Amateur Radio's Role in the Liberation of the Falklands

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RadCom

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HF Convention 11-13 October at New Venue

The 2002 RSGB Commonwealth Contest Results

Build a GPS - Locked Frequency Source for LF

Peter Hart Reviews the ICOM IC-7400

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SCOTTISH BRANCH OPEN DAY 19th OCTOBER

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Our Scottish Branch run by Bill at Jaycee Electronics is getting busier by the week.

You'll find all the Waters & Stanton products at the same competitive prices. If you live in Scotland or the Borders, then give Bill a call or pay him a visit (closed Sunday and Monday). It makes sense to be loyal to your local dealer, particularly with our prices!

The chance to do some deals and meet old friends. Trade stands in adjacent hall, with refreshments and easy parking. The biggest Open Day ever held in Scotland. Be there!

NEW

NEW 2003 RADIO COMMUNICATIONS GUIDE £2.95 carr. £1.25

World's largest guide to Amateur Radio

336 PAGES

FT-1000MP MKV FIELD £2299

NEW

YAESU FT-897

NEW

100W HF 50W 2m and 20W 70cm Plus 20W on (optional) Internal Battery

Available November

Power Tank

FD-7021 £24.95 B

4 Ah supply with built-in 3/6/9V output plus 12V DC. Has built-in lantern and computer controlled battery state. Compact size: 180w x 85d x 210h mm, 3kg. Shoulder strap.

AC chargers included

AR-147 GREAT VALUE!

2M 50W OUTPUT

£199.95 Carriage £6.00

The AR-147 offers a top performance 2m FM transceiver plus VHF air-band receiver. You get CTCSS, (auto reading), and DTMF complete with keypad microphone. 12.5 and 25KHz steps plus 1750Hz tone makes it truly universal. Power levels of 10 Watts and 5 Watts are also selectable. Includes mobile mounting hardware and full warranty.

UK's largest Selection of HF Transceivers

We will price match on any currently advertised in-stock items that are of UK origin. Beware of none UK sourced items. If the dealer cannot get supplies from the UK distributors, then there may be a reason! All our gear is UK sourced with full manufacturers warranties.

29 YEARS in THE BUSINESS
WINNER of KENWOOD 2002 AWARD
YAESU's LARGEST UK DEALER
PLAY SAFE, GO TO W&S

ICOM HF Transceivers

IC-756-PRO	160m - 6m 100W	£1799.95 C
IC-756-PROII	160m - 6m 100W 12V	£2495.95 C

IC-756-PRO II

The flag ship of the ICOM range. Lovely big easy to read display

SP-20	Speaker with filters	£164.95 B
SP-21	Speaker for IC-756	£74.95 B
SM-8	Base microphone	£129.95 B
SM-20	Base microphone	£144.95 B
PS-125	Icom tcvr PSU	£295.95 C
IC-7400	160m - 2m 100W 12V	£1499.95 C
IC-706	160m - 70cm Tcvr with DSP 12V	£849.95 C
IC-718	160m - 10m 100W 12V	£649.95 C

Yaesu HF Transceivers etc.

FT-1000mkV	160m - 10m 200W 230V	£2899.95 C
VL-1000	Quadra HF - 6m 1kW linear	£3999.00 D
FTV-1000	6m transvertor 200W	£799.95 C
FT-1000 Field	160m - 10m 100W 230V	£2199.95 C
MD-200ABX	Desk mic	£249.95 B
MD-100ABX	Desk mic	£110.00 B
FT-920AF	160m - 6m 100W 12V	£1099.95 C
FT-847	160m - 70cm 100W etc 12V	£1149.95 C
FT-817	160m - 70cm 5W Batt.	£595.95 B
FT-840	160m - 10m 100W 12V	£499.95 B

FT-817

All bands & All modes gives you a totally portable HF DX or VHF/UHF station. *Ours includes* battery and charger.

Kenwood HF Transceivers etc.

TS-870S	160m - 10m DSP 100W 12V	£1349.00 C
PS-33	AC power supply	£199.95 C
PS-53	AC power supply	£229.95 C
MC-60A	Desk mic	£117.95 B
MC-80	Desk mic	£72.95 B
MC-90	Desk mic	£187.95 B
TS-570DGE	160m - 10m 100W 12V	£849.00 C
YK-88CN-1	270Hz CW filter	£61.95 B
YK-88SN-1	1.8kHz SSB filter	£61.95 B
TS-50S	160m - 10m 100W 12V	£599.00 C
TS-2000	160m - 70cm <100W	£1695.00 C
TS-2000X	150m - 23cm <100W	£1999.00 C
TSB-2000	Computer controlled	£1549.00 C
RC-2000	Remote head for TS-2000	£199.95 B
ARCP-2000	TS-2000 software	£44.95 B

Waterproof 3-Band Radio 6m - 2m - 70cm Yaesu VX-7R NEW

The new robust handy from Yaesu

£329.00

NEW 3-Band Radio Icom E-90

At last, the new Icom handy has arrived for 6m-2m-70cms plus general coverage and TV sound!

HL-50B Amplifier

£265.95

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

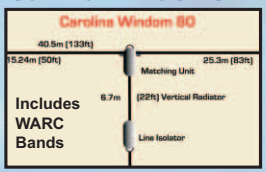
Triple Mag Mounts *Upgraded*

£39.95

Ideal for HF whips and large VHF whips. Amazing adhesion even at 70mph! SO-239 or 3/8" available

W-300T = 3/8" **W-300S** = SO-239

Carlina Windoms - DX from a wire!



Outperforms G5RVs and "Del-Boy" designs! The only antenna to give both high and low angle radiation even at 20ft above ground. Rated at 1kW, there's a model for you.

CW-160	160-10m 80.1m	£139.95 C
CWS-160	160-10m 40.5m	£134.95 C
CW-80	80m-10m 40.5m	£99.95 C
CWS-80	80m-10m 20.1m	£119.95 C
CW-40	40m-10m 10.3m	£94.95 C

Many more in our 2003 Radio Communications Guide 336 pages! £2.95 plus post

FT-817 ADD-ONS

One Plug Power
1.8Ah pack module
80% capacity increase!

£79.95

One Big Punch
Speech processor. Dealer fit

£59.95

One Board Filter
Collins 500Hz & 2.3kHz dual filters fitted by us.

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PRICE MATCH

YAESU

FT-1500M 2m FM Mobile £159 C

SPECIAL OFFER SAVE £70

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

KENWOOD

TM-D700E 2m + 70cm FM £449 C

Large detached screen and APRS, make this a firm favourite. 50W on 2m and 35W on 70cms. Features 200 memos, CTCSS, Band Scope, built-in TNC, DX cluster monitor, alphanumeric etc.

TM-G707E 2m + 70cm FM £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!

TM-V7E 2m + 70cm FM £359 C

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

ICOM

IC-207H 2m + 70cm FM £279 C

A great budget class radio for VHF & UHF use.

IC-2800H 2m + 70cm FM £419 C

Large colour display with video input, and airband rx. 50W/35W and remote head unit.

IC-2100H 2m FM Mobile £229 C

Rugged design with switched receive filters 12.5/25kHz

IC-910 2m + 70cm All Mode £1299 C

Icom's new dual band all-mode base station radio with 23cms option.

YAESU

FT-7100 2m/70cm Mobile £299 C

NEW

Just arrived is this new dual band radio that has extended rx. Power is 50/35W. Features dual in-band reception and detachable display (requires YSK-7100).

One of the Best Buys in Dual Bamd Mobile!

AV-40 VSWR METER £39.95 B

- 144 - 470MHz
- Impedance 50 Ohms
- Power 0 - 30W / 0 - 300W switched
- Measures forward / reflected power + VSWR
- Sensitivity 3W for full scale deflection
- Accuracy 10% at full scale
- Sockets SO-239
- Size 85 x 87 x 95mm • Weight 280g

KENWOOD

TH-D7E 2m + 70cm £299 C

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.

TH-F7E 2m + 70cm £249 C

NEW

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.

WEST MOUNTAIN

RIGRUNNER DC DISTRIBUTION £109 B

The *RIGrunner* 12-way 13.8V DC distribution system with Over voltage, Normal and Under voltage indicators.

LINEAR AMPLIFIERS UK

CHALLENGER II	HF LINEAR AMP10-160m	£1795 D
RANGER-811H	HF LINEAR AMP10-160m	£895 D
DISCOVERY-2	2m LINEAR AMP 400-1000W OUT	£1395 D
DISCOVERY-6	6m LINEAR AMP 50-54MHz 400-1000W OUT	£1395 D
NEW DISCOVERY-70	70CMS LINEAR AMP 430-440MHz 50W IN/ 700W OUT	£1495 D

YAESU

YAESU VX1R 2m/70cm

Ultra-wide frequency coverage which includes VHF and UHF TV audio, AM broadcast, FM broadcast and AM airband.

£149 B

W-25SM 25AMP SWITCH-MODE POWER SUPPLY

THE QUIET ONE

£79.95 Carr. £6.00

Switched 230 / 115V AC input and fixed 13.8V output at 22 Amps continuous and 25 Amps peak. Over voltage and over current protected and fan cooled. Measures 180mm (W), 75mm (H) and 190mm (D)

HL-50B

NEW FT-817 AMPLIFIER 50 WATTS PEP

NEW

£299 Carr. £6.00

Made by Tokyo High Power, this amplifier covers 80m to 6m. Purpose designed for the FT-817. RF switched or can be wired to FT-817 access. socket. Measures 148 x 55 x 190mm.

YAESU VX5R

SPECIAL OFFER

~~£299~~

NOW £199

Tiny but incredibly rugged, the VX-5R provides transceiver capability on three amateur bands (50/144/430MHz) and almost continuous reception from 500kHz up to 999MHz.

THE FAMOUS ZX MONO BAND YAGIS DESIGNED BY ON4UN BALUN MATCHED

Model	Elements	Gain	Price £
ZX10-2	2	6.3dB	£119.95 C
ZX10-3CL	3	9.1dB	£129.95 C
ZX10-3DX	3	10.3dB	£159.95 C
ZX12-2	2	6.3sB	£109.95 C
ZX12-3	3	9.1dB	£129.95 C
ZX12-4	4	11.4dB	£169.95 C
ZX15-2	2	6.3dB	£119.95 C
ZX15-3	3	9.1dB	£159.95 C
ZX15-4	4	11.4dB	£199.95 C
ZX17-2	2	6.3dB	£129.95 C
ZX17-3	3	9.1dB	£169.95 C
ZX17-4	4	11.4dB	£199.95 C
ZX20-2	2	6.3dB	£149.95 C
ZX20-3	3	9.1dB	£209.95 C
ZX20-4	4	11.4dB	£269.95 C
ZX20-5	5	12.1dB	£329.95 C
ZX20-6	6	12.7dB	£549.95 C
GP-3	-	0	£79.95 C
GP-2W	-	0	£79.95 C
GP-3W	-	0	£89.95 C
MN-2000	-	6.1dB	£339.95 C

NEW MINI-BEAM MN-2000

MN 2000 MINI BEAM

- *10 - 15 - 20m 1kW*
- *2m boom length*
- *Longest element 5m*
- *Gain 3.5 - 6.1dBd*
- *F/B ratio 8dB*
- *Mast 50mm max Weight 8kg*

This mini beam is designed to give good forward gain within the minimum of space. It has generous power handling and even with a small garden, the addition of a linear will make this a potent DX combination. But even at 100W you will find a big improvement over simple wire antennas and verticals.

WATERS & STANTON

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Freephone Orders 08000 73 73 88

Get in Front with HUSTLER

CARRIAGE CHARGE CODES: A=£2.75, B=£6, C=£9, D: £12

5BTV 4BTV

£209.95 Carr. £9.00

£169.95 Carr. £9.00

HUSTLER®

BASE STATION ANTENNAS

Spec	5BTV	4-BTV
Bands	5	4
Coverage	80m-10m	40m-10m
Bandwidth 10-40m	Full	Full
Bandwidth 80m	100kHz	N/A
Resonance	1.15:1	1.15:1
Power	1kW CW	1kW CW
Traps	1" forms	1" forms
Tubing	1.25"	1.25"
Bracket size	1.75"	1.75"
Height	25ft 1" (7.64m)	21ft 5" (6.52m)
Weight	17lbs. (7.7kg)	15lbs (6.8kg)
Wind (112kph)	13kg	-

These base antennas are very rugged and easy to set up. They can work well at ground level with just a good earth rod. Wire ground radials improve things. For mast mounting you need one quarter radial per band. No other antenna beats them at ground level! GREAT VALUE

HUSTLER Mobile Antennas

Model	Band	Bandwidth	Price
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

These antennas are are centre loaded so you you need one lower mast section, plus a resonator for each you operate on.

Model	Band	Bandwidth	Price
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

The base of the antenna (lower mast) is fitted with a standard 3/8" stud. We can supply suitable 3/8" mounts - please ask

WATSON

CAPTURE THAT FREQUENCY!

Supplied with telescopic antenna and AC battery charger. If you are within 200 ft or so of the hand-held, you should be able to read off the frequency. Note it down and enter it in your scanner. It's that simple and it's pocket sized.

Each counter is supplied with internal Ni-Cad pack, AC charger and whip antenna.

Hunter	10MHz - 3GHz	£59.95 B
FC-130	1MHz - 3GHz	£79.95 B
S. Hunter	10Hz - 3GHz	£149.95 B
S. Searcher	10MHz - 3GHz	£99.95 B

SPY CATCHERS

Zoom into any FM transmission between 30MHz and 900MHz and monitor the audio. It takes a fraction of a second. The WR-5001 comprises a complete receiver with auto tuning, skip button, squelch adjustment and built-in speaker. The WR-5002 is similar, but adds an auto-hold control and a bargraph signal meter. It also adds a CI-V port for reaction tuning Icom and AOR receivers fitted with this feature. These monitor receivers are designed for nearfiled use and the range is from a few hundred metres to around 1km, depending on frequency and power of the transmitter.

WR-5001 £99.95 WR-5002 £159.95

LDG USA

LDG AT-11MP Auto ATU £269.95 A

1.8MHz - 30MHz 150W

Requires no data leads - just 12V at 500mA . Just connect between transceiver and antenna. Handles all coax fed systems but with much wider impedance range than internal models. Should be OK for G5RVs etc.

CS-600 2-way Coax Switch £12.95 A

2-way coax switch ideal for use in antenna systems and service departments. Provides a very positive method of switching between two coax systems and offers very low loss.

B1-2K Balun £25.95 A

This balun is designed for dipoles, inverted V antennas, and similar 50 Ohm feed designs.

B4-2K Balun £34.95 B

The B4-2K 4:1 voltage balun is ideal for folded dipoles, delta loops or other medium impedance balance antennas where ATUs are not required.

REM-BAL4 Remote Balun £49.95 B

The REM-BAL4 is is a 4:1 current type balun and is ideal for open wire to coax interfacing, especially external to the operating position. Unlike voltage baluns, current type baluns maintain output balance over a wide range of loads. Can be used with a transmatch.

WATSON

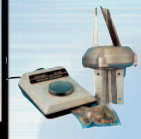
WEP-300B EARPIECES £2.95 A

Over-the-ear earpiece, popular for security and emergency use. Its low cost and firm mounting even in arduous conditions make this a popular item. Fitted with 3.5mm jack plug.

WSA-1 PSK-31 Adaptor £39.95 B

All you need to connect up to your sound card and run PSK-31. Includes CD software.

YS-130 ROTATORS £79.95 B



Ideal for medium sized VHF antenna systems, the YS-150 is a good quality Japanese manufactured product. It is supplied with control box with rotary direction setting, plus upper and lower in-line mast clamps.

REVEX L-20 15W DUMMY LOAD £21.95 A

- Range DC - 500MHz
- Power 15W/50W
- VSWR 1.15:1
- Connector PL-259
- 50 Ohms impedance
- Size 34 x 72mm
- Weight 70g

MASPRO VHF/UHF YAGIS

These high quality Yagis are made in Japan and superbly engineered. Features folded dipole, balun transformer, waterproof box and SO-239. You won't find anything better on the market.

Take a look at our prices!

144-WH5	2m 5 el. 6.6dBd 0.93m	£26.95 B
144-WH8	2m 8 el. 8.6dBd 1.79m	£37.95 B
144-WH10	2m 10 el 9.7dBd 2.3m	£41.95 B
435-WH8	70cms 8 el. 8.6dBd 0.8m	£29.95 B
435-WH12	70cms 12 el. 12.8dBd 1.51m	£35.95 B
435-WH15	70cms 15 el. 14.2dBd 2.19m	£41.95 B

To compare with dBi figures, add 2.4dB

WATSON

QS-112 SPEAKER MIC £16.95 A

Combined speaker-mic. with PTT switch. Models for Yaesu, Kenwood, Icom, Alinco and Motorola.

SPM-102 SPEAKER MIC £9.95 A

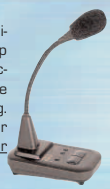
Incredible value!

Has 4-way 3.5mm plug for VX-1, VX-5, FT-50 and IC-Q7E Handies

Limited stocks.

WM-308 BASE MIC £59.95 B

The perfect answer for a high quality base microphone. Built-in pre-amp powered from rig or 2 x AA, electronic PTT and FM/SSB response switch. Includes lead with 8-pin plug. The plug needs to be wired for your radio. We can do this but phone for quote.

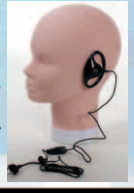


WCT-321 LAPEL TALKER £19.95 A

The elegant way of personal communications.

Earpiece with combined lapel hanging mic and PTT. Models to suit most radios.

State: Kenwood, Yaesu or Icom when ordering

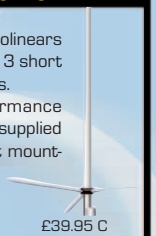


AVAIR VSWR POWER METERS

Great value and great performance. There's one just right for you.

AV-200 1.8 - 200MHz 5/20/200/400W £49.95 B
AV-400 140 - 525MHz 5/20/200/400W £49.95 B
AV-600 1.8 - 525MHz 5/20/200/400W £69.95 B
All fitted with SO-239, PEP/RMS readings, 3W for FSD approx.

BASE VHF/UHF VERTICALS



2m / 70cm fibre glass colinears with stainless steel fittings, 3 short radials and SO-239 sockets.

These are high performance antennas, pre-tuned and supplied with all hardware for mast mounting.

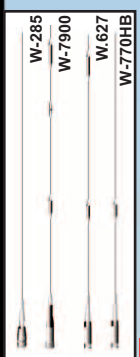
Dual Band 2m/70cms

W-30	3/6dB 1.15m long	£39.95 C
W-50	4.5/7.2dB 1.8m long	£49.95 C
W-300	6.5/9dB 3.1m long	£64.95 C

Triple band 6m/2m/70cms

W-2000	0/6/9dB 2.5m long	£69.95 C

GREAT VALUE MOBILE WHIPS



W-285	2m 5/8th whip with PL-259 base £14.95 B
W-7900	2m/70cm 5 & 7.5dB length 1.58m £32.95 B
W-627	6m / 2m / 70cm 2 / 4.5 7.2dB length 1.6m £34.95 B
W-770HB	2m/70cm whip 3dB / 5.5dB length 1.1m £24.95 B

ALL WITH TILTOVER BASES

RSGB Matters

AROS TALKS

BARRY Scarisbrick, G4ACK, the AROS Coordinator, will be giving talks on the work of the RSGB Amateur Radio Observation Service at the Southport & DARC on 21 October; at the Guildford & DARS on 25 October and at the City of Bristol RSGB Group on 28 October.

RSGB QSL BUREAU NEWS

THERE IS a new RSGB QSL Bureau sub-manager for the G7 series of callsigns. He is Andy Shipp, M0CEG (QTHR). Andy takes over from D Hudson, G6OVO, who is thanked for his service to the QSL bureau.

VHF AWARD NEWS

CLAIMS FOR RSGB awards are not confined to UK residents and to make that point two overseas claims for 50MHz appeared this month. The first, a multi-part claim from John Bautista, ZB2EO, successfully enabled him to upgrade his award status to the 225 square and also 70 countries (2-way) level. The second from Costas Krallis, SV1XV, was rewarded with certificates and base level stickers for 10 and 20 Countries (2-way), 25 Countries (DX) also for 25 Squares.

From Plymouth, Ivor Peters, M5PLY (PL), claims a certificate and sticker for 10 Countries (2-way).

From Devon to Yorkshire, where from Filey David Mappin, G4EDR (YO), makes his entry into the lists with successful claims for 10 Countries (2-way) and also for 25 Squares.

Finally for 'six', regular claimants David Jarrett, G4DCJ (PE), gains a sticker for 475 Squares; Tony Jarvis, G6TTL (PE), gains a sticker for 225 Squares and Grant Wilson, MM5TGW (GW), a sticker for 150 Squares.

From Wales D Lewis, GW4HBK (NP), gets a foot on the first rung of the 144MHz ladder with a successful claim for 40 squares and 10 countries.

The new Foundation Award is gaining popularity as numbers two and three have now been issued - to the McKay brothers from Wick (KW). The first was gained by Erik, MM3AXK, the second by older brother Magnus, MM3AXL. Congratulations to all recipients.

MORSE EXAMINERS WANTED FOR HERTFORDSHIRE

BECAUSE OF THE increasing popularity of the RSGB Morse Campaigns, vacancies have arisen for Morse Examiners in the county of Hertfordshire. If you are interested in joining the Hertfordshire Morse test team, please contact Catherine Liston at RSGB HQ, tel: 0870 9043 7373; e-mail: ar.dept@rsgb.org.uk

GIVE ONE TO A FRIEND!

DUE TO A mistake at the mailing house, a number of members in the North-West area received two copies of the September *RadCom*. Rest assured that the additional copies were sent out at no cost to the RSGB and no-one was left without a *RadCom* as a result of the error. If you were lucky enough to receive two copies, please give the spare to a non-member, or leave it at your local doctor's surgery waiting room - you never know, you may just spark a new interest in amateur radio!

NEW LOOK FOR GB4FUN AMATEUR RADIO DEMONSTRATION VEHICLE

THE GB4FUN amateur radio demonstration vehicle now sports some additional antennas. Thanks to a generous donation by AMSAT-UK, GB4FUN is now fully satellite-capable. The new antennas include 2m and 70cm cross-polarised Yagis, plus a 2.3GHz dish with down-converter to 144MHz. The antennas are rotatable and tiltable, and can be computer-controlled to track the satellite as it passes overhead.

The new antennas and computer software were installed by Howard Long, G6LVB, of AMSAT-UK.

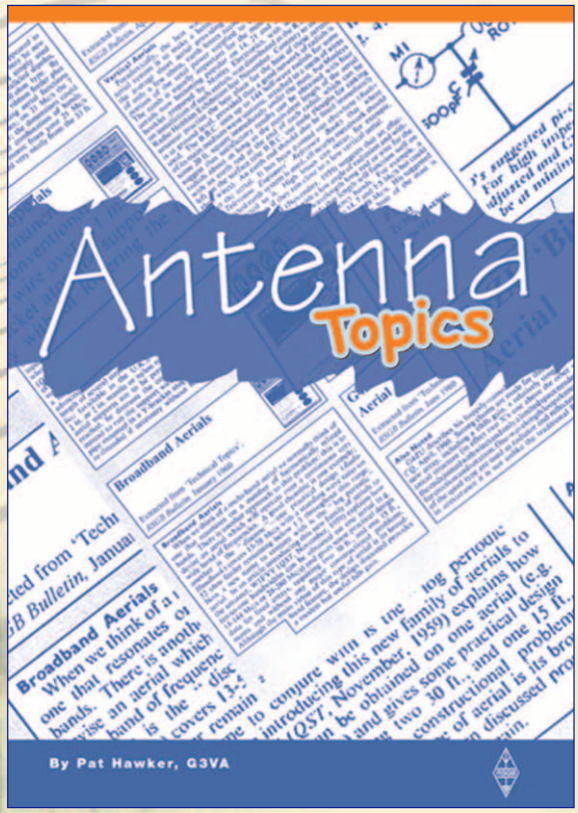
A TS-B2000 transceiver kindly donated by Kenwood UK will allow GB4FUN to operate through the satellites and also ATV on 70 and 23cm.

If you would like to use the GB4FUN vehicle to demonstrate amateur radio at an event open to the general public or at a local school, please contact Carlos Eavis, G0AKI, at RSGB HQ, tel: 0870 904 7373.

NEW

OCTOBER PUBLICATIONS FROM THE RSGB

Antenna Topics by Pat Hawker, G3VA



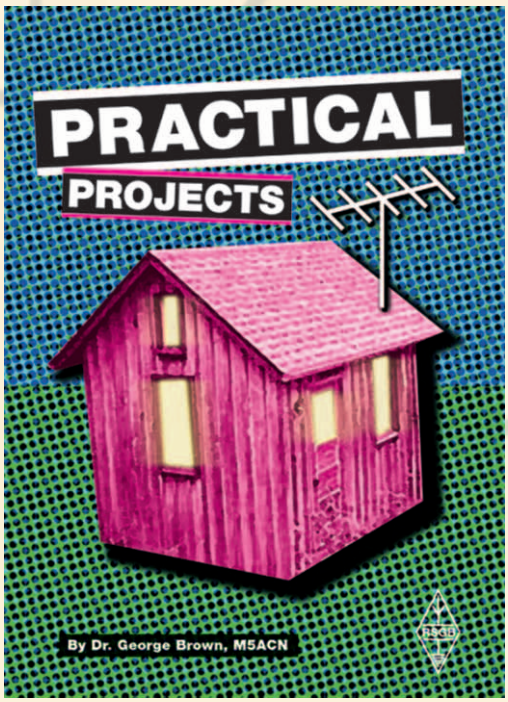
297x210mm

If you are interested in antennas this book is a goldmine of information and ideas on the subject. Pat Hawker has been writing his "Technical Topics" column in Radcom since 1958 and has produced much excellent work in this time. This book is a chronological collection of cuttings of Pat's words over the years. Hundreds of areas and subjects are covered and many a good idea is included. Carefully indexed this book is not only a great reference work but also a history of over forty years of antenna design.

ONLY £12.74 + p&p (£14.99 non-members)

PRACTICAL PROJECTS

Packed with around fifty "weekend projects" Practical Projects is a book of simple construction projects for the radio amateur and those just interested in electronics. A wide variety of radio ideas are covered with everything from an 80m Transceiver, Antennas, ATUs and simple electronic keyers all included. Other simple electronic designs are such as dry battery testers, mobile microphones and various meters and monitors are also added. The book also contains a handy section on "now I've built it what shall I do with it?" questions answered. This book is excellent for those just looking for interesting ideas to construct and for the newcomers to the hobby looking to expand their knowledge.



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(Both publications available late October)

Icom Magic

Icom IC-718

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Icom IC-756 Pro Mk2

The new Icom flagship has all the features of the IC-756 Pro plus -

- Improved Receiver
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This is the long awaited IC-746Mk2! With 32 bit DSP and 100 Watts on HF/50Mhz and 144MHz plus a built in ATU this radio offers performance at a value for money price.

Features
- 100 Watts HF
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FINANCE EXAMPLE: ICOM IC-2800 AT £425
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Front Cover:

Peter Hart reviews the Icom IC-7400 this month - see page 67. Also, the RSGB's International HF Convention from 11 to 13 October takes place at a new venue this year - the Savill Court Hotel and Conference Centre in Egham, Surrey. See pages 42 - 43.

RadCom This Month
October 2002

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Technical Features

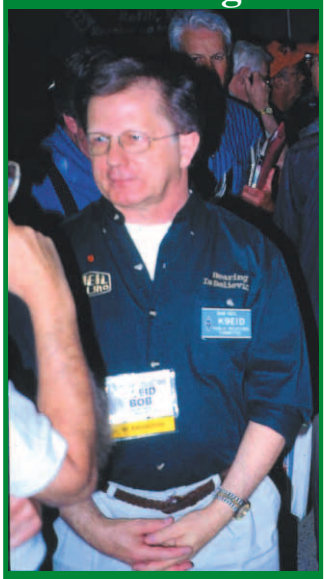
Down To Earth - Amateur Radio From The Ground Up

Reviews

Regulars

RadCom NEWS

'Hearing is Believing'



Bob Heil, K9EID, discussing the ins and outs of audio at a recent convention.

THIS ISSUE OF *RadCom* should arrive with members a day or two before the Leicester Amateur Radio Show at Donington on 20 / 21 September. Bob Heil, K9EID, well-known audio expert and boss of Heil Sound, will be demonstrating the full range of Heil microphones and headsets on the Waters & Stanton stand at the show. Bob will also be presenting his 'Audio Workshop' in the Convention area at 1.00pm on both days of the show.

International Travel Host Exchange

THE INTERNATIONAL Travel Host Exchange (ITHE), is a programme administered by the German national society, DARC. It provides radio amateurs with the possibility of free accommodation with other amateurs around the world in exchange for you offering accommodation to overseas amateurs. Most members are in Europe, but there are also amateurs registered in Australia, New Zealand, Canada, USA and elsewhere. Once registered, postal or e-mail addresses are made available so that contact can be established well before any visit takes place. There is no explicit commitment to host anybody at any time. Further information from Thilo Kootz, DL9KCE, tel: 00 49 5153 963054 or e-mail: dl9kce@darc.de There is a website at www.darc.de/referate/ausland/ithe providing more information.

International Marconi Day

THE CORNISH Radio Amateur Club, organisers of the International Marconi Day event with its accompanying award, would like to point out that, for a callsign to be accepted as an official award station, the organisers behind that callsign should be registered with the Cornish club via its IMD website at www.users.globalnet.co.uk/~straff

For anyone not having Internet access, information can be obtained from Richard, G3MRT, or Norman, G4USB, both QTHR. Contacts with stations not listed on the website as 'official' are not counted as participating stations towards the award. The Cornish club welcomes applications from organisations who consider they have a close connection with Senator Gugliemo Marconi.

RNIB Sponsorship Requested

TERRY ROBINSON, G3WUX, requests sponsorship to support the RNIB's New College Worcester 'Costa Rica Experience 2003', an expedition for blind and partially-sighted students. Terry is asking for 1p per QSO (with an upper limit if you wish) during his entry in the *CQ* World Wide CW contest this November. To obtain sponsorship forms please contact Stuart Snowdon at RNIB New College Worcester, Whittington Road, Worcester WR5 2JX, or e-mail: snowdon@rnibncw.demon.co.uk

Farewell to *Fearless*

THE SCARBOROUGH Special Events Group ends its 2002 season of special event stations with GB5FF over the weekend of **12 / 13 October**. Activity is on 40m SSB and CW, 2m SSB and FM, 70cm SSB, and HF PSK31. *HMS Fearless*, the Royal Navy's last steam-driven warship, was built in 1965. In 1982 she acted as command ship during the Falklands War, but was decommissioned in August, when the ship's bell and battle honours were presented to the Borough of Scarborough. There are now plans to turn her into a Falklands War Museum. A special souvenir QSL of *HMS Fearless* at anchor in Scarborough's south bay will be issued. QSLs can be sent via the bureau or direct to club call G0OOO.

Jamboree on the Air

A REMINDER that Jamboree on the Air (JOTA) takes place over the weekend of 19 / 20 October. This is the event where Scouts and Guides use amateur radio to contact other Scouts and Guides throughout the world. It is estimated that 3700 special event stations will be established for JOTA, representing 350,000 Scouts and Guides in over 100 countries.

Here in the UK, pictures and reports of JOTA 2001 can be found at www.radio-scouting.org.uk 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 Catherine Liston at RSGB HQ by **Wednesday 9 October** if they want details of their activity to appear in the information pack.

See also the report on pages 34/35 this month of Guides and Scouts camps that featured amateur radio during the summer.

GB2COS, located at the HQ of the 25th Chester (Oldfield) Scout Group, has operated in JOTA for the last 20 years and will be on the air again this year. It was also operated as a special event station for the Queen's Jubilee on 31 May / 1 June this year: (left to right) John, G3PXX; Peter, GW4IGF; Adam, M3JAL; Tony, G3TRL; David G7GFC / M3GFC; Tony, G6FIT; Mike, G1CZU / M3CZU; Rod, GW7TKZ / MW3ROD; Arthur, G7BQY; Patrick, GW4WSU, and Sid, G0HTP.

Tibetan Research - Can You Help?

ROGER CROSTON, who researched and wrote the article about Sir Evan Nepean's, G5YN, 1936 adventures in Tibet in the June *RadCom*, is now trying to find out more details about the other radio operators who worked for the British Mission in Lhasa in the 1930s and 40s. The individuals concerned are Sidney Dagg, Evan's colleague in 1936; Henry 'Titch' Baker of the Royal Signals, who went to Lhasa in 1940; and Reginald Fox who followed and also operated on the amateur bands as AC4YN, taking over Evan's callsign (Reg is known to have married a local girl and later lived in Sikkim). Any information at all about these people, including what they did before and after their time in Tibet, would be of interest. If you knew them or know about what they did, please write to: Roger Croston, Eaglescliffe, 4 Bridge Drive, Christleton, Chester CH3 6AW.

Well-known Northern Ireland amateur John Stringer, GI3KDR, with his wife Muriel at Buckingham Palace, where he received the OBE for outstanding service to Northern Ireland Industry and Commerce. Congratulations, John!

BARTG News

THE BRITISH Amateur Radio Teledata Group (BARTG) has made major changes to its magazine, *Datacom*, and has a new membership secretary. The magazine has changed from a quarterly A5 publication to a monthly A4 magazine and will in future concentrate more on up-to-date information about amateur radio datacoms operating. Membership of BARTG is open to anyone with an interest in amateur radio datacoms, whether they are a listener, novice or licensed amateur. The membership secretary is now Bill McGill, GM0DXB, who can be contacted by e-mail to: members@bartg.demon.co.uk or by post, c/o 1 Nobel Place, Roslin, Midlothian EH25 9NN (*not* QTHR).

PA 'Ham Radio Convention'

THIS POPULAR EVENT takes place this year on **12 October** in the Americahal in Apeldoorn, Netherlands. There will be several presentations (mostly in Dutch), a 'homebrew' exhibition, equipment sales, and a components market. Talk-in will be provided by PA6DVA on 145.500MHz.

Hearing Stars?

FOR THOSE interested in the PIC-A-STAR project by Peter Rhodes, G3XJP, three .WAV files have been provided on the RSGB Members-Only website (at www.rsgb.org/membersonly). These enable you to hear PIC-A-STAR in action. Explanatory text is provided by Peter for each one.

The GB2RAF QSL card. Operator Terry, G4PSH, apologises for the delay and says that the backlog of GB2RAF QSLs has now been cleared. Cards will now be sent via the RSGB bureau system once a month.

Over 300 Lighthouses and Lightships On the Air from 45 Countries

International Lighthouse Weekend Another Success

THE International Lighthouse / Lightship Weekend (ILLW 2002) took place on 17 / 18 August and was another great success. 318 stations at lighthouses and lightships in 45 countries took part. A list of stations that were active can be found at vk2ce.com/illw/2002.htm (allow a couple of minutes for the data to download).

The organiser of the event, Mike Dalrymple, GM4SUC, was at GB2LT. He reports that the station made 718 contacts, including 29 with lighthouses.

GB2ELH was active from privately-owned Eshaness Lighthouse in the Shetland Islands. It is in an isolated location some 40 miles north-west of Lerwick. The owner, Sharma Krauskopf, an author from Michigan, USA, agreed to open Eshaness to the public for ILLW and Peter Leybourne, MM5PSL, organised the station. Hans Stoeteknuel, DJ6AU / MM0XAU, agreed to help with the operating. Sharma's husband, Dean, who hosts the popular *Gardening Show* on WJR radio in Detroit, made the trip to Shetland especially for the occasion. Also on hand were David Leybourne (cook), Leslie Johnson (Lighthouse Attendant of the Northern Lighthouse Board) and Tom Williamson (caretaker at Eshaness), giving a total of five plus two operators.

The rigs were a Ten-Tec Omni VI and a Yaesu FT-101ZD to an inverted-V dipole for 40 and 80m on the lighthouse flagpole and a Cushcraft R6000 vertical on a 20ft pole behind the main buildings. On the second day of activity, Dennis Naylor, GM3SKN, arrived and helped with the operating. Peter Leybourne, MM5PSL, said that Hans is a first-class operator who loves CW and that without Hans and Dennis to ease the pressure on operating, it would have been a struggle to cope. In all, well over 900 contacts were made with at least 40 lighthouses. The event was reported in Aberdeen's *Press & Journal*, Sharma was interviewed on Radio Scotland and is writing an article for her regular column in the American *Lighthouse Digest* publication.

Eshaness Lighthouse on the Shetland Islands

Peter commented, "Operating GB2ELH from Eshaness Lighthouse was a joy and looks like becoming a tradition. Already heads are nodding and we will do it again next year."

Next year's International Lighthouse / Lightship Weekend takes place over the weekend of 16 / 17 August 2003.

A short report from the Wisbech Amateur Radio and Electronics Club's activity during ILLW 2002 can be found in 'Club News' on page 75 in this issue of *RadCom*.

Tying the Knot

13 JULY was the lucky date for Roger Wilson, G4IPE,and Celia Kent, who were married in Louth Registry office. Among the gathering of some 35 guests were Official witnesses Mick Reeson, G8OOS, and his wife Diane. Roger and Mick were original instigators of the still operational Louth 'LC' UHF repeater in 1980. Roger has been instrumental in helping and encouraging newcomers to the hobby for many years by running novice classes and now there is talk of a Foundation Licence course for Celia. The official photographs were taken by David Dunn, VK3DBD / G3SCD, who was visiting the UK for a few weeks.

Q u a l i t y • I n n o

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ALINCO DX-70TH

Fully Featured Portable HF+6mtr Transceiver

The DX70 TH packs a hefty 100W punch on all Ham bands 1.8 - 50MHz. It is backed by a superb receiver with narrow filters fitted as standard. Make no mistake - this is a real DX operators transceiver ideal for use at home, or for that portable DXpedition.

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- 100W output on HF & 6mtrs
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- SSB, CW, AM, FM and digital modes
- 100 memories
- Detachable faceplate and remote mounting kit available
- Speech processor standard
- Narrow filters fitted as standard

~~£699.00~~
SPECIAL £599.00

ALINCO DX77E *HF Transceiver 'GREAT VALUE'*

The DX-77 is a design achievement that puts a HF desktop transceiver within your reach! And this is no 'bare bones' radio, nor is it a converted 'channelised' adaptation. The DX-77 was designed from the beginning to be a quality Amateur Radio, full of features to enhance its performance and your enjoyment.

- 100W HF transceiver
- General coverage RX 500kHz - 30MHz
- All modes, FM, LSB, USB, CW & AM
- 100 memory channels
- Built in speech compressor
- Front mounted speaker, loud clear audio
- Optional keyer

~~£599.00~~
SPECIAL £499.00

EDX2

Auto Tuner

An automatic antenna tuner that matches a transceiver to a random wire antenna of over 3m in length (3.5MHz and above), or over 12m in length (1.6MHz and above). It comes installed with 5m of coaxial and control cables for instant operation with Alinco DX-70.

- Auto tuner
- 3.5MHz-30MHz (with over 3 metre element)
- 200W PEP power handling
- Power for tuning = 7-20W
- 13.8V DC ±10% operating voltage

£289.00

HFM-1

A stainless steel, heavy duty HF mobile antenna complete with spring base. Covers 3.5 to 30MHz when used with the Alinco EDX-2 Automatic Tuner. Alternatively it may be base matched with any type of tuner for mono band or multi band use. Power handling with the EDX-2 is 150W.

- Covers: 3.5 - 30MHz (when used with EDX-2 auto ATU)
- Length: 2.7 metres

£59.95

ALINCO DR-605E *Dual Band Mobile*

The DR-605E is a no-nonsense twin-band mobile transceiver that delivers power and performance with user-friendly features. The command keys are simply laid out to enable intuitive operation.

- Ready for 9600 bps packet
- Extended RX capability 136 - 174MH, 420 - 470MHz
- 50W (2m) - 35W (70cms)
- 100 memory channels (+ CALL Channels)
- Cross band full duplex
- Tone search function
- Cable cloning function
- Channel indication mode
- CTCSS encoder fitted

£299.95

DJ-X3

Ultra modern scanning receiver

- 100kHz - 1300MHz
- AM/FM/WFM
- 700 memory channels
- Steps: 5/6.5/8.33/10/12.5/ 15/20/25/ 30/50/100kHz
- Auto descrambler
- Bug detector
- Stereo FM (with headphones)
- Attenuator
- SMA Antenna
- Battery saver cct
- Size: 56w x 102h x 23d mm
- Weight: 14.5g (without batteries)
- Supplied c/w: 3 AA dry cell battery case carrying strap

with 8.33kHz for airband

Optional extras

- Lithium ion battery pack
- Ni-Mh battery pack
- Drop in mains charger
- Earphone

£129.95

DR135E

- TX: 144 - 146MHz RX: Expandable 118 - 174MHz
- 50/10/5 Watts power settings
- 100 memory channels
- Frequency Steps: 5, 8.33, 10, 12.5, 15, 20, 25, 30, 50kHz
- Optional internal TNC operates 1200, 9600bps
- Front panel GPS input for APRS
- Rear panel DSUB9 computer connection
- Ignition key on/off feature
- CTCSS and DCS encode + decode
- Super-wide 7 character display
- Wide/narrow (25/12½kHz) FM modes
- Theft alarm feature
- AM airband receive
- Ten auto dial memories
- Size: 142 x 40 x 174mm

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GREAT VALUE 2 mtr Handheld

- New design 2m (144-146MHz) handheld
- Up to 5W VHF
- Wide RX possible (typical 135-173MHz)
- CTCSS + DCS enc/dec fitted
- 40 memory channels + 1 call channel
- Alphanumeric display
- DCS, Tone burst and DTMF
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- THEFT ALARM!
  Emits a tone when disconnected from power
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- Call cloning facility
- Comp. programmable 3rd party software
- Experimental insect repellent feature!
  Can the DJ-193 actually repel mosquitoes?
  Activate the special tone and decide for yourself!

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DJ-596 NEW Dual Bander

A feature packed dual bander - yet simple to use, with the capability of Digital Voice operation (where permitted - using optional digital voice board).

A nickel metal-hydride (NiMH) battery is supplied as standard, for added power and convenience.

VHF/UHF TX/RX including cross-band split operation

- 100 memory channels, any mix of VHF/UHF
- Alphanumeric channel labels
- Direct frequency input from keypad
- Large backlit display and keypad
- CTCSS, DCS encode+decode
- DTMF tones and autodial memories
- Tone bursts
- Three scan modes
- Theft Alarm feature
- Wide and narrow FM TX/RX
- 12VDC direct input (5w output)
- High-power NiMH battery (4.5w output VHF/4w UHF)
- Busy Channel Lock Out
- Mosquito Repelling feature (experimental)
- External Terminal Control
- Wire cloning capability
- Optional digital mode *(where permitted)*

£199.95

DJ 195E

2 mtr Handheld with Keypad

Alinco has created a new 2 meter HT that sets new standards in features, convenience and easy operation. The DJ-195 sports an alphanumeric display for easy memory management. It has an ergonomic design that's "user friendly" and the 5 watt output battery is standard. You'll be ready to travel the world with CTCSS encode+decode, DCS and European tone bursts, all included at no extra cost.

- New 2 metre (144-146MHz) handheld
- Easy to use, direct entry keypad
- Wide RX possible (typical 135-173MHz)
- Up to 5 watts output (0.8W low power)
- 40 memory channels + 1 call channel
- Large range of accessories available

£159.95

DJ-G5EY Feature Packed Dual Bander

A brilliant twin band handheld that does everything including spectrum display of 4 adjacent channels. The receiver has a superb front end that does not suffer with breakthrough like other handhelds and has CTCSS/DTMF built in as standard.

- Spectrum channel display
- RX expandable 108-173.995AM/FM 420-479.995 + 800-920MHz
- Built in CTCSS tone encoder & decoder
- DSQ encoder/decoder as standard
- Optional receive to include Airband
- Full VHF/UHF Duplex
- 100 memories
- Over air cloning
- Cross band repeater function
- Up to 5W RF output
- NiCad battery
- Charger, Rubber Duck antenna and Belt clip

Advanced Channel Scope

- Monitor 5 freq activities in VFO/Memory modes
- Simultaneous monitor of VHF/UHF bands
- Real time monitor of 11 channels during mono band operation
- VFO mode
- Memory mode
- Sweep scan

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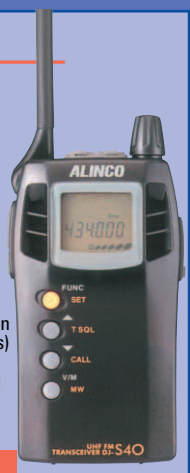
DJ-S40 CQ

UHF Pager Sized Handheld



Alinco has created a new UHF FM Hand held Transceiver that sets new standards in features, convenience and easy operation packed in a compact pager-size package. The DJ-S40T has an ergonomic design that's "user friendly" and capable of 1 watt output with optional Ni-MH battery pack. You'll be ready to travel the world with CTCSS encode/decode and European tone bursts, all included at no extra cost.

- Up to 1 W output (with 13.8V supply)
- Large illuminated display
- Loud clear speaker horn system
- 100 memories+1 call channel
- Multi Scan functions
- 38 CTCSS tones for selective calling
- S-meter
- Cable Cloning
- External device control feature (outputs 3Vdc 5mA signal from an accessory port when squelch opens)
- Additional features, including anti-theft alarm and experimental mosquito repelling tone!
- Huge selection of accessories available

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DJV5E

Compact Dual Bander

Alinco introduces an exciting new VHF/UHF handheld-transceiver that will change the way you think about communications. The new Alinco DJ-V5 can fill a variety of roles and it does them all well. Loaded with technical features, 5 watts of output power and a wide array of operator conveniences, the DJ-V5 is an attractive radio in a compact package.

- New dual band handy transceiver
- 5W/1W/0.5W output power
- Super wide receive (76-999MHz)
- Includes wide FM mode
- CTCSS Encode+decode, DTMF squelch and 4 different European Tone Bursts
- 200 memory channels +2 call channels
- Alphanumeric Display, up to 6 characters
- Autodial memories
- Up to 6 character alpha-tagging
- 4 scan modes, 5 programmable scan banks
- Input voltage display with over voltage warning
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AMPRO 17 mt **£16.95**
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AMPRO 20 mt **£16.95**
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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 OdB/3.OdB 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") S0239 fitting commercial quality **£19.95**
MRQ500 2m/70cms, 1/2 wave & 2x5/8, Gain 2m 3.2dB/5.8db 70cms (Length 38") S0239 fitting commercial quality **£24.95**
MRQ750 2m/70cms, 6/8 wave & 3x5/8, Gain 2m 5.5dB/8.0dB 70cms (Length 60") S0239 fitting commercial quality **£39.95**
MRQ800 6/2/70cms 1/4 6/8 & 3x5/8, Gain 6m3,OdBi/ 2m 5.OdB/70 7.5dB (Length 60") S0239 fitting commercial quallty **£39.95**

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**
MR258 2 Metre 5/8 wave 3.2 dBd Gain (3/8fitting) (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")
SO239 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**

SINGLE BAND END FED BASE ANTENNAS

70 cms 1/2 wave (Length 26") Gain 3.5dBd **£24.95**
2 Metre 1/2 wave (Length 52") Gain 3.5dBd. **£24.95**
4 Metre 1/2 wave (Length 80") Gain 3.5dBd **£34.95**
6 Metre 1/2 wave (Length 120") Gain 3.5dBd **£44.95**
6 Metre 5/8 wave (Length 150") Gain 5.5dBd **£49.95**
(All above end fed antennas are without ground planes)

PROFESSIONAL MOBILE GLASS MOUNT ANTENNAS

GF151 2mtr (Length 20") **£39.95**
GF401 70cms (Length 11") **£39.95**
GF233 23cms (Length 9") **£44.95**
GF270 Dual band 2/70 (Length 31") **£59.95**

VHF/UHF VERTICAL CO-LINEAR FIBREGLASS BASE ANTENNAS

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

BM100 Dual-Bander **£29.95**
(2 mts 3dBd) (70cms 6dBd)
(Length 39")
SQBM100 Dual-Bander **£39.95**
(2 mts 3dBd@ (70oms 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)
(Length 100")
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 100/200/500/1000 are Polycoated Fibre Glass with Chrome & Stainless Steel Fittings. 2 years warranty.

2 METRE VERTICAL CO-LINEAR BASE ANTENNAS

BM60 5/8 wave, (Length 62"), 5.5dBd Gain **£49.95**
BM65 2 x 5/8 Wave, (Length 100"), 8.0 dBd Gain **£69.95**

70CMS VERTICAL CO-LINEAR BASE ANTENNAS

BM33 2 x 5/8 wave, (Length 39") 7.0 dBd Gain **£34.95**
BM45 3 x 5/8 wave, (Length 62") 8.5 dBd Gain **£49.95**
BM55 4 x 5/8 wave, (Length 100") 10 dBd Gain **£69.95**

ROTATIVE HF DIPOLE

RDP-3B 10/15/20 Mtrs Length 7.40m **£99.95**
RDP-40M 40Mtrs Lengh 11.20m **£139.95**
RDP-6B 10/12/15/17/20/30 Mtrs Boom Length 1.00m Length 10.00m **£199.95**

MINI HF DIPOLES

MDO20 20mtr version approx only 11ft **£39.95**
MDO40 40mtr version approx only 11ft **£44.95**
MDO80 80mtr version approx only 11ft **£49.95**

HAND-HELD ANTENNAS

"New Lower Price"

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 H/held antennas.

HB9CV 2 ELEMENT BEAM 3.5dBd

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 l0dBd) **£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 l0dBd) **£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**

YAGI COUPLERS

YC-6M For 2 x 50MHz Yagi **£29.95**
YC-2m For 2x144MHz Yagi **£24.95**
YC-7M 2x70cms Yagi **£19.95**

HALO LOOPS

2 Metre (size 12" approx) **£12.95**
4 Metre (size 20" approx) **£18.95**
6 Metre (size 30" approx) **£24.95**

MULTI PURPOSE ANTENNAS

MSS-1 Freq RX25-2000 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

G5RV WIRE ANTENNA

All fittings Stainless Steel

	FULL	HALF
Standard	**£22.95**	**£19.95**
Hard Drawn	**£24.95**	**£22.92**
Flex Weave	**£32.95**	**£27.95**
PVC Coated Flex Weave	**£37.95**	**£32.95**
Deluxe 450 ohm PVC Flexweave	**£49.95**	**£44.95**

TSI Stainless Steel Tension Springs (pair) for G5RV **£19.95**

UNIT 12, CRANFIELD ROAD UNITS, CRANFIELD ROAD, WOBURN SANDS, BUCKS MK17 8UR. sales@moonrakerukltd.com

CALLERS WELCOME
OPENING TIMES:
MON-FRI 9-6PM

SALES 01908 281705

E&OE.

G5RV INDUCTORS

"New Lower Price"

Convert your half size g5rv to a full size with just 8ft either side. Ideal for the small garden **£19.95**

SHORT WAVE RECEIVING ANTENNAS

MD37 SKY WIRE **£39.95**
(Receives 0-40MHz)
Complete with 25 mts of enamelled wire, insulator and choke Balun Matches any long wire to 50 Ohms. All mode no A.T.U. required. 2 'S' points greater than other Baluns.
MWA-H.F. (Receives 0-30MHz) **£29.95**
Adjustable to any length up to 60 metres. Comes complete with 50 mts of enamelled wire, guy rope, dog bones & connecting box.

MOUNTING HARDWARE ALL GALVANISED

6" Stand off Bracket *(complete with U Bolts)* **£6.00**
9" Stand off Bracket *(complete with U Bolts)* **£9.00**
12" Stand off *(complete with U bolts)* **£12.00**
12" T & K Bracket *(complete with U Bolts)* **£11.95**
18" T & K Bracket *(complete with U Bolts)* **£17.95**
24" T & K Bracket *(complete with U Bolts)* **£19.95**
36" T & K Bracket *(complete with U Bolts)* **£29.95**
Chimney Lashing Kit **£12.95**
Double Chimney Lashing Kit **£24.95**
3-Way Pole Spider for Guy Rope/ wire **£3.95**
4-Way Pole Spider for Guy Rope/ wire **£4.95**
1 1/2" Mast Sleeve/Joiner **£8.95**
2" Mast Sleeve/Joiner **£9.95**
Solid copper earth rod **£9.95**
Pole to Pole clamp 2"-1.5" **£4.95**
Di-Pole Centre (for wire) **£4.95**
Di-Pole Centre (for aluminium rod) **£4.95**
Dog Bone insulator **£1.00**
Dog Bone Insulator (H/Duty) **£2.00**

POLES H/DUTY (SWAGED)

1 1/4"Single Ali Pole **£7.00**
1 1/4"Set of four **£24.95**
1 1/2"Single Ali Pole **£10.00**
1 1/2"Set of four **£34.95**
2"Single Ali Pole **£15.00**
2" Set of four(set of 4) **£49.95**

REINFORCED HARDENED FIBRE GLASS MASTS (GRP)

1 1/2" Diameter 2 metres long **£16.00**
1 3/4" Diameter 2 metres long **£20.00**
2" Diameter 2 metres long **£24.00**

GUY ROPE 30 METRES

MGR-3 3mm (max. load 15 kgs) **£6.95**
MGR-4 4mm (max. load 50 kgs) **£14.95**
MGR-6 6mm (max. load 140 kgs) **£29.95**

10/10 METRE VERTICALS

G.A.P.12 1/2 wave aluminium (length 18' approx) **£19.95**
G.A.P.58 5/8 wave aluminium (length 21' approx) **£24.95**

COAX

RG58 best quality standard per mt **35p**
RG58 best quality military spec per mt **60p**
Mini 8 best quality military spec per mt **70p**
RG213 best quality military spec per mt **85p**
H200 best quality military coax cable per mt **£1.10**

PHONE FOR 100 METRE DISCOUNT PRICE.

