RadCom

THE RADIO SOCIETY OF GREAT BRITAIN MEMBERS' MAGAZINE. WWW.RSGB.ORG

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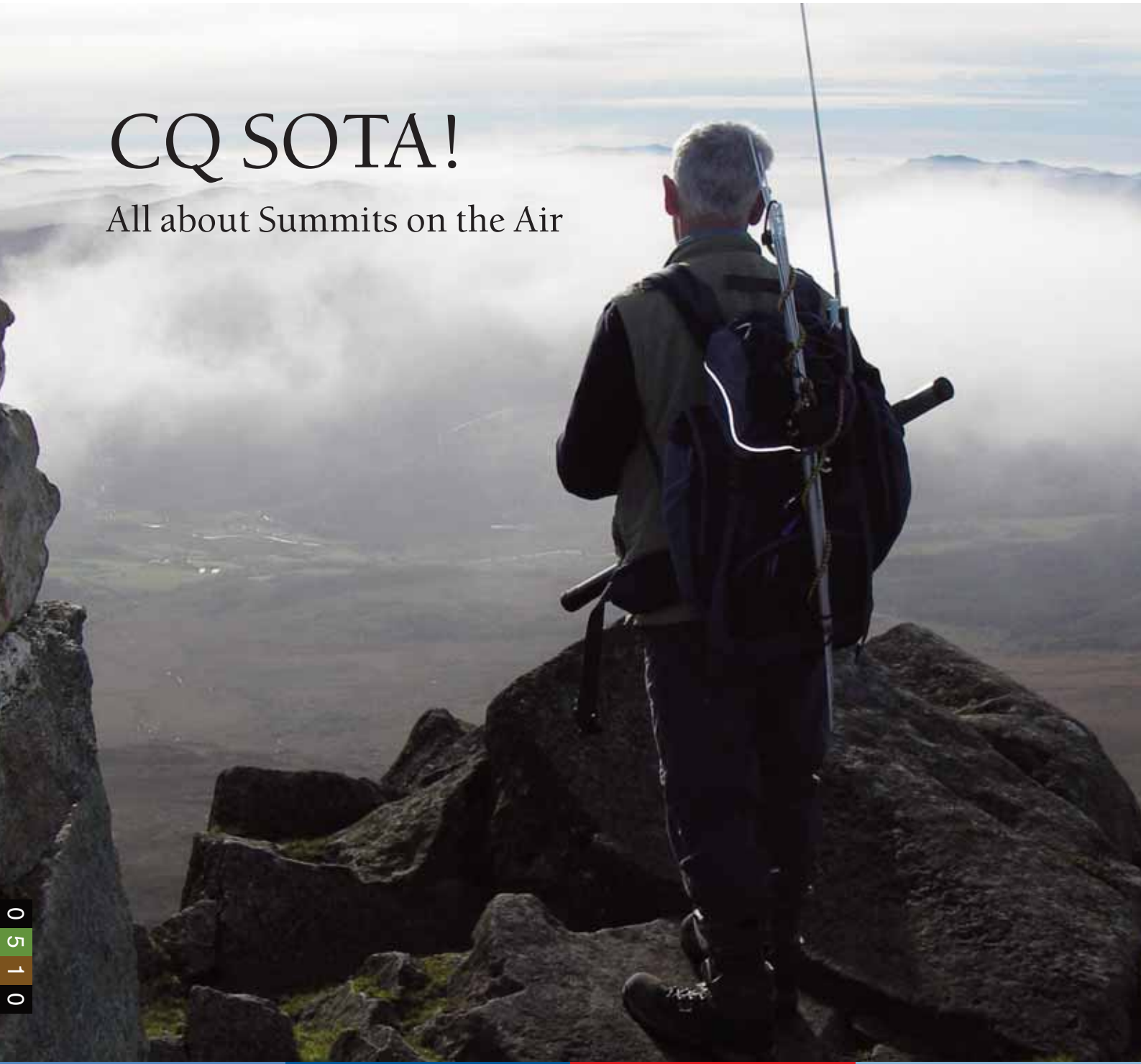


CQ SOTA!

All about Summits on the Air

0510

HPSDR Hermes

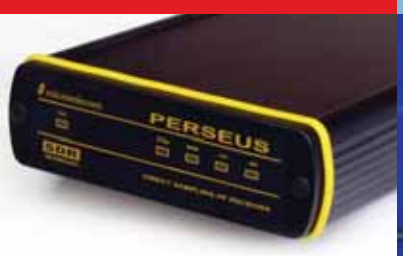
All-amateur SDR transceiver launches at Dayton

Antennas

The very useful Grid Dip Oscillator

Perseus SDR

The new No. 1 in Peter Hart's list



Round and round

VE5OB builds his own rotator from junkbox parts

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- (600W max above 30MHz) PEP or Average.

WCN-400 £69.95 C
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- (600W max above 30MHz) PEP or Average

WCN-600 £89.95 C
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- (600W max above 30MHz) PEP or Average

ICOM HF Transceivers

IC-7600 FREE USB keyboard!

This HF-6m transceiver is the successor to the IC-756 series. It takes features from the flagship IC-7800 and the more recent IC-7700, putting them into a package that brings the price within reach of many more hams. **£3379 D**

IC-7800	HF/50MHz All-Mode 200W. Masterpiece of ham radio engineering	£7999 D
IC-7700	1.8-54MHz 200W with built-in PSK-31 + keyboard	£5499 D
IC-7400	160m-70cm 100W base station + large easy to read LCD display	£1339 D
IC-7400	*DEAL!* Plus SM-20 base mic. and SP-21 speaker	£1499 D
IC-7200	HF & 6m DSP 0.005-3335MHz wideband receive with USB port	£759 D
IC-718	160m-10m 100W transceiver that brings HF on a budget	£449 D

IC-7000 100W 1.8-440MHZ all-mode transceiver with 2.5" colour display. An incredibly small package with a quite amazing performance. **£939 D**

DEALS: IC-7000 + Power Mite NF PSU £989 D
IC-7000 + TFT-7000 screen £1019 D
IC-7000 Power Mite NF & TFT-7000 £1069 D

Receivers & Scanners

IC-R5	*LAST FEW* Handheld scanner 0.15 - 1310MHz	£172.95 C
IC-R6	*NEW* Handheld scanner (see opposite page)	£172.95 C
IC-R20	Handheld scanner 0.15 - 3305MHz	£314.95 C
IC-R1500	PC scanner 1.01 - 300MHz	£449.95 C
IC-R8500	Base receiver 1.01MHz - 2GHz	£1379.95 D
IC-R9500	Base receiver 5kHz-3.3GHz	£8899.95 D

KENWOOD HF Transceivers

TS-2000E £1489 D
The TS-2000E is the classic all-band, all-mode base station covering HF - 70cms at up to 100W. Includes dual channel receivers & DX-cluster monitor with built-in TNC. **TS-2000X** +23cm £1749 D

TS-480HX Ideal for mobile, portable or base station. Gives a massive 200W on HF and 100W on 6m. **£849 D**

TS-480SAT This model gives 100 Watts on all bands up to 6m, but adds a built-in automatic ATU. **£749 D**

KENWOOD Handhelds

TH-F7E	2m/70cm 5W +FREE Clip Mic	£229.95 D
TH-K2E	2m 5W 4-Key Keypad +FREE Headset	£159.95 D
TH-K2ET	2m 5W 16-Key Keypad +FREE Headset	£165.95 D
TH-K4E	70cm 5W + FREE Headset	£159.95 D

Kenwood VHF/UHF Mobile/Handy

TM-V71E
*2m 70cm *Wideband Receive *Built-In Echolink *Removeable Control Head *CTCSS Encode/Decode *Supplied w/ DTMF Mic. **£289 D**

TM-271E
*2m FM 60W Mobile Transceiver *MIL-SPEC DTMF Mic *Built-in CTCSS & DCS encoder / decoder. **£165 D**

TM-D710E
Kenwood's new mobile FM station is great! *APRS *Built-in TNC *DTMF Mic *Weather Station ready. **£429 D**

Icom VHF/UHF Mobile/Handy

IC-E208 Dualband Mobile
*Freq range 144-146MHz, 430-440MHz Tx *55/50W (3 pwr steps each band) *Wideband Rx: 118-173, 230-549 & 810-999MHz **£254 D**

IC-910H £1249 D
2m / 70cm 100W Base station all modes with option for 23cm module (UX-910 £359)

IC-910HX £1449 D
As above but with 23cm module ready fitted and a big saving as well.

IC-2200H £199 D
2m 55W FM mobile with rugged construction and with digital option.

IC-2725E £319 D
Dual band 2m/70cm. Easy to operate and install and a lovely detachable head.

IC-E90
6m / 2m / 70cm Handheld Transceiver. **£234 C**

IC-R6 *Scanner* NEW
This new model wide frequency range of 0.100-1309.995MHz in AM, FM, and WFM modes Amateur stations, AM, FM, short wave broadcasts, TV audio can be listened to. **£172 C**

COMING SOON YAESU

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Programming software for your radios. Comes with interface lead.

Yaesu FT Handhelds	£44.95 C
Yaesu VX Handhelds	£44.95 C
Yaesu FT Mobiles	£44.95 C

State model of radio when ordering.

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V-ID *Paddle* Iambic Deluxe Chrome Base. **£199.95 C**

V-CM	"The Code Mite"	£63.95 C
V-CWJ	iambic key	£114.95 C
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V-OSBK	Standard Bug Key blk	£179.95 C
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RB/NO/CUSB	£79.95 C
NOMIC Data Mode Soundcard Interface Passive USB	
RB-CD	Software Collection v8.1 £8.95 C

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SSB CW AM FM

The new software defined transceiver that rocks the world when it comes to price & performance. It's tiny, measuring 10x15x5cm yet produces 5W out. No soundcard needed, just plug into your USB port on your laptop.

£549 D

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Famous all over the world, this software is designed by professionals in radio communications. Use today's technology to make your ham operating more fun.

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RadioCom-4.5UNI	£79.95 C
RadioCom-4.5PCR	£59.95 C
RadioCom-6-UPG5	£59.95 C

We stock a wide selection of interface leads, phone for details.

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High quality microphones with a range of leads to suit most radios.

AM-308GBL	£79.95 C
AM-508GBL	£99.95 C
Leads from	£12.95 A

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Morse Key Paddles

Morse Paddles Of Distinction

A range of high quality keys from the USA.

Hex-Paddle Iambic paddle	£199.95 C
BY-1 Twin paddle, black base	£119.95 C
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RJ-2 Strght key, chrome base	£129.95 C

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The World's Largest Range of Ham Radio Products

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**Digital & Analogue x-needle VSWR*
**1.5kW SSB & CW *1.8 - 30MHz*
**20,000 memories*
**Built-in antenna selector*
**Auto bypass protection*

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MFJ-945E Mobile atu 300W	£129.95 C

MFJ-929
AUTO TUNER 1.8-30MHz 200W

LCD readout, 20,000 memories, long wire & coax, radio interface.

W&S £209.95 C

MFJ-991B Auto atu 150W	£209.95 D
MFJ-993B Auto atu 300W	£249.95 D
MFJ-994B Auto atu 600W	£339.95 D
MFJ-962D 1.5kW ATU	£289.95 D
MFJ-969 160m - 6m 300W	£209.95 D
MFJ-971 Portable atu	£118.95 C
MFJ-974B Balanced ATU 3.5-30MHz	£189.95 D
MFJ-986 3kW differential tuner	£349.95 D

MFJ-112B

World map clock.

Was ~~£32.95~~ Now £22.95 A

MFJ-1260 Mic control 1 in/2 out	£99.95 C
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MFJ-1275 Sound card adaptor	£109.95C
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MFJ-16B01 Dipole centre SO-239	£21.95 A
MFJ-16C06 6x dog-bone insulators	£4.95 A
MFJ-16E01 300Ω end fed SO-239	£10.95 D
MFJ-1796 40m-2m vertical	£239.95 D
MFJ-1798 80m-2m vertical	£299.95 D
MFJ-1908H 43ft fibre glass mast	£239.95 D
MFJ-1922 Digital screw driver control	£99.95 D
MFJ-1924 Prog. screw drvr control	£129.95 C
MFJ-1925 ATAS-100 controller	£72.95 C
MFJ-202B Receiver noise bridge	£79.95 C
MFJ-250X 1kW dummy load (x-oil)	£55.95 C
MFJ-260C 300W dummy load	£44.95 C
MFJ-261 100W dummy load	£32.95 C
MFJ-265 2.5kW load fan cooled	£199.95 C
MFJ-403 Micro CW keyer	£66.95 C
MFJ-403P Micro travel iambic	£79.95 C
MFJ-4103 PSU for FT-817	£52.95 C
MFJ-417 Pocket morse tutor	£76.95 C
MFJ-4403 Trcvr volt conditioner	£109.95 C
MFJ-442 Slim electronic keyer	£199.95 C
MFJ-461 Pocket morse reader	£99.95 C
MFJ-4714 4-way remote ant switch	£87.95 C
MFJ-4726 6-way remote ant switch	£159.95 C
MFJ-490 Memory keyer + paddle	£244.95 C
MFJ-495 Memory keyer	£189.95 C

FlexRadio Systems

FLEX-3000
160m - 6m 100W Transceiver

100 Watts from 160m - 6m with built-in auto ATU in package that sits neatly under your laptop. (Laptop not included)

£1399 D

FLEX-5000A

The ultimate 100W SDR transceiver that has a performance that achieves amazing selectivity, Dynamic range and DSP power. ATU, dual receiver and VHF-UHF options.

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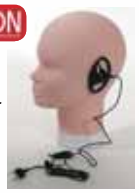
WCT-321
Lapel Talker

WATSON



**Clip-over earpiece*
**Clip-on adjustable lapel mic.*
**Mic tail hangs from clip*
**PTT built-in on mic. lead*
**8 Ohm earpiece*
**Very high quality*

This earpiece is ideal for long-term wear. The mini mic with PTT has a flexible tail permitting it to be clipped to the lapel yet be instantly available.

Versions avaiable for 2-pin Yaesu, Icom, Kenwood and Motorola.

