeper will bring the repeater into service.

Callsign	Type	Channel/Frequency	Keeper
GB3IN	New 2m Huthwaite, Yorks	RV51 In 145.0375 MHz Out 145.6375 MHz	G4TSN

OUTSTANDING VOICE REPEATER PROPOSALS SUBMITTED FOR LICENSING ARE:

Callsign	Type	Process Stage	Proposed Keeper
GB3AA	New 23cm Alveston, North of Bristol	PU	G4CJZ
GB3BM	New 70cm Wide Southport	Cancelled	G4WPS
GB3FJ	Site Change 70 Lincolnshire	Cancelled	G8LXI
GB3IT	New 70cm Wide split Tamworth	Cancelled	G6NHG
GB3JF	New 2m Lincolnshire	RIS	G8LXI
GB3KY	2m Spec Change Kings Lynn	NFAP	G1SCQ
GB3MI	New 70cm Ballycastle, NI	Cancelled	MI0CRQ
GB3PK	New 2m Ballycastle, NI	NFAP	MI0CRR
GB3RB	New 70cm Bolsover	Cancelled	G1SLE
GB3WB	Site change 70cm Backwell, North Somerset	Cancelled	G4SZM
GB3WE	New 2m Backwell, North Somerset	RA	G4SZM
GB3WJ	70cm Freq Change Scunthorpe	Cancelled	G3TMD
GB3WM	New 70cm Wide Woofferton	Cancelled	G4AIJ
GB3XC	New 70cm Wide Exeter	Cancelled	G8UWE

NEW

Available October

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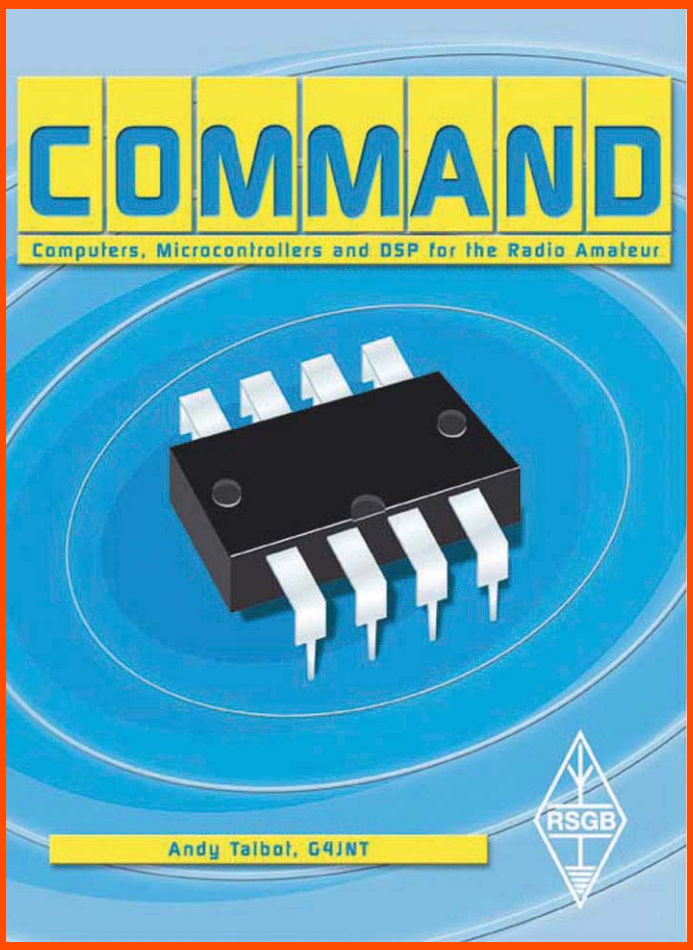

This book is for the radio amateur and home experimenter who wants to use modern digital and computer technology to make more use of his/her radio equipment. It is aimed at those who want to add additional hardware and try new signalling and communications methods, and to build hardware and systems for controlling existing equipment.

The home computer is first covered, writing programmes and software, with much detail on how to interface the PC to external hardware via its various ports. Particular emphasis is placed on what can be done with the older computer, now very cheaply available. Software techniques for detecting signals in nose and for automatic beacon monitoring are described.

Then come Microcontrollers, covered in depth, particularly the PIC family of devices. From the basics of writing the first PIC programme and programming the device, many different types of hardware are described, such as A/D converters and relays. This includes simple arithmetic and coding issues for security and remote control.

Finally, basic Digital Signal Processing is covered, with aspects such as digital filtering, time/frequency transformations and very narrow bandwidth working being described. How to start using DSP techniques at home is explained; evaluation modules and some simple DSP routes using some simple additional hardware and a PC are covered. Programming in the Windows operating system, with particular emphasis on using the soundcard for DSP purposes, is then introduced.

Written for the experienced amateur, this book is aimed at the experimenter and home constructor who wants to get involved in the subject, and to understand how to take it further.

Size 240 x 173 mm, 240 pages
ISBN 1-872309-94-1

Members Only £14.44

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www.rsgb.org/shop or Tel: 0870 904 7373

EMC

Coverage of items on Broadband Wireless Internet access, USB devices, personal computer EMC and noisy TV sets, not forgetting PLC/PLT.

HAM RADIO 2003 FRIEDRICHSHAFEN

Hilary, G4JKS, has been representing IARU Region 1 on the CENELEC/ETSI Joint Working Group which is developing EMC standards for Conducted Transmission Networks. Hilary also prepared some display posters on Power Line (Tele)Communications (PLT/PLC) for the IARU Region 1 stand at the HamRadio 2003 Exhibition at Friedrichshafen, Germany on 27-29th June (see photo and 'Websearch').

Hilary also attended an IARU Region 1 EUROCOM EMC Meeting at Friedrichshafen. Minutes can be found on the DARC Web site (See 'Websearch').

PLC/PLT OR HF RADIO?

A consequence of EMC standardisation activities related to HF PLC is that the electromagnetic incompatibility between PLC and radio services is becoming more widely known. If a standard protects radio services from interference, it is too strict to allow PLC to operate and if it is relaxed sufficiently to allow PLC to operate, it does not protect radio.

This raises the question of what the European Commission will do about PLC. It appears that it may decide whether to give priority to conventional radio services or to the innovative broadband Internet service PLC.

The European Commission is planning a joint workshop of representatives of member states and authorities on 16 October 2003 (see 'Websearch'). In preparation for this, the Commission is seeking written contributions and/or position statements from interested parties before 1 October 2003. Needless to say, the RSGB EMC Committee will be making a submission.

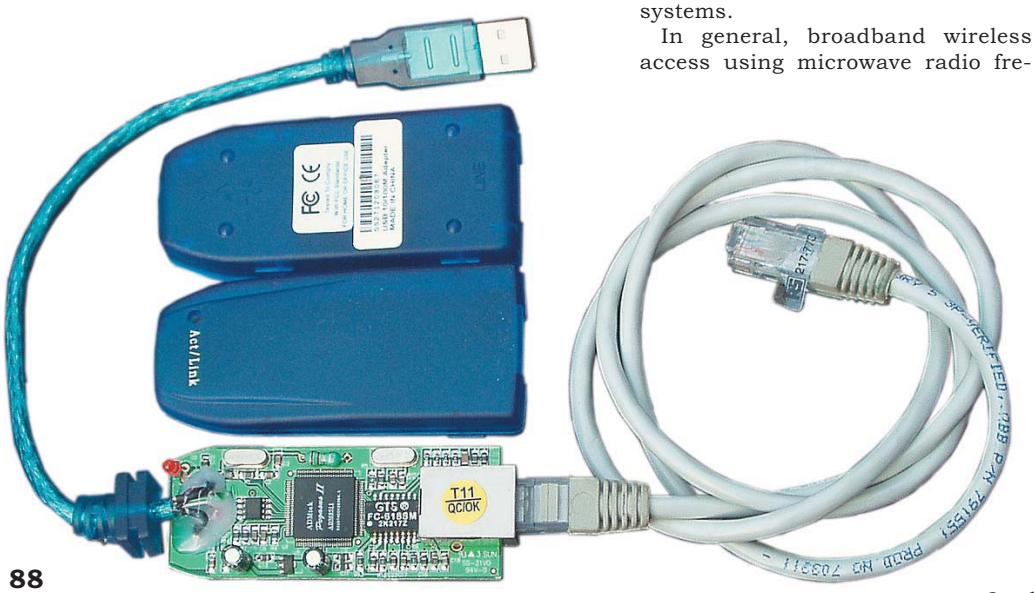
BROADBAND WIRELESS

The subject of broadband Internet access has been in the news quite a lot recently. 'Broadband' is often regarded as any service that allows fast, 'always-connected' access to the Internet at higher speeds than standard dial-up telephone lines can provide. One option for broadband access in areas where ADSL or cable TV are not available is Fixed Wireless Access (FWA) and several members have asked about potential EMC problems related to such systems.

In general, broadband wireless access using microwave radio frequencies is fairly 'EMC-friendly' to amateur radio and is much better than PLC in this respect. It is to be hoped that we will not see a repetition of the EMC problems with the home units for the Ionica FWA telephone system that were reported in August 1997 'EMC'. This had a switch-mode power supply/battery charger which was reported to radiate interference on the 3.5MHz amateur band via the downlead from the roof-mounted microwave antenna.

Some FWA and Radio Local Area Networks (RLANs) operate on frequencies shared with amateur bands. Although this is not really an EMC issue but a spectrum utilisation issue, the following information may be of interest to operators on the 13cm and 6cm amateur bands.