CONNECTORS & ADAPTORS

PL259/9 ..... **£0.75**
PL259/6 ..... **£0.75**
PL259/7 for mini 8 ..... **£1.00**
BNC (screw Type) **£1.00**
BNC (Solder Type) **£1.00**
BNC for 9mm (RG213) **£2.50**
N TYPE for RG58 ..... **£2.50**
N TYPE for RG213 ..... **£2.50**
SO239 to BNC **£1.50**
PL259 to BNC **£2.00**
N TYPE to SO239 ..... **£3.00**
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**

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 **£24.95**

RIBBON LADDER USA IMPORTED

300 Ohm 20 mtr pack **£15.00**
450 Ohm 20 mtr pack. **£15.00**

(other lengths available please phone for details)

TRI/DUPLEXER & ANTENNA SWITCHES

MD-24 (2 Way Internal Duplexerl (1.3-35 MHz 500w) (50-225 MHz 300w) (350-540 MHz 300w) insert loss 0.2dBd SO239 fittings **£22.95**
MD-24N same spec as MD-24 'N-type' fitting **£24.95**
MD-25 (2 Way external/Internal Duplexer) (1.3- 35 Mhz 500w) (50-225 MHz 300w) (350-540 MHz 300w) insert loss 0.2dBd **£24.95**
MX2000 Tri-plexer 1.6-60MHz (800w) 110-170MHz (800w300-950MHz (500w) SO239 fitting **£49.95**
CS201 Two way antenna switch, frequency range 0-IGhz, 2,5 Kw Power Handling SO239 fittings **£18.95**
CS201-N same spec as CS201 'N-type' fitting **£28.95**

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**

ROTATOR CABLE

3 Core ..... **0.45p** per metre
7 Core ..... **£1.00** per metre

(please phone for 100 metre discount price)

MOUNTS

Turbo Magnetic Mount 7inches 4 mtrs coax/PL259 3/8 or SO239 ..... **£14.95**
Tri-Magnetic Mount 3x5 inches 4 mtrs coax/PL259 3/8 or SO239 ..... **£39.95**
Hatch Back Mount (stainless steel) 4 mtrs coax/PL259 3/8 or SO239 fully adjustable with turn knob **£29.95**
Gutter Mount (same as above) **£29.95**
Rail Mount (aluminium) 4 mtrs coax/PL259 suitable for up to 1 inch roof bars or poles ..... 3/8 fitting **£12.95**
..... SO239 fitting **£14.95**
Gutter Mount (cast aluminium) 4 mtrs coax/PL259
..... 3/8 fitting **£9.95**
..... SO239 fitting **£12.95**
Hatch Back Mount 3/8 4 mtrs coax/PL259 ..... **£12.95**
Roof Stud Mount 4mtrs coax/PL259 3/8 or SO239 fitting **£12.95**

BEST QUALITY ANTENNA WIRE

The Following Supplied in 50 metre lengths

Enamelled 16 gauge copper wire **£9.95**
Hard Drawn 16 gauge copper wire **£12.95**
Multi Stranded Equipment wire **£9.95**
Flex Weave **£27.95**
Clear PVC Coated Flex Weave **£37.95**

TRAPS

10 Metre trap 400W **£23.95**
15 Metre trap 400W **£23.95**
20 Metre trap 400W **£23.95**
40 Metre trap 400W **£23.95**
80 Metre trap 400W **£23.95**

HF BALCONY ANTENNA

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

HF DELTA LOOP

DLHF-100 10/15/20 Mtrs (12/17-30M) Boom Length 4.20m Max Height 6.80m Weight 35 KG Gain 10dB **£399.95**

VISA SWITCH MasterCard

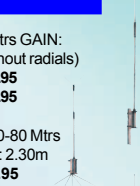
HF YAGI

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**

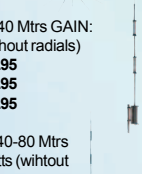
ADEX-3300 3 BAND 3 ELEMENT TRAPPED BEAM FREQ: 10-15-20 Mtrs GAIN: 8dBd BOOM 4.42m LONGEST ELE: 8.46m POWER: 2000 Watts **£269.95**

ADEX-6400 6 BAND 4 ELEMENT TRAPPED BEAM FREQ: 10-12-15-17-20-30 Mtrs GAIN: 7.5dBd BOOM: 4.27m LONGEST ELE: 10.00m POWER 2000 Watts ... **£499.95**
40Mtr RADIAL KIT FOR ABOVE **£99.95**

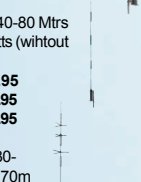
HF VERTICALS



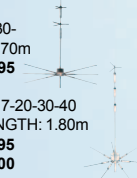
VR3000 3 BAND VERTICAL FREQ: 10-15-20 Mtrs GAIN: 3.8dBd HEIGHT: 3.80m POWER 2000 Watts (without radials) POWER: 500 Watts (with optional radials) .. **£89.95**
OPTIONAL 10-15-20 Mtr radial kit **£34.95**



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



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



EVX5000 5 BAND VERTICAL FREQ: 10-15-20-40-80 Mtrs GAIN: 3.5dBd HEIGHT: 7.30m POWER 2000 Watts (wihtout radials) POWER 500 Watts (with optional radials) **£139.95**
OPTIONAL 10-15-20 Mtr radial kit **£34.95**
OPTIONAL 40 Mtr radial kit **£14.95**

EVX6000 6 BAND VERTICAL FREQ: 10-15-10-30-40-80 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 HF verticals require grounding if optional radials arenot purchased to obtain a good VSWR)

TRAPPED WIRE DI-POLE ANTENNAS

(Hi Grade Heavy Duty Commercial Antennas)

(picture for reference only)

UTD160 FREQ: 160 Mtrs LENGTH: 28m POWER:1000 Watts **£44.95**
MTD-1 (3 BAND) FREQ: 10-15-20 Mtrs LENGTH: 7.40m POWER: 1000 Watts **£39.95**
MTD-2 (2 BAND) FREQ: 40-80 Mtrs LENGTH: 20m POWER: 1000 Watts **£44.95**
MTD-3 (3BAND) FREQ: 40-80-160 Mtrs LENGTH: 21.5m POWER: 1000 Watts **£79.95**
MTD-4 (3BAND) 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 **£69.95**

(MTD-5 is a crossed di-pole with 4 legs)

TELESCOPIC MASTS
(aluminium and fibreglass options)

TMA3 - 3" to 11\4" Heavy Duty Aluminium Telescopic mast set, approx 40ft when erect 6ft collapsed **£149.95**
TMA2 - 21\2" to 11\4" Heavy Duty Aluminium telescopic mast set, approx 30ft when erect 6ft collapsed **£129.95**
TMA1 - 2" to 11\4" Heavy Duty Aluminium telescopic mast set, approx 20ft when erect 6ft collapsed **£99.95**
TMAF - 2" to 11\4" Heavy Duty Fibreglass telescopic mast set, approx 20ft when erect 6ft collapsed **£99.95**

WINDOM WIRE DI-POLE

MWD-3 Freq: 10/20/40 Length: 20mtrs Power:500 watts Balun: 6:1 included Socket: SO329 ..... **£44.95**
MWD-5 Freq: 10/20/40/80 Length: 36mtrs Power: 500 watts Balun: 6:1 included Socket SO239 ..... **£54.95**

MISCELLANEOUS ITEMS

CDX Lightening arrestor 500 watts **£19.95**
MDX Lightening arrestor 1000 watts **£24.95**
AKD TVI Filter **£9.95**
Amalgamating Tape (10mtrs) **£7.50**
Desoldering Pump **£2.99**
Alignment 5pc kit **£1.99**

All prices plus £6.00 per order

PIC-A-STAR:

a Software Transmitter And Receiver

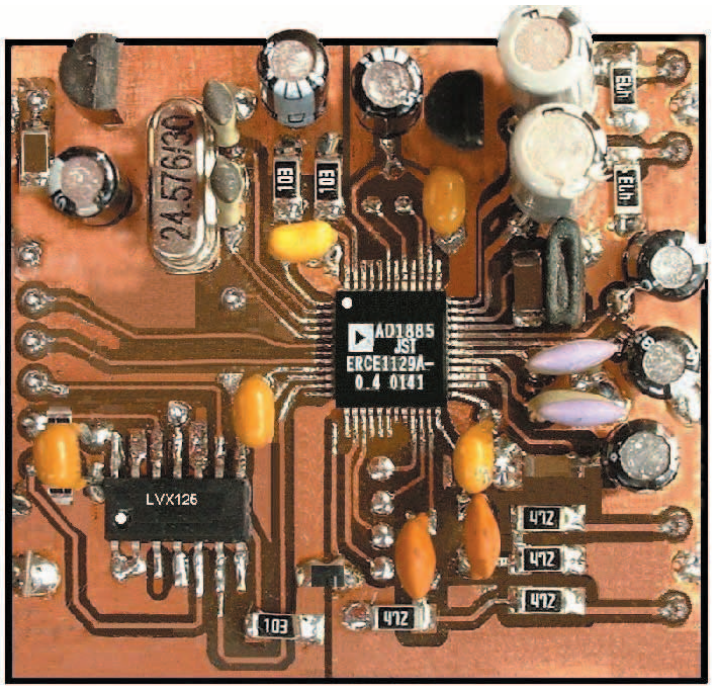
*Part three of our new series by Peter Rhodes, BSc, G3XJP **

HARDWARE infrastructure is this month's focus. Firstly, the process for producing the PCBs. Specific detail on mounting IC25 and IC27 and any other board-specific notes follow later. Secondly, the total (ie with all options) project component list - so you can contemplate costs and sources.

PCB MANUFACTURE

IT HAS BECOME a tradition with my projects that each has been produced by a different one-off PCB production technique - in an attempt to dispel any unwarranted mystique and even some phobia. Frankly, I want to advance my own craft skills with every project. I used iron-on laser film to speed-up the development cycle and as the only realistic approach to making the DSP board - and found the results to be excellent.

I am indebted to Ed, EI9GQ, and subsequently Harold, W4ZCB, for sharing their experiences with this approach.



The completed CODEC board, illustrating the quality of PCB production available (0.2mm wide tracks at 0.5mm intervals) - using domestic kitchen resources. The CODEC chip is 7mm square.

PROCESS OVERVIEW

In outline, the process is to photocopy the published artwork onto the film; then transfer the toner from the film to the board using heat and pressure from a clothes iron. This toner then acts as a superb resist while etching the copper in the normal way.

This is not entirely a precision engineering process and there are some experiential skills. Cleanliness is everything! Although incredibly fine lines and small spacings reproduce well in my experience, *iron*ically there is sometimes difficulty with large black areas. But equally, these are the easiest to touch up with an indelible pen before etching - and, at times, you absolutely will need to.

RESOURCES

You need access to a black-and-white *laser* photocopier. Almost all modern machines use this technology. It may well be that the copier in the corner shop will not be up to the job and you should probably consider the small cost of taking it to a professional copy shop as money well spent.

Some sheets of laser film (sold nowadays by several suppliers for this purpose) are required; a block of flat scrap wood larger than the PCB; and a domestic clothes iron constitute the tools.

The latter should preferably *not* be a steam-iron. If it is, ensure it is fully-drained, since water / steam and this process do not mix. Also, the steam holes in the sole-plate are unhelpful. Avoid if possible the more modern easy-iron technology which has fine ridges on the sole-plate. Check that the sole-plate is flat. Some have a slight curvature. If faced with these problems, it is best to use several (say, three) intervening layers of clean paper to provide a more evenly distributed heat source. Experiment!

The PCB material (all double-sided) can start out badly discoloured, but must not be mechanically damaged, ie no scratches. 1oz (or more) copper is better, but I used merely 0.5oz on GRP for all my boards.

THE PROCESS

1. Firstly, test-copy the artwork onto plain paper in order to check for copier quality and acceptable scaling error. Use the maximum contrast consistent with retaining a clean white background.
2. Copy the artwork onto the film. When viewed with the toner (matt) side down, you want to end up looking at the tracking with the correct orientation ie as if viewing the finished board. For most published artwork this requires the extra step of firstly copying it to a transparency, flipping it over and then copying that to the iron-on film. In order to avoid this extra step - with some inevitable degradation - the PCB artwork in this project will be printed pre-flipped so to speak - and therefore should be copied directly to the film. The film itself is not 'sided'.
3. Cut the PCB to size (or, preferably, somewhat over-size for now). Remove all burrs and sharp edges. With *cold* water, wet a soap-impregnated wire-wool pad and use it to polish the copper - with increasingly light strokes - until immaculate; do not touch the surface thereafter. Polish both sides and then wash off all traces of soap residue with a clean paint-brush and *cold* water - and dry with kitchen paper.
4. Place the PCB on the scrap wood and clean it with some kitchen paper (uncoloured) moistened in acetone, isopropyl alcohol or cellulose thinners.
5. Heat the iron to about 140°C (cotton setting) and leave it for a few minutes to attain an even temperature across the sole-plate. At this temperature it should just scorch plain 80gsm copier paper.
6. Cut out the artwork to no larger than the PCB and register it *toner* side to the board.
7. With at least one sheet of clean paper interposed, lower the iron vertically onto the middle of the board and let it rest there for some 5 seconds. This will establish the registration of the artwork to the copper.

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8. If the board is bigger than the iron, lift the iron off and relocate it every few seconds. Under no circumstances use an 'ironing' motion. Simply raise and lower it vertically - and frequently - until all the board has seen the iron and some applied pressure for about 20 seconds. For pressure, the weight of the iron plus about as much again is near enough and is not critical. Too little pressure and the toner will not transfer. Too much and the toner will migrate to widen the lines (ie smear) and reduce its depth. The former is correctable, the latter is *absolutely not.*
9. Inspect the result. You may see any areas which have not transferred as still retaining a somewhat glossy appearance. Repeat selectively as necessary. Pay particular attention to the edges.
10. Allow the board to cool naturally back to room temperature.
11. Carefully peel back the film from each corner and note that the toner has transferred. If any critical areas have not taken, the artwork will still be registered and you can selectively repeat.
12. Touch up any blemishes or areas of visibly thin toner with an indelible pen.
13. Now spray-mask the opposite side of the board and etch as normal.
14. Before removing the etch resist, centre-pop and / or drill the holes. They are easier to see at this stage. Clean off the etch resist with cellulose thinners and gently re-polish the board.
15. At this stage I *lightly* spray the board with SK10, which is both a protective lacquer and a flux. Available from Rapid Electronics, this makes for clean soldering and prevents contamination of the copper.

THE FINAL IRONY

DON'T FORGET to reset the clothes iron to a more modest temperature before putting it away. 140°C will melt many synthetic materials and add alarmingly to the project costs. Even this has been Beta tested! ♦

COMPONENTS LIST *

Resistors, 1/8-1/4W, 5-10%

R1	47R
R2, R48, R49, R76, R77	100R
R3	220R
R4	470R
R5, R6	560R
R7, R50, R64-R71	1k
R10, R43, R52, R72	2k2
R11	2k7
R12, R34, R37	22k
R13-R15	3k3
R16-R19	4k7
R20	5k6
R21-R32, R45-R47, R53-R55, R63, R73, R78	10k
R33, R51, R59-R61	47k
R35, R36	100k
R38	120k
R56-R58	10R
R62	56k
R74	1k x 4 SIL network (5 pin)
R75	1k x 8 SIL network (9 pin)
RV1, RV2, RV6	100k horizontal preset
RV3, RV4	10k horizontal preset
RV5	47k horizontal preset

The following resistors are all SMD 1206 size, 5%

R8, R9, R93	1k
R39, R40	22k
R41, R42, R97	220k
R44	3k3
R79-R89	10k
R90	330
R91, R92	2k2
R94-R96, R100-R103	4k7
R98, R99	100k
R104,R105	47k

Capacitors, 16V rating

C1-C19	1n solder-in feedthrough (C11 and C12 may be replaced with a stereo jack socket)
C21	10p ceramic plate
C20, C22, C23, C26, C69	220µ axial
C24	10µ radial
C25, C75, C76, C84	33µ radial
C27	47µ axial
C28	2µ2 radial
C29	4µ7 radial
C30	33µ radial
C31-C34	220n ceramic
C35, C36	1n ceramic
C37-C44, C59, C70, C71	10n ceramic
C45	22n ceramic
C46-C58, C60-C65, C67, C68 C74, C77-C83, C85-C89	100n ceramic
C72, C73	15p ceramic plate
C90, C91	22p ceramic plate
C92, C93	270p NPO ceramic
C94	47n ceramic
C95, C96	220n ceramic
C97	220p ceramic plate
C120, C121	18p ceramic plate
C122, C131	4µ7 radial
C123-C125, C128, C132	10µ radial
C126, C127, C129, C130, C133	1µ radial
C66, C98-C119	100n SMD 1206 size
VC1-3	100p polyethylene trimmer (1)

Inductors

RFC1-RFC3, RFC6, RFC7	1mH axial choke
RFC4, 5, RFC8-RFC10	100µH axial choke
RFC12	330µH axial choke
L1	4.85µH 38t 30swg on T50-2 (2), (3)
T1	6t:3t 30swg on FT37-43 (2)
T2	10t:3t 30swg on FT37-43
T3	20t:4t 24swg on T50-2 (3)
FB	1 turn through small ferrite bead

Semiconductors

IC1, IC13, IC15, IC17-IC19	78L05 regulator, 5V
IC2	AD603AQ (DIL)
IC3, IC4	FST3125M (SMD)
IC5	SBL-1 (7)
IC6, IC7, IC22	TL072 (DIL)
IC8	TLC7524CD (SMD)
IC9	PIC 16F870-ISP (DIL)
IC10	24LC256-IP (DIL)
IC11, IC28	PIC 16F627-04P(DIL)
IC12	ULN2803A (DIL)
IC14	7810 regulator, 10V
IC16	4094 (DIL)
IC20	74LVX125 (SMD
IC21	ST232N (DIL)
IC23	74HC14 (SMD)
IC24	LE33CZ regulator, 3V3
IC25	AD1885JST
IC26	27C512 512KB PROM, programmed
IC27	ADSP-2181 KS130 or KS160
TR1, TR2	J310
TR3-TR5, TR12	2N3904
TR6	2N3906
TR7, TR8	BC517
TR9-TR11	VP0300LS P-ch MOSFET
D1-D6, D11, D15	1N4148
D7-D10	BA244 (8)
D12-D14, D34	1N4007 or similar
D16-D20, D35	3mm LED, red
D21	3mm LED, red/green tricolour
D22-D33	1.8mm LED, colours for S-meter
ZD1	4V7 200mW Zener diode

Miscellaneous

FL1	Crystal roofing filter (4)
X1	wire-ended BFO crystal (5)
X2	4MHz wire-ended crystal
X3	16.67MHz, probably custom
X4	24.576MHz low profile, Rapid Electronics
S-meter	1mA, optional
S1	8-pole on/off PCB DIL switch
S2, S3	skeleton push-to-make switch
All screened RF leads	RG174
Other screened leads	thin microphone lead
Spacers and 3mm nuts/bolts	4 sets (6)
PL1	2 strips of 9-way SIL header ie male/male
SK2-SK8	SIL socket strip
PL2-PL8	mating SIL plug strip
Turned pin socket IC6, 7, 10, 22	8 pin
Turned pin socket IC16, 21	16 pin
Turned pin socket IC11, 12, 28	18 pin
Turned pin socket used as spacer	18 pin
Turned pin socket IC9	28 pin by 0.3in
Turned pin socket IC26	28 pin by 0.6in

NOTES

(1) These three trimmers may all be replaced with fixed capacitors after adjustment.
(2) Assumes a 2.2kΩ filter impedance.
(3) Assumes FL1 and X1 around 10.7MHz.
(4) Any HF centre frequency. Filter width between 2.7kHz and 15kHz. Around 3 - 6kHz is ideal.
(5) Centre frequency of FL1 plus 15kHz.
(6) Spacing specified to give clearance between FL1 and the DSP board.
(7) The SBL-1 mixer may be replaced by a stronger mixer and / or one using discrete components at your discretion. It is specified here as a well-established datum and works well.
(8) These diodes can be replaced with 1N4148 if you can't obtain RF switching diodes.

SUPPLIERS

Most of the components were procured from Farnell or Rapid Electronics. The exceptions are the toroids which I bought from Mainline - and the crystal filter, the specification of which is loose enough that it should be possible to find a surplus one.

The two critical chips, namely IC25 and IC27, are manufactured by Analog Devices. They have an enlightened marketing policy for promoting interest in their products, such that for many of their devices, individuals can order up to two as free samples. You do this via their website - and the first time round you have to register and answer a few questions. You do *not* have to be a commercial organisation; the occupation of 'Amateur Radio' at your private address and for the purpose of 'training and self-education' are entirely acceptable.

Do not attempt to abuse their generosity - this would reflect adversely on the amateur community as a whole. Personally, I consider ordering chips, where their MTBF exceeds your life-span, as spares; ordering just in case one day you might find a use, or the simple inability to turn down a free offer - would all constitute abuse. My ethical test is that I never order a free sample if I can purchase small quantities.

* For all options, ie: Timer board,
DSP boards and assembly,
IF board,
PicAdapter board,
Status board.

Invitation

The Role of Amateur Radio

by Les Hamilton, GM3ITN*

LES HAMILTON'S FALKLANDS - THE BACKGROUND

ON 2 APRIL 1982, Argentina started to make claims that it had invaded and taken over the Falkland Islands. They seized control of the international telephone and radio networks on the islands and so the Governor, Rex Hunt, was unable to contact the Foreign and Commonwealth Office to report his surrender to the Argentine forces. Although the Argentine dictator General Galtieri was proclaiming that "the will of the people has been fulfilled", Prime Minister Margaret Thatcher and the British government had no independent verification of the Argentine claims.

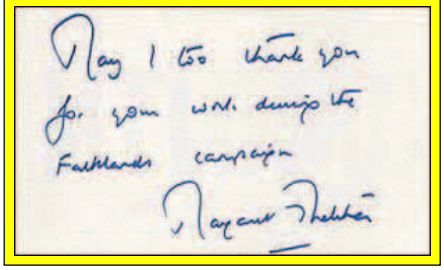
Meanwhile, Les Hamilton, GM3ITN, had been having regular contacts with Tony Pole-Evans, VP8HZ, on Saunders Island, just off West Falkland, since the 1960s. He also regularly spoke to Bob McLeod, VP8LP, at Goose Green. "I'd been talking to Tony almost daily," said Les. "As it came nearer to 2 April, we knew something was going to happen, because of various reports of Argentine activity. But then I heard from Bob McLeod that the Argentine flag was flying over Government House in Stanley. When later we heard nothing more from Bob, we knew the Argentines had reached Goose Green too."

Les was the first person outside Argentina or the Falklands to know that the invasion had taken place. He phoned the Ministry of Defence, who informed Margaret Thatcher. British Military Intelligence asked Les to keep in contact with the Falklands' amateurs as much as possible and in the weeks that followed he was able to pass on reports from Tony Pole-Evans which were of vital importance in the liberation of the islands. Les and his wife Pilar also intercepted Argentinean radio communications, which Pilar - a university lecturer in the Spanish language - translated for the MoD.

"At the time we didn't think what we were doing was very important. But when we went down for a debrief, military intelligence told us that it had been extremely important. Mrs Thatcher even wrote to thank us", Les said.

Until recently, Les Hamilton's role in the liberation of the Falklands had been a closely-guarded secret, known only by senior British politicians, military intelligence officers - and a select few radio amateurs. His contribution has not been forgotten by the grateful Falkland Islanders: when the 20th anniversary of the liberation of the islands was celebrated in June this year, Les was one of only 16 Britons invited by the Falkland Islands Government to take part in the ceremony. Les and Pilar flew out to Stanley for the 20th anniversary celebrations, which took place on 20 June.

This is Les's story of his first visit to the Falkland Islands, 20 years after the end of the Falklands War.



FINALLY, WE HAD arrived in the Falklands, after a journey from Glasgow, via Luton, RAF Brize Norton, and Ascension Island. It was -5 °C with a snow covering to greet us, a distinct difference from the hot weather on Ascension. After passing through immigration and customs there was a reception held by some of the Councillors with a welcome cup of tea and biscuits before the bus ride to Stanley. Driving out of Mount Pleasant Airport ('MPA'), with the snow now almost at blizzard proportions, gave us our first views of the Falkland Islands through the damp steamy windows of the coach: a rock-strewn moorland with the odd rocky outcrop stretching as far as it was possible to see in the snow. The surface of the moon would be more hospitable, I thought. As we travelled on to Stanley the only life we saw was the odd snow-covered sheep looking at our bus oddly, as if we should not be there - what a hellish place on a winter's day.

We arrived in Stanley to find all the pictures that I had known for all these years coming to life - the quaint-coloured roofs of the houses, the Globe Tavern, the Upland Goose Hotel, the Post Office, the Falkland Company, and of course the cathedral and the whalebone arch. In winter buzzards continually hover over the town by riding the thermal currents from the chimneys. Giant petrels patrol up and down the sea front, and upland geese waddle all over town, safe under the non-shooting policy within the town limits.

Les Hamilton, GM3ITN, under the whalebone arch in Stanley.

The Malvina House Hotel was a lovely warm place to rest each night, so comfortable with good food and hospitality from its owner Mike Rendell, VP8NT, and his kind staff from St Helena.

OFFICIAL VISITS

WE WERE GIVEN an A4 wallet containing all the information for our visit, including tickets for various dinners and functions, and two visits to Government House to meet His Excellency Donald A Lamont.

One evening we were piped aboard *HMS Newcastle* where we had a wonderful time in the aircraft hangar although it was about -5 °C outside. We were treated to a performance by the band of the Royal Marines in full dress uniform, playing a medley of tunes in the snow flurries, against floodlighting on deck: all stirring stuff. It was a full programme for the week.

At Government House we met the Governor and his wife, both Scots. A young lady called Rachel came up to me and wanted to know all about our radio contacts, as if she had not read my file - she was from the MoD. We also met Maria Strange from the Legislation Department who had done so much in the organisation of our trip.

We met our fellow veterans, Rear Admiral Sam Salt of *HMS Sheffield* and Brigadier David Chaundler, Commanding Officer 2 Para, who was parachuted into the islands when Col 'H' Jones was killed at Goose Green. We also met Brigadier Morgan of the Gurkhas and another Brigadier, Roddy Macdonald, Commanding Officer of the Commandos Royal Engineers, who told me that the information provided by amateur radio was their only source in the first week following the invasion.

Also there were the captains of the *Canberra* and the *Tristram* and other VIPs, including Dr Alison Bleaney, OBE, who was the Medical Officer at the hospital in Stanley during the occupation. She didn't realise that her radio transmissions were of such importance and that they had been sent to me in Scotland from Tony Pole-Evans, VP8HZ, and the late Ambrose Morgan, VP8AEI, who had monitored her signals in

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to the Falklands

in the Liberation of the Falkland Islands

Antarctica. Alison's radio equipment was taken from her at one stage and she went to plead with General Menendez to have it returned, carrying her baby and nipping it to make it cry in his office. The General rescinded and asked her to leave to stop hearing the screams. Alison went back to the hospital and managed to connect up the radio, restarting her medical broadcasts which were full of useful information.

Outside the Malvina Hotel one night in a snowstorm Lt Col Ewen Southby-Tailyour showed me how to find the Southern Cross between the snow flurries - what a interesting man. All of our fellow guests were so nice to us. In turn they were amazed to hear our tales of secret codes, our reception of weather forecasts in Spanish for the Argentine Navy from the South Sandwich Islands, and of the death threats I received from Argentine amateurs who heard the contacts - such a pity, as I have so many good amateur radio friends from Argentina from before and after the war who still talk to me.

THE ANNIVERSARY CELEBRATIONS

THE DAY OF the anniversary of the Liberation, 14 June, was a bitterly cold day with a chill factor of -12 °C in the strong wind. All the veterans were given a grandstand view of the ceremony and supplied with blankets and gloves. There was a fly-past by two Tornados and a march-past of forces with fixed bayonets, who received a scroll giving them the freedom of the Falkland Islands.

Afterwards there was a meeting in a large hall at the top of Stanley where the islanders and the forces plus the VIPs and a British Government minister all met His Excellency the Governor to hear speeches, and partake of a drink or two together. I estimated that about 1000 people attended and about 250 must have shaken hands with me and introduced themselves. It was amazing just how many I knew from radio contacts over the years, sons and daughters or some relation of someone who knew me, as almost all the Falkland Islanders have their own amateur radio callsigns.

In the afternoon we were taken for a tour of Stanley and shown all the places of interest in town. We went out to Moody Brook to see Tumbledown, Mount Longdon, Mount Kent, Two Sisters and to Stanley Airport to see the beautiful beaches, very similar to the Western Isles of Scotland but still surrounded by Argentine minefields. Souvenirs of minefield signs can be obtained from an office of the Royal Engineers on the waterfront at Ross Road.

VP8ITN ON THE AIR

I SPENT ONE evening with Mike Pole-Evans, VP8JC, a son of Tony, VP8HZ, and operated as VP8ITN for the first time, immediately starting a pile-up. The second evening, in deep powdery snow, we went to Bob McLeod's, VP8LP, who now lives in Stanley. From here I brought my QSO total up to 200 in two hours of operating time. It was great being on the other end of the pile-up, but they were coming at me so fast I almost couldn't keep the pile-ups in order. Both evenings were on CW and before the HF bands died during the winter conditions.

The next morning we paid a visit to Stanley Museum, an excellent place and a 'must' to visit. Outside the museum is the refuge hut from the Danco Coast and which was brought to and erected in Stanley, complete in every detail, from the Antarctic - including Brigitte Bardot pin-up on the interior walls. I remembered when I contacted the station on CW way back in the early 1960s.

VP8ITN is on the air.

A MEMORABLE ENCOUNTER

ON THE TUESDAY morning Councillor Richard Cockwell gave me an early call to drive me out to Stanley to catch the flight on the FIGAS (Falkland Islands Government Air Services) Islander to Saunders Island. Here I was at last to meet my old pal Tony Pole-Evans, VP8HZ, who had risked his life to get the messages through to me in Scotland during every day of the conflict. We were told at the time that if the Argentines had caught him he would have been shot immediately.

We took off quickly in the little twin-engined Islander, along with Dr Alison Bleaney and her husband Mike, who had travelled from Tasmania to visit friends on Pebble Island. The weather was closing in with yet more snow storms. On our way through the mountains Mike and I were kept busy taking photographs of the wild scenery. Alison and Mike were dropped off on Pebble Island and I went on to Saunders Island, a further 10

His Excellency the Governor of the Falkland Islands, Donald Lamont, takes the salute on the 20th anniversary of the liberation.

Tony Pole-Evans, VP8HZ, meets the FIGAS Islander at Saunders Island.

minutes' flight, to land on a snow-covered runway. The island's entire population of four were waiting to meet me with a Land-Rover. All I could see was snow and the Union Jack flying over the settlement.

I had finally arrived at Saunders Island on the other side of the world from my cottage in Scotland.

Tony was just as I had imagined him over the radio. I suppose after talking to someone over a period of 35 years or so you must get to know each other pretty well. He welcomed me into his home and had roast lamb and potatoes prepared for our dinner. That evening we polished off a bottle of good whisky between us and we still had a good supply left. At 82 years old, Tony is still very active and sends in weather reports to the coastguards every morning at 7.00am. He knows all the shipping goings on around the islands.

Strange birds called 'Johnny Rooks' - a mix between a crow and a falcon, brown in colour with golden chest and talons - perched themselves all around the settlement, always waiting for their next meal. Another visitor is the Upland Goose which is very abundant. Its flesh is game-like and makes a fine meal. I went for a walk in the snow and five Johnny Rooks kept following me: I guess they thought I may croak it and I would be their next bite to eat!

The second day David, VP8NX, who runs the island with his wife Suzan, VP8VK, took me to The Neck, a small isthmus on the north side of Saunders. After a 10-mile journey in their Land-Rover over rough moorland and tracks we were met by a troop of 100-odd Gentoo Penguins, White Petrels, 20 King Penguins and one big fluffy brown chick. The varied bird life of the Falklands is a must for anyone interested in ornithology. We spotted over 10 different small birds in a few minutes on the snow-covered beach.

I managed to operate on both nights on Saunders Island, making my total from the Falklands 500 QSOs, almost all on CW. I had done my best for such a short operation, remembering that this was a celebration trip and not a DXpedition.

On leaving David's house to cross back to his father's place on the other side of the settlement it was a howling night with a blizzard and I almost got lost in the drifts. It brought to mind the phrase when Lawrence Oates left the Antarctic tent of Captain Scott, saying "I am just going outside, I may be some time". Fortunately I made it to Tony's as the rest of the roast lamb had to be eaten and washed down with malt.

The morning before I left to return to Stanley (a day early as the weather was to get worse and I could not miss my flight to Santiago via Punta Arenas) I had a great surprise. There was a sudden roar and a shout of "go outside". There was a Tornado fighter wheeling round and getting ready to buzz us. He came down very low and dipped his wings in a personal salute, then climbed steeply into the clouds within a few seconds. It really made me feel all our work was appreciated, even after 20 years. What a fine gesture by RAF Falklands.

FLYING HOME

SADLY THE TIME had come when I had to leave my friends on Saunders. The little Islander aircraft came in and landed on about six inches of snow to take me off. We flew back to Pebble Island to pick up Alison and Mike, then we were on our way back over San Carlos Water where the action and landings took place all those years back. An hour later we dropped down over Cape Pembroke lighthouse to land back in Stanley.

The next day we travelled back to MPA up the same bleak road and caught the Lanchile flight out. There was 20-hour flight ahead to Madrid, time to warm up and relax after a wonderful two weeks in 'Victor Papa 8 Land', my life's dream fulfilled.

Who knows, maybe we can return some day for a *real* DXpedition, but until then we can still have a 'rag chew' on 20 metres any night - that's the wonder of amateur radio. ♦

WWW.
Les Hamilton, GM3ITN:
www.gm3itn.co.uk

The VP8HZ QTH on Saunders Island.

THE CDG2000 HF TRANSCEIVER

Part five, by Colin Horrabin, G3SBI, Dave Roberts, G8KBB, and George Fare, G3OGQ *

THIS MONTH, we begin a close look at the synthesiser. It is critical to the operation and performance of the transceiver, and provides the local oscillator on transmit and on receive.

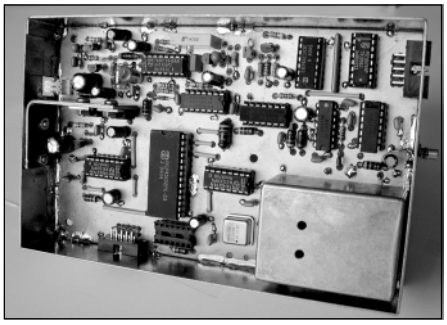
It is required to provide an output signal that can drive the 74AC series logic divider in the H-mode mixer [13]. This signal must have as little phase noise as possible and must be crystal-derived for stability and accuracy. It is controlled by the main CPU and must be capable of being set to any frequency in the range 46 to 78MHz. Whilst this may appear to have a 32MHz range and therefore capable of covering the whole of the HF spectrum, remember that there is a divide-by-2 process in the mixer – so for a 30MHz range we would require a VCO swing of 60MHz. This is avoided by using a programmable divider in the VCO output circuit. This can be seen in **Fig 26**, which shows a block diagram of the synthesiser.

By using low- as well as high-side local oscillator injection, an even narrower VCO range is possible, but is not used here. The controller software does, however, support this if you wish to experiment with it.

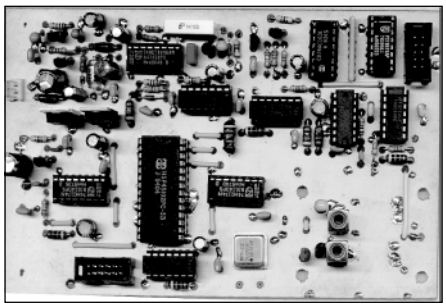
The heart of the synthesiser is the VCO. This has four ranges controlled by the two control lines from the I²C bus interface which give overlapped coverage from 46 to 78MHz. The output of the VCO takes three paths, two of which lead to the output. The signal can either be passed to the output via a multiplexer or it can first be divided by 2, 3, 4 or 5. This ratio can be changed to any value up to 15 if the design is used for other purposes, but this is unnecessary for CDG2000. The other path taken by the VCO signal is into the phase-locked loop. Before this, however, it is divided by 512 using a divide-by-4 and a divide-by-128. This gives a frequency in the range 90 to 152kHz which is phase-locked to a signal from a Direct Digital Synthesiser (DDS) at the same frequency. The control signal from the Phase Comparator is filtered and amplified by the loop filter before being passed to the VCO varicaps through a final low-pass filter.

The completed unit is, like other CDG2000 modules, constructed on a 160 x 100mm Eurocard which may be fitted into a tinplate box as shown in the photograph (bottom left). If the unit is otherwise screened, for example by being fitted into a rig that offers screening by other means such as a 'bookcase' style of construction, then this is unnecessary. What is essential, however, is the extra screening around the VCO, provided by a small diecast box. This can be seen in the same photograph. Also visible in the photograph is a small heatsink connecting the two voltage regulators to the side of the box. The photograph above shows the partially-constructed unit without screening or heatsink. The VCO coils can be seen at the bottom right hand corner of the board and the reader will notice the lack of components in the vicinity of the VCO – that is because the majority of the VCO is constructed of surface-mount components which are situated on the track side of the PCB as shown in the third photograph – a close-up of the VCO.

* 1 Old Hall Close, Higher Walton, Warrington WA4 6SZ.



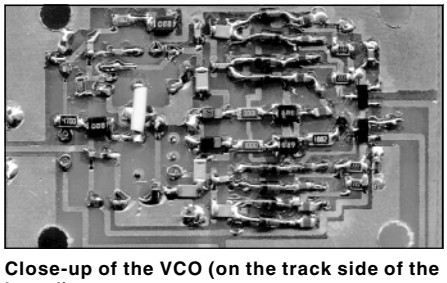
The completed synthesiser.



The partially-assembled synthesiser card - no screening or heatsink.

THE CIRCUIT

THE FULL CIRCUIT diagram of the synthesiser is shown in **Fig 27**. Before we embark on a detailed description though, a few points need to be made, to give credit where it is due. Colin Horrabin, G3SBI, sent notes on a novel tank VCO design to Pat Hawker, G3VA, who published them in *RadCom* [14]. Learning from earlier designs of VCOs [15], Colin produced an inherently low-noise design capable of excellent performance where a second coil acted as a Q-multiplier giving a 30dB per decade noise reduction. Remember from the overview to CDG2000 [16], that there is no point trying to use the PLL to 'clean up' a noisy VCO as this will inevitably let through the DDS spurii to the VCO. This has been well covered in the literature [17]. Even exceptional DDS designs such as the newest Analog Devices products with spurious products of -97dBc are inadequate for the performance levels we seek [18]. This VCO design was picked up by John Thorpe (the man behind the excellent AOR AR7030 receiver), who developed it into a reproducible design. He also moved away from the PCB inductors used by Colin in his prototype. It is this VCO that we used and are indebted to John for the permission to repeat his circuit here. The excellent performance of the VCO is easy to see from the phase noise in the reviews of the AR7030 [19].



Close-up of the VCO (on the track side of the board).

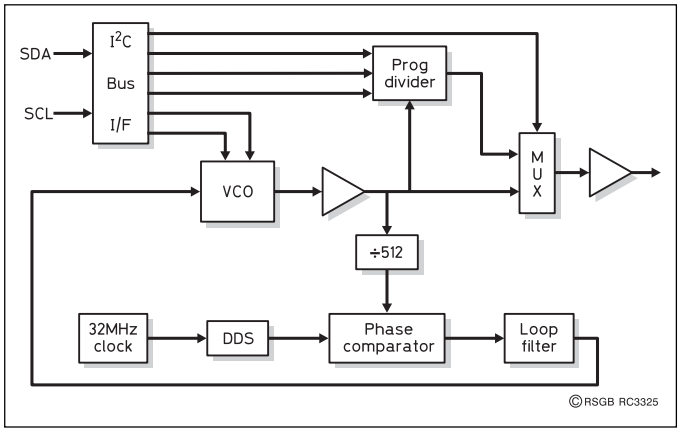


Fig 26: Block diagram.

So, let us now embark upon a detailed review of the design.

The VCO, as has been noted, has been described in 'Technical Topics' [14]. Specifically it is a dual-tank VCO. The two tank circuits (L1 and L2 plus associated capacitors) are tuned to the same frequency. They swing over their range by virtue of the varicaps D2 and D3 on each tank. Four ranges are provided, selected by a binary code on the two switch inputs to the VCO. These cause transistors TR8 and TR9 to switch in additional capacitance. The switching is effected by a parallel pair of diodes D8/D9 and D10/11, to reduce losses and maintain operational Q.

The VCO tuning ranges are shown in **Fig 28**.

The output of the VCO is buffered by IC6 and converted to a logic level signal. The reader will notice that the device used to do this has an individually-decoupled and filtered supply line. The same is true for many of the other logic devices used. This is because an AC logic gate, as used here, is not just a logic gate – it is a very effective non-linear mixer/modulator, and stray noise on either a logic input tied high or on the power rail will manifest itself as phase noise on the output signal. Care also needs to be exercised over the supply to the loop filter / amplifier. Very clean 20V and 8V rails are needed. This is achieved by heavy filtering of the voltages delivered by monolithic regulators Reg1 and Reg3.

The buffered signal is either passed directly to the output via IC11 or it is divided first by IC10. This allows the output to be either the basic VCO frequency, or this frequency divided by 2 to 5. The divider is a synchronous device (essential to minimise phase noise) and may be used for other ratios by tying the programmable divider 'load' inputs as required.

The selection of the divide ratio, multiplexer and VCO control is effected by means of a parallel interface from an I²C interface chip (IC9). This accepts serial command data from the controller and outputs the appropriate signals. It also detects the phase-lock signal from the PLL so that it may be read by the controller. A bit map showing the function of the output bits (0 to 7) from the PCF8574 is shown in **Table 4**. The operation of I²C is not addressed here, but in précis it comprises a two-wire interface (clock and data) that allows a master device, in this case the controller, to address a number of parallel-connected slave devices and read from or write to them. For further information, refer to the PCF8574 datasheet [20]. In the case of the synthesiser, the controller writes to the PCF8574 which allows it to set the states of six control lines and to read the state of the PLL lock signal. Each I²C device has a unique address and, for the synthesiser, this is 0x4A if a PCF8574 is used or 0x7A if a PCF8574A is used.

The VCO frequency is divided by 512 in IC7 and IC8. The resultant signal is passed to one comparator input of IC5, a 74HCT9046 [21]. This is an enhanced version of the familiar 4046 PLL chip. The reference frequency for the PLL is generated by a DDS – more of that later. The output of the phase comparator drives the loop amplifier and filter which gives the loop a bandwidth of around 1kHz. The output of the amplifier is further low-pass filtered by a passive RC filter which then drives the VCO. The loop filter amplifier is also attributable to John Thorpe.

The DDS is hardly the latest technology, being formed by the venerable HSP45102 DDS [22] chip, IC2, clocked at 32MHz by X1. The DAC is external to the DDS chip with an R - 2R ladder driven by two 6-bit latches (IC3 and 4) giving a 12-bit DAC. While more modern devices may be as good (or better), this combination has been found by a number of designers to offer excellent performance. The signal is low-pass filtered and passed to the phase comparator.

The Digital to Analogue converter used by the DDS warrants closer attention. It has been found that the structure shown performs well, with a noise floor about -90dBc/Hz. As was pointed out by one of the article's reviewers, this should not be the case - with 1% resistors an effective resolution of about 6 bits only ought to be obtained. It is believed that the measured performance is due to operation far below the Nyquist limit, but this remains an area of interesting investigation and one that will probably draw much comment. It would therefore be prudent to use 0.1% resistors such as the Meggitt RN series from Farnell, even though the performance presented here was obtained using 1% devices.

Bit(s)	Function
0, 1	Set 74AC163 divide ratio from 2 (both high) to 5 (both low)
2	If low, hold 74AC163 reset when not being used
3	Select direct output of VCO (if high) or divided by 74AC163 (if low)
4, 5	VCO range selection
6	PLL lock detect
7	Unused

Table 4: I²C control.

The lock output of the phase comparator is made available to the controller via the I²C bus.

NEXT MONTH

THE SYNTHESISER description continues next month with the construction, measurements, programming and alignment sections, and the components list.

REFERENCES

[13] H-mode mixer, 'Technical Topics', *RadCom* Sept 1998, p58.
[14] VCO design, 'Technical Topics', *RadCom* Feb 1996, Jan 1995, July 1994.
[15] Peter Martinez, G3PLX, p4.53, *Radio Communication Handbook*, 5th Ed RSGB.
[16] CDG2000 Part 1, *RadCom* June 2002.
[17] Use of PLL and DDS to reduce noise and avoid spurs, 'Technical Topics', *RadCom* Feb 1996, April 1996.
[18] AD9857 datasheet available from **www.analog.com**
[19] AR7030 review by Peter Hart, G3SJX, *RadCom* p44, July 1996.
[20] Datasheet for PCF8574 from **www.semiconductors.philips.com**
[21] Datasheet for 74HCT9046 from **www.semiconductors.philips.com**
[22] HSP45102 datasheet. ♦

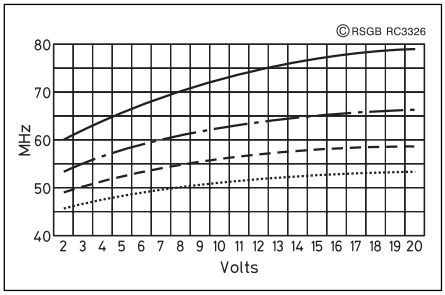


Fig 28: VCO tuning.

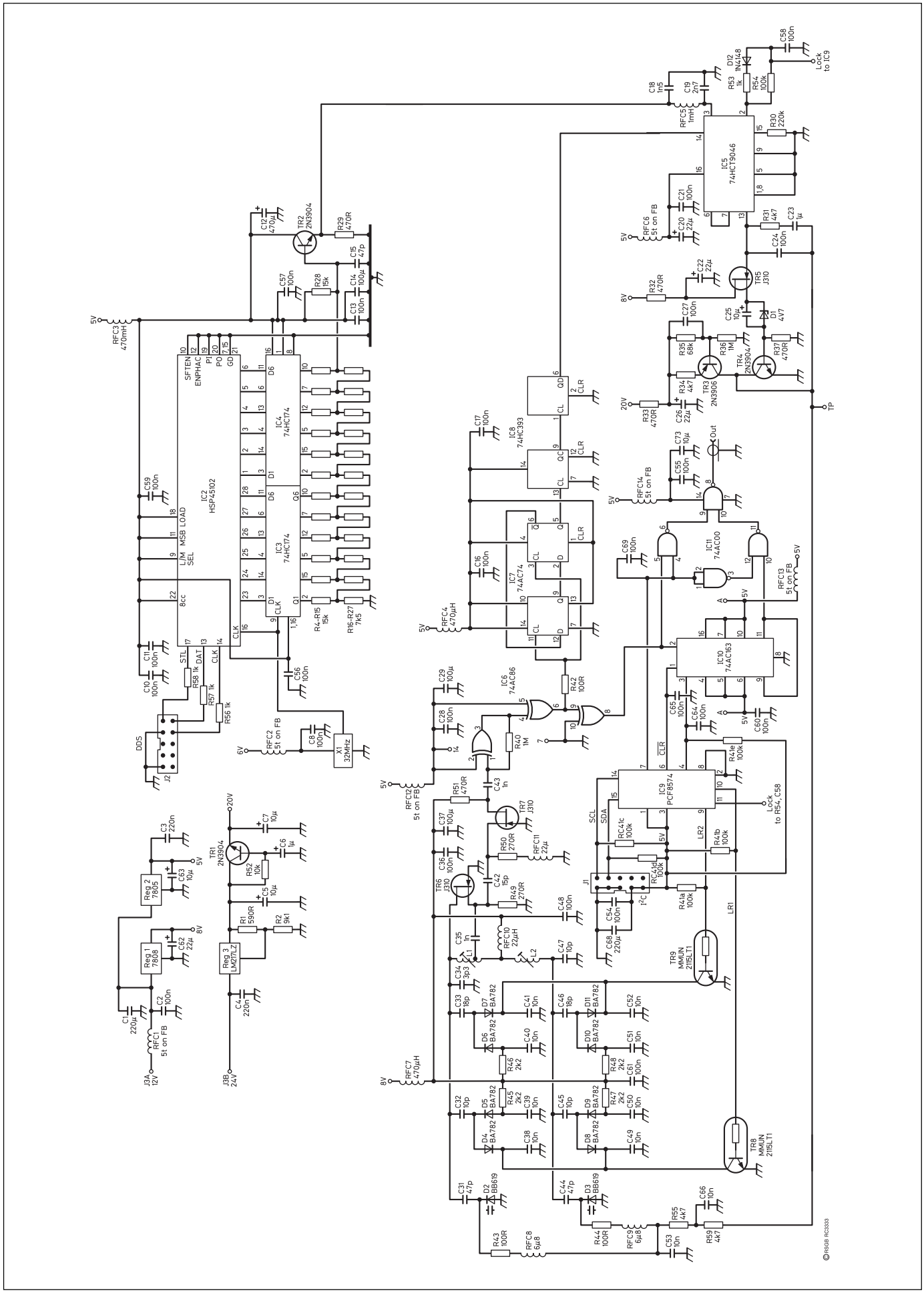


Fig 27: Full circuit diagram of the synthesiser.

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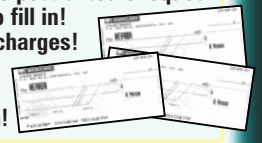

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CF-416B	144/430MHz SO239/PL/'N'	£28.50
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COMET TRIPLEXERS		
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Comet CFX-514N	50/144/430MHz	£47.95

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- 3-15V adjustable
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- 10mW RMS noise and ripple

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1.5KW HF ANTENNA TUNER

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- Matches dipoles, centre fed doublets, G5RV's balanced feeders, Verticals, single wire, delta loops, beams, windoms, Inverted V's
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- 200W PEP

£359.95 | 3 CHEQUES OF **£123.31** | P&P £10
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MFJ-962D	1.8-30MHz 800W Compact Tuner	£259.95
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MFJ-971	1.8-30MHz 200W Portable Tuner	£99.95
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The Yaesu FT-1000MP MARK-V 'Field'

A user review by Don Beattie, G3BJ*

WHEN Yaesu introduced the FT-1000MP in the mid-1990s, it was as a lower cost, but high-performance, alternative to the massive FT-1000D. The FT-1000D, weighing in at nearly 26kg, was nobody's idea of a portable transceiver, but its performance was impressive, with a sturdy 200W PEP output. The FT-1000MP introduced a switch-mode power supply, offering a 100W PEP package at a weight of some 15kg. With excellent receiver performance, it soon became the standard by which competition radios were judged, and has proved itself in many of the high-profile DXpeditions of recent years.

Some 18 months ago, the FT-1000MP MARK-V was launched, providing enhanced receiver facilities, and reverting to the 200 watt PEP output of the original FT-1000D. Unusually, the new MARK-V offered an option of running the PA in Class A for enhanced linearity, with a 75 watt PEP output power in this mode. To accommodate the increase in transmit power and the Class A operation, Yaesu removed the integral power supply and fitted a set of cooling fins on the top part of the case of the MARK-V to keep the larger PA cool. Power was supplied by a separate AC mains switch-mode power unit, providing both the 13.8 and 30 volt supply rails required. The 30-volt rail is no doubt needed to obtain optimum linearity from the 200-watt PA stage.

The MARK-V received excellent reviews (see *RadCom* October 2000) and as a base station it is outstanding. I use one at home, and find the 200 watt power output more than adequate for most purposes. However, for DXpedition use, and more generally for portable work, the MARK-V is seen to have a couple of minor drawbacks. Firstly, it needs the separate power supply and, secondly, it is not possible to operate the transceiver from a nominal 12-volt supply, because of the 30-volt requirement of the PA stage.

No doubt responding to these concerns, Yaesu has recently introduced a derivative of the MARK-V, called, appropriately enough, the 'FT-1000MP MARK-V Field'. I have had the opportunity to use one of these units for a week or so, and have to say it is most impressive.

CHANGES

FIRSTLY, IT reverts to a single 'box' with integral power supply. The top cooling fins have gone, leaving the top of the case smooth. The unit will run from a nominal 12 volts DC or AC mains. The case is also fitted with a side carrying handle, emphasising the relative portability of this rig. These changes largely address the concerns of the DXpeditioners and portable operators, but has anything else changed?

The answer is - a little. The power output is back to the 100W PEP of the original FT-1000MP. The Class A output has been dropped even more, to 25 watts PEP.

It is interesting to consider whether the Class A option on the 'Field' is really worth the extra engineering involved. On the original MARK-V, the third-order transmit IMD products were -31dB at 200W PEP in Class AB, and -50dB at 75W PEP in Class A.

The claimed figures for the FT-1000MP MARK-V Field are -31dB at 100W PEP in class AB and -40dB at 25W PEP in Class A. The reduction in IMD improvement in Class A is no doubt a result of having to use just 13.8 volts for the PA rail voltage. It is interesting to contemplate what the IMD performance at 25W PEP would be in Class AB - perhaps not a great deal worse than the Class A performance!

The receiver performance, as far as I could determine in a side-by-side comparison, is virtually identical to the standard FT-1000MP MARK-V.

* *Hares Cottage, Woolston, Church Stretton, Shropshire SY6 6QD.*

The original FT-1000MP set a high standard for linearity and overall functionality (see the October 2000 *RadCom* review). With the IDBT (Interlocked Digital Bandwidth Tracking), 'Shift' and 'Width' controls, a range of filters (some are optional extras) and the variable front-end tuning, the FT-1000MP MARK-V raised the bar further. These facilities are exactly mirrored in the MARK-V 'Field'. I have always found the original FT-1000MP to be easy to use, with good ergonomics, and this remains true of the MARK-V range.

A little niggle with the 'Field' is that the power meter on the front panel is still the 400W meter of the standard MARK-V, even though the rated power of the 'Field' is now a quarter of this. But unless accurate readings at QRP level are needed, this should not be a problem.

I suspect that the 'Field' will find a place in the shacks of many serious DXers, as those who use linear amplifiers will be happy with a 100W PEP output (enough to drive most linears) and the added convenience of an integral AC mains power supply will, I am sure, appeal to many. Rest assured, the 'Field' is a no-compromise competition-grade HF transceiver with an exacting specification.

Overall, and setting transmit power aside, I have been unable to detect any significant differences in performance between the MARK-V and its 'Field' derivative. Both are worthy additions to any shack, and if my own experience of the original FT-1000MP is any guide, will provide many years of happy and relaxed DX-chasing.

The FT-1000MP MARK-V Field retails at around £2300, compared with around £2900 for the standard FT-1000MP MARK-V.

I am grateful to Yaesu UK Limited for the loan of the 'Field' for this user review. ♦

	FT-1000MP MARK-V	FT-1000MP MARK-V 'Field'
Weight:	14kg + PSU 4.2kg	15kg
Power output Class AB:	200W PEP	100W PEP
Power output Class A:	75W PEP	25W PEP
3rd order IMD in Class A:	-50dB	-40 dB
Power requirement:	AC mains only from matching FP-29 PSU	200 - 240V AC and 13.8V DC (internal PSU)

Table 1: At-a-glance guide to the differences between the FT-1000MP MARK-V and the FT-1000MP MARK-V Field.

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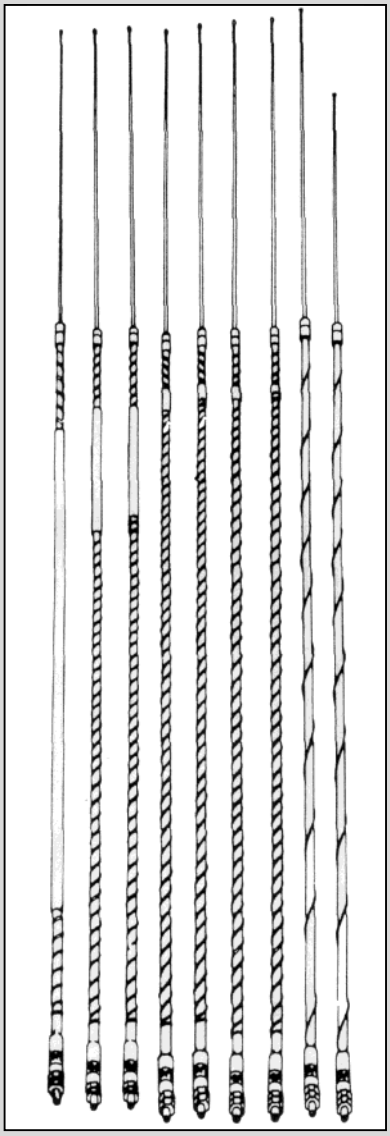
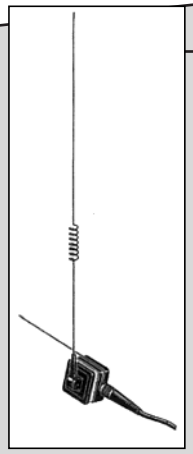


IHF80E	80 mtrs	36kHz	***£24.95***
IHF40E	40 mtrs	60kHz	***£19.95***
IHF20	20 mtrs	150kHz	***£19.95***
IHF17	17 mtrs	175kHz	***£19.95***
IHF15	15 mtrs	200kHz	***£19.95***
IHF10	10 mtrs	500kHz	***£19.95***
IHF6	6 mtrs	1000kHz	***£19.95***

ADD £8.00 P&P FOR ABOVE ANTENNAS

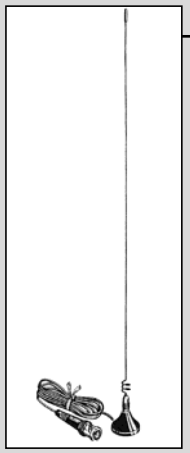


Model ATA270

Dual band glass mounted antenna

- **FREQ:** 144-148/440-450MHz
- **GAIN:** 2.6dB over 1/4 λ at 2m
  4dB over 1/4 λ at 70cm
- **TYPICAL VSWR:** Less than 2.0:1 through the bands
- **MAX POWER:** 50 Watts
- Field tuneable
- 14ft RG58 cable with PL259
- 26in copper plated whip with black finish
- Instructions and mounting package included
- Replacement whip, base and remount kit available

£29.95 ***£4.00 P&P***

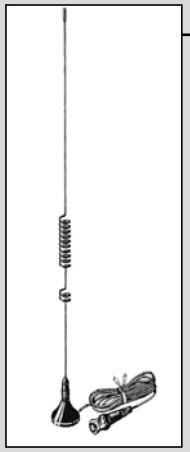


Model IHMM270

Dual band Mini Mag Mount

- **FREQ:** 144-148/440-450MHz
- 1⅛in diameter black ABS base
- Rare earth magnet
- 9ft of RG174 cable with BNC
- **HEIGHT:** Less than 20in
- **WEIGHT:** Less than 2oz
- 1/4 λ length at 2m and 5/8 λ length at 70cm
- **TYPICAL VSWR:** Less than 1.5:1 through the band
- **MAX POWER:** 25 Watts @ 70cm
  50 Watts @ 2m
- Black/chrome finished brass ferrule
- Replacement whip available

£19.95 ***£4.00 P&P***



Model IHMM3

Dual Band & Scanner Mini Mag Mount

This Dual band TX antenna for 2/70cms also receives from 100 - 1200 MHz. It weighs less than 2 ozs and is only 13.5" tall. It features a super strong rare earth magnetic base pre-wired with 9 ft of RG174 cable c/w BNC connector.

- **FREQ TX** 144 - 148 MHz
  440 - 450 MHz
  820 - 896 MHz
- **FREQ RX** 100 - 1,200 MHz
- **POWER** 40W on 2 mtr
  24W on 70 cms
  15W on UHF
- Black powder coated for durable performance

£19.95 ***£4.00 P&P***

Antenna Mounts

Model IHCU-114

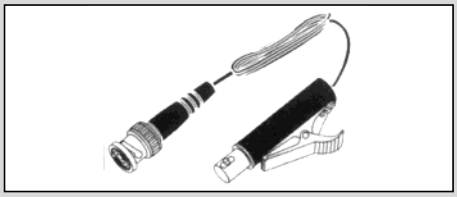
Heavy duty trunk lip mount with swivel feature. 3/8 x 24 beehive top mount hardwired connection required for installation.

£28.95 ***£4.00 P&P***

Model IHCU-114C

Heavy duty trunk lip mount with swivel feature. 3/8 x 24 beehive top mount, SO-239 connection for quick cable installation and 18ft RG-58U low loss hardwired cable with mini - UHF's in-line connectors for easy installation PL-259 connector to radio.

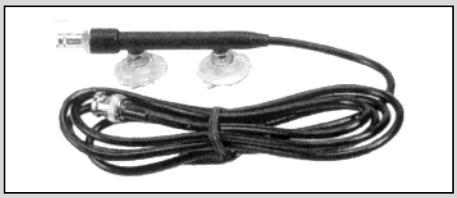
£39.95 ***£4.00 P&P***



Model IHC-18 *Hat Clip Mount*

BNC female clip mount and 4ft RG-174 and BNC male

£14.95 ***£2.50 P&P***



Model IHC-20 *Suction Mount*

Easy to install with 2 strong suction cups and 6ft RG-58U cable, BNC male connector at end.

£14.95 ***£2.50 P&P***

Model IHDL

60W Dummy Load with Heat Sink

- SWR: 1.10 (250MHz), 1.20 (450MHz)
- POWER: 20W (cont), 60W (max)
- IMPEDANCE: 50 Ohm
- CONNECTOR: PL-259

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e-mail: steve.white@rsgb.org.uk

IN THE September edition of *RadCom*, I described how Alinco had produced add-on digital modulation boards for a couple of its VHF / UHF FM transceivers, thereby beating Icom and Kenwood's D-Star system to the market. I doubt, however, that this will affect Icom or Kenwood's plans, as their proposed system offers a more integrated approach to communication, with different data rates for data and voice, backbone and user. It is tempting to think that one or both of these systems may come to dominate the digital voice scene of the future, but it ain't necessarily so! There are plenty of opportunities for other companies and individuals to develop digital voice, and a couple of interesting devices that could be used as part of a home-brew digital voice system that came to my attention recently are the CMX639 and the CMX589A, both from CML Microsystems PLC.

The CMX639 is a continuously-variable slope delta (CVSD) codec. It is the part of the system that converts the analogue voice modulation to and from a digital stream. **Fig 1** shows the internal layout of the device. It can generate its own clock or be clocked externally, and data rates from 8Kbps to 128Kbps are supported. According to the data sheet, in general, optimum codec performance is achieved when both encoder and decoder crystal / clock signals are synchronized. While this is practical in many telecommunications applications, it may not be so for others such as radio data links. The CMX639 decoder can generally deliver best performance when its data clock is recovered or derived from the received data stream and applied as an external data clock to the decoder.