~~£12.95~~ **£8.95**

Heil
Headsets

Pro-Set-4 & 5

The standard headset with a choice of NC-4 or 5 inserts. Requires AD-1 patch lead.

£114.95 C

For Icom transceivers, choose the **Pro-Set-IC** with "Icom" Element **£129.95 C**

Pro-Set-Plus

Pro-Set-Plus you have the benefit of dual NC-4 / NC-5 mic capsules that can be selected. Requires AD-1 patch lead. **£189.95 C**

Pro-Set-PLUS-IC Icom Element **£189.95 C**

AD-1 Connector Leads There's one to suit any ham radio rig. **£16.95 A**

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All windoms include WARC bands

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CW-80	80-10m 133' l.	£129.95 D
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CW-40	40-6m 66' l.	£119.95 D
CW-40LP	40-10m	£116.95 D
CW-40PLUS	40-10m 66' l.	£139.95 D
CW-620	20-6m 33' l.	£119.95 D
G5RV-PLUS	80-10m 102; l.	£79.95 C

Baluns

B1-2kPLUS	1:1 2kW	£39.95 C
B4-2K	4:1 1.5kW	£49.95 C
Y1-5KPLUS	1:1 1.8-50MHz	£52.95 C

Ferrite Clamps

RFFF-213	for RG-213	£5.95 A
RFF-58	for RG-58	£3.95 A

IN STOCK! AIRNAV RADARBOX-3D

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Why are customers switching to RadarBox? It offers 3-D Google Earth Maps, it's reliable and rugged, is regularly updated, needs no add ons & automatically shares data world wide.

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Carriage Charges: A=£3, B=£4, C=£6.95, D=£10, E=£12

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FT-950 100W 160m-6m

The FT-950 was made to give performance that matched the wallets of hams around the world. It benefits from Yaesu's engineering developments and many of the design features have been taken from its more expensive family members. If you are looking for a radio that will take strong signal levels and adjacent QRM in its stride, then the FT-950 may be exactly what you are looking for. More info: www.wsplc.com

FT-2000 PEP 100-200W 160m-6m

The FT-2000 needs little introduction. It is the standard by which many rigs are compared. And if you select the FT-2000D you get 200W of output power complete with AC power supply. All our models are "PEP" versions with the latest firmware update.
Check: www.wsplc.com

FT-450 100W 160m-6m

Don't let the low price mislead you! This radio has lots that you might think impossible in this price bracket. It includes 400MHz IF DSP and a superb roofing filter network. And you will love the variable if tuning and width.
Check: www.wsplc.com

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YAESU *More NEW Radios from Yaesu!*


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FT-2900E £124.95


FT-7900E £229.95

Further details and any latest price changes, please check our web site.

IS THIS THE BEST HAM DEAL?
100W of Base/Portable 160m - 70cms for £579!

FT-857 100W

Sometimes you look back and think - "I wish I had bought that rig." The FT-857 is just that "IWIHBT" radio. Look at the spec; look at the possibilities; look at the quality. Where else could you get all this in one very versatile and punchy radio?

NEW VX-8DE

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Check: www.wsplc.com

FTM-10SE	50/40W 2m/70cms stereo FM	£269 D
FT-2800	2m Mobile 65W wideband receiver	£124 D
FT-7800	Dualband 50W mobile, AM airband	£189 D
FT-8800	Dualband Mobile 50W / 30W	£289 D
FT-8900	10/6/2m & 70cm Mobile	£334 D
VX-3E	2m / 70cm Handheld Wideband receive	£139 D
VX-7R	Waterproof dualband handy (silver or black)	£259 C
VX-8DE	Triple band 6m-70cms APRS etc.	£399 D
VX-6E	2m/70cms handy, 5W Wideband Receive	£199 C
FT-60E	2m/70cms, 5W handy Wideband Receive	£142 C

FT-2000 PEP	100Watt 160m - 6m "Industry Standard" Rig	£2099.95 D
FT-2000D PEP	200 Watt version of FT-2000 with built-in PSU.	£2649.95 D
FT-950	100W HF - 6m transceiver with DSP & Auto ATU	£1099.95 D
FT-450AT	100W HF - 6m with automatic ATU & latest updates	£679.95 D
FT-450	100W HF - 6m transceiver - great value.	£589.95 D
FT-DX9000contest	200W HF - 6m "formula one" contest machine	£4599 D
FT-DX9000D	Deluxe fully loaded base station	£7695 D
FT- DX9000MP	Amazing 400W "legal limit" radio	£8549 D
FT-857D	HF to 2m mobile. portable or base - up to 100W	£574.95 D
FT-817ND	HF - 70cms 5W all-mode transceiver	£439.95 D
FT-817BHIDSP	Fitted with DSP module exclusive to W&S	£549.95 D

RadCom

THE RADIO SOCIETY OF GREAT BRITAIN'S MEMBERS' MAGAZINE

MANAGING EDITOR:
ELAINE RICHARDS, G4LFM
E-mail elaine.richards@rsgb.org.uk

TECHNICAL EDITOR:
GILES READ, G1MFG
E-mail giles.read@rsgb.org.uk

RSGB ADVERTISING:
KIM MEYERN

All contributions and correspondence concerning the content of *RadCom* should be posted to: The Editor, *RadCom*, 3 Abbey Court, Fraser Road, Priory Business Park, Bedford MK44 3WH
Telephone. 01234 832700
Facsimile. 01234 831496
E-mail. radcom@rsgb.org.uk

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Tel./Fax. 01603 898678
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E-mail. radcom@imotea.com

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GW3RMD/P on Moel Siabod GW/NW-010 looking out over the inversion layer.

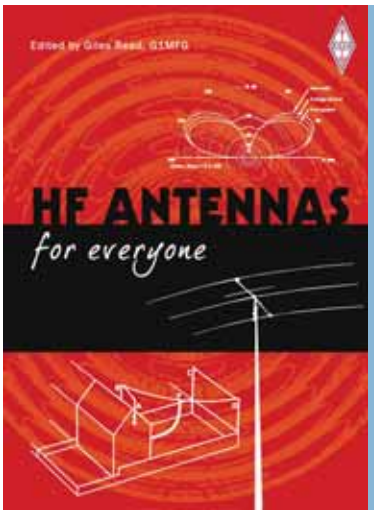
Photo: G4ERP

News and Reports

Reviews

A sneak look inside the Powerex MH-C9000 WizardOne – P74

Features



The HF antennas book you really need – P69

Technical Features

Regulars

Science Week youngsters use ARDF techniques to get their K.E.(R.N.O.) 'wings' – P78

Bylaw Change

Following the successful transfer of the voting operation to the Electoral Reform Society in October 2009 the Board has directed that the bylaw concerning the ballot be revised. This has been agreed by the majority of the Board at the January 2010 meeting. The revised bylaw is given below.

5.0 BALLOT FOR ELECTION TO THE REGIONAL COUNCIL AND THE BOARD

5.1 In the event that the number of valid nominations under 4.2 exceeds the number of vacancies arising under Article 4.1 of these Bylaws a ballot shall be held.

5.2 If a ballot is required then the Board shall send to each Corporate Member (as defined in Article 8.0 of these Bylaws) entitled to vote, not later than 28 days before the date of the election a ballot paper containing names of all Members duly nominated and setting out the names of the Members by whom they are nominated.

5.3 The ballot shall be conducted by both postal and electronic means. Members are encouraged to use electronic voting.

5.3.1 Voting will be conducted by the Electoral Reform Society. Electronic voting will be performed on a website constructed for the purpose by the Electoral Reform Society and accessed through the Radio Society's members' only website.

5.3.2 The physical ballot papers for Regional Council and Board elections shall provide a space in line with the name of each candidate thereon and each Corporate Member voting shall place a cross in the space against the name of each candidate for whom he desires to vote but so that the number of names so marked with a cross shall not in any case exceed the number of names to be elected to the respective offices. The ballot papers, marked as determined by the Board from time to time, shall be returned so as to reach the Secretary not later than twenty four hours before the date fixed for the Election. In the ballot for the Regional Council members no Member shall vote for more than one Regional candidate and both voter and the candidate for whom he votes shall be resident in the same Region. These ballot papers will be securely delivered unopened to the Electoral Reform Society for consolidation with the electronic ballot.

5.4 Each Corporate Member may vote for fewer candidates than there are vacancies to be filled. Any ballot paper, or electronic submission, which does not comply with all the requirements of this and the preceding Bylaw shall be null and void.

5.5 The results declared by the Electoral Reform Society will be deemed to be accurate and final except in the event that the Electoral Reform Society is unable to report the election of the prescribed number of persons to fill the vacancies in the Board or Regional Council owing to an equality of votes, they shall submit the names of the candidates having the same number of votes to the President who shall determine by his casting vote or votes which candidate or candidates having equality of votes shall be elected.

5.6 The Society shall announce the results of the ballot within forty eight hours of completion of the Election. Notices will be posted in *RadCom*, GB2RS and on the RSGB members only website.

Rupert Thorogood, G3KKT,
Company Secretary

Jamming problems

Following the ongoing jamming and abuse problems on a number of Central Scotland FM Group (CSFMG) repeaters a meeting has taken place between Ofcom, the CSFMG and the RSGB to discuss options to address the problem.

Ofcom has indicated that the problem is under active investigation and as a result enforcement action has been taken against one individual resulting in the forfeiture of equipment and a number of others being warned of their conduct. The investigations are still ongoing and Ofcom has asked that any evidence of abuse is in the first instance forwarded to the CSFMG to co-ordinate information rather than create duplicate reports. The CSFMG can be contacted at info@csfmg.com or via Crawford, GM8HBY who is QTHR.

Ofcom have also reminded repeater users not to respond to any abuse of jamming heard on the repeaters.

Advise and guidance can be found at www.ofcom.org.uk/radiocomms/ifi/licensing/classes/amateur/information/misuse_aradio.

CONGRATULATIONS

To the following members whom our records show as having reached 50, 60 or 70 years' continuous membership of the RSGB.

60 years

Mr A G Bounds	G3KDP
C D Colbeck	G4IER
Mr K W Dews	G3PMW
J E Lacey	G3GLB
Mr N Miller	G3MVV
Mr A M Smith	G3IAS

50 years

Mr J H G Allsop	G3OGX
Mr C R Bell	G3NIE
Mr G Foster	G3POD
Mr B C Gibbs	G3MBN
Mr T C Haydu Jones	G3OAD
M A Hoare	RS22800
Mr W A Jeffs	G3OAF
Mr D S Moffatt	G3RAU
Mr K A Morgan	G3NWX
Mr L D Woolf	GJ3RAX

YOUTH NETS

Friskney & East Lincolnshire Communications Club Youth Net for Under 16s will take place on 12 May, 9 June and 14 July, starting at 1930BST on 433.225MHz, the GB3LC repeater. All young people in the area are welcome to join in.

Microwave Managers Report

The UK Microwave Group continued its popular roundtable programme and 2009 saw the confirmation of the new event at Finningley in Yorkshire as a regular venue. The expanded RSGB Convention also was well supported by an exhibit and talks. The online Beaconspot facility www.beaconspot.eu, expanded to include processing DX cluster reports for VHF/UHF beacons as well. Developments include trialling new MGM (such as JT4g) and kits for DDS frequency sources.

Concerns regarding Wi-Fi interference and other frequency spectrum issues for TV repeaters have increased in 2009 and are receiving attention.

In 2009 AMSAT-UK announced the FUNcube satellite – an educational project with the goal of enthusing and educating young people about radio, space, physics and electronics. It has been part funded by the RCF and will support the activities of GB4FUN. It will feature a 145MHz telemetry beacon. Engineering Models are expected to feature at the next Annual Colloquium. AMSAT-UK members continue working on the ESEO satellite that will feature a beacon on 5.84GHz in addition to UHF/VHF and UHF/S Band transponders.

Outcomes from the IARU-R1 Conference at Cavtat occupied the start of 2009 including work on updating RSGB bandplans and (ongoing) development of options for 23cm that would accommodate both amateur use and the primary users. On a similar theme the latter part of 2009 saw several papers generated for the 2010 IARU-R1 Interim meeting in Vienna. During the course of the year meetings and papers occurred on Crown Access/release of 3.4GHz, 2012 Olympics spectrum and new generations of car radars. A close watch is also being maintained on threatening commercial developments in the 2.3GHz band.

Support for beacon applications (from 50MHz upwards), licensing and technology has also continued. Several new beacons and changes were processed and licensed in 2009. Contributions have been made to the new RSGB Beacon Policy and a major exercise to migrate all UK propagation beacons onto new Ofcom NoVs is almost complete. The new NoV includes a standard option for MGM to support modernisation and automatic propagation monitoring systems.

QSL Matters

SHIPPING. More than 140kg, for some 14 countries left us during March. Top honours going to Ukraine & USA, with smaller packages to Venezuela, Moldova and Iceland. The full breakdown was: Austria (10kg), France (10kg), Germany (10.6kg), Iceland (1.5kg), Italy (10.5kg), Moldova (4kg), Netherlands (10.3kg), Russia (10.5kg), Spain (10.5kg), USA 1 (10.2kg), USA 2 (10kg), USA 4 2 letter (10kg), Ukraine (33kg) and Venezuela (1.7kg).

During April we will be delivering to every UK sub Manager, so please make sure you have envelopes with your manager.

CONFUSION. Last month we urged you to use C5 envelopes for the collection of your cards. When sending C5 envelopes to your QSL manager, by all means fold them in half to get them in a smaller envelope but you must use a large 1st or 2nd class stamp on those envelopes. If we send them out folded with an ordinary 1st or 2nd class stamp on them you can only get 2 or 3 cards in before they become larger than the 5mm limit! Please place a large 1st or 2nd class stamp on the envelope going to your QSL sub manager too as that prevents them having to pay charges on over-sized letters.

SUB MANAGER CHANGES. Phil Yates, G7BZD, hard working QSL sub manager for a number of groups, is 'downsizing' his workload and handing over two sub groups, G4C and G4Y, to other volunteers. G4C and G4Y been combined with adjacent groups as part of a rationalisation. The G4Y and G4Z groups will be handled by Robert, G4ZIB and G4B and G4C are now handled by Benny Tonkin, G7DUC. Members' envelopes and outstanding cards have already been transferred.