One RLAN system is IEEE802.11b or 'Wi-Fi'. This was originally intended for short-range office use, but is now being used for public access at a number of 'hotspots' and is also becoming popular with home



A USB-to-Ethernet LAN adaptor which radiates on 144MHz.

By David Lauder, GOSNO, 20 Sutherland Close, Barnet EN5 2JL. E-mail: emc.radcom@rsgb.org.uk

Left: The PLC display on the IARU Region 1 stand at the Ham Radio 2003 Exhibition, Friedrichshafen, Germany, 27–29 June.

users. The 'hotspots' are primarily aimed at business travellers and some are operated by BT in hotels, airports and motorway service stations around the UK. There is even one on Brighton beach (not run by BT).

IEEE802.11b operates in an industrial, scientific and medical (ISM) band at 2400 to 2483.5MHz. This band overlaps with part of the 13cm amateur band, 2310 – 2450MHz, which is a secondary allocation to the Amateur Service. *The UK Amateur Radio Licence (A) or (B) Terms, Provisions And Limitations Booklet, BR68*, states that users must accept interference from ISM users between 2400 and 2450MHz. This ISM band is starting to fill up, as it is used not only by microwave ovens, but also by increasing numbers of home and commercial RLANs and licence-exempt 10mW FM video senders.

The frequency ranges 3480 – 3500MHz and 3580 – 3600MHz have been allocated to longer-range fixed wireless access links. These operate just above the 9cm amateur band (3400 – 3475MHz).

Another range of frequencies to be used for RLANs ('HIPERLAN') and fixed wireless access in the UK is 5150 – 5350MHz and 5470 – 5875MHz. Part of this range is shared with the 6cm amateur band, 5650 – 5850MHz, which is a secondary allocation.

For further information, please see 'Websearch'.

USB DEVICES

A member has sent me an AEI brand USB-to-LAN adaptor (see photo) which is reported to radiate on 144MHz. This device allows a computer with a USB port to be connected to a 10/100Mbit/sec unscreened twisted pair (UTP) Ethernet LAN.

When I plugged it into the USB port of my shack PC about 3m from the 144MHz antenna, sure enough there was an S9+20dB signal on 144.004MHz on an FT-480. This is the third harmonic of a 48MHz crystal oscillator which full-speed USB devices use to synchronise to the 12Mbit/sec USB data.

Does it meet the EN55022 standard for Information technology equipment (ITE)? It may do as the EN55022 Class 'B' radiated limit at 144MHz is 30dB(μV/m) or 31.6μV/m at 10m distance, measured in 120kHz bandwidth. If using a dipole antenna at 144MHz, the antenna factor would be +11dB which means that the field strength in dB(μV/m), would be 11dB higher than the signal in dB(μV) delivered to a 50Ω receiver. Hence the receiver would see 19dB(μV) or 8.9μV.

The IARU definition of S9 above 144MHz is -93dBm or 5μV in 50Ω, although the S-meter reading of many transceivers is far from this standard. Assuming an IARU standard S-meter above 144MHz, the EN55022 Class 'B' limit is equivalent to S9+5dB at 10m distance with a dipole antenna. If the antenna used is a long Yagi with a gain of 14dBd, the limit is equivalent to S9+19dB at 10m. This assumes that the interfering signal is narrow band, like a clock harmonic, so that the receiver bandwidth does not affect the received level.

Clearly, the EN55022 Class 'B' radiated emission limits above 30MHz allow interfering signals which are very large in relation to signal levels on VHF amateur bands. Further information on emission limits in relation to minimum detectable field strengths can be found in June 1995 'EMC'.

Unfortunately, the lower end of the 2m band near 144.000MHz has become one of the most polluted parts of the VHF spectrum as many clock frequencies commonly used by digital equipment such as 4, 8, 12, 16, 24 and now 48MHz all have harmonics at or near 144.000MHz.

SEE-THROUGH PC CASES

Some PC enthusiasts, known as 'case moders', buy such things as fluorescent cables to connect the disc drive to the main board and a blue lamp to light up the inside of the PC case. This would all be rather pointless if no-one could see inside the case, so PC cases are now available with acrylic plastic windows in the side. Recently, I saw the ultimate 'see-through' PC case at a computer fair. The brand name was 'Bean-Tech', model BT-82 'Crystal Dream' and the whole case was completely transparent, with only the switch-mode power supply in a metal box.

Spike, G4AKQ, saw PC cases with side windows on display at his local branch of Maplin Electronics and asked the deputy manager how these cases complied with EMC regulations. The reply was that only complete computers had to comply and therefore cases were not covered by the EMC standard.

This is correct, but it does raise the question of whether a PC built into one of these cases is likely to comply with the EN55022 radiated and conducted emission limits. If a company assembles PCs in the UK and sells them then, under UK EMC regulations, they are being 'placed on the market' so it is the responsibility of the company that does the assembly to ensure that the PC complies with the UK EMC Regulations and to affix the CE mark. Similar regulations apply elsewhere in the EU.

If a private individual assembles a new PC into a case for his or her own use or personally imports a computer from outside the EU, then it is 'taken into service' but is not 'placed on the market'. Private individuals do not need to affix a CE mark, nor do they need to declare compliance with the EMC regulations, although they could be held responsible if their self-assembled or personal-import PC caused a radio or TV interference problem.

In the US, the FCC has an 'open enclosure' test for personal computer board products, which must meet a limit 6dB above the normal limit when the case is open. There is no such 'open enclosure' test in European standards, so EMC compliance of PCs in windowed cases or transparent cases appears questionable. I would be interested to hear of any reports of excessive levels of RF interference (probably on VHF/UHF) from PCs with windowed or transparent cases. ◆

WEBSEARCH

RSGB EMC Committee web site	www.qsl.net/rsgb_emc/
Ham Radio 2003 Exhibition, Friedrichshafen, Germany	www.darc.de/referate/ausland/hamradio/
Minutes of IARU Region 1 EUROCOM EMC Meeting June 2003	www.darc.de/referate/ausland/hamradio/ham03-emc-eurocom.html
European Commission DG Enterprise Workshop on Powerline Communications	http://europa.eu.int/comm/enterprise/electr_equipment/emc/plcworkshop.htm
Radiocommunications Agency Broadband Wireless Update	www.radio.gov.uk/topics/broadband/
Broadband Wireless Association	www.broadband-wireless.org/

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AOR AR-5000 + 3 in as-new cond, little use, £900, ovno. Yaesu VX-7R + case, £200. 01903 859 712 (Rustington).

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ARMY Clansman HF radios in gc: PRC 320 & VRC 321 (inc turf) plus some ancillaries, £350 each or £600 the pair, cash only. Buyer inspect & collect, G3XYF QTHR, 01377 254 441 (Driffield). E-mail: braceybridge@enterprise.net

BNOS 6m, 5-ele beam antenna, boom length 3.45m, longest element 2.99m, £40. 2m, 9-ele beam antenna, boom length 3.48m, longest element 1m, including Mirage 2m masthead preamp plus control box switch to pass 12V via coax feed, £100. Alan, G7CDK, 01763 262 443 (Royston). E-mail: aj.flo@virgin.net

CAPCO AMA3 magnetic loop antenna 13.6 – 30MHz (20-17-15-12-10m) used only in loft, complete with control unit, perfect working order, fully assembled (will fit in average car boot), buyer to collect, £75. Capco AMA5 magnetic loop antenna 3.4 – 12.6MHz (80-40-30m). Dismantled, needs new motor & refurbishing, with control unit – buyer to collect, £35. Both loops for £100. Cyril, G3LPA. 01953 883 826 (Norfolk). E-mail: cyrilg3lpa@aol.com

COLLECTORS' item, part early Wartime Radar Magnetron (huge magnet), Klystron –23 Rhumbatron t/r cell circular waveguide, offers around, £100. G3LMR, 0116 287 1522 (Leicester).

DAIWA ANTENNA tuner CNW-727, dual 144/430MHz, 200W. Bargain at £75. Alan, 01763 262 443 (Royston). E-mail: aj.flo@virgin.net

DUE TO SHACK tidy-up, Ten-Tec Omni-V (562) tcvr 160m to 10m & WARC bands, £250, inc 2, 2.4kHz 8-pole filters, T-T hand mic, no scratches on front panel or case, original man & box. Ten-Tec Paragon (585) tcvr 160m to 10m & WARC bands, £250, inc T-T hand mic (receiver section covers 30kHz to 30MHz), no scratches on front panel or case, original man. Ten-Tec optional accessories, 9MHz 1st IF, TT-219 CW 6-pole 250Hz, TT-221 CW 6-pole 250Hz (C/F500), TT-217 CW 8-pole 500Hz, TT-218 SSB 8-pole 1.8kHz. 6.3MHz 2nd IF, TT-282 CW 6-pole 250Hz, TT-285 CW 6-pole 500Hz, TT 288 SSB 8-pole 1.8kHz, £35 each. TT-962 matching spkr & PSU, £75. TT-960 matching spkr & PSU, £65. TT-705 electret desk mic, £40. N4PY V.9 upgrade chip for Omni-V, £30. Giehl, upgrade chip for Paragon 585, £25. TT-258 RS-232 board (new), £25. TT-257 voice board (new), £25. G3XVF, QTHR. E-mail: g3xvf@btinternet.com

FT-100 HF – 70cm mint, £450. FT-747GX, £225. TM-721E dual-bander, £150. Brand new solder station, £30. BNOS UHF 50W amp, £85. Yaesu 50W VHF amp, £75. KLM 160W VHF amp, £150. 1kW low pass filter, £25. Homebrew 1kW load, £20. Heavy-duty rotator with two controllers, £150. Daiwa VHF rcvr, £20. Mosley triband 2kW vertical, as new, £75. Timestep weather satellite equipment, offers? Watton, 01953 884 305 or 07970 214 039.