The CMX589A is a full duplex Gaussian Minimum Shift Keying (GMSK) modem. **Fig 2** shows the internal layout of the device. It can work from 4Kbps to 200Kbps, but the data sheet includes a cautionary note that the type of crystal used to clock it must be chosen carefully (tuning fork crystals do not generally meet the requirement). Both devices are available in SM and non-SM packages, both can be powered from supplies as low as 3V, and each consumes low current.

So there you have it. Digital voice need not require an enormous amount of development – devices are already out there that perform major parts of the function. Neither does digital voice require a large component count – existing devices require few external components. Devices of the future may integrate all the necessary functions into a single chip, so digital voice may become an even simpler proposition. The problem is that if numerous standards emerge it will become increasingly difficult to tune across a band and find a signal that can be decoded.

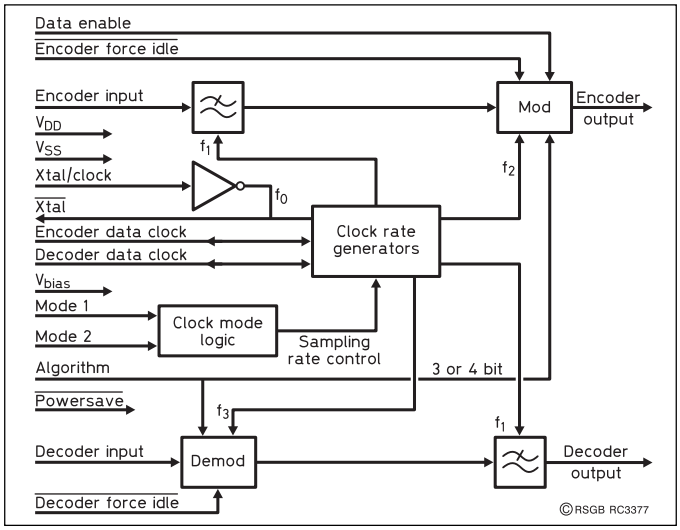


Fig 1: The CMX639 CVSD codec converts analogue voice to a digital data stream and back again. Its audio response is essentially flat from 300Hz to 3.4kHz. Clocking of the data is an important function.

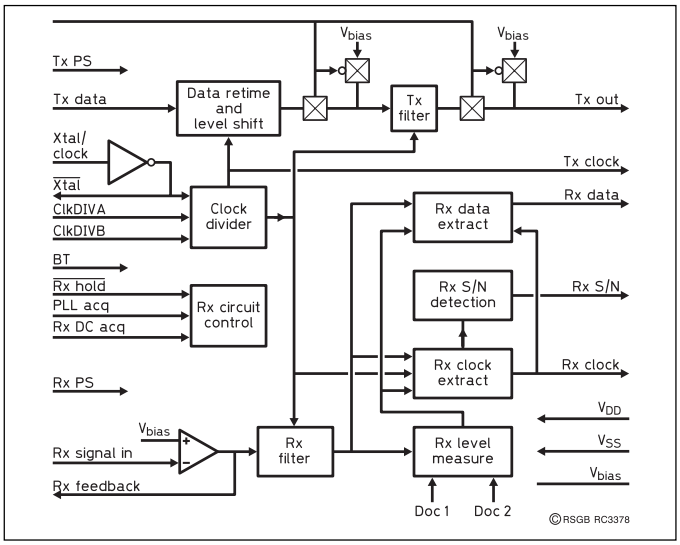


Fig 2: Block diagram of the CMX589A GMSK modem.

ENCOURAGING SIGNS

IN MARCH, I wrote 'No Fly Zone', an item in which I questioned why UK radio amateurs are not allowed to operate transmitters "from any aircraft or airborne vehicle" (as BR68 states it). I pointed out the fact that the administrations of some countries allow their citizens to operate amateur radio from aircraft, but went on mainly to highlight the activities of the Near Space Balloon Group, an American group of radio amateurs from Kansas who send helium-filled balloons high into the atmosphere and recover them when they finally return to earth. The payloads of their balloons have included SSTV transmitters, repeaters, computers and telemetry transmitters. Flights have lasted over three hours, heights of over 90,000ft (17 miles) have been achieved, and recovery has sometimes taken place over 150 miles from the launch site. When I looked recently, the NSBG web site was not available, but there was an equally interesting web site to be found – that of a group who call themselves Nebraska STratospheric Amateur Radio (NSTAR).

Clearly my previous words were remembered by Peter Badham, G0WXJ, when his company received an enquiry recently about radiosondes. To cut a long story short, it got several members of the Avon Valley Amateur Radio Association talking about the possibility of launching a balloon carrying an amateur radio payload. "With great gusto", as Peter puts it, "I approached the Civil Aviation Authority's Aerospace Utilisation Section to enquire about the regulations surrounding such projects. A very helpful chap there sent me all the details and even checked if we were in a 'no fly zone'. All-in-all he said there would be no problem. All we had to do was send in a form detailing the balloon release at least 48 hours prior to doing so." First hurdle crossed, methinks.

Feeling like he was getting somewhere, Peter's next step was to contact the Radiocommunications Agency, which he did the very

Lift-off of 'Asimov 2', one of the Kansas group's balloons.

next day. He e-mailed his question but, being impatient, decided to telephone too. Upon speaking to a gentleman in the Amateur Radio department, he was informed that there was absolutely no chance of getting an NoV for such an experiment. The reasons given were that "we operate as secondary users on many amateur bands and it is in fact the Ministry of Defence that expresses concern over amateur radio equipment operating in such a way." Peter was informed that the RA was, in fact, looking into such practices and the subject has been handed over to a committee for review. However, because there are many other agencies to be involved, it was likely to take some considerable time for a decision to come through. Peter added, "He also said that if such a decision was a positive one, there would be heavy restrictions on power, frequency, etc, and that bands where amateur radio was the primary allocation would be considered."

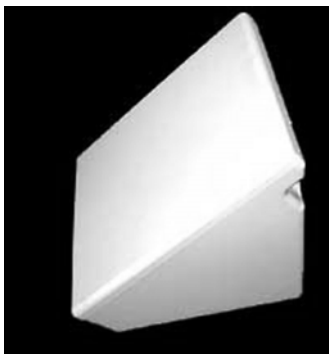
Having quoted BR68 once, I might as well do so again. The licence schedule indicates that the Amateur Service has primary status on all the HF bands (with the exception of 10.1 - 10.15MHz), plus 50.0 - 51.0MHz, plus 144 - 146MHz. Looking at it another way, the only band that Peter and his friends are likely be frustrated at *not* being able to use from a balloon is 432MHz. "With the implications on the weight of power supply, the equipment would automatically be milliwatting anyway," Peter says, adding "Don't you just love red tape".

Subsequently Peter received a written communication from the RA, in which it was indicated that they are currently finalising the restricted use of amateur radio on airborne vehicles. This would only be allowed on primary amateur frequencies with set parameters on the use of this service.

Whilst we are not yet cleared for take-off, the possibility of airborne amateur radio in the UK does now look more encouraging. Looks like a step in the right direction to me. If the launch of a balloon carrying amateur radio was brought to the attention to the media, it could also bring the hobby some positive publicity.

WHAT DISHES?

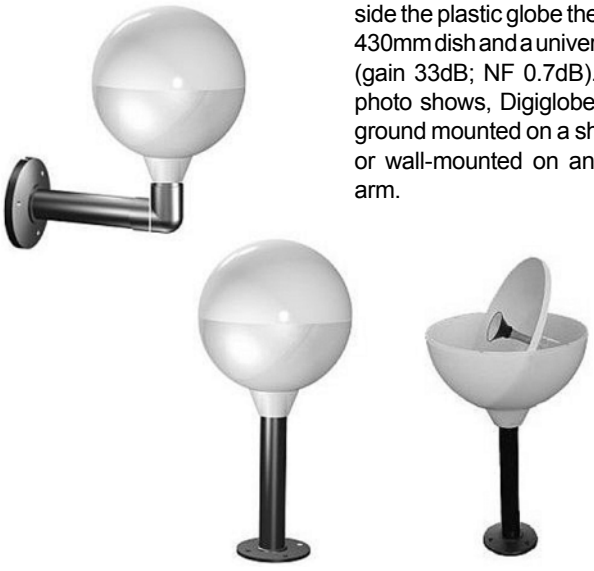
THOSE OF YOU who can erect antennas without anyone raising an eyelid ought to have sympathy for those who have the local council, partners or neighbours breathing down their necks even at the sight of a ladder being erected. Fortunately, there are things we – as radio amateurs – can do to minimise the visual impact of our antennas; sometimes we can even make them look like something else, but it's not such a simple task with a dish for satellite TV which has to 'see' the satellite. In conservation areas or shared properties, dishes are sometimes forbidden, but a couple of innovative companies have now come up with concealed and disguised dishes.



The discreet Digicube satellite TV antenna.

Digicube (above) is the first. All it appears to be is a plastic box with an angled front, but inside it contains a 490mm antenna and a universal LNB. The gain of the antenna is 35dB and the noise figure of the LNB is 0.6dB. Digicube is intended to be placed at ground level or on the floor of balcony.

The second antenna is Digiglobe. Here the developers have adopted a different approach – they have not tried to hide the antenna, instead they have made it look like an everyday object. Digiglobe looks like an outdoor light (see photo below), indeed it even contains a socket for a light bulb for it to be outdoor light! Inside the plastic globe there are a 430mm dish and a universal LNB (gain 33dB; NF 0.7dB). As the photo shows, Digiglobe can be ground mounted on a short post or wall-mounted on an angled arm. ♦



Digiglobe, the satellite TV antenna that can double as an outdoor light.

WWW.

CVSD codec chip: www.cmlmicro.com/products/twoway/CMX639.htm
GMSK modem chip: www.cmlmicro.com/products/wdata/CMX589A.htm
Nebraska Stratospheric Amateur Radio: http://members.cox.net/mconner1/nstar.html
Digicube and Digiglobe www.ddelec.com

If there is an item of new technology you would like to know more about - or one that you know about and think ought to be mentioned here - drop a line to the author, or e-mail him at the address at the start of the feature.

The GB4FUN Supporters' Honour Roll

GB4FUN 'Big Hitters'
Terry Barnes, GI3USS
Bangor & DARS, GI3XRQ

GB4FUN with members and friends of the Glengormley Electronics ARS, GI0XYZ. Following GB4FUN's highly successful visit to Northern Ireland, past RSGB President Terry Barnes, GI3USS, organised a collection among members of the Bangor & DARS and contributed a significant sum himself. Thanks Terry and members of the Bangor club!

R Browne, 2E0ATY
Mrs C E Sanderson, 2E1BRG
K J Jones, 2E1HXT
P Stepponat, DL7BAT
D J Walsh, EI5CD
D I Layne, G0AHK
P J Finbow, G0DEH
D L Moss, G0DLM
D J Marjoram, G0JVT
H Gorman, G0MVG
L C V Duncan, G0OLK
A G Gilbert, G0OMD
W E McCallum, G0POD
Prudential ARS, G0PRU
D C Symonds, G0PRZ
C A Garbett, G0RCX
E Barclay, G0SBX
R B Herrick, G0SZY
L Vaughan, G0VBO
Portland ARC, G0VOP
H Yearl, G0WKI
LRN Mills, G1HWR
R N Allen, G1IPO
P J Brolan, G1MPU
R J Pennington, G1NVS
JFC Scott, G1OLD
A Woodhouse, G1WFJ
M V Beach, G1YQH
N I Neame, G2AUB
A Williams, G2DQW
J H Knowles, G2FXS
E G Anthoney, G2HFW
R A Lord, G3DSK
V D Bullett, G3EAO
A Seed, G3FOO
H J Hudson, G3FVL
S P Hay, G3HYH
M Watson, G3JME
G Dale, G3MFH
F E Garrett, G3MVZ
R P Smith, G3SVW
I D Brown, G3TLH
M H Roach, G3TWJ
M G Foster, G3VOF
P Burgess, G3VPT
R C Beadle, G3VQG
G W Gardiner, G3WEB
Otley ARS, G3XNO
E Tredgold, G3XWI
R L G Kemp, G3YYF
S W Taylor, G4CKX
J P Ball, G4DPI
K L Bird, G4JED
A Rhodes, G4KIJ
W C W Dean, G4MFD
R E Curtis, G4MGZ
C J Seymour, G4NNA
P Langdon, G4OLE
B H Lowe, G4PPC
J Muzyka, G4RCG
E Meekers, G4SNR
D J P Herd, G4SOZ
P Barnett, G4TMC
D Blackwell, G4UFX
B Crow, G4UYJ
G R Dymond, G4VQL
S G Hill, G4XRO
B Shaw, G4YKA
A W Gilbey, G4YTG
J Diaz, G4ZHS
J L Scott, G4ZTF
A C Wright, G6AQV
P F Minshull, G6DQM
D M King, G6KWA
M R Law, G6OKU
D Cadman, G6XGF
B Mellor, G7UOT
K Sharman, G7VJA
P E J Tester, G8CIG
A D Heasman, G8GJO
G L Robotham, G8KLH
C Rose, G8MKE
Dr A J Kent, G8PBH
P F Byrne, G8PWG
P S Gebbie, G8YQN
Dr A K L Chin, GI0XAC
J R Stapleton, GM0GKR
A J C Plumtree, GM0KAI
D J Simpson, GM3LVA
J O Smith, GM4UYP
J G Howell, GM4ZQH
J E Martin, GU3YIZ
D J Workman, GW0OHJ
D W Jones, GW0UDJ
A E Gwynne, GW3LNR
O W A Wade, GW3YVC
P W Granby, GW4OKF
V Schaldach, HB9DUK
D H Walker, K0COP
R S Johnson, M0AKE
V G Saundercock, M0AVS
M Fitchett, M0BMX
D E Francis, M0CDV
R F Henshall, M0CVK
D G Morris, M0DAV
J Tildesley, M0DIT
K Brown, M0TCP
W Greenall, M1AIX
M A Sanderson, M1AQI
A G Dent, M1ELM
J J T O'Toole, M3HEM
Mrs C I Law, M3OKT
D J Rees, MW1ARM
D P Usher, RS173492
Dr A Kicman, RS178972
M J Dunn, RS44977
A F Walker, RS91042
D P Bishop, RS91087
I Dobnik, S51DI
J W Pearson, VK5AJF
Dr R L Winslow, W2DAP
B J Ryall, ZL1AVZ

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.

The RSGB is also grateful to those many generous members who have sent donations anonymously, or who have asked us not to publish their names.

RadCom Helplines FOR MEMBERS

● Richard, G7EML, needs a manual and / or circuit diagram for the **Schlumberger Stabilock 4021 radio test set**. All postage and photocopying costs will be reimbursed. G7EML, *not* QTHR. Tel: 0113 258 4903 or e-mail jrhardcastle@aol.com

● Ken, G3XSJ, is looking for any information on a rare early **projection TV**, the **Philips 799**, dating from 1949. He would especially like a circuit diagram. As the usual sources have not turned up anything and the chassis was almost certainly shared with other models, a circuit of similar-age Philips sets using EF50s might provide a close match. All costs met. G3XSJ, QTHR. Tel: 01453 845 013 between 6.00 and 9.00pm or e-mail: kenbrooks@iee.org

● Pat, G3MA, is looking for circuits, layout, alignment details, on the ex-government radio model **R209 MkII (ZA41981)** - BFO not working. G3MA, QTHR. Tel: 01452 539 519.

● Roy, GW4DYY, would appreciate the loan or a photocopy of the manuals for the T**rio TW-4000A** and the **Trio R-1000**. All expenses will be refunded. GW4DYY, QTHR. Tel: 01938 580 280 or e-mail: roymander@aol.com

● The Curator of HMS Collingwood requests service information for the **Hammarlund SP200 communications receiver**. W E Legg, Radar & Communications Museum, Maritime Warfare School, HMS Collingwood, Newgate Lane, Fareham, Hants PO14 1AS.

- IMPORTANT NOTE -

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.

'Helplines' is a free service to members. Requests for help are published in the order in which they are received. We regret it is not possible to provide an undertaking of when any submitted request will appear.

LINEAR AMP UK

Field Head
Leconfield Road, Leconfield,
Beverley, E. Yorks. HU17 7LU
E-mail: sales@linamp.co.uk

Telephone / Fax:
01964 550921

Website: www.linamp.co.uk

New Generation CHALLENGER III

About 8 years ago the first Challenger and Discovery were made by Linear Amp UK. Over the last year a complete refurbishment has been in progress. Firstly was to change over to the popular and robust Russian tubes, the GS31 and GS35 now being available at many outlets at a very competitive price. The GS35 has a similar output power to the 3CX 1500A7 and the GS31 is similar to the 3CX 800A7, yet both are physically larger and have a much higher maximum operating frequency. With the help from Ian White, G3SEK we are now using a very much more advanced control board made especially for the new amplifiers. The new control board has two levels of protection, 'hard' for the major faults such as internal valve flashover and 'soft' for over drive, grid over-current etc. The new amplifiers now have EBS electronic bias, soft start and fast internal relays for smooth operation and protection.

The new Challenger now has a new chromate finish internal chassis to improve the look and electrical performance. The band change switch now has a new large ceramic output stage especially designed by Jackson Bros for LA UK Ltd. The cooling is now a special internal flat-pack blower made by Papst in Germany. The power output should be more than adequate for most people! With 100 watts of drive the power is around 1500 watts o/p and at 400 watts only needs 30 watts of drive so giving your transceiver a very cool ride. The amplifier is selling well all over Europe since the launch at Friedrichshafen in June via WiMo in Germany and other good quality Ham shops in the EU.

CU9D operated by HB9CRV / CT3FN in IOTA quoted *"I was impressed how flawless the amplifier worked under severe conditions heat, dust and salty humidity"*

The price is now less than the early Challenger due to the saving on the cost of the valve. You can have a full specification amplifier for only **£1795 inc VAT.**

The DISCOVERY for VHF and UHF

4 brand new models for 2002

Over the last 8 years the Discovery has been used in many VHF operators shacks to win or do well in major contests and also to do EME on all bands from 6m to 70cm. Most of the amplifiers used the famous 3CX 800A7, which has performed well but with a valve and base costing around £500 it was time to look for an alternative. We started using a prototype with a GS31 about 18 months ago and we have been very impressed with the tube. We have now re-designed the Discovery with the help and cooperation of Ian White, G3SEK to have four complete new models.

Like the Challenger, the Discovery has the new control board which controls the amplifier and protects it in the event of a problem arising. All the amplifiers have a large coaxial O/P relay from Amphenol. The cabinets which are made by Bonney Greenhalgh & Co Ltd. are high spec CNC manufactured. The chassis and outer covers are strong powder coated finish in charcoal while the RF compartment is aluminium with an alochrome finish to give high efficiency up to 70cm.

There are two 6m models, one with a GS31 which will give over 1kW with around 100W of drive. The other has a GS35, which is a very high spec amplifier producing 1500W from 100W.

The 2m Discovery was introduced this Summer and was used on the first claimed VE to EI contact. It was also used from GJ by Conrad, G0RUZ to achieve over 30 EME contacts in one weekend from his portable station.

The 2m model (GS31) will produce over 1200W from a 100W radio, so there is plenty in hand for cable loss to give you 400W at the antenna!

The new GS31 70cm amplifier as used by G4DEZ is proving to dominate the band in major contests, its O/P power is about 800W.

"I am now using two of your latest series of amplifiers, 70cm & 6m..... I wholeheartedly recommend them to anybody who wants to generate a strong, clean signal on the VHF UHF bands" Bryn, G4DEZ

6m GS35..£1595, 6m GS31..£1395, 2m GS31..£1395, 70cm..£1495

Surpr!se Yourself - Guides and Scouts

At the end of July and beginning of August, a series of international Scout and Guide camps throughout the UK provided the opportunity for many thousands of young people to discover amateur radio for the first time. We have reports from 'Chamboree 2002' in Cheshire, 'Flame 2002' in Hampshire, 'Bounce Camp' in Northamptonshire, 'Unity 2002' in the West Midlands, and 'Cumbaree 2002' from Cumbria.

'Chamboree 2002', Knutsford, Cheshire

by Frank Mallows, G1GYJ / M3GYJ (Mid-Cheshire Scout Radio Communications Advisor)

THE CHESHIRE SCOUTS International Jamboree, 'Chamboree 2002', took place from 27 July to 3 August in the grounds of Tabley House, Knutsford, Cheshire. We were fortunate enough to have had the use of the RSGB's mobile amateur radio demonstration vehicle, GB4FUN, for the duration of the camp.

The main operators were Hans Field, G4XFD; Frank Mallows, G1GYJ; Colin Rickerby, G1NWA; RSGB Regional Manager Kath Wilson, M1CNY; and Deputy Regional Manager Dave Wilson, G7OBW.

Scouts and Guides visiting GB4FUN were given the opportunity to take the communicator proficiency badge course and, if successful, gain their badge. About 20 Scouts signed up and were given the appropriate instruction leaflets to study. The phonetic alphabet and some of the commonly used Q-codes had to be learnt, as well as 25 amateur stations logged. How to tune a radio and find stations was part of the badge work and Scouts were shown how, then encouraged to try for themselves. The full week provided ample time, as GB4FUN was available in their free time as well as activity times. A number of Scouts were quite keen on the badge work, and it seemed as though they had got 'the bug'. Fortunately for this group, whilst they were busy logging stations, conditions were good and stations could be heard quite clearly from faraway places such as Argentina, Nepal and the Cook Islands. The Scouts were amazed and could not believe their luck.

Besides those involved with badge work, other Scouts and Guides were told about GB4FUN, what it was there for, and how it worked. They were given an explanation of amateur radio as a hobby, how exciting it can be, making contact with people like themselves, from other countries as well as locally within the UK. The youngsters were encouraged to tune a radio for themselves to find out what it was like searching for stations. Some of the Scouts and Guides were particularly interested in taking the next step and training for the Foundation Licence course.

A group of Dutch Scouts in the GB4FUN van.

We met some Scouts and Guides who had previous experience of amateur radio from Jamboree on the Air (JOTA), which takes place on the third weekend in October each year [**19 / 20 October 2002** - *Ed*] or Thinking Day on the Air (TDOTA) on the anniversary of the founder's birthday in February. This demonstrated well the spirit of friendship: how contacts made can turn into meetings in the future.

The Cheshire Cub Scouts visited the camp with their leaders to gain an insight into an international jamboree. Several Cub Scout groups visited the station, and some sent greetings messages over the air. The camp also had a visit from a group of children from Chernobyl, not Scouts or Guides but just on a visit staying with families in the county. These children visited our station with their interpreter Tania, and were able to give their names and say hello to British radio amateurs in their own language (I don't suppose many amateurs understood!)

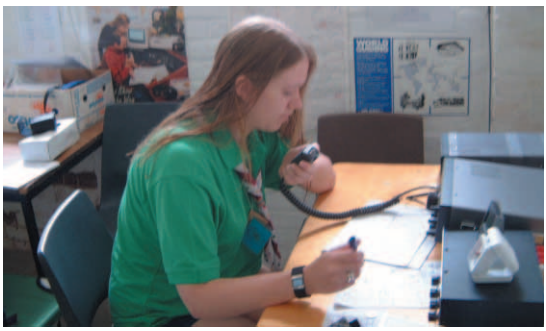
The Chief Scout honoured us with a visit, talking to us about the working of the station and the participation of the Scouts and Guides. There were also visits by the county commissioner, district commissioners, and Scout leaders, some of whom held their own amateur radio licences. GB4FUN was visited by Scouts and Guides from Holland, Sweden, Russia, Canada and Ireland, as well as various parts of the UK. I believe the demonstration station was a great success, that the Scouts and Guides really enjoyed their time with us, and look forward to JOTA in October.

'Flame 2002'

by Brian Jones, G0UKB

SURPR!SE YOURSELF. In case you don't recognise that, it's Girlguiding UK's current catchphrase. In August, 100 young ladies certainly surprised themselves when the amplified speaker kits they had just made burst into life and the unmistakable energy of Queen's *We Will Rock You* reverberated around the radio shack!

Foxlease, just outside Lyndhurst in the New Forest, is Girlguiding UK's oldest training centre. In August 2002 it found itself home to 'Flame 2002', an international Girl Guide and Girl Scout camp organised by Girlguiding



Lucy, M3LMJ, using GB2HWG to make contact with VK5IAM, which turned out to be the station's best DX.

Hampshire West. 1500 girls (plus a handful of boys!) from 21 different countries spread themselves over a dozen subcamps dotted around the site. Subcamp 'Notting Hill' (all the camps were named after carnivals from around the world) also contained the amateur radio station, GB2HWG.

GB2HWG ('Hampshire West Guides') managed to wangle one of the few brick buildings on the site so we were able to keep the loaned Kenwood TS-570D and Icom IC-756PROII nice and dry (thanks again Kenwood UK and Icom UK). The HF rigs were complemented by a G5RV at 25ft and an old Hustler multi-band vertical. The VHF station consisted of a Yaesu FT-8100 into a collinear, again at about 25ft.

The Itchen Valley Special Event Team organised GB2HWG with support from members of the Waterside, Andover and Itchen Valley amateur radio clubs. We decided to try something a little adventurous and introduce the girls to soldering. The choice of project was paramount; it had to be something useful and exciting but also something simple enough to guarantee most of the girls would get it working first time. We settled on an amplified loudspeaker which could be plugged into any Walkman-style portable stereo in place of headphones. The TDA7052 audio amp chip requires few external components and puts out 1 watt, more than enough to impress friends and annoy parents.

GB2HWG was not just the camp's amateur radio station but also part of the main camp activities. Twice daily for five days 10 girls would descend upon the radio shack and demand to be kept amused, entertained and educated for two hours. For the main sessions we split the girls into two groups of five and each of the groups would spend one hour either making the amplified speaker kit or finding out about radio before swapping over. Yes, that meant that the girls (some as

Find Out About Amateur Radio

young as 10 and some with limited English) had just one hour to learn to solder, make 41 solder joints and box and test the resultant kit. The assistants worked hard!

The 'worked first time' rate for the kits was about 85%, most of the failures happening when we were short staffed and needed one instructor to supervise three young ladies.

The gasps of amazement when Roger Taylor's driving drum beat introduced *We Will Rock You* to the shack (in competition with exactly the same tune coming through the open windows from the 'It's a Knockout' team across the field) were magnificent. These youngsters were even more proud of their construction than I am of my Elecraft K2. The units were deemed useful too: one subcamp leader assured us that one girl was testing hers at 4.30 the next morning!

Whilst one group built the amplifiers the other was experiencing radio. A brief introduction to the bands, callsigns and HF SSB vs VHF FM was followed by a practical demonstration of radio, with the girls passing greetings messages and then playing 'battleships' via PMR-446 handhelds. We made some nice inter-G contacts including those with several other Scout and Guide camps. During a couple of the evening sessions we managed to set up 80m skeds with M0BMF. The delight on his granddaughter's face when she passed her greetings message, across the noisiest 80m band I've heard in a while, was amazing.

DX? Lucy, M3LMJ, had only just christened her callsign before coming to the camp as a member of the craft team. Early Tuesday morning she worked her first Australian station, VK5IAM, and then caught PJ2/M0WLF for good measure.

Was the venture a success? Were those 1700 holes drilled in the boxes, 500 track breaks and hours of hunting to shave pence off component costs worth it? A resounding *yes*! There are three new candidates for the next Foundation course, even though we weren't pressing radio as a hobby - the goal was to ensure the girls had fun, enjoyed the experience of building something useful that actually worked and shared the enthusiasm of the team. Their faces told us this goal was not merely achieved but surpassed.

The camp itself was superbly run, the food excellent and the girls' enthusiasm heart-warming. So next time you hear of a large youth activity ask yourself, "Will an amateur radio station add something to the event?" Then ask yourself "Can I offer something more than just stuffing the microphone under the nostrils of some youngsters?" "Can I find something that will really excite and enthuse them?" I bet the answer is "*yes*", so go on - Surpr!se Yourself.

A Week at Bounce Camp with the Guides
by John Chisholm, M5TTT

GUIDE LEADER Sue Hall, M5AFY, organised special event station GB2BGC ('Bounce Guides Camp') to run from 27 July until 3 August at Boughton House in Kettering, Northamptonshire. Some 850 Guides from Hawaii, Malaysia, Uganda, Nigeria, Japan, Slovakia, Hungary, the USA and, of course, the UK visited and camped at the site. Each day they visited a variety of events from circus training to a crystal maze. The radio tent was one of these events. How popular we were! We had to limit the number at any time to 15 plus staff.

The Guides were taught how to send their names in Morse at about 5WPM, then they learnt the phonetic alphabet so they could say their name on the air in phonetics. It was a laugh a minute! The Guides wrote down their names, Guide group, area they were from and any hobbies, interests, pets etc they had. They then queued to wait their go on the air. They went on to read their notes to the patient waiting contacts. They received a certificate saying they had been on the air and a badge with the Guide Emblem saying "I've been on the air with the Guides!" They were all proud of their achievements and so were we. It was the most successful radio event I have operated in, and the surprising thing is that the children were absorbed by the Morse, and many came back to learn more after the events were supposed to be closed.

The fascination in radio was very evident. I am sure events like these will inspire youngsters to join our hobby. I would like to thank Ray, G4MRA; Tim, G0RTC; Sue, M5AFY; Sandra, M1BPZ, and Bob (ex-Signals) for all their hard work, time and effort, and the loan of equipment. Anyone wishing to donate equipment for these Guides' events in the future should contact me, John Chisholm, M5TTT, tel: 01604 454516 (evenings) or e-mail: john@chisholms.co.uk Any equipment would be gratefully received.

The magnetic draw at Bounce Guides Camp was the opportunity to learn some Morse code.

Asya Shcotova, from Volgograd, sending a greetings message, with John Simons, M3ZAM.

'Unity 2002' International Guide Camp
by Stan Houlding, G0BYA, and Roy Clarke, M0RLY, RSGB Regional Manager, Region 5: West Midlands

THE ST LEONARDS Amateur Radio Society operated special event station GB0IGC ('International Guide Camp') from 29 July to 2 August for the Guides' 'Unity 2002' camp. The event was held at Shugborough near Stafford, in the West Midlands, home of the Earl of Lichfield. Over 1000 guides from the UK and all over the world, including Russia, Canada, Japan, Kenya, Australia and Ascension Island took part in the Jamboree.

The station was set up in support of the event, and to demonstrate our hobby to Guides and leaders. Operators were Richard, M0EWW; Stan, G0BYA; Gary, M0TTO; John, M3ZAM, and Dave, M0DJF. Representing the RSGB were Roy Clarke, M0RLY, the RSGB Regional Manager, and Arnold Matthews, G3FZW, Deputy Regional Manager.

Many of the guides took the opportunity to pass greetings messages to other camps and radio amateurs and they were warmly welcomed by all they spoke to. Some 200 Guides took a turn at sending their names on the Morse practice oscillator.

A great deal of interest was shown in the 'Foundation Licence' and Guides have taken details back to their local units, so we look forward to working some of the young ladies in the near future.

This event was very well received. The operators and organisers worked hard during the week and were amply rewarded by the enthusiasm shown by the girls.

'Cumbaree 2002'
by Guy Moser, G3HMR

BETWEEN 29 July and 1 August 1200 Scouts and Guides from 16 countries, with 300 Leaders and 200 helpers, took part in 'Cumbaree 2002' at the Westmorland County Showground near Kendal. GB2CUM was on the air from under canvas and it is estmiated that over 150 Scouts and Guides visited the station and were given information about the Foundation Licence scheme. ♦

Down To Earth

Newcomers' News

News and Comment from and for Amateur Radio's Newcomers. Compiled by Steve Hartley, G0FUW *

LOTS TO FIT IN so, without further ado, to the post bag.

SCHOOL ACTIVITY DAYS

ROBIN ROOM, M0RCR, is the Design and Technology technician at Oldfield School in Bath. As well as helping us with our evening classes Robin (was) volunteered to run a 'radio day' as part of the school's activities week. This proved so popular when it was advertised that it soon became *two* radio days!

On each day around 10 girls were treated to talks about radio communications, the RSGB video and a display of radios dating from the 1930s to present day. The girls also took part in a range of practical sessions including building a medium wave receiver, exchanging greetings messages on the 40m band and taking a 'mock' Morse assessment.

As you can imagine, they were a couple of very busy days, but the girls must have enjoyed it as several have already registered for the next Foundation course. There are vague plans to repeat the exercise again next year, perhaps with a visit from GB4FUN, the RSGB mobile demonstration station?

Robin, M0RCR, with some of the girls, who became less and less mic-shy as the day went on (see 'School Activity Days').

EXAMS ABROAD?

PETER Pennington, G4EGQ, runs an on-line Radio Amateurs Examination (RAE) correspondence course (see www.penningtonp11.freeserve.co.uk/index.htm) and he has asked how the changes in the UK exams will affect those countries outside the UK who use the current City & Guilds exams.

I understand that this is a matter for the national societies to sort out with their licensing authorities. I guess they could approach whoever picks up the contract from City & Guilds, hopefully the RSGB. However, without the soon to be mandatory progression through the UK licensing exams, the revised RAE is unlikely to be sufficient for use elsewhere.

I asked Ted Alleyne, 5Z4NU, how this might affect Kenya and he reports that they are waiting to see how things pan out, but their national society is conscious that the City & Guilds RAE has just three sittings left to run.

Any thoughts from those other countries that currently use the UK exams?

MD3 FOUNDATIONS

I CAME TO contact John Butler, GD0NFN, when someone sent me a computer virus purporting to be from John's account. It wasn't, and I later found out a number of other amateurs had received similarly infected e-mails appearing to be from *bona fide* RSGB members.

Anyway, John told me how Foundation training is up and running on the Isle of Man and that there are over 20 MD3 callsigns now active. Plans for some Intermediate training were put on hold in favour of the Foundation courses but now the newcomers are keen to progress, spurred on by their Foundation success. Great news John, keep it up!

MORSE SPEED

THE QUESTION of Morse code sending and receiving speeds has proved extremely popular with readers. However, I must draw things to a close as there seems to be as many who can read the code faster as those who can send it faster.

Writing or typing the received messages slows you down, says Graham Eagle, G4UTX. He believes that the brain can receive and de-code the dits and dahs much faster than the hand can write, type or even operate a Morse key, the opposite view of Dr Cliff Ayling, G4HSU (see August 'Newcomers' News').

David Reynolds, G3ZPF, also notes that his transmit speed is limited by his reflexes and the use of a straight (up and down) key. He says that he struggled to meet the 12 word per minute (WPM) test back in 1970 and only realised that his receive speed had improved when he listened to a friend's Morse tutor and thought 12WPM was "way too slow". David recons that regular use of the code increased his speed by 1WPM each year.

CLUB VISITS

ROBERT SNARY, G4OBE, is the RSGB Intermediate Training Co-ordinator but he has been busy with Foundation courses of late. Robert has asked me to pass on his offer to provide talks on the revised UK training and licensing structures to radio clubs within reasonable travelling distance of his home in Enfield. He can be contacted on 020 8360 6555 or via e-mail: robert.snary@rsgb.org.uk

I would like to echo Robert's offer for any clubs in the South West. I have already visited a couple of groups in Bristol and will be at the Swindon club on 10 October. My contact details are set out below.

WHAT CALLSIGN?

REGULAR READER Brian Davis, 2E0BGD, asked me about the various UK callsigns that he has come across on the bands. As Brian pointed out, the exams only cover the *current* callsigns.

A fairly comprehensive listing can be found in the *RSGB Yearbook* (page 17 in the 2002 edition) but I have provided a potted version in **Table 1**. I hope this helps Brian and other newcomers to make sense of the 'rare' calls within the UK. ♦

Class A Licences
G2 plus two letters - 1920-39
G3 plus two letters - 1937-38
G4 plus two letters - 1938-39
G5 plus two letters - 1921-39
G6 plus two letters - 1921-39
G8 plus two letters - 1936-37
G2 plus three letters - pre-1939
G3 plus three letters - 1946-71
G4 plus three letters - 1971-85
G0 plus three letters - 1985-96
M0 plus three letters - 1996-present
M5 plus three letters - 1999-2001 (originally Class A/B)
2E0 plus three letters - 1991-present (Intermediate, limited to 50 watts)
Class B Licences (VHF / UHF)
G8 plus three letters - 1964-81
G6 plus three letters - 1981-83
G1 plus three letters - 1983-88
G7 plus three letters - 1988-96
M1 plus three letters - 1996-present
2E1 plus three letters - 1991-present (Intermediate, limited to 50 watts)
Foundation Licence (no Class A or B, limited to 10 watts)
M3 plus three letters - January 2002-present

Table 1: Years of issue of UK callsigns (see 'What Callsign?') *Note*: Regional Secondary Identifiers omitted for clarity.

* *5 Sydenham Buildings, Lower Bristol Road, Bath BA2 3BS; e-mail: newcomers.radcom@rsgb.org.uk*

What is Speech Processing?

A guide to this seemingly-complex subject by Ian Poole, G3YWX *

SPEECH PROCESSING is a vital part of SSB communications, particularly on the HF bands. It enables the best use to be made of the available power and often provides as much, if not more, equivalent gain than a linear amplifier, and all this at a fraction of the cost of a linear. Also, where the legal power limit is a restriction, speech processing will legally enable a gain of several decibels to be achieved. Today, virtually every new HF transceiver incorporates a processor, although many older rigs do not, and an external unit can be a very worthwhile acquisition. Whether an internal or external processor is used, a knowledge of speech processing can enable the best use to be made of the equipment.

HOW DOES IT WORK?

THE PROBLEM with speech is that it contains lots of peaks, but its average is very low. If a speech waveform is viewed on an oscilloscope it might look something like that shown in **Fig 1**. It can be seen that there are a few peaks but, for most of the time, the voltage is much lower. In addition, the overall 'loudness' of the speech may vary as the speaker moves nearer or further away from the microphone, or places more emphasis on some words than others.

As the output power of a single-sideband (SSB) transmitter depends on the instantaneous value of the audio, this means that, if the audio has short peaks and a low average power, the same will be true of the output from the transmitter. This does not utilise the transmitter power very effectively. If the average output power could be raised, the received signal would be much stronger and the available transmitter power would thus be used far more effectively. This is exactly what a speech processor does. The use of such a device can add up to about 8dB effective gain in some circumstances.

It must be said that the situation is not quite the same for FM and the use of a speech processor is far less critical. Here, the magnitude of the carrier determines the strength of the signal, and this is independent of the modulation.

There are several different techniques that can be used for processing speech: compression, clipping, and frequency tailoring. Each has its own part to play, and some processors may use all three methods.

COMPRESSION

AS THE NAME IMPLIES, this method of processing involves compressing the 'dynamic range' of the audio signal. This can be achieved by having a circuit where the audio gain is reduced as the signal is increased.

There are two ways in which this can be achieved. The first is where the audio gain is adjusted instantaneously, varying the gain over each part of the waveform. This type of compression is known as 'instantaneous compression', and is illustrated in **Fig 2**.

The other type of compression looks at the short-term magnitude of the incoming waveform and adjusts the audio gain accordingly. This type of circuit operates very much like an AGC system in a radio, and is implemented by introducing a time-constant into the control loop placed around the amplifier as shown in **Fig 3**. This type of compressor is the one that is more likely to be found in amateur radio systems where the name VOGAD (Voice-Operated Gain-Adjusting Device) may be used. These circuits are often used to maintain constant audio to the next stage.

For this type of compressor, the time constants in the feedback loop are very important and must be chosen carefully. A fast 'attack time' is required so that the circuit can react very quickly to the sudden increases in audio (transients) which are always present. The attack time is the time that the compressor takes to respond to a sudden increase in voltage. If the attack time is too slow, the transients will pass through into the next stages where they may cause overloading and distortion. As a general rule, an attack time of around 10ms is usually chosen.

The decay time is also important, and it is generally much

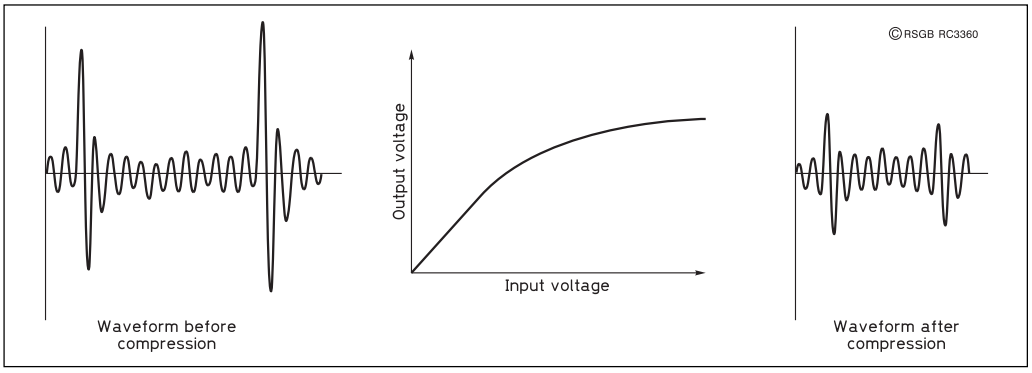


Fig 2: Instantaneous compression, where the gain of the amplifier reduces as the waveform voltage increases at any instant.

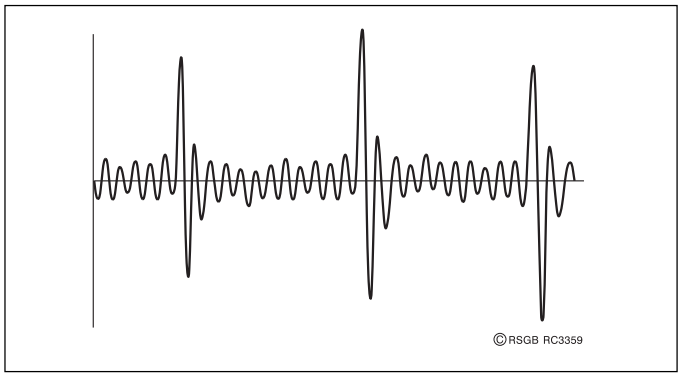


Fig 1: A typical speech waveform.

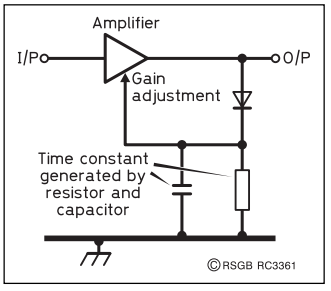


Fig 3: An audio compressor with a time constant in the control loop.

* 5 Meadway, Staines, Middx TW18 2PW.

longer. For speech processors used in amateur communications equipment, a figure of around 300ms is ideal. This enables the compressor to follow the general variations in the speech and keep the overall audio approximately constant.

It is worth noting that, when a compressor is used, it is possible to regenerate the original audio at the remote end. This can be done by having an equivalent piece of equipment at the receiver called an expander. This has the inverse response to the compressor, having a larger gain for larger signals so that the original signal is reconstituted. Normally this is not required for amateur applications.

CLIPPING

ANOTHER METHOD of reducing the dynamic range of a signal is known as clipping. As the name implies, it 'clips' or removes the peaks from the audio waveform and thereby increases the average value of the signal. Often, the degree of clipping may be mentioned; it is defined as the ratio between the peak of the signal before clipping, to the peak of the signal after clipping, and expressed in decibels - **Fig 4**.

Clipping may be accomplished in several ways. A transistor amplifier, or one using an operational amplifier may be driven hard so that the output is limited as the it nears the voltage rails. Sometimes a pair of back-to-back diodes may be used but, as these have a gradual turn-on, it may be considered as a form of compression. Some methods of clipping are shown in **Fig 5**.

While clipping may appear to distort the signal severely, the effect is not quite as bad as may appear at first sight. The human ear recognises sounds by their frequency content more than by amplitude changes. However, it should be remembered that clipping adds distortion, and this manifests itself in a radio system as harmonic and intermodulation distortion. To remove as many of the distortion products as possible, a low-pass filter is placed after the clipper. The normal audio bandwidth for communications purposes extends up to between 2.5 and 3kHz, and the filter is designed to remove any products above this frequency (**Fig 6**). However, some distortion products usually remain within the audio bandwidth, and these cannot be removed. They tend to detract from the quality of the signal, reducing its intelligibility. This means that the degree of clipping is limited to figures of around 10 to 15dB, meaning that the maximum achievable gain is around 4 to 5dB. To increase the degree of clipping that can be used, a method of removing the distortion products must be found.

RF CLIPPING

IT IS POSSIBLE to remove the distortion products generated by using a process known as RF clipping. To clip a signal at a radio frequency, a single-sideband signal is first generated (see **Fig 7**). This may involve passing the audio into a balanced mixer with an RF local oscillator signal to generate a double-sideband signal which is then filtered to remove the unwanted sideband as shown in **Fig 8**. Another method would be to use phasing techniques. Whatever method is used, the signal is then clipped. As the harmonics fall at multiples of the radio frequency, these are easily removed using a filter. Once this has been done, the audio signal can be regenerated using a balanced mixer, or it may be passed on to further stages in the transmitter, if it is an integral part of the transmitter.

RF clipping is far superior to audio-frequency clipping, although it requires more circuitry and is more expensive. It is necessary to have circuits to generate a single-sideband signal with a good degree of carrier suppression; it is necessary to clip, filter and then possibly demodulate the signal. On the positive side, it is possible to achieve good clipping while still retaining intelligibility. With this type of clipping, an effective gain in the region of 8dB is possible - about 3 or 4dB more than an audio clipper. While much greater clipping can be used with RF, higher levels of clipping reduce the naturalness of the audio. This results from the clipping process emphasising the stronger audio components, and reducing the weaker ones. This is one of the reasons why some people do not like to use high levels of clipping, especially under good conditions when the clipper is not needed.

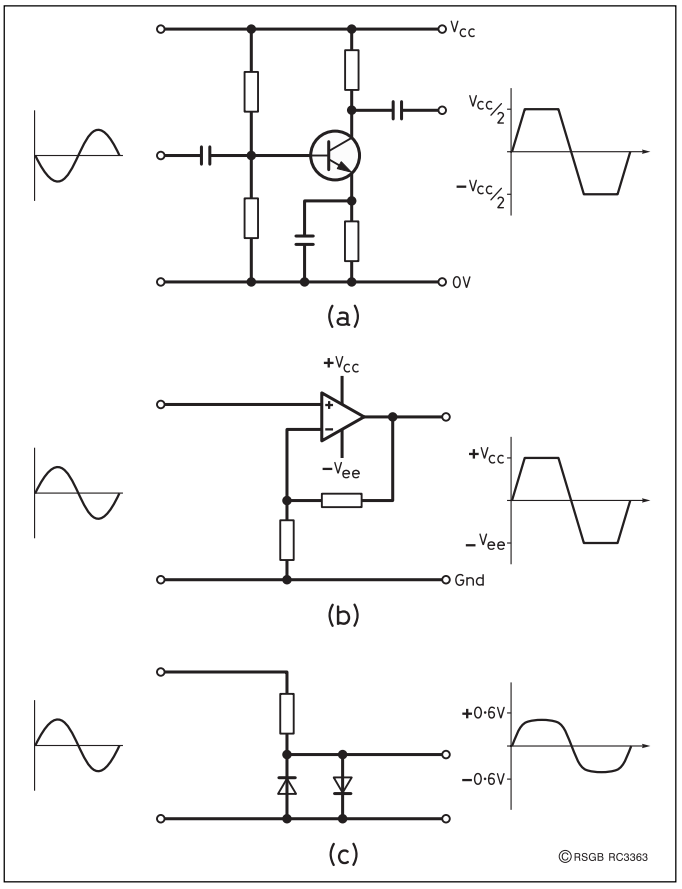


Fig 5: Methods of achieving clipping. (a) Transistor, (b) Op-amp, (c) Diodes.

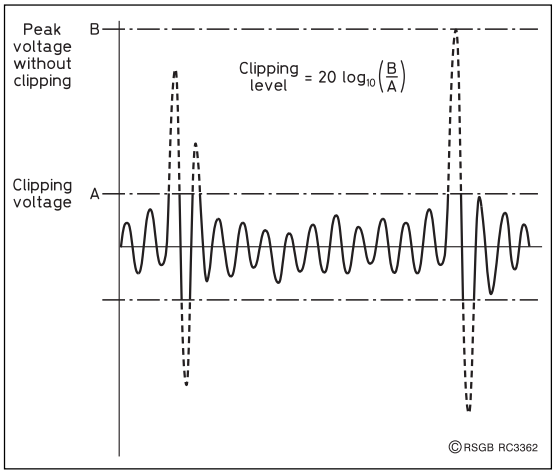


Fig 4: Clipping a signal.

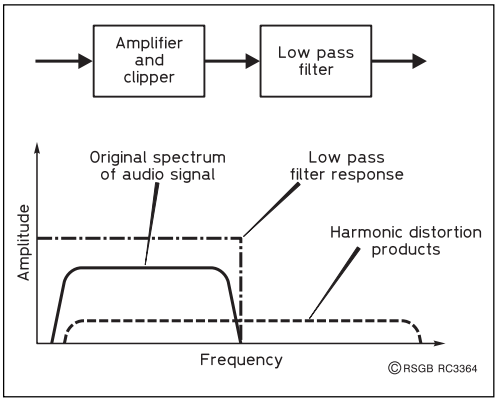


Fig 6: Removing distortion products after audio clipping.

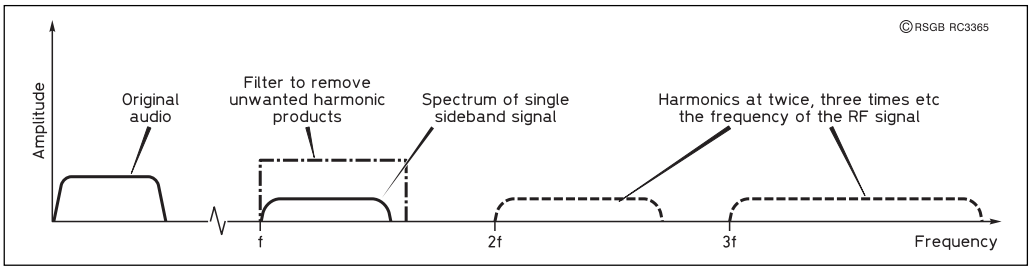


Fig 7: Removal of the unwanted products after clipping at radio frequencies. The widths of the harmonic spectra are not to scale.

AUDIO BANDWIDTH LIMITING

APART FROM CLIPPING and compression, limiting the audio bandwidth can prove beneficial for a number of reasons. First and foremost, it ensures that the bandwidth occupied by the transmission is kept to a minimum so that interference is reduced as far as possible. In addition to this, there is no advantage to be gained by using transmitter power on frequencies that are not really needed to carry the speech information. Generally a bandwidth of 300Hz to 3.3kHz is taken as the telecommunications standard. Even so, it is possible to reduce it still further and, in many amateur transceivers, the audio response may extend only as far as 2.7kHz. The main problem encountered in reducing the bandwidth is that some of the sounds with a large high frequency content will not be so easy to distinguish from each other.

Advantages result not only from reducing the bandwidth. There are benefits in altering the frequency response to emphasise some frequencies and reduce others. This is known as pre-emphasis. It is particularly useful because the process of clipping has the effect of emphasising the stronger components and reducing the weaker ones. This can be useful because the components of speech below about 600Hz have relatively high intensities, but contribute less to the intelligibility of the audio. By reducing the components below 600Hz and emphasising those between about 1.5 and 3kHz, some improvements can be made. Usually, a simple filter that reduces the magnitudes of frequencies below about 600Hz is quite satisfactory.

THE IDEAL PROCESSOR

ALTHOUGH VERY useful gains can be made by using one of the concepts described, a very comprehensive processor, capable of providing significant effective gain, can be designed by combining all the elements: pre-emphasis, compression and clipping. Looking at the block diagram of **Fig 9**, the input circuitry may include a filter to limit the audio bandwidth and apply some pre-emphasis. A compressor or VOGAD circuit may then be used to remove the variations in level. Finally, an RF clipper can be used to provide the clipping. In this way, a constant signal is applied to the clipper so that a known degree of clipping is obtained. It may even be switched so that the clipping can be tailored to the prevailing conditions.

In this processor, the signal from the microphone undergoes pre-emphasis and then compression. Then it is fed into a balanced modulator with a signal from a local oscillator to generate double-sideband. This signal has to be filtered to remove the unwanted sideband; the wanted single-sideband signal is then clipped. After this, there is a further stage of filtering to remove unwanted harmonics before the clipped audio is regenerated by mixing the RF with the local oscillator. This signal can be buffered before being fed out of the unit.

SETTING UP THE SYSTEM

IN GENERAL, the first stage is to adjust the peak output from the processor so that the transmitter provides its required peak output. Once this has been correctly set, the audio gain can be set to provide the right amount of processing.

CONCLUSION

SPEECH PROCESSING is an essential part of any HF radio transmitter. While most transceivers and transmitters incorporate speech processors, it is still very useful to have a good idea of how they operate. ♦

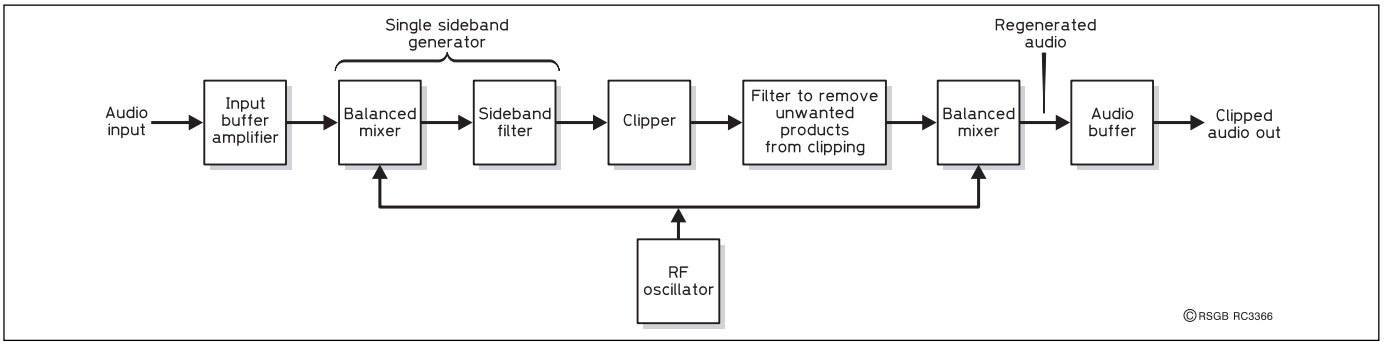


Fig 8: Block diagram of an RF clipper.

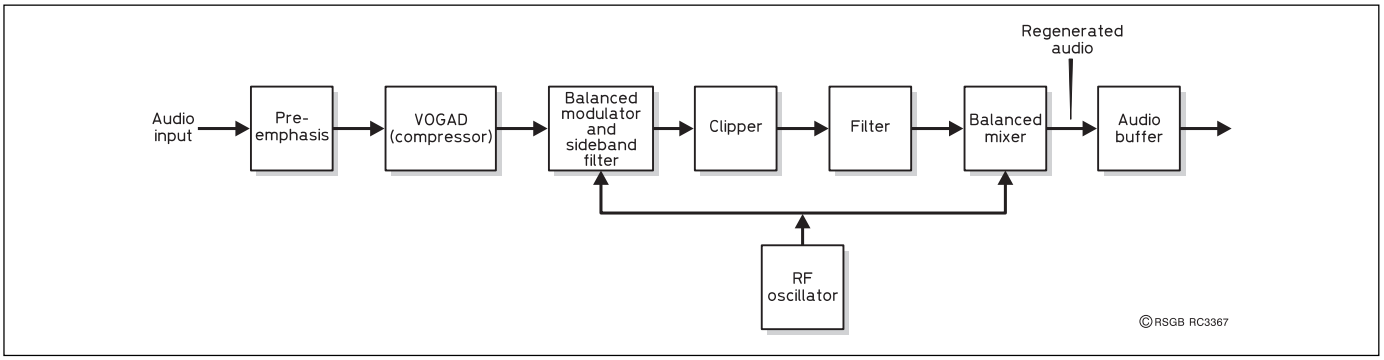


Fig 9: A speech processor combining several types of processing.

Down To Earth

Easilog Computer Logging

Thinking of using a computer logging program for the first time? Maybe Easilog is the answer. It is reviewed here by Jack Birse, G4ZVD *

I HAVE BEEN using the *Easilog* program on my computer for about nine years, since I met its author, Don Ward, G0MDO, at the Keighley Amateur Radio Society. In a discussion about computer logging I made the point that most of the logging programs I had tried were either too complicated or did not do what was wanted. Some of them were also very big on memory or disk space, whilst others seemed very pricey for what they were.

Don approached me later in the evening and said he was writing a logging program which would be simple to use, with no 'bells and whistles', and asked if I would like to try it out. To be honest I did not expect the program to be any better than those I had already tried, but it was free and to a Scot living amongst tight Yorkies that appealed.

Easilog has come a long way since those days, but Don has stuck to the principle I required: that it had to be 'idiot proof', otherwise I would not use it. From the basic program of logging and printing QSOs this DOS-based system (which runs comfortably in *Windows*) now presents me with as near an ideal as could be expected.

USING *EASILOG*

ON LOADING the program you are presented with a Menu which gives you eight choices.

Item 1 allows you to **'Start a New Log'**. All you do is type in a name, eg 'G4ZVD' and then Enter to go back to the menu.

Item 2 is **'OFF Line Logging'**. This is where you can enter all your previous QSOs, and you can do this at your leisure, even if you are also using the log for current entries.

The *Easilog* opening screen allows you to select from these eight options (see text).

Item 3 is **'ON Line Logging'**, or 'Run Current Log' (RCL). Just fill in the four fields: even I managed that first time. In RCL you will see at the top of the page the fields in which to enter your current information, all of which is done from the line of 'F' keys listed at the foot of the page. If you press the 'Alt' key you find various other useful items, including the ability to access callbooks on line if you have set up this facility.

Item 4, **'Log Utilities'**, allows you to search the log for callsigns or comments (names etc), enter the log's DXCC facilities, print on or off line, and 'Tools', which allows you to merge, import, export, extract or strip logged CQ calls from logs.

Item 5, **'Select another Log'**, is self explanatory.

Item 6, **'Options'**, allows you to set up the current log as you want whilst the program is running (or you can use 'options' in the Command line at start-up, so you do not need to go to 'Options' each time you use the log).

Items 7 and 8 are 'Select B/W Monitor' and 'Exit' respectively.

SUMMARISING

THE PROGRAM is as 'idiot proof' as possible, especially if (unlike me) you take the time to read the excellent *Easilog* document that comes with it and which can be printed out.