Contact details can be found in the members' area of the RSGB website and both managers, G7DUC and G4ZIB, are listed in the RSGB *2010 Yearbook*.

Dr. Michael (Mike) Dixon, G3PFR, SK

RSGB Life Vice President, Mike Dixon, G3PFR, sadly passed away on 17 March. He had apparently been in good health, so this was sudden and unexpected. The committal service was held on the 30 March at Walton Lea Crematorium, Warrington. The service was very well attended by family, amateur radio friends, rugby and golf club members and work colleagues from his days in the pharmaceutical industry.

Mike worked tirelessly on amateur microwave matters, having been Chairman of the RSGB Microwave Committee from 1984 until the late 1990s, when he was appointed the RSGB Microwave Manager, a post he finally relinquished in December 2006. He managed to combine these duties with that of the *RadCom* microwave band columnist from 1984 until 1999.

I first met Mike in 1975 when the then *RadCom* microwave columnist, Dain Evans, G3RPE, wrote in one of his columns that his friend, G3PFR, was seeking other radio amateurs in the Cheshire area who might be interested in amateur microwaves. I wrote to Mike and asked if he thought mid Staffordshire was close enough? It was and in the years that followed we met regularly to discuss microwaves, swap microwave parts and to discuss 'the correct way to do something'! Mike was always a mine of information.

As the RSGB Microwave Manager he attended many International Amateur Radio Union conferences, delivering and debating RSGB prepared papers on a wide range of microwave matters as well as providing liaison between the RSGB and Ofcom. In all of this he worked towards one very important goal. Mike wished to see the implementation of a number of international primary allocations in each of the recognised amateur microwave bands in the face of rising commercial interests.

In his professional life Mike worked in the pharmaceutical industry, having joined Glaxo in 1957 where he worked on, and became an expert in, antibiotic fermentation development. He later joined Fisons and remained there until he retired.

Mike eventually gave up his role of RSGB Microwave Manager at the end of 2006. In 2007, in recognition of his work as Committee Chairman, Microwave Manager and Microwave columnist he was appointed Life Vice President of the RSGB. Mike was immensely proud of this title. It was well-deserved and a great accolade for a very worthy radio amateur. My friend; Mike Dixon, G3PFR.

Sam Jewell, G4DDK

Club of the Year

On 27 March, the Chairman, John Bowen, Vice President, Geoff Mills and several members of the Chelmsford Amateur Radio Society visited Waters & Stanton to receive their prize as winners of the Region 12 Club of the Year competition.

This was presented by the Regional Manager, Phillip Brooks, G4NZQ to Chairman John Bowen, G8DET and sponsored by Waters & Stanton PLC.

Jeff Stanton, M3JJS praised the huge amount of work put in by the committee particularly in training and encouraging new members and members of CARS to bring them this reward.

Phillip Brooks wished them future success in the national competition

Jeff Stanton, G6XYU and Region 12 Manager Phillip Brooks, G4NZQ presenting the Winning RSGB Region 12 Club of the Year Trophy to CARS Chairman John Bowen, G8DET.

Acting Region 1 Manager Len Paget, GM0ONX presenting the Region 1 Club of the Year trophy and certificate to Ayr Amateur Radio Group Chairman Dennis Nutt, GM3YDN and Secretary Charlie Stewart, MM0GNS.

SPECIAL EVENT STATIONS FOR MAY 2010

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. Details published here are kindly provided by Ofcom.

Please note that the QSL Bureau sub-manager for all special event station callsigns (GBxAAA-GBxZZZ) has recently changed and is now Mrs Davina Williams, M0LXT, 20 Neale Close, Wollaston, Northamptonshire, NN29 7UT, e-mail QSLTREK@hotmail.co.uk, web site www.gb-special-event-qsl-status.webs.com. Will organisers of special event stations please ensure that they lodge plenty of envelopes with M0LXT?

Date	Callsign	Phonetics	Location	Bands	Keeper
01/05/2010	GB0FSG	Fochabers Scout Group	Orton Morayshire	LH2	MM0SMD
	GB4VE	Victory in Europe	Wythall, nr Birmingham	LH2	G0EYO
	GB1ST	Saltram Telegraph	Plympton, Devon	LHV27	M0XIG
	GB2WBM	West Blatchington Mill	Hove, East Sussex	LH2	G4JZC
	GB8RUM	Isle of Rum	Inner Hebrides	TLHV27	MM0DFV
	GB0YAA	Yorkshire Air Ambulance	Otley, North Yorkshire	LHV2	G0SNN
	GB1RT	Ronaldsway Tower	Ronaldsway, Isle of Man	TLHV27	GD0HYM
	GB2RT	Ronaldsway Tower (until 31/12/10)	Ronaldsway, Isle of Man	L	GD0HYM
	GB2MOP	Museum Of Power	Tanygroes, Ceredigion	L	GW7EUL
05/05/2010	GB2RM	Ruiton Windmill	Dudley, W. Midlands	TLHV27	G7DMO
	GB2PW	Polegate WindMill	Polgate, East Sussex	TLHV27	G3DQV
06/05/2010	GB1WM	Weybourne Mill	Weybourne	TLH27	G0GFQ
	GB0HW	Holgate Windmill	York	LH2	G1DRG
07/05/2010	GB2EM	Elstead Mill	Surrey	LHV27	G3KND
	GB4HCM	Heron Corn Mill	Beetham, Cumbria	LH	G0RDH
	GB8VAW	Village At War	Tilford	TL	G8YFH
	GB4HM	Howsham Mill	Howsham, Yorkshire	LHV27	G1JKE
	GB4SWM	Shermanbury Water Mill	Shermanbury Nr Henfield	TLHV27	G7AIE
	GB2BWT	Bocking Windmill Trust	Bocking, nr Braintree	LHV27	G0EMK
	GB0WSM	Whitchurch Silk Mill	Whitchurch, Hants	LH	G8NDN
	GB2WWM	Wymondham Windmill	nr Melton Mowbray	LH27	G0IJM
	GB4CWM	Calbourne Water Mill	Calbourne, Isle of Wight	LH2	G1EUW
	GB4MPW	Mount Pleasant Windmill	Kirton-in-Lindsey, Lincs	TLHV27	G4YHP
08/05/2010	GB5SM	Stock Mill	Stock, Essex	TLHV27	M0XAP
	GB2RWM	Rayleigh Windmill	Essex	LH27	G7IIO
	GB2ANE	Angel of the North	Gateshead	TLHV27	G7SPN
	GB0WMH	WindMill Hill	Hailsham, East Sussex	L27	M0RJO
	GB0ETM	Eling Tide Mill	Totton, Hants	TLH2	G4YVY
	GB6MW	Meopham Windmill	Meopham, Kent	LH2	M0KSJ
	GB0KLM	Kilhope Lead Mine	Upper Weardale, Co Durham	TLHV27	G0OCB
	GB2WMS	Water Mill Shepshed	Shepshed	L27	G1ETZ
	GB2LM	Longbridge Mill	Hook, Hants	LH	M0CYX
	GB2GGM	Gelligroes Mill	Gelligroes, Gwent	TLHV2	MW0LAO
14/05/2010	GB0BNS	Blind National Sailing	Ipswich, Suffolk	LHV27	G8EHS
	Event on 22 and 23 May, blind ops welcome to operate.				
	GG100SB	Silsden Brownies	Ilkley, Yorks	TLHV27	M0PLN
	GB1RBP	RAF Bentley Priory	Stanmore, Middlesex	TLHV27	G0CAG
21/05/2010	GB2MAC	Marble Arch Caves	Marlbank Furencecourt Co. Fermanagh	TLHV2	GI6PYP
22/05/2010	GB5GEO	Geoparks	Merthyr Tydfil	TLHV2	MW0EQL
23/05/2010	GB2VVR	Vintage Vehicle Rally	Darlington	LH	G3MAE
28/05/2010	GB1HA	Headcorn Aerodrome	Headcorn, Ashford, Kent	TLHV27	G0UXG
	GB0TWT	Twyford Waterworks Trust	Twyford, Hants	TLH2	G0JLX
	GB0FHI	Flat Holm Island	Flat Holm Island, Bristol Channel	LHV27	M0MTT
	GG100GGR	Girl Guiding Renfrewshire	Ardgowan Estate, Inverkip	LH27	MM1AWV
29/05/2010	GB2HS	Honley Show	nr Huddersfield, West Yorks	TLHV27	M0RBG
	GG100GMW	Greater Manchester West	Knutsford, Cheshire	LH2	G8DTF
31/05/2010	GB5AFD	Armed Forces Day	Colerne, Wiltshire	TLH2	GW4XKE
	GB4HFH	Help For Heroes	Colerne, Wiltshire	TLHV2	GW4XKE

Welcome

The RSGB would like to welcome to the RSGB family the following new Members who have joined their voice to ours and are helping to keep the RSGB strong.

2E0BJQ	Mr M S Roebuck
2E0BKW	Mr G Warriner
2E0CPT	Mr C Turton
2E0DPY	Mr D A Pye
2E0JAN	Mr G E Martin
2E0KJW	Mr K Jones
2E0OFF	Mr P Webster
2E0YAZ	Mr G Bean
2E1GDB	Mrs M Jeffery
2E1HZW	Mr D Middlehurst
2W0WXM	Mr E S J Lake
EI4GMB	Mr F McGavin
G0AJZ	Mr B J Park
G0DEH	Mr P J Finbow
G0GBX	Mr W A Jones
G0GSA	Mr R J Hall
G0LWG	Mr N V Sheriden
G0OVE	Mr K L Mohammed
G0XBL	Mr H B Watts
G1BXL	Mr N P Mann
G1CHM	Mr C Milburn
G3REV	Mr R E Pulling
G3SBT	Mr W Turnbull
G6LXE	Mr T Doyle
G6LZO	Mr S A Baxter
G7CLR	Central Lancs Raynet
G7ERX	Mr A Hobbs
G7LVN	Mr M E B Odam
G7UQV	Mr M Willoughby
G8SIG	Mr A F Jeffery
GM1OST	Mr T L I Ferguson
GM6WAZ	Mr A Ronnie
GW7VEH	Mr J Humphrey
GW7VQD	Mr N Griffiths
HB9ALH	Mr B Wehrli
K6EON	Mr T G Laubhan
K8RBW	Mr R Wiltgen
KE6PWM	Mr B P Anderson
M0GLH	Mr C D Bury
M0HAZ	Mr A Freeman
M0XXT	Dorridge Scout Group
M3YXA	Mr W Mellar
M3ZGN	Mr M H Lamport
M3ZNV	Mr N Edwards
M3ZQR	Mr I Munro
M3ZRQ	Mr G N Crane
M6CCE	Mr C Etchells
M6DLS	Mr D Stephenson
M6DRS	Mr L Stubbs
M6DVD	Mr D Hammond
M6DWR	Mr D Ramsell
M6DXU	Mr A Wyatt
M6EMW	Mr S Hunter
M6GCF	Mr C Spencer
M6GIG	Mr R A Eyre
M6GTP	Mr A Anderson
M6GUZ	Mr A Burridge
M6KLO	Mr R Rushbrooke
M6KPM	Mr K Peter Maymon
M6MHD	Mr M Jodrell
M6PRH	Mr P R H Higgins
M6UWS	Miss M A Sharman
M6WDY	Mr C J Johnson
M6WJR	Mr W J Ramsell
M6XJP	Mr C J P Dennis
MI1ERL	Mr R P Cranston
MM0GZZ	Mr D Taylor
MM0SAJ	Mr S Smith
MM0TGB	Mr TG Brown
MM6ARG	Mr R Baxter
RS205581	Mrs B Gardner
MW6LIZ	Ms E Martin
MX0MHC	Crewe Heritage Centre ARC
NY8J	Mr J Jusuf
ON3WIB	Mr B Wim
ON4LRG	Mr R Gillon
PE1RGE	Mr J Bastemeijer
RS201257	Mr J A Willby
RS203768	Mr P C Bannon
RS205314	Mr F L W Rhodes
RS205343	AMS/UMA Informacion
RS205384	Mr R M J Hewett
RS205450	Mr T Schwabe
RS205584	Mr N Whitehouse
RS205593	Mr J S M Fletcher
RS205625	Mr J A Hone
RS205657	Mr P Gurney
RS205658	Mr D Simpson
RS205659	Mr R Johnson
RS205682	Mr B Lepkowsi
RS205683	Mr T W Coe
RS205686	Mr P E Daly
RS205749	Mr E Price
RS205760	Mr G Boon
RS205767	Mr N Hook
RS205768	Mr H R Watts
RS205770	Mr D V Evans
RS205771	Mr J Lake
SA0AYV	Mr L Thunblad
VK3AUD	Ms S Thompson
W3JKS	Mr J K Scoggin Jr
W5UWB	Mr J Butrovich
WB4OEE	Mrs S Ingram
ZL2BGX	Mr W H Smith

The following people rejoined the Society last month

2E0AYD	Mr M Butcher
2E0BTX	Mr P R Chamberlain
G0NOR	Mr C E Jones
G0WOU	Mr D T Atkinson
G1ZHL	Mr M R Dharas
G4IKI	Mr Paul Gabriel
G4JCP	Dr P J Cadman
G6OIH	Mr R Phillips
G6TFP	Mr C Mann
G6VRT	Mr B Collins
G7NZR	Mr A Haslam
G8TMV	Mr C R Tuckley
GM4YLN	Mr C W Grierson
M0DJH	Mr J Hale
M3BAN	Mr J Sergeant
PE1NOJ	Mr E E C Knol
RS194777	Mr P Giuseppe
SM6EGL	Mr G Lagerulf
ZL3TKR	Mr D S Dwyer