FT-480R 2m, £150. BNOS linear 2m 100W, £65. Howes CTU-8 rcvr tuner, £30. Palstar AA30 active ATU, £40. Sony AN71 compact reel antenna, £10. 12A PSU stabilised, £25. CTE SWR/pwr meter, £10. M0BTP, QTHR, 01983 873 652 (Isle of Wight). E-mail: lowedmunds@tesco.net

FT-920 HF/6m, £750. SP-8 matching spkr, £60. MD-100 mic, £60. As new, boxed, manuals. G4ZTX, QTHR, 01709 896 959 (Rotherham). E-mail: g4ztx@aol.com

GARMIN GPS III + Mapsource CD (UK), case, leads & man, boxed, £280. Kenwood TM-D700E dual-bander with TNC, mans, boxed, £300. G8VHG, QTHR, 01482 809 274 (Hull). E-mail: g8vhg@igower.karou.co.uk

GEM Quad 2-ele, needs some TLC or for spares, £40 ono. CDE AR-40 rotator & control unit & cable – good cond, £60 ono. Alinco DJ-162 2m FM h/h, new memory battery. Factory mod for marine band tx plus nicads, £60 ono. Palomar Engineers rcvr noise bridge, immaculate, £35 ono. Mans for all above. Transformer 1.2kV at 0.2A, £20. G3MGW, QTHR, 01206 302 382 (Brightlingsea). E-mail: r_wheel@yahoo.com

HAMMARLUND HQ-170A & rare HX-50 transmitter 160 – 10m with mans, spares, exc cond, suit collector, £100 each. Minimitter 160m mobile whip, £25. G3VTT, 01634 719 703 (Rochester). E-mail: g3vtt@aol.com

HEATHKIT HW-9 deluxe antenna tuner, QRP wattmeter together, £180. Realistic DX-394 rcvr, £70. H/held rcvr HF/VHF/CB/Air, etc, £40. Quick sale, G4RCY, 01934 842 797 (Shipham).

HEATHKIT SB220 soft start, £600. Heathkit SB201, £250. Two new Amperex 3-500ZGs, £280. (£230 if bought with SB220). Packratt PK-232MBX, £50. Prefer buyers collect linears. G4ZOY, 01670 811 950 (Stakeford, Northumberland).

HRO (R-106), 10 coils, mains PSU, £80. Heathkit GDO GD1U, 7 coils, £20. Nevada RC-26 roller coaster unused, £20. Mains PSU +24V +12V+ 5V, 5V+ 5V floating £10. BC221, in-built reg, mains PSU, h/book, cal book, £22. T-1154 c/w all valves, £40. Cash preferred. Buyers ispect, collect. G3LYU, 01162 876 459 (Leicester).

IC-2KL 500W HF linear with IC-2KLPS, £700. Yaesu FT-480R VHF all-mode, £180. Swan Cygnet, £70 plus carriage. GM3WED, QTHR, 01349 877 435 (Dingwall).

ICOM 706 MkII, HF/6/2m, 100W boxed, man & all leads including CAT. £400 or swap for FT-817. Mark, M0DEV, 07977 407 824 (Shrewsbury). E-mail: mtwells@fastmail.fm

ICOM 706 MkIIG HF/6m/2m/70cm, DSP FL-223 SSB narrow filter, original box & man never used, mobile unmarked vgc, £400 + postage. GM0FSW, QTHR, 01382 815 173 (Dundee). E-mail: nm010c0645@blueyonder.co.uk

ICOM IC-756PRO tcvr, mic, boxed, man, £1050. Hy-Gain DX-77 vertical 40 – 10m, used twice, £180. Swan 100MX tcvr 80 – 10m, £125. Trio JR-599 rcvr, £80. Dave, G4BUO, 01892 870 400 (Tonbridge). E-mail: g4buo@compuserve.com

KENWOOD 570DG tcvr, £600. Icom 706 tcvr, £400. MFJ-989C Versatuner, £220. Icom AT-180 automatic ATU, £195. Revox SWR meter, £35. MFJ Morse keyboard keyer, £35. Daiwa SWR/Power meter, £50. GD4EIP, 01624 801 592 (Isle of Man). E-mail: gd4eip@yahoo.com

KENWOOD 950SDX, fully loaded, gc, £1250. 01482 705 244.

KENWOOD R-600, £120, ono. Palstar KH6 6m h/h transceiver, £70. Kenwood 79E dual band with three standard battery packs, plus one new H-D battery & case, all in exc cond. 01782 749 899 (Stoke on Trent).

KENWOOD SP-31 spkr, £40. Kenwood PS-31 PSU, £50. IC-706 HF/6/2m, £375. Microwave Modules 28/433 tvtr, £60. Microwave Modules ARTT1U tvtr interface, £30. AM 508 desk mic Adonis compressor, £55. 2m linear Microwave Modules 5/30, £30. Kantronics all-mode KAM, £150. 70cm antenna MBM48/70cm 48-ele multibeam, £25. 2m antenna 8XY/2m crossed-element Yagi, £25. G0WOC, QTHR, 01283 732 950 (Derby).

KENWOOD TR-751E 2m 25W all-mode, mobile bracket, man, boxed, vgc, £290. PK-232, vgc, leads, h/book, £80. G3HKH, QTHR, 01235 527 168 (Abingdon). E-mail: mjfh@waitrose.com

KENWOOD TS-50 & AT-50 in almost mint cond with quick release bracket, man & boxed £500. SG-231 Smartuner. Top band to 6m c/w Smartlock PRO, operating man & box, £150. G0OID, QTHR, 01249 890 674 (nr Chippenham). E-mail: johng0oid@aol.com

KENWOOD TS-790E 2m/70cm multi-mode base station, hardly used, boxed, £700. Colinear & SSB beam gratis. G0WKA, QTHR 01302 538 544.

KENWOOD TS-850S, £485. Junkers key, £48 as new. Trio TS-700 2m base station (all modes), £80. Disabled – buyer must collect. G0UAU, QTHR, 0121 358 3639 (Birmingham).

LARGE wide-spaced capacitors for those legal limit power amps or ATUs: 500pF single-gang, £15. 220pF single-gang, £5. Split-stator type 500 + 500pF, £15. 200 + 200pF, £5. Extra large 200 + 200pF, £15. Carriage extra. Dave, 01443 683 912 (Rhondda).

LEADER TR dip meter LDM-815, as new with complete set coils 1.5 – 250MHz with man, £20. Omega antenna noise bridge model TE7-01 with man, £10. SMC T3–170L relative power SWR

CONGRATULATIONS to the following, whom our records show as having reached 50 or 60 years' continuous RSGB membership this month:

60 years
G3AAZ Mr G G Gibbs

50 years
G3JFR Mr N B Cottrell
G3MDM Mr G J McGee
GW3MPP Mr G C Price
GW4HXO Mr M Probert

SILENT KEYS

We regret to record the passing of the following radio amateurs:

G0KQG	Mr A Hoyle	03
G0ONQ	Mr C N Foster	10/07/03
G2TA	Mr Ray	03
G3BGL	Rev P W Sollom	01/08/03
G3BSQ	Mr C Ramsbottom	18/07/03
G3EPP	Mr E W Trevitt	07/08/03
G3TVU	Mr J D Brown	03
G3TWO	Mr F Rhodes	01/08/03
G3VDW	Mr T F Underwood	03
G4GTO	Mr R McEwan Reid	29/07/03
G4GUD	Mr A Clarke	27/07/03
GI3IWD	Mr W Douglas	05/08/03
GM3HOQ	Mr D Stobie	05/08/03
M3AOE	Mr F A W Bradford	13/05/03
RS94075	Miss S P Parker	10/07/03
–	Mr M J Carter	07/03

bridge 3.5 – 170MHz, £10. SST T3 mobile impedance switched transformer 3 – 500MHz, £5. Dewsbury Electronics StarMaster key MkII as new, £10. Scanmaster VHF/UHF SP-55 low-noise wide-band GaAsfet pre-amplifier, 3 bands 24 – 1500MHz with leaflet, £20. CX-201 two-way diecast antenna switch, SO-239 fittings, new, freq 0 – 1000MHz – 2500W, £10. Ferrite filters 13 x 0.5in ferrite rings, 8 x 0.5in split beads, 13 x 1.75in ferrite clear channel filters, 10 x 2.75 x 0.5in solid ferrite rods, new, boxed with instruction leaflets, £10. Yaesu headphones YH-55, £3. The lot £75, buyer to collect or post at cost. G3LPA, 01953 883 826 (Norfolk). E-mail: cyrilg3lpa@aol.com

MAKING room in shack – Foster CR-8000 low-voltage thyristor thumper fault locator. Hi-volt set (needs attention). Switchgear timer unit. Control panel parts, inc motorised variac, relays, meters etc. Lot, £200. Too good to scrap. Buyer collects. 2E1IID, 01438 314 297 (Stevenage).