Printing QSL cards is a joy once you have had a bit of practice at it. Yep, it's almost 'idiot proof' as well, and I have no qualms about sitting down and printing off any number of cards needed.

Easilog will also run with CAT programs for many popular transceivers and if yours is not included Don is willing to help.

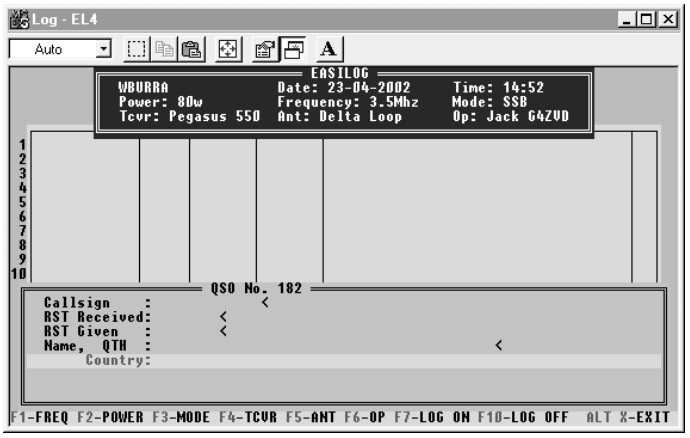
Don has written a version of *Easilog* for blind operators to use with speech programs. He has even adapted it for an amateur who is a disabled operator and who now no longer needs to have a carer sitting beside him to make log entries, allowing him the freedom of going on the air as and when he wants.

For those who like a *Windows*-style log, *Easilog* version 5 is due to be released very shortly (it is also a DOS-based program, but *looks* like a Windows program). I am currently running the Beta version and find *EL5* very intuitive and easy to use. Previous logs from other versions work in *EL5* without any problems.

OBTAINING *EASILOG*

YOU CAN download a copy of *Easilog* and other radio-related programs from Don's website at www.rafars.freeserve.co.uk After you have tried it, you are requested to register your copy of *Easilog* with G0MDO for £5.00. The program can also be obtained directly from Don Ward, G0MDO, 10 Bircham Close, Eldwick, Bingley, West Yorks BD16 3DYfor £5.00, which includes the cost of the disk, postage and updates of the program.

Other programs available from G0MDO include ones for SWLs, Learning Morse, Morse for Pilots and even a foreign language translator that Don wrote for me when I was particularly interested in RTTY. ♦



The main On-Line Logging screen.

** 178 Long Lee Lane, Keighley, West Yorkshire BD21 4TT.*

KENWOOD

The Digital Flagship

"Your signal's 59, lovely audio!"

Lets face it, you have to get used to hearing that every day when you own a Kenwood TS-870S – its digital technology has transformed the world of amateur communications. This HF all-mode transceiver is equipped with powerful twin 24-bit DSP (digital signal processors) at the IF stage – an innovation that leads to such benefits as high-efficiency digital filtering, powerful noise/interference reduction, equalizers and DSP detection. And the TS-870S is digital in other ways: it can be fully computer-controlled using a high-speed link. There's an antenna splitter, dual antenna connectors and an automatic antenna tuner that works on transmit and receive. All of this, plus the full range of high-performance features for which Kenwood rigs are renowned. By any measure, Kenwood's TS-870S merits true distinction.

■ IF-stage digital signal processing & digital filtering ■ SPAC noise reduction (CW/SSB) ■ Built-in K1 Logi-Keyer with full contest mode ■ Built-in Com port (to 57k bps) – standard Kenwood protocols ■ AIP and IF auto notch ■ Menu system ■ 100 memories ■ Multiple scan functions ■ Time or carrier scan-stop ■ All-mode squelch ■ Optional digital recording unit ■ Optional voice synthesizer for CQ calls, etc.

HF ALL-MODE TRANSCEIVER TS-870S

Available from all official Kenwood amateur radio dealers. For full details of our dealer network and all Kenwood amateur products contact your local dealer or Kenwood Electronics UK Ltd. 01923 655284.
E-mail: comms@kenwood-electronics.co.uk

HFC 2002

Savill Court Hotel & Conference Centre - Egham, Surrey, UK.


Savill Court Hotel

THIS YEAR'S RSGB HF Convention takes place at an exciting new venue - the Savill Court Hotel and Conference Centre in Egham, Surrey. Despite the change of address, the location is actually only a mile or so from the previous venue in Old Windsor.

This is the place to come for everyone interested in HF. In fact 'HF' - in this context at least - encompasses both LF and 6 metres as well, so no-one is excluded! The Convention covers all technical and operating aspects of amateur radio from 73kHz to 50MHz.

The main draw for the HF Convention is always the excellent lecture programme. A special stream has been added this year with the HF beginner in mind, but no matter how experienced a radio amateur you are, you are sure to learn something from the experts' presentations. But it's not just a learning experience, the HF Convention is also very much a social event, with the opportunity to participate in the lively exchange of views and tall stories that goes on in the informal bar area until well into the early hours! There are informative and interesting displays too, by HF and LF related clubs and organisations, and you can get QSLs checked for the prestigious DXCC award - without the risk of having to trust your precious cards to the international postal services. Class B amateurs are welcome too, and can take their 5WPM Morse test at the Convention so as to be able to take out a Class A licence. Finally, there are just a select few trade stands from the sponsors of the Convention, Yaesu (UK) and ML&S, at which you can admire the latest HF equipment.

The Convention is a truly international event, drawing DXers, contesters, IOTA enthusiasts and LF operators not only from the UK, but also from Europe, USA, Japan and even further afield.

The full list of presentations and events, correct at the time of going to press, is shown below. Opposite are details of the packages on offer if you want to stay overnight at the Savill Court Hotel. Day visitors are very welcome as well, and it will only cost you £6 for a whole day's entertainment (or just £10 for the full weekend). We look forward to seeing you at Egham - Welcome!

Provisional Saturday Programme

Time	Great Hall	Library	Terrace Room	Upper - Great Hall
09:15	Welcome, Bob Whelan, G3PJT, RSGB President			
09:30	IOTA by Martin Atherton, G3ZAY & Roger Balister, G3KMA	Aerial modelling by Peter Dodd, G3LDO	Transatlantic on 73kHz by Laurie Mayhead, G3AQC	New Intermediate Licence Structure by Alan Betts, G0HIQ, RA
10:15	Coffee	Coffee	Coffee	Coffee
10:45	IOTA: Henderson Isl by Mike, K9AJ	HF Contest Forum by Justin Snow, G4TSH	MB7LF - remote receiver update by Stewart, G3YSX & Derek, G3GRO	"How to" by Martin Lynch, G4HKS Martin Lynch & Sons Ltd.
11:45	IOTA: RI0B Ushakova and the Lost Islands of Central Arctic by Valery, RW3GW	HF Trophy Presentations by Justin Snow, G4TSH	LF Network Analyser by Frank Gentges, K0BRA	Dos and Don'ts for HF operating and DXing by Don Field, G3XTT
12:30	Lunch Break	Lunch Break	Lunch Break	Lunch Break
14:15	VP8 DXpedition by Declan Craig, EI6FR	Software Defined Radio by Andy Talbot, G4JNT	Latest LF Achievements in Cave Radio by John Rabson, G3PAI	Backyard Aerials by Peter Dodd, G3LDO
15:15	Logbook of the World -eQSLs by Wayne Mills, N7NG		Latest LF digital techniques - PSK08, WOLF & JASON by Jim Moritz, M0BMU	
16:00	Tea	Tea	Tea	Tea
16:30	WRTC by Roger Western, G3SXW	Greyline Propagation - Fact and Fiction by Steve Nichols, G0KYA	LF Forum by John, G3WKL *LF Propagation by Alan Melia, G3NYK *GPS Coherent BPSK by Andy, G4JNT	How to work DX by John Butcher, G3LAS
17:30	XR0X by Franz Langner, DJ9ZB	RTTY/PSK31 Contesting by Phil Cooper, GU0SUP & Dick Whittering, G3URA		Effective QSLing by Phil Whitchurch, G3SWH
18:30	Raffle Draw			
19:00	Free	Free	Free	Free
19:30 for 20:00	DX Dinner with Master of Ceremonies, Martyn Phillips, G3RFX			

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PACKAGE A: *Two-day package for one person. Includes 2 nights accommodation, Friday 12 & Saturday 13 October, breakfast & lunch Saturday and Sunday, the Friday evening IOTA Buffet and Saturday evening DX Dinner.* ***£180***

PACKAGE B: *Two-day package, as for 'A' but for two people.* ***£245***

PACKAGE C: *One-day package for one person. This includes accommodation on the Saturday night, 13 October, DX Dinner on the Saturday evening and breakfast on the Sunday.* ***£105***

PACKAGE D: *One-day package, as for 'C' but for two people.* ***£165***

EXTRA NIGHT (SUNDAY) AT THE SAVILL COURT HOTEL *Single* **£60** - *Double* **£80**

IOTA Buffet on Friday 11 October **£20** - *DX Dinner on Saturday 12 October* **£26**

DAY VISITORS: ***Saturday*** **£6** - ***Sunday*** **£6** - ***All weekend*** **£10**

SPECIAL OFFER
BUY 4 DAY PASSES
& GET 1 FREE

Provisional Sunday Programme

Time	Great Hall	Library	Terrace Room
09:15	Welcome, Bob Whelan, G3PJT, RSGB President		
09:30	VP6DI by Kan Mizoguchi,JA1BK, & Mike McGirr, K9AJ	Loop aerials by Prof Mike Underhill, G3LHZ	Digital Modes by Murray Greenman, ZL1BPU (via Internet)
10:15	Coffee	Coffee	Coffee
10:45	Summits on the Air by John Linford, G3WGV	Critically coupled aerials by Phil Harman, VK6APH	In Practice - live by Ian White, G3SEK
11:45	Portable operation with Yaesu FT-817 and FT-897 by Chip Margelli, K7JA / 8P9EX	Toroidial antennas and Long Wave Photons, by Prof Roger Jennison, G2AJV	DXCC basics by Wayne Mills, N7NG
12:30	Lunch Break	Lunch Break	Lunch break
14:15	CDG2000 - High performance HF Transceiver design - George Fare, G3OGQ & Dave Roberts, G8KBB	Low-cost HF Station - Dave Wlson, G7OBW, and Ed Taylor G3SQX	Remote Operation of an HF Station by Dave Gould, G3UEG
15:15			8Q7ZZ by Mark Haynes, M0DXR
16:00	Tea	Tea	Tea
16:30	Raffle Draw by John Gould, G3WKL, followed by Farewell from Bob Whelan, G3PJT, RSGB President		

STOP PRESS
SPECIAL ANNOUNCEMENT BY THE RA 9.30 SATURDAY REGARDING THE NEW INTERMEDIATE LICENCE STRUCTURE

*Please note, these programmes are subject to change, please check our website for updates

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The 65th Commonwealth Contest 2002

by Harold Owen, G2HLU, and Bob Whelan, G3PJT *

WHO SAID IT couldn't happen again? Conditions this year, at least on the HF bands, proved generally as good as in 2001, if not better, although some antipodean stations were not too happy about 10m. Numerous entrants reported that their score had improved over last year, some said the best ever. The LF bands were disappointing, true, but you can't have everything!

We had a record entry of 168 logs in total (the best for 55 years). The new start / finish times were generally approved. It was particularly gratifying to receive at last a log from South Africa - many thanks to Hans, ZS6KR. Let's hope we can build more participation in coming years.

Many entrants expressed the pleasure derived from operating in this unique contest, and there is a large body which wants to keep it basically unchanged.

OPEN SECTION

BACK IN TOP place, which he last occupied in 1998, and winner of the Senior Rose Bowl, is John, VE3EJ. John's seventh win equals the record number of wins by Lee, VE7CC. John was followed very closely by 8P9IF (G3PJT). Bob made a great score from Barbados, but once again had to settle for second place. Vladimir, 9H1ZA, rose to third place, not far behind the other two, who will clearly have to watch their backs. There is a larger gap then, to Lee, VE7CC, and Dave, VE2ZP, fourth and fifth with only a point between them. Dave, G3TBK, as J88DR, came sixth, closely followed by 9G5AA, operated by Don, G3XTT, both of whom gave valued bonuses to many. Dave, G4BUO, re-occupies his accustomed top G slot, in ninth place, and, as leading UK station, once again receives the Col Thomas Rose Bowl. Tenth position, and leading station from Oceania, is Brian, ZL1AZE, operating as ZL6QH, worked by many on all bands. Second UK station was Jan, G0IVZ, in 12th place overall, and third was Dennis, G3MXJ (15th overall).

RESTRICTED SECTION

BRUCE, ZF2NT, already a winner of the Open section in 2000, has tried the Restricted section before, and this year is the clear leader and winner of the Junior Rose Bowl. Second is Bob, 5B4AGN, a first-time entrant who is eager for more. Third place is occupied by another 5B4 - George, 5B4AGC, who was leader of this section last year. Bill, VE6BF, operated VE6JY again to come in fourth. Fifth was Bert, VE3QAA, with VE3KP not far behind, followed by Des, ZC4DW. Steve, VK6VZ, was eighth, then ninth - and leading UK station in this section - was Peter, G3LET, who receives the Ross Carey Rose Bowl. John, G3LZQ, makes up the top 10.

HQ STATIONS

ONLY TWO HQ stations this year: Fraser, G4BJM, came to the rescue at a late stage and operated GB5CC to general satisfaction and a high score. Keith, VK4TT, put VK4WIA on the air again. We are grateful to both operators.

Two QRP stations deserve special mention: Des, G3HKO, achieved a commendable score in the Open section again, and Steve, G0DCK, did even better in the Restricted section. Both showed how efficient QRP can be, especially when in the fists of such experienced operators, and under contest conditions like BERU, where searching out the DX really pays dividends.

PARTICIPATION

THE TOTAL POINTS scored by the top 10 in the Open section were 84,133, an increase over last year (83,281). It seems that the increase was obtained by going for bonuses: up from 1841 to 2216.

About the same number of callsigns was recorded as last year, 770 over all bands. There were fewer Gs (474), more VEs (138), and comparable numbers of VKs (50), ZLs (36) and ZSs (13).

Call areas were the highest for years, at 63, but some of them were worked by only a select few: 3B8, 4S, 5B, 5H, 5N, 7Q, 8P, 9G, 9H, 9J, 9M2, 9M6, 9V, 9Y, AP, C5, G (including 2E, GD, GI, GM, GU, GW, M, MJ, MM, MU, MW), GB (HQ), V3-5, VE1-7, VE9, VK1-7, VK4 (HQ), VK9, VO1, VP2E, VP2V. VP8, VQ9, VU, VY0, VY1, YJ, Z2, ZB2, ZC4, ZD9, ZF, ZK2, ZK3, ZL1-4, ZL6, ZS1-2, ZS5, ZS6.

Fewer stations were recorded on 80m than last year, but smaller numbers participated on the other bands too, except for 40m. The figures are: 80m 184 stations including 93 Gs, 24 call areas; 40m 364 (204 Gs), 46; 20m 462 (268 Gs), 54; 15m 430 (279 Gs), 50; 10m 434 (286 Gs), 47.

Harold Owen, G2HLU, proudly displays his Commonwealth Medal, awarded for his years of service adjudicating the RSGB Commonwealth Contest.

LOGS

THE TREND OF recent years continued: most logs (56%) were sent by e-mail, 39% were on paper, and only 5% on disk. The standard of log-keeping was generally high. There were some unfortunate errors in misreading calls, which lost points and in some cases bonuses - or it could have been mistyping: the adjudicator cannot tell which!

SOAPBOX

"Great fun on the high bands, horrendous QRN on LF", 9G5AA. "No time to put up LF antennas before the contest. My first entry in BERU", 9M2/G4ZFE. "Where do I go next year?", 9M6A (VK2BJ). "Conditions must have been better. Down to 3 watts but a lot more contacts", G3HKO. "Really frustrating to wait patiently (?) for a QSO only to have the guy hauled off to another band . . .", G3JKY. "... It should not be allowed", G3LIK. "Amazing HF conditions / LF patchy", G3LZQ. "Best BERU for many years", G3NAN. "Not much luck with CQ and 100W! How about low power section?", G3TJE. "A suggestion: double points for 3.5 and 7MHz QSOs", G3VDL. "If only all contests were conducted in such a pleasant manner", G4BYG. "Roll on next year!", G4CZB. "Hats off to the globe-trotting Gs", GW3HGJ. "Never worked so many VK and ZL stations . . . fantastic, I am one very happy, relatively new contester", M0AJT. "Very pleased to work a few ZSs this year", VE2ZP. "I continued to send a true RST myself (some of the time)", VE3VHB. "Activity from VK continues to drop", VE7CC. "This is a contest I really enjoy", VE7VF. "BERU was fun, as always . . . great to hear so many old friends from UK", VK6AJ. "Great to work the 2E novices . . . some fine operators among them", VK6VZ. "I am now 88 and next year will be my 40th BERU", ZL1HV. "Failure of my only antenna in the middle of my first ever QSO with Ghana, 9G5AA, was a bit of a disappointment", ZL2EX.

* E-mail: G3PJT@whsmithnet.co.uk

ADJUDICATION (G3PJT)

HAROLD OWEN, G2HLU, has been our adjudicator for more years than I can remember and he has asked to retire after this year. Harold, all of the BERU participants thank you for a really quite excellent job, always done to time and most thorough. We have decided to award this year's Commonwealth medal to you to mark our appreciation of the tremendous contribution you have made. Congratulations!

START TIME

THE EARLIER start and finish time (1000UTC) seems to have been appreciated. It makes for a dawn start in the Caribbean and Eastern Canada and makes a rather convenient weekend for them. It also gives the UK and Mediterranean stations most of Sunday to recover! Hopefully this will encourage some more entrants in both sections. We commiserate with the VE6/7s over the rather early start time in Western Canada, though. We propose to continue with the 1000UTC start time for the next few years.

NEXT YEAR

THE CONTEST WILL be **8 / 9 March 2003**, so get that date in your diary now. And why not plan a DXpedition to one of the Commonwealth prefixes? It has never been easier and airfares are expected to be even lower next year.

We will be mailing all non-Gs with the results and write-up with their certificates if they won one. ♦

2002 RSGB Commonwealth Contest - Results

Open Section - (QSOs/Bonuses)

Pos	Call	80m	40m	20m	15m	10m	Score	QSOs	BCAs
1*+	VE3EJ	70/28	192/57	232/61	206/56	263/53	9882	963	148
2*	8P9IF	80/26	187/47	246/57	256/53	251/54	9791	1020	130
3*	9H1ZA	71/15	174/41	287/68	241/58	242/47	9613	1015	134
4	VE7CC	32/28	115/49	246/57	178/44	190/50	8335	761	119
5	VE2ZP	42/27	143/40	239/59	175/47	197/47	8334	796	132
6	VE7UF	30/24	123/57	204/52	196/50	140/47	8037	693	131
7	J88DR	21/14	135/36	257/50	174/36	245/41	7647	832	102
8	9G5AA	6/6	85/23	236/54	267/48	267/36	7602	861	100
9++	G4BUO	35/27	77/54	114/66	117/65	92/59	7577	435	161
10	ZL6QH	26/19	106/37	225/59	201/50	102/37	7315	660	115
11	9M6A	17/14	68/35	195/48	190/58	94/54	6995	564	117
12	G0IVZ	39/26	78/49	117/64	95/53	93/52	6958	422	145
13	VE1ZJ	47/19	167/43	184/48	140/25	123/31	6598	661	108
14	VK4EMM	17/16	65/36	236/54	162/41	81/38	6496	561	111
15	G3MXJ	17/17	49/44	86/59	71/49	61/48	5760	284	136
16	9J2BO	6/6	42/30	138/49	106/38	212/37	5698	504	102
17	VE3VHB	28/18	76/33	114/43	88/41	103/40	5538	409	118
18	9M2/G4ZFE	-	-	181/45	192/47	164/43	5360	537	87
19	GW3NJW	23/16	63/40	74/46	63/47	64/42	5235	287	123
20	VO1GO	39/16	98/28	105/42	82/23	149/30	5143	473	89
21	G3IAF	13/13	44/37	73/49	57/48	62/43	5023	249	122
22	VA3DX	6/5	96/34	168/44	66/17	138/28	4913	474	83
23	G3GLL	13/13	38/33	84/55	64/47	48/36	4910	247	116
24	G0ORH	3/3	26/24	59/47	75/51	73/51	4700	236	112
25	ZB2EO	-	11/9	234/54	72/21	158/30	4640	475	73
26	ZL2AZ	23/20	73/36	84/33	62/37	55/29	4585	297	94
27	GW3HGJ	14/14	40/33	60/49	57/45	45/33	4540	216	119
28	VK2AYD	14/14	43/34	155/48	130/31	14/12	4533	356	90
29	VE3ZI	10/10	45/24	105/32	139/27	122/28	4518	421	78
30	ZL2BR	7/7	32/22	120/41	131/32	49/29	4308	339	84
31	G4IIY	5/5	35/31	59/48	58/38	52/37	4225	209	101
32	G4CZB	9/9	27/25	47/42	56/46	53/39	4180	192	108
33	G2QT	16/13	38/30	62/43	42/36	49/30	4064	207	98
34	VE2AWR	12/8	56/21	83/25	120/28	92/30	4055	363	72
35	G2HLU	14/13	29/26	54/43	49/42	35/32	4025	181	108
36	ZS6KR	3/3	34/24	35/17	116/30	177/37	4014	364	75
37	VE7JKZ	2/2	41/32	88/38	77/32	54/30	3988	262	91
38	G3LIK	7/7	27/24	66/50	45/41	44/29	3956	189	103
39	VE7UZ	18/11	60/40	40/32	42/25	50/37	3935	210	94
40	G3JJG	6/6	29/29	48/40	56/46	38/32	3929	177	103
41	G3KKP	4/4	27/24	44/42	51/43	45/35	3811	171	96
42	VE3IAY	9/9	44/32	98/40	45/23	39/25	3750	235	84
43	G3WPH	8/8	34/30	50/44	43/39	30/26	3746	165	104
44	G4TSH/P	10/10	22/21	52/41	50/41	37/28	3665	171	98
45	VK6AJ	-	11/11	132/40	89/38	61/17	3559	293	70
46	M0AJT	5/5	13/13	59/47	50/41	40/30	3555	167	87
47	VE7NH	7/7	20/14	77/19	116/32	60/31	3445	280	60
48	ZL2TX	-	40/26	138/42	45/29	12/12	3339	235	74
49	G3NAN	4/4	13/13	51/43	44/36	40/32	3298	152	87
50	G3LHJ	4/4	33/28	46/36	38/27	42/29	3279	163	86
51	G3ZGC	6/6	22/20	46/42	34/33	34/27	3270	142	87
52	VE3HX	9/9	26/20	34/27	47/29	59/33	3251	175	82
53	G3JKY	2/2	20/18	50/37	39/35	39/32	3228	150	88
54	VK4UW	-	2/2	150/41	95/22	39/26	3190	306	57
55	G3VDL	4/4	17/16	53/43	38/33	26/25	3108	138	83
56	G3MPB	-	28/25	39/33	44/36	30/23	3036	141	83
57	G3RFH	-	14/14	40/34	46/42	32/27	2998	132	80
58	G3TEV	-	22/19	41/37	40/36	27/25	2966	130	82
59	VE3EZP	21/16	57/29	39/27	44/23	17/7	2908	178	68
60	ZL1MH	2/2	38/21	38/30	49/33	22/18	2818	149	68
61	VK2YN	10/8	17/16	54/31	42/29	20/15	2685	143	65
62	GW0ETF	-	14/14	48/39	37/34	20/17	2675	119	67
63	G4FAL	2/2	12/12	32/29	41/38	26/21	2590	113	76
64	VU2UR	1/1	15/14	75/33	21/21	35/23	2563	147	61
65	G3EBH	-	-	32/32	33/32	37/30	2398	102	71
66	VE1LS	25/11	44/20	46/22'	35/18	11/9	2349	161	54
67	VK2EL	1/1	30/25	46/35	28/20	9/8	2325	114	66
68	G3KKJ	5/5	8/8	30/25	33/26	30/19	2188	106	60
69	G3GMM	-	13/13	31/26	30/25	23/20	2112	97	36
70	ZC4VG	1/1	2/2	57/18	85/11	90/18	2109	235	40
71	G3HKO	-	9/9	33/27	25/21	24/20	1978	91	49
72	G4ZIB	-	6/6	36/34	18/18	17/17	1885	77	68
73	VE1KB	16/12	36/18	21/15	11/11	16/11	1807	100	45
74	VE1EP	3/3	11/11	23/23	17/15	20/20	1792	74	64
75	VE9VAR	9/8	19/13	37/14	8/6	68/17	1788	141	37
76	G3BBR	-	9/9	21/21	26/23	20/18	1774	77	58
77	GU3SQX	-	13/12	29/23	9/9	18/17	1555	69	48
78	G3ZDD	-	10/8	27/23	14/13	17/13	1445	68	42
79	MU0FAL	-	21/18	19/18	23/20	-	1420	63	43
80	G4ZME	-	-	16/14	12/11	23/18	1099	51	35
81	G4KHM	-	-	-	50/42	-	1090	50	28
82	ZL1IE	3/3	3/2	14/13	13/13	12/11	1042	45	41
83	VK4XW	-	11/10	17/8	13/10	11/10	1002	52	30
84	VE2OWL	4/4	10/8	6/5	11/8	5/5	765	36	22
85	G3CQR	-	-	17/11	15/7	12/10	691	41	22
86	VK3KS	-	10/10	12/12	-	-	550	22	17
87	VK5HO	-	16/14	8/7	-	-	521	24	15
88	VE6YP	-	3/3	20/15	-	1/1	498	24	17

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

Restricted Section - (QSOs/Bonuses)

Pos	Call	80m	40m	20m	15m	10m	Score	QSOs	BCAs
1*+	ZF2NT	58/21	135/36	133/45	198/40	247/40	7465	771	104
2*	5B4AGN	21/10	117/38	195/53	160/46	171/40	7024	664	115
3*	5B4AGC	19/14	73/27	208/53	170/43	211/41	6927	681	111
4	VE6JY	7/7	120/43	167/38	183/43	143/37	6329	620	100
5	VE3QAA	27/17	86/31	135/38	122/31	136/31	5512	506	103
6	VE3KZ	13/12	74/33	120/37	140/34	146/29	5338	493	96
7	ZC4DW	13/8	72/17	172/38	144/34	147/29	5251	548	85
8	VK6VZ	8/8	55/39	179/34	168/31	106/19	5187	516	87
9++	G3LET	9/9	44/35	73/50	69/51	67/49	5185	262	124
10	G3LZQ	20/17	46/39	56/42	52/40	53/34	4566	227	115
11	VK2APK	5/5	47/33	177/45	101/28	30/22	4454	360	89
12	VE5SF	14/8	40/23	124/28	91/32	116/24	4211	385	64
13	VE3KP	1/1	45/18	101/28	105/21	157/31	4010	408	66
14	G3KZR	7/7	26/23	53/39	53/42	50/41	3981	189	103
15	ZL2CD	11/9	65/32	79/30	82/26	36/26	3808	273	72
16	G3KHZ	2/2	14/14	49/40	50/45	51/42	3678	166	97
17	G3JJZ	4/4	23/23	35/34	42/37	36/31	3280	140	93
18	G2AFV	-	32/27	47/44	24/24	39/31	3230	142	84
19	G4BYG	-	-	70/50	44/37	46/33	3200	160	81
20	VE7VF	1/1	25/22	71/35	78/31	32/20	3156	207	72
21	VE4YU	7/7	19/18	39/26	43/29	75/30	3108	183	67
22	G3VYI	6/6	25/23	39/33	33/30	41/28	3105	144	90
23	GW4MVA	-	14/14	43/37	34/32	47/37	3086	138	85
24	ZL3REX	4/4	29/22	51/41	40/31	19/15	2956	143	71
25	G3XSV	1/1	21/20	39/34	38/32	35/28	2954	134	82
26	G0CKP	-	-	33/30	55/38	53/35	2760	141	71
27	G3IGW	-	22/22	32/27	40/33	33/25	2754	127	76
28	VE3FU	15/13	27/23	24/21	44/21	52/19	2741	162	62
29	G3HEJ	3/3	5/5	33/31	41/38	33/30	2715	115	79
30	VE2AYU	20/12	91/25	58/24	43/14	10/5	2708	222	47
31	VK4BUI	4/4	24/23	64/37	54/21	14/8	2650	160	62
32	G3TJE	2/2	16/15	28/24	36/30	37/30	2615	119	73
33	G3RSD	5/5	27/25	44/38	27/22	11/11	2588	114	73
34	GW3KDB	6/6	24/24	23/23	25/25	24/24	2550	102	77
35	G3YEC	1/1	6/6	39/33	35/32	32/26	2494	113	70
36	GW4HBK	4/4	16/15	36/33	21/20	30/24	2449	107	75
37	G3GMS	1/1	11/11	36/29	32/29	26/23	2390	106	68
38	G4GCI	2/2	22/16	28/23	32/29	22/22	2360	106	68
39	GW4XXF	-	5/5	22/22	39/33	39/31	2343	105	69
40	G3HAL	1/1	17/16	36/29	23/21	24/22	2272	101	65
41	G4AKR	3/3	6/5	25/24	24/23	33/29	2108	91	67
42	VA3UZ	-	4/4	36/12	44/19	86/25	2050	170	43
43	G0DCK	-	3/3	34/29	34/30	26/16	2010	97	56
44	ZL2RX	-	23/19	44/26	19/15	16/13	1935	102	48
45	G4KTI	3/3	5/5	27/27	17/17	28/23	1887	80	62
46	VE1AYY	-	84/26	-	44/16	18/16	1876	146	38
47	GW3SB	2/2	7/7	21/20	24/22	20/16	1703	74	51
48	ZL2IH	2/2	22/19	51/24	11/8	6/5	1563	92	44
49	VE7NI	-	-	33/20	47/18	19/15	1545	99	35
50	G3VQO	2/2	12/12	27/23	12/12	12/8	1461	65	45
51	VE3PYG	-	8/8	34/5	73/9	50/7	1356	165	21
52	VA3XRZ	-	17/15	23/14	16/10	15/15	1401	71	36
53	G3BPM	-	4/4	29/20	15/13	17/17	1342	65	46
54	VE3NXB	1/1	16/14	9/7	14/10	31/17	1335	71	36
55	ZL1HV	2/2	7/7	34/23	22/14	3/3	1300	68	37
56	G3UFY	8/8	32/20	27/17	-	-	1228	67	31
57	G4OGB	-	-	16/15	25/23	10/7	1155	51	34
58	G8DR	-	5/5	43/38	1/1	1/1	1146	50	35
59	VE3STT	-	-	4/4	22/10	93/14	1135	119	20
60	VA3IX	-	12/11	14/8	6/6	35/18	1077	67	32
61	G4EDR	-	-	25/22	2/2	20/15	1008	47	32
62	G/OZ5IPA	-	-	12/9	20/16	10/9	866	44	25
63	G3WRR	-	-	11/11	13/13	8/8	800	32	27
64	VE1JS	-	35/9	5/5	3/3	8/8	755	51	17
65	G3ZRJ	-	11/11	15/15	-	-	650	26	20
66	5N0/G3SVW	-	-	6/6	10/7	4/4	440	20	12
67	VU3BKY	-	-	52/9	-	-	425	52	6
68	G4OBK	-	13/13	-	-	-	325	13	11
69	VE5AAD	-	-	-	19/11	-	313	19	6

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HQ Stations

Pos	Call	80m	40m	20m	15m	10m	Score	QSOs	BCAs
1	GB5CC (G4BJM)	95/28	178/47	213/62	197/53	186/53	9203	869	141
2	VK4WIA (VK4TT)	-	15/12	180/48	97/32	60/33	4296	352	70

BCAs - Band Call Areas

Checklogs from 5B4AGQ, G3HCT, G3KKQ, G3PEM, G3SXW, G3TXF, G3WP, VE3ABX and VE3IGJ are gratefully acknowledged.

A GPS-Locked Frequency Source for LF

*by Andy Talbot, G4JNT **

The low-cost GPS-locked frequency source described here is designed specifically for low data-rate signalling on the LF bands. Phase noise and short-term frequency stability preclude its general use at HF or above; for these frequencies, other, more conventional, frequency standards are preferable, based around crystal oscillators of inherently higher stability.

For locking a frequency source to the 1 pulse per second (PPS) signal from a GPS receiver, a conventional synthesiser or phase-locked loop (PLL) approach is impractical. The only reference frequency is at 1Hz, so a PLL would need to have a bandwidth considerably less than this, meaning that the loop would only lock up after many tens of minutes or hours. Furthermore, the stability of the basic oscillator element - the Voltage Controlled Oscillator or VCO - would have to be such that it did not drift by more than 1Hz during a time comparable with the loop bandwidth, otherwise lock could never be achieved. A high-stability VCO is needed and, for a design operating at a few megahertz, the required stability would be less than 1 part per million (PPM). Voltage-controlled crystal oscillators (VCXOs) to this accuracy, also usually temperature-controlled, are available, but are expensive and only occasionally appear on the second-hand surplus market as part of test equipment. Brooks Sheera, W5OJM, has designed an excellent GPS-locked high-stability frequency source using such an oscillator, which was described in *QST*, July 1998. This does require several hours to achieve lock up and is the sort of precision test equipment that should be left running continuously and not be turned off every day.

However, where short term stability is of less importance, another technique can be used. The source described here is based roughly on the old 'Huff and Puff' stabiliser, first described by Klaus Spaargaren, PA0KSB, in 1973. This design stabilised a 'good' LC-tuned VCO to give it crystal oscillator stability, in steps of 10Hz. In essence, the design used a 1-bit frequency counter - a single flip-flop clocked by pulses divided down to 10Hz from a crystal oscillator. Depending on whether the VCO frequency was high or low of the appropriate 10Hz step, the output of the flip-flop ends up at a 1 or 0 and is applied via a low pass filter to a varicap on the LC oscillator, which is ramped up or down to maintain the long-term frequency. The output would then be continuously hunting just above or just below the nearest 10Hz step.

The problem with this design was when the LC oscillator drifted by more than one step, ie >10Hz; the locked frequency would then slowly move in jumps of 10Hz. There were numerous improvements to the original design in the following years, several adding more bits and resolution to the frequency counter allowing a higher inherent drift, but Huff and Puff gradually died out as frequency synthesisers took over.

CIRCUIT DESCRIPTION

THIS DESIGN APPLIES the Huff and Puff technique to a simple un-ovened VCXO to maintain a source frequency that hunts either side of a specified 1Hz multiple, but uses an extended 8-bit frequency counter to avoid the possibility of the locked frequency drifting in jumps of 1Hz. The VCXO operates at 4.194304MHz (2^{22}Hz), for reasons that will be described later, but any frequency that is a multiple of 1Hz may be employed; it is also easier to understand the concept if a frequency that is an exact multiple of 256Hz is initially chosen. Refer to the circuit diagram, **Fig 1**.

A straightforward crystal oscillator is built with CMOS gates, with a varicap connected across the crystal to shift its frequency either side of nominal by a few tens of hertz. Choose the varicap and coupling capacitors to ensure that it is not possible to pull the frequency more than 128Hz over the full input voltage swing of 0 - 5V. This oscillator drives a synchronous 8-bit counter made from a pair of 74HC161 chips, the eight outputs from which are connected to a 74HC374, 8-bit D-type latch. This is triggered by the rising edge of the 1PPS (pulse per second) signal from a GPS receiver so that, each second, the output of the latch contains the lowest significant eight bits of the count. This counter overflows many times for each counting interval but, for any frequency that is an *exact* multiple of 256Hz, the counter will overflow to the same point each time, and the count latched by each seconds pulse will then be a constant number. If the frequency is not a multiple of 256Hz, but is still an exact 1Hz multiple, the count will change from one second to the next in a predictable manner. For example, a 5MHz signal would give successive counts (assuming a start at zero) of 00, 64, 128, 192 before the sequence repeats, which is completely predictable. However, for this description, we will continue with a frequency that is a multiple of 256Hz, so the ideal count stays a constant. If the frequency departs slightly from its correct value, the residual count will steadily increase or decrease by the magnitude of the frequency error and, if not corrected, the counter will eventually wrap round.

What we now do is to read the count every second, then drive a charge pump circuit in a direction such as to correct the frequency. Software in a 16F84 PIC processor, using the trigger pulse from the GPS, reads the latched counter value and calculates an error value from the expected count every second. For multiples of 256Hz, this merely involves subtracting a constant, which can conveniently be a value of 128 - half the counter length. If other frequencies are wanted, the 'correct' value will increment by the frequency, modulo 256, every second. The sign and magnitude of the error value obtained is then a measure of the phase (and hence frequency) error and is used as follows :

Port A3 on the PIC is normally maintained at a high impedance, by setting it as an input. Every second, except for the single case where the error value is zero, this port is set as an output and strobed high or low, depending on the sign of the frequency / phase error. The duration of the strobe pulse is proportional to the magnitude of the error so that an error count of 128 leads to a strobe pulse of 640ms, either high or low, down to the minimum resolution of 5ms for an error count of one. This strobe pulse is then taken via an RC network to drive the varicap on the VCXO. The RC constants were determined by a combination of experience, trial and error, serendipity and luck to give an acceptable compromise between lock-up time, chirp and pull in range. To assist lock-up, the PIC software after turn-on applies a precise square-wave to the charge pump for 20 seconds, to force the capacitor to mid-voltage, and the frequency near to the nominal operating frequency. The loop then has only to make minor corrections to get the correct frequency and phase (the counter mid-point). The use of a three-state high-impedance port which is only briefly pulled high or low considerably reduces the residual chirp over that of a continuously changing low-impedance connection, as in the original PA0KSB concept.

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As an additional aid to debugging, the error value is output from the PIC as an RS232 signal at 1200 baud. The format is a decimal number ranging from -128 to 127, followed by a space, for display on a standard ASCII terminal.

PERFORMANCE

WITH THE RC VALUES and varicap specified, and after the 20s initialisation period, the loop was fully-stabilised after running for about two minutes. The frequency as measured on a counter was exact, when using a 10s counter gating time. By monitoring the output on a vectorscope referenced to a high stability source, every second, on average, the phase would rapidly rotate by a value between 180 to 500° (0.5 to 1.5 cycles), then return more slowly. This appeared as a slight audible chirp of a few Hz. However, the mean phase stays constant, ie the vectorscope always averages out the clockwise and anti-clockwise rotations to zero. The error value transmitted from the RS232 port usually stabilised at a small positive number rather than zero. The reason for this is not clear, but may be due to leakage around the charge pump circuitry, or rectification of the RF in the varicap causing a constant offset. Its effect does not appear to be important to operation. Without programming-in the 20s initialisation period, there were times, depending on the initial random starting count, when the loop would fail to lock up at all, and other times when lock would occur after a few minutes.

By using the output as a clock for my AD9850 DDS module, the output frequency is divided down and the phase blip is reduced by the same proportion. At 137kHz, for example, a 360° blip at 4MHz appears as a blip of 11° every second, always returning to the same value. When averaged out over a 30-second signalling element, the net phase shift is very close to zero. An LED flashes with the 1PPS signal, and the duration of flash is related to the width of the charge pump pulse. Therefore, when locked, the LED gives a short flash but, during the lock-up phase, the flash is of varying duration and, if the GPS pulse is not present, the LED does not flash at all.

CONSTRUCTION AND SETTING UP

THE CIRCUIT LAYOUT is not critical, apart from that around the VCXO. Here, wires need to be as short as possible and the loop filter components need to be mounted close to the varicap to avoid picking up interference which is then coupled onto the output signal. A double-sided PCB has been produced which makes use of normal 2.54mm pitch DIL ICs, but surface mount resistors

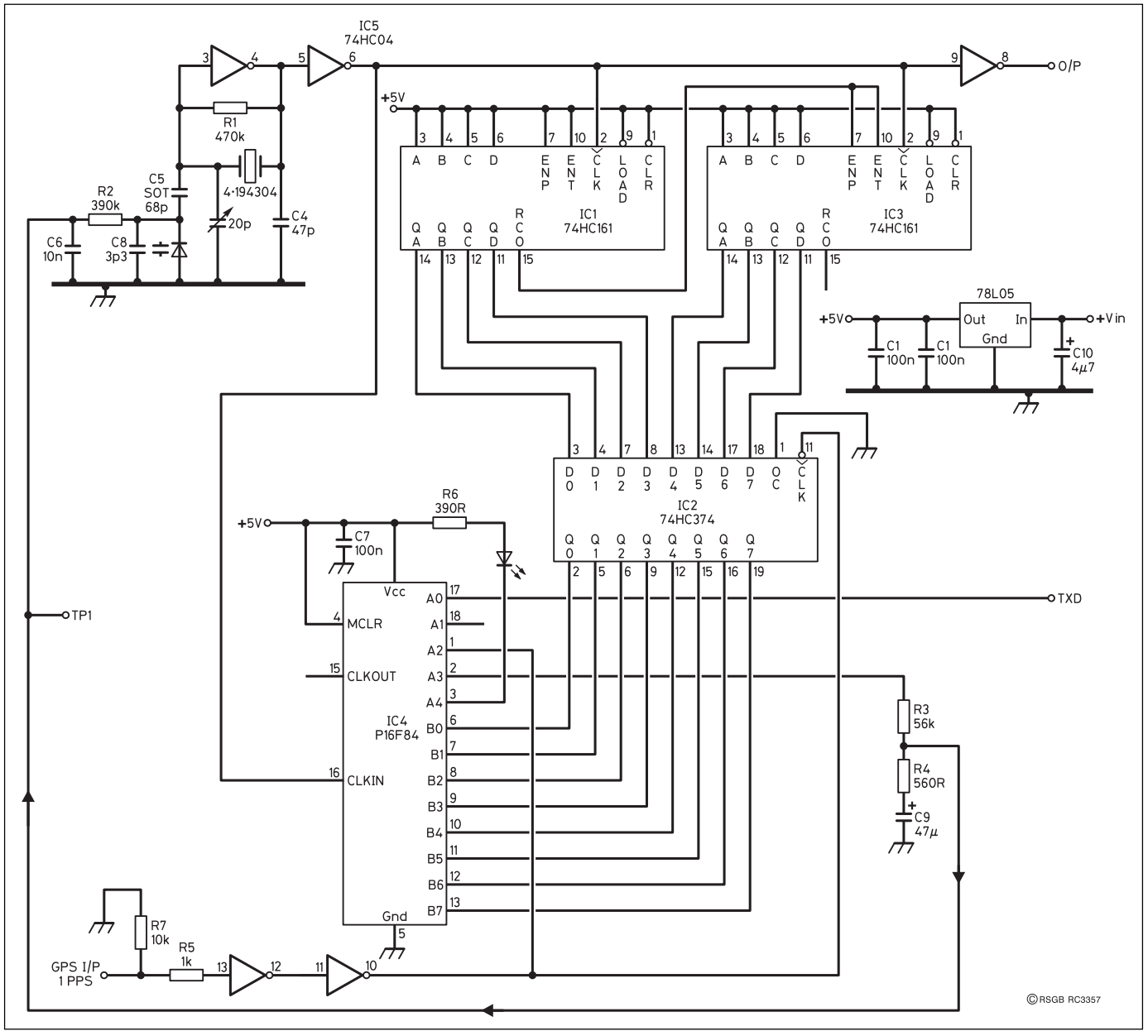

Fig 1: Complete circuit diagram of the GPS-locked frequency source for LF.

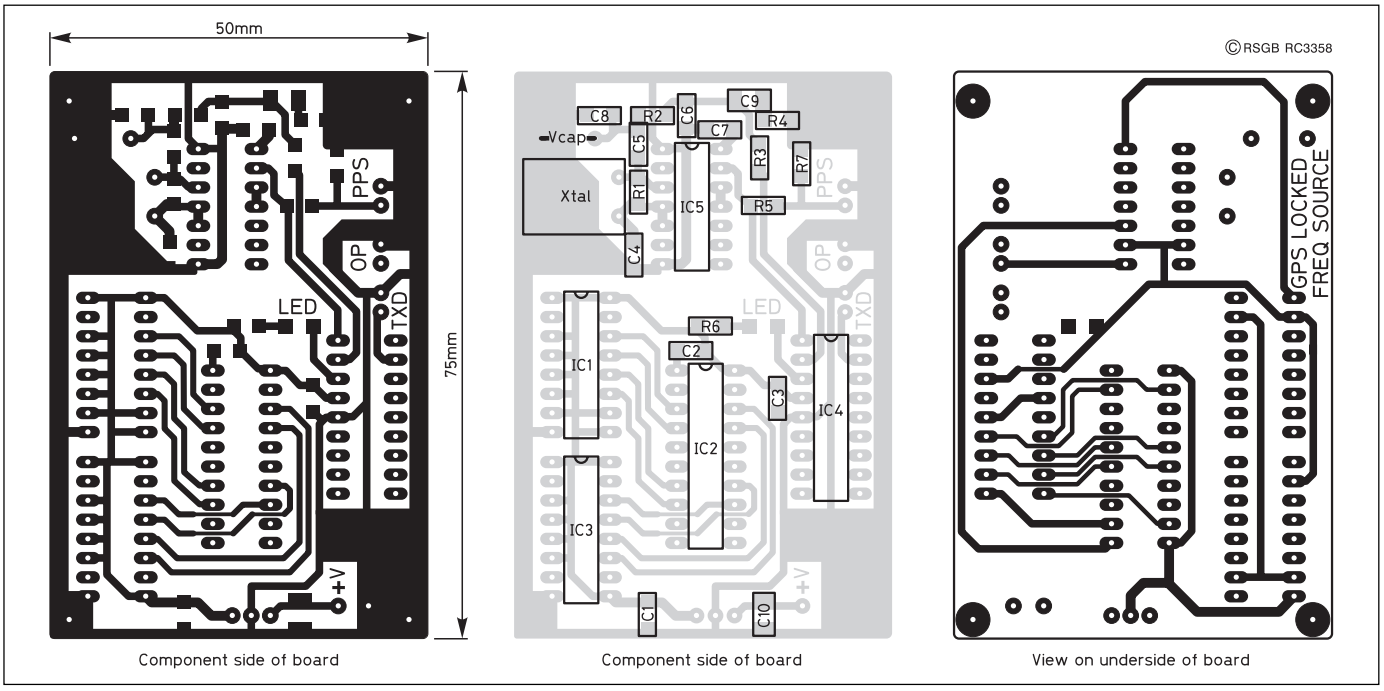

Fig 2: Tracking details for the PCB.

and capacitors. (No apologies are offered for the SMT construction, I do not have many stocks of wire-ended components these days, just SMT ones.) The prototype layout is given in **Fig 2**.

There is a certain amount of initialisation of the circuit necessary before satisfactory operation can be guaranteed. Firstly, the VCXO has to be set to the correct frequency. Before soldering in the RC loop filter components, connect a potentiometer to the varicap decoupling resistor, shown as TP1 on the diagram. Set to mid-rail at 2.5V, and adjust the preset capacitor for a frequency as close as possible to the correct value. Swing the tuning voltage over the range 0 - 5V, and ensure that the output frequency shifts by no more than about 100Hz in either direction. Much more than this, and a false lock 256Hz away is theoretically possible if the crystal drifts over time; much less that this, lock-up time and drift may be a problem. To change the tuning range, alter the value of the 'select on test' capacitor experimentally. Once the VCXO tuning has been set up, insert the remaining loop filter components. Connect the 1PPS output from a GPS receiver to the board and switch on. It may be convenient to monitor the loop tuning voltage with a high-impedance meter at this stage. If one is available, connect PIC port A0 to the RXD line of an ASCII terminal set to 1200 baud, 8-bit, no parity, to monitor the loop-locking progress.

For the first 20 seconds after switch-on, the LED will stay off and the voltage at TP1 should rise to 2.5V, at which time the output frequency will be close to the correct value if the setting-up procedure was followed carefully. After this time has elapsed, the LED will start to flash in synchronism with the GPS pulses, the flash duration appearing to vary in an apparently random manner. If the counter error value is being monitored, it will also show a rapidly varying number each second but, after about 30 seconds to a minute, a pattern will start to emerge and the value will gradually converge to a constant value, not far removed from zero; the duration of the LED flashes will also shorten. The voltage at TP1 should now be stable and, after a few minutes, the loop should have stabilised, at which point the output frequency is locked. If you listen to this signal on an SSB receiver, it should give a slight blip every second which should be just about audible, but how much depends on how musical your ears are!

There is plenty of scope for further experimentation, particularly around the loop to decrease chirp / phase blips and improve lock-up times. One idea that would be worth investigating is to have a non-linear relationship between error value and pulse width, something that is straightforward to implement in software, but complex in a PLL built completely in hardware.

PIC SOFTWARE

THE PIC SOFTWARE STABIL01 is supplied in the *RadCom Plus* area of the RSGB Members-Only website. Examination of the source code in the .ASM file should show the operation; I hope it is well documented enough!

An updated version of the software, STABIL02, is available. This now sends debug information at 19200 baud rather than 1200, and has improved balance between positive and negative pulse durations, leading to a more stable lock up condition. Programmed PICs can be made available if you cannot blow your own.

KNOWN PROBLEMS

- The loop error value is rarely stabilised at exactly zero during operation. This is probably caused by rectification of the RF in the VCXO by the varicap, which the loop has to fight. It could be cured by adding an op-amp buffer to isolate the varicap drive from the loop filter itself, but the effect does not appear to cause a problem, so no buffer has been included. Increasing the value of the 390k resistor feeding the varicap reduces this effect, but this shouldn't be made too high, as spurious pick-up could then become more of a problem. Charge-pump capacitor leakage will show the same effect if any is present, and is particularly noticeable when a voltmeter is connected to TP1.
- The latching of the counter by the GPS pulse is asynchronous to the counter increment, so there is a probability (a certainty in fact) that at some point the reading will try to be latched at the very instant it is changing; minimising this, in fact, was the reason for using a synchronous counter here. Fortunately, there is a simple work-around. During testing, is was noticed that a read like this always appeared to result in a latched value of 0xFF, or all ones. The software detects this condition and ignores that particular value, treating it as if a value of 128 had been read and issuing no pulse. The loop will never be so stable that this glitch situation will occur repeatedly, and the tracking continues uninterrupted at the next pulse. The resultant 2-second delay may cause a slightly larger blip than usual, but this should not be unacceptable in practice. ♦

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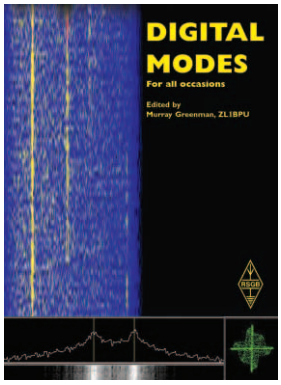

This is the book for every person who is interested in digital modes, as it is simply the most complete book yet written on this subject. The book describes serial transmission and various data and error correction techniques. It explains the differences between a bit, a byte and a symbol, the baud and BPS, Baudot and ITA2 and much more.

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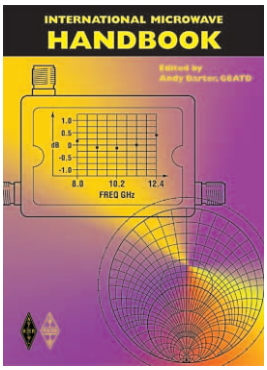

The microwave bands are an excellent area for radio amateurs who want to experiment and construct their own equipment. The RSGB in partnership with the ARRL has produced this invaluable source of reference information for those interested in this area, along with excellent designs from around the world to fire the imagination. Material has been drawn from many sources including the RSGB journal RadCom and the ARRL publications QST & QEX. Alongside this material a truly international range of sources have been used including items from Germany, Denmark, New Zealand, Slovenia and many more.

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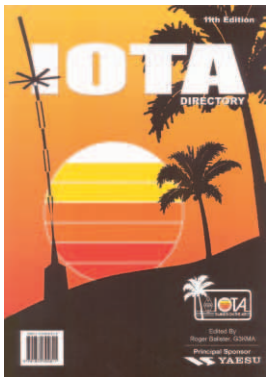

This book is an essential guide to participating in the IOTA (Islands on the Air) programme. It contains everything a newcomer needs to know to enjoy collecting or operating from islands for this popular world-wide programme.

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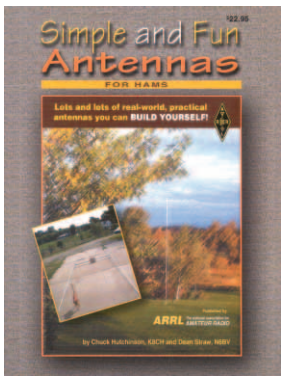

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UP THE DOWNLEAD, DOWN THE UPLEAD

I RECENTLY mounted a multiband HF vertical on the roof of the house, and am now finding considerable noise pickup from the shack PC. The PC is directly connected to the transceiver, but there is no interference when I use the horizontal G5RV, down the garden.

IT'S ALWAYS HARD to diagnose RF interference (RFI) problems from a distance, because so much can depend on small details of the setup, but here goes. With luck, we can probably cure your received interference problem, and at the same time drastically reduce the risks of your transmitter causing RFI to other systems.

There are potentially several routes for interference to get from the PC into your receiver, but you can probably check - and dismiss - most of them fairly quickly.

1. Direct path from the PC to the radio, either by radiation or by conduction along leads. This is the least likely, because you say there is no interference when using the G5RV.
2. Direct radiation from the PC to the vertical. This is possible, but relatively unlikely - if the PC was radiating significantly, you'd probably be hearing something on the G5RV too.
3. Conduction from the PC along various leads, *up* the coax to couple into the HF vertical, and then back *down* the coax to the receiver. This is my best guess, so let's look at it more closely.

If you're not already familiar with these problems, the first question you'll ask is: "What do you mean, the interference is going both up *and* down the coax?". The answer is in the skin effect, which makes RF currents (at HF and above) flow exclusively on the *surfaces* of conductors. This means that a shielded cable such as coax has two personalities. On the inside, it's a coaxial two-conductor cable, just as you thought. But on the outside surface, quite separately, it behaves like a single fat wire. The skin effect also applies to the metal case of your transceiver: although your transmitter generates quite intense RF currents, the skin effect confines them to the *inside* surface of the case. Likewise, all kinds of RF currents can flow on the *outside* of the case, but they won't get inside unless they're offered a way in. The coaxial antenna connector is *not* a way for surface currents to get either inside or out, because it is always securely grounded to the chassis on the rear panel, and this maintains continuity for the two separate RF paths. The currents on the inside of the coax are connected only to the inside of the transceiver, while the currents on the outside stay outside. The December 2001 column [1] showed what happens if those precautions are ignored: if a shielded microphone lead is not grounded where it enters the transceiver case, it can be a major cause of RF feedback problems. The cure, of course, is to ground the shield to the case, right at the connector.

Returning to the main question, the absence of problems with the second antenna shows that this particular transceiver is pretty RF-tight. What I think is happening is illustrated in **Fig 1**. The computer is somehow leaking its internal signals, quite probably through the monitor or its external leads. These signals are then flowing onto various other leads in the shack, and onto the outside of the transceiver case. But they aren't getting inside the transceiver directly; instead they flow *up the outside* of the coax and then jump across to the antenna. From there on they behave like normal received signals, and come back *down the inside* of the coax and into the receiver.

How the signals 'jump across' from the coax to the antenna needs more detailed examination. The mechanism will be the same for both reception and transmission, and although we're mainly interested in the reception case (where the interference signal jumps across from the feedline to the antenna), it's much easier to understand it in terms of transmission. So let's look how unwanted RF currents can get from the antenna onto the outside of the coax feedline.

A typical 'no radials' HF vertical is in fact a multiband half-wave dipole, fed a long way below its electrical centre [2]. The vertical element is the radiating part; the fan of short horizontal radials forms part of the half-wave resonance on each band, but is arranged to act as a non-radiating counterpoise (**Fig 2**). The counterpoise works because the RF current divides itself equally among all the radials, which are in pairs pointing in opposite directions. In the far field, radiation from each rod is cancelled by the radiation from its opposite number. The counterpoise is electrically short, so it looks capacitive on all bands. To cancel this capacitive reactance, the vertical radiator is arranged to look inductive on each band, giving a purely resistive feedpoint impedance at mid-band. This impedance is quite high because the 'dipole' is being fed some way from its centre, so the designer usually provides a broadband step-down transformer to 50Ω. The feedpoint is also the place where the RF current can cross from the inside to the outside of the coax, because that's where the inside and the outside meet. So the designer also provides a feedline choke - probably some thin coax wrapped round a ferrite toroid - which creates a high impedance against RF currents flowing down the outside of the main feedline. Ideally, this creates a clear separation; the coax acts only as a feedline, and if its outer surface is dead to RF it will not try to behave as part of the antenna. But in practice this separation is not so clear-cut.

The difficulty is that the antenna itself will induce considerable currents directly onto the outer of the coax. Unlike a centre-fed

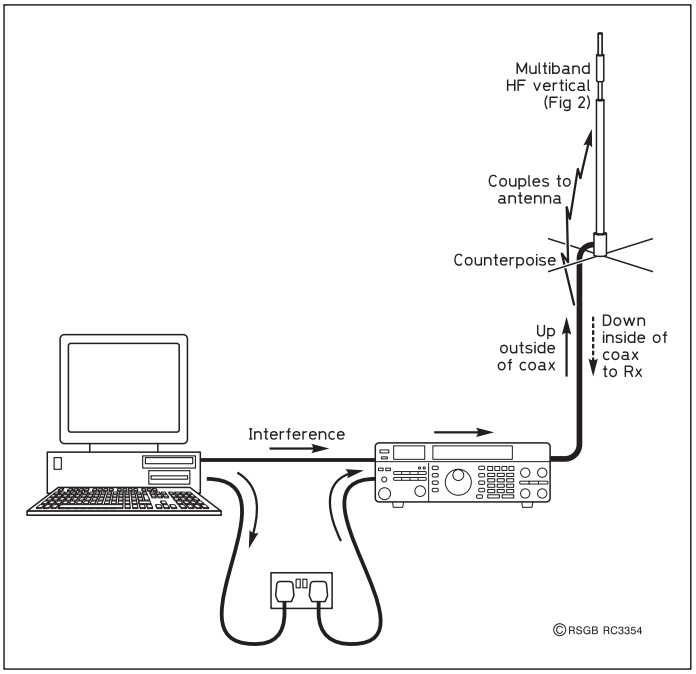

Fig1: How interference can flow from the PC to the receiver, up the outside of the coax and then down the inside. The place to stop it is on the outside of the coax, by winding the cable to make RF chokes.