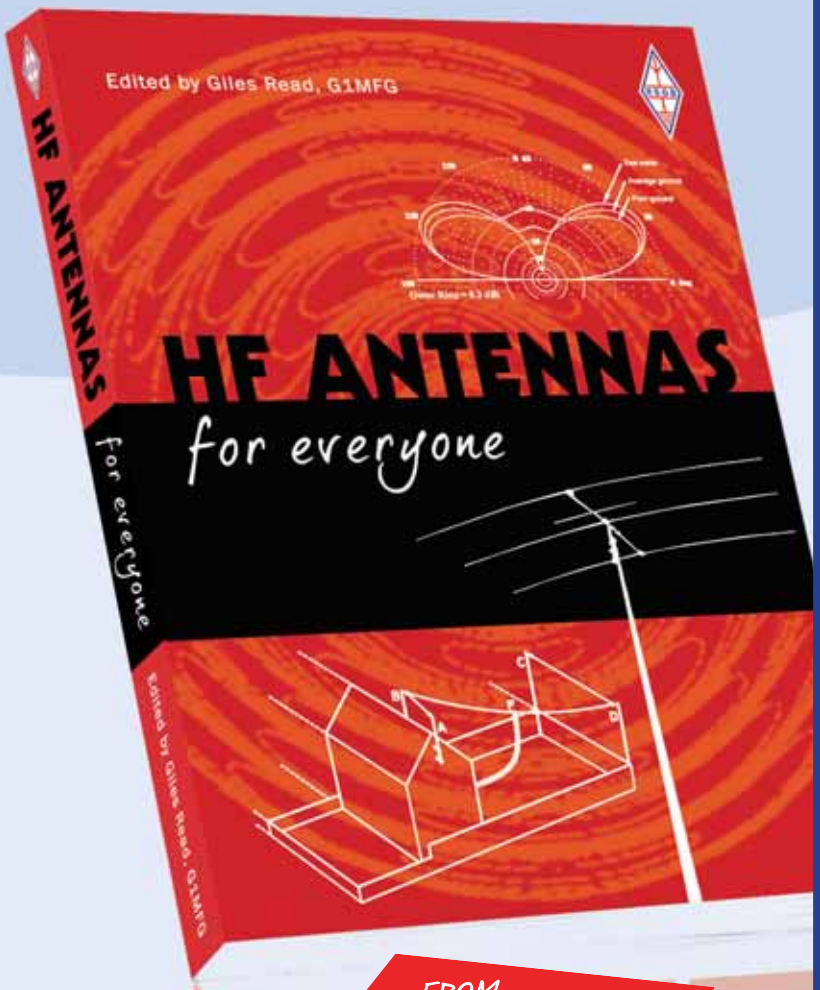
RSGB shop

NEW

HF ANTENNAS

for everyone

Edited by Giles Read, G1MFG



FROM **£12.74**

The RSGB has always published the very best antenna designs available to the radio amateurs. From the most complex to the very basic, these antennas have provided radio amateurs with much food for thought and practical designs to build. *HF Antennas for Everyone* draws on 90 of these RadCom and Radio Communication articles from the last forty years, providing a comprehensive collection of HF antennas, with something for everyone.

The selection in this book is a deliberate mix of the traditional and more recent designs. Sub divided into broad sections including horizontal, vertical and loop antennas, there is much variety to be found here. Looking back at the earlier decades it is amazing to see how many of the aerial giants, such as Louis Varney, G5RV have written for the RSGB. There is however much more than this. Conventional wisdom of HF antennas says you will need lots of space and money in order to put up suitable aerials. *HF Antennas for Everyone* shows that no matter the size of the available space you will find antenna designs that will help you get your signals in and out. Feeders are also not forgotten with a section devoted to this fascinating and often overlooked topic. But what if your local regulations prohibit the erection of antennas? That needn't get in your way, because this book even contains a section on Stealth antennas that are either essentially invisible or disguised as something quite different.

It is often said that there is nothing new in aerials, but *HF Antennas for Everyone* shows this isn't so. This book demonstrates a considerable number of developments and innovations from the last 20 years in particular, that show designers are starting to find innovative solutions to the age-old problems.

Whichever bands you want to work on, whatever the state of the sunspot cycle and however large or small your garden, in *HF Antennas for Everyone* you'll find an antenna that will get you heard.

Size 240 x 174mm, 336 pages, ISBN 9781-9050-8659-7

Non Members' Price £14.99

RSGB Members' Price £12.74

Radio Society of Great Britain
3 Abbey Court, Fraser Road,
Priory Business Park, Bedford, MK44 3WH
Tel: 01234 832 700 Fax: 01234 831 496

www.rsgbshop.org

E&OE All prices shown plus p&p

Donate online at www.rsgbshop.org
Spectrum Defence Fund

Thinking Day on the Air

Lincoln Short Wave Club put on a Special Event Station for the Welton Rural District Girl Guides to take part in Thinking Day on the Air and to celebrate 100 years of Guiding using the callsign GG100WR. During the day they managed to work nine other GG100 stations in the UK and Girl Guides in the other regions enjoyed exchanging greetings with the Welton group. The highlight of the day was when they moved to the 15m band and the girls were getting excited exchanging greetings with David, N6LF in Dallas, Texas, Tammy, N1CE in New Hampshire, Merve, VA3RKO in Eastern Ontario and Bob, WX92 in Milwaukee. LSWC would like to thank these international amateurs for permitting the girls to exchange greetings with them.

Everyone enjoyed the day and thanks to Anne Cook and Elizabeth Tebbs, Joint District Commissioners, who organised the event in conjunction with Pam, G4STO representing the Lincoln Short Wave Club. It was a very pleasant day.

Chris, G0PIO demonstrating amateur radio to one of the guides while one of the Guiders takes a picture.

Presentations

The RSGB DRM for East Yorkshire was approached by Peter, G1EQF about a shack clearance of the many bits & pieces that were surplus to his requirements. So, over the last six months or so, many of the items were advertised or sold at radio rallies. In total the sum of £260 was raised with Peter, G1EQF kindly donating the proceeds to the East Yorkshire Repeater Group at their recent AGM held at the Hull DARS.

RSGB DRM Mario Brashill, G2DPA & EYRG Treasurer Dave Proctor, M0IOK. Photo courtesy G0VRM.

Foundation Results

All 18 candidates from Lough Erne ARC's Foundation course at the SHARE centre passed the recent examination. They ranged in age from 13 to 78 years and included four ladies and three SHARE staff. Thanks go to the dozen Club members who helped in the practical work on-site and mobile, or loaned equipment. Many thanks also to SHARE whose staff and facilities were invaluable, particularly the ten computers online for exam question practice.

The Club's progression plans for new licensees include on-air activity and a special station in May. There is already demand for another Foundation, an Intermediate course and a kit-building weekend.

Michael Clarke, MI5MTC, Lough Erne ARC Chair and Lead Instructor, centre, surrounded by a crowd of successful Foundation trainees and Club helpers.

GB3GJ

Jersey repeater GB3GJ could be on the air by the end of May. The original site at Westmount fell through late in 2009 but a new site on the Jersey Electricity Company's building has been found. The repeater group is now putting together the ancillary items needed. Anyone who can lend their time and assistance will be gratefully received. If you think you can help please e-mail mj0rzd@robluscombe.com.

Bittern DXers trophies

Bittern DXers won two trophies in Transmission 2009 run by the British Wireless for the Blind Fund. One trophy was for the most contacts made. Propagation was not particularly good on that weekend; despite this, 1113 QSOs were recorded. The other trophy was given for the most money raised by a club in aid of the British Wireless for the Blind Fund.

The presentation was made by Fiona Picket, the Regional Development Manager for BWBF, at the Headquarters of the Norfolk and Norwich Association for the Blind in Norwich. Money raised during Transmission results in many visually handicapped people being offered radios compatible with the new digital broadcasting services.

On display were several radios that the British Wireless for the Blind Fund produce. With their bright yellow markings on a black background, it was clear that a good deal of thought had gone into their design, especially those that could be used in conjunction with a computer for internet radio reception.

Ken Holloway, M6KAH, the membership secretary for Bittern DXers, who is himself registered blind, received the cups on behalf of the club. In the brief speeches, those who took part in or organised the event were thanked. So too were the owners of the Emcy Garden Centre, Mike and Caroline Crane, who allow Bittern DXers to operate from their site.

Fiona Picket, Regional Director for British Wireless for the Blind Fund, making a presentation to Ken Holloway.

CW Lives

January 2010 saw the creation of a new worldwide club dedicated to CW on the amateur radio bands. In the first two months of 2010 close to 700 hams from 56 countries have joined up. The goal of CWops is to bring together amateur radio operators who enjoy communicating by Morse Code. To find out more about becoming a member visit the CW Operator's Club website at www.cwops.org.

GG100FCB

Chippenham and District Amateur Radio Club assisted Lee Wiltshire, G0IAY, to put on a Thinking Day on the Air special event station with the callsign GG100FCB for the first Chippenham Brownies.

2010 marks the centenary year for Girl Guiding and the station marked the first TDOTA station for Chippenham Brownies in 20 years. The station was on air for 6 hours and with most contacts on 40m and 20m SSB, and some 2m FM. They had three operating points, HF, 2m/70cm FM and 6m/10m. The best DX was Helen, VA1YL, herself a guider, in Nova Scotia, Canada. The Brownies and Guides also completed other radio related activities during the day, such as making Morse code biscuits, Morse code bracelets and designing QSL cards. All the girls had a great time and were apparently still talking about the people they had talked to when they went back to school the following week.

The group would also like to thank the RSGB for the provision of posters, leaflets and lollies that went down a treat. Special thanks to G0GRI, 2E0OTL, 2E0DIM, 2E0LRD and G0IAY for the successful event.

Gary, 2E0OTL and Isobel passing the first message of the day.

Intermediate course Success

North Wakefield Radio Club had a 100% success rate in a recent Intermediate Exam. The photograph shows (l-r) Les Potter, Barry Tufnell, Michael Dailey, John Towner, Roger Wilkinson, Andrew Taylor, John Woods, Alan Kent, instructor Robin, G1MHU and Chris, 2E0FPE.

Exam Success

Midlands Amateur Radio Society had a great success rate in the recent Intermediate exam. The photo shows (l-r) instructor Derek, G7ORT, Alan, M6ARW, Michael, M6MJX, Matthew, M6WOL and Nigel, M6BCX.

Lottery Funding

The Itchen Valley Amateur Radio Club has been awarded nearly £5000 in Lottery funding to assist with providing community-based radio projects. The projects will include supporting the Radio Amateur Emergency Network in providing communications coverage for disaster and emergency exercises (and the real thing, if necessary). The grant will primarily be used to equip a portable radio station with a 25ft trailer tower with antennas and a portable generator system to enable the station to provide communications services without mains power or the normal mobile phone networks.

In addition, the grant will provide funds for working with local youth organisations such as Scouts and Guides, as well as other public projects to broaden awareness of amateur radio, provide an enthusiastic introduction to the science and technology of radio, and to serve the local community.

MM0KLR

Kilmarnock and Loudoun ARC were active as a multi-op station during the Black Sea Cup weekend recently. The team members were MM0GHM, MM0GOR and GM3YEH. This year the club almost doubled their score, but at times it was hard going. During the night there was a period of 4 hours when only two QSOs were made and these were in the space of 2 mins. "Thank heavens for voice keyers!" say the operators and thanks to GM0ONX who built one for the club. The team enjoyed the contest and are looking forward to CQ WPX.

GM3YEH operating the station.

Celebrating 25 Years

Members of the Brickfields Amateur Radio Society celebrated their 25th Anniversary in March with a weekend of special events. Sixty members and guests attended a buffet lunch at the Brickfields Equestrian Centre adjacent to the club's headquarters, where a table-top sale was held and the special event station GB4BAR was activated, working nearly two hundred stations across the world. Past members reminisced about the early days of the club when it first met at the local Scout Hut and was named the Binstead Amateur Radio Society. Within two years the club had grown in size from five to no fewer than seventy members. With limited access and no lock up facilities, new premises were sought, resulting in a move to their present site in January 1987. At first their shack was the rear end of an old van positioned just outside the Lounge Bar Area where their club meetings were held. But within months permission was granted for their first antenna tower to be raised, and soon a Wireless Museum was incorporated within the adjacent barn. The Museum quickly grew in size, becoming an attraction to the public and, because of its necessary management and supervision the present club headquarters were built as an annexe in 1990, providing much needed space for their own meeting room, shack and workshop.

Editor de libros requeridos

El RSGB está considerando traducion de algunos de sus libros para español. Podremos hacer traducciones básicos, pero no es probable que sean de natureza técnica. Necesitamos de alguien fluente en español (escrito), y un amador de radio competente para sub-editar y mejorar traducciones. Si tiene interés en hacer este trabajo y recibir una pequeña remuneración, por favor email (en Ingles) mark.allgar@rsgb.org.uk para mas información.

NEWS IN BRIEF

• The 61st Lake Constance Convention and Ham Radio 2010, both organised by DARC, will take place from Friday 25 until Sunday 27 June in Friedrichshafen. The Informal International Meeting for representatives of IARU member societies will be held on Friday 25 June at 4pm.

RNARS is 50

The Royal Naval Amateur Radio Society was formed in 1960 and to celebrate the 50th anniversary a special callsign GB50RNARS is being aired by members of the Society throughout the year. Over 1700 contacts have been made with stations as far away as VK. A special anniversary award is available to listeners and licensed amateurs who hear or contact RNARS members and the specials event stations during 2010. Full details can be found on the RNARS web site at www.rnars.org.uk.

An anniversary dinner has been organised for 26 June at HMS Collingwood in Fareham. For bookings, please contact G3KOJ (QTHR) by e-mail to penray93@tiscali.co.uk. A Society get-together weekend has also been organised in August at Coventry in the West Midlands. Tickets can be obtained from G4BEQ (QTHR) by e-mail to g4beq@tiscali.co.uk. Membership of the RNARS is not a requirement to attend either of these social events.

Summits on the Air

An absorbing evening was had by the members of the Milton Keynes ARS when they were given a talk by Marc Tinkler, G0AZS, the summits manager of SOTA. Marc began by relating the early history of SOTA and went on to explain the rules and the three types SOTA participation that are open to all licensed amateurs. There are the chasers and the SWLs who look for and log SOTA stations on the air and the activators, the hardy souls who go and activate the high ground. Marc's talk was both interesting and informative and was well received by the members present of whom there were a few converts to the SOTA cause.