MFJ-461 pocket Morse reader, still guaranteed to December, perfect, unused, original packaging, unwanted gift, Christmas 2002, £68, inc p&p. 01242 524 217 (Cheltenham). E-mail: g3moe@onetel.net.uk

OSCILLOSCOPE Elmac 4810, single beam, bandwidth DC – 5MHz, immaculate cond, c/w original instruction man, £35. Postage extra. G3RDG, 020 8455 8831 (NW London). E-mail: kennethb@btinternet.com

RADIO BYGONES, Nos 1 to 84, mint cond in binders. What offers over £200, please? Can deliver to Hants area, Dec – Feb 2004. Eric, GU3HKV, 01481 247 278 6 – 7pm (Guernsey). E-mail: ericpeg13@hotmail.com

RADIO VALVE collection mixed new and s/h, over 5000 (2622 numbers/manufacturers + 2272 duplicates). Most valve types from early pre-war, wartime, microwave, modern valves & high power tx valves. Also 100+ assorted valve holders & valve books, collection will appreciate in value over the years as valves are now turning up at antique fairs. Offers around £1,000. Buyer collects, John, G3LMR, 0116 287 1522 (Leicester).

REDIFON HF transmitter drive unit model GK-203N, £150. R&S Polyskop SWOB 1, £80. R&S SKTU noise generator, £70. R&S NRD power meter, £50. SMLR high power signal generator, £100. R&S NAN power meter, £60. Siemens T-100 teleprinter, £150. Tono 9100E comms terminal, £20. Marconi TF-144 sig gen, £30. Advance audio sig gen, £20. Racal MA-79 HF drive unit, £450. CT-432 frequency calibrator, £15. Dressler HF active aerial, £75. Roller coaster inductor & vacuum variable capacitor for 1kW high frequency ATU (as new), £140. Nigel, 01323 486 822 (Eastbourne). E-mail: nigel@irisys.co.uk

RIG SALE Mizuho SB – 2m, 2m SSB QRP tcvr + 10W PA & rcvr amp, £60. Santec 40m SSB/CW portable QRP tcvr + whip + xtal filter + DC/DC converter, £65. Howes 15m/12m/10m DC rcvr, fully working, £30. Howes 1MHz – 35MHz frequency counter, fully working, £30. Datong Morse tutor, £10. Alinco DR–112 EM 25W 2m FM tcvr, £135. Instructions for all, offers considered. Ben 01727 845 811 (eve) – 07949 032 397 (St Albans). E-mail: ben.allen@kcl.ac.uk

SAILOR MARINE R/T outfits. Offers invited for several old MF/HF AM/SSB rigs. Most in working order, buyer collects. List from G3JMG, QTHR, 023 9246 2462 (Portsmouth).

SATELLITE Dish 1.5m heavy aluminium & steel, floor mount, H to H mount, £80. B Simpson, G8PZF, 01274 543 453 (Bradford). E-mail: bsimpson_g8pzf@onetel.net

SGC SG-2020, £400. Atlas 210X + PSU + mic, £100. Eddystone EC10, £70. Yaesu FT-208R 2m + charger, £50. Maxon SMX-4450 70cm, £50. PM-2000 power/SWR meter HF, £25. Osker 200 pwr/SWR HF & VHF, £25. 2 x Howes rcvrs, £20 each. 20MHz scope Farnell DTV-20, £50. ITT OX-7520 20MHz storage scope, £75. AVO 1000 meter, £20. AVO M2035 meter. £75. Bird 4304 25MHz – 1000MHz 1W – 500W, £100. Bird 4304A 25MHz – 1000MHz 1W – 500W, £125. Bird 43 + 7 elements, £75. 01803 290 133 (Torquay).

SGC-239 SMARTUNER, hardly used, immaculate, £140 plus postage. GM3MXN, 01698 330 248.

SILENT KEY SALE, GM3BXW. Kenwood TS-570D mint, boxed, £650. SP-23 spkr, £50. 2 mics, leads, £20. MFJ-949E Versatuner, £70. MFJ-784 Super DSP Filter, £70. Kenwood LF-30A low-pass filter, £10. Micronta 3-range tester, £30. Junkers Morse key, £30. Ameco PT-3 pre-amplifier, £40. Trio P-5430 DC PSU, £35. Skiptech PSU-1203 13.8VDC PSU, £30. Hokushin HF-5 5-band vertical antenna, £30. Decca 3-way antenna switch, £7. RF field strength indicator, £5. Icom IC-215 2m portable (slight damage), £50. Take the whole lot for £1,000, plus books, etc. A Malcolm, 01223 294 291 (Cambridge).

SILENT KEY SALE, G3HVY. Trio TS-870, immaculate, £900. Yaesu FT-101DZ, FM, FB cond, one of last batch manufactured, £225. KW-2000B with 10m preamp, £100. Yaesu FT-7B, 50W, digital display, no WARC bands, £150. Ameriton AL-811 linear, £350. Nissei PSU DPS-530GL, 2-15V, 30A, £80. Lowe EP-925 PSU, 0-20V 30A, £70. Trio TR-7200G, 2m tcvr, c/w xtals, £55. Matching Trio VFO 30G, £35. Various VHF, UHF tvtrs, power amps. 10m tcvrs, ATUs test gear, components, devices, etc, too numerous to mention. G3CRH, 01543 686 364 (Burntwood, Staffs). E-mail: g3crh@aol.com

SILENT KEY SALE, G8MWR. Icom IC-R8500 rcvr, £850. Kenwood R-5000 rcvr, £250. Yaesu FT-736R 6/2/70/23, £725. JRC NRD-525 rcvr, £300. Weltz SP-300 power/SWR meter, £50. Twinmeter SWR bridge, £5. Radio shack DX-394 comms rcvr, £50. Yaesu FT-209, £100. Marconi TF-2002AS sig gen, £40. AEA Morse etc reader, £25. Tiny-2 TNC, £75. N-type antenna switch, £10. Global antenna coupler, £25. Ian, G0EDT, QTHR, 01789 268 863 (Stratford-upon-Avon). E-mail: g0edt@arrl.net

SILENT KEY SALE. Kenwood TS-440S, mic incl, £295. Zetagi 28 – 30MHz, 100W lin amp, £80. Zetagi 30A PSU, £45. All vgc, will accept sensible offers only, prefer you inspect & collect. G8BCA, QTHR, 01638 714 051. (Suffolk).

TEN-TEC PARAGON, voice unit option, all filters, vgc, £325. Yaesu FT-23R, FT-73R pair, simple but sturdy h/hs, charger, four battery packs, all for £175. FT-480R, recently serviced, £165. YH-2 VOX headset, virtually unused, £25. NC-29 desk charger, £25. Tvtrs: MM 70cm, original style, £65. Newer style, £90. RN electronics, 6m, 25W, hardly used, £125. SEM QRM Eliminator, £35. Keith, G0OZK, 07974 953 018 after 6pm (Stockport).

TOWER, 40FT, 2-SECTION, ground post, rotator, 3-band HF antenna, £350. Ameritron AL-811 amp, £500. G3WBA, 01275 873 691 (Clevedon). E-mail: ivan@g3wba.co.uk

TRIO TS-120V 10W 80m to 10m tcvr, inc owner's/workshop man, £175. YK-88CW filter, £25. TS-120 remote VFO, £45. TS-770 2m/70cm SSB/CW/FM tcvr, includes hand mic, owner's/workshop manual, £275. AEA Morse-Matic CW keyer, £75.G3XVF, QTHR. E:mail: g3xvf@btinternet.com

TS-830 VGC, £250. Buyer collects. Ron, G0NXC, 01915 866 383.

VHF ANTENNA 2m/6Y new, £25. Channel Master rotator crown, £35. MM converter 2m/10m, £20. Labgear Eliminac PSU, 0 – 20V, £15. Evershed chart recorder, £65. 'Smiths' box 15 x 8 x 9in, £15. AM modulation indicator type 2, £10. Marconi transmitter o/p meter 912A, 5/25W, £25. Mullard EL-37 new, £10. RCA 6HF5 new, £15. Ex equipment QQVO6-40A, QQVO3-20A, QQVO3-10, 807. Offers? G3TLG, QTHR, 01892 833 569 (Tonbridge).

YAESU FT-1000MP DC plus Yaesu FD-1030A PSU, MD-100ABX mic plus remote keypad plus Kenwood TL-922 linear amp plus spare valves, £1,900. All in mint cond & with mans & boxes. Ian, 01829 760 072 (Tarporley).

YAESU FT-1000MP mint cond, man, £1100. Two Hy-Gain vertical towers, good cond, used for 80 meter DXing, can be seen erected, £450. Hy-Gain T2X 220V rotator, £300. Millen Transmatch model 92200, perfect cond, spare new freq switch, never used, £200. Racal model 9915h freq meter, £30. Trio SP-940 speaker, £30. Reason selling – regret age demands retirement, no time wasters please. G3DAM, 01386 41951 (Evesham).

YAESU FT-1000MP MkV Field, 12 months old with 12 months warranty left, original box property of silent key GM0KXF. GM7VFR, 07719 133 476 (Irvine). E-mail: gm7vfr@hotmail.com

YAESU FT-1000MP, Inrad mods, filters 500, 250, 500 in sub rcvr, £1200. G3PJT, QTHR, 01223 263 137 (Cambridge).