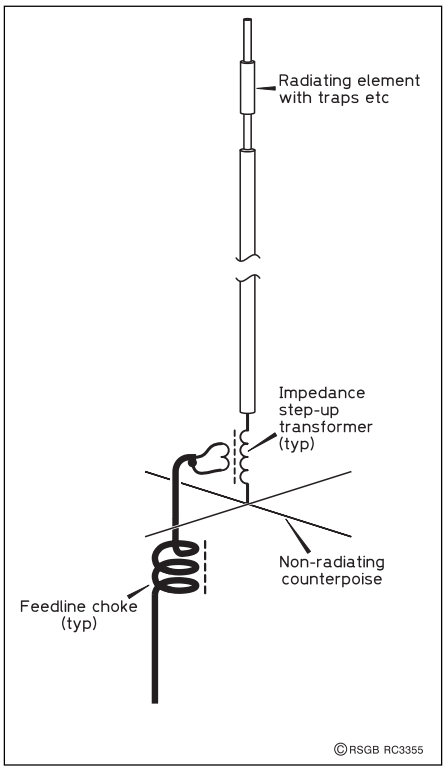

Fig 2: Outline of a typical HF 'no-radials' vertical antenna - details vary, but the basic resonance mode on each band is a half-wave including the counterpoise. Since the feedpoint is a long way off-centre, there is a significant risk of induced currents on the coax feedline.

dipole, a 'no-radials' HF vertical is highly asymmetrical, so there is really *no* 'best' direction to run the coax away from the antenna to avoid induced currents. If you want to clean-up the outside of your coax, the only solution is to add your own feedline chokes at some distance down from the antenna. Feedline chokes are very easy to make - simply wind some coax into a small, flat coil (dimensions below) and tape it up. But where should the chokes be? If the built-in choke at the feedpoint is working well, this creates a high-impedance point which is a good place to start reckoning from. Remember that high-impedance and low-impedance points alternate every quarter-wavelength down the line, and that current maxima like to sit at low-impedance points. Therefore the first maximum of the induced current would want to be at the first low-impedance point, a quarter-wavelength down from the feedpoint. Since your objective is to make life as awkward as possible for these unwanted currents, you place your first choke exactly where the current maximum would want to be - an electrical quarter-wavelength down from the feedpoint.

How far from the feedpoint is that? Resonances on the outside of the feedline will be greatly modified by the presence of nearby objects but you have no way to quantify this, so you might as well relax and use the uncorrected free-space values. Starting at the shortest wavelength of the multiband HF antenna, 10m, a quarter-wavelength at 28MHz is about 2.7m, so that's where to place your first choke. Dropping down to the 20m band, a quarter-wavelength here is about 5.4m, so the best place for the second choke is another 2.7m down the line from the first one. This treatment will also be quite effective for the bands between 20m and 10m, because the presence of the two chokes makes it very awkward for induced currents to build up at those wavelengths either. Unless your vertical also covers bands below 20m, just those two chokes near the antenna should do the job. Another choke in the shack is always a good idea too [3].

Dimensions for the choke coils are given in the *ARRL Antenna Handbook*, and are intended so that the coil's self-capacitance forms a parallel resonant circuit with its inductance. If you're planning to cover the upper HF bands, a good choice would be 2.5m of cable, wound into 6 - 8 turns, like coiling a rope. Just tape it together and let it hang. If you're winding two identical chokes only 2.5m apart, as suggested above, wind the second one in the opposite direction from the first, so that you cancel-out the twists in the rest of the cable.

Now that your coax is hostile to outer-surface currents, either going up from the shack or coming down from the antenna, your whole RF environment should be much cleaner. On receive, you should be at much less risk of RFI from local sources. On transmit, you should also be at much less risk of RF feedback into your own equipment, or of injecting your RF into the overhead mains or phone lines if they pass near your coax.

This discussion has wandered in several different directions from the main question... but 'not all those who wander are lost'. To solve practical RF problems, you often need to understand several different topics before you can see how they all fit together. In this case we've needed to know something about the skin effect, how RF shielding works, how 'no radials' HF verticals work, and how unwanted currents get onto your coax... and then we can finally understand how to stop them.

POWER ATTENUATORS AND DUMMY LOADS

HERE ARE SOME further comments on June's item about thin-film resistors for power attenuators.

FIRST OF ALL, two correspondents pointed out that a power attenuator is *not* suitable for reducing the power output of a transmitter to meet the Foundation Licence regulations! A 10dB attenuator rated for 100W input will certainly reduce the output power to a typical 100W transceiver to the required 10W - but it will also reduce all received signals by an unacceptable 10dB. The best way to reduce the power is the obvious way, using the transceiver's RF POWER control. Do not use the MIC GAIN control for this purpose - tune the transmitter up at the 100W level into a dummy load, following the instructions in the handbook, and then reduce the power using the RF POWER control. You should not need to touch the MIC GAIN control again unless you change microphones.

In making these basic points, I am not falling into the trap of assuming that all M3s are 'newcomers'. On the contrary, some brand-new M3 callsigns belong to people who have held B licences for a long time and are highly experienced in both RF electronics and operating. It's not the class of licence you hold, but what you *do* with it when you've got it!

Returning to the original subject of using thin-film power resistors at RF, John Fielding, ZS5JF, e-mailed with a report of some measurements he made about five years ago using a vector network analyser (VNA). "Using an SMA connector with very short leads connected to the sample resistor - a 100Ω part made by Craddock - I was amazed to see the expected 2:1 SWR right up to 3GHz! Later, I obtained some 50Ω resistors from the same source and they also behaved perfectly up to 3GHz, the limit of the VNA. However, performance degraded badly when bolted to a heatsink, due to the capacitive coupling between the flange and the heatsink. As I recall, the SWR was better with the leads connected one way than the other. We eventually used these resistors as a 50W dummy load for 'silent tuning' a 30 - 88MHz transceiver, and they were more than satisfactory. They are certainly a lot cheaper than the pukka RF load resistors sold by other firms. When properly heatsinked, they will work well up to about 432MHz at the full rated power."

REFERENCES AND NOTES

[1] 'In Practice' for December 2001 contains a lot more references to previous columns - this is a popular topic!

[2] Product Review: Cushcraft R7000, by Peter Hart, G3SJX, *RadCom* January 1997.

[3] As explained in December 2001 and previous columns, attempting to connect an 'RF earth' in the shack is often a *bad* idea. Instead of curing RFI problems, it can just as often make them *worse*. ♦

If you have new questions, or any comments to add to this month's column, I'd be very pleased to hear from you by post or e-mail.

Please remember that I can answer questions through this column only, so they need to be on topics of general interest.

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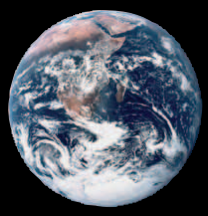

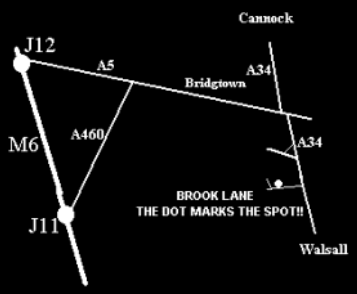

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ALINCO	DR-605E	2M / 70CMS MOBILE	£200.00
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Technical Topics

PAT HAWKER, G3VA
37 Dovercourt Road, London SE22 8SS

DX, NVIS & LARGE HORIZONTAL LOOPS

THE SEPTEMBER 'TT' noted the good performance that can be achieved with balance-fed large horizontal 'loop' (circular, square, rectangular, triangular [delta]) antennas mounted at a height of some half-wave or more above ground. But it also noted that, if the height was of the order of a quarter-wave or less, optimum radiation, at least on the band where the 'loop' is a full-wave, is skywards, forming a 'cloud-warming' NVIS antenna. See, for example, 'TT' February 2002, Fig 1(c).

But there is still something of a mystery about this conventional finding. Many years ago ('TT' July 1968 and subsequent editions of *Amateur Radio Techniques),* Peter Pennell, G2PL, a renowned DX operator of that era, reported a "happy-accident" experience that led me to name his findings the 'G2PL Special' antenna. To quote: "Peter Pennell, G2PL, has found a way of using a two-element quad which suggests a new form of easily-built omnidirectional antenna. Normally, his two-element [three-band] quad is up in the air on a tilt-over type mast, but during some gales this was lowered so that the quad was firing directly up into the sky, with the 14MHz reflector-loop touching the ground in places.

"Under these conditions, he found the performance of the antenna to be superior to that of a resonated vertical on all three bands (typically S9 from VK on 14MHz, S7 from W6 on 21 and 28MHz). The feeder SWR was little different from that in the vertical position. The particular array has three feeders about 100ft long and terminating in balun toroidal transformers [separately] feeding each of the driven elements. When tilted over, the height of the 28MHz driven element was about 7ft and that of the 14MHz element about 12ft.

"Tests at 2PL suggest that the vertical angle of radiation compares with a dipole a half-wave above ground, and he feels that it would be a simple matter to erect such a system using four vertical posts, rather in the manner of the original DDRR hula-hoop antenna. It seems that the resonant loop antenna is being assisted by the reflector on the ground." For *ART* I was able to add: "Subsequently, several other amateurs reported effective use of this arrangement." It also became clear that a horizontal full-wave quad loop performs well as a roof-space antenna. The higher radiation resistance and lower Q than an indoor dipole are useful characteristics in this application.

I have never seen a satisfactory explanation of why the 2PL antenna, with each element a full-wave perimeter at a height of about 0.2λ, should exhibit a vertical angle of radiation comparable with a horizontal dipole at a height of 0.5λ. I was reminded of the 2PL Special, first by a letter from Peter Ball, G3HQT, and secondly by an article in *QST,* August 2002 'A Horizontal Loop for 80-metre DX' by Dr John S Belrose, VE2CV.

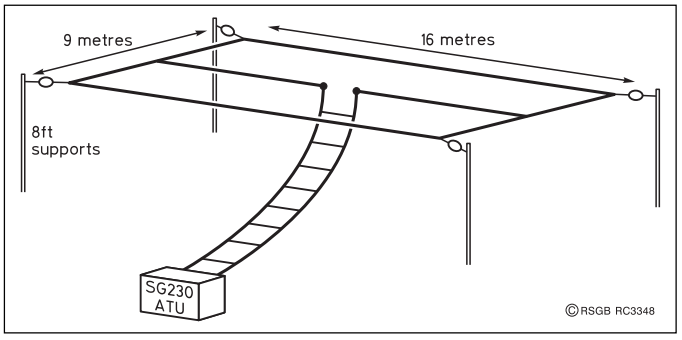

Fig 1: The low (8ft high) large 'loop' antenna with a 50m perimeter and fed by open-wire line across the short sides. Erected by G3HQT for 3.5MHz NVIS operation, it has proved a reasonably-effective DX antenna on the higher HF bands.

G3HQT writes: "The item on NVIS antennas in the June 'TT' struck a chord. About a year ago I put up a 50-metre horizontal rectangular loop only 8ft high, with the idea of working short skip on 3.5MHz. A small variation is that I feed it across the short sides as in **Fig 1,** the intention being to make the current in phase in each branch. A short length of open-wire feeder connects to a SG230 auto-ATU nearby. It tunes up on all bands 1.8 to 28MHz.

"As intended, it works well on 3.5MHz as an NVIS antenna but, surprisingly, is a reasonable DX antenna on other bands: for example HK0, ZD7 on 7MHz; VK6, TI, EY, 9G, VU, 6W on 10MHz; LU, A5, V51, HI on 14MHz; ZL, A9, FR, P4, W7 on 18MHz; 3W, V3 on 21MHz; KG4, ZF on 24MHz; and P4 on 28MHz. This with 100W, sometimes in competition with other stations."

If it was serendipity that brought about the G2PL and G3HQT extremely low-height 'loop' antennas, a different route was followed by VE2CV for what amounts to an NEC-4 simulation of an original loop design specifically for 3.5MHz DX (but suitable also for 7 and 10MHz): **Fig 2(a)**. This was inspired by earlier work by Paul Carr, N4PC (*CQ* December 1990), and W Bolt, DJ4VM (*Ham Radio,* August 1969, and see brief mention in G6XN's *HF Antennas for all Locations*), **Fig 2(b)**. The transposed arrangement of Fig 2(a) results in a full-wave loop operating in a W8JK driven-element mode and with a null in the overhead radiation pattern: **Fig 3**.

Although it does not appear that VE2CV has yet validated the design with an actual antenna, it is based on a simulation using W7EL'S *EZNEC Pro* version of *NEC-4D*. In his introductory notes, VE2CV stresses that he considers horizontal polarisation is preferred for 3.5MHz DX, particularly at low elevation angles, since horizontally-polarised waves are hardly affected by the finite conductivity of the ground in front of the antennas. The exception is where vertically-polarised antennas are used over very good ground, near the sea shore or over alkaline salt flats.

Nevertheless, VE2CV does not consider that a 3.5MHz horizontal dipole at a practical height to be an ideal antenna for DX. He believes that the radiation pattern should have a null overhead, to minimise NVIS signals from atmospheric noise and interference, and a low-angle lobe to maximize reception / transmission over paths to distant stations. This would require the dipole to be about 40m high. The proposed arrangement uses 40ft supports as normally proposed for the conventional 'Loop Skywire', as illustrated in the September 'TT' (Fig 1). On 3.5MHz, such antennas are more suited to NVIS than to DX (although even high vertical radiation can prove effective sometimes for 'grey line' (chordal hop) propagation during ionospheric tilt periods).

VE2CV, in his six-page article, provides details of matching network values for the system impedance of the antenna at 3.75, 7.2 and 10.14MHz. Fig 3 shows the vertical and horizontal radiation patterns of the antenna at a height of 40ft. **Fig 4** shows that when a 1λ horizontal loop is used at twice the design frequency (as a 2λ loop) it produces a vertical null.

COMMON FAULTS & CURES

HARRY LEEMING, G3LLL, with many years in the trade behind him, adds to the com-

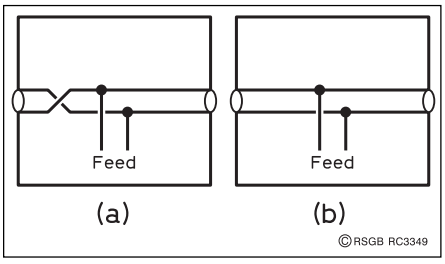

Fig 2: (a) Top view of VE2CV's simulated quad loop with transposed phasing lines, operating in the W8JK mode and producing a vertical null on 3.5MHz. (b) Top view of the 1969 DJ4VM loop. (*QST*, August 2002)

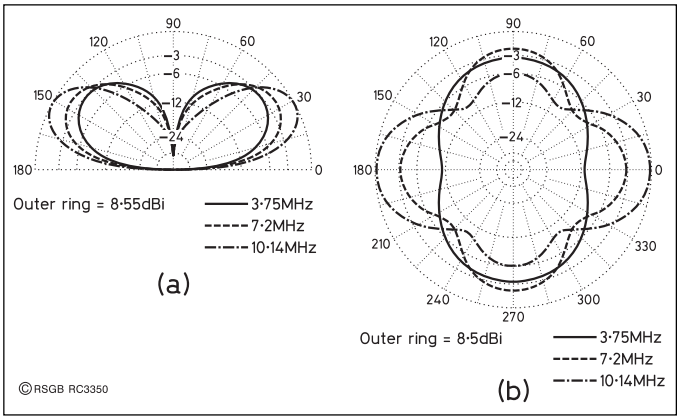

Fig 3: Principal plane elevation (a) and azimuthal (b) patterns for the simulated antenna of Fig 2(b) at a height of 15m over average ground.

ments in the August 'TT' on intermittent and other common faults. He writes:

- *"Intermittent faults:* As suggested, these can be very time consuming. I find that often the best approach is a few pokes and prods in likely areas.
- *"Dirty contacts:* Controls and switches are largely self-cleaning, provided that they are used regularly. But the never- or very seldom-used switch or control that is tucked behind the back of a rig or, even if at the front, is a common source of trouble.
- *"Relays*: A common cause of intermittents. Removing the case and gently poking at the contacts with an insulated tool will usually show if this is the trouble. Be sure to clean them with a cleaner free of lubricant, such as video head cleaner.
- *"Plug-in circuit boards*: Another weak link, especially if the socket and contacts on the boards are made from different metals. I find that gold-plated memory and non-gold-plated sockets on computers need cleaning every couple of years.
- *"Crimped connections in plugs*: These tend to start becoming troublesome after 20 years or so, and are a common cause of intermittent faults on the FT-707.
- *"Intermittent dry or broken joints*: These cannot be blamed on smoking, but often occur where a largish component, such as an audio output or regulator IC, is clamped on to the chassis and soldered to a PCB with resultant movement between the two as the board flexes.

"The first five problems are much more likely to occur where the owner of the rig smokes. When I was in business, I reckoned that about a third of my repair income came from undoing the faults caused by cigarette smoke!" [See also 'The Smoker's Legacy' ('TT', July 2001, p64), in which G8MOB stresses: "The moral is to be very careful when buying radios from smokers or those acting for 'silent key' smokers, unless the set is a fully-sealed military unit such as the R210 receiver. Tobacco smoke and electronics just do not mix."]

G3LLL emphasises, from the viewpoint of a service engineer, that often the most difficult aspect of fault-tracing is obtaining the complete story of what has happened from the customer. He writes: "At times I have felt that an interrogation room with a bright light would come in handy! One time, a hand-held unit was presented to me claimed as 'intermittent on transmit'. Eventually it transpired that it was in fact intermittent on receive. The owner had presumed that it was not transmitting as at times he could hear nobody coming back to him!"

He advises: "When presenting a rig for repair, try to give as much detail as possible. If the receiver tends to go dead, is the 'S' meter still registering? Can you hear any hiss from the loudspeaker? Do the pilot lamps go dim when you key the microphone? Can you hear the output on a receiver in the shack? Is the fault on all bands and modes? Do not rely on a third party to pass on the information to the engineer. Write everything down and attach a note to the rig with a day-time telephone number. The more information you give, the quicker the fault will be to fix, and the less you should have to pay."

Finally, G3LLL endorses the use of an elastic band around the handles of a pair of pliers to form an effective "third hand" as mentioned in the caption to Fig 1 of the August 'TT' as an alternative to the use of wooden or plastic clothes pegs.

LEAD-FREE SOLDER AHEAD?

A MAY 2000 'TT' item "Electronics & the Environment" (p55) drew attention, *inter alia*, to the third draft of a European Commission directive on 'Waste Electrical and Electronic Equipment', which was aimed primarily at reducing the growing mountains of computer junk, but also addressed the use of cadmium, mercury and some other toxic metals, along with lead. The draft at that time scheduled a phasing-out of the use of all these substances, exempting batteries and PCBs, by January 2004.

It was reported by *IEEE Spectrum* that some major companies, including Sony and Matsushita, were planning to eliminated lead solder from domestic products during 2000. Possible alternatives to lead-tin solder were given as tin, copper and silver: "It seems likely that tin / copper will be used for wave soldering, with tin / silver / copper used for solder paste. These alloys have higher melting temperatures than the current

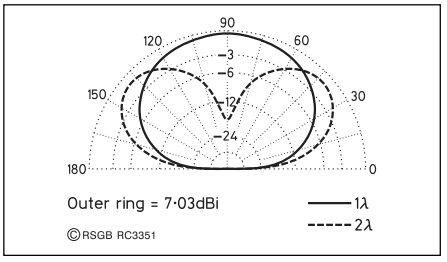

Fig 4: Vertical radiation patterns for 1λ and 2λ loops.

tin / lead solder alloys (melting point, typically 173 - 220°C according to the percentage of tin). Tin / silver / copper melts about 240°C and tin / copper still higher." The melting point of pure lead of is about 328°C, copper about 1083°C and silver about 961°C. The percentage of tin in the alloy governs the melting point of the solder alloy.

Derek Penrose, G1CWZ, provides an update on the situation in the form of an article in the IEE's *Electronic Technology,* July/August, 2002 (pp46 - 47): 'Micro-Welding Offers Solution to High Process Temperatures', by Tessa MacGregor. This describes the use of custom-built micro-welding machines for gold-ribbon bonding of PCBs. Such a setup might well be suitable for industrial purposes, but would seem out of the question for DIY construction. What is relevant is the introductory note which states: "In 2006, laws are being activated which ban solder containing any lead, and some assembly categories will not tolerate the 260°C temperatures needed for most lead-free solders. Manufacturing industries are now looking for alternative joining methods and micro-welding may provide the solution."

It was noted in the August 'TT' that, for effective soldering of SMT with current lead / tin solder, one needs the bit temperature of the iron to be roughly 100° above melting point (eg about 290°C or a little lower). But it was also stressed that "one should never go above 300°C" with present solid-state and SMT components. One can see a problem arising! G1CWZ wonders whether we need to stockpile what he calls "proper" solder! Or will the law ban only the *use* of lead / tin solder but not its *sale*?

Brian Horsfall, G3GKG, adds some further useful points to the soldering lore given in August. He writes:

- "Regarding filing the tip (and bit-wear generally). If the bit is uncoated copper, a normal 60% tin / 40% lead solder will eat it away quite quickly by dissolving the copper in the molten solder. Multicore *Savbit*, which contains a small percentage of copper, was designed to slow down this effect and did, indeed, give many times the bit life. With an iron-coated bit on the other hand, *Savbit* or similar copper-containing solder will rap-

idly dissolve away the iron at the tip and lead to pitting and a very much shortened life. The unfortunate corollary is that, using the correct, plain 60 / 40 solder with an iron-coated bit, it is much more difficult to keep the tip nicely tinned, compared with the incorrect use of *Savbit*. You pays your money and takes your choice!

- "Watch out for apparent bargain prices of solder at rallies – usually on a reel with one corner of the label 'accidently' torn off. If you fall for this one (as I once did), you will probably find that it is a 40% tin / 60% lead solder, quite unsuitable for radio work. Although both mixtures start to melt at about the same temperature (183°C), the 60 / 40 'eutectic' mix is fully liquid by 188°C and the joint solidifies quite quickly as it cools. The 40 / 60 mix is not fully melted until about 235°C and so goes through a gradually-solidifying 'pudding' phase on cooling, during which the slightest movement is guaranteed to produce a dry joint."

MF PERFORMANCE OF THE CFA

THE AUGUST ITEM 'Poynting Vector Synthesis & the CFL' drew the conclusion that there is very little significant radiation from the 'loops' of the CFL and that 'Poynting Vector synthesis', in the form suggested in the Patents, is based on a fundamental fallacy. But this does not mean that the original CFA structure does not work, if relatively poorly, as an antenna based on conventional theory. What is disputed by the professionals is the uniquely high efficiency that has been claimed ever since 1989 by the inventors of this electrically-short antenna.

There have been several trials and tests of the CFA as an MF broadcast antenna; in none of which has it proved capable of reproducing the performance claimed by the inventors for the original Cairo broadcast crossed-field antenna. Admittedly, much of the criticism has come from simulated studies, with the inventors steadfastly claiming that the CFA is not amenable to *NEC* programs.

At the Millennium Conference on Antennas and Propagation in Davos, Switzerland, April 2000, Dr John Belrose, VE2CV, presented a paper 'The Crossed-Field Antenna – Analysed by Simulation and Experiment' that concluded: "The inventors claim that their CFA, in spite of its small electrical size, is a broad-band efficient radiator due to its ability to couple very effectively to the propagation medium and to minimise wasteful near-field reactive power. Our study shows that the CFA is a very inefficient radiator. The near field is very strong. And, the very large reactive powers which circulate between the two feed points causes problems with the transmitter (an apparent mismatched load) with the matching and phasing networks, and results in power loss. There is (in the author's experience) an unbelievably wide divergence between the results of our study and the performance claimed for the MF broadcast CFA antenna system in operational use in Egypt. Thus the excellent operational performance claimed by the inventors of the CFA is an enigma."

A detailed study of a variety of electrical-short MF antennas is reported in a long (22-page) paper 'Short Medium-Frequency AM Antennas', by the Brazilian professional broadcast engineer (and radio amateur) ValentineTrainotti (*IEEE Trans on Broadcasting,* September 2001, pp263-284).

This is introduced with the comment: "Vertical antennas with heights less than λ/8 for broadcast service have not been very well studied because of poor interest in radiators of low efficiency."

The paper analyses from a theoretical and practical viewpoint a wide variety of short monopoles, short dipoles and short folded monopoles as well as the crossed-field antenna (CFA). Types analysed include: top-loaded monopole; umbrella-loaded monopole; cylindrical monopole; top-loaded cylindrical monopole; series-fed monopole skirt-loaded; folded monopole, short dipole and the CFA. For optimum performance all the antennas require a virtually-perfect ground plane.

Of the CFA, he writes: "This antenna is nothing new and its behaviour is similar to a short monopole of the same height. It has a short cylindrical monopole structure as a radiating system, called the 'E' plate, and a metallic plate (called the 'D' plate) under it and parallel to the ground plane with, lately, in order to increase its radiation performance and facilitate its tuning, a top hat." In the paper he points out that there are "no magical effects" in the CFA radiation behaviour, because this is similar to a short monopole as measurements indicate. He insists that the assumptions made by the inventors as to how it works "seem completely wrong". Among the many points made in this paper is that it was determined by calculations and measurements that top-loaded and umbrella-loaded antennas of less than λ/8 in height can give a performance not too far below those of a quarter-wave monopole when an almost perfect ground-plane is used. **Fig 5** shows the original 'barrel-shaped' CFA, as disclosed in 1989.

I must apologise for some confusion and shortcomings in respect of the patent numbers for the CFL antenna given in the August 'TT', both in the text and in the caption to Fig 3. The correct number for the CFL is US 6,025,813 as given in the text but GB 9,718,311 refers to the first 'Application' filed in the UK. This was later revised and not finally accepted as Patent GB 2,330,695 until 26 June 2002. There are some differences in the 'claims' made in the UK and USA patents, but the descriptions and illustrations are similar. It is interesting to note that the inventors claim that the CFL radiates vertically-polarised signals as would radiation from the outer braid of a vertical feeder! The numbers given in the caption are those for the original CFA patents: US 5,155,495 and GB 2,215,524.

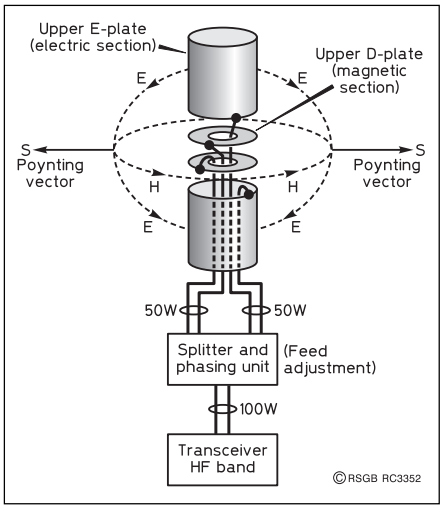

Fig 5: The original 'barrel-shaped' crossed-field antenna (CFA) as disclosed in 1989.

METERING & TUNING AT HIGH VOLTAGES

DEREK BUNDEY, FIEE, G3JQQ, adds usefully to the March 'TT' item 'Metering High-Power Valve Amplifiers', contributed by G3GKG. He writes: "I seem to recall that past wisdom was to ensure that the risky zero adjustment screw and front cover was covered by perspex, not difficult to do, but use appropriate screws rather than Araldite. I assume the use of old-fashioned full-size UK meters rather than the modern small Japanese-style meters. Most of the older black variety will withstand medium-EHT but, if nervous, a larger fixing hole can be used with a plastic ring spacer. Rear grub screws can be covered with tape.

"Concerning the question discussed by G3GKG of tuning tetrode valves by monitoring the screen-grid current, this was covered extensively by the late Bill Orr, W6SAI, in 'Understanding Tetrode Screen Current' published in an Eimac *Newsletter*, circa 1961. Another *Newsletter* reviews the suitability of various valve types to circuit configuration and covers heavy control-grid current for the 4CX series in inappropriate circuits."

G3JQQ adds that his set up is similar to that used by G3GKG, but based upon a modified STC V-bomber transmitter unit, the RAF T4188, mentioned in 'TT' some years ago. It uses two 4CX250 ceramic valves, strict AB1, 1500V (no-load) EHT, 350V screen voltage, tuned by variometer and out-

put loading capacitor, and an input pi-network with preset capacitor. With 20W input, it provides at least 250W output. As driver, a Yaesu FT-1000MP is used at low power: "There is no ALC, but a small amount of compression set by monitoring output with an oscilloscope. It covers all bands from 3.5 to 28MHz. The unit is compact and sits under the desk, but it has a large, separate power supply unit. The input is untuned passive-grid with 200Ω loading using a 4:1 setup balun. The input VSWR becomes increasingly reactive at the high-frequency end by the FT-1000MP ATU. The previous driver was an FT-102 that could be matched manually. The amplifier has been in use for nearly 20 years.

"Anyone else out there with a T4188? Be assured that a little effort will produce a good linear amplifier!"

CERAMIC FILTER AS 455kHz BFO

JOHN BEECH, G8SEQ, was interested to see the notes from LA8AK ('TT'. July 2002) on his experiments in using 5, 6 and 10 MHz ceramic IF filters as variable frequency elements in VFOs. It reminded him that he had proposed a roughly similar arrangement for use at 455kHz and 10.7MHz some 14 years ago. He writes: I remember trying to get this type of filter to oscillate since, at the time, ceramic resonators were relatively expensive and I had a box full of filters which I had bought cheaply".

His results were published originally in *SPRAT* issue 54, spring 1988, and a later version (including the use of ceramic resonators) appeared in 'TT' November 1993 (see *TTS 1990-94*, p240). In this he reported *inter alia*: "Finding myself without a suitable ceramic resonator, I experimented with ceramic CMF filters types CMF24550 (455kHz) and also a 10.7MHz ceramic filter type CFS: **Fig 6(a)**." He found that, provided he connected pin 2 (normally grounded when the device is used as an IF filter) as a 'centre tap' in a Hartley / Colpitts configuration, it oscillated. With the 455kHz filter, the output frequency tends towards the bottom edge of the filter passband (ie about 450kHz). With the 10.7MHz filter, oscillation was at the top end of the passband, ie about 10.87MHz.

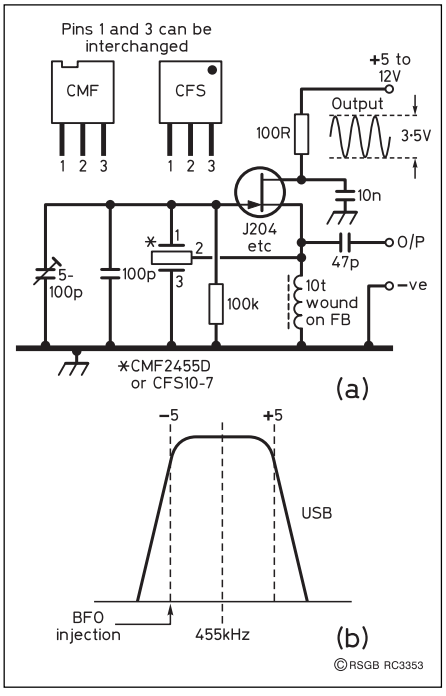

Fig 6: BFO oscillator using a ceramic 455kHz IF filter, as described by G8SEQ in 1988.

He added: "Using the 4550 as an oscillator in conjunction with a 4550 IF filter, upper sideband can be effectively demodulated: **Fig 6(b)**". At the time, he thought about 'pulling' the oscillator frequency, though never got round to attempting this. Now, more than a decade later, he is thinking of finding time to re-investigate this type of oscillator.

GALLIUM NITRIDE – THE FUTURE?

EXPERIMENTAL TRANSISTORS based on gallium nitride are claimed to withstand heat and to be capable of handling frequencies and power levels well beyond what is possible with silicon, gallium arsenide, silicon carbide or essentially any other type of semiconductor yet fabricated. A six-page article 'The Toughest Transistor Yet', by Lester F Eastman (Cornell University) and Umesh K Mishra (University of California at Santa Barbara), appears in *IEEE Spectrum*, May 2002, pp28-33. The authors state that GaN transistors could double or triple the efficiency of cellular base-station amplifiers, enabling base stations, freed from fans and correction circuitry, to be shrunk to the size of a smallish dormitory refrigerator, something that would fit on a utility pole.

They stress that those same characteristics of speed, high power handling, and heat resistance would also suit the transistors for countless other uses. The fly in the ointment is that no inexpensive substrate material for gallium nitride exists, although silicon carbide is a fairly good match. Unfortunately, at present, a 50mm wafer of gallium nitride on silicon carbide, which might yield a couple of thousand transistors, can cost in excess of $10,000, far more than prepared silicon wafers in much larger sizes. Experimental GaN devices have proved capable of sustaining power densities above 10W/mm of gate width (compared to less than 1W/mm for gallium arsenide), while amplifying signals at 10GHz. Researchers tested a GaN transistor at a sizzling ambient temperature of 300°C, and found that it still had a gain of about 100, whereas silicon transistors stop working at about 140°C.

If wafer prices can be brought down, there would appear to be a dazzling future for GaN devices in radio communications.

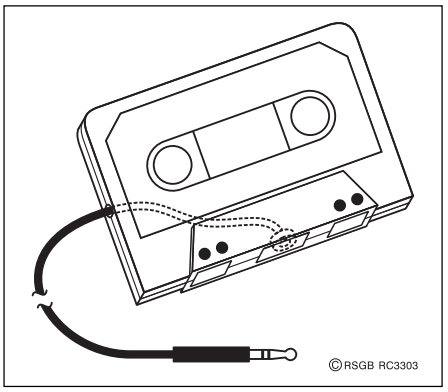

Fig 7: ZS6BFI's method of using a discarded tape cassette and earpiece to feed the audio output from a handheld transceiver into a car audio system. (Source: *Radio-ZS*)

HANDHELD TO CAR AUDIO

BURRIDGE EMMELL, ZS6BFL, has described in *Radio-ZS* (January / February 2002) a simple means of 'Connecting a Hand-held Transceiver to a Car Audio System'. He had found that the output level of his HT did not suit his hearing when competing with car noise. Adapting a system used in some drive-in cinemas, he found a way of using a dismantled tape cassette to feed the audio from a headphone socket into the car audio system: **Fig 7**. He writes: "All that is needed is an old cassette case with everything removed and a cheap portable-radio ear-piece. Dismantle the ear-piece and keep the coil. Throw away all the metal bits, possibly keeping the magnet for other use. Install the lead and the coil remembering to keep the coil a fraction away from the pickup head. The lead, where it exits the cassette, must not interfere with the operation of the tape mechanism, If necessary, first test it on a portable tape recorder. On the other end of the lead, connect a plug that suits your HT. Mine is working on a Kenwood AT-22 and Icom R2 and does the job for me."

Remember the warnings of the potential danger of speaking into a handheld unit while driving. But listening through the car audio system seems acceptable.

HERE & THERE

IN CONNECTION with the June 'TT' item on the early Eddystone 'product detector' fitted to the WWII Model 400, in which I suggested that this 130-2200kHz receiver may have been used for the RAF air / sea rescue service, Dave Rumens, G4BOO, comments: "I believe these receivers were used by the Communication Branch of the Home Office between 1942 and 1952 when they operated their wide-area-coverage emergency services communications on MF." Further investigation has shown that the RAF launches were fitted with the T1154N / R1155N combination, a second R1155 (type A, B or F) for the navigator (with DF loop) and also the TR1143 and TR1133 for sea / air communications. ♦

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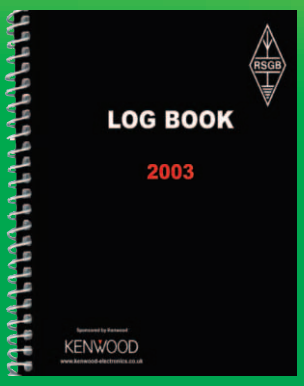

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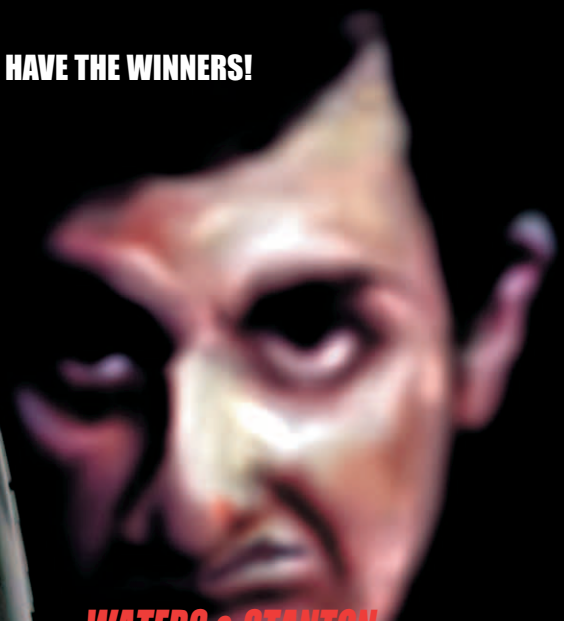

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ICOM IC-7400 HF/VHF TRANSCEIVER

Reviewed by Peter Hart, G3SJX*

SOME FIVE years or more ago, Icom was busy developing a complete new range of HF transceivers. The IC-746 and IC-756 were introduced as the middle and high end base station models, both also covering 6m and with the IC-746 also covering 2m. Both radios used conventional analogue IF circuitry with crystal filters for the main selectivity and DSP for audio functions. These radios proved very popular, packed with features made easily accessible through large LCD panels and clever software. Since then the IC-756 has been upgraded to the IC-756PRO and more recently the IC-756PROII, both radios using DSP-based IF processing for all channel selectivity functions, eliminating the need for optional extra and expensive IF filters. It is now the turn of the IC-746 to undergo the same treatment. Using the same DSP filtering block developed for the IC-756PRO series and a number of other enhancements, the result is the IC-7400.

Although the outward appearance of the IC-7400 is virtually identical to the IC-746, under the bonnet the IF DSP makes the signal processing architecture very different, with much greater flexibility to the channel filtering, AGC, and extensive transmit audio filtering and processing. There are other enhanced features such as built-in RTTY decoder.

PRINCIPAL FEATURES

THE IC-7400 is a 12V operated radio measuring 287W x 120H x 317Dmm and weighing 9kg. The power lead for the radio incorporates a filter box containing toroidal inductors and capacitors. This is in addition to already extensive filtering on the power line inside the radio. This added filter has obviously been necessary to meet the European CE mark and EMC requirements. In the US, which has less stringent requirements, the IC-746PRO is marketed with reduced performance in this area, but in all other aspects the radios are the same.

The usual modes are covered for LSB, USB, CW, RTTY, AM and FM with reverse sideband selectable on CW and RTTY and data selectable on the voice modes (this mutes the microphone and speeds the T/R switching). The receiver tunes continuously from 30kHz to 60MHz and 144 to 146MHz with the transmitter enabled only within the amateur bands and a little more on either side. There are slight variants in different countries. Individual buttons select the bands with the usual Icom triple band stacking registers, returning one of three last used frequency / mode combinations for each press of the band key.

The smooth-action tuning knob tunes in 10Hz steps at 6kHz per knob revolution with auto speed-up on fast sustained tuning which can be disabled if desired. Faster tuning rates for rapid frequency changes and a slower rate for precision tuning are also provided. 101 memory channels are provided with direct tune from memory, easily selected by a click-step rotary control. Preview of memory contents together with label tagging up to nine characters is provided, although this needs to be accessed from the menu system which sacrifices other display options. An additional memory channel is assigned as a call channel and accessed directly by a front panel push button. A separate memo pad feature allows up to five (or 10) frequencies to be quickly stored and recalled by a simple key press, on the basis of last in, first out.

A quick split feature enables split frequency operation to a predefined offset by a single key press, and another key selects reception on the transmit frequency and allows it to be independently tuned. Other keys perform the usual memory and VFO transfer and selection functions and allow direct frequency input via the band selection keypad. RIT and transmitter independent tuning operate over a range of ±9.99kHz and various scan modes are implemented. The CW pitch is adjustable over the range 300 - 900Hz to suit personal preferences.

A front panel pushbutton selects between two antenna sockets on HF / 50MHz with a third antenna socket dedicated to VHF / 144MHz. The antenna selections are stored with the band stores. The built-in auto ATU covers HF and 50MHz, matching up to 3:1 VSWR, with tuning settings stored every 100kHz to enable rapid and accurate reselection. The auto ATU is automatically bypassed if an external auto ATU is used. Unfortunately, there is no provision to allow for a separate receiver antenna. To cope with different receive conditions, two preamplifiers are available on HF and 50MHz, one on 144MHz or for exceptionally strong signals a 20dB input attenuator can be selected. No preamp is selectable below 1.6MHz. A combined RF gain / all mode squelch control is provided, now used on most Icom radios. A new feature is voice squelch control. This only opens the squelch when receiving voice signals and is probably of most use during scanning, preventing the scan from stopping on carriers and other non-voice signals.

For FM and repeater use several facilities are provided. Duplex offsets may be set over a wide range, programmed separately for HF, 50 and 145MHz and separate repeater tone access frequencies may be programmed for these different bands. Selective calling may be implemented using CTCSS tone squelch or DTCS which uses a three-digit code to open the squelch and different tones or codes may be preset for the different bands. A scan may be implemented to determine which tone or digital code is being used by the received signal.

For RTTY and data, the IC-7400 provides significantly enhanced capabilities compared with the earlier radio. Extensive filtering (see DSP section), support for FSK and AFSK modes, selectable FSK parameters,

The Willows, Paice Lane, Medstead, Alton, Hants GU34 5PR.

packet data optimisation to 9600 baud or lower rates, a tuning indicator and a simple RTTY decoder / monitor are all built-in.

The transmitter power is variable from about 2 - 100W on all bands including 144MHz. An audio speech compressor is included with VOX, transmit signal monitor and audio response tailoring. Full and semi break-in is available on CW with a built-in message keyer and twin key jacks for the internal or for external keyers. Four message stores are included, each up to 50 characters in length with a provision to send automatically incrementing serial numbers, abbreviated number formats and auto-repeat after a time delay. The message stores are programmed alphanumerically from the front panel push buttons.

The rear panel includes the usual interfaces, common to all Icom radios, for control of linears, ATUs, data terminals etc. The standard Icom C-IV serial computer interface is provided with data transfer rates from 300 to 19,200 baud, allowing several Icom radios to be connected to a common bus. A comprehensive 112-page manual is provided packed with information and circuits are included. Options include voice-synthesised readout of display frequency and mode, and a high stability reference oscillator.

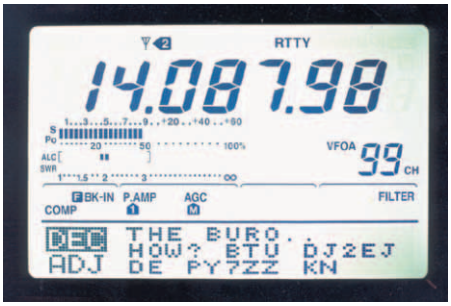
DIGITAL SIGNAL PROCESSING

THE IC-7400 architecture and DSP functions are similar to the IC-756PROII. The radio is a triple conversion superhet with a first IF of 64.455MHz, a second IF of 455kHz and a third conversion to 36kHz to feed the DSP. The 32-bit floating point DSP is interfaced to the analogue circuitry through very high resolution 24-bit A/D and D/A converters. The DSP provides the IF filtering, modulation, demodulation and audio processing functions. 41 different passband widths are selectable on CW and SSB from 50Hz to 3600Hz, 32 on RTTY (50 - 2700Hz) and three each on AM (3, 6, 9kHz) and FM (7, 10, 15kHz). Three separate bandwidths are immediately available for each mode selectable by a simple push of a front panel key, from the available menu of bandwidths. In addition, two selectable filter profiles on CW and SSB modes are selectable, a sharp profile with a flat passband for best audio quality or a soft profile with a more rounded passband for weak signal readability. For RTTY a twin peak audio filter may be selected, similar to the IC-756PROII, providing five different bandwidths in addition to the IF filters.

The DSP also provides the passband tuning function, enabling the filter passband to be shifted and narrowed in incremental steps. The AGC is also implemented by the DSP with three separate time constants selectable from the front panel. These three values may be set from a menu of 13 different values (0.1 to 6s) and are set separately for all modes except FM. Two separate notch functions are provided in this transceiver, both using the DSP. A particularly effective manually tuned IF notch with a depth of 70dB is included within the AGC loop and hence does not result in desensitising with strong carriers. An auto-notch is implemented at AF and will automatically attenuate several beat notes, even if they are moving. An adjustable DSP noise reduction system is included and there is also a conventional (not DSP) IF noise blanker for pulse type interference such as car ignition.

The modulated transmit signal is also generated by the DSP with adjustable bass and treble microphone equalisation and adjustable compressor.

LCD PANEL



MUCH OF THE operation of the IC-7400 centres on the monochrome LCD dot matrix panel and associated five function keys along the bottom, as used in the IC-746. The upper part of the panel displays the frequency, mode, RIT offset, memory, antenna etc and status of all selected functions. A bargraph meter displays signal strength, power output, ALC and SWR with optional peak hold.

The lower part of the panel is associated with the function keys and depends on selected mode and other parameters. Two levels of menu and a general settings mode are provided for selecting many of the features. This allows for the setting of a vast number of parameters including the keyer functions, scanning, memory preview, RTTY settings, repeater access and tones and selectable options for all the functions of the radio. A scan can be enabled showing the spectrum on either side of the receive frequency with selectable step sizes. This provides spans from about ±15kHz to ±750kHz. The receiver is muted during this process but it can be done just once and stored. This lower part of the panel can also provide a simple two or three line readout for the built-in RTTY decoder. The function key labels cannot be displayed at the same time as the spectrum or RTTY decoder outputs. A novel feature using the lower part of the panel is to plot antenna VSWR against frequency for a number of selectable frequency spans. This handy check is unique to the IC-7400.

MEASUREMENTS

THE FULL SET of measurements is given in the table when powered from a 13.8V supply, with additional comments as follows.

Receiver Measurements

The sensitivity results are very similar to the IC-746. Preamp 1 has a gain of about 10dB and preamp 2 about 17dB. With preamp 2 selected, the receiver shows an improvement in sensitivity over preamp 1 of about 2 - 3dB. On 144MHz the single preamp has a gain of about 20dB. The S meter calibration is approximate due to the resolution of the bargraph and appears independent of mode. The rejection of images, IFs and spurii was very good, in excess of 100dB in most cases. There were, however, a number of internal 'birdies' audible in the LF region (30 - 300kHz). Rejection of the first mixer image occurring in the VHF region was a major problem on HF with the IC-746 when a 2m antenna was also connected. This problem has been significantly improved in the IC-7400 and now shows some 70 - 90dB rejection.

The filter bandwidths shown in the table are just a small selection from the filters available. Although the bandwidths available are the same as for the IC-756PROII, the shape

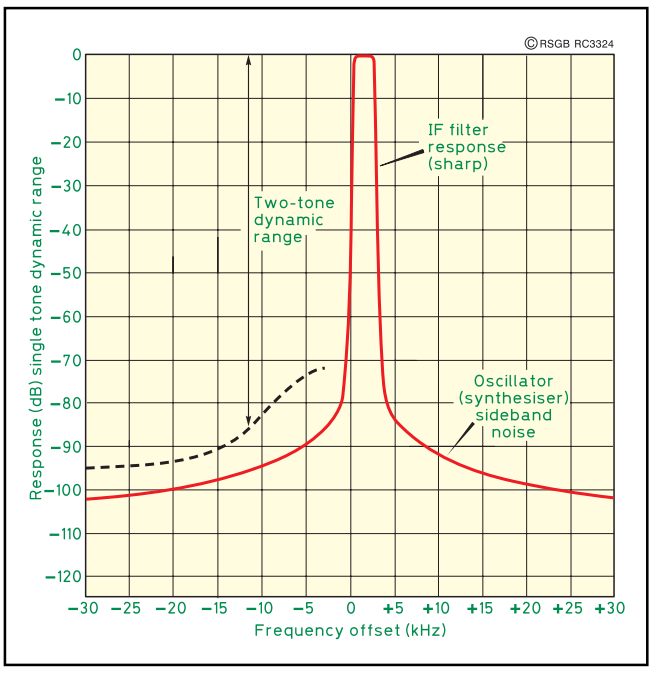


Fig 1: Effective selectivity curve on USB.

factors and skirts are not as steep, particularly for the narrower bandwidths. Presumably the IC-7400 uses a simplified DSP filtering algorithm. The effective selectivity curve on USB is shown in **Fig 1**.

The reciprocal mixing results are good, slightly better than the IC-746 and virtually identical to the IC-756PROII, suggesting a common synthesiser design is now used. The third order intercept and dynamic range figures are good but the IC-746 measured slightly better.

Transmitter Measurements

The power output figures in the table were measured with the ATU out of circuit. The ATU introduced a loss of about 10%. At full power on SSB, the two-tone intermodulation products measured significantly better than the IC-746 which showed a particularly poor result. The CW rise and fall times were ideal with slight character shortening at higher speeds, perhaps 15% in semi break-in or 30% in full break-in at 40WPM. Transmit-receive switching was clean and very fast in data mode when interfaced via the ACC1 connector. Interfacing via the microphone connector, it took as much as 80ms for the transmitter to achieve full output. Make sure that data mode is selected and the appropriate data interfaces are used for effective AmTOR and packet operation.

ON-THE-AIR PERFORMANCE

WHEN I REVIEWED the IC-746 four years ago, I found this radio performed extremely well and was a delight to use. These same comments also apply to the IC-7400 and even more so with the extra flexibility provided by the DSP filters and added RTTY features. With the clear, bright LCD, the radio is easy to use and access to the various features fairly intuitive. The tuning rate and feel is ideal and auto speed-up just about right. Quick-split and XFC (transmit frequency monitor and tune) makes split frequency operation very simple and a nice touch is the ability to lock the receive frequency and still be able to vary the transmit frequency. This is particularly useful in the heat of a split frequency pile-up. The filters were excellent, I generally preferred the sharp setting in all cases.

The strong signal performance appears excellent and no particular intermodulation problems were experienced. The receiver was very good on all modes with excellent AM broadcast quality and clean VLF performance, an indication of good synthesiser noise. The transmitter performed well with clean break-in on CW and good audio reports.

The RTTY decoder was effective and functioned well on weak signals but it is limited to 45 baud / 170Hz shift. The radio also performed effectively on 2m on CW / SSB and on FM. The repeater access features were straightforward to use.

CONCLUSIONS

THE IC-7400 provides an entire HF / VHF station in one box. With an excellent performance, 100W output on all bands and packed with features it should prove a popular choice. Available for around £1499, it is excellent value with the added bonus that no additional filters need be fitted.

I would like to thank Martin Lynch & Sons for the loan of the equipment. ♦

ICOM IC-7400 MEASURED PERFORMANCE

	SENSITIVITY SSB 10dBs+n:n		INPUT FOR S9	
FREQ	PREAMP1 IN	PREAMP OUT	PREAMP1 IN	PREAMP OUT
136kHz	-	1.6µV (-103dBm)	-	250µV
1.8MHz	0.13µV (-125dBm)	0.28µV (-118dBm)	16µV	50µV
3.5MHz	0.11µV (-126dBm)	0.28µV (-118dBm)	13µV	56µV
7MHz	0.11µV (-126dBm)	0.25µV (-119dBm)	14µV	50µV
10MHz	0.13µV (-125dBm)	0.28µV (-118dBm)	16µV	56µV
14MHz	0.13µV (-125dBm)	0.28µV (-118dBm)	16µV	56µV
18MHz	0.13µV (-125dBm)	0.28µV (-118dBm)	16µV	56µV
21MHz	0.13µV (-125dBm)	0.28µV (-118dBm)	16µV	56µV
24MHz	0.13µV (-125dBm)	0.28µV (-118dBm)	14µV	63µV
28MHz	0.14µV (-124dBm)	0.28µV (-118dBm)	16µV	63µV
50MHz	0.16µV (-123dBm)	0.45µV (-114dBm)	22µV	100µV
144MHz	0.1µV (-127dBm)	0.25µV (-119dBm)	4.5µV	40µV

All signal input voltages given as PD across antenna terminal. Unless stated otherwise, all measurements made on SSB with receiver preamp 1 switched in and with 2.4kHz bandwidth sharp filter selected.

INTERMODULATION (50kHz Tone Spacing)				
	PREAMP1 IN		PREAMP OUT	
Freq	3rd order intercept	2 tone dynamic range	3rd order intercept	2 tone dynamic range
136kHz	-	-	+14dBm	85dB
1.8MHz	+4dBm	93dB	+15.5dBm	96dB
3.5MHz	+4.5dBm	94dB	+16dBm	96dB
7MHz	+4.5dBm	94dB	+16dBm	97dB
14MHz	+6dBm	94dB	+18dBm	97dB
21MHz	+7dBm	95dB	+19dBm	98dB
28MHz	+7dBm	94dB	+19dBm	98dB
50MHz	+8dBm	94dB	+22dBm	97dB
144MHz	-12dBm	83dB	-7dBm	81dB

RECEIVER MEASUREMENTS

AM sensitivity (28MHz): 1µV for 10dBs+n:n at 30% mod depth
FM sensitivity (28MHz): 0.2µV for 12dB SINAD 3kHz pk deviation
AGC threshold: 0.9µV
100dB above AGC threshold for +0.5dB audio output
Max audio before clipping: 1.6W into 8 ohm, 1.9W at 10% distortion
Inband intermodulation products: better than -55dB

	SHARP IF BANDWIDTH		SOFT IF BANDWIDTH	
FILTER	-6dB	-60dB	-6dB	-60dB
10kHz	10.9kHz	17.2kHz	-	-
6kHz	6.6kHz	11.0kHz	-	-
2.4kHz	2525Hz	3750Hz	2400Hz	3650Hz
500Hz	517Hz	1458Hz	546Hz	1482Hz
250Hz	255Hz	1055Hz	264Hz	1081Hz
100Hz	107Hz	817Hz	113Hz	787Hz
50Hz	64Hz	668Hz	65Hz	661Hz

CLOSE-IN INTERMODULATION ON 7MHz BAND				
	PREAMP1 IN		PREAMP OUT	
Spacing	3rd order intercept	2 tone dynamic range	3rd order intercept	2 tone dynamic range
3kHz	-33dBm	69dB	-21dBm	72dB
5kHz	-31dBm	70dB	-19dBm	73dB
7kHz	-25dBm	74dB	-13dBm	77dB
10kHz	-16dBm	80dB	-5dBm	83dB
15kHz	-5dBm	87dB	+7dBm	91dB
20kHz	-1dBm	90dB	+11dBm	93dB
30kHz	+1dBm	91dB	+13dBm	95dB
40kHz	+1.5dBm	92dB	+14dBm	95dB
50kHz	+4.5dBm	94dB	+16dBm	97dB

RECIPROCAL			
FREQ OFFSET	MIXING FOR 3dB NOISE	BLOCKING PREAMP1 IN	BLOCKING PREAMP OUT
3kHz	83dB	-40dBm	-30dBm
5kHz	87dB	-40dBm	-30dBm
10kHz	93dB	-36dBm	-27dBm
15kHz	96dB	-21dBm	-13dBm
20kHz	99dB	-9dBm	+1dBm
30kHz	102dB	-3dBm	+7dBm
50kHz	106dB	-3dBm	+7dBm
100kHz	111dB	-3dBm	+7dBm
200kHz	119dB	-3dBm	+7dBm

S-READING (7MHz)	INPUT LEVEL SSB PREAMP1 IN	PREAMP OUT
S1	1.0µV	4µV
S3	1.8µV	7µV
S5	4µV	14µV
S7	8µV	28µV
S9	14µV	50µV
S9+20	250µV	1mV
S9+40	2mV	7mV
S9+60	13mV	45mV

TRANSMITTER MEASUREMENTS

Carrier suppression: >70dB
Sideband suppression: >80dB @ 1kHz
Transmitter AF distortion: <1%
Microphone input sensitivity: 2mV for full output
SSB T/R switch speed: mute-TX 15ms, TX-mute 1ms, mute-RX 15ms, RX-mute 1ms

	CW POWER	SSB(PEP) POWER		INTERMODULATION PRODUCTS	
FREQ	OUT	OUT	HARMONICS	3rd order	5th order
1.8MHz	110W	105W	-68dB	-30 (-24)dB	-46 (-40)dB
3.5MHz	106W	105W	-62dB	-36 (-30)dB	-51 (-45)dB
7MHz	105W	104W	-70dB	-32 (-26)dB	-51 (-45)dB
10MHz	104W	104W	-60dB	-34 (-28)dB	-44 (-38)dB
14MHz	104W	103W	-65dB	-34 (-28)dB	-50 (-44)dB
18MHz	103W	102W	-63dB	-28 (-22)dB	-50 (-44)dB
21MHz	100W	102W	-64dB	-30 (-24)dB	-50 (-44)dB
24MHz	103W	102W	-70dB	-30 (-24)dB	-50 (-44)dB
28MHz	103W	101W	-70dB	-24 (-18)dB	-40 (-34)dB
50MHz	98W	96W	-70dB	-30 (-24)dB	-42 (-36)dB
144MHz	97W	83W	-75dB	-26 (-20)dB	-44 (-38)dB

Intermodulation product levels are quoted with respect to PEP, figures in brackets are with respect to either tone.

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HEATHKIT RA-1 6-band rcvr, 10 valves, Xtal calibrator AM CW USB LSB, Xtal filter, S-meter spkr, man, £40 plus carriage. G3HGM, 01582 733 436 (Luton).

IC-765 HF tcvr, Inrad filters, £750. IC-756 HF + 50MHz tcvr, Inrad filters, auto ATU, £650. 01732 822 473 (Sevenoaks). E-mail: stevek@camelcom.com

ICOM 706 MkIIG with at AT-180 ATU as new, 28-3-02, £900, cost £1230. Kenwood TH-F7E, £190 + extras 12-03-02. Icom 207H mint & boxed, £190. Tennamast with rotator cage & stub pole, £300, cost £680. Diamond CP6, 26-5-02, £180, mint & boxed. Daiwa OAX 2-70 mobile, £20. Mobile fixings & cables, £20. Kenwood SP-430 spkr, £20. Imax 2000 antenna, £35. SL-250 DX HF linear, £70. 30A designer power supply, the best components, £150, cost £360 to build. Kenwood MC-80 mics, £40. DCI 1452H filter, £50. WO24 duplexer £10. Daiwa 2-way switches x 2, £10 each. Mick, 01782 876 700 (Stoke).