Foundation First

Chester & District Radio Society has held its first Foundation licence course run by John, G0KKO and Bruce, M0CVP. In photo are the eight students who were successful in passing the exam, Jason, M6TXH, Chris, M6GOZ, Alan, M6RTR, Dave, MW6DIG, Glyn, M3ZLA, Dave, M6DOA, Shaun, M6SPW and Glenn, M6GHP.

Raising Money

Meirion Amateur Radio Society, based in Mid-Wales, organised a bag packing and radio weekend over 13 and 14 March to raise funds for the Help for Heroes charity. Members of MARS, with help from the Ardudwy Knights re-enactment group packed shopping bags, rattled buckets and sold Help for Heroes merchandise to raise £1124.

The Ardudwy Knights, dressed in their authentic armour, entertained the shoppers, packed bags and posed for pictures while collecting money. Meanwhile Meirion ARS, setup an amateur radio station, alongside the Help for Heroes merchandise stand, to demonstrate our hobby to shoppers. The club operated on all HF bands and 2m, making many contacts including an aeronautical mobile station SK0SAS and QSOs into Europe and Russia. The station used a Yaesu FT-897 with an LDG pro auto ATU into an SRC X80 vertical.

Club Construction

Shefford Club members display their latest winter project, a neat little digital PIC based LC meter built using club kits. Developed by Richard, G3NII from the design by Phil, VK3BHR and with low cost LCDs sourced by Bryan, M0BIK, the kits were prepared by Dick, G4LBH and were complete in every aspect. They were supported by very detailed instructions, several help and support sessions plus final set-up and testing by G3NII.

Shefford Club members show off their homebrew kits.

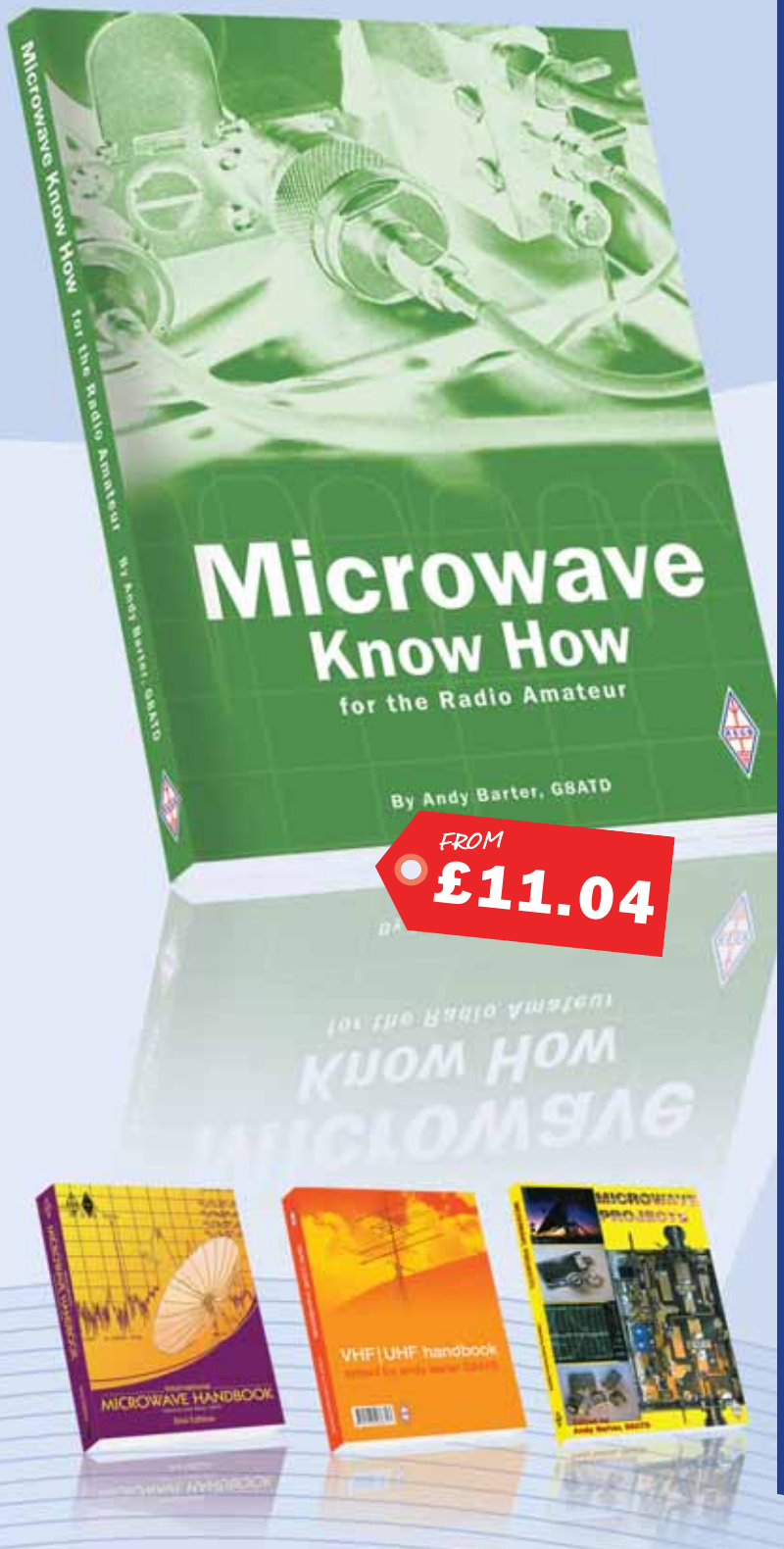
Active Antenna

Nevada has recently taken delivery of the new Palstar LA30 Active rotary antenna & preamplifier. Designed for the avid LF and short wave listener, it has a rotating directional antenna and high Q tuneable preamplifier with variable selectivity and gain. The antenna supplied covers 410 to 2050kHz, with optional antennas available covering 100 up to 7500kHz. The price is £269.95 from Nevada - www.nevadaradio.co.uk.

NEWS IN BRIEF

• Aberdare and District ARS will be running GB0GMD for Marconi Day on April 24. The station hopes to be active on 23/24/25 April on most HF bands at various times depending on conditions. SSB and PSK/RTTY will be used.

RSGB shop



NEW

Microwave Know How

for the Radio Amateur

By Andy Barter, G8ATD

Microwave Know How is a new compilation of articles aimed at those who are interested in building equipment for the amateur radio microwave bands. The designs in this book are from authors all around the world who are keen microwave constructors themselves. This ensures that all of the projects use modern techniques and up to date components.

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- Oscillators showing how to use a DDS and MMICs.

If you are already active on the microwave bands or simply looking for interesting projects *Microwave Know How* will show you how easy it is to become more active using modern devices and equipment.

Size 174x240mm, 184 pages, ISBN 9781-9050-8656-6

Non Members' Price £12.99
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Spectrum Defence Fund

Advance!

Mexborough Amateur Radio Society has had five candidates upgraded to Advanced level: Richard, M0RET, Carl, M0KRL, Steve, M0SGJ, Kev, M0KVM and Derrick, M0UGD. The club has also had success with a Foundation course too. Mark Watson, Tony Beresford, John Gibson, Malc Billen, Glenn Marsden and Dean Chedzoy all passed.

21st Success

The 21st Foundation course run by the Chelmsford Amateur Radio Society proved to be a great success. Eight candidates took the course and all passed with flying colours. What's more, all the candidates decided to proceed straight away with the Intermediate course, starting in March. It is refreshing to see so many Foundation candidates keen to upgrade and a good sign for the future of the hobby.

To find out more about CARS amateur radio courses speak to Clive, G1EUC on 01245 224577.

The successful candidates at the back with some of the CARS team seated.

Meopham Windmill

On 8 and 9 May, Cray Valley RS will be taking part in the National Mills weekend celebrations with Mills on the Air special event station GB6MW from Meopham windmill in Kent (JO01EI). Active on HF and VHF on both days (mill interior open on Sunday 9th) this is an ideal opportunity to see the mill and meet club members. A display about amateur radio, licence courses and the club will also form part of the visitor attraction this year. Further details at www.cvrs.org.

MB7UEW goes live

Eastbourne & Wealden RAYNET Group has activated its APRS digipeater, MB7UEW, at its base in Heathfield, East Sussex. MB7UEW is tasked to provide infill coverage from Lewes across to Hastings including the coastal area from Eastbourne to Hastings. The activation was the culmination of 18 months development of a project conceived five years ago and involved several members of the Eastbourne and Wealden RAYNET Group. The digipeater will benefit APRS enthusiasts and enhance the position tracking benefits APRS provides for RAYNET operations in the group's area.

The digipeater has an effective radiated power of 10dBW and utilises an omni-directional antenna 188m above mean sea level. In the event of mains power failure the digipeater is equipped to run off battery power for about 40 hours.

Comments and signal reports should be directed by e-mail to Dick, G4KAR at dick.jeffries@raynet-uk.net or to Bob, G0BUX at rhclinton@tiscali.co.uk.

New Contest

Friskney & East Lincolnshire Communications Club has been instrumental in starting a new contest in remembrance of their good friend Geoff Moorehouse, 2E0ITV. The 2E0ITV Commemorative Multi Mode Competition is over four legs spaced over four months. The first leg is PSK on 7 May, the second leg is CW on 4 June, the third leg is HF SSB on 2 July and the fourth leg is 2m SSB and FM on 5 August. Running times are from 7 to 10.30pm. This competition is open to FELCC members and non member alike. The results and prizes will be announced at the FELCC rally on 15 August. Competition rules are obtainable from Brendan, 2E0BDS by email to bren.sykes@btinternet.com.

Up & Down the Country

Chris, G8RBW is planning to go from Lands End to John o'Groats three times this year with an Icom 2820, 706 mk II G and 92D in his van. He's a tour leader for the Cyclist's Touring Club, the biggest British cyclist's club and the oldest in the world, escorting about 22 cyclists each time, about half of them are doing it for various charities. Dates are 15 May to 2 June, 3 July to 21 July and 4 Sept to 22 Sept. He plans to work through FM and D-Star repeaters along the way.

NEWS IN BRIEF

• W5KUB.com will be broadcasting the Dayton Hamvention again, streaming live on the internet this year. The fun starts when the convoy leaves for Ohio on Wednesday morning May 12 at approx 1300UTC. See http://w5kub.com.

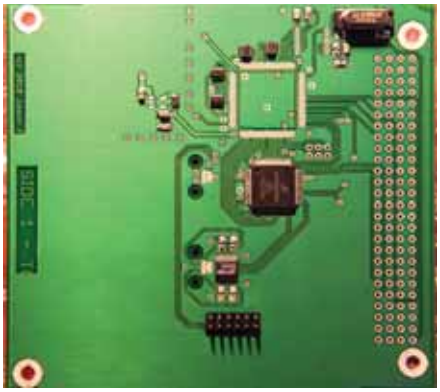
Morse Certificates

At a meeting of the Thornton Cleveleys ARS, Ron, M0GMN was presented with his Morse Proficiency Certificate by Mick, G4EZM, watched by the area Morse Assessor Ken, G3RFH. Ron passed his test at 20wpm and is believed to be the first successful candidate in the North West.

(l-r) Mick, G4EZM, Ron, M0GMN and Ken, G3RFH.

FUNcube

AMSAT-UK has released pictures of the Command, Control & Telemetry board being developed for the FUNcube Amateur Radio satellite. FUNcube is the latest satellite project being developed by AMSAT-UK members. In addition to a telemetry beacon FUNcube will carry a 435 to 145MHz linear transponder for SSB/CW operation. It will be the first time a satellite this small has carried such a transponder. Pictures and further information can be found on the FUNcube site at www.FUNcube.org.uk. There will be a presentation on FUNcube at the AMSAT-UK International Space Colloquium to be held in Guildford from 31 July to 1 August.



70 Years of Success

In the latest Foundation exam, Bishop Auckland Radio Amateur Club's class were all successful. The five candidates had braved the winter weather, serious health problems and the demands of Key Stage 3 homework to study for the exam. Their ages ranged from 13 to 83 and matched the breadth of their experience. Despite all, they passed with flying colours and are applying for new M6 callsigns. It's hoped that, as honorary members of BARAC following their pass, some will go on to join the intermediate class. BARAC is fortunate to have its own shack and unfettered use of the Village Hall at Stanley Crook County Durham. Exam classes are run every week throughout the year there and the only cost to candidates is the exam fee. Thanks must go to members of the Club for subsidising the courses through their subs and the annual rally proceeds.

GB1RBP

The Radio Society of Harrow has been invited by St Luke Hospices to demonstrate amateur radio and display some WW2 communications equipment at Bentley Priory on 22 May, between 11am and 4pm. St Luke Hospices are holding a 1940s Day fund raising event open to the public, in association with the Bentley Priory Battle of Britain Trust. There will be afternoon teas, Spitfire display, music, art, dance, drill, tours of the priory, re-enactment displays, exhibitions, workshops. www.g3efx.org.uk.

Foundation Sucess

The Mid Ulster Amateur Radio Club held its first weekend Foundation course and exam. It was a great success for a first time with all candidates passing, thanks to the hard work of tutor Alex, MI0MVP and other club members who gave up their weekend. Well done all.

Radar Reenactment

A team comprising radio amateurs from the Coventry Amateur Radio Society and the Northampton Radio Club with many other people including the pilots of the aircraft, who are all radio amateurs, were successful in the re-creation of the experiment on the 75th anniversary of the Daventry Experiment. This was the culmination of around two years' research, planning and preparation.

Independent witnesses included farmer, Helen Brodie, and local villagers who gave a round of applause as the trace on the oscilloscope moved due to the reflections of the 2m signal from GB75RDF at Daventry. It is by the good grace of Helen that we were able to use the field. Her immediate reaction was to say, that her father, who owned the land 1935 always thought "It was great honour that this took place on my land".

On a very wet and windy day there were displays by Watson-Watt society that included a model of the Chain Home radar station. The Defence Electronic History Society brought along original second world war magnetrons along with informative display material.

The Coventry Amateur Radio Society put GB4WWR on 80 metres at Litchborough. The Northampton club manned GB75RDF at the ex BBC site Daventry.

A highlight of the day was a fly past by three aircraft all piloted by amateur radio operators. These provided the targets to reflect the 2m signal from Daventry, replacing the BBC's original 49m transmission.