YAESU FT-736R 2m 70cm all-mode tcvr, boxed with man, mic and leads. One non-smoking owner vgc, buyer collects. £525. Matching MD-1 desk mic, £45. Geoff, G3YVR, QTHR, 01293 883 253 (Crawley). E-mail: geoff@g3yvr.freeserve.co.uk

YAESU FT-817 guaranteed, £620. Miracle Whip/soft case. Kenwood 707, £180. Kenwood TH-D7 with extras, £380. Mic/rapid charger. Comet dual-band antenna, £35. M3BKS, 023 9242 6507 (Gosport).

YAESU FT-847 mint cond, £800. Yaesu G-5500 az/ele rotators, £320. SGC-239 tuner, £125. Paul, 07977 122 345 (Ware).

YAESU FT-920 AF, HF + 6m, very nice tcvr, mint cond, DSP + two VFOs + gen/cov rcvr 100W output, 12 months old, you won't find a nicer one, buyer must collect, £750, no offers or traders.

WANTED

ALL RACAL OR WATKINS Johnson items wanted by enthusiast & collector in any condition. Receivers, accessories, spares, or manuals. What have you? Especially looking for an RA17 LF converter & SSB adaptor, RA1772, RA1218. Also R1155, and tall 19in equipment racks, & a JRC NRD535. Can arrange collection from anywhere. G8WKA, QTHR, 01252 795 234 (Surrey). E-mail: richardreich@aol.com

DX-70TH, FT-817, IC-703, IC-718 wanted or similar compact HF tcvr. I collect Racal tactical radios & want Comcal TRA-922, Syncal TRA-921 & amplifier TA-944C in any cond. Also Yaesu FT-70G & any accessories & FT-70G/F for salvage. Fair prices paid, exchanges welcome. All calls answered: please leave number if machine activated. John, G3GTJ, 01963 240 319 (Castle Cary).

FOR RESTORATION of 1936 national HRO, original silver tuning dial & other contemporary parts, especially resistors. Would accept modified butchered or incomplete HRO containing these items. Neil, G8LIU, QTHR, 01895 230 006 (Uxbridge).

ICOM IC-AT100 auto ATU including cable, must be gwo c/w h/book. Des, G0JCF, 01895 633 118 (Ruislip). E-mail: gonedes@aol.com

KENWOOD YG-455C-1 500Hz CW filter for my TS-930S. Bob, G3PLP, QTHR, 01404 812 348 (Ottery St Mary, Devon). E-mail: bob@g3plp.fsnet.co.uk

LABGEAR amateur radio equipment, mans, brochures etc. Required by collector, especially Mark II Topbander tx. G3VKM, QTHR, 01502

GB CALLS

These callsigns are valid for use from the date given, but the period of operation may vary from 1 – 28 days before or after the event date. Operating details are provided in an abbreviated form as follows: T = 160m; L = 80 or 40m; H = HF bands (30 – 10m); V = 6 and/or 4m; 2 = 2m; 7 = 70cm; S = satellite and P = packet. Please send operational details of your special event station to the RadCom office at least five weeks before publication. The only QSL Bureau sub-manager for special event station callsigns is as follows: GBxAAA-MZZ – Mike Evans, 322 Heol Gwyrosydd, Penlan, Swansea SA5 7BR, e-mail mw0cna@ntlworld.com. Will organisers of special event stations please ensure that they lodge plenty of envelopes with their sub-manager?

1 Oct	GB2BOB: Battle Of Britain. Rochester, Kent. (G4EVY)
4 Oct	GB40WL: Owl. Ravenglass, Cumbria. LH2P (G0OMB)
5 Oct	GB0MCS: Mayor Charities Sandwell. Oldbury. L2 (M0CEN)
	GB2SMC: Sandwell Mayors Charity. Sandwell, W Midlands. LH2 (M0BPT)
7 Oct	GB0NPD: National Poetry Day. Bradford. LHV2 (G0PFH)
14 Oct	GB4LI: Lundy Island. Devon. TLH2 (G0NFL)
26 Oct	GB0BRC: Bredhurst Radio Club. Bredhurst, Kent. TLH2 (M0AAK)
1 Nov	MB2HFC: HF Convention. Didsbury, Manchester. LH (G3LAS)

677 622 (Norwich). E-mail: basford@btinternet.com

TRIO AT-180 antenna tuner also SP-180 spkr. Ken, M0CFT, 01952 251 478 (Telford).

TS-830S or TS-530S mains transformer needed. Any otherwise scrap, either model equally acceptable. Carriage cost happily will be paid. G4AVZ, QTHR, 01837 851 635 (Okehampton).

YAESU FTS-64E tone encoder for FT-480R, GI4NRB,QTHR, 028 9267 6708 (Lisburn).

YAESU FTV-250 & FTV-650B VHF tvtrs, must be in exc cond/wkg order with mans/cct diagrams, G4KZZ, QTHR, 01723 890 786 (Scarborough). E-mail: nigel@hunmanby13.freeserve.co.uk

YC-601 freq counter to match FT-101 tcvr. Also looking for FT-707 for mobile use, sensible price please with FC-707 preferred or, if anyone has separate FC707, give me a call please, 01443 412 695 (Trelewis). E-mail: martwil.martwil@virgin.net

RALLIES & EVENTS

28 SEPTEMBER 2003

NATIONAL VINTAGE Communications Fair – Hall 11, National Exhibition Centre, Birmingham. OT 10.30am, £5, under-14s free. 300 stalls, vintage wireless, valve amplifiers, classic hi-fi, gramophones, records (shellac 78, vinyl and CD), early TV, etc. Terry Martini, 07947 460 161, info@nvcf.org.uk [www.bvws.org.uk]

5 OCTOBER 2003

BELGIUM Amateur Radio & Computer Rally – Hall 'La Louvière Expo', La Louvière, access direct from motorway 50km S of Brussels. OT 9am. TI on FM repeaters: 145.600MHz & 430.325MHz. FM, TS from UK, Holland, Germany & France. Michel, ON7FI, 0032 64 849 596, or dewyngaert@skynet.be [www.qsl.net /on6ll/]

11 OCTOBER 2003

G QRP CLUB Mini-Convention – St Aidan's Church Hall, Manchester Road, Rochdale. OT 10am, £1. 'Old style' radio rally, components, junk and kit vendors. No expensive new equipment will be on sale, notable absence of computer equipment. LEC plus the traditional pie and peas lunch. g3rjv@gqrp.co.uk

12 OCTOBER 2003

GREAT LUMLEY AR & ES Rally – Great Lumley Community Centre, Front Street, Great Lumley, nr Chester le Street. OT 10.30am, £2 (accompanied under-14s free). CP free, C, B&B, radio, hobbies, satellite, component stalls, model aircraft flying display, TI. Nancy, 0191 477 0036 or 07990 760 920 or nancybone2001@yahoo.co.uk

14/15 OCTOBER 2003

LOW-POWER RADIO ASSOCIATION Radio Solutions 2003 – ETSI, Sophia Antipolis, nr Nice. Diane Green, 020 8658 3511, diane@instrotec.demon.co.uk

19 OCTOBER 2003

BLACKWOOD & DARS Rally – Newport Centre, Newport, 1 mile from jn 25A of the M4, (jn 26 travelling west to east). OT 10.30/10.45, £1.50. CP free, B&B, TI, TS, SIG, LB, C, DF, WIN, LB. George, 2W1JLK, 01495 724 942, or Dave, GW4HBK, 01495 228 516.

HORNSEA ARC Rally – The Floral Hall, Hornsea. OT 10.30am. TI, CP, B&B, LB, C. Richard, G4YTV, 01964 562 498 or g4ytv@aol.com

25 OCTOBER 2003

RSGB 50TH ANNIVERSARY Raynet Emergency Communications Convention – W Midlands Police Conference & Sports Centre, Tally Ho!, Pershore Road, Birmingham. [www.rsgb.org/emergency]

26 OCTOBER 2003

GALASHIELS & DARS Annual Rally – The Volunteer Hall, St John's Street, Galashiels. OT 11am. TS, B&B, C. Jim, GM7LUN, 01896 850 245.

WEST LONDON RADIO & Electronics Rally – Kempton Park racecourse, Sunbury-on-Thames, Middx. £3.50 (£3 after midday), under 16s free. TS, MT (plus free entry), CP for 2000, DF, C, LB, TI on 144.550MHz, B&B, external seating & picnic areas. Paul, M0CJX, 01737 279 108, m0cjx@lineone.net

31 OCTOBER – 2 NOVEMBER 2003

RSGB INTERNATIONAL HF & IOTA Convention – Britannia Country House Hotel, Didsbury, Manchester. [www.rsgb.org/hfc]

1 NOVEMBER 2003

RAEN ANNUAL GENERAL Meeting – celebrating 50 years of Raynet – Durham. All members are asked to attend.

2 NOVEMBER 2003

23RD NORTH DEVON Radio Rally – Holsworthy Memorial Hall. OT 10am B&B etc. G8XMI, 01409 241 202.

SOUTH YORKSHIRE RG 13th Great Northern Hamfest – Metrodome Leisure Complex, Queen's Road, Barnsley. Less than two miles from jn 37, M1. Five minutes' walk from train and bus station (follow the brown 'Metrodome' signs from all directions). OT 10am, £2.50. DF, TS, SIG, B&B. Ernie, G4LUE, 01226 716 339 or 07787 546 515.