ICOM IC-735 boxed with man, £350. Yaesu FT-290RII boxed with man, £150. PacCom Tiny 2 MkII with man, £50. Raycom, 13.8V 20A regulated power supply, £35. Welz SP-10X SWR and power meter 1.8 to 150MHz 200W. G0WGI, 01793 740 355 (Swindon). E-mail: meadow8@lineone.net

ILL health forces sale of Icom 775 as new, £1500. Icom 775, brand new, £1800. New unused Gem quad, £350. 2 x 17 element Cushcraft Boomers for 2m, £200 the pair. 1 x 13-ele Cushcraft Boomer for 2m, £60. 5-ele 6m Yagi, £40. Mobile whips 6m, 10m, 15m & 20m, £40 ono. Brand new Hustler No4 BTV vertical, £100. 70cm vertical, brand new, £20. Rotator cage, not used, £50. A very large 3-bedroom, 2-bathroom bungalow in Tintagel, Cornwall. One year old with internal loops for 20m, 40m & 80m (block built), £160,000. All enquiries to Trev, G2KF, 07974 892 179 (Cornwall).

JAYBEAM tri-bander for 20, 15 and 10m with traps and elements for 18MHz, H/D rotator, c/w long control cable, both items in good condn, £160. Dave, G0IQL, QTHR, 01903 236 780 (Sussex).

KENWOOD Trio TS-9130 2m all-mode tcvr 25W, boxed man, £200. Howes kit ATU built with slow motion drives 150W, £20. Dandy Dart folding trailer camper 1996, sun canopy, lockable door, glass window, under floor gas heater, 12V lighting, leisure battery, gas bottles, spare wheel, garaged from new, full sized G5RV and 6m vertical antennas £1550. G0FMB, QTHR, 020 8989 3686 (London).

KENWOOD TS-50 multimode 100W HF tcvr AM+FM OK but slight audio fault on SSB Tx, hence £100. Sean, 07966 256 664 (Birmingham).

KENWOOD TS-570DGE, as new, boxed, £700. G0RXG, 0117 956 8380 (Bristol).

KENWOOD TS-950SD as new cond, boxed. Kenwood cardioid mic, type MC-60A also as new cond, boxed, both complete with mans. Purchase receipt available, £1100 ono. Brian, G0DBR, 01530 222 453 (nr Loughborough).

KENWOOD TS-950SDX inc opt filters and MC-60A mic, £1200. Kenwood TL-922 linear amplifier with slow start fitted, £1000. Both items are immaculate with original boxes and mans etc. Yaesu FT-790R multimode 70cm tcvr including ELH-703G UHF amplifier, £150. Both items in very good cond. G3RCU not QTHR. 01202 475 048 (Christchurch). E-mail: chris@g3rcu.fsnet.co.uk

LINEAR amps 'Hunter' (Peter Rodmell) >500W 3.5-30MHz with h/book, vgc, £400. Trio-Kenwood TL-922, 1.8-30MHz, h/book, original packing, slow start, totally mint, £800. 01526 353 696 (Lincs).

MARCONI Instruments sig gens TF-2016 10kHz -120MHz, AM FM. Also TF-2015 10MHz - 520MHz AM FM. Both perfect with lid and man, £130 each. Buyer collects for preference. G3LBA, Robin, 01865 821 503 (Abingdon). E-mail: robin@g3lba.freeserve.co.uk

MARCONIPHONE 2 5-speed reel to reel tape recorder, portable 1960. Model 4208, c/w mic, 2 connecting leads for PU and amplifier input/

CONGRATULATIONS

to the following whom our records show as having reached 50 or 60 years' continuous RSGB membership this month:

50 years		*60 years*	
G3HRB	Mr J Coatsworth	GM0IJA	Mr B C Skinner
G3HRE	Mr F Watson		
G3JMX	Mr P C Hayward		
G3KKP	Mr J Burgess		
G3LMX	Mr T W Mitchell		
GM0UPE	Dr G R Sutherland		

output, exc cond, offers? 01928 723 118 (nr Chester).

MFJ 1798 9-band vertical antenna, covers 2, 6, 10, 12, 15, 17, 20, 30, 40, 80m, 26ft tall, top-feed system, no radial required. Only up 2 months, partly dismantled, prefer buyer collects, £150 ono. G4UZG, QTHR, 0161 790 3461 (Manchester).
E-mail: gordonp@mlgb.u-net.com

MULTIMODE Trio TR-9000, 2m, SSB/FM/CW 10W, ideal for M3s, good cond, built-in Rx preamp, very sensitive, rugged and reliable, £180. Kantronics KPC-9612, 9600/1200 baud TNC, excellent condition, leads, dual-port, £180. ADI 200, 2m h/held, ext Rx /Tx, 5W, antenna, good condition, £60. 01665 570 381 (Morpeth).
E-mail: steve@g7anv.freeserve.co.uk

QRT sale: Icom IC-R8500 rcvr, £875; remote control software for 8500 and CI-V reference man, £25. Yaesu FT-290 Mk1, Mutek front end, new NiCads, YM-47 mic, £115. YM-24 spkr mic, £10. MMB-11 mobile mount for 290/790, £15. NC-11C charger for 290, £5., Adonis AM-308 desk mic cabled for 290, £20. Microwave Modules 144/40 2m linear, £20, BNOS LPM144-3-50 linear, £45. Yaesu FT-208 2m handie, new NiCads, £50. Yaesu FT-208 2m handie, new NiCads US spec, £40. Yaesu FT-708 70cm handie, new NiCads, £50. YM-49 spkr mic x 2 for 208/708, £10 each, NC-8 and NC-8A bench chargers for 208/708, £15 each. PA-3 car charger for 208/708, £15. NC-9C charger for 208/708, £10. Watson W-620 dual range SWR/power meter, £40. Yaesu SP-6 speaker, £45. Ringo Ranger 2m colinear, £20. Sirio SD-1300U discone with 100ft cable, £35. SPI-RO trap dipole, £40. Nissei DPS-300GL 30A power supply, £50. Type 51 Morse key, £15, all gwo, M5OYQ / M0OYQ, QTHR, 01525 752 418 (Beds).
E-mail: steve_long@ntlworld.com

QUAD aerial spider, stainless steel, for ease, radiator and reflector removable. Crossover boom to stub mast eliminated. Anyone interested? G3GYE, (Penzance).
E-mail: peterpitts@aol.com

RACAL 9916 frequency counter and 9442 freq standard and VLF option, £90. SE labs SM-202 counter (150MHz) with orig man and Cathodeon standard, £40. Both lab grade in gwo. Racal 9301 and 9301A RF millivoltmeters, £30 each, slight faults. Redifon MCU 12 way HF aerial multi-coupler, £70 like new. Elcom hybird combiner, £5. G8MOB, QTHR, 07751 838 760 (Surbiton).

RACAL RA-1792 back-lit, in desktop cabinet, workshop man, £550. Desktop cabinet for RA-1792, £50. FT-290R Mk1, £150. TH-D7E dual-bander, £200. Trio CO-1303G monitor scope, £45. Kantronics all-mode KAM TNC, £100. Hands 3.5MHz QRP tcvr, £40. All vgc or near-mint. Two Racal RA17 MkIIs, gwo, £80 each. 01526 860 546 (Lincoln).

The Members' Ads order form is now published here. If members do not wish to cut the form out of the magazine, photocopies will be accepted, as will recent copies of the form from previous months, or recent copies of the 'carrier' sheet. *As a last resort*, members may also send in their advertisements on separate sheets of paper, but if you choose to do this, you *must* supply an accurate word count - and, of course, the correct fee in the normal manner.

RSGB MEMBERS' ADS ORDER FORM

Application form for one For Sale, Exchange or Wanted advertisement. Do not mix classifications on this form; separate applications must be made.

Please ensure you read and understand the conditions of acceptance of these subsidised Members' Advertisements, printed at the top of the Members' Ads page of the current *RadCom*.

FOR SALE ☐
EXCHANGE ☐
WANTED ☐
Tick one box

I enclose a cheque/PO for £ ..... or please charge to my credit account below

CARD No ☐☐☐☐ ☐☐☐☐ ☐☐☐☐ ☐☐☐☐ ☐☐☐☐ EXPIRY DATE

Issue No (Switch only) .....

Signed: ..... *Date:* .....

FREE ENTRIES TOWN PHONE E-MAIL

RATES: UP TO 20 WORDS £5.50; 21-40, £6.50; 41-60, £7.50

SILENT key – G2BRR. FT-50R dual band inc airband, as new, complete with charger/man, boxed £150. MFJ-931 artificial ground, as new, boxed & man, £30. Hanson SWR-3 standing wave bridge, boxed, instructions, £10. YW-3 Power SWR with instructions, £10. MFJ-900 ECONO tuner with instructions, £10. SEM Easitune, £5. Oskar SWR 200 power/SWR meter, £20. 2 boxes junk free. Large wooden box valves (150?). Offers? All items collect or pay carriage. John, G4KJV, QTHR, 01249 720 456. g4kjv99sqn@supanet.com

SILENT key sale, Icom 290D 2m multimode, £120. Yaesu FC-902 ATU, £95. PK-232 digimode (no cables), £30. Kyo SWR/PWR meter, £20. Altai dip meter, £18, p&p extra. 0191 253 3130 (Whitley Bay).

SILENT key sale. Yaesu FT-1000MP, 12 months old, £1250. Alinco DX-70 with Palstar PSU, £350. Watson WT-20 SWR / power meter (2), £25 each. Daiwa NS-660 SWR / power meter, £30. 01780 751 338 (Lincolnshire).

SONY ICF-2001D rcvr with Sony AN1 active antenna, mans, AC adapter, £60, buyer collects. 01932 847 019 (Weybridge).
E-mail: 101764.2735@compuserve.com

TENNAMAST standard mast fully galvanised with ground post, autobrake winch, rotator cage and head bearing, £380 ono. Cushcraft A3S triband beam 10/15/20m in unopened carton, £230 ono. Cushcraft AR10 10m vertical in unopened carton, £35 ono. Tonna 5-ele 6m beam in unopened carton, £40 ono. Tonna 9-ele 2m beam in unopened carton, £30 ono. All now surplus to requirements. Ask about other VHF/UHF beams. 01259 781 433 (Dollar).
E-mail: richard.turner11@btinternet.com

TIGERTRONICS Baypac BR-2m modem with Baycom software, £40. MFJ-784 DSP tunable filter, £120. ERA Microreader, £20. John, G8FDJ, 0114 233 3847 (Sheffield).
E-mail: j.s.roberts@sheffield.ac.uk

TRIO AT-130 aerial tuner, 80-10 incl WARC bands SWR 100W rated perfect 6½ x 5½ x 2¼in, ideal mobile, offers? G4EVP, QTHR, 01902 847 296 (Wolverhampton).
E-mail: con@g4evp.fsnet.co.uk

TRIO TS-430S HF, £250. Yaesu FT-707 HF, £150. Yaesu FT-301S analogue 20W HF, £90. Yaesu FT-290RII 2m, £150. M0CYZ, 01677 423 349 (N Yorks).

TS-830S, exc cond in regular use, no mic, £300 plus carriage, deliver free 75 miles. Doug, 01548 580 088 (Kingsbridge).

WS62 set with headphones, mic, mans, vgc, £220, can deliver. BARTG Multyterm TU, £25. Micronta metal detector, £55. 01376 554 628 (Braintree).

YAESU FT-1000MP AC/DC with Inrad mod, box, man, etc, £1100+carriage. Linear Amp UK Ranger 811H with new valves, £450 + carriage. 01929 463 171 (Wool).
E-mail: eric_g0cgl@lineone.net

YAESU FT-1000MP with internal PSU. Unmarked condition and flawless performer, must sell, £1250 ovno. Ameritron AL-811 10-160m HF amplifier full legal output plus. Fully overhauled with new Svetlana tubes, £350. Would consider P/X for IC-706 / FT-100. 0131 661 4686 (Edinburgh).
E-mail: mm0bqi@thersgb.net

YAESU FT-480R 2m all mode tcvr, £280, post free. BNOS 144MHz 100W linear amplifier LPM144-10-100, £120. Icom IC-706 MkII narrow CW filter, DSP, £595. All with mics + mans. John, EA7IT, 0034 950 523 753 (Almeria).
E-mail: palfreys@wanadoo.es

YAESU FT-920 HF + 6m tcvr, SP-8, MD-100, Watson 25 amp PSU, butternut HF2V (40, 80m vert), top band coil (160m), 10-20m vert, 6m vert, Kenwood low pass filter, 100W dummy load and CX-201N switch, all boxed, mans etc, bargain to good home, £995. Would prefer buyer inspects and collects or pays p+p. Also surplus MFJ-931 artificial ground unit, Vectronics VC-300DLP, £115. Jon, 01706 620 793 or 07976 299 867 (Manchester).
E-mail; jon_lynch@btopenworld.com

WANTED

EARLY crystal and valve wireless wanted; anything to do with early wireless is of great interest, especially Marconi items. Also looking for top-end valve comms, rcvr and early AM Txs by Johnson, Hallicrafters and other US makers. G4ERU, QTHR, 01202 510400 (Bournemouth).

AT-50 auto tuner unit (or similar) to use with TS-50S. John, 01449 721 225 (Suffolk).

CREED 75 teleprinters, unused spares and tools. Rohde & Schwarz Polyskop SWOB IV. Racal Speedrace MA275 oscillator coupling unit. Racal valve radio equipment, mans and sales literature bought for cash. Nigel, G0UGD, 01323 486 822 (Eastbourne).
E-mail: nigel@classicracal.info

DRAKE PS-7 power supply for Drake TR-7. Collins CW filter F455Q-5 for 75S-1. GM2FVV, 01786 811 237 (Stirling)

EARLY television rcvr, preferably single-channel round tube. For private collection and hopefully restoration. WHY? Related items? Thanks. Ken, G3XSJ, 01453 845 013 (6-9pm) or 07867 926 101 (Gloucestershire).
E-mail: kenbrooks@iee.org

FL3 filter. G4WNG, QTHR, 01670 822 172 (Northumberland).
E-mail: thomas.furness@ntlworld.com

MAIN tuning knob or slow motion drive for Collins 75A4 Rx. Meters for Collins KWS-1 TX and other KWS-1 parts. 01379 783 657 (nr Diss).

ONE or two 3-500ZG used valves in reasonable cond to test linear amp, will pay postage and costs. G3CSY, 01524 413 373 (Morecambe).
E-mail: kenhill@talkgas.net

SILENT key clearout or just not needed, I collect QSL cards for their historic interest and a research project, especially from periods before 1970. Can collect or arrange collection. 0113 269 3892 (Leeds).
E-mail: g4uzn@qsl.net

VALVE mono Hi Fi equipment, Quad series 2 power amp, pre amp, AM tuner. Collaro transcription record deck. Mullard 5-10 amp from Sterna kit with control panel. Mono speaker to suit above. G4HHZ, QTHR, 023 8027 0785 (Eastleigh).
E-mail: tony@nicholrd.fsnet.co.uk

YAESU FT-902DM or FT-901DM also Yaesu accessories, Y0-901 scope, YR-901 RTTY/CW reader, YVM-1 monitor, SP-901 speaker, FC-902 ATU, FV-101DM VFO, FTV-901 transverter, if anyone can help please call Ian, 01829 760 072 (Tarporley).

Rallies & Events

4 - 6 OCTOBER 2002

WACRAL CONFERENCE and AGM 2002 - Torquay. Christian and radio activities are planned. Construction competition, TS, MT. Non-members welcome to attend by arrangement with the organiser Geoff, G4YJW, 01323 721 352 or geoff@g4yjw.freeserve.co. uk who can supply all the details.

6 OCTOBER 2002

GREAT LUMLEY AR & ES Rally - Great Lumley Community Centre, Front Street, Great Lumley, nr Chester-le-Street, just off the A1(M). OT 10.30am, £2 (accompanied under-14s free). TI on S22, TS, B&B, SIG, C, DF, CP free, model aircraft, satellite & component stalls. Nancy, 0191 477 0036 (H) or 07990 760 920 or e-mail nancybone2001@yahoo.co.uk

HORNSEA ARC Annual Rally - Floral Hall, Hornsea, E Yorkshire. OT 10.30am. G4YTV, QTHR, 01964 562 498 or g4ytv@aol.com

MANSFIELD ARS Radio, Computer & Electronics Rally - Intake Leisure Club, Kirkland Avenue, Mansfield. OT 10am, TI on S22. David, G0RDP, 01623 631 931 or mail@davidg0rdp.vispa.com

11 - 13 OCTOBER 2002

RSGB International HF & IOTA Convention HFC 2002 - Savill Court Hotel, Egham, Surrey. RSGB 0870 904 7373. [www.rsgb.org/hfc/]

13 OCTOBER 2002

NORTH WAKEFIELD RC Radio Rally & Computer Fair - Outwood Grange Secondary School, Potovens Lane, Outwood, Wakefield, W Yorkshire. Follow signs from M1 jn 41. CP free, TS, SIG, B&B, C. [www.g4nok.org]

19 OCTOBER 2002

WATERS & STANTON @ JAYCEE Open Day - 20 Woodside Way, Glenrothes, Fife. 01592 756 962.

20 OCTOBER 2002

BLACKWOOD & DARS Radio, Computer & Electronics Rally - Newport Centre, Newport, 1 mile from jn 25A of M4. OT 10.30/10.45am, £1.50. CP free, B&B, TI, TS, SIG, LB, C, DF, WIN, LEC. George, 01495 724 942 or Dave, GW4HBK, 01495 228 516.

26 OCTOBER 2002

CARRICKFERGUS ARG Rally - Downshire School, Downshire Road, Co Antrim. OT 12 noon. C. Billy, MI0CZF.

27 OCTOBER 2002

GALASHIELS & DARS Annual Rally - The Volunteer Hall, St John's Street, Galashiels. OT 10.45/11am. TS, B&B C. Jim, GM7LUN, 01896 850 245 or gm7lun@qsl.net

2 NOVEMBER 2002

RAEN Annual General Meeting - National Space Centre, Leicester. Details from g_griffiths@compuserve.com

2 / 3 NOVEMBER 2002

16th NORTH WALES RADIO & ELECTRONICS SHOW - North Wales Conference Centre, Llandudno. OT 10am, £2, accompanied under-14s free. Clubroom, B&B. Muriel, GW7NFY, tel/fax: 01745 591 704.

3 NOVEMBER 2002

NORTH DEVON RADIO RALLY - Holsworthy Memorial Hall. OT 10am. B&B, etc. G8MXI, QTHR, 01409 241 202.

10 NOVEMBER 2002

12th GREAT NORTHERN HAMFEST - Metrodome Leisure Centre, Queen's Road, Barnsley, less than 2 miles from M1 jn 37, and 5 minutes' walk from train and bus stations. Follow the brown 'Metrodome' signs from all directions. OT 10am, £2.50. DF, TS, SIG, B&B, TI via GB3NA on 145.675MHz. Ernie, G4LUE, 01226 716 339 or 07787 546 515 (6pm - 8pm) or e-mail ernest.bailey1@virgin.net

17 NOVEMBER 2002

COULSDON ATS CATS Bazaar - 4th Purley Scout HQ, Lion Green Road, Coulsdon. OT 10am. Andy, G0KZT, 01737 552 139 or andyg0kzt@hotmail.com

MIDLAND AMATEUR RADIO SOCIETY Radio & Computer Rally - King Edward's Grammar Camp Hill School, Vicarage Road, King's Heath, jn A4040 & B4122. OT 10am, £1. TS, Clubs, SIG, CP free, C, B&B. Peter, G6DRN, 0121 443 1189.

23 / 24 NOVEMBER 2002

LONDON COMMUNICATION & COMPUTER SHOW - New venue - Wodson Park, Ware, Herts. RadioSport 01923 893 929. [www.radiosport.co.uk]

30 NOVEMBER 2002

ROCHDALE & DARS Traditional Radio Rally - St Vincent de Paul Catholic Church Hall, Caldershaw Road, off the A680 Edenfield Road, about 2 miles west of Rochdale. This is a **Saturday** rally! Follow orange arrows from M62 jn 20. OT 10.15/10.30am, £1. TI on S22, CP free, TS, B&B, C. John, G7OAI, 01706 376 204 (eve) or radars@mbc.co.uk

1 DECEMBER 2002

BISHOP AUCKLAND RAC Rally - Spennymoor Leisure Centre. OT 10.30/11am, £1, accompanied under-14s free. TI on S22, DF, TS, CP, B&B, C, LB, MT, FAM. Mark, G0GFG, 01388 745 353 or Brian, G7OCK, 01388 762 678.

8 DECEMBER 2002

WEST MANCHESTER RADIO CLUB Red Rose Radio Rally - Lowton Civic Hall, Lowton, nr Leigh, jn 23 M6. OT 10.45/11am. CP, LB, Santa Claus. Stephen, G6BVN, 01942 888 900.

WORCESTER RADIO RALLY - Worcester Rugby Club, on B4538, just off M5 jn 6. OT 10am, £2. CP free, TS, SIG, LB, C, WIN. John, G8MGK, 01527 545 823 or 07762 203 355. [www.qsl.net/gb2tcr]

26 JANUARY 2003

OLDHAM ARC Rally - New venue - Clayton Arms Sports Club next to Oldham Athletic's stadium. Steve or Hazel, 01706 848 092 or m5aeg@btinternet.com [www.oarc.zen.co.uk]

2 FEBRUARY 2003

SOUTH ESSEX ARS Canvey Island Radio & Computer Rally - Brian, G7IIO, 01268 756 331 or briang7iio@yahoo.com [www.southessex.ars.btinternet.co.uk]

14 FEBRUARY 2003

CAMBRIDGE & DARC Rally - Britten Arena, Wood Green Animal Shelter, Godmanchester. OT 10am, £2, concessions £1.50. CP free, LB, C, FAM. [www.cdarc.org.uk]

25 - 27 APRIL 2003

SCANDINAVIAN HAMVENTION 2003 - [www.scandiham.com]

5 MAY 2003

DARTMOOR RC Dartmoor Radio Rally - Ron, G7LLG, 01822 852 586.

18 MAY 2003

MIDLAND ARS Drayton Manor Radio & Computer Rally - Norman, G8BHE, 0121 422 9787 or 07730 132 726. [http://midamradio.members.beeb.net]

1 JUNE 2003

SPALDING & DARS Annual Rally - Ray, M0CTM, 01775 711 953, or John, G4NBR, 07946 302 815. Replaces original date of 8 June. [www.sdars.org.uk]

15 JUNE 2003

NEWBURY & DARS Amateur Radio Boot Sale - [www.nadars.org.uk]

22 JUNE 2003

EPSOM RADIO & ELECTRONICS FAIR - Paul, M0CJX, m0cjx@lineone.net [www.epsomrally.co.uk]

10 AUGUST 2003

FLIGHT REFUELLING ARS Hamfest - hamfest@frars.org.uk [www.frars.org.uk]

KEY

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.

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.

1	**Oct**	GB6HF: Houghton Feast. Houghton-Le-Spring Tyne & Wear. TLHV27P (G0PMX)
4	**Oct**	GB2BOB: Battle of Britain. Rochester, Kent. TLH2 (G4EVY)
5	**Oct**	GB0RSF: Rhondda Steam Fair. Porth, Rhonnda. LH2 (GW4KBG)
		GB2IOM: Isle of Man. Isle of Man. TLH (G3WNI)
6	**Oct**	GB8SI: Soroptomist International. Swadlincote, Derbys. LH (G4CRT)
11	**Oct**	MB2HFC: RSGB HF & IOTA Convention. Egham, Surrey. LH (G3LAS)
12	**Oct**	GB5FF: Farewell to HMS Fearless. Scarborough, N.Yorks. LH27 (G4SSH)

SILENT KEYS

WE REGRET to record the passing of the following radio amateurs:

G0JEG	Miss J Mackenzie	26/11/01
G0MEH	Mr O Selby	04/07/02
G2DGF	Mr A Sullivan	19/08/01
G3CTI	Mr J H Burr	13/04/02
G3DEQ	Mr H N Woodnutt	03/07/02
G3GVR	Mr P J Blewett	21/07/02
G3MCO	Mr W C Mills	10/08/02
G3NOF	Mr D McLean	01/08/02
G3RJB	Mr B Edwards	14/07/02
G3YJY	Mr J P Kealy	11/08/02
G4AXK	Mr J Castell	04/07/02
G4BRX	Mr P W Legg	02/08/02
G4ZDS	Mr J B Stringer	04/08/02
G6GO	Mr JHM Goodacre	09/03/02
G7NEV	Mr S Cheetham	01/07/02
G7UHK	Mr D Lovatt	15/08/02
GI7CBD	Mr T H Hopkins	8/02
GI7EZF	Mr F Bowman	01/03/02
GJ5NO	Lt Cdr A G Chambers	01/08/02
GM2FHH	Mr L Hardie	03/07/02
GM3BXW	Mr C Malcolm	
M0CQM	Mr F T Swain	03/08/02
M3XDS	Mr N D Lightowler	8/02

Club & Regional NEWS

Region 1: Scotland West & the Western Isles

PAISLEY (YMCA) ARC
2, EMC matters. 16, The Foundation Licence Success Story. 30, Homebrew transmitters. Jim, GM3UWX, 01505 862817.

WIGTOWNSHIRE ARC
5, 6, Foundation Course (courses will be held bimonthly). Intermediate courses on demand; RAE courses as required. Morse tests bimonthly. Ian, MM3WIG, 01988 403364.

Region 2: Scotland East & the Highlands

COCKENZIE & PORT SETON ARC
18, Video. 26, 27, *CQ* WW DX SSB contest. Bob, GM4UYZ, 01875 811723.

Region 3: North West

FYLDE ARS
10, Quiz. 24, Video. Ken, G3RFH, 01253 407952.

SOUTHPORT & DARS
21, Amateur Radio Observation Service, Barry Scarisbrick. Don, M1BUL, 01704 227726.

STOCKPORT RS
1, Skills group, inc demo of International Beacon Project. David, M1ANT, 0161 4567832.

THORNTON CLEVELEYS AMATEUR RADIO SOCIETY
7, 'Mining', Colin, G0EPY. 14, AGM. 21, RSGB video. 28, CW evening. Jack, G4BFH, jack@jduddington.fsnet.co.uk

WARRINGTON ARC
1, 5th beginners' night, George, G3OGQ. 15, Social evening. 22, Surplus Equipment Sale. John, G0RPG, 01925 762722.

Region 4: North East

GOOLE R & ES
4, Fund raising at the *Black Swan*. 11, Satellite TV demo at G0GLZ QTH. 18, Planning night at *Black Swan*. 25, Junk sale at Courtyard Centre. Richard, G0GLZ, 07867 862169.

GRIMSBY ARS
3, AGM. 17, Junk sale. Brian, G4DXB, 01472 231383.

HORNSEA ARS
6, Hornsea Radio Rally, Floral Hall, Hornsea. 9, Fractals: from Complex Numbers to Chaos. 16, Adobe Premiere. 23, Activity Night. 30, Cadet Force radio. Andy, G0VRM, 01482 643660.

KEIGHLEY ARS
10, On air. Ian, M1BGY, 01274 723951.

NORTH WAKEFIELD RC
13, Radio Rally and Computer Fair. www.g4nok.org

YORK RC
17, AGM. Alex, G0WUY, 01904 423871.

Region 5: West Midlands

CHELTENHAM ARS
4, Tuned loops and the small antenna controversy, Prof Mike Underhill, G3LHZ: open meeting at Civil Service Club, Tewkesbury Rd, Cheltenham - all welcome. Ivan, G4BGW, 01452 731956, ivan@g4bgw.freeserve.co.uk

COVENTRY ARS
4, AGM. 11, On air, Novice class, CW practice. 18, Club trip, venue TBC. 25, On air, Novice class, CW practice. John, G8SEQ, tel: 024 76 273190 johng8seq@ntlworld.com

GLOUCESTER AR & ES
7, Talk: 'Gadgets'. 14, Workshop / on air. 21, DF receiver testing. 28, Workshop / on air. Tony, 01452 618930 (day).

HEREFORD ARS
4, Ten-Tec Jupiter DSP HF Transceiver, Bill Wells, G3HVX. 10, Informal. Keith, G0RQF, tel: 01432 870224, k.hales@ntlworld.com

KIDDERMINSTER & DARS
1, Surplus Equipment Sale. Tony, G1OZB, 01299 400172.

MID-WARWICKSHIRE ARS
8, Planning for 2003. 22, Computer Topics, Dave, G8UIO. Bernard, M1AUK, 01926 420913.

SALOP ARS
10, AGM. Wayne, M5WJF, m5wjf@qthr.freeserve.co.uk

SANDWELL RC
25, Morse tests. John, G4AAL.

STRATFORD UPON AVON & DISTRICT RADIO SOCIETY
14, On air. 28, Digital TV, Steve, G6MMD. Ron, 01789 267430.

TELFORD & DARS
2, Open evening, on air. 9, Video. 16, '136kHz', Dave Pick, G3YXM. 23, Social evening. 30, Table-top sale. Mike, G3JKX, 01952 299677.

Region 6: North Wales

NORTH WALES RRC
11 - 13, Beach Radio Weekend. Ted, GW0DSJ, 01745 336939.

Region 7: South Wales

ABERYSTWYTH & DARS
10, AGM. Ray, GW7AGG.

BARRY ARS
1, Open forum, discussion. 8, Quiz, Glyn Jones, GW0ANA. 15, Club website update and discussion, Paul Butt, GW0GVQ. 22, Chat on club history. 29, Review & talk, 'Safety in the shack'. Richard, GW4BVJ, 01656 658830.

Region 8: Northern Ireland

BANGOR & DARS
2, Videos of some recent big DXpeditions. Mike, GI4XSF, 028 42772383.

Region 9: London & Thames Valley

CHESHUNT & DARC
2, Members' forum. 16, Constructors' contest. Jim, G0JXN, 01992 468204.

COULSDON ATS
14, Old Purley club reunion. Steve, G7SYO, 01737 354271.

CRAY VALLEY RS
3, Chatham Island, Roger Western, G3SXW (TBC). 13, GB6AF Crown Woods Autumn Fair. 17, Surplus sale. 19, JOTA station. 26, 27 *CQ* World Wide M8C. Bob, BRS32525, 020 82657735 after 8pm & weekends.

CRYSTAL PALACE R & EC
4, Morse instruction. 18, Microwaves, Jim Gale. Bob, G3OOU, 01737 552170 or Victor, 020 86532946.

EDGWARE & DARS
10, The Internet gateway, Steve, G0PQB. 24, Informal, on air. David, G5HY, 01923 655284 (days) / 020 89549180 (eves).

HODDESDON RC
15, Cuffley Airship, John Higgs. alan@cbug.freeserve.co.uk

MAIDENHEAD & DARC
3, Junk sale: all welcome. 15, Internet linking of repeaters, Paul, G4HLF. John, G3TWG, 01628 525275.

RS OF HARROW
6, GB2DHH operating day. Jim, G0AOT, 01895 476 933 or 020 7278 6421.

SILVERTHORN RC
11, Essex Repeater Group, Murray Niman, G6JYB. David, G0KHC, 020 8504 2831.

SOUTHGATE ARC
10, Recycled equipment (junk) sale. 24, Radio on the air. Mike, M0ASA, 020 8366 0698.

SURREY RCC
7, Surplus equipment sale. Ray, G4FFY, 020 8644 7589.

WIMBLEDON & DARS
25, Surplus equipment sale. Jim, G4WYJ, 01737 356745.

Region 10: South & South East

BASINGSTOKE ARC
7, AGM. 27, 'Foxhunt'. Peter, M1DGQ, 0118 983 6545.

CROWBOROUGH & DARS
24, Quiz Jarvis Brook Social Club. Eric, G3TXZ, 01892 654633.

FAREHAM & DISTRICT ARS
2, On air. 9, Video. 16, Club winter project. 23, Coast Guard station visit Lee-on-Solent. 30, Club winter project part 2. Steve, G7HEP, 01329 663673.

FARNBOROUGH & DRS
9, Forces Broadcasting, Alan Grace. 23, Construction contest. Norman, G0VYR, 01483 835320.

HASTINGS E & RC
16, Last auction this year. 19, 20, Hobbies Exhibition at William Parker School. R C Gornall, G7DME, 01424 444466.

HORNDEAN & DARC
1, Social. 22, AGM. Stuart, G0FYX, 023 92472846.

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

ITCHEN VALLEY RC
5, Foundation course part 2. 11, Foundation course: VHF & HF contacts and antenna analysing. 18 - 20, JOTA. Mike, G6AIQ, mamjh@yahoo.com

MID SUSSEX ARS
4, Jubilee quiz, Gavin, G6DGK. 5, 6, Foundation Course, John, G8JBJ, QTHR. 11, Shack Ops.

18, AGM. 19, 20, JOTA operations. 25, Shack ops & table-top sale. 31, Junk sale, Marle Place. Geoff, G6MJW, 01273 845103.

OXFORD & DARS

10, Amateur radio software, Ray Goff, G4FON. Dave, G3BLS, 01865 247311.

READING & DARC

10, 'Digital Radio Mondiale', Andy Giefer, Senior Research and Development Engineer, BBC. Pete, G8FRC, 0118 969 5697.

SOUTHDOWN ARS

7, Talk: 'Foundation licence and new licence arrangements'. John, G3DQY, 01424 424319.

SWINDON & DARC

10, 'The Foundation Licence: Dispelling the Myths', Steve Hartley, G0FUW. 24, 'Transmitting Valves, Past & Present', Tom Morgan, G3XMM. Den, M0ACM, 01793 822705.

THREE COUNTIES ARC

10, 'Circuit Modelling', simple PCB designs on a PC, Bob, G4ZEJ. Damian, KammDP@btinternet.com

TROWBRIDGE & DARC

2, Table-top DF hunt. Ian, G0GRI, 01225 864698 (eves).

VALE OF WHITE HORSE ARS

1, AGM at *The Fox*, Steventon. Ian, 01235 531559.

WORTHING & DARC

2, Practical construction night. 9, AGM. 16, Commercial radio, G4UOU. 23, Discussion evening. 30, Magnetic loops. Roy, G4GPX, 01903 753893.

Region 11: South West & Channel Islands

APPLEDORE & DARC

21, Talk on invisible antennas. Brian, M0BRB, 01237 473251.

CORNISH RAC

3, EMC / RFI, G4DMP. 14, Computer section. John G4LJY, 01872 863849.

SOUTH BRISTOL ARC

2, Lundy video, photos. 9, On air. 16, Bring & buy. 23, 'Computer clinic'. 30, VHF workshop for newcomers. Len, G4RZY, 01275 834282.

TORBAY ARS

18, Talk: industrial archaeology, Micheal Vyner. Walt, G3HTX, 01803 663200.

WEST SOMERSET ARC

1, Photo quiz, Oli, G8NC. Jean, G0SZO, 01984 633060.

Region 12: East & East Anglia

BRAINTREE & DARS

7, JOTA Planning. John, M5AJB, 01787 460 947.

BROMLEY & DARS

15, Quiz. Alan, G0TLK, alangm4@clara.net

CAMBRIDGE & DARC

11, DDS signal generator, debug and demo, Mike, M0BLP. 18, Discussion: tell us about your aerials. 25, Assistance building your DDS signal generator. Ron, G3KBR, 01223 501712.

CHELMSFORD ARS

1, AGM. David Bradley, M0BQC, 01245 602838.

COLCHESTER RAC

10, AGM. 24, Talk on Cyprus. Andy, M1MOD, 01206 735122.

FELIXSTOWE & DARS

14, Fish & chip supper at The Victoria, Felixstowe Ferry. 28, Working satellites. Paul, G4YQC, 01394 273507.

HARWICH AMATEUR RADIO INTEREST GROUP

9, Surplus equipment sale. Eugene, G4FTP, 01206 826633.

IPSWICH RADIO CLUB

2, Rig clinic / test equipment, Iain, G0OZS. 6, The RSGB 21-28MHz SSB Contest. 12, 13, JOTA, Hallowtrees. 16, Club net, S18 / QSY HF. Keith, G7CIY, 01394 420226.

LEISTON ARC

1, Development of the Long Shop Museum 1980 to present. Stephen Mael. Paul, M3MIG & Diana, M3VDT, 01728 746044, m3mig@aol.com

MAIDSTONE YMCA ARS

4, RAE licence conditions. 5, RSGB Morse test. 11, RAE operating procedures. 18, RAE DC theory. 25, RAE AC theory. Andy, M0CST, tel: 01622 661035.

NORFOLK ARC

2, Talk & video, RA, Bruce Davis, Regional Manager. 9, Informal Morse practice and instruction. 16, 'In Trivial Pursuit of Radio' (quiz game), Peter, G3ASQ. 23, Informal Morse practice and instruction. 30, 'My most interesting QSO: mini talks by members. Peter, G3ASQ.

SUDBURY & DRA

1, QRP Junk Box Challenge, Kim, G8GRL. Bryan, G1TWY, 01787 247893.

THE RSGB REGIONS AND DISTRICTS

Region 1	**Scotland West & the Western Isles**		**Gordon Hunter, GM3ULP**
District 11	MM0BHX	Central, City of Glasgow	
12	GM4GZQ	Lanarkshire, Renfrewshire	
13	MM0BRG	Ayrshire, Dumfries & Galloway	
14	GM3UWX	Dunbartonshire, Argyll & Bute, Western Isles	
Region 2	**Scotland East & the Highlands**		**Billy Jenkins, MM0WKJ**
District 21	GM3WKZ	Highlands	
22	MM1CNA	Aberdeenshire, Moray	
23	GM4ZNX	Angus, Perth & Kinross	
24	GM6CMQ	Fife, Lothian, Borders	
25	GM7GMC	Orkney	
26	GM7RKD	Shetland	
Region 3	**North West**		**Kath Wilson, M1CNY / M3CNY**
District 31	G4USW	Cumbria	
32	G1GNS	Lancashire	
33	G4YYB	Gtr Manchester	
34	G7OBW	Cheshire, Merseyside	
35	GD0TEP	Isle of Man	
Region 4	**North East**		**Geoff Darby, G7GJU / M3GJU**
District 41	M0CBP	Northumberland, Tyne & Wear, Cleveland, Co Durham	
42	G0VRM	North Yorkshire, East Yorkshire	
43	M1BGY	West Yorkshire	
44	G3PTV	South Yorkshire, NE Lincolnshire	
Region 5	**West Midlands**		**Roy Clarke, G8AYD / M0RLY**
District 51	G3FZW	Shropshire, Staffordshire	
52	-	West Midlands	
53	M0VGG	Hereford, Worcestershire	
54	-	Gloucestershire, Warwickshire	
Region 6	**North Wales**		**Liz Cabban, GW0ETU**
District 61	GW4GTE	Flintshire, Wrexham	
62	GW3RBM	Conwy, Denbigh	
63	GW0ABL	Gwynedd, Ynys Môn (Anglesey)	
64	GW0RJV	Powys	
Region 7	**South Wales**		**Simon Lloyd Hughes, GW0NVN**
District 71	-	Pembrokeshire	
72	GW7AGG	Ceredigion (Cardigan)	
73	GW4RVA	Carmarthenshire	
74	GW0VSW	Vale of Glamorgan, Cardiff, Newport, Swansea	
Region 8	**Northern Ireland**		**Jeff Smith, MI0AEX**
District 81	MI5JYK	N Belfast, Co Antrim	
82	GI6ATZ	S Belfast, Co Down	
83	GI8RLE	Co Armagh, Co Fermanagh	
84	GI4YWT	Co Londonderry, Co Tyrone	
Region 9	**London & Thames Valley**		**Alan Ross, G1SQB**
District 91	G3MCD	London north of the Thames	
92	G0SVN	Berks, South Bucks	
93	-	Herts, North Bucks	
94	M0CJX	Surrey, London south of the Thames	
Region 10	**South & South East**		**Ivan Rosevear, G3GKC**
District 101	M3JFM	Oxfordshire	
102	G0GRI	Wiltshire	
103	G4DRV	East Sussex, West Sussex	
104	G4KWX	Hampshire, Isle of Wight	
Region 11	**South West & Channel Islands**		**Richard Atterbury, G4NQI**
District 111	G3VWK	Cornwall	
112	-	Devon	
113	G0XAY	Somerset, Bristol	
114	G0KKL	Dorset	
115	GJ0JSY	Jersey	
116	GU4YOX	Guernsey	
Region 12	**East & East Anglia**		**Malcolm Salmon, G3XVV**
District 121	M0CNX	Cambridgeshire	
122	G4NZQ	Norfolk, Suffolk	
123	-	Essex	
124	-	Kent	
Region 13	**East Midlands**		**Bryn Llewellyn, G4DEZ**
District 131	-	Leicestershire & Rutland	
132	G3XZF	Lincolnshire, Nottinghamshire	
133	-	Derbyshire	
134	-	Bedfordshire, Northamptonshire	
Region 14	**Overseas**		

This listing shows the 14 RSGB Regions, as revised in January 2002, with their RSGB Regional Managers (RRMs) and, underneath each Region, the RSGB Districts with their Deputy RSGB Regional Managers (DRRMs), and the areas making up those Districts. The RSGB Regional Representation Scheme is designed to allow changes to the district boundaries as required in order to support the membership most effectively, therefore further changes to the districts shown above may take place in the future.

Breakdown of the RSGB Regions and Districts, with Regional and Deputy Regional Managers, as of 4 September 2002.

Region 13: East Midlands

EAGLE RADIO GROUP

8, Experiences during first six months as A licensee, Richard, M0RJP. G0SWS, 01507 478590.

LINCOLN SW CLUB

9. *PW*, Rob Mannion. 23, Junk sale. John, G1TSL, 01522 793751.

SHEFFORD & DARS

3, *CQ* World Wide planning. 10, Mobile DF hunt (you may need a torch). 17, Grand autumn junk sale. 24, DX practice evening: use of rigs, technique and logging computers. 26, 27, *CQ* World Wide Contest. Derek, G4JLP, 01462 851722.

SOLIHULL FOUNDATION SUCCESS

SOLIHULL ARS ran a Foundation Licence course in July 2002. All six candidates were successful and the photograph shows three of the new M3 licensees and their instructors. The Society aims to provide three or four courses per year and further information is available on its website at http://homepages.which.net/~r_a.hancock/sars.htm

Left to right: M3BDA, M3RWB, G7BZD, G3NXC, G4BBT and M3KIS.

A CLUB EFFORT!

ON SATURDAY 29 June at 0700UTC, Bill, M3WTW, made contact with George, VK5QG, in Adelaide, South Australia, on 20 metres, together with Alan, G0JUS, and Bernard, G3PCX. All are members of the Maidstone YMCA ARS and VK5QG is a former Vice Chairman of the club. To continue the club effort, Bill's aerial system, a 186ft end-fed wire, was designed by Peter, G3ORP, who is the current chairman of the club.

The Maidstone YMCA ARS has been in existence for 40 years and is well known as a centre of excellence for training for the RAE and CW. It has its own website at http://website.lineone.net/~g3trf/clubinfo.htm

M3s SET TO BECOME INTERMEDIATE LICENSEES?

THE SOUTH DERBYSHIRE & Ashby Woulds ARC will be running an Intermediate course at the Moira Replan Centre, Moira, Nr Ashby de la Zouch, Leicestershire, starting on 28 September (details were received too late for inclusion in the listings in last month's *RadCom*). This is the club's first Intermediate course with Foundation Licence candidates from earlier Foundation courses. Further details from Pete, M0PCA, tel: 01530 273070 or e-mail: m0pca@supanet.com

CHELMSFORD JOTA STATION

THE CHELMSFORD Scout Amateur Radio Fellowship, SCARF (see www.chelmsford-scarf.co.uk) will be active on most HF bands for Jamboree on the Air on 19/20 October using the callsign M5CDS. So far 18 Chelmsford Scouts have obtained their Intermediate licences, with a further 15 hoping to take the Foundation Course in September, so there should be no shortage of operators. Working this station counts towards the Chelmsford Award, full details of which can be found at www.g0mwt.org.uk

Scout groups wishing to arrange a sked should e-mail: jota@chelmsford-scarf.co.uk

Chelmsford SCARF members operating M5CDS at last year's JOTA.

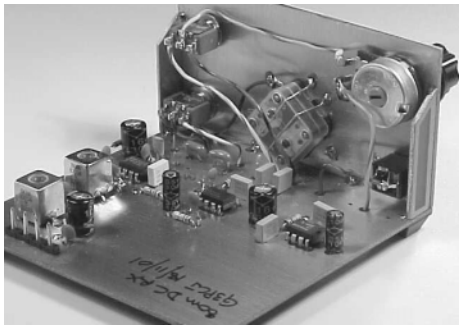
WISBECH CLUB LIGHTS UP HUNSTANTON

THE WISBECH Amateur Radio & Electronics Club (WAREC) ran GB0HLH from Hunstanton Lighthouse for the International Lighthouse and Lightships Weekend on 17/18 August. Hunstanton is in a unique location, as it is the only west-facing resort on the East Coast of the UK. The station was established on the highest point of the cliff, nestled between the white lighthouse and the disused coastguard lookout. WAREC operated from its 'Mobile Communications Centre', a converted caravan with two mobile masts, one for the main HF station and one for the 23cm, 13cm and 3cm ATV station. There was much interest from the general public, who basked in the sun on the Saturday, and got soaked in the rain on the Sunday!

GB0HLH was located on the cliff top between the lighthouse and the now disused coastguard station.

YEOVIL CLUB CONSTRUCTION PROJECT

THE YEOVIL Amateur Radio Club will be starting an exciting club construction project in November. Anyone in the local area is invited to come along to the evenings. The project will be headed by Tim Walford, G3PCJ, and the kit to be constructed is a Walford Electronics direct conversion receiver, with an optional matching voice transmitter. As well as the construction, the theory of the rig will be explained. If anyone fails to get their rig to work properly, they can call on Tim for expert guidance. Further information about this exciting project can be obtained from Derek, M1WOB, tel: 01935 414452.



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

Club News 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*.

VHF/UHF

NORMAN FITCH, G3FPK
40 Eskdale Gardens, Purley, Surrey CR8 1EZ.
E-mail: g3fpk@compuserve.com

THIS IS BEING compiled towards the end of the Perseids meteor shower and initial reports suggest that this year's stream was quite effective. The 70MHz Trophy Contest was blessed with some good propagation and there was some August Sporadic E on 144MHz.

All times are in UTC, ODX indicates best DX and QTHR signifies that the operator's address is in the current *RSGB Yearbook*. An asterisk (*) after a callsign denotes a CW contact, (EX), (LU) etc refers to the postcode area and (KP02), for example, is the Maidenhead grid.

BEACON NOTE

ANDY TALBOT, G4JNT, sent information about his 4m personal beacon the reception of which Brian Williams, GW0GHF (CF), reported - see page 74 in the August *RadCom*. Andy writes that it is signing G4JNT/P and sending its locator as IO80UU, not IO90IV which is his home QTH (sorry Andy, I assumed it was located at your home QRA, my mistake).

He explains, "The Beacon is intended primarily as the remote telemetry for the GB3SC# microwave beacon complex on Bell Hill in Dorset (every band 2.3 to 24GHz) and was only placed there so us beacon keepers could monitor some of the remote site operating parameters such as mains voltage, current, DC power, temperature and other status points. The very low shift that your correspondent complains about is due to the fact that the beacon is primarily designed to transmit slow CW at 1 dot per second for reception by Spectrogram or similar in a 1Hz bandwidth. The fast CW is there for the benefit of a more local station only." The beacon only runs 500mW to a dipole 2.5m AGL but on a hilltop site 250m ASL.

GEOMAGNETIC AND SOLAR ACTIVITY

THERE WAS A considerable surge in solar activity in the last week of July during which the 10.7cm radio flux exceeded 200 on seven consecutive days peaking at 242 units on the 26th. It varied widely with a minimum of 135 recorded on 8 August. The average for the 30 days to 13 August was 184.2, 29% above that for the previous 30-day period. 43 new sunspot regions were observed and the areas of these in millionths of the Sun's visible disc exceeded 2000 on 15 days. The highest value of 2710 coincided with the maximum solar flux.

In the 29 days to 13 August the mid-latitude geomagnetic A-index at Fredericksburg was in the unsettled region (11-20) on 10 days and reached to substorm (21-50) twice on 1 and 2 August when it peaked at 28. The remaining days were quiet (0-10). The 3-hourly K-index reached 5 on four occasions in this period. So, the Sun remains quite active.

PROPAGATION

TWO EDITIONS OF the *Six and Ten Report* were received this month covering April and May. In his commentary on 50MHz reports in the April issue Jeremy Whitfield, G3IMW, deals with the unusual QSO between G3FPQ and KH6IX on 7 April at 0958, when no-one else in the UK appears to have heard this area. He suggests that in the beginning of March through mid-May period, winter conditions, with their higher F_2 MUF, tend to occur simultaneously in both the northern and southern hemispheres. This accounts for long path morning openings on the lower bands 28-14MHz but it is unusual on 50MHz. At the time, G3FPQ was beaming to South Africa.

A mixed bag of propagation on 6m was reported in the May edition with Es, meteor scatter (MS), tropo, auroral and 'DX' mode QSOs being made. Each issue includes pages of solar, geomagnetic and particle data for each day of the month and 50MHz reports from outside Britain. The *Report* is an activity of the RSGB's Propagation Studies Committee (PSC), and is edited by Dr Steve Reed, G0AEV, and Prof Martin Harrison, G3USF. Subscription inquiries should be addressed to Steve (QTHR) whose e-mail address is g0aev@explore.force9.co.uk and there is a PSC website - see the list.

A group of VHF amateur radio operators meets for an informal lunch at a pub in South Croydon every couple of months. Left to right:Paul Piqué, G8KDQ; Don Pike, G3WDY; Ken Rosier, G3DJK; Bob Knight, G3DPW; Harry Bellfield, G3SBV (who now lives in Kent); and 'VHF / UHF' columnist Norman Fitch, G3FPK.

AWARDS

ALMOST ALL MAJOR awards require sight of QSL cards in support of an applicant's claim. Tony Jarvis, G6TTL, the RSGB VHF/UHF Awards Manager, passes along a comment from an applicant as follows, "Trying to get the QSL cards in for a 2m award but despite a number of 'directs' to the appropriate stations, no QSLs forthcoming. UK contest and club stations seem to be the absolute worst. It's a real shame when they operate from a comparatively rare square in a contest and then won't QSL." Tony says this is typical and laments the fact ". . . that many stations haven't the common courtesy to reply even when SASEs are supplied." Any ears burning out there?

MOONBOUNCE

IAN WILLIAMS, M0BCG (IO91), writes, "On 14 July between 2145 and 2224 I completed an EME QSO on 6m with Lance Collister, W7GJ (DN27), using JT44 mode and a single 8-ele 40ft boom Yagi this side. This I believe to be the first-ever digital mode EME QSO made from the UK." So, any prior claims anyone?

He had skeds with Barrie Smith, W7ALW (DN36), the previous week but Barrie's elevator broke so Lance took over the remaining ones. Ian says, "I made major and radical changes to my station on the Saturday, almost at the end of the skeds. I took down the 2 x 8-ele stacked array and designed and built the single 8-ele Yagi, using it for the last two skeds. I also added an external preamp for the final sked on the Sunday."

His station comprises an early IC-756 with 20dB preamp fitted in line. The PA is an old Heathkit SB-220 run on lower voltage setting and modified in the grid choke area with extra cooling added. This allows it to

run the JT44 duty cycle at the legal power limit for the allocated one-hour sked period. The antenna is up at 70ft and is fed with Heliax LDF5-50A and LDF2-50A, only one feed line for transmit and receive.

In the August *432 and above EME Newsletter* it is reported that the July sked weekend brought excellent conditions on 23cm - see last month's reports - and a good turnout for the Europe / North America window. However, 70cm reports were down and many operators missed a new country, 4L/ZL1RS (Georgia), because nobody bothered to pass the word.

Al Katz, K2UYH, considers the growing use of JT44 mode on 70cm and above and this was to be a topic at the International EME Conference in Prague in August. He proposes that for the present 432.024MHz and 1296.024MHz be designated as the JT44 CQ calling frequencies and that skeds should not be run on those QRGs. We await the outcome of the Conference discussions.

As this is being compiled on 14/15 August, the Conference is imminent, but the astonishing amount of rain in central Europe has caused the River Vltava to overflow and much of the low lying city is flooded and the people evacuated. Checking on the Conference website, there is no mention of any cancellation, so we presume it will have gone ahead.

The only August operating news comes from Howard Ling, G4CCH (IO93), who wasn't able to be QRV in the whole of the 3/4 activity weekend. While conditions on 23cm were good, activity was low. On the 3rd he completed with SM2CEW*, K5JL*, ON4QQ* RO/O for initial no. 172, DF4PV*, K9BCT* and N2UO*. Next day brought GW3XYW*, OH2DG* also on SSB, PA3CSG*, K2UYH* also on SSB, VE6TA*, W5ULA* and IK3COJ*.

On the 10th he completed with F1ANH*, N2UO*, VE6TA* and N7AM. Next day saw QSOs with F6ETI*, F5VHX* O/RO and initial no. 173, F6KHM, DL8OBU*, ZS6AXT*, IK3COJ*, W7BBM, K0YW, G3LTF, VE6TA*, WA6PY* and OZ4MM*. Howard runs a website - see the list.

The main October event is the first leg of the ARRL International EME Contest, which takes place on the 26/27 weekend. Thanks to the high declination throughout, London latitude stations will have 32.6 hours of Moon time. The declination varies from +24.66º at the start, peaking at +25.73º during the weekend. The 144/432MHz sky temperature ranges from 575/44K to 393/29K and the signal degradation referred to perigee varies between -1.32dB and -0.89dB. -117º is the Sun offset at Saturday midnight.

METEOR SCATTER

PRELIMINARY reports suggest that this year's Perseids shower was quite good. Ken Punshon, G4APJ (IO83), heard loads of stuff on WSJT on 2m from before 7 August through to 1900 on the 13th. His raw data printout illustrates what G3WZT was mentioning about garbled callsigns. Countries recorded on screen were DL, EA, EA6, ES, F, G, GW, HA, HB9, I, LA, LY, OK, OM, OZ, PA, SM, SP, S5 and 9A.

Clive O'Hennessy, GM4VVX (IO78), heard reflections on the random 2m CW frequency but found activity nothing like as good as in some previous years. The random SSB QRG was very quiet. He made a number of CW skeds, some of which were completed in minutes but, ". . . others were very difficult due to very many short pings that did not read too well on my old two-speed tape recorder." He completed on CW with LY2BIL (KO24) at 1873km, DK8VS (JN39), F6CRP (IN96), F9IE (IN86), F5HGO (JN05), and DJ1OJ (JN58) in 4min. Many would not take skeds because he didn't have FSK441 capability.

Jamie Ashford, GW7SMV (IO81), had 2m WSJT completions with DK5TE (JN58) on 8 August, OE5KE (JN78) and SM7EOI (JO86) on the 10th, LY2BIL and OE6IWG (JN77) on the 11th, HA1VHF (JN87) and IW2NEF (JN46) on the 12th and OH6KTL (KP02) on the 13th. He worked HA5OV (JN97) on SSB on the 12th.

WSJT COMMENTS

JOHN MATTHEWS, G3WZT, has been a keen MS operator for many years so has tremendous experience of the mode from the days when 400 letters-per-minute was the norm for 'high-speed' CW skeds. So his observations on FSK441 mode are very well worth airing, not least for the benefit of potential newcomers to the concept.

First he comments on 144.370MHz having been adopted for this new mode on 2m and users of it complaining about SSB QRM. Quite rightly he points out that SSB or CW has every right to be there, so, until a proper allocation is made for the mode, we must learn to live together.

He writes that FSK441 has certainly generated a vast amount of interest in MS operation, which cannot be a bad thing, but he is not so sure that it's the new future for MS. He states, "Staring at a PC monitor compared with listening to real-time high-speed CW (HSCW) signals from 1000 miles away on 2m leaves me in no doubt as to my preferred mode - CW every time! This does not mean that I am not prepared to embrace the new mode and use it along with the more traditional methods."

On the down side, he finds that HSCW activity has almost stopped but his main complaint is ". . . the high levels of 'garbage' that come with FSK441 bursts." To illustrate this he cites a 2m QSO with SP3VST during which his call came up on screen as G3WST, G3VST, G3GST and G3WZT, while the Polish station's call came in several versions.

John points out that, "With CW and SSB, what you hear is what you get, no ambiguity exists. WSJT is only intended for very short - tens of milliseconds - bursts at which it is very effective. Anything longer and the burst seems to be unusable as it cannot be decoded." He concludes by saying, "These comments and observations do not mean that I will not be using WSJT. Like all modes old and new it has a place. K1JT should be applauded for his work in putting the software in place and allowing all amateurs to use it for free."

Thanks, John, for a very sensible and timely appraisal, which I'm sure, will be appreciated.

LOCATOR SQUARES TABLE
Starting date: 1 1 1979

Call	50	70	144	430	1296	Total
G3IMV	813	20	616	125	53	1627
GJ4ICD	780	1	267	121	79	1248
G0JHC	1000	26	48	4	-	1078
G0FYD	676	1	285	20	-	982
G0EVT	506	14	309	77	16	922
G4TIF	509	28	235	112	-	884
GW7SMV	664	-	211	-	-	875
G4DEZ	595	18	116	41	25	795
G1SWH	350	42	240	81	30	743
G4YTL	-	53	529	122	-	704
G8TOK	405	34	140	56	29	664
G8BCG	661	-	-	-	-	661
G3XDY	-	34	251	175	123	583
G0XDI	228	-	254	67	-	549
G8HGN	310	-	168	67	-	545
G7BXB	300	15	153	56	-	524
G7CLY	244	-	248	16	-	508
G4OBK	423	21	57	4	-	505
G3FIJ	273	29	107	50	23	482
G6TTL	220	-	133	90	27	470
GM4VVX	307	3	128	-	-	438
G7KHF	434	-	-	-	-	434
G1UGH	280	-	130	18	-	428
G4ZHI	101	10	259	33	-	403
GU6AJE	338	13	32	-	-	383
G0ISW	218	2	87	22	-	329
G1EFL	230	-	67	2	-	299
GW3EJR	289	-	-	-	-	289
G3FPK	30	-	246	-	-	276
G4APJ	176	-	56	22	-	254
M1DUD	196	1	31	1	-	229
GM6MEN	186	-	-	-	-	186
G4FUJ	78	19	24	6	5	132
G4OUT	-	23	107	-	-	130
M5PLY	120	-	-	-	-	120
M1DRK	113	-	-	-	-	113
EA7IT	-	-	103	-	-	103
G8RWG	-	-	30	-	-	30

No satellite, repeater or packet radio QSOs. If no updates received for a year entries will be deleted. Next deadline is 11 October.