Thanks go to Helen Brodie, owner of the land, Brian G8GMU, for his co-ordination of all activities, Peter Grace (Watson Watt Society), Defence Electronic History Society, David Hooper (owner of the replica Flat Nosed Morris), Giles Herbert, G0NXA, for organising the aircraft, Frog Brewery for the special beer, Bulkington Scouts for the tentage and members of the Coventry & Northampton Radio Societies and Arqiva for the facilities at Daventry & many others without whose cooperation this event could not have happened.

The model Chain Home radar station with the Watson Watt statue in the foreground.

NEWS IN BRIEF

• G2BKZ and members of Stevenage & District ARS will be using GB6CW at Cromer Windmill, near Stevenage Hertfordshire, for Mills on the Air weekend, 8 & 9 May.

FUNcube at UKSC 2010

The UK Space Conference was held in March in Godalming Surrey. Many of the presentations are available for view from the Ustream server. AMSAT-UK attended to explain their exciting plans for the FUNcube satellite. As well as the amateur radio SSB/CW transponder FUNcube will provide an in-orbit tool for science education outreach and hands-on training in space and all the Science technology, Engineering & Mathematics subjects. The telemetry system is designed for easy reception by school pupils using extremely simple hand held VHF receive equipment connected to a PC soundcard or USB port. The satellite contains a materials science experiment and pupils will be able to receive the results direct from space and compare them with similar reference experiments in the classroom.

There will be more demonstrations of FUNcube at the AMSAT-UK International Space Colloquium to be held in Guildford from 31 July to 1 August.

Club Success

Otley Amateur Radio Society recently held a Foundation course, culminating in examinations in March. All four participants gained a pass. In addition, two existing Members sat their Intermediate exam earlier the same night and also gained passes. A great result for the Club. By the time you read this, several members will also be in the throes of studying for their Advanced License, with the exam date in June. Pictured are the successful Foundation licence holders; Alex, M3ZTN, Dominic, M6DBA, Joyce, M6JHW and Karl, M6TKA, together with their lead instructor Nigel, G0NIG and Chris, 2E0CJW (far right), one of the Intermediate passes. The other, Stuart, 2E0HGR, was absent for the photo.

CQ SOTA – CQ for Summits on the Air

G4ERP enjoying some summer sunshine on Loughrigg Fell G/LD-047 in the heart of the Lake District.

SOTA. Anyone who listens on 2m is likely to have heard the call, "CQ SOTA – CQ for Summits on the Air". With better weather just around the corner, now is a good time to consider joining in the fun. If you enjoy walking and already own a 2m portable radio then there's nothing to stop you getting involved straight away.

Summits on the Air is an awards scheme that has been running since 2002. It is now worldwide and there are new countries joining each year.

So what is SOTA all about? First, SOTA isn't a contest. It's about achieving your own personal goals. SOTA encourages those of us who like the outdoors to take our radios with us when we go off walking and to operate then from the hilltops. The choice of when and on what bands to operate is completely free. We gain points for making QSOs from the summits and fixed stations can gain points for working us. The concept is very simple and the enjoyment immense.

The SOTA scheme was cleverly designed to appeal to all radio amateurs. The originators of the scheme – G3WGV and G3CWI – thought long and hard about the rules before it was launched. It is a testament to their forethought that the basic rules have remained unchanged in all that time. All the more amazing is that the pair had no idea of how successful it would be and anticipated only a handful of stations taking part. This rule stability is good news for anyone who views SOTA as a long-term commitment. There is no time constraint on the awards that are on offer.

Those who take their radios to the summits are known as 'activators' and they earn 'points' once they have made at least four QSOs. The 'chasers' are those who look for the activators and earn points for working them. SOTA is not a closed shop – in fact far from it. Anyone can call the activators and they are very much encouraged to do so. New participants are always made welcome. Although the activator needs a minimum of four QSOs to qualify a summit, rarely will he or she close down until the calls from the chasers have stopped.

THE WEBSITE. Key to the success of SOTA is the web. The SOTA website keeps everyone in touch via the built-in reflector but, most importantly, it is SOTA's version of the DX cluster. A list of planned activations can be viewed along with any spots of current activity from summits. Anything you need to know about SOTA can be found here. It acts as the database of reference documents, summits and scores. Everyone is encouraged to contribute to this database of knowledge and the result is a huge amount of information about everything SOTA – from equipment that people are using to parking spots and the best routes up the summits. There is even a SOTA group on Flickr where you can see photos of the summits, the activators and their equipment.

THE SCHEME IN OPERATION. An investigation of the log database on the website will reveal four tables – two for activators and two for chasers. Any points you earn as an activator or chaser are automatically added to both the relevant tables when you download your log. In each category, one table lists your total score and the other lists the number of unique summits you have successfully activated or chased. At this point it is worth saying that you can only gain points by activating a summit once in each calendar year.

The tables are presented so that you can 'compare your performance with others' and whilst SOTA is not ostensibly competitive it evidently has a competitive element. This often emerges as friendly rivalry between enthusiasts with similar scores. Here, the competitive spirit can be harnessed to good advantage to boost one's motivation that extra bit.

THE SUMMITS. SOTA is now worldwide but in the UK we use the Marilyns list of summits. Not all hills in the UK qualify so this is the list to which you need to refer and the website will provide all the details. This cleverly devised list is the result of Alan Dawson's concept that a summit is only valid if it is separated from its neighbours by having a defined drop all round. In his case, he chose 150m and this concept of separation is known as prominence. Unlike some 'tick lists', this one includes hills all over the UK and the net result is a collection of diverse summits. There are hills and mountains to please everyone and to cater for all abilities. For the more adventurous, there are many that can be tackled as a group in backpacking style and it's not unknown for activators to camp out overnight. Many summits are also located on the routes of our National Trails.

Scoring is based on the altitude of the summits and the points vary between associations. In G and GW, summits between 150 and 500m attract 1 point, those between 500 and 600m attract 2 points and so on. The maximum score is 10 points and in this category are some well-known mountains like Scafell Pike, Snowdon and Helvellyn.

Each summit has been given a unique

reference in the form 'GW/NW-001' – which just happens to be the reference for Snowdon. In this example, GW and NW signify Wales and specifically North Wales.

GETTING INVOLVED. This is the easy bit – regardless of whether or not you're the outdoor type. To begin collecting points for the chaser tables, simply use your current home station. You may want to optimise it later with SOTA in mind. (At present, most activations take place in the UK and Europe, so a DX antenna system for HF is probably not the best choice.) A check on SOTAWATCH will alert you to any imminent activations and it will let you know who is currently active and on what frequency. When you work the station make sure you note the summit reference. You will need this when you enter the QSO into the SOTA database.

If the activator's manner seems a bit abrupt and the QSO seems more contest-like than ragchewing, don't be too surprised. Take your cue from him. Whilst you may be enjoying a glorious day, conditions on the summit may be difficult and the activator is anxious to retreat to a lower altitude for reasons of safety.

Even if you have no intention of becoming a chaser just yet, call the summit station and note the reference in your log. You never know, you might get the bug at some time in the future. You can claim the points at any time and the activator will appreciate your call.

If you are the outside type and have some suitable equipment, you are ready for your first activation. First and foremost, make sure you choose a summit that is well within your capabilities as a walker. Carrying radio equipment as well as your normal safety equipment will make a noticeable difference to your performance. Most activators would be happy to mentor someone new to hillwalking and there is plenty advice on safety available both on the website and in the walking magazines.

Ensure your activation fulfils the spirit of SOTA as well as the rulebook and make your four qualifying QSOs. Enter your activation on the database when you get back (you will need to register first) and your points will appear in the tables.

I think a word of caution is needed at this point – not on the safety aspects of hillwalking but on the addictive nature of SOTA. If you like the outdoor life and are a keen radio amateur, the combination of these two pastimes can prove almost narcotic.

The view from the shack. Lake Windermere below Red Screes G/LD-017 early one morning after an overnight stop just below the summit.

EQUIPMENT. Outdoor operating is one aspect of amateur radio that really lends itself to homebrew construction. With one or two notable exceptions, there are no commercial suppliers catering for the lightweight enthusiast. I guess this is not surprising as equipment weight is irrelevant in a home station. When you have to carry the station up a mountain, a few extra grams suddenly become important. There is plenty of scope for you to engineer your station down to the minimum weight whilst making sure it is still reliable. You will notice the difference with every kilogram you discard and the challenge is great fun.

Whilst a 2m FM handheld should allow you to qualify many of the summits in more populated areas, a small lightweight beam and SSB from an FT-817 is probably a better bet. From the more remote summits, the extra power of, say, an FT-857 should be considered. You will then, however, need to think about external battery packs – probably either NiMH or lithium.

On HF, simple wire inverted V dipoles are the most common antennas and again, the FT-817 will produce remarkable results on either 60m SSB or 40m CW – the two most common HF bands in the UK.

The latest edition of the RSGB's *Radio Communication Handbook* contains a chapter dedicated to equipment suitable for SOTA-style operating.

AWARDS. At the heart of SOTA is the enjoyment we all obtain from the heady combination of two pastimes we enjoy. It is, however, nice to have something tangible and SOTA offers a range of certificates to recognise different levels of achievement. In addition, superbly engraved glass Mountain Goat and Shack Sloth trophies are available for those gaining 1000 points in the activator and chaser tables respectively. For an activator to reach this level of achievement does require considerable commitment, fitness and good hill walking skills however the elation that comes when the magic 1000 points is reached is difficult to describe. To date, only a small number of amateurs have achieved that status but it is a testament to the lure of SOTA that most of them are still active today.

WEBSEARCH

SOTA watch: www.sotawatch.org
SOTA group on Flickr: www.flickr.com/groups/sota_pics
Antennas: www.sotabeams.co.uk
Mountain weather: www.mwis.org.uk
National Trails: www.nationaltrail.co.uk
The Relative Hills of Great Britain by Alan Dawson, ISBN 1-85284—68-4

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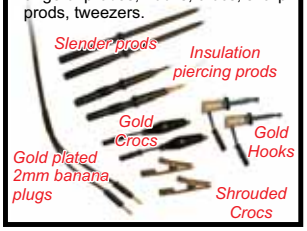

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Homebrew

The microphone: your voice transmission starts here…

PHOTO 1: Typical dynamic microphone (left) and electret condenser mic (right). The electret mic is 9.8mm diameter.

ESSENTIAL ITEM. The microphone is one of the most important components of a telephony transmitter. As the microphone is the very first stage in a phone transmitter, any distortion or noise from the microphone or its amplifier is sure to degrade the quality of the transmitted signal. The amateur radio shack can be a harsh environment for a microphone. RF signals at high field strength and strong magnetic fields from power supply transformers are easily picked up by the mic. Acoustic noise from cooling fans is another source of unwanted noise.

A microphone is a transducer that converts sound (vibrations in air) into a varying electrical voltage or current. This electrical signal can be amplified and used to modulate a speech transmitter. 'Dynamic Mike' is not necessarily the name of a particularly lively radio amateur; the word 'microphone' is often abbreviated to 'mike' or 'mic'. There are many different types of microphone in common use.

- Some older military equipment used carbon microphones of the type that used to be found in telephones. The carbon microphone uses a loosely packed capsule of carbon granules that are in close contact with the diaphragm. Vibration of the diaphragm causes small changes in resistance of the carbon granules.
- Crystal microphones have a piezoelectric material in contact with the diaphragm. Stresses caused by the vibrating diaphragm generate a voltage across the piezoelectric material.
- Condenser (capacitor) microphones use one plate of a capacitor as the diaphragm. The second plate is fixed in position. A polarising bias voltage is applied across the two plates. Movement of the diaphragm plate relative to the fixed plate causes the capacitance to vary. This produces a changing output voltage.
- The dynamic microphone is an electromagnetic device that works in the same manner as a moving coil loudspeaker. The diaphragm is connected to a coil that is suspended in a magnetic field. Movement of the diaphragm will produce an electric current in the coil.

Carbon microphones are rarely used today because they tend to suffer from higher levels of distortion than other microphone types. The carbon mic is also very sensitive to humidity. Crystal microphones are not as popular as they used to be, but you will still hear many older examples on the amateur bands today. The two most popular types of microphone in use today are the dynamic mic and one particular type of condenser microphone known as the electret condenser mic. Both types are inexpensive, readily available and capable of producing high quality audio.

CONDENSER MICROPHONE. Figure 1 shows the configuration of a condenser microphone. The two capacitor plates are on the left of the schematic. The fixed plate is connected to ground; the diaphragm plate is connected to a polarising voltage supply. Movement of the diaphragm varies the capacitance by changing the spacing between the plates. As the capacitor has a fixed charge provided by the polarising voltage, variations in capacitance will cause voltage changes at the input of the high impedance source-follower buffer amplifier. Regular readers will remember how I accidentally made a condenser microphone when I was testing an audio amplifier in the February 2010 Homebrew.

The electret type of condenser microphone doesn't need a polarising supply across the capacitor plates because the capacitor is made from a special, permanently charged material called an electret. Modern electret microphones are small, light, inexpensive and capable of producing very high quality audio. Electret mics are used in mobile phones, camcorders, telephony headsets and anywhere else that a small high quality microphone is required. Electret microphones usually have a built-in FET (field effect transistor) buffer amplifier with a very high input impedance. The buffer amplifier requires a DC supply, typically in the range 1.5 to 12V at a current of less than 1mA.

DYNAMIC MICROPHONES. Figure 2 shows the configuration of a moving coil dynamic microphone. This type of microphone has a lightweight coil that is attached to the centre of the diaphragm. The coil is suspended in a magnetic field that is usually provided by a permanent magnet. Air pressure acting on the diaphragm causes the coil to move through the magnetic field, which induces a small electric current in the coil. The dynamic mic acts like a loudspeaker in reverse. Some small loudspeakers can make reasonably good microphones.