8/9 NOVEMBER 2003

NORTH WALES RADIO & Electronics Show – North Wales Conference Centre, Llandudno. OT 10am, £2, accompanied under-14s free. TS, B&B, C, LB, components etc, TI on 145.550MHz. Jenny, MW0BET, 01492 549 413.

9 NOVEMBER 2003

BISHOP AUCKLAND RAC Rally – Spennymoor Leisure Centre. OT 10.30/11am, £1, accompanied under-14s free. B&B, C, LB, MT, DF, FAM. Mark, G0GFG, 01388 745 353, or Brian, G7OCK, 01388 762 678.

16 NOVEMBER 2003

MIDLAND ARS 15th Radio & Computer Rally – King Edward's Grammar Camp Hill School, Vicarage Road, King's Heath, Birmingham, jn A4040 and B4122. OT 10am, £1.50. TS, clubs, SIG, B&B, CP free, C, DF, RSGB regional stand/bookstall. Peter, G6DRN, 0121 443 1189 or 07808 078 003, or nlgutteridge@aol.com

22 NOVEMBER 2003

ROCHDALE & DARS Traditional Radio Rally – St Vincent de Paul Catholic Church, Caldershaw Road, off the A680 Edenfield Road, 2 miles west of Rochdale. Follow orange arrows from M62 jn20. Please note that this is a Saturday rally! OT 10.15/10.30am, £1. CP free, TS, B&B, C, TI on 145.550MHz. John, G7OAI, 01706 376 204 (eve), or radars@mbc.co.uk [www.mbc.co.uk/radars]

30 NOVEMBER 2003

PENCOED ARC Radio & Computer Show – Bridgend Recreation Centre. OT 10am, £1, children free. TI, CP, TS, B&B, LB, C, DF, FAM. MW5MWR, 01656 864 579, or mw5mwr@tesco.net

7 DECEMBER 2003

WEST MANCHESTER RC Red Rose Winter Rally – Lowton Civic Centre, just off the A580 East Lancs Road. OT 10.30am. TI on 145.550MHz, CP free, TS, B&B, SIG, LB, C, DF, RSGB bookstall. Steve, 01942 895 198. [www.wmrc.org.uk]

WORCESTER RADIO & Computer Rally – Worcester Rugby Club, access from M5 jn 6. RSGB stand & bookstall. [www.qsl.net/gb2tcr]

18 JANUARY 2004

OLDHAM ARC Rally – Mike, 01706 367 454, m1cvl@thersgb.net

1 FEBRUARY 2004

SOUTH ESSEX ARS Mobile Radio Rally – Brian, G7IIO, 01268 756 331 or briang7iio@yahoo.com [www.southessex.ars.btinternet.co.uk]

15 FEBRUARY 2004

RADIOSPORT Communication & Computer Show – RadioSport 01923 893 929. [www.radiosport.co.uk]

29 FEBRUARY 2004

CAMBRIDGE & DARC Rally – [www.cdarc.org.uk]

SWANSEA ARS Amateur Radio & Computer Show – Roger, GW4HSH, 01792 404 422.

7 MARCH 2004

VINTAGE VALVE Technology Fair – Trevor, 01274 824 816 or vvt@supanet.com [www.myciunka.supanet.com/VVTF2003 (case-sensitive)]

14 MARCH 2004

WYTHALL RC Radio & Computer Rally – *** New Venue *** – 0121 474 2077, or enquiries@wrcrally.co.uk [www.wrcrally.co.uk]

16 MAY 2004

MIDLAND ARS Drayton Manor Radio & Computer Rally – Norman, G8BHE, 0121 422 9787 or 07808 078 003.

6 JUNE 2004

SPALDING & DARS Annual Rally – John, G4NBR, 07946 302 815. [www.sdars.org.uk]

25 – 27 JUNE 2004

HAM RADIO 2004 – [www.messe-friedrichshafen.de]

18 JULY 2004

MCMICHAEL Amateur Radio Rally & Car Boot Sale – Dave, G4XDU, 01628 625 720 or g4xdu@amsat.org

8 AUGUST 2004

FLIGHT REFUELLING ARS Hamfest – Mike, G0MJS, 01202 883 479, hamfest@frars.org.uk [www.frars.org.uk]

RALLIES & EVENTS

TI – Talk-In; **CP** – Car 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** – prize draw, raffle; **LEC** – LECtures/ seminars; **FAM** – FAMily attractions; **CS** – Camp Site.

The Members' Ads order form is now published here. If members do not wish to cut the form out of the magazine, photocopies will be accepted, as will recent copies of the form from previous months, or recent copies of the 'carrier' sheet. *As a last resort*, members may also send in their advertisements on separate sheets of paper, but if you choose to do this, you *must* supply an accurate word count - and, of course, the correct fee in the normal manner.

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Business Cards

The Last Word

An 'Advanced' or 'Extra' Licence Class?

I read with interest the letter from Mark Hill and your response to it. I do not believe that your interpretation of Mr Hill's comments is correct. The point that he makes is that while much work and many changes have been made to the entry point of the hobby (generally a good thing in my opinion), there has been nothing done to encourage the further progression of those who have achieved the 'Full licence' standard. Indeed, it is now easier than ever to get a 'Full licence'. The overall result is that the average standard of attainment will fall. This can perhaps most readily be addressed by the introduction of an Extra or Advanced class of licence as Mr Hill suggests. Egalitarianism is by no means always a good thing and in respect of our hobby we may be in danger of 'throwing the baby out with the bath water' unless amateur radio can continue to differentiate itself from other aspects of 'hobby radio' by the recognition that for some it remains demonstrably a technical hobby.

Richard Newstead, G3CWI

...It is perhaps time to consider whether to have a further Extra class licence for experienced amateurs to work towards. To get this Extra class would be an incentive to increase the technical expertise that would be on tap if needed in a disaster situation – a little like NFD was intended. As there are already a few amplifiers capable of a kilowatt out, it would seem fair to offer those with the knowledge and technical ability to have this Extra class, as in USA – if not for all modes might I suggest that 1kw out on CW only should be considered.

Oh yes, you're going to say, the TVI – but I say that the difference between 400W and 1000W is little more than about 4dB and should not present any problems. I believe that this power is possible for some in the EU and it would restore the faith in the RSGB here.

So come on RSGB, after 45 years as a Class A, how about something for old members on a plate for a change – instead of everything given to new members on a plate?

John Lewis, G3MYI

LETTERS PUBLISHED in 'The Last Word' do not necessarily reflect RSGB policy. 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. Letters not published in RadCom may be published on the RSGB members-only website at rsgb.org/membersonly/lastword 'Last Word' letters may be e-mailed to **radcom@rsgb.org.uk**

3-Stage Licence Structure to Encourage Practical Skills

Mark Hill's, G4FPH, comments ('The Last Word', September) would infer to me that the passing of a Morse test implies a superior technical knowledge than that of former class B licence holders. Perhaps there are many former class A operators who can demonstrate a high level of technical expertise, but not because they have passed a Morse test. Likewise I know of many former class B operators who have more advanced technical and constructional skills than many class A operators. There is one gentleman I know who used to belittle former class B operators on local VHF nets. The same gentleman habitually had to ask the advice of class B operators when setting up aerials and before undertaking the simplest of repairs to his equipment, but never on air and normally by telephone.

Many black box operators, and I include both former A and B licence holders, limit their practical skills to soldering a plug to a coaxial cable. With the advent of a three-stage series of courses and examinations with both a practical and theory element, it will probably do more, not less, to encourage practical skills and self building in the hobby, thereby increasing technical expertise.

Colin Topping, GM6HGW

Class 'B' Opportunity

In the August issue, Don Field's 'HF' column offered some advice to former Class B licensees on which HF rig to purchase. I would like to offer a different perspective since there are many of us out here who don't understand how anyone could derive any sustained pleasure from any purchased equipment.

I also don't want to let the moment pass without noting that the merging of the licences offers us HF folk a new opportunity to benefit from the wealth of VHF constructional experience out there – and vice versa. Further, with increasing digital content, the mysterious arts of VHF construction practice are fast becoming equally important at HF.

There is an HF home-brew net which meets most lunch-times and early evenings on 3727kHz – and anyone is welcome. As with most nets, we value the conversational content – and so on these occasions tend to value those 'conversational features' on a transceiver that Don says he does not – coming from his DX and contest perspective. But to paraphrase Don's words – it's horses for courses.

Peter Rhodes, G3XJP

Poynting Out the Flaws

Some months ago, following a review of the 'Crossed Field Loop' antenna in *RadCom*, I drew attention, in letters to this column, to flaws in the 'Poynting Vector Synthesis' (PVS) concept, which some designers claim makes it possible to improve the performance of small antennas. This technique appears to rely on a process involving interaction of orthogonal electric and magnetic fields. I pointed out that interaction implies intermodulation, and since we know that real antennas are linear, we can always deduce their performance by simple superposition of the behaviour of the separate elements. No magic improvements are seen if we do this with crossed fields.

Yet another 'PVS' claim has appeared in *RadCom*. The review of the E-H antenna (*RadCom* September 2003) included a reference to a detailed technical description, so I headed for the website, particularly interested in the structure of the "phasing network" which the inventor claims is the key to the crucial 90-degree alignment of the two fields. The E-H antenna seems to consist, not of two (E and H) elements, but a single one in the form of a short fat dipole, and the "phasing network" looks like a loading-coil preceded by a pi-network in the single feeder. The inventor claims that the pi-network provides the important 90-degree phase-shift. However, it's clearly only shifting the phase of the entire radiated signal, whether E field or H field or both, and could just as easily be achieved by lengthening the coax cable, a trivial process which achieves nothing. I believe any competent antenna engineer would agree with me that this antenna is no more than a short fat loaded dipole matched to 50Ω. I do accept that the added pi-section could improve the SWR bandwidth.