BAND REPORTS

50MHz

On 28 July Terry Chaplin, G1UGH (JO02), worked IK1RGM/IF9 (JM68) on Favignana Island for a nice rare one on Es. He heard several EHs and CTs on 11 August and worked EH3LL (JN01). Bryn Llewellyn, G4DEZ (JO03), finds the band open most days, but not always big openings. On 7 August he worked five Israeli stations, one in Cyprus and three in the Ukraine. He listens for the beacons and, if they are heard, puts out a CQ call in their direction, which usually results in a QSO.

Ted Collins's, G4UPS (IO80), report for the last half of July supports G4DEZ's observation that the band is open most days. Conditions were unstable on the 22nd, for example the I0JX beacon was S9 at 1818 and the OY6SMC one was S6 with his beam on Italy. He worked stations in I0-3, OZ and SP6FUN/4 (KO04) for a new grid. EH7HZ/EH9* and EH7HZ/EH9 (IM85) were contacted around midday on the 24th. The band was open to Italy on the morning

of the 28th then at 1007 he worked EH8BPX (IK18) and at 1102 5C2MI* (IM50) for another new grid.

Derek, G8TOK (JO01), remarks on the "strange conditions" when there seem to have been a disproportionately large number of openings to Scandinavia but fewer to the south and east. In July he worked LA7THA/MM (JP24) on the 8th, JX7DFA (IQ50) on the 9th and SM3VAC (JP83) on the 31st. August brought SM6CMU/2 (JP95) on the 3rd and OH8HAR (KP14) and SM3/DL1RNW (JP72) on the 5th. GM4VVX added a couple of new grids in ES, LA, LY and SM and SV8AQY (KM08) was Clive's second only Greek contact.

GW7SMV lists some excellent DX including SP4FUN/4, EH7HZ/EH9 and 5C2MI* in July. European countries worked up to 1 August were DL, I, OE, OK, PA, SM and 9A. Also on the 1st he had QSOs with EH8BPX, NA1CW (FN44), AA6TT (FN34), K1TOL (FN44), KU2A* (FN42) and K1SIX (FN43) who was Jamie's first JT44 DX contact. ODX of the month was VU2ZAP (MK82) at 8236km on the 8th.

70MHz

Quite a lot of 4m input this time, starting with Phil Catterall, G4OBK (YO), who spent an enjoyable 90min on the band in the Trophy Contest on 11 August during which he made 28 QSOs. EI, G, GD, GI, GM and GW stations were easily worked in this well supported event. He missed out on the S5s that were around via Es. ODX was G4ZAP/P (IO70) at 557km. G8TOK has been working a few S5s and M0VHF/P (IN79) on 7 July and EI/G3TCU/P (IO63) in the contest were welcome new grids for Derek.

David Dodds, GM4WLL, operated portable in IO85 in the contest running 20W to a 6-ele Yagi 30ft AGL. He completed 37 contacts in five countries and 28 districts. Being that much further north than most participants, his average QSO distance is higher; in this event 360km. GM4VVX blew the dust off an old 10W transverter, hooked it up to a 30-year old FT-101 and made up a 6-ele Yagi which he erected on a temporary mast so he could have a go in the contest. Clive's first ever QSOs on 4m were with GM4SIV/P (IO75) followed by GM3CKR/P (IO85).

Steve Rawlings, GW4ALG (IO81), was QRV in the contest running just 5W to a 5-ele Yagi 10ft AGL. Using CW to work SSB stations, he made 12 QSOs including GD4EMG (IO74) and EI/G3TCU/P. He heard S51DI.

144MHz

G4DEZ's best DX were some OZs during the 6 August Cumulative session and a few DLs in JN59 - over 800km on a flat band. G8TOK missed the excellent Es on 11 August and just failed to complete with EA9IB (IM85) which would have been a new country for Derek.

No Es for GM4VVX though, and not much decent tropo either in IO78. There was a weak aurora on 12 July when some of the beacons had been auroral for about an hour before Clive's constant CQs were answered by DG1GST* for a difficult QSO. In a short- lived aurora on 1 August he only worked G4HGI. GW7SMV had more luck with the Es, though. Jamie worked CT1HZE (IM57) on 28 July. In the 11 August opening he contacted EA9IB, EA5AGR (IM88) and EA7ERP (IM87).

Nothing to report on the UHFs.

DEADLINES

THE DECEMBER deadline is **Friday 11 October** and the January date is **Friday 8 November**, quite early due to the Christmas / New Year holidays. My telephone answering and fax machine is on 020 8763 9457 and my CompuServe ID is g3fpk ♦

WWW.

RSGB PSC	http://www.keele.ac.uk/depts/por/psc.htm
G4CCH	http://www.g4cch.com/
DF5AI (Prop Info)	http://www.df5ai.net
Temperature maps	http://www.wetterzentrale.de/pics/Rtvan125.html

CONTEST

TIM KIRBY, G4VXE
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E-mail: tim@g4vxe.com

OCTOBER BRINGS plenty of interest to the HF contester, starting with the RSGB's HF International HF Convention at Egham on 11 - 13 October. This always provides an excellent opportunity for contesters and DXers to get together, tell tall stories and attend some fascinating presentations. We hope to see you there. On the air, of course, the highlight for many people will be *CQ* WW SSB on 26 / 27 October. No matter what the size of your station, this represents a great opportunity to try a new antenna and make some contacts all around the globe. If you are a serious (or not so serious) competitor, there are many categories to choose from. Whatever you do, I hope you have fun! Closer to home, the RSGB runs the 21 / 28MHz SSB and CW events on 6 and 20 October respectively. Many overseas stations support these events, so please try to get on and make sure that they have someone to work other than the 'serious' entrants. The Autumn EU Sprints are held on 5 October (SSB) and 12 October (CW). As we noted a couple of months ago, UK interest in these events is rising, so let's do our best to support them again this time around, although of course, the CW event does clash with the HF Convention.

On the higher bands, October provides the 432MHz and Up contest on 5 / 6 October, which is a really enjoyable opportunity to make contacts on multiple bands with well-equipped stations. Running concurrently with the first eight hours of the contest are the 1.3 / 2.3GHz Trophies. If you are active on UHF or higher this is a good chance to go on and be certain of having some contacts. Finally, on 20 October, the RSGB 50MHz contest provides an interesting operating challenge: making as many UK contacts as possible but of course with the possibility that some F2 propagation may be available also.

CONTEST CALENDAR

HF Contests

Date	Time	Mode	Contest	Bands	Exchange
5 October	*0000-2400*	*PSK31*	*TARA Rumble*	*3.5-50*	*Name + DXCC Prefix*
5 October	*1500-1900*	*SSB*	*EU Sprint*	*3.5,7,14*	*SN + Name*
5/6 Oct	*0800-0800*	*SSB*	*Oceania Phone*	*1.8-28*	*RS + SN*
6 October	0700-1900	SSB	RSGB 21/28MHz SSB	21,28	RS + SN + District
12 October	*1500-1900*	*CW*	*EU Sprint*	*3.5,7,14*	*SN + Name*
12/13 Oct	*0800-0800*	*CW*	*Oceania CW*	*1.8-28*	*RST + SN*
20 October	0700-1900	CW	RSGB 21/28MHz CW	21,28	RS + SN + District
26/27 Oct	*0000-2359*	*SSB*	*CQ WW DX*	*1.8-28*	*RS + CQ Zone (UK=14)*

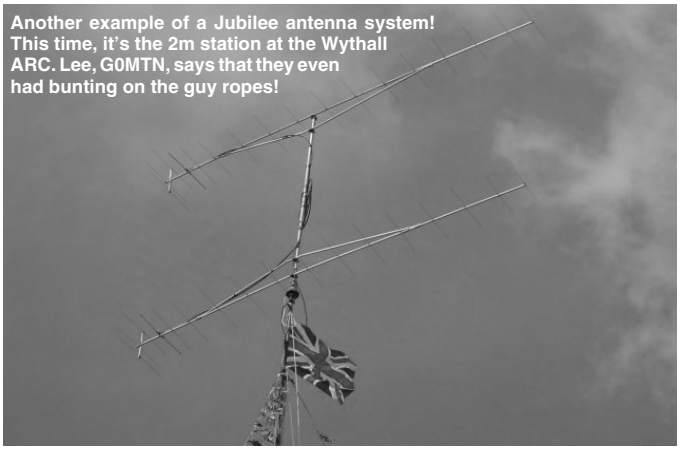
VHF Contests

Date	Time	Mode	Contest	Bands	Exchange
1 October	1900-2130	ALL	RSGB 144MHz Activity	144	RST+SN+Locator
5 October	1400-2200	ALL	RSGB 1.3/2.3GHz Trophies	1.3/2.3	RST+SN+Locator
5/6 Oct	1400-1400	ALL	RSGB 432MHz to 248GHz	432up	RST+SN+Locator
8 October	1900-2130	ALL	RSGB 432MHz Activity	432	RST+SN+Locator
15 October	1900-2130	ALL	RSGB 1.3/2.3GHz Activity	1.3/2.3	RST+SN+Locator
20 October	0900-1300	ALL	RSGB 50MHz	50	RST+SN+Loc+Postcode+Cnty
22 October	1900-2130	ALL	RSGB 50MHz Activity	50	RST+SN+Locator

Microwave Contests

Date	Time	Mode	Contest	Bands	Exchange
6 October	0900-2000	ALL	RSGB 1.2GHz up	1.2Gup	RST+SN+Locator
20 October	0900-2000	ALL	RSGB 10GHz Cumulative	10G	RST+SN+Locato
27 October	0900-2000	ALL	RSGB 24GHz up	24Gup	RST+SN+Locator

The full rules of RSGB HF, VHF/UHF and Microwave contests were published in the RSGB Contesting Guide in January 2002 *RadCom*. Brief rules for non-RSGB contests, which are listed in italics above, can often be found in the 'HF' and 'VHF/UHF' columns. The HF and VHF Contest Committees both have websites from which comprehensive details are available. These are www.rsgbhfcc.org and www.blacksheep.org/vhfcc RSGB Microwave Contest rules can be found on the Internet at: http://www.g3pho.free-online.co.uk/microwaves/calendar2002.html



Another example of a Jubilee antenna system! This time, it's the 2m station at the Wythall ARC. Lee, G0MTN, says that they even had bunting on the guy ropes!

Christmas Cumulatives, 2001

THIS YEAR'S event saw a number of welcome new entrants taking part, and most people commented favourably on the experience. The tops of the tables are again dominated by multi band entries, proving that a long stint on 6m or 2m isn't necessarily the best way to gain a good points score in the overall table. G4KZY/P built the biggest overall score in the Open Section from a few local contacts on the less popular bands. At the other end of the country, MM0BPQ/P operated from IO87 and really struggled for QSOs.

Thanks to all the participants and congratulations to the certificate winners.

Steve Redfern, G4AEQ

Christmas Cumulatives 2001

Single Operator Fixed

			50MHz					70MHz					144MHz					432MHz					
			26/12	27/12	28/12	29/12		26/12	27/12	28/12	29/12		26/12	27/12	28/12	29/12		26/12	27/12	28/12	29/12		
Pos	Call	Loc	QSOs	QSOs	QSOs	QSOs	Band Norm	QSOs	QSOs	QSOs	QSOs	Band Norm	QSOs	QSOs	QSOs	QSOs	Band Norm	QSOs	QSOs	QSOs	QSOs	Band Norm	Total
1	G7ULL*	JO01AK	8	4	5	5	2333	0	0	0	0	0	28	36	35	33	1713	2	1	3	0	2222	6268
2	M5FUN*	JO00DX	0	1	4	4	782	0	0	0	0	0	8	11	49	45	1316	2	2	2	3	2110	4208
3	G4HLX	IO91FP	1	3	3	3	775	0	0	0	0	0	21	26	28	33	1180	0	3	2	2	1888	3843
4	G0PZO*	IO83LJ	7	5	4	2	1108	0	0	0	0	0	7	7	6	7	74	2	3	2	2	2332	3514
5	G4DBL	IO91HC	1	10	6	4	2480	0	0	0	0	0	10	15	26	26	585	0	0	0	0	0	3065
6	G8ZRE	IO83NE	6	8	6	8	2324	0	0	0	0	0	19	27	23	27	695	0	0	0	0	0	3019
7	G3IKR	IO82XF	0	0	0	0	0	9	0	10	8	3000	0	0	0	0	0	0	0	0	0	0	3000
8	G4ZTR	JO01KW	0	0	0	0	0	0	0	0	0	0	55	52	0	56	2952	0	0	0	0	0	2952
9	G7RAU	IO90IR	0	0	0	0	0	0	0	0	0	0	54	25	32	61	2951	0	0	0	0	0	2951
10	G1ZJP	IO92WV	0	0	0	0	0	0	0	0	0	0	33	49	15	46	2068	0	0	0	0	0	2068
11	PE1EWR*	JO11SL	1	0	0	0	13	0	0	0	0	0	2	13	14	5	269	1	3	2	1	1610	1892
12	G4SJH	IO91PI	0	0	0	0	0	0	0	3	3	299	0	0	0	0	0	0	0	3	3	966	1265
13	G4OBK	IO94	10	0	0	0	1000	0	0	0	0	0	2	0	0	0	3	0	0	0	0	0	1003
14	G0DVJ	JO01MX	0	2	1	0	166	0	0	0	0	0	1	9	16	0	190	0	1	1	0	444	800
15	G3YJR	IO93FJ	0	0	0	0	0	0	0	0	0	0	5	0	0	10	59	1	0	0	2	610	669
16	G0TXL	IO91WI	0	0	0	0	0	0	0	0	0	0	11	18	16	18	407	0	0	0	0	0	407
17	G7DWY	IO93BQ	0	0	0	0	0	0	0	0	0	0	16	21	16	19	367	0	0	0	0	0	367
18	G1TWS	JO01HO	0	0	0	0	0	0	0	0	0	0	14	18	13	14	233	0	0	0	0	0	233
19	GW4HBK	IO91KP	0	0	0	0	0	0	0	0	0	0	12	14	7	0	188	0	0	0	0	0	188

All Others

			50MHz					70MHz					144MHz					432MHz					
			26/12	27/12	28/12	29/12		26/12	27/12	28/12	29/12		26/12	27/12	28/12	29/12		26/12	27/12	28/12	29/12		
Pos	Call	Loc	QSOs	QSOs	QSOs	QSOs	Band Norm	QSOs	QSOs	QSOs	QSOs	Band Norm	QSOs	QSOs	QSOs	QSOs	Band Norm	QSOs	QSOs	QSOs	QSOs	Band Norm	Total
1	G4KZY/P*	IO90MX	9	15	0	14	3000	0	1	1	1	3000	0	16	1	17	736	0	1	0	1	2000	8736
2	G6QM*	IO94DB	0	0	0	0	0	0	0	0	0	0	13	4	3	8	291	2	1	0	1	3000	3291
3	ON1YW*	JO11LC	0	0	0	0	0	0	0	0	0	0	39	38	38	42	3000	0	0	0	0	0	3000
4	G8JBJ	JO00AX	1	0	1	2	1380	0	0	0	0	0	5	0	19	14	620	0	0	0	0	0	2000
5	MM0BPQ/P	IO87BC	0	0	0	2	48	0	0	0	0	0	0	0	2	1	16	0	0	0	0	0	64

*Certificate winner
Checklog received from G3MEH.

144MHz Affiliated Societies Contest, 2001

THIS CONTEST CONTINUES to be well supported and benefit from good activity levels, with the leading scores up on last year. The Northern Lights and Andy, G4PIQ, again top the tables in the Multi-Op and Single-Op sections respectively with very similar scores. An interesting result, considering their geographical distance and that of the 500 different stations they worked between them, only 30% appear in both logs.

The scoring for the AFS table has changed this year, giving the opportunity for each of the five stations in each team to score 1000 points. Congratulations to Harwell ARS who came out on top, with the Chesham & DARS second.

This contest was originally open to fixed stations only, but was opened up to portables last year. However the /P stations are not eligible for the overall AFS section. One group did make a plea for a /P station, which was not strictly portable, to be included. But to be totally fair to all, it was felt that this rule had to be adhered to. Fortunately in this case it made no difference to the overall table.

Congratulations to all winners and runners-up who will receive certificates, as will G3JMB for the highest placed 25W / single antenna entry.

Pete Lindsay, G4CLA.

144MHz Affiliated Societies Contest, 2001

Affiliated Societies Section

Pos	Group	Call	Points	Norm	Call	Points	Norm	Call	Points	Norm	Call	Points	Norm	Call	Points	Norm	Total
1*	Harwell Amateur Radio Society.	G3NNG	33082	303	M1PIA	23782	477	G8CUL	17158	1000	G4HLX	13620	1000	G0AOZ	9148	1000	3780
2*	Chesham & DARS	G0XDI	57221	524	G3MEH	36961	741	G0ODQ	12199	711	G0VFW	6546	481				2457
3	Martlesham DX & CG	G4PIQ	109170	1000	G4MRS	49891	1000	G0OZS	3502	204							2204
4	Five Bells CG	G4SIV	73644	675	G1ZJP	31331	628	G4NPH	10001	583							1885
5	Colchester Radio Amateurs	G4ZTR	33763	309	G3FIJ	5540	111	G7PLL	5224	304	M1GJG	4093	301	G0HKG	3750	410	1435
6	Wythall ARC	M0COP	8376	77	G4VPD	6111	122	M0COK	4335	253	M5UGC	3829	281	G0ICJ	1854	203	936
7	Harwich Amateur Radio Interest Group	G0DVJ	23673	217	G7HOW	2346	47	G4FTP	1204	70	M0GIM	822	60	2E1XJR	119	13	407
8	Cray Valley Radio Society	G3JJZ	6119	56	G4BUO	4004	80	G4DFI	1405	82	G8ITB	1158	85	G0WLF	856	94	397
9	Mid Sussex ARS	G0APZ	11720	107	G3JMB	6575	132	G8JBJ	2283	133							372
10	Herstmonceux Megacycles	M5FUN	20946	192	G3YNN	6569	132										324
11	Sutton and Cheam Radio Society	G3WHK	14702	135	G3OLX	3063	61	M0BOV	1323	77							273
12	Colchester Radio Amateurs B	G7MHK	3618	33	2E1GUA	3487	70	G0OLM	1822	106	G4KTI	289	21				230
13	Mid-Cheshire ARS	G8ZTT	22885	210													210
14	De Montfort ARS	M5CSM	17698	162													162
15	Douglas Valley AFS	G8ZRE	15322	140													140
16	Ariel Radio Group (London)	G7BBC	6138	56	G8BBC	790	16	G7MXG	618	36							108
17=	Harwell Amateur Radio Society. B	G0THY	4622	42	M0BJE	194	4										46
17=	Crawley ARC	G3YSX	5007	46													46
19	Wythall ARC B	M0AEJ	1308	12	G7OJO	233	5										17

Multi Operator

Pos	Call	Loc	Zone	QSOs	Points	ODX	km	Power	Ant	
1*	GD0EMG	IO74QD		278	109944	DF2VJ	957	400	8x9 + 2x17 + 4x9	Northern Lights
2*	G4SIV	IO92WS	B	242	73644	DG2NBN	861	400	6x12	Five Bells CG
3	G1ZJP	IO92WV	B	129	31331	F5LRL	763	400	4 x 9	Five Bells CG
4	G8ZTT	IO83QE	A	119	22885	ON4KRI	640	350	17	Mid-Cheshire ARS
5	M5FUN	JO00DX	C	124	20946	GM4ZUK/P	688	25	12	Herstmonceux Megacycles
6	G8CUL	IO91JO		123	17158	DF2VJ	629	150	14	Harwell ARS
7	G3WHK	IO91VJ	C	114	14702	GM4ZUK/P	635	100	16	Sutton & Cheam RS
8	G3YNN	JO00EU	C	45	6569	DF2VJ	498	25	9	Herstmonceux Megacycles

Single Operator Fixed

Pos	Call	Loc	Zone	QSOs	Points	ODX	km	Power	Ant	
1*	G4PIQ	JO01MU		372	109170	DJ2NR	772	400	4x15	2x9 Martlesham DX & CG
2*	G7RAU	IO90IR		212	70842	DG2NBN	897	400	2x9	
3	G0XDI	IO91RP		240	57221	DK1FG	857	400	9	Chesham and DARS
4	G4MRS	JO02PB		177	49891	DG2NBN	745	400	15	Martlesham DX & CG
5	G3MEH	IO91QS		201	36961	F5LRL	680	400	2 x 10 el	Chesham & DARS
6	G4ZTR	JO01KW		154	33763	DJ2NR	785	200	12	Colchester Radio Amateurs
7	G3NNG	IO91EP	D	180	33082	DF2VJ	658	200	17	Harwell ARS
8	M1PIA	IO91IN	D	140	23782	DL0HNF	690	100	17	Harwell ARS
9	G0DVJ	JO02OD		104	23673	DL1AAH	625	50	17	Harwich AR Interest Group
10	PE1EWR	JO11SL		71	20544	GM4ZUK/P	724	80	10	
11	G8HGN	JO01FO	C	74	19987	DK1FG	788	150	2x15	
12	M5CSM	JO01FO		109	17698	DJ2JA	589	80	17	De Montfort ARS.
13	G8ZRE	IO83NE		88	15322	PE1EWR	475	80	8XY	Douglas Valley AFS
14	G4HLX	IO91FP	D	102	13620	DK5DQ	613	100	13	Harwell ARS
15	G0AFH	JO01EI		84	13145	GM4ZUK/P	649	400	2 x 17	
16	G7TAS	JO03DG		62	12949	DJ6AG	701	100	9	
17	G0ODQ	IO91NQ		104	12199	GM4ZUK/P	594	120	11	Chesham & DARS
18	G0APZ	IO90WW	C	74	11720	GM4ZUK/P	686	100	8	Mid Sussex ARS
19	G4NPH	JO02BI	B	82	10001	DF2VJ	584	100	9	Five Bells CG
20	G0AOZ	IO91GQ		86	9148	F5LRL	711	160	16	Harwell ARS
21	M0COP	IO92BK	B	79	8376	GM4ZUK/P	502	100	8/8 slot	Wythall ARC
22	ON2VS	JO21LH		20	7434	GD0EMG	717	50	9	
23*	G3JMB	IO91WA	C	57	6575	DK5DQ	518	20	7	Mid Sussex ARS
24	G0VFW	IO91RR		55	6546	GM4ZUK/P	593	35	13	Chesham & DARS
25	G7BBC	IO91UM		61	6138	GM4ZUK/P	620	25	19	Ariel Radio Group (London)
26	G3JJZ	JO01AJ	C	71	6119	DK5DQ	504	25	8	Cray Valley Radio Society
27	G4VPD	IO92BJ	B	42	6111	DK5DQ	642	200	18	Wythall ARC
28	G4XPE	IO92GU		35	5916	DK5DQ	623	25	10	
29	G3FIJ	JO01KV		54	5540	GD0EMG	445	15	10	Colchester Radio Amateurs
30	G7PLL	JO01IW		47	5224	DK5DQ	461	100	9	Colchester Radio Amateurs
31	G3YJR	IO93FJ	A	28	5161	GM4ZUK/P	399	2.5	9	
32	G3YSX	IO91WF		50	5007	GD0EMG	444	160	9	Crawley ARC
33	G0THY	IO91IT	D	37	4622	GM4ZUK/P	576	25	9	Harwell ARS
34	M0COK	IO92AJ	B	47	4335	GM4ZUK/P	506	50	7	Wythall ARC
35	M1GJG	JO01HO		41	4093	GD0EMG	434	20	7	Colchester Radio Amateurs
36	G4BUO	JO01CD		33	4004	DK5DQ	493	25	9	Cray Valley Radio Society
37	M5UGC	IO92BK	B	35	3829	GM4ZUK/P	502	50	8/8	Wythall ARC
38	G0HKG	JO01IV		44	3750	GD0EMG	436	100	9	Colchester Radio Amateurs
39	G7MHK	JO01JP		52	3618	GD0EMG	457	50	Vertical	Colchester Radio Amateurs
40	G0OZS	JO01MX	B	35	3502	GD0EMG	449	120	5	Martlesham DX & CG
41	2E1GUA	JO01FS		44	3487	G4RRA	321	50	13	Colchester Radio Amateurs
42	G3OLX	IO91VH	C	44	3063	GD0EMG	433	50	4	Sutton & Cheam RS
43	G7HOW	JO01NW		27	2346	GD0EMG	456	50	9	Harwich AR Interest Group
44	G8JBJ	JO00AX	C	22	2283	G4HGI	335	'100	7	Mid Sussex ARS
45	G0ICJ	IO92BJ		26	1854	M5FUN	217	25	7ZL	Wythall ARC
46	G0OLM	JO01KX		20	1822	GW8ASA/P	306	7	8	Colchester Radio Amateurs
47	G4DFI	JO01BL	C	31	1405	G4SIV	145	5	9	Cray Valley Radio Society
48	M0BOV	IO91VI	C	14	1323	GD0EMG	430	180	9	Sutton & Cheam RS
49	M0AEJ	IO92BK	B	16	1308	GD0EMG	264	40	5ZL	Wythall ARC
50	G4FTP	JO01LU		21	1204	G7RAU	200	50	Collinear	Harwich AR Interest Group
51	G8ITB	JO01AI	C	24	1158	G4SIV	158	20	Halo	Cray Valley Radio Society
52	G0WLF	IO91WJ	C	20	856	G1ZJP	167	25	Vertical	Cray Valley Radio Society
53	M0GIM	JO01MX		12	822	G3NNG	187	50	5	Harwich AR Interest Group
54	G8BBC	IO91VM	C	19	790	G7RAU	116	25	8	Ariel Radio Group (London)
55	G7MXG	IO91TO	C	18	618	G3NNG	86	50	Co-linear	Ariel Radio Group (London)
56	G4KTI	JO01KV		8	289	G4SIV	119	10	Discone	Colchester Radio Amateurs
57	G7OJO	IO92CK	B	7	233	G0ODQ	104	8	Wythall ARC	
58	M0BJE	IO91JS	D	9	194	G0VVE	76	2.5	Slim Jim	Harwell ARS
59	2E1XJR	JO01PW		5	119	G7MHK	47	40	Collinear	Harwich AR Interest Group

Single Operator Other

Pos	Call	Loc	Zone	QSOs	Points	ODX	km	Power	Ant	
1*	GM4ZUK/P	IO86RW	G	121	58417	DK5DQ	897	400	13	
2*	G4CQR/P	JO00CR		156	45560	DJ2NR	821	250	13	
3	GW8ASA/P	IO81FP		135	28593	DK5DQ	751	50	5	
4	G3MDG/P	IO91RR		59	6859	ON4SG	471	35	13	Chesham & DARS
5	G0WJR/P	IO81QJ		33	5344	GM4ZUK/P	616	40	7ZL	
6	M0EEE/P	IO91NK		20	1473	G4RRA	222	7	Dipole	Reading DARC
7	G3VQO/P	IO91VG		19	1005	G4DEZ	214	50	Mobile whip	

Checklog

Pos	Call	Loc	Zone	QSOs	Points	Best DX	Dist	Power	Ant	Name
	G3WSC	IO91VC		19	1481	GW8ASA/P	239	50	10	Crawley ARC

1st Slow Speed Cumulatives, 2002

A FEW ENTRIES up on last time, most entrants welcomed the return of the five sessions. There was a bit of confusion over the 20 bonus point scoring, but bonuses were given for 2E0 and M3 stations only. It was good to see some M3 calls in the logs, keep it up guys and gals! Why not put in an entry next time?

Activity on the first session was low, but the average number of stations active for each of the other four sessions was 70. Congratulations to the winners of the sections, Leading Intermediate licensee was Bob MacDonald, 2E0ATZ, using his Ten-Tec Argosy, 5W to a long wire, and the leading Full licence was Mick Puttick, G3LIK, using an FT-1000MP, 10W to a W3DZZ.

Derrick Webber, G3LHJ

1st Slow Speed Cumulatives, 2002

Pos	Callsign	Session: 1	2	3	4	5	Points	Equipment
1*	2E0ATZ	CKL	-	300	340	320	960	1W1?
2*	G3LIK	-	CKL	220	255	225	700	2C23
3	G0RAF (M)	CKL	CKL	175	195	205	575	2C17
3	G3YAJ	CKL	180	205	CKL	190	575	2C1?
5	G2HLU	-	175	200	190	CKL	565	2C12
6	G3ZRJ	CKL	CKL	195	190	170	555	2C1?
7	G4BJM	CKL	-	150	200	185	535	2C1?
8	G4BLI	CKL	155	-	180	175	510	2C13
9	G4XPE	CKL	-	180	155	165	500	2C11
10	G3HZL	CKL	CKL	189	150	155	485	22C?
11	G0FYX	160	-	CKL	190	130	480	2C1?
12	G3ZGC	-	160	150	165	-	475	2W1?
13	G3TTB	-	130	-	160	170	460	2W12
14	G3SET	-	105	155	170	-	430	2C13
15	G4EBK	110	140	-	-	175	425	2C13
16	G0VYR	CKL	120	-	110	185	415	2C14
17	G3WUX	-	205	-	180	-	385	2W11
18	GW4LZP	CKL	CKL	125	120	135	380	2C1?
19	G0VQR	-	-	160	-	185	345	2C13
20	G4KEW	CKL	95	-	110	110	315	2???
21	G3FIJ	-	95	100	-	95	290	2C1?
21	M5ACR	CKL	85	90	115	CKL	290	2W12
23	G0WWD	CKL	55	55	50	-	160	1C1?
24	G0MRH	-	-	-	-	85	85	2C12
25	M5ALG	35	55	-	-	-	90	2W1?

(M) = multi-op. CKL = checklog. Many thanks also for checklogs from: G4CVA, G4PTE and 2E0SJD (would have won it if entered).

HF HF HF HF

DON FIELD, G3XTT
105 Shiplake Bottom, Peppard Common, Henley on Thames, RG9 5HJ.
e-mail: hf.radcom@rsgb.org.uk

WELL-KNOWN contester and DXpeditioner Andy Chadwick, G4ZVJ, reports that he has now been issued the callsign G3AB (this was the call of Andy's late uncle from 1937 - 1983). The G4ZVJ mailing address remains active.

Chris, G0WFH, will be active as GJ0WFH/P from 5 to 12 October. Activity will be QRP portable with a kite antenna on 160 - 10m SSB only. QSL via G0DBX.

DL7AFS and DJ7ZG were due to be active from **Mozambique** as C98DC, starting a two-week operation around 24 September. Activity will be from Bazaruto Island (IOTA AF-072). They will operate SSB on the usual DX frequencies. Also, look for operations on RTTY / PSK on 18101kHz. QSL via DL7AFS.

Ed, ON7UN, was due to be in the **Democratic Republic of Congo** (9Q) in late September for two weeks, followed by a trip to **Congo** (TN) to see if he can get operating permission. Over the next six months he will also visit **Gabon, Kenya, Tanzania, Zambia** and **Mozambique**. QSL via ON4ACA.

The DL7DF crew will sign 3XY7C from **Guinea**, starting 30 October until 13 November. They will have several stations on the air on all HF bands and modes, hopefully including SSTV. The QSL route is either direct or via the bureau to DL7DF. An on-line log will be available and updated during the DXpedition. The pilot for this DXpedition will be Bernd, DF3CB, bernd@df3cb.com

Bernie, FR/F6BLK, was due to be active from **Reunion** 23 - 29 September, then as TO8MZ from **Mayotte** 30 September to 9 October. He will mainly be on CW, but with occasional SSB. QSL via F6BLK.

Ed, N1UR (ex-K8EP), will be active from **Macau** (XX9) from 11 to 21 October, all bands. QSL via N1UR.

Several Japanese groups will operate as 8N1OGA from **Ogasawara** until 1 February. The operation, headed up by Toshi, JA1ELY, commemorates 75 years of the Japan Amateur Radio League. The islands are located about 1000km south of Tokyo and can only be reached by taking a 25 hour boat trip from Tokyo. A permanent station will be set up for the use of the various teams. They will aggressively participate in major DX contests such as the CQWW Phone, CQWW CW and JIDX Phone contests, looking particularly for Europe and the East Coast of North America on the low bands. Currently, the following visiting amateurs are expected: 27 Sept to 5 Oct JQ2EHG, JO1LVZ; 2 - 5 Oct JI2UNR; 8 - 16 Oct 7K3EOP, WA1S; 2 - 23 Oct Unknown; 26 - 29 Oct JA1WSX, JS1DLC; 26 Oct - 4 Nov JA1MRM, JA1LZR; 8 - 11 Nov JO1RUR, JP1JFG; 14 - 23 Nov Unknown; 27 - 30 Nov JA1ELY, JA1IDY; 4 - 24 Dec Unknown; 27 Dec - 1 Jan JA7AYE; 31 Dec - 4 Jan JA1WSX; 4 - 31 Jan Unknown. QSLs will be available for all contacts via the Japanese bureau or, if you want a direct card, send to JA1MRM.

The Kermadec DX Association's operation from **Chatham Island** (OC-038) is scheduled to take place from 17 to 28 October local times. The multi-national team will include one UK operator, Steve, G4EDG. Operation will be on all bands and modes, and will include the CQWW Phone Contest. The callsign will only be announced once operations commence. This is the same group which has operated from both Kermadec (ZL8) and Campbell (ZL9) in recent years. QSL via ZL4HU, either direct or through the bureau.

A multi-national team of DXers will be operating from **American Samoa**, KH8, starting 26 October. Special emphasis will be placed on following the European openings. They will split the team, to activate two of the KH8 IOTA groups simultaneously: 29 October to 8 November from Tutuila (OC-045) and 30 October to 6 November from Ofu (OC-077). The team will be led by Glyn, GW0ANA, who headed up last year's successful expedition to ZD7 / ZD8. They will also have local help from Larry, AH8LG. Check out their website for updates and propagation predictions.

The Low-Land DXpedition Team (LLDXT) is organising its next expedition, this one 12 October to 1 November to J7, **Dominica** and VP2M, **Montserrat**. Operators will be PA0ZH, PA3EWP, PA5EA and PA5ET.

Mike, G4IUF, plans to operate 2 - 29 October from **Ecuador**, HC, and the **Galapagos**, HC8. He will be staying with HC8GR on the Galapagos from 5 to 23 October. The operation will be relatively low key as Mike and his wife plan to enjoy watching the wildlife on the islands. He hopes to have an HC8 call. Otherwise, he'll be on as HC8/G4IUF.

Two well-known UK HF operators passed away recently. Don, G3NOF, was high on the DXCC roll and was a former president of the ISWL. Eric, G0KJW, was probably best-known for his various IOTA expeditions around the British Isles.

IOTA ACTIVITY

JIM, MM0BQI, expects to be back on the **Summer Isles** (EU-092) as GB5SI from 19 to 24 October. QSL to his home call.

QSLs for the April / May 2002 Baker Island DXpedition are now being sent out.

Joe, KE6SGA, and Bill, KA6SPQ, will be on, weather permitting, from the **St George Reef** lighthouse 19 - 20 October. St George is NA-184 for IOTA.

Several members of the Diamond DX Club will be on from some islands in Micronesia as follows: **Nomwin Island** (IOTA-NEW) in the Hall Islands Group, 24 - 27 October; **Ta Island** (IOTA-NEW) in the South Mortlock Group, 30 October to 4 November. The group will use a Yaesu FT-900AT, Icom IC-706, Kenwood TS-50, two 5kW Honda generators, 500W amplifier, R6000 vertical, rotating dipole for 10 / 15 / 20, Mosley tribander, and dipoles for the lower bands.

Elizabeth, VE7YL; June, VK4SJ; Mio, JR3MVF, and Gwen, VK3DYL, will operate from **Aitutaki** (OC-083) 1 to 6 October and from **Rarotonga** (OC-013) 7 - 15 October. Both the islands are in the Southern Cooks. Callsign to be announced later. QSL to VK3DYL either direct or through the VK3 bureau.

Mariano, LU4EJ/D, and Daniel, LU3DTD, will be on **Ariadna Island** (SA-021) from 4 to 6 October. Check around 3680, 7080, 14260, 14200, 21260, 21300, 28460 and 28560kHz. On CW check 3520 and 7020 from 2100UTC. QSL via their home calls either direct or via the bureau.

SPECIAL PREFIXES

TERRY, VE7TLL, reports that Canadian amateur radio operators have been authorised to use special prefixes to celebrate the 125th anniversary of Japanese immigration to Canada. Until 31 October, the following special prefixes are authorised on a voluntary basis: CK replaces VE, CJ for VA, CY for VO and CZ for VY.

In celebration of the 70th anniversary of the Federacion Mexicana de Radio Experimentadores (FMRE), the Mexican Government has authorised Mexican amateurs to use the special prefix 6J instead of XE

QTH Corner

JA1MRM Saburo Asano, 3-26-8 Toyotamakita, Nerima, Tokyo 176-0012 Japan.
KU9C (new) Steven Wheatley, PO Box 31, Morristown, NJ 07963-0031, USA.
TI9KZ Box 50-C, Guatemala City.
VK3DYL Gwen Tilson, 3 Gould Court, Mt Waverley, Victoria 3149, Australia.

when working DX. This is valid until 31 December.

Norway's PTT has given permission for amateurs there to use the LN prefix during major HF contests. Most club stations in Norway are now using 2 x 1 calls of silent keys, eg LA1V. The LN prefix was used just once before, in 1995 to commemorate the 50th anniversary of the WWII liberation of Norway.

HL14AG and DT14AG are active from South Korea until 23 October to commemorate the 14th Busan Asian Games. QSL via HL0BHQ.

To commemorate the 60th anniversary of the creation by Charles de Gaulle of the Normandy Niemen air flotilla, special event station TM4ENN will be active from 26 September to 6 October on 40, 20, 15 and 10m.

AWARDS

CARL, G3PEM, writes with details of the Chelmsford Award, to commemorate the centenary of Marconi's First Trans-Atlantic transmission. Marconi's first radio factory was in Chelmsford, hence the connection. Work stations such that their suffix letters (any suffix letters can be used) spell the following phrase: "Chelmsford, the Birthplace of Radio". Use only one callsign per letter, so a total of 30 callsigns is required. One callsign should be from the Chelmsford (CM) postal district. All bands and modes, contacts to have been made since 12 December 2001, no repeater contacts. Send a certified log extract plus 10 IRCs or £6 (cheques payable to The Chelmsford Amateur Radio Society) to Martyn Medcalf, M3VAM, 47 Paddock Drive, Chelmsford CM1 6UX. For every award issued, a donation will be made to the Essex Air Ambulance service.

CQWW CONTESTS

THE CQWW PHONE Contest takes place, as always, on the last full weekend of this month (26 / 27), with the CW leg taking place one month later (23 / 24 November). Rules are as before, with one significant change in this year's contest. For the first time, there is a multi-two category, sitting between the previous multi-single and the full-blooded multi-multi. It will be interesting to see what sort of level of support this new category attracts. Operations already notified for the Phone leg, in addition to those already mentioned in the text (and I'm sure there will be many more), include: CN2R by W7EJ; Martinique by NH7A using a TO5 callsign; GU by a German team and, separately, MU0C by a G and GU team; various single-band efforts from TY, Benin, by Italian group (QSL I8ACB); VC2C (Zone 2) by a US / UK team; ZK1 (both North and South Cooks) by mainly US teams with local help from ZK1CG; VP2T multi-multi by N2VW WA2VYA etc (QSL N2VW); 9M6A by N1UR; D4 operations both by IV3TAN and by 4L5A; FS/AH8DX; GD6IA by GM3WOJ; IG9A and IH9P multi-multi operations from African Italy; J49Z by Italians; JW5E multi-single; KP4WW 15m only; NP2B multi-op; OH0Z by OH5DX; P40W by W2GD; PJ2T multi-single; PJ7/K7ZUM multi-single; T48W (Cuba) multi-single; TI5N multi-multi; XU7ACE by ES1FB; V31BD by WQ7R; VP2E multi-single; VP2M multi-single; W4WX/HI9 multi-single; WP2Z multi-multi; YN2EJ multi-single; ZD8Z by N6TJ; ZF2AH by W6VNR, 15m only. Don't forget that many of these will be up and running before the contest, most likely on CW / RTTY and / or the WARC bands, to avoid diluting demand for SSB contacts on the main bands before the contest starts.

CQWW CW 2001
(An asterisk beside the callsign indicates low power)

Single-Operator		
G4BUO	A	5,129,800
M5X (op G4TSH)	A	3,457,443
GJ2A (op K2WR)	A	2,663,696
G3UFY	A	1,975,061
GW7X (op GW3NJW)	A	1,938,609
G3MXJ	A	1,260,637
G0IVZ	A	1,080,742
GM3W (op GM3JKS)	A	808,800
GW3JXN	A	646,112
G3SJJ	A	489,270
G4BJM	A	354,688
G3YXX	A	249,812
G3WUX	A	247,725
M2W (op G0PZA)	A	227,520
G3LUW	A	112,796
GI4KSH	A	108,783
G3VYI	A	85,500
G3NAS	A	71,712
GI0KOW (op GI0NWG)	21	879,069
M0C (op M0DXR)	7	106,920
G3VPS	3.5	63,900
GU4YOX	3.5	31,260
*MU/DL2OBF	A	3,110,894
*GW3KDB	A	1,561,908
*G4IIY	A	1,270,512
*G0MTN	A	971,813
*GM4SID	A	853,860
*G3KKQ	A	728,992
*G3KKP	A	705,180
*G3NKS	A	576,271
*G4KFT	A	422,892
*G3JJZ	A	350,207
*G4DDX	A	268,804
*G0UKX	A	255,013
*G3ZRJ	A	248,036
*MU0FAL	A	211,347
*G3GGS	A	164,284
*G/N9LYE	A	100,606
*G4SLE	A	81,192
*G4ZME	A	48,384
*G3ECS	A	27,354
*MW5EPA	A	10,873
*G0DAY	A	10,804
*2E0ATS	A	9,800
*M0AEK	A	6,486
*G3VQO	A	1,440
*G3KHZ	28	371,266
*GI4SNC	28	103,410
*GM3CFS	28	97,092
*G3RSD	28	81,396
*GI0KVQ	28	39,748
*GU3SQX	28	16,402
*G4OGB	21	55,292
*G3IZD	21	35,583
*G4HTD	21	13,104
*M4T (op G0VQR)	14	112,832
*G4ODV	7	92,232
*G3WGV	1.8	32,240
QRP		
MU0ASP (op F5SHQ)	A	294,550
GI0GDF	A	221,256
GM4HQF	A	93,934
M0O (op G4JZO)	28	38,480
G4EDG	21	206,822
G3TXZ	21	76,760
G2HLU	21	43,775
G4ELZ	14	131,300
G3VPW	7	45,920
GW0VSW	7	13,293
G0WAT	7	4,704
G0DCK	1.8	238
Assisted		
GW3YDX	A	4,432,635
M/UT3UA	A	3,180,942
G4OWT	A	229,577
G4IRN	A	130,050
G4OBK	A	19,920
G5X (op G4RCG)	28	313,316
G4PDQ	14	35,856
G5LP	7	89,919
Multi-Single		
M2A		3,505,677
MW2I		3,418,129
Multi-Multi		
GM7V		12,207,936
MZ5A		4,332,589

The Phone results appeared last month. Results of last year's CW contest appear in the table. Congratulations especially to GI0KOW (op GI0NWG, European 1st and World 5th on 15m), G4BUO (European 2nd all-band), to ZC4DW (World 4th, low-power all-band), G3KHZ (European 2nd 10m low power), G4ODV (European 6th, 40m low power), G3WGV (European 4th, World 5th, low power 160m), and GW3YDX (World 10th and European 4th, all-band Assisted). In the QRP category, G4EDG was World 3rd on 15m, and G4ELZ World 5th on 20m. I might also mention the XT2DX team, almost all from the UK, who came World 2nd in the multi-multi category and ex-pat Jeff, 9H1EL, who, as 9H0A, was European 1st on 10m. Apologies to anyone I might have omitted! It is gratifying to see such a high level of UK interest.

OTHER CONTESTS

BRIAN, ZL1AZE, WRITES with details of the 2002 Oceania DX contest. Last year, of 243 European logs, only three were from the UK, and Brian would very much welcome an increase in this number. Indeed, as one of the UK logs was from an SWL, the only UK entrant turns out to have been G3GLL, who scored 1722 points in the CW leg and 1742 in the SSB leg. This year's contest is scheduled for the first two weekends of this month, with the phone leg from 0800 on 5 October for 24 hours, and the CW leg exactly a week later. Rules for this year's contest, and results from last year's appear on the website, or I can provide them in return for an e-mail or SASE.

The ON Contest takes place as follows: 6 October 80m SSB; 13 October 80m CW. Both are 0600 to 1000UTC. Work Belgian stations. Send RS(T) and serial number, receive same plus, where appropriate, club code (eg 59001 MCL). Each QSO with ON counts 3 points. Each club worked gives one multiplier. Logs go to ON5WL (on5wl@qsl.net).

Just two UK entrants are listed in the results of the ARRL 160m contest 2001. These are GM3POI with 5,096 points and GW7X (GW3NJW) with 40 (both in Class C). GM3POI was leading European station.

The next European Sprints are on 5th October (SSB) and 12th October (CW). Four hours only. The UK took top honours in the last CW Sprint. Congratulations to G4BUO, G0CKP and G4PIQ/P who took 1st, 2nd and 3rd respectively. These were followed by GM3POI (6th), M0TTT (14th), G3SXW (16th), GU3SQX (20th), GW3NJW (21st), G0MTN (29th), G3TXF (33rd) and G3RSD (36th). UK support for this event was high: 11 out of 51 total entries. There was a good turn-out for the SSB event also: 8 out of 68 entries. UK SSB entrants included GM3POI (14th), G0AEV (23rd), M5ZAP (26th), G0MTN (27th), GW4BLE (29th), GW3NJW (35th), G0VOK (42nd), EI/G4BUO (59th) and GD4GWQ (62nd). Check the web page for rules and all-time records.

TABLES

THE NUMBER OF entrants continues to grow, even at this relatively late stage in the year. An old friend of mine, G3YMC,

comes in with an excellent QRP (5 watts) score, while Martyn, M3VAM (ex-G1EFL), becomes our first M3 participant. I also received a note from Vince, M3IQL (ex-G6IQL), who, while he doesn't contribute a score, says that in his first three weeks on the HF bands, his 10 watts to a trapped dipole at 45ft have enabled him to work some nice DX. Indeed, so successful has he been in some of the pile-ups that others have accused him of running high power. But, as Vince says, it's about calling in the right place at the right time. It's probably no coincidence that both Martyn and Vince previously held Class B licences and had undoubtedly cut their teeth in some of the pile-ups on 2 and 6m. Vince sent a copy of his log, which includes such DX as 8Q7ZZ (didn't those youngsters do a great job from the Maldives?), OX3HX (Greenland), XY5T (Myanmar) BV4VE (Taiwan) and many others. Dave, M0BVE, reports that he was flooded out recently, so has had to move his gear out of the shack. But he still managed to send in an update. Thanks Dave

COUNTRIES WORKED, 2002
(Sorted this month by datamodes totals)

CALL	CW	SSB	DATA	MIXED
G0ARF	0	0	160	160
G3JFS	164	141	127	206
GU0SUP	0	0	118	118
G3LHJ	174	70	111	191
MM0BQI	33	84	101	130
ZC4DW	148	89	96	168
ZC4BS	186	221	84	239
G0URR	0	0	81	81
G4OBK	144	69	76	176
M0BZK	0	117	59	126
G3XTT	106	85	50	133
G4UCJ	187	0	47	187
M0CNP	7	164	46	164
G3URA	0	0	42	42
M5AFA QRP	0	0	38	38
G0GFQ	0	160	21	162
G4DDL	69	19	12	72
ZC4VG	148	14	4	150
G4PTJ	197	213	0	259
G0NXX	243	0	0	243
G3SXW	240	0	0	240
M0AWX	0	226	0	226
G3YVH	184	136	0	225
G3SED	176	131	0	209
M5PLY	0	202	0	202
G4WXZ	148	143	0	197
G4IRN	190	0	0	190
MU0FAL	135	103	0	152
MW5VZW	42	131	0	140
G3YMC QRP	133	0	0	133
M5GUS	0	130	0	130
G4FVK	55	117	0	122
G4DJX	110	0	0	110
M0BVE	110	0	0	110
G0LGJ/M	0	103	0	103
G3ING	102	0	0	102
MU3DHI				100
G3WP	97	0	0	97
G4YWY/M	0	94	0	94
GM4ELV QRP	72	69	0	93
M0CAL	2	83	0	83
M5AEF QRP	50	61	0	71
G4IDL	46	34	0	67
M3VAM	0	58	0	58

and good luck! And how about this for a nice one? Mark, G0LGJ, reports working ZK1CG in the South Cook islands while running just 100 watts from his car! Phil, GU0SUP, reports some nice counters worked on RTTY, such as FO5QG (French Polynesia, QSL via XE1L) and TI9KZ (Cocos Island).

A couple of correspondents have also mentioned 60m this month. Phil, G4OBK, says "How about starting a table of four-figure Locators worked on 60m owing to the lack of DXCC countries currently active? Everyone seems to give them out". Any takers? Even if not, I would be interested in hearing of your achievements on the band (if that's what a series of spot frequencies can be called!) To start the ball rolling, Peter, G3JFS, mentions having worked 50 stations in his first 10 days, covering all UK call areas except GU, and a large variety of modes including SSB, CW, RTTY, PSK, QPSK, Hellschreiber and C/MT Hell. Peter says, "Indications are that modest power and antennas will allow reliable communication for most of the day with stations throughout the UK."

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). Thanks also to G4OGB for contest results. Please send items for the **November** issue by **21 September.** ♦

WWW.

C98DC:	www.qsl.net/dl7afs
KH8 expedition:	www.ukdxers.co.uk
Micronesia IOTA Tour:	www.ddxc.net/v63
MM0BQI:	www.qsl.net/mm0bqi
Oceania DX Contest:	www.nzart.org.nz/NZART/Update/Contests/Oceania
8N1OGA:	www.fivenine.com/8n1oga/eng/
3XY7C:	www.qsl.net/dl7df/3x/

HF F-Layer **Propagation Predictions** for **October 2002**

	3.5MHz	7.0MHz	10.1MHz	14.0MHz	21.0MHz	24.9MHz	28.0MHz
Time	0000111112220	0000111112220	0000111112220	0000111112220	0000111112220	0000111112220	0000111112220
(UTC)	2468024680 20	2468024680 20	2468024680 20	2468024680 20	2468024680 20	2468024680 20	2468024680 20
*** Europe							
Moscow	88.....7778	8871..158888	348544478886	..87777883..	..79999973..	...68885....	...37762....
*** Asia							
Yakutsk	.....132.	2.....16664	524212578888	2.7777876564	..2784.....	...673.....	...55.....
Tokyo	.....11..	.....4666.	.....26665.	....3223322.	...34.....	...66.....	...43.....
Singapore	.....	25442	177643	588411	....15785...	...346772...	...35666....
Hyderabad	.....	1.....2223	5.....47776	2.....278753	..77778982..	..6889997...	..5889995...
Tel Aviv	67.....4445	887...18888	9983..268889	758866788387	...877782...	...33343....	....222.....
*** Oceania							
Wellington	.....2...	...1..678...	...666889...	...888978...	...4665.2...	...4665.....	....44.....
Perth	.....	.....1555.	.....5664.	.....26531.	....15663...	..356775....	..26664.....
Sydney	.....	.....255..	.....3775..	.....27762..	...168875...	..2688873...	..267774....
Honolulu	.....	..23.....	..484313....	...633.52...	.....3...	.....	.....
W. Samoa	.....	...4.....	..287545....	...788862...	....676.3...	....576.....	....264.....
*** Africa							
Mauritius	1.....	5.....14555	4.....56655	2.....77532	.....275...	...1..372...	...1..25....
Johannesburg	78.....45	99.....2799	99.....7899	873....49988	..6766799742	..68888995..	..3778998...
Ibadan	.....	243.....112	778.....3556	52951..15543	2.8998888312	2.8999998 42.	..7999984..
Nairobi	.....	11.....	23.....1.11	561....12134	..7521256522	..7764567 2..	..4776776...
Canary Isles	666.....665	8884....5887	88871..17788	856875568886	2..89988983.	...8888883..	...688888...
*** S. America							
Buenos Aires	111.....1	7771.....57	6455.....44	3117.....121	...8742356..	...7765663..	...5765 66...
Rio de Janeiro	.....	223.....22	323.....132	1114.....21.	...8754 6772.	...7876775..	...5776772..
Lima	.....	11.1.....1	1..3.....1	...3.....	...3264342..	.....76652..	.....7665...
Caracas	.....	111.....1	2232.....11	1..11.....2.	....542223..	....487773..	....28777...
*** N. America							
Guatemala	.....	2112.....1	21.4.....1	...2.....	.....11.1...	.....3554...	.....543...
New Orleans	.....	212.....2	3113.....2	1..2.1....11	.....68886..	.....59984..	.....38882..
Washington	111.....1	6673.....26	87473.....67	52.253112573	.....77787..	.....77872..	.....4888...
Quebec	666.....67	8774.....688	4..5.....655	...6521346..	...3888884..	...2799973..	....68976...
Anchorage	.24.....	5774.....13	4.531...1123	.....133..	.....42..	.....	.....
Vancouver	.....	222.....	2.11.....1	.....	.....372..	.....382..	.....6...
San Francisco	.....	2111.....	1..1.....	.....	.....552..	.....67...	.....35...

Key: Each number in the table represents the expected *circuit reliability*, eg '1' represents reliability between 1 and 19% of days, '2' between 20 and 29% 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 the signal is expected to be strong.

The RSGB Propagation Studies Committee provides propagation predictions on the Internet at www.g4fkh.demon.co.uk The page is updated monthly. The provisional mean sunspot number for August 2002 issued by the Sunspot Data Centre, Brussels, was 116.4. The maximum daily sunspot number was 186 on 17 August and the minimum was 73 on 9 and 10 August. The predicted smoothed sunspot numbers for October, November and December are respectively: (SIDC classical method – Waldmeier's standard) 95, 93, 90 (combined method) 83. 78, 74.

Antennas

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FROM MY mail I understand many of you are using one or other of those devices that Gerd Janzen, DF6SJ, refers to as an 'Active Standing Wave Ratio Meter'; a battery powered, comprehensive antenna measuring instrument all in one box. Gert has devoted a book [1] to a whole range of RF measurements for which one of these instruments can be used. Most manufacturers of these devices call them 'Antenna Analysers'.

ANTENNA ANALYSERS

THE TWO MAIN suppliers of commercial antenna analysers are Autek [2] and MFJ [3]. I have the RF1 from Autek (1.2 to 35MHz) and the MFJ-249 (1.8 to 170MHz) from MFJ. These instruments do a fine job of measuring SWR but if you are into antenna experimenting it is useful to measure R ± j impedance. This impedance can be extracted from readings of SWR and Z from the RF1 and converted to R ± j using *TLW* program described in the September 'Antennas' column. However, as you are aware, the impedance at the antenna will not be the same as that measured at the other end of any feeder connected to the antenna, due to the transmission line transform effect. This impedance transformation is shown projected on a Smith Chart in **Fig 1**. Halfway round the chart equals 0.25 or quarter wavelength, while a full rotation equals 0.5 or half wavelength.

There are two ways to find out what the real antenna impedance is:

1. Measure the electrical length of the feeder and use a transmission line calculator, such as the Smith Chart or the *TLW* program (or similar) to find the antenna impedance.

2. Measure the impedance of the antenna using a halfwave, or a multiple of a half wavelength, of coaxial. I use this method quite a lot but you have to bear in mind that, because the cable is resonant, it can result in antenna currents on the cable, which can give inconsistent impedance measurement results. However, antenna currents can be minimised using an RF current choke. Remember that the cable is a half wavelength long on one frequency only.

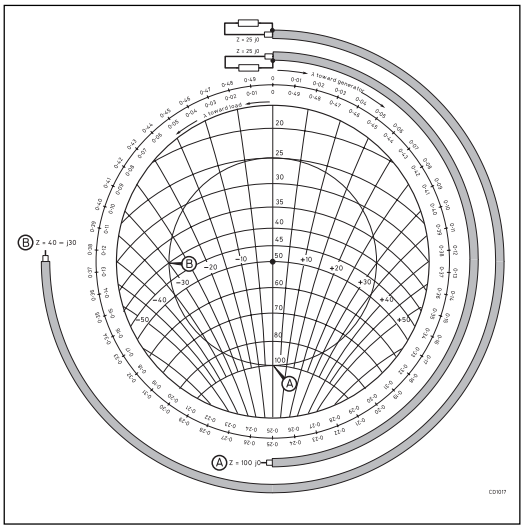

Fig 1: Two lengths of 50Ω coaxial feeder are shown superimposed around the circumference of a Smith chart; one a quarter-wave long and the other 3/8-wavelength. Both lengths are connected to a load having an impedance of 25 +j0. The quarter wavelength line (0.25) gives a measured impedance of 100 +j0 at the other end while the 3/8λ section (0.375) gives an impedance of 40-j30. A halfwave length of coaxial would transform the impedance back to 25 j0.

I have just acquired an Autek VA1. This remarkable little instrument has additional facilities compared with the RF1. It can measure R ± j, and its polar equivalent. Furthermore it can measure equivalent parallel resistance and reactance and even the transform action of a length of feeder.

My interest is the measurement of impedance so I was interested in how the good the VA1 was in this respect. One method is to use a set of accurate dummy loads. Assuming a 50Ω system, dummy loads for 50Ω, 25Ω and 100Ω are useful. However, these dummy loads only measure the resistive component of impedance. How would you go about measuring the reactive component?

A novel approach, first described by W N Carron [4], uses the impedance transform effect illustrated in Fig 1. A length of coaxial cable is used with a resistive load which will produce an SWR of around 1.5:1 to 2:1. The impedance is plotted over a range of frequencies, which has the effect of changing the electrical length of the test feeder. The physical length of the test feeder is not critical because the accuracy of the instrument will be apparent by any deviation from the SWR contour when the results are plotted on an impedance diagram. I made a test using my prized HP 4085A vector impedance meter and the Autek VA1, the results of which are shown in **Fig 2.**

While neither of the plots look ideal you have to remember that this is a sensitive test. Both instruments are accurate enough to enable one to devise a suitable matching network for an antenna. There may be errors due to the measuring technique. I feel that it would be more accurate to use a Cartesian projection for plotting R ± j, which is shown automated in [5]. Plots on a Smith chart projection are only necessary if you need to calculate impedance transforms, which are much more easily done on a computer these days. You can find a suitable Cartesian chart for impedance instrument checking on my website [6].