Photo 1 shows a typical dynamic mic insert (left) and an electret condenser mic. The dynamic insert is a DM-9 type (Maplin QN39N), the electret is a type EM-60B (Maplin FS43W). SSB is not very demanding in terms of microphone frequency response. The bandwidth of an SSB transmission is usually less than 3kHz. A typical SSB exciter will require a reasonably flat response from about 200-300Hz at the LF end up to 3kHz at the HF end. Both of these microphones have a specified frequency response from 50Hz to more than 12kHz. Dynamic microphones have a specified load impedance, which is usually in the 200-600Ω range. The DM-9 specifies an optimum load impedance of 600Ω. It is usually acceptable to use a load impedance that is a bit higher than the specified value. Many microphone amplifier inputs have an impedance somewhere between 1kΩ and 50kΩ. Using a load impedance that is much lower than the specified optimum impedance may lead to low output, excessive distortion and poor frequency response.

Electret microphone elements require a very high load impedance, in the order of

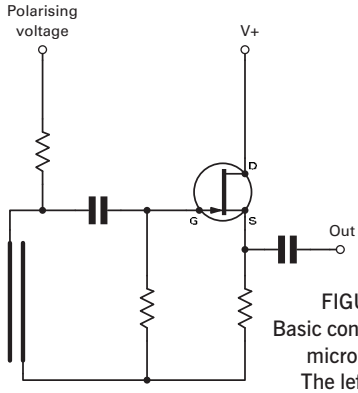

FIGURE 1: Basic condenser microphone. The left hand 'plate' is the diaphragm, which is moved in relation to the grounded plate by sound waves. This results in a voltage output that is impedance matched and buffered by the FET.

PHOTO 2: My original desk microphone, which has given more than 20 years' good service.

several megohms. Most if not all electret capsules (as in the photo) have a built-in FET amplifier that meets this requirement. The optimum load impedance for the output of the FET amplifier will be a more reasonable value ranging from 1kΩ to about 10kΩ.

As most dynamic microphones don't have a built in amplifier, no DC supply will be required. Take care to ensure that DC is not accidentally applied across the terminals of a dynamic mic. This could easily burn out the coil or damage the diaphragm. A coupling capacitor of about 10μF between the mic insert and the amplifier input will isolate the mic coil from the DC bias of the amplifier. Dynamic inserts with plastic bodies are usually symmetrical so that they can be used with either balanced or unbalanced amplifier inputs. Some metal-bodied inserts may have one end of the coil attached to the case ground. Electret inserts have the negative supply/mic ground terminal attached directly to the metal outer shell of the capsule.

There are two types of electret capsule in common use. One type has just two connection terminals, the other has three. **Figure 3** shows typical connections for both types, **Figure 4** shows the electrical configuration of both types. The three-terminal capsules (a) have a built-in load resistor for the FET amplifier. The DC supply is fed to one end of this resistor and the amplifier AF output is taken from the other end at the junction with the drain of the FET amplifier. The two-terminal capsules (b) don't have this resistor built in, so it is necessary to use an external resistor connected to the DC supply. The external resistor is typically about 2.2kΩ for a 5-12V supply and about 1kΩ for a 1.5V supply. The external coupling capacitor is typically about 1μF. A close inspection of the back of the capsule will show that it is very easy to identify the negative/gnd terminal because it is always connected directly to the metal case. Note that a three terminal electret can usually be used to replace a two terminal type by simply leaving the V+ terminal unconnected.

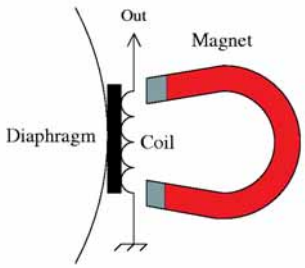

FIGURE 2: Basic principles of a dynamic microphone. A coil attached to the diaphragm moves in sympathy with sound waves and directly generates an electrical signal by induction.

MICROPHONE AMPLIFIER. The output from a typical dynamic microphone is just a few millivolts (mV) when the operator is speaking directly into the mic and even less when the mouth is more than a few centimetres away from the diaphragm. Electret mics produce slightly more output: I measured about 20mV p-p at normal speaking levels. This may be enough to fully modulate some transmitters, but my homebrew rig and some commercially made rigs will require a higher level for proper operation. The microphone amplifier in this month's construction project is based on my standard design as used in several previous projects [1]. I used the surface mount version of this amplifier as shown on p59 of the October 2009 *RadCom*. You can, if you prefer, use a DIL dual op-amp instead of the SMT components. The choice of op-amp is not too critical. I got good results using the LF353 dual op-amp. Even standard types like the humble LM4558 can be expected to perform well in this circuit. The schematic of this amplifier is shown in **Figure 5**. Some slight changes must be made to the circuit depending on whether it is to be used with the electret insert or the dynamic insert. For use with the electret insert, a 2k2 resistor was connected from the mic input to the DC supply rail. A 1μF capacitor was initially used for C1. The original R1/R2 values of 10k/100k were used. On-air testing of this configuration resulted in reasonably good reports on the audio quality. Some reports suggested that the audio was a little bit too 'bassy' compared to my usual microphone. Replacing C1 with a 100nF capacitor gives a slight bass cut at frequencies below 200Hz. On-air reports on this configuration were universally good.

For use with a dynamic microphone, the 2k2 resistor should be removed from the microphone amplifier input and C1 should be replaced by a capacitor with a much larger value: about 10μF works well with the DM-9 insert. If you use an electrolytic capacitor for C1, connect the positive side to the amplifier input and the negative side to the dynamic mic. To compensate for the low output of the dynamic mic, I changed R1 to 3k3 and replaced R2 with a 220kΩ pot so that I could set the amplifier gain to the required level.

DESK MICROPHONE. This month's construction project is a desk microphone that can be used with your home made or commercial transmitter. The design is based on my original desk microphone that has, so far, given more than 20 years of service,

FIGURE 3: Typical electret mic connections: (left) three-terminal type (see Figure 4a) and (right) two-terminal type (see Figure 4b).

PHOTO 3: Detailed view of how the mic insert is mounted.

although I have had to replace the electret insert twice during this period. This microphone was built in an aluminium box, which gives good RF screening. The electret insert is mounted on a flexible metal 'gooseneck' removed from a cheap table lamp. A short length of plastic tubing was used to secure the electret mic on the end of the gooseneck. This microphone is shown in **Photo 2**. The Tx/Rx switch and mic gain controls are on the top of the box. The small push button was used to operate a 1750Hz tone burst oscillator for VHF repeater operation.

A similar method of construction was used for the new microphone. An aluminium box (Maplin AB10 or similar) was used as the base. Unfortunately, a desk lamp with a suitable gooseneck was not available on this occasion. After checking out some of the local electrical and DIY stores, I found that the only desk lamps with a suitable gooseneck actually cost considerably more than a 'proper' microphone gooseneck. There are a few possible alternatives like the flexible map reading lights available from car accessory shops or flexible lamp goosenecks that are designed to plug directly into a USB socket. One very practical approach as used by EI2EUB is to use a length of co-ax cable (Westflex 103 is ideal) as the gooseneck with standard PL259 and SO239 connectors for mounting it on the base. I eventually bought a 6in gooseneck (Maplin YW72P), a DM-9 dynamic insert (Maplin QN39N) and, to make a really posh job of it, a mic windshield (Maplin LB35Q). The SMT microphone amplifier/LPF PCB described earlier was used to amplify the signal from the dynamic mic up to the 50-100mV level required by my transceiver. The PTT switch (although push-to-talk isn't really an accurate description of this type of switch) is a standard DPDT single hole mounting type.

The DM-9 insert is a slightly loose fit on the end of a standard mic gooseneck. I used a thin layer of PVC tape to fill the gap. **Photo 3** shows close-up details of how the microphone insert is mounted. It doesn't look very pretty, but the windshield does a good job of concealing the ugly bits. **Photo 4** shows the finished project.

POWER SUPPLY. The obvious choice of power supply for a microphone amplifier is a small 9V battery, but there are some disadvantages to this approach. If you do decide to use a battery, you will need to fit a switch so that the amplifier can be turned off when the mic is not in use. It would be possible to use a spare pole on the PTT switch so that the amplifier is only powered up while you are transmitting. This approach can be problematic as it is likely to lead to audible pops and clicks on the transmitted signal. A separate power on/off switch is probably a better option, but if the switch is accidentally left on, the battery will run flat after a couple of days. You could fit a LED power indicator but, since it would draw more current than the mic amp, it might do more harm than good. In my experience, the best way to provide power for the microphone is to steal it from the radio. This is very easy to do if you use a home-made rig and you have a spare pin on the mic connector. Be careful about taking power from the mic socket of a commercially made rig. Many transceivers have a DC supply of about 8V

PHOTO 4: The finished microphone.

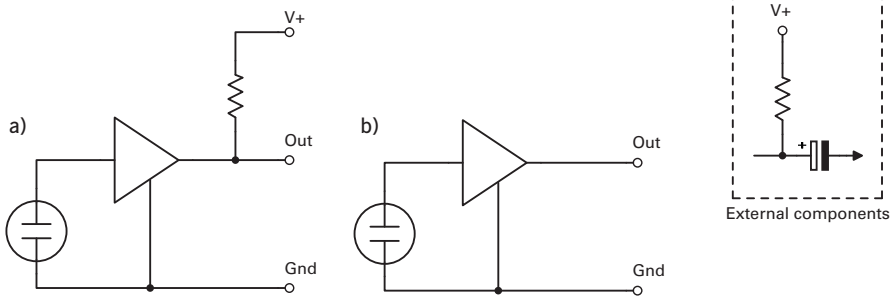

FIGURE 4: Representative circuit diagrams of the (a) three - and (b) two-terminal electret mic types shown in Figure 3.

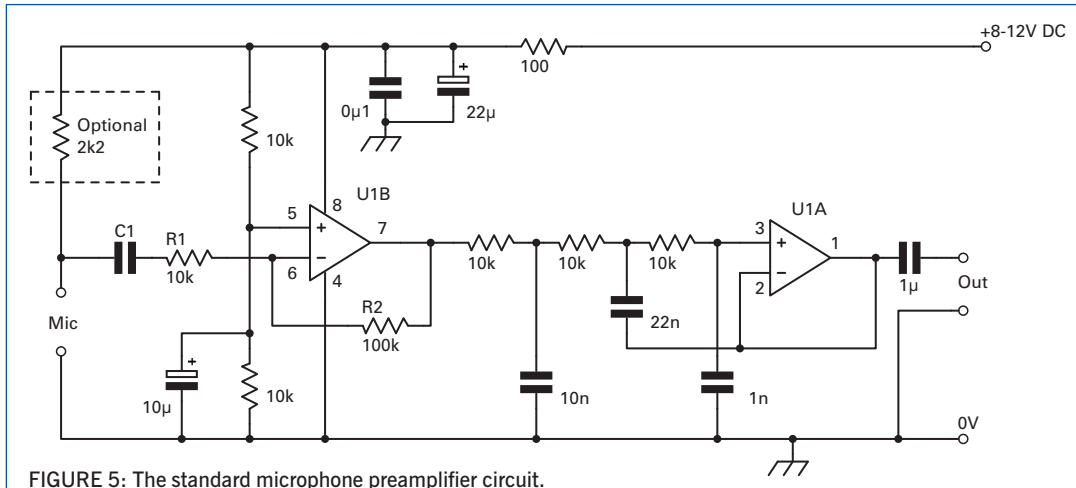

FIGURE 5: The standard microphone preamplifier circuit. See text for C1, R1 and R2 values for electret and dynamic mics.

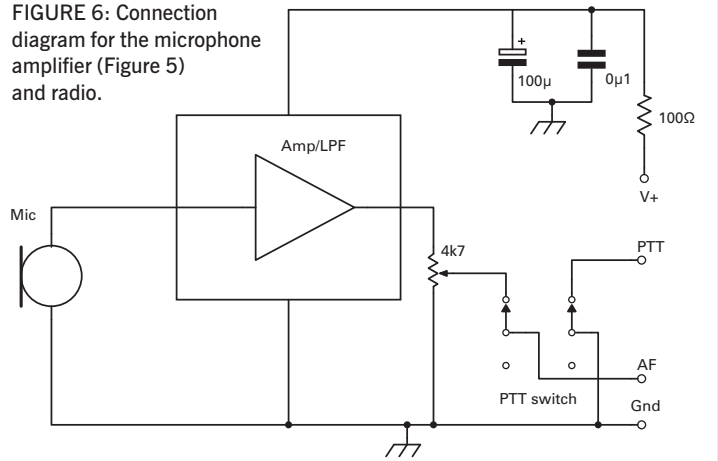

FIGURE 6: Connection diagram for the microphone amplifier (Figure 5) and radio.

available from the mic socket. It is possible to damage some transceivers by shorting this DC output to ground. Accidental short circuits can lead to blown voltage regulators and damaged wiring. You have been warned!

Figure 6 shows the configuration of the microphone, amp/LPF module and PTT switch. Note that I have included the mic gain pot shown in the photographs.

I used a spare pin in the mic socket to provide power for the microphone amplifier. To eliminate the possibility of clicking/popping when changing from receive to transmit, the amplifier is always powered up, regardless of whether I am transmitting or receiving. Even in these environmentally aware times, the 3-4mA drawn by the mic amplifier can be regarded as insignificant. I used the microphone for a few days without telling anyone that I had a new microphone. During this period, nobody noticed any change in my audio quality. Comparison tests have shown that the dynamic mic compares quite well with my old electret mic.

There is plenty of room in the base on the mic for additional circuits, such as oscillators for Morse code generation, two-tone testing, subaudible tone, DTMF generators etc... Other possible additions include level indicators, tone controls, equalisers, digital speech record/playback, AF or RF clippers/compressors – but please don't install a roger beep!

The microphone should be connected to the rig using screened cable that is grounded to the rig ground/chassis at one end and the metal case of the mic at the other. Special microphone cable has several wires with separate screening for the audio wire only. This guarantees good isolation between the audio wire and the other wires used for PTT and power. As this type of cable is not readily available, I use ordinary multi-core screened cable which has a single screen enclosing all wires in the cable. Old computer keyboard cables and some types of network cables are a good source of high quality screened wire. I have been chopping up old AppleTalk RS-422 cables to make my microphone leads. RF signals on the PTT and/or power wires could easily leak into the audio wire via capacitive coupling. To keep RF signals out of the microphone cable, it is a good idea to solder 10nF capacitors from the PTT and power pins directly to ground at the back of the microphone socket of a home made rig.