I am not denying that this antenna works, and I suppose we have to accept that the marketing tactics used are no worse than those common with other 'quack' products seen in everyday life, but surely we cannot let flawed theoretical claims like these go unchallenged.

Peter Martinez, G3PLX

HRO Was Outdated by 1940

It was nice to see in the first copy of *RadCom* received here after joining the RSGB that Mr Hawker in his 'TT' column referred to my own modest outpourings regarding the HRO that appeared in *Radio Bygones* recently. I have to complain though that Mr Hawker's comments on my text, taken as they are out of context, seem to imply that it was my opinion that the HRO was outdated by 1939. It was not my opinion, but rather the one found whilst searching the web for historical material on the HRO. It was indeed the opinion in early 1940 that a set using plug-in coils and with no dial reading was outdated by the standards of the other sets that were around at the time. Frankly, as the set was designed in 1935 the advancements already available by 1939/1940 were considerable so it's blatantly obvious why radio users should have thought such.

Ben Nock, G4BXD

Holding Two Callsigns

I understand from the Radiocommunications Agency, both via the RA website FAQs on the recent licensing changes and from verbal discussions with representatives at the Stevenage rally in June, that they will not allow amateur licensees to retain both their callsigns if they have now become of the same class.

I currently hold the Full callsigns G8BUR and M0MAA; I will now be forced, much against my will, and even though I am entirely willing to pay the licence fees for both callsigns, to give up one and use the other exclusively.

I have decided to give up my ex-Class B callsign, but under protest. I feel that I have a moral right to retain that callsign, as it is the callsign by which I have become known locally over the past 35 years; and also a moral right to retain my ex-Class A callsign, as I earned it by passing the Morse test, and as it is by that callsign that I am now known on the HF bands.

Would the RSGB please consider requesting of the RA that amateur licensees holding two callsigns which have now become of the same class, be allowed to retain both their callsigns, provided that they pay the normal renewal fee for each callsign separately when it falls due each year? I am sure that a great number of other amateurs in the same position as myself would be keen to retain both their callsigns if the RA were to grant this request.

Andrew Marshall, M0MAA, and G8BUR until 2359hrs 27 Aug 2003.

Callsign Restructuring

I see that Holland has just reorganised its amateur callsign structure, quite painlessly. Well, well!

Paul Thompson, op station GM6MEN

Active, Thanks to RAIBC

I am now the proud owner – or should I say guardian – of a TS-570D supplied to me with power supply by the RAIBC. It is a compact yet quite amazing 'box of tricks', covering all the HF bands. Not only does this set perform in every conceivable way desired by the operator, but it also tells you what it is doing via the voice synthesiser. It is virtually impossible, however disabled, to get things wrong.

I would like to thank the RAIBC, all volunteers, many having daytime jobs to contend with, who manage in some way to find time to make sure that disabled radio enthusiasts are able to enjoy this hobby at the same level as the completely able-bodied.

Thanks to one and all at RAIBC.

Alan Thomas, GW1PYY

A Vote of Thanks

These days all too many companies fail to give good service. Here is one that does – Waters & Stanton plc. The service engineers there are first class and deserve a public accolade for the service they give. Over the years I have had to send items for repair, especially as I suffer from arthritis. On 7 July I posted my Yaesu mobile transceiver to them for repair, it arrived back on 10 July. Now that is what I call rapid service. Many thanks W&S.

Ernie Knight, G4NVD/G8TXU

Licensed to Thrill

I have been paying particular interest to the promotion of amateur radio by both the RSGB and many of the local clubs throughout the country of late. I take my hat off to you all, and I have also included a donation to GB4FUN in my membership subscription. However, are we marketing the hobby correctly? Amateur radio and in particular 'radio ham' can sound as bland as cheese sandwich to someone outside of radio circles. Whilst at university, if I was ever asked what I did in my spare time, I would answer, "Well, I have a government licence to experiment with radio communications systems, you know, satellites, world-wide communications and the like." Apart from getting some pretty amazed and interested looks, it was also a pretty good chat-up line for the ladies! On a serious note, why don't we promote this fantastic hobby in this way, say in the national press? Example: "This man / woman holds a government licence to experiment with radio communication systems..." See what I mean? To me, it doesn't sound 'fun', it sounds 'funky'! I would very much like to know what anyone thinks of this idea.

David John Turner, MW0DJT (MW0DJT@aol.com)

Welcome to HF

I have for many years tried in vain to remember and then decode the 'noise' of Morse into letters and numbers. Until recently I wondered why I just couldn't get my head around this fairly simple task. I have now discovered that I have a 'serial mental dis-function'. Simply put, I remember things out of order or translate facts and figures in a misplaced order – I remember everything correctly, but they get jumbled up when it's regurgitated! Daft maybe, stupid definitely not, just one in a dozen or so of us with an odd memory recall. It has meant that the HF bands and I were destined never to be – shame – as I would never be able to pass the test and then apply for my grandfather's callsign – big shame. I assume I can now inherit his call and use it on HF. My grandfather was Frank Evans from Shropshire and he died towards the end of WWII.

Clive Harding, G1XOZ

Congratulations MM3OVK

I would like to congratulate a friend of mine, Mark McAllister, MM3OVK, from Ayrshire, in his most recent accomplishment of being the first MM3 to get multi-band DXCC and also WAC on 15m plus two other DX awards. This I believe is a first for an MM3 station if not across the entire board of the 3 series, so well done Mark. Mark is a member of the Paisley YMCA ARC where he sat the MM3 licence in May 2002. He recently got more good news as he just passed the May RAE 2003, so well done for that too.

Mark is fortunate in being able to have an antenna farm at the rear of his house so a lot of the success is down to his wonderful set-up at home and having good neighbours who do not mind the array of antennas he has sticking up everywhere.

Kenny McCormick, MM1KNY/MM3KMC

Give M3s a Break!

Amateur radio is great hobby and a lifetime's fun. We all have our many and varied reasons for getting involved in the many facets our hobby can bring us. It is for obvious reasons we 'open the door' to new members. Therefore will you all please give a welcome to our new 'recruits' who deserve our help and encouragement, and stop wingeing and moaning about M3s that have yet to learn the basics.

Learning is their primary aim at this early stage. They want to fit in, they want to get it right. Tell them! Correct their mistakes! What use is a teacher who refuses to teach?

Martin Russell, G0CAK

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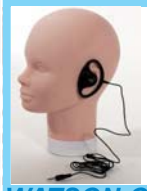

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AUDIO

HEIL DESK MICS

The Heil Classic studio quality microphone, exact replica of the 1930's RCA 74B type of broadcast microphone. Inside it has the benefit of modern technology. Two inserts are provided, one for broadcast studio quality and a choice of one other Heil insert. Includes base stand, soft-touch PTT back panel switch and cover for microphone. Requires CC1 adaptor.

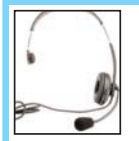
HCL5	Classic retro-look HC-5 desk mic	**£259.95**	B
HCL4	Classic retro-look HC-4 desk mic	**£259.95**	B
HCLic	Classic retro-look IC desk mic	**£259.95**	B

HEIL HAND MICS

Goldline professional quality dynamic microphone. Three versions available, GM-4 with Studio & HC-4 elements, GM-5 with Studio & HC-4 elements and GM-V Vintage Goldline with Vintage Studio high impedance element, for older valve rigs such as Drake & Collins. Includes stand threaded holder. Requires CC-1 adaptor £29.95.

GM-4	Goldline HC-4 hand mic	**£129.95**	B
GM-5	Goldline HC-5 hand mic	**£129.95**	B
GM-V	Goldline Vintage Hi-z hand mic	**£159.95**	B

HEIL HEADSETS & BOOM MICS



PORTABLE OR MOBILE

The Traveler lightweight single side headset with boom mic. Many models to choose from. Supplied with an interface cable. Choice of extra interface cables, for modular or 8-pin.

HST-817	Traveler single side headset for FT-817	**£89.95**	B
HST-706	Traveler single side headset for IC-706	**£89.95**	B
HST-IC8	Traveler single side h/set for ICOM 8-p	**£89.95**	B
HST-K8	Traveler single side h/set for Kenwood	**£89.95**	B
HST-KM	Traveler single side h/set for Kenwood	**£89.95**	B
HSTA-817	Extra interface cable for FT-817	**£24.95**	B
HSTA-706	Extra interface cable for IC-706	**£24.95**	B
HSTA-IC8	Extra interface cable for IC 8-pin	**£24.95**	B
HSTA-K-M	Extra interface cable for K mod	**£24.95**	B
HSTA-K-8	Extra interface cable for K 8-pin	**£24.95**	B

HEIL HEADPHONES & BOOM MICS

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.