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[1] *RF Measurements with an Active Standing Wave Ratio Meter*, Gerd Janzen, DF6SJ. DARC Verlag GmbH, Baunatal. ISBN 3-88692-023.
[2] Autek RF1 and VA1, available Eastcom, tel: 01692 650077. www.cqcqcq.com
[3] MFJ 249, 259B and 269, available Waters & Stanton, tel: 01702 206835 / 204956. www.wsplc.com.
[4] 'The Hybrid Junction Admittance Bridge', W N Carron, *Antenna Compendium Vol 3*, ARRL, 1992.
[5] *The Antenna Experimenter's Guide, Second Edition*, Peter Dodd, G3LDO, RSGB. Available from RSGB Sales.
[6] http://web.ukonline.co.uk/g3ldo ♦

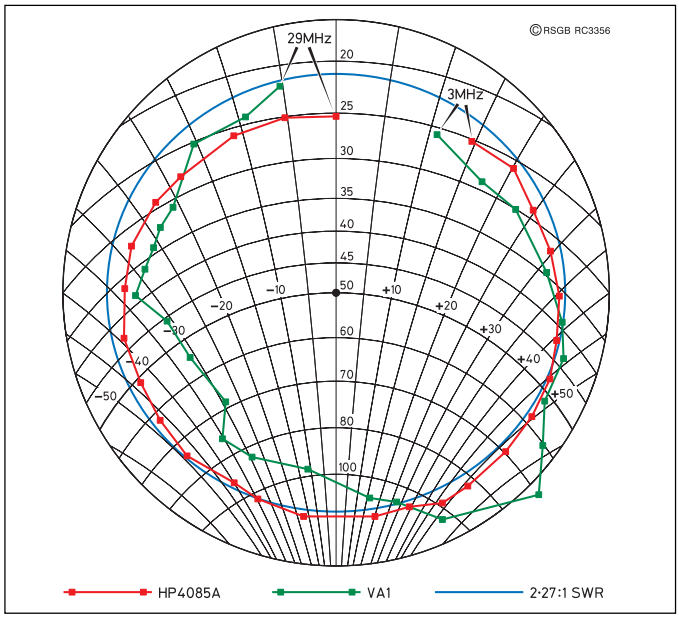

Fig 2: Results of an impedance plot of a 22Ω resistor made via a length of coaxial cable over a frequency range 3 to 29MHz. The blue circle is the calculated 2.27:1 SWR produced by a 22Ω resistor. Ideally, the impedance plot should follow this circle with a slight spiralling towards the centre due to coax cable loss. The red and green plots are of the HP4085A and the VA1 respectively.

SWL

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OCTOBER IS traditionally the start of the 'new' DX season. It is also *CQ* World Wide month. October DX looks quite promising.

Please accept my apologies for the lateness of the results of last year's SWL CQWW Challenge. This was due to my involvement with GB50, summer holidays, a new job, etc. Hopefully, the results can be posted out before this year's event. The CQWW Challenge will happen again this year. Rules are included in this column. My London SWL Contest Team is unlikely to be taking part this year because one of my team is off to join the VC2C team in Zone 2, one is in hospital, while a third has moved to France! Coupled with all those absentees, the remainder of the team has been asked to help out with the logging at M8C! Time for another SWL group to take the limelight?

GW DXCC

READERS WILL KNOW that this year's summer holiday was back to the Pembrokeshire coast. Apart from the beaches, the bars and the restaurants, the aim was to improve my DXCC score from GW. The existing 148 was swelled to 179 - so, unless we holiday in Pembrokeshire during a major contest, it looks like one or possibly two more visits will be required to reach the magic 200. So far, the 179 have been heard using a very portable Sony ICF-7600G receiver, and its whip antenna (or the accompanying extension wire or a 33ft long wire). No top-of-the-range receiver or sophisticated antenna system - so far.

This year, the best DX was LU1ZA on South Orkney, but I was also pleased with 9M6A. I also took the plunge and started collecting islands for IOTA - only from GW, mind you! We were on holiday for the IOTA contest this year, and I thought that would be a good way to accumulate lots of interesting IOTA references. Unfortunately, I had no idea where EU this and NA that were, but I have 100 IOTAs and now have to wait for the cards, when I get this year's GW card produced!

Bob, BRS32525, and Simon, RS177448, taking part in relaxed style in the RSGB IOTA contest from GW [Simon: you'll have to persuade dad to get the *new* RSGB IOTA Directory! - *Ed.*]

My son Simon, on the other hand, seemed to have a fairly good idea of where they all were, and he is not far off the 100 mark from GW either. In terms of DXCC, Simon had a great two and a half weeks. He took his DXCC score from 80 to 132, again just with the ICF-7600G and pretty basic antennas.

ON THE OTHER FOOT!

BILL McConachie, BRS88921, is now MM0WPM. With the boot on the other foot, Bill sent me two SWL QSL cards which did not give any information at all in referring to the QSO in question. Rather sad, but as listeners sometimes have enough difficulty getting cards in return, Bill was at least grateful to receive cards in reply to his SWL reports.

Completing QSL cards for SWLs in not rocket science! Perhaps a few pointers will help? When using the traditional 'six box' report that you get on most cards, put the SWL number in the 'Radio' box, put the Date in the 'Date' box, put the time in the 'UTC' box, put the frequency in the 'Freq' or 'QRG' box, put the mode in the 'Mode' box, ie SSB, CW, etc,. The only 'difficult' one is the 'RST' box. Here you can either write in the callsign(s) of the stations you worked, write 'Tnx', leave it blank, quote the report the SWL gives you, or write 'SWL'. Any of these are perfectly acceptable. Hopefully this advice will swell yet further the number of SWLs that receive the QSL card they obviously desire when they send their card.

On a personal note, Bill has not given up SWLing, but at 76 years of age he thought he would have a go at the RAE - and was successful. Congratulations, Bill.

HEARD ALL BRITAIN

THE SECRETARY and Awards Manager for HAB is about to change. I was heavily involved in HAB quite a few years ago. The founder was John Morris, G3ABG, and I have many fond memories of those days. It was interesting reading in the most recent newsletter that a lifeboat was financed in remembrance of John. It seems to be based in the south as reports were of its activities off Hayling Island. It seems that in two months last year *The John Morris G3ABG Lifeboat D483* saved property to the value of almost £20,000. Full details of HAB is available on the Internet at www.worked-all-britain.co.uk

MORE NON-DX!

ROBERT Small, BRS8841, reports "a major dive" in conditions since his last report. He likens the most recent period on HF as "just like the sunspot minimum" and commented that almost every day late in the morning when he does most of his listening, the bands had been dead, except for a few European stations on 14MHz. Most of what DX he heard had been on 14MHz in the evening, the best of which seems to have been HP1IBF, YN8TLS/TI3, 3V8KO, YB8VM/P (OC-249), OJ0/AE9YL, TI1/G0CEX, BI4J, TY4DX, and 8A3M (OC-250). 18MHz had, perhaps, been the best band, with the highlights being FP5AC, S9SS, P40SF, A61AW, CY9DH, 9K2HS, 5K0Z and 9Q1YL. However, of all the stations logged there had not been a single new country on any mode! ♦

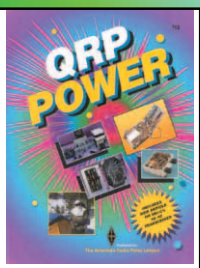
CQWW SWL CHALLENGE 2002

*The aim of the challenge is to log as many countries as possible - **SSB**: in the 48 hours from 0000 on **26 October 2002** to 2359 on **27 October 2002**; **CW** in the 48 hours from 0000 on **23 November 2002** to 2359 on **24 November 2002**. 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 3 sections: '**A**': Single operator. NOTE: SWLs entering Section 'A' must include a declaration to the effect that only one listener used the station, there was only one receiver in use and no use was made of *PacketCluster* or the *DX Summit*. '**B**': Multi-operator multi-receiver. '**C**': Multi-operator single-receiver. NOTE: Any single-operator SWL with access to *PacketCluster* 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 shall 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 shall count as a multiplier.* 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.
10. Logs must be postmarked not later than: **SSB Challenge - 27th November 2002; CW Challenge - 28th December 2002.**
11. Entrants wishing to receive a copy of the Results Booklet must include £1, $1 or 2IRCs to offset the cost of printing and postage. The results may also be published on the Internet.

RSGB BOOKSHOP



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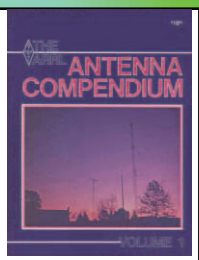

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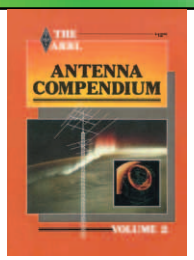

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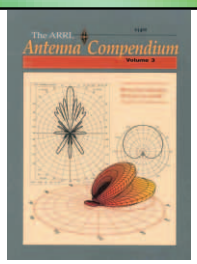

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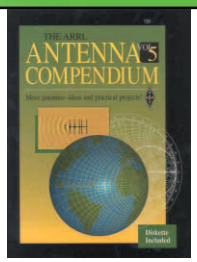

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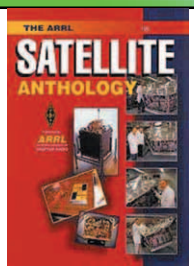

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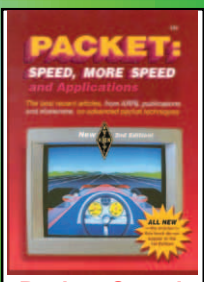

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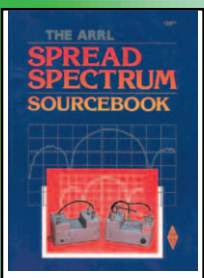

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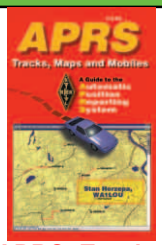

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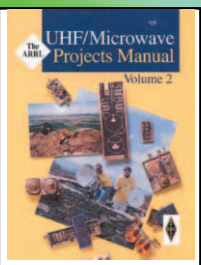

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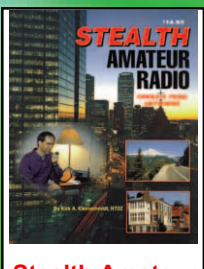

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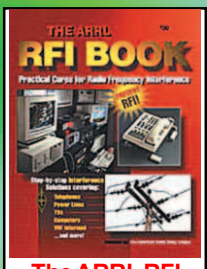

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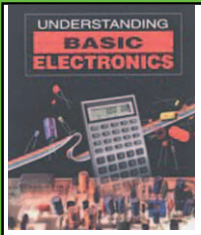

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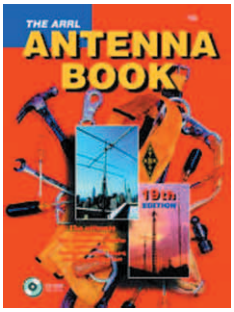

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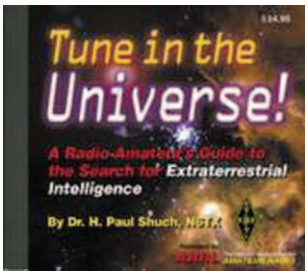

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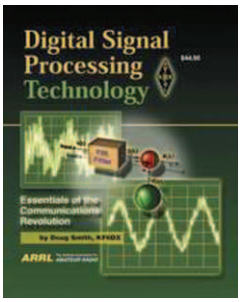

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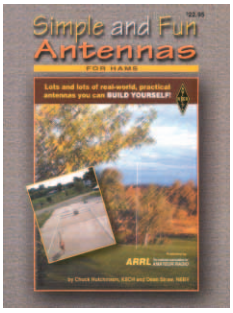

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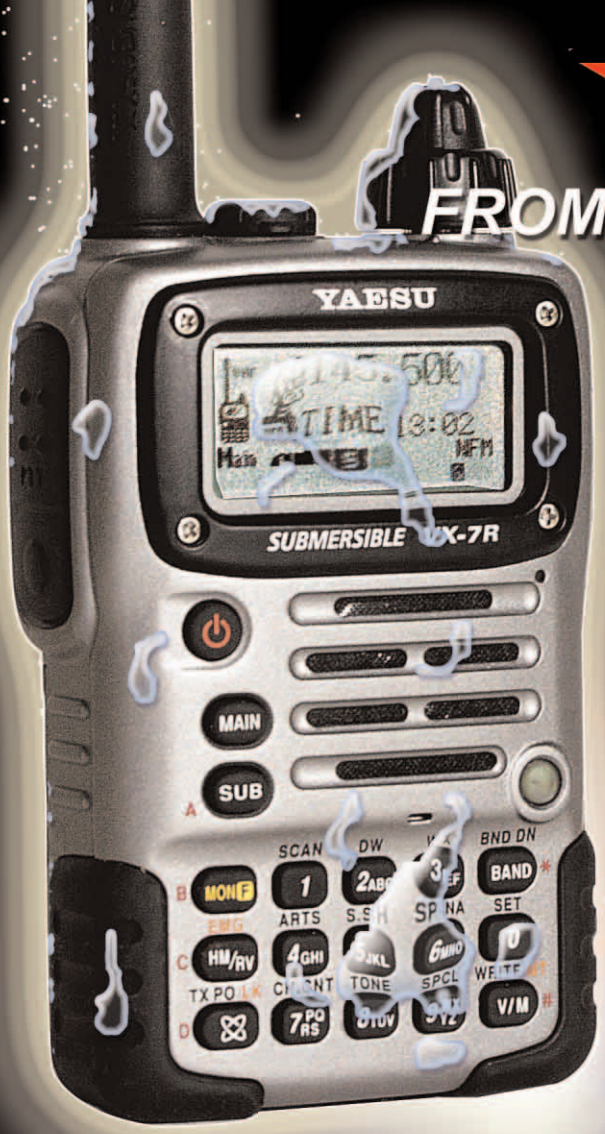

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REPEATERS

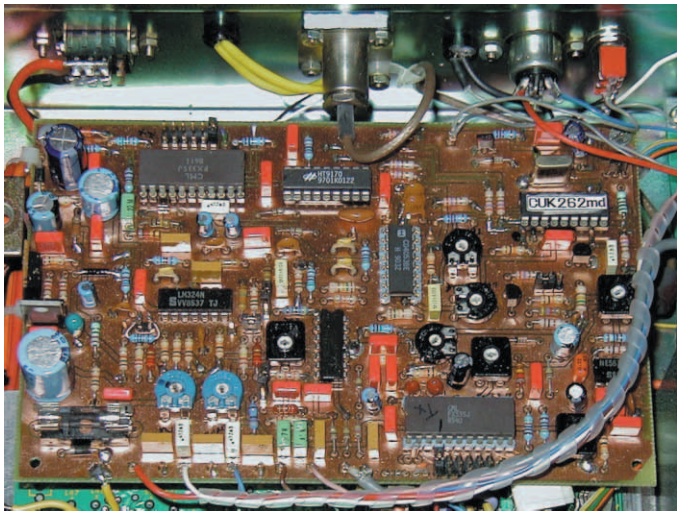
MARK LEWIS, GW7KDU
14 Hornbeam Close, St Mellons, Cardiff CF3 0JA. E-mail: rmcwales@ntlworld.com

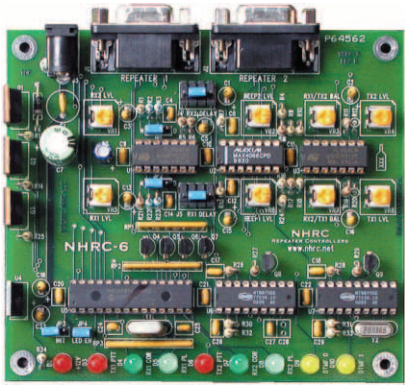
THERE HAVE been several responses to the subject of 70cm repeaters sited in residential areas that was featured in the August 'Repeaters' column. Not surprisingly, perhaps, much of the feedback criticised the position of the Repeater Management Committee (RMC) for not defending the 'rights' of amateurs in the use of 70cm repeaters in this type of area. Others pointed out that there are other users of the band also likely to cause problems to car alarm / remote locking devices. As stated in the August column, the RMC had taken this problem to the Radiocommunications Agency (RA) after a number of problems associated with amateur repeaters came to light. During a meeting held with the RA recently at their headquarters in London the following was agreed. All future applications for new / site changed 70cm repeaters to be sited in residential / urban areas will be heavily discouraged by RA / RMC. If, however, a keeper wishes to pursue such an application against advice they will have to contact their local RA Radio Investigation Service (RIS). The RIS will conduct a site survey and then make a decision if the application should proceed.

REPEATER LOGIC

THE MAIN CONTROL unit of a repeater is often referred to as the 'logic'. This sits between the receiver and transmitter of the repeater and provides functions such as access tone detection, transmitter keying, timeout and more latterly control of things like repeater linking either to other repeaters or to the Internet. In the most basic mode of operation the logic listens to the incoming audio signal from the receiver and if conditions are correct (eg the correct CTCSS tone is present or a 1750Hz tone is received on an incoming signal) the transmitter will be keyed and through (received) audio will be relayed to the transmitter. The logic will then continue to do this plus adding inter-transmission pips or Morse K characters between overs until, for example, no further transmissions are received within a certain time period whereupon the repeater's transmitter will be de-keyed.

There have been several different logic systems developed over the years and some have become more popular than others. One of the most well known is the G3RKL logic (also known as GB3US) developed by Dr Tony Whitaker, G3RKL, in the early 1980s. The logic was further enhanced in 1982 / 83 and to date more than 130 PCBs have been supplied to repeater groups around the country.





Above: the G6CUK repeater logic board installed in the Mansfield Repeater Group's spare Pye F496 base station. Compare this with the commercial repeater controller from a US company shown right.

G6CUK's Repeater Controller version 2 is built around a PIC 16F84 micro-controller. This logic offers a huge range of facilities including sophisticated remote control which not only offers remote closedown but also 'tuning' of repeater operation parameters without the need for a site visit.

The G1SLE logic has an interesting deterrence to repeater 'blippers' by giving a taste of their own medicine! If the logic receives a signal of less than five seconds then it responds but holding the transmitter on for the duration of the received 'blip' and adding a pip every second. This logic is in use on GB3EE (RB12, 434.900 MHz) in Chesterfield.

G8CUL's repeater logic is designed around a Motorola MC68HC705 micro-controller. This logic offers the ability to have its configuration parameters programmed via a PC on the 'bench' and also to be updated on air with the use of a datalink and BayCom modem. There is also a facility on the PCB to provide an interface to an additional receiver to use for repeater linking, although according to the website the software does not currently support this.

For more information of the logic systems mentioned the RMC website [1] has links to other web pages containing full details of each system.

RMC COMMITTEE CHANGES

SEVERAL applications were received for the position of VoIP specialist. A shortlist of applicants has been drawn up and they will be invited to an RMC meeting in the near future. The successful candidate will be announced in the next 'Repeaters' column. ♦

LATEST CLEARED REPEATERS

Call	Type	Channel/ Frequency	Proposed Keeper
GB3SV	70cm Site change, Bishops Stortford	RB0 433.000 MHz	G1NOL
GB3YR	New 2m, Rotherham	RV53 145.0625 MHz	G4LUE

Outstanding voice repeater proposals submitted for licensing are

Call	Type	Process Stage	Proposed Keeper
GB3AA	New 23cm Alveston, North of Bristol	RA	G4CJZ
GB3AS	New 2m, Wigton, Cumbria	RA	G4KFN
GB3BY	6m Site change, Kidderminster	PU	G8EPR
GB3CD	New 70cm Wide split, Cardiff	RMC	GW6CUR
GB3DN	New 2m Gt Torrington, Devon	RA	G1BHM
GB3FJ	70cm Site change, Winceby, Lincolnshire	RA	G8LXI
GB3IB	New 70cm Wide split, Weston-super-Mare	PU	G4SZM
GB3IT	New 70cm Wide split, Tamworth	PU	G6NHG
GB3KR	70cm Site change, Kidderminster	RIS	G8NTU
GB3NB	2m Site change, Wymondham, Norfolk	RA	G8VLL
GB3PL	New 2m, East Cornwall	RA	M5DAP
GB3RB	New 70cm, Wide split, Bolsover	RIS	G1SLE
GB3SH	2m Site change, Southampton	RA	M1AFM
GB3SM	70cm Site change, Leek, Staffs	RA	G8DZJ
GB3WD	New 2m Plymouth	RA	G7LUL
GB3XN	New 70cm Wide split, Worksop	RIS	G3XXN

Repeater proposal status as of 30 August 2002. The latest clearance status can be obtained from the RMC website [2]. 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.

WWW.

[1] RMC Logic links: www.coldal.org.uk/logic.htm
[2] RMC web: www.coldal.org.uk/rmc

EMC

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20 Sutherland Close, Barnet, Herts EN5 2JL.
E-mail: emc.radcom@rsgb.org.uk

IT SEEMS unfortunate that some electrical devices that are designed to reduce environmental pollution by saving energy can increase pollution of the electromagnetic environment by generating RF interference. Switch-mode power supplies and fridge 'Savaplugs' spring to mind.

PLC DELAY IN JAPAN

THERE WAS an item in the *JARL News*, Vol. 15 No 4, August 2002 about Power Line Communications (see also *RadCom* Sept 2002, p10). JARL is very concerned about PLC and has expressed strong opposition to the Ministry of Public Management, Home Affairs, Posts and Telecommunications (MPHPT).

On 31 July, the MPHPT's PLC study group officially announced that it is too early to allow PLC between 2MHz and 30MHz due to the effects on HF users. JARL President, Shozo Hara, JA1AN, said "JARL is glad that the Ministry's study group on PLC concluded that it is not suitable to allow PLC between 2MHz and 30MHz. However, we need to keep in mind that the future course of environmental demonstrative tests, their direction and international standards planning need to be watched very carefully."

Further information can be found on the JARL web site (see WWW above).

RA EMC DAY

ON 30 JULY, the Radiocommunications Agency organised an EMC Day at the RA HQ in London which was attended by myself and representatives from within the RA.

The presentations by RA staff covered a number of current and future EMC issues that are of concern to the RA.

It was stated that digital terrestrial TV broadcasting allows a trade-off of capacity versus robustness. The original franchises went for maximum capacity, whereas the new franchise will have fewer channels to improve robustness.

The matter of complaints to the Radio Investigation Service (RIS) was also mentioned. The number of complaints is diminishing, but this does not necessarily mean that there are fewer problems. For anyone wishing to complain, there are several obstacles. The first is the commitment to pay £50. The second is the difficulty in getting the necessary form (RA179), as these have not been available from Post Offices for many years, and the online version is only available to people with Internet access.

Another factor is that interference to some services is not easy to recognise as interference. Whereas a crackle, buzz or whine or a radio are easily identifiable as interference, broad band noise - like interference (from DSL or PLC for example) is likely to be mistaken for a weak signal.

In the case of TV reception, spots or lines on an analogue picture would be widely recognised as interference, but with digital terrestrial TV, interference can cause the picture to freeze or go blank. Many viewers do not associate this with interference and think that it is a fault in the set-top box.

The ever-increasing number of domestic electronic devices was also mentioned and the fact that most use switch-mode power supplies nowadays. A specific issue with switch-mode power supplies is the 'electronic transformers' that power miniature 12V halogen spotlights which are often used in shops for display lighting. The RA has found some types of 'electronic transformer' that are designed to power four lamps but, if one lamp fails, the level of RF interference generated increases substantially. This indicates the need for testing at part load as well as at full load.

Another issue that was mentioned was the UK implementation of 'Broad Band Britain' using 'Legacy Networks' such as the local telephone network or electrical supply wiring for high-speed data transmission.

It was stated that there are about one million users of ADSL in the UK who receive 256kbit/sec data rates via existing telephone wiring.

EMC in transport was also covered. To save weight in cars, there are moves to use a common cable to distribute power and to carry data to tell devices when to switch on or off. Electric road vehicles are another EMC issue with switch-mode power supplies controlling the traction motors. Railways have limits for emissions of RF interference, but these are based on levels of emission caused by pantograph arcing, not on protecting radio services. Trains and tramways are using regenerative braking to save energy, but this involves high power 'chopper' circuitry with potential for RFI generation.

The RA RTCG from Whyteleafe had set up several interesting demonstrations but, unfortunately, it was not possible to see these working due to a prolonged power cut.

FRIDGE 'SAVAPLUGS'

DAVID, G3RZF, purchased a 'Savaplug' from his local Iceland shop which sells frozen food and refrigeration appliances. This device is claimed to reduce the power consumption of a domestic fridge or freezer (see photo). David found that on his regular Sunday morning net frequency, there was interference at a level of S9 + 15dB! He soon discovered the cause was the Savaplug.

He sent an e-mail to the manufacturers, Savawatt (UK) Ltd, and received a quick response from the Customer Care Department. He then returned the device to Iceland and got a refund without any quibble, but he is not convinced by Savawatt's explanation for the cause of interference. Here is what they said.

"In reference to your e-mail regarding interference on your radio, this is most unusual but is caused by the Savaplug interacting with the electrical system in your house. This system includes the fridge / freezer and any other electrical item on the same electricity supply (including the wiring from the fuse box or even in some cases to the supply sub station). Because of these effects, the Savaplug uses sophisticated circuitry to ensure that it meets not only the British Standard electromagnetic compatibility requirements but it has been independently tested to exceed the extremely stringent EMC Directive 89/336/EEC and is thus CE marked. Unfortunately, many electrical appliances and supply systems do not meet these requirements, which leads to interaction in a few cases. There is no opera-

The 'Savaplug' energy-saving plug for fridges and freezers.

WWW.

PLC item on the JARL web site (in English) **www.jarl.or.jp/English/4_Library/A-4-1_News/jn0208.htm**

Laboratory testing of a Savaplug.

fridge / freezer then went into the shack and listened on various HF bands. On 3.5MHz, I noticed exactly the same effect that G3RZF had reported. On SSB, there was a fluctuating 100Hz buzzing noise right across the band at a level of 20dB over S9 when the fridge motor was stopped and slightly less when it was running. Like most models, the fridge part of my fridge / freezer is an 'auto-defrost' type with a low-wattage heater element that dissipates about 12.5W when the thermostat turns the motor off.

During the daytime, this QRM obliterated all but the strongest signals on the 80m band. There was also S9 interference on the 1.8MHz and 7MHz bands but little on other bands. This seems to be a device that radio amateurs and short wave listeners can do without.

First I checked to see if my fridge / freezer was CE marked. It wasn't, but this shouldn't make any difference as household appliances have been required to meet BS800 since 1978. BS800 has been superseded by EN55014 which is virtually the same. In any case, fridge / freezers normally use induction motors which do not generate RFI so the only scope for RFI is when the thermostat switches on and off.

My house mains wiring and fuse box aren't CE marked either and neither is the local electricity substation!

I then did some laboratory EMC tests on the Savaplug with a refrigerator connected (see photo). The conducted emission spectrum is shown in **Fig 1**. 'Pre-compliance' EMC test equipment was used and the tests were not performed in a shielded enclosure. The results indicate that the Savaplug does comply with EN55014 when connected to a fridge with an 80W motor, after allowing for the fact that the limit line shown is for a Quasi-Peak (QP) detector, but the plot uses a peak detector.

This raises the question of why the Savaplug appears to generate more RFI when actually in use than other types of equipment such as switch-mode power supplies with a similar conducted-emission spectrum. It appears that the standard EN55014 conducted-emission test of RF interference fed back into the mains by the Savaplug may not model a real-life situation in this case.

Fig 2 shows a simplified circuit diagram of the Savaplug. In principle, it is like a special type of triac lamp-dimmer. It is well known that phase control of mains loads using a triac produces fast edges that generate RFI and require filtering. The filtering in the Savaplug is not like that normally found in a lamp dimmer, but is like that used in a switch-mode power supply. RF filtering on the mains input side reduces RFI fed back into the mains, but there is no filtering on the mains output to the fridge. The 220nF and 33Ω across the triac appear to be a 'snubber' network rather than an RFI filter.

There is, therefore, little to stop RF interference being radiated by the mains cable to the fridge or by the wiring in the fridge itself (eg to the thermostat).

It thus appears that there is a need to test products like this for conducted emissions at both the input and output ports, and also to test over a range of load currents.

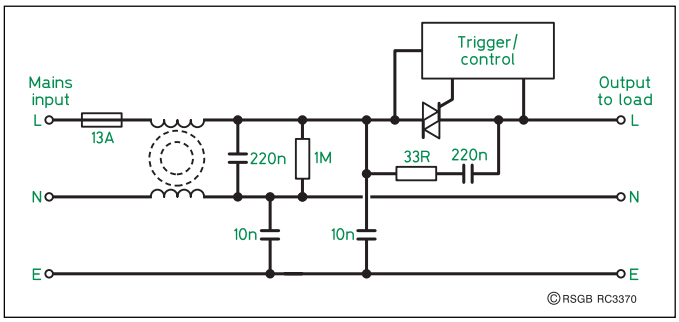


Fig 2: Simplified circuit diagram of the Savaplug.

tive detriment caused to the Savaplug or the refrigeration appliance by this effect, only that of inconvenience. Please return the Savaplug to where purchased for a full refund. We thank you for your interest in our products."

According to the packaging of the Savaplug, "Over half a million Savaplugs are already in use, saving money and helping the environment by reducing CO_2 emissions". In view of the number of these devices in use, I thought it was time to test a Savaplug.

I connected it to my

SECURITY LIGHTS

WE ARE GETTING reports of RFI from a new type of outdoor security light where the light is on from dusk until dawn but is dimmed. When movement is detected, it comes on at full brightness. The dimmer would almost certainly use a triac and it may be that some models use RF filtering at the mains input but no filtering in the output to the lamp.

I would be interested to hear of any more reports of RF interference radiated by security lighting systems. ♦

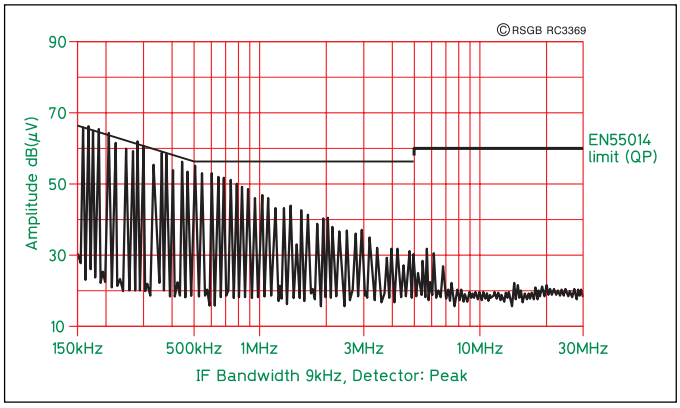
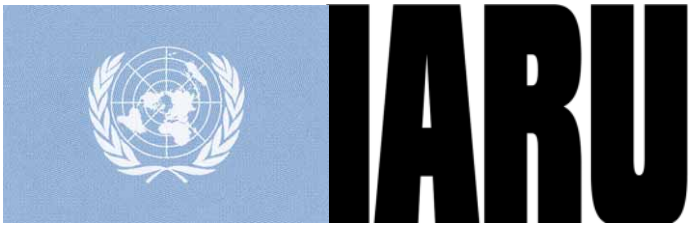


Fig 1: Conducted emission spectrum from a Savaplug.



TIM HUGHES, G3GVV
10 Farm Lane, Tonbridge TN10 3DG.

AS RADIO amateurs, we may think that the ITU's functioning is only devoted to WRCs (World Radio Conferences), which in turn discuss frequency allocations and regulations which affect our functioning. However, its responsibilities result in many conferences on a wide-ranging series of topics, the latter in turn being grouped under headings which include the Radiocommunications Sector, Telecommunication Standardisation Sector and Telecommunication Development Sector.

ITU News is the source of this information, showing that the first of these three Sectors has amongst its topics at 17 meetings between May and the end of 2002: All mobile satellite services and radiodetermination satellite service, Land mobile service excluding IMT-2000 amateur and amateur satellite service, Terrestrial wireless interactive multimedia applications, Propagation fundamentals.

The Telecommunication Standardisation Sector's 25 meetings have agendas which include Integrated broadband cable networks and television and sound transmission, and Protection against electromagnetic environment effects.

The Telecommunication Development Sector will have 20 meetings, with topics including a Forum on telecom policies and international standards, and Third generation of mobile systems. Geneva is the venue most frequently used, but meetings are also arranged to be held in Hanoi, Chitose (Japan), Cheju Island (Republic of Korea), Montevideo, Bamako (Mali), Riga, Tunis, and Montevideo, to name but a few.

WRC PREPARATIONS

MEANWHILE, world-wide preparations continue for WRC-03, to be held from 9 June to 4 July 2003 at the International Conference Centre, Geneva. The Working Parties of ITU Radiocommunication Sector (ITU-R) completed their draft contributions to the Conference Preparatory Meeting (CPM) Report in May of this year. The CPM is responsible for preparing a 500-page report which will provide the technical basis for the consideration of WRC-03 proposals. Involved in this were IARU representatives Larry Price, W4RA (President); David Sumner, K1ZZ (Secretary); and Wojciech Nietyksza, SP5FM (Region 1 EC Member, and Chairman of Region 1 External Relations Committee). Other amateurs who were present as members of their national delegations assisted in producing a good outcome.

Ole Garpestad, LA2RR, Region1 Executive Committee member and President of the Norwegian national society, NRRL.

The CPM Report is a technical resource for the WRC. The most important inputs to WRC will be the proposals of Administrations, particularly those which reflect some regional consensus. The three IARU regional organisations are participating in the WRC preparatory work of the three regional telecommunications organisations - CEPT (Region 1), CITEL (Region 2) and APT (Region 3).

Young-Soon Park, HL1IFM, Director IARU Region 3.

There are three WRC-03 items which are of the greatest concern to IARU; other issues also exist but are not mentioned here.

7MHz (WRC-03 Agenda Item 1.23) Realignment of the amateur and broadcasting allocations around 7 MHz, as detailed by WP8A, suggests three alternatives:

1. A world-wide allocation of 7.000 to 7.300MHz for the amateur service, and a world-wide allocation of 7.300 to 7.550MHz for the broadcasting service, in two stages by the year 2010. By accomplishing this in two stages, 100kHz at a time, the impact on the broadcasting and fixed services would be reduced to manageable levels. This is the option preferred by IARU.

2. This also calls for two stages within the same period as in alternative 1, culminating in similar allocations , except that in Regions 1 and 3 the band 7.200 - 7.300 would be shared on a co-equal, primary basis by the amateur, fixed and mobile (except aeronautical mobile) services. In Region 2, the band would remain exclusively amateur, as it is now. This proposal is gaining support within CEPT.

3. The third alternative is far less desirable, resulting in an allocation of only 200kHz for amateurs in Regions 1 and 3. It would also perpetuate the existing unsatisfactory arrangement where broadcasting stations in Regions 1 and 3 clash with the amateur service in Region 2.

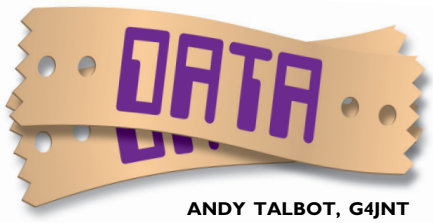
It is possible that further alternatives may be proposed by Administrations, and that these could be even less favourable to the amateur service. Yet another possibility could be a proposal for no change to the existing allocation.

Articles 25, 19 and 1 (WRC-03 Agenda Item 1.7) These Articles all affect the amateur service: Article 25 contains the rules that are specific to our service; Article 29 contains rules relating to the identification of stations, including callsigns; Article 1 consists of terms and definitions possibly resulting from changes to Article 25. The proposals are consistent with IARU objectives.

Earth exploration satellite service at 420-470MHz (WRC-03 Agenda Item 1.38) The drafting group dealing with this matter was chaired by Ken Pulfer, VE3PU, IARU Technical Representative. One method of satisfying the agenda item that is described in the text is an allocation between 432 and 438MHz, with technical and operational constraints to protect other primary services. This is opposed by the IARU because of concerns about the adequacy of these constraints to protect sensitive receivers in the amateur and amateur satellite services.

IARU REGION 1 MONITORING SYSTEM

THE AUGUST 2002 issue of *RadCom* carried a paragraph in the 'IARU' column on page 91, about the IARU Monitoring System. Following 12 years of devoted service, its co-ordinator, Ron Roden, G4GKO (QTHR), is standing down. He is looking for a successor to carry on with this work, and will be delighted to hear from anyone who would like to take over from him. He will be pleased to give an interested person further information about the tasks involved. ♦



ANDY TALBOT, G4JNT
15, Noble Road, Hedge End, Southampton SO30 0PH.
E-mail: data.radcom@rsgb.org.uk

THE OPPORTUNITY for amateurs to operate on specific frequencies within the 5MHz band to explore Near-Vertical Incidence Skywave (NVIS) experiments opens up the perfect opportunity for channel probing and digital mode experiments. NVIS links can, in the right circumstances, give very good quality beyond-line-of-sight communications paths, and in some cases at certain times of the day, multipath can be very low or even non-existent - opening up the possibility of high-speed digital communications over HF.

The last two IEE-sponsored HF Conferences, in 1997 at Nottingham and in 2000 at Guildford, both included papers on military uses of NVIS, at signalling rates of up to 9600b/s over HF.

Charles, G4GUO, is proposing to test digital voice using the parallel-tone protocol, using this mode. He is also proposing to leave an Automatic Link Establishment (ALE) station operational in single-channel mode so that, when anyone calls him, the station will automatically respond giving location, power and antenna details, etc.

In fact, this seems an excellent idea for anyone to be able to participate in beacon and propagation experiments. On bands where unattended operation is permitted (many of those above 70MHz) such a propagation-testing system could run continuously, using just a single frequency per band, so long as the callsigns of all operators were published in advance to enable connecting.

For the software to run ALE protocols, see Charles's website at the address given in the WWW box.

DATA ON TOPBAND

PETER, G3PLX, asks: "Why is there no RTTY or PSK31 activity on topband?". It seems there are two reasons.

One is historical. For many years, RTTY was not permitted on topband due to the band being shared by the ship-to-shore services. That restriction was lifted many years ago now, but there still isn't any digital mode activity on topband. Why?

The other reason is to do with band-planning. If you dig out your copy of the IARU bandplan you can see that digital modes are allocated to the section between 1838 and 1842kHz. No problem here. It's not a very large sub-band, but that shouldn't be a problem, especially nowadays with PSK31 being so narrow.

The real reason why there's no digimode activity is because the 1838 - 1842kHz section of the band is - and has always been - heavily used by SSB. In fact, the band 1840 - 1842kHz is shown in the bandplan as being shared with SSB, so it's not surprising that SSB is the dominant force above 1840kHz.

But, for many years now, it's been custom and practice for 1840kHz lower-sideband to be used as a DX calling frequency, so the section 1837 - 1840kHz is also heavily used by SSB, in spite of the fact that 1840kHz is defined as the lower limit for SSB.

Of course, using lower sideband means that SSB transmissions now occupy the 1838-1840kHz part of the band, which is the *only* place where digital modes are permitted, by SSB stations who claim they have every right to be there. It's not surprising then, that there has never been any digimode activity on this band.

To resolve this problem really needs a redefinition of what is meant by the lower limit of SSB activity – perhaps by defining it in terms of dial reading. The alternative might be to reassign the digimode section to 1835 - 1837kHz. If this course is taken, it must be accompanied by the definition of a 3kHz 'guard band'. Whichever solution is adopted, the common factor is that there has to be some clarification that resolves the conflicting definitions of where the edge of the subband actually lies. The same problem occurs at 3600kHz and 7040kHz but, in the case of 160m, this problem has been the major reason why digimode activity on this band has never been allowed to develop.

WWW.

ALE software — www.chbrain.dircon.co.uk
TAPR digital voice — www.tapr.org/tapr/dv/index.html

DESIGNING A DATA MODE FROM SCRATCH

AMATEUR USE OF Meteor Scatter (MS) has concentrated around exploitation of the long-duration bursts of several seconds, usually those occurring during the well-known showers and now making use of the WSJT mode, detailed in this column in February 2002. The much shorter bursts, perhaps lasting only 100ms, that occur every minute or so, are generally ignored.

MS communications are widely used by a variety of commercial organisations who make use of the continual short-duration paths available to transmit high-speed burst data. Provided a latency of a few minutes is permissible, an effective rate of a few hundred bits per second can usually be achieved reliably and continuously over paths of hundreds of kilometres.

A web search on 'meteor scatter' throws up many sites and organisations making use of this medium, particularly for remote monitoring and telemetry.

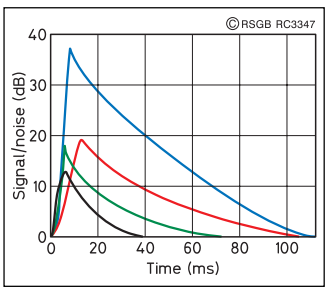


Fig 1: Typical signal strength curves for meteor 'pings'.

So, thoughts turn to how we can play too! What we need first is a signalling protocol matched to the medium. Meteor bursts are characterised by a sharp rise in signal strength, followed by a gradual tailing-off as the ionised trail fades. **Fig 1** shows a range of typical plots of signal strength against time for some of these short-duration 'pings'. This shows that the link may support a very high data rate initially, falling back to lower speeds after a short period.

The very random nature of the bursts lends itself ideally to an automatic system continually probing the link, looking for the short-duration openings. A two-way link will continually send test transmissions that are monitored by the other end and, when a short 'opening' is detected, test them for signal strength. The far end will then reply and data communication can proceed. So how do we go about designing such a system from scratch, choosing protocols, data rates and modulation parameters?

Over the next few 'Data' columns, we will develop this scheme and show how a data mode that is matched to its medium is designed from first principles, using this meteor scatter scheme as a worked example. Perhaps someone will take the idea on board and we can start a different type of amateur meteor scatter QSO technique

DIGITAL VOICE

FOLLOWING ON from the notes on the digital voice presentations at Dayton mentioned in the last column, full details of these, together with TAPR's progress with this mode and details of its kits can be found on the TAPR website. Details are given in the WWW box. ♦

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the last WORD

Linda Replies

Can I just say a big thank you to all who took the time to reply to my letter in 'The Last Word' (*RadCom* June 2002) through your pages and by e-mail. The response was 'out of this world' and has given me the encouragement I, and many other M3s, needed.

Linda Chesters, MW3LIN

By the Way . . .

. . . Since getting my MM3 callsign, I now read *RadCom* from cover to cover!

A Full Class B, Scotland

In Praise of the Foundation Licence

Since the beginning of amateur radio, every change to the regulations has been greeted by uninformed criticism and predictions that the end is nigh for the hobby. However, the resulting new era has always been an improvement on what went before, showing that the status quo is not necessarily the best that can be achieved. First there was the introduction of formal licences in the early part of the last century. In 1946, the pre-war Artificial Aerial licences were re-issued as full licences. A few years later, the compulsory one year on CW was abolished, to be followed by the Class B licence. Next came the Novice licence and a lowering of the Morse speed required for a full licence. Now we have the well conceived and excellent Foundation Licence, with more innovations still to come.

The next likely change is the abolition of the Morse requirement and the merging of the Class A and B licence grades. However, amateur radio will survive and prosper and we should applaud the changes. Those who can't find it within themselves to do that, should at least accept the inevitable with good grace. We must not lose sight of the fact that amateur radio is a hobby to be enjoyed, not the preserve of a privileged elite. We are unlikely to find Utopia but we can all co-exist and still enjoy those facets of the hobby that we love and cherish.

A C Wadsworth, C Eng, MIEE, G3NPF

Holidays in Southern England

I would like to tell you about my experiences working amateur radio whilst on holiday in the UK. I often travel with a motorhome. In spring this year we decided to tour Southern England. Whenever possible, I put up an aerial and worked either VHF / UHF or, when I had permission to put up a larger aerial, I worked HF as well. Most of the time I used QRP equipment, a Yaesu FT-817.

The best experience this year was my stay at Stubcroft Farm, Stubcroft Lane, East Wittering. The proprietor offers B&B as well as a few pitches for caravans and motorhomes. I was allowed to put up a G5RV between two trees. To my surprise, the location turned out to be a really good place, working nearly all of Europe on SSB on 20 or 15 metres with an output between 3 and 5 watts. The location was also used for transmitting during WWII. So, if anybody is looking for a good place to work amateur radio in Southern England, this is a place worth considering. By the way, it is a really cheap place to stay as well.

Joachim v Geisau, DH4JG

Use or Lose

I am writing concerning the current lack of use of the FM part of the 2 metre band. In south Hertfordshire there are nine repeaters regularly accessible and also the use of 15 simplex channels and 15 additional channels at 12.5kHz spacing. If I use the scan facility and scan through these 30 channels, nine repeater channels and the calling channel I am lucky to find perhaps three or four in use at any one time. Why is this?

The lack of use has become more noticeable since the beginning of 2002 for some reason. It is all very well keeping abreast of technical progress, eg 12.5kHz spacing, CTCSS, using the Internet links etc, but at the end of the day if the band is not used we as a community are going to lose it.

My station is equipped for CTCSS but I don't see the point of exclusive CTCSS-only repeaters as this means that non-CTCSS users will be excluded. It is too glib a response to say that they need to update their equipment, because if they do not hear people using 2m FM why should they lash out on new gear?

We need to get people using the band again. Because of the lack of use I have no qualms about using repeaters from home. Why should I? At least the channel in question will be in use then.

Stephen Slater, G0PQB

A Tribute

I would like to pay tribute to all the members of Felixstowe & District Amateur Radio Club. I very nervously attended a Foundation course at Orwell Park School, Ipswich, on 20 / 21 July. They were so kind, patient and very knowledgeable, and I was impressed by their good humour. Thanks to them, I'm very proud of my achievement in passing the exam, and joining the ranks of amateur radio enthusiasts.

Mrs D D Hawkins, M3DDH

Put at Ease

I was surprised to read 'A Change of Heart' ('The Last Word', September 2002). I had a feeling of being here before! I looked at the dates, examined the content and went to check my log. There on the given dates was the evidence. I was the person being written about. The bit about it being the RAFARS net was incorrect, I was working for the very first time with the Royal Signals (RSARS) net, and about being nervous, I was near on having kittens when I had such a large net to QSO with.

I enjoyed every minute, the controller and all those on the net could not have been more helpful. I was very pleased with the way it had worked out. I had envisaged making the most appalling mistakes. I did not know I had at least one SWL (Martyn) listening, that would have made me nervous. I am so pleased he did listen. What better accolade could I have been given than his very kind letter to *RadCom* commending the operators who were putting me at ease.

I thank you very much Martyn Whyte and wish you well with your studies for the RAE, I look forward to working you on the bands. Perhaps you too will have your day for the first time with the RSARS net. Do not let a few put you off the hobby. In the main there are more of the right sort in the hobby than those few who give a bad impression of the many. Thank you to my fellow RSARS members for an unforgettable welcome to the society.

Dennis Holdroyd, M0CYU

[*No doubt the RAFARS - and RNARS - nets put newcomers at ease as much as the RSARS net obviously does!* - Ed.]

Nutty Reply

I saw this comment in an American magazine recently. It went something like this: some person had bought an oil-filled dummy load, trouble was, the person in question wanted to know how often to change the oil - and in doing so, which oil he or she needed to use? I think some wag suggested 'peanut oil' if running QRP!

Oh yes, someone else was a little troubled because wanting to learn CW they were left-handed and thought as a result that their dits and dahs might come out the wrong way round! Hmm?

Ray J Howes, G4OWY

4m Contests

For many years the Newquay Amateur Radio Society, G4ADV, has taken part in contests on 'the gentleman's band', 4 metres. One of the attractions was the sending of a named location as part of the exchange, which gave immediate satisfaction in knowing where our signals were reaching. This contrasted with the dull, monotonous, mechanical exchange of numbers and letters on other bands. Now that postal codes have been substituted for locations, the sense of achievement has been diminished. If there is a good reason why locations cannot be reinstated as part of the exchange cannot the mention of actual location be encouraged?

Ted Warne, G3YJX

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W-25AM	25 Amp variable supply	£89.95	C
W-30AM	30 Amp variable supply	£119.95	C

W-25SM 25 Amp £79.95 B

Switched 230 / 115V AC input and fixed 13.8V output at 22 Amps continuous and 25 Amps peak. Over voltage and over current protected and fan cooled. Measures 180mm (W), 75mm (H) and 190mm (D) excluding terminals. Provided with detachable 13 Amp plug and cable.

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RC5-1 Standard control box, OK for 4-el Yagis - needs 7-core cable £349.95C

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MC-2 Lower mast clamps £59.95 B

WATSON ATX WALKABOUTS

WALKABOUT PORTABLES

Multi & single telescopic whips. Covers 80m to 6m BNC. Ideal for FT-817 and similar QRP radios.

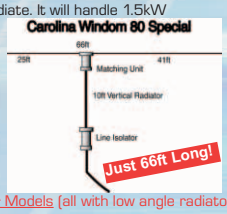
ATX Walkabout 80 - 6m £69.95B

AT-80 Single band	£24.95B
AT-40 Single band	£24.95B
AT-20 Single band	£19.95A
AT-17 Single band	£19.95A
AT-15 Single band	£19.95A
AT-12 Single band	£19.95A
AT-10 Single band	£19.95A

CAROLINA WINDOMS

CW-80 Special

Just 66ft long yet covers 80m - 10m. It will out perform a G5RV and give lower angle of radiation because of the 10ft vertical section which is forced to radiate. It will handle 1.5kW



£119 C

Other Models (all with low angle radiator stub)

CW-160	160 - 10m 171ft long	£139.95 C
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CW-80	80 - 10m 133ft long	£99.95 C
CW-40	40 - 10m 66ft long	£94.95 C
CW-20	20 - 10m 34ft long	£84.95 C

80-40-20m Mini Dipole

The "80 plus 2" Mini - Dipole was designed by our Director, Peter Waters, G3OJV. Just 52ft long, it uses linear loading - no tuned traps. It can be directly fed without ATU and also operates at 2.5:1 VSWR on 15m. Amazingly efficient, it handles 400 Watts and is balun fed. Erect it as an inverted V and it takes up less than 40ft of space. If you have a small garden, don't miss out on the LF bands anymore.

£79.95 B

MFJ-986 ATU £349.95 C

3kW Differential 1.8 - 30MHz

One less knob to twiddle, but all the facilities of the MFJ-989C

MFJ-969 ATU £199.95 C

HF + 6m! 300W "T" Match ATU

It has a very accurate PEP meter built-in, (PP3 battery needed) Includes VSWR cross needle meter, dummy load and lovely roller coaster for critical adjustment. Handles coax, balanced an wire. Size 268 x 242 x 95mm.

MFJ-949E ATU £159.95 C

1.8 - 30MHz 300W "T" Match ATU

Our most popular ATU because it covers all HF bands and matches anything from coax to long wire to balanced feed. Take a look at the price and then consider that it even includes a dummy load plus power and VSWR meter. Measuring 260 x 190 x 83mm, it really is great value.

MFJ

MFJ-914 Auto ATU Extender £64.95 C

Match into that G5RV or similar

If your internal auto ATU is having trouble matching your G5RV or similar antenna. this should solve the problem. Just place it in series with the coax feed to the rear of your transceiver. Magic!

MFJ-418 £79.95 C

The easy way to learn CW

Unlike other tutors, this one sends true text and full length QSOs, just like the real test. The massive database avoids frequent repeats too! Will also send groups and displays the text.

MFJ-269 AND MFJ-259B

THE MOST ADVANCED ANTENNA ANALYSERS

MFJ-259B £269.95 B
MFJ-269 £349.95 B

Connect it to your antenna and get all the information you need to optimise it for best performance including resonance, VSWR and impedance. Totally portable (using AA cells), you can work right up by the antenna. The MFJ-259 is the basic design covering 1.8 - 170MHz. The MFJ-269 has extended coverage up to 470MHz and gives an extremely wide range of measurements, even indicating where a break is in a coax cable.

MFJ DUMMY LOADS

MFJ-264 or MFJ-264N
1.5-150MHz 1.5kW £74.95
"N" version of above £79.95
MFJ-260C or MFJ-260CN
1.5 - 150MHz 300W£37.95
"N" version of above £44.95

Carr. £9.00

MFJ-962D ATU £279.95 C

1.8 - 30MHz 1.5kW "T" Match

For use with medium linears. Using the famous "T" Match design, this ATU will cope with any antenna whether it be coax, end fed wire or balanced feed. You can monitor your power (average or PEP 200W or 2kW max))and VSWR. Antenna switch selector is included for two antennas. Size 270 x 375 x 115mm.

MFJ-989C ATU £379.95 C

3kW 1.8- 30MHz "T" Match

This design has a roller coaster coil and a 4:1 balun to match balanced line. Ideal for coax, end fed wires and open wire feeder. Features PEP or RMS power measurement VSWR, antenna switch, bypass, built-in dummy load etc. Size 270 x 375 x 115mm.

MFJ

MFJ-1025 Local Noise Canceller £159.95 C

Kills local noise, but lets signals through. Handles electrical noise, TV time-base etc. Short length of wire picks only local interference and cancels it out.

MFJ-1026 As MFJ-1025, but has active whip antenna for picking up noise signals (as illustrated above). £159.95 C

MFJ COMPACT VERTICALS

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HEAR SIGNALS BETTER

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Dummy Loads

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300W 50 Ohm load
(30 secs) 1.5 - 150MHz. SO-239
"N" version £44.95

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MFJ-264 **Carriage £6.00**
1.5kW 50 Ohm load
1.5 - 150MHz
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MFJ-1704 4-way switch £69.95 B

DC - 500MHz 2.5kW

This is a heavy duty die-cast 4-way switch with SO-239 sockets, central earth position and built-in static discharge protector. Makes changing antennas a breeze!

MFJ-392 Mono Padded Communications Earphones £24.95 A

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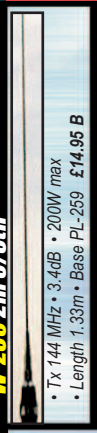
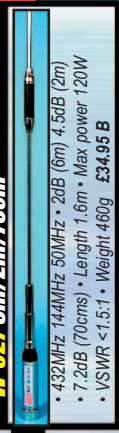
- Length 1.33m • Base PL-259 **£14.95 B**



W-6ZT 6m/2m/70cm
- 432MHz 144MHz 50MHz • 2dB (6m) 4.5dB (2m)
- 7.2dB (70cms) • Length 1.6m • Max power 120W
- VSWR <1.5:1 • Weight 460g **£34.95 B**



WSM-27O Mini-Mag
- Tx 144-146 & 430-440MHz • 2.15dBi, 6.15dBi.
- 50W max • Micro magnetic 29mm base
- Element length 0.46m • 2.75m mini coax with BNC **£19.95 A**

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W-7ONB 2m/70cm
- Tx 144 & 430MHz • 3dBi & 5.5dBi • 200W max
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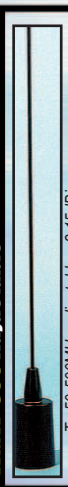
WMW-5OO Adjustable
- Tx 50-500MHz adjustable • 2.15dBi
- VSWR <1.5:1 • 200W max • Length 1.27m
- Base PL-259 • Weight 100g **£12.95 B**



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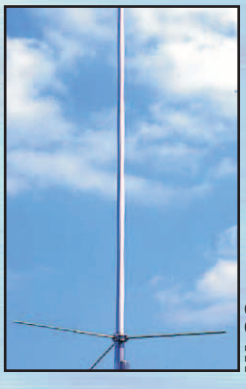

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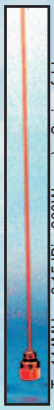
- 270MHz • 3/6 dB • 150W • 1/2, 2x5/8
- 1.15m • 0.885kg **£39.95 C**

W-50
- 270MHz • 4.5/7.2dB • 200W • 3x1/4, 3x5/8
- 1.8m • 1.2kg **£49.95 C**

W-300
- 270MHz • 6.5/9dB • 200W • 2x5/8, 5x5/8
- 3.1m • 1.46kg **£64.95 C**

W-2000
- 6/2/70MHz • 2.15/6.2/8.4dB • 150 (50W 6m)W
- 1/2, 2x5/8, 4x5/8 • 2.5m • 1.2kg **£69.95 C**

W-2LE 2m 1/4 wave
- Tx 144MHz • 2.15dBi • 200W max) • Spring foldover
- Length 0.48m • Base PL-259 **£9.99 A**



W-79OO 2m/70cm
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- Instant indication of propogation
- 18 different world paths
- 5 HF DX Bands
- Locked to atomic standard clock
- DX operations secret weapon

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18.110
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28.200

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MFJ-461 MORSE CODE READER

JUST PLACE NEAR YOUR RECEIVER AND INSTANTLY DECODE CW - NO CONNECTION REQUIRED

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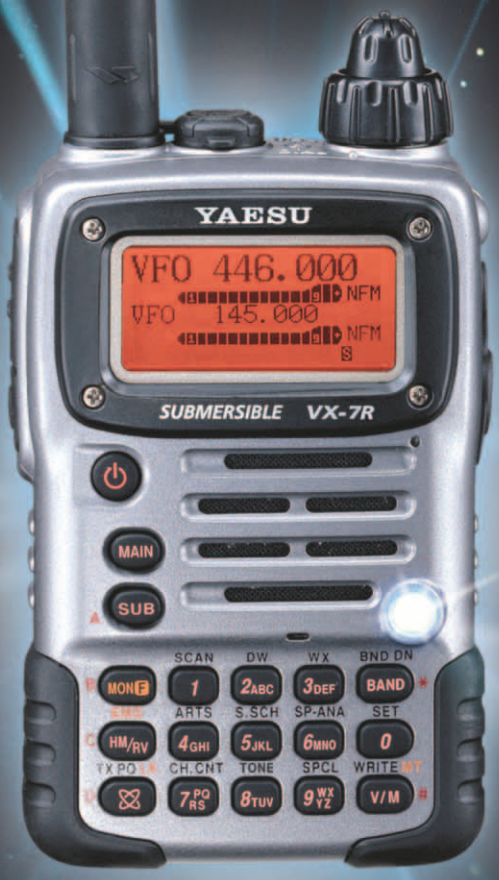
50/144/430MHz 5W FM Transceiver

VX-7R

ULTRA-RUGGED, SUBMERSIBLE TRI-BAND MAGNESIUM HANDIE



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