Next month: A VHF DDS/PLL frequency synthesiser.

REFERENCES:

[1] Homebrew August 2006, May 2009, October 2009.

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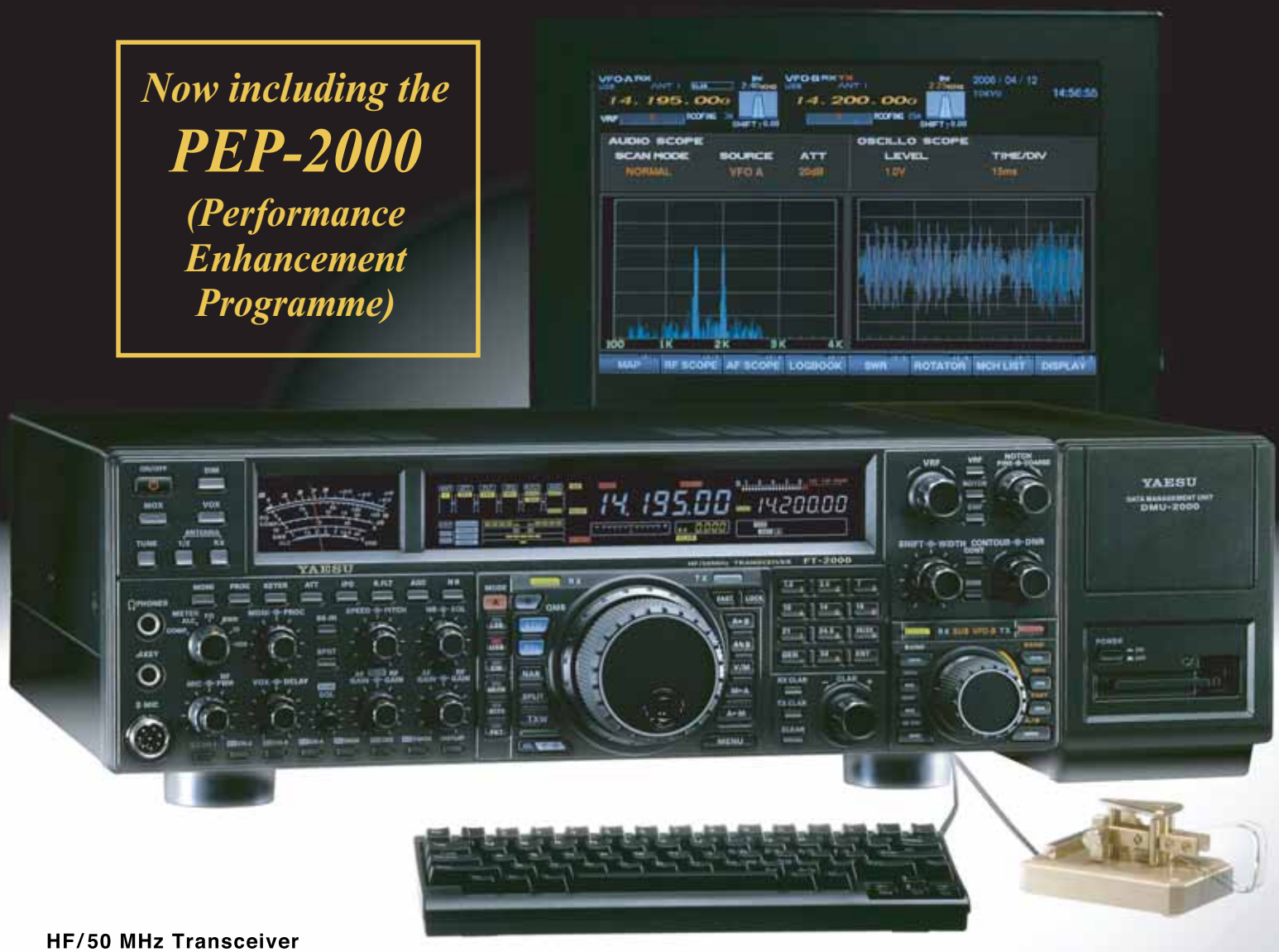

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Microtelecom Perseus SDR

How good is it as an auxiliary receiver?

The Perseus receiver and WoodBoxRadio DSW-150 switch box.

INTRODUCTION. SDR receivers provide features that are opening up new avenues for enjoying our operating experience on the amateur bands. With an integrated PC environment, high resolution spectrum displays, fast frequency navigation and excellent quality and dynamic range, SDR receivers are now being adopted for many demanding applications such as contest operation, DX working and spectrum monitoring. These features fully complement those of the traditional analogue receiver such that a combination of the two can provide the best of both worlds.

It is entirely feasible to add an SDR receiver to an existing transceiver with appropriate software to provide linking and control. This review takes a look at the key parts of such a system. It is by no means the last word on this approach; rather a first example of what can be achieved using current off-the-shelf parts and software.

Adding a high performance SDR receiver to an existing transceiver has a number of significant benefits:

- it can rejuvenate an older radio where the receiver has inferior performance or lacks facilities.
- A wideband spectrum display is provided far superior to that built into conventional radios, together with point and click tuning.
- A wider bandwidth feed is available to drive band monitor applications such as CW Skimmer.
- A second full receiver is provided which helps considerably when chasing DX in split frequency pile-ups if the host transceiver does not already incorporate this.

The Microtelecom Perseus SDR receiver was used for this review, in conjunction with the WoodBoxRadio DSW-150 switching and interface unit and Ham Radio Deluxe software. The equipment was used with Yaesu FT-1000MP and FT-847 transceivers.

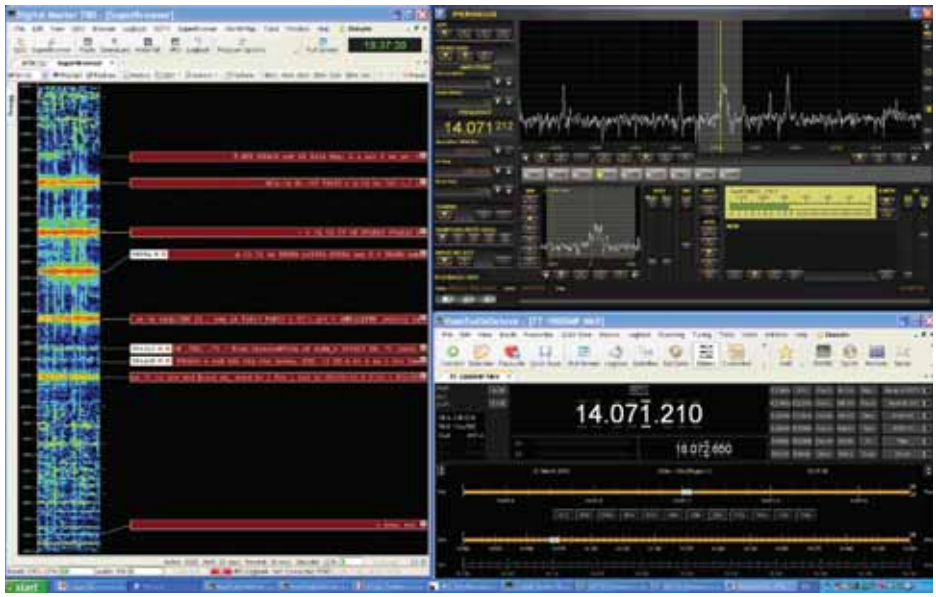
PERSEUS RECEIVER. The Perseus is a second-generation SDR receiver that uses direct digital sampling instead of down-conversion into a sound card. The receiver was reviewed in the March 2008 issue of *RadCom* by IK1ODO so, to avoid repetition, I will not repeat areas already covered in detail.

The receiver tunes from 10kHz to 40MHz and runs from a 5V supply, drawing around 700mA. A small universal wall plug PSU is provided. There are just three connectors on the rear; BNC antenna connector, DC supply and USB computer interface and, on the front panel, LEDs show front-end selection status. A red LED indicates when strong signals overload the A to D converter. The receiver comprises a 14 bit 80MS/s analogue to digital converter operating at signal frequency with a high performance FPGA digital downconverter and the resulting segment of band is output to a high speed USB2 interface. A switchable preamplifier, switchable input attenuators and a range of ten selectable input filters completes the hardware. Housed in a sturdy diecast case, it is very small at just 110mm (w) x 36mm (h) x 185mm (d).

PERSEUS SOFTWARE. The radio is provided with software on a CD ROM but updated versions are downloadable from the Microtelecom website. A PC with 2.5GHz dual core CPU and 1GB RAM is needed for maximum performance and the highest sample rates yielding displayed bandwidths up to 1600kHz, but a lower specification PC is adequate for lower sample rates and bandwidths. The software runs under Windows 2000, XP or Vista.

The first step is to load and install the USB drivers followed by the receiver application software and these were installed without difficulty. Microtelecom provide an eye-catching and easy to use graphical interface for the various controls but alternative software such as *WinRad* will also drive the radio. A large area of the Perseus display is devoted to the high-resolution main spectrum or waterfall window over a wide range of frequency spans and a display range of over 120dB in amplitude. A secondary display enlarges the area close in. The signal strength meter indicates signal level at the antenna socket in dBm independent of preamplifier or attenuator settings together with an S-meter scale based on 50μV for S9 and 6dB per S-unit.

The receiver frequency can be controlled



Display using Perseus software (top right) with *Ham Radio Deluxe* controlling the FT-1000MP (bottom right) and *DM780* software concurrently decoding several streams of PSK (left).

With its cover removed the Perseus receiver looks deceptively simple but is a formidable performer. Two banks of relays on the right control the bandpass filters.

in many different ways, using the mouse wheel, clicking or dragging on the main or sub displays or direct entry. A rotary knob accessory, Tmate from WoodboxRadio, is available if desired but other USB rotary controllers are also suitable. Modes are USB, LSB, CW, AM, Synchronous AM, FM and RTTY but only upper sideband on CW and RTTY. This gives inverted RTTY according to the normally used LSB convention. The DRM digital broadcast mode is available with external decoder software and virtual audio cable. Virtual audio cable is available through third party software and provides the best solution for CW Skimmer and data decoding packages for RTTY, PSK etc.

Channel bandwidth filtering is very comprehensive, fully variable from as high as 50kHz down to below 25Hz with full passband tuning and independent setting of the filter sides. A notch filter, impulse noise blanker and noise reduction system are all included and all are fully adjustable. Three AGC time constants can be selected – fast, medium and slow – and the AGC can also be switched off.

An interesting feature of the Perseus is the ability to record up to 1600kHz of the RF spectrum, which can be played back later with all the receiver controls such as tuning, mode selection and bandwidth fully operational. It uses a considerable amount of hard disc space to record at the higher bandwidth settings. Of particular interest to the broadcast listener are the databases of broadcast schedules. When tuning across the broadcast bands, the station names, schedules and times are displayed when there is a match according to frequency for records held in the databases. Three databases are supported, the HFCC and EIBI databases that are available on the internet and a separate list maintained by the user.

Apart from the receiver software, Microtelecom also includes a spectrum analyser application, which runs using the Perseus hardware. This will scan from near DC up to 40MHz at the widest span range.

PERSEUS MEASUREMENTS.

Unless stated otherwise, measurements were made with the preamplifier off and the preselector filter set to wideband. Sensitivity measurements for 10dB s+n:n on USB in 2.4kHz bandwidth showed 0.5μV (-113dBm) across most of the tuning range, reducing by a couple of dB at 28MHz. Sensitivity figures held well down into the LF/VLF region, reducing a little below 50kHz with the rise of some phase noise. The preselector filters generally showed a loss of 1 to 2dB and the preamplifier improved sensitivity marginally by about 1-2dB. ADC Dither (see later explanation) reduces sensitivity by 2dB.

The signal strength meter calibration was excellent, within 1dB or so, reducing slightly above 20MHz.

The rejection of spurious signals was exceptionally good, 80dB worst case and 100dB or more on most bands. The sampling image was undetectable. Subharmonics of the clocks at 20MHz and 24MHz were around S2 (-115dBm).

The AGC threshold is quite soft over a range of about 20dB before the audio level is fully flattened. The default setting for AGC threshold results in AGC action at quite a low level but this is adjustable from the setup screen accessed by clicking the blue Perseus icon in the top left corner of the display. This is not documented in the manual. The AGC attack characteristic inserts a 10-15ms hole in the audio, a characteristic exhibited by many of the current breed of DSP radios. This impairs weak signal performance under noisy conditions. An AGC button labelled 'Spk Rej' (could this be spike reject?) reduces this hole and lowers the audio slightly but results in an initial overload and a long settle period. Not a real improvement in my opinion. AGC decay has a fairly linear characteristic settling in 500ms for fast, 2s for medium and 6-8s in the slow setting.

Direct sampling SDR receivers respond to strong signals in a completely different way from analogue receivers and do not follow the 3dB/dB rule. This makes the calculation of an Intercept Point rather meaningless. However the concept of dynamic range is entirely valid and is measured in the usual way. With standard two generator intermodulation measurements, low level products are seen for quite small signals but these do not increase until close to the ADC clipping level. These low level spurious products can be removed by enabling dither in the ADC and this is best left enabled for normal operation unless signals are very weak. I measured 100dB intermodulation limited dynamic range in 2.4kHz bandwidth (104dB in 500Hz bandwidth), a result independent of signal spacing and this equates to an analogue receiver with a 3rd order intercept of +27dBm. This is an excellent result equal to the best receivers available, particularly at close spacings. The ADC clipping level was reached with –5dBm input from a single signal or –11dBm from each of two equal signals as used for IMD testing. Signal handling collapses when the ADC clipping level is reached.

Reciprocal mixing measurements showed that the phase noise performance was excellent. Indeed, the figures are the best for any radio I have ever measured. The results are shown in the table measured at 16MHz using a low noise Wenzel oscillator source.

Frequency Offset	Reciprocal mixing for 3dB noise, 2.4kHz bandwidth	Reciprocal mixing for 3dB noise, 504Hz bandwidth
1kHz	-	93dB
2kHz	100dB	106dB
3kHz	103dB	109dB
5kHz	107dB	113dB
10kHz	109dB	115dB
15kHz	113dB	119dB