PRO-SET-PLUS	Large H/phones with HC-4 & HC-5	**£199.95**	B
PRO-SET-PLUS-IC	Large H/phones with IC & HC-4	**£219.95**	B
PRO-SET-4	Large H/phones with HC-4 element	**£129.95**	B
PRO-SET-5	Large H/phones with HC-5 element	**£129.95**	B
PRO-SET-IC	Large H/phones with ICOM element	**£149.95**	B

bhi NES10-2 DSP SPEAKER £99.95 B

Combined speaker and programmable DSP unit. Offers dramatic noise reduction, even reduces annoying hetrodynes.
8 Ohms, 8 filter settings, 3.5mm plug, 12-24V DC

bhi NES-5 DSP SPEAKER £79.95 B

Combined speaker and fixed setting DSP unit. Offers same dramatic noise and hetrodyne reduction. (Formally NESCB)
8 Ohms, 3.5mm jack plug, 12-24V DC 500mA

bhi NEIM1031 NEW £129.95 B

NOISE ELIMINATING IN-LINE MODULE

** Noise attn -20dB (typical) * Noise Attn levels 8*
** Audio output power 2.5W RMS max (8 Ohms)*
** Audio connections: Line level in/out (RCA Phono), Audio in/out 3.5mm mono jack * Line i/p impedance 10K*
** Line o/p impedance 100 Ohms * Line in sensitivity 300mV -2V RMS * Headphone socket 3.5mm mono jack * Power 12-24V DC 500mA*

WEB ORDERING
www.wsplc.com

PRICE MATCH

THE ONLY THING WE WON'T DISCOUNT • CUSTOMER SERVICE •

WATSON W-25SM PSU £79.95 B

Very popular budget switch mode power supply. **Output voltage 13.8V DC *Output current of 22A (25A peak) *Front panel output terminals *Over current & voltage protection *Quiet operation*

WATSON W-25AM PSU £89.95 C

DC power supply for the shack & esp. for use with 100W transceivers. Separate voltage and current meters. **Output voltage 0-15V DC *Output current of 25A (30A peak). *3 sets of output terminals *10A cigar socket. *Over current protection*

WATSON W-5A PSU £29.95 B

DC power supply for the shack and low power QRP transceivers. **Output voltage 13.8V DC *Output current of 5A (7A peak) *Front panel output terminals *Over current protection*

LOWE SPS-8400 PSU £99.95 C

A general purpose 3-15V DC, 25A (30A peak) power supply able to provide the needs of the modern 100W HF transceiver.

MANSON EP-925 PSU £99.95 C

A general purpose 3-15V DC, 25A (30A peak) power supply able to provide the needs of the modern 100W HF transceiver. **Dual analogue meters *Over current protection *Large power terminals for rigs *Quick snap connectors for ancillaries*

AVAIR AV-200 VSWR PWR METER £49.95 B

Ideal for HF and VHF operation. It features high power handling up to 400W * 1.8-180MHz * 5W, 20W, 200W, 400W * Av or PEP

AVAIR AV-400 VSWR PWR METER £49.95 B

Ideal for VHF and UHF operation. It features high power handling up to 400W * 140-525MHz * 5W, 20W, 200W, 400W * Av or PEP

AVAIR AV-600 VSWR PWR METER £69.95 B

Two sensors used for HF and VHF/UHF operation. * 1.8-160MHz, 140-525MHz * 5W, 20W, 200W, 400W * Av or PEP

LDG Z-11 AUTOTUNER £209.95 B

IDEAL FOR YOUR FT-817

An auto ATU to match the FT-817. 1.8MHz to 30MHz up to 60W. Latching relays means very low current and almost zero when not tuning.

WEST MOUNTAIN RIGBLASTERS

RIGblaster pro	Data interface 8-pin/mod, Cd & cables	**£299.95**	B
RIGblaster Plus	Data interface 8-pin/mod, Cd & cables	**£139.95**	B
RIGblaster M8	Data interface 8-pin, software & cables	**£109.95**	B
RIGblaster M4	Data interface 4-pin, software & cables	**£109.95**	B
Rigblaster RJ	Data interface RJ45, software & cables	**£109.95**	B
RIGblaster nomic8P	Data interface 8-pin, software & cables	**£59.95**	B
RIGblaster nomicRJ	Data interface RJ, software & cables	**£59.95**	B
FT100-CBL	Adapts all units to FT100 input	**£12.95**	A
RB-CD	Standard RIGblaster program CD	**£9.95**	A

FREQUENCY COUNTERS

WATSON

The **FC-130** is an ideal frequency counter for the shack, mobile or portable use. Supplied complete with Ni-Cads, charger and telescopic whip.

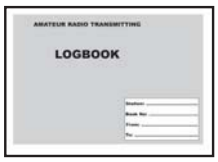
Super Searcher	RF finder & freq. cnter 10MHz-3GHz	**£99.95**	B
Super Hunter	Frequency counter 10Hz-3GHz	**£149.95**	B
Hunter	Frequency counter 10MHz-3GHz	**£59.95**	B
FC-130	Frequency counter 1MHz-3GHz	**£59.95**	B

OPTOELECTRONICS

More than just a frequency counter, the **Xplorer** is a complete mini test receiver. High speed nearfield FM receiver 30MHz to 3GHz. Automatically records up to 500 frequencies in memory, built-in CI-V interface.

Xplorer	Freq. cnter / CTCSS/DTMF decode	**£849.95**	B
Digital-Scout	Digital Freq. counter 60MHz-2.6GHz	**£529.95**	C
Scout	Freq. finder 10MHz-1.4GHz	**£379.95**	B
Mini-Scout	Freq. finder (no memories)	**£199.95**	B
Micro-Counter	Micro freq. counter 10MHz-1.2GHz	**£119.95**	B
Cub	Mini counter 1-2.8GHz	**£134.95**	B

TRANSMITTING LOGBOOK NEW £4.99 A



Traditional Logbook for Radio Amateurs, A4 spiral bound for ease of use plus updated Prefix List and room for extra notes. A logbook is a legal requirement for any radio station.

MOBILE LOGBOOK NEW £4.99 A

You've asked for one so here it is - the Radio Amateurs Mobile/Portable Logbook. A5 size, it also contains relevant repeater information. A mobile logbook is not a legal requirement.

RAMSEY HR RECEIVER KIT SERIES

SPECIAL OFFER

- **Models: 20m, 40m, 80m**
- **NE-602 IC**
- **Output: 8 Ohms headphones**
- **Supply: 9V DC PP3 Batt.**
- **Case & knob set (CHR): Optional**

These single band radios use direct conversion with varicap tuning and have amazing sensitivity. They offer reception of SSB, CW and AM and are ideal as part of a QRP station.

Models: HR-20, HR-40, HR-80 all ~~£31.95 B~~ **£19.95 A**

CHR (optional case & knob set) ~~£14.95 A~~ **£9.95 A**

5 WAYS TO BUY WITH CONFIDENCE

1 **Scotland & Borders**
WATERS & STANTON @ JAYCEE
20 Woodside Way, Glenrothes, Fife, KY7 5DF
Tel:01592 756962 Fax:01592 610451
closed mondays

2 **Midlands & North**
WATERS & STANTON @ LOWE
Bentley Bridge, Chesterfield Rd, Matlock, Derbyshire, DE43 5LE
Tel:01629 582380 Fax:01629 580020

3 **South**
WATERS & STANTON HEAD OFFICE
Spa House, 22 Main Rd, Hockley, Essex, SS5 4QS
Tel:01702 206835/204965
Fax:01702 205843

4 **WEB MAIL ORDER**

www.wsplc.com

5 **TELEPHONE MAIL ORDER**

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HF EXCITEMENT

INTRODUCING YAESU'S ALL NEW HF MOBILE

Blending leading-edge technologies developed on the FT-897 and MARK-V FT1000MP transceivers, the FT-857 is the world's smallest HF/VHF/UHF Multimode Transceiver, and it's available now!

FT-857 DESIGN HIGHLIGHTS

The FT-857 is a high-performance, ultra-compact transceiver operating on the 160-10 meter HF bands, plus the 50, 144, and 430 MHz VHF/UHF bands. Providing 100 Watts of power on HF/6 meters, 50 Watts on 2 meters, and 20 Watts on 70 cm, the FT-857 is ideal for mobile, vacation, DX-pedition, or home use when space is at a premium.

Utilising the renowned receiver performance of the FT-897 and MARK-VFT-1000MP, the FT-857 features wide dynamic range, optional Digital Signal Processing, and outstanding audio.
(*DSP supplied as standard in the UK)

The wide array of convenience features includes a 32-colour display; Spectrum Scope; built-in keyer with memory and beacon mode; U.S. Weather Band reception; 200 memories with Alpha-Numeric labels; AM Aircraft reception; detachable front panel (optional YSK-857 required); and much, much more.

You've asked for it, and it's here today: the FT-857 New Mobile. . .from the engineers at Yaesu!

New Remote Control DTMF Microphone MH-59A8J (Option)

The optional MH-59A8J Remote Microphone provides control of the major functions of the FT-857 from the microphone's keypad. The MH-59A8J includes a rotary control knob for adjusting the operating frequency and the receiver volume level.

Actual Size

HF EXCITEMENT

FT-857

ULTRA-COMPACT HF/VHF/UHF 100 W ALL-MODE TRANSCEIVER (HF/6m 100W, 2m 50W, 70cm 20W)

YAESU
Choice of the world's top DX'ers

YAESU UK Ltd, Unit 12, Sun Valley Business Park Winnall Close, Winchester, Hampshire, SO23 0LB, U.K.

For the latest Yaesu news, visit us on the Internet: http://www.yaesu.co.uk

Specifications subject to change without notice. Some accessories and or options may be standard in certain areas. Frequency coverage may differ in some countries. Check with your local Yaesu Dealer for specific details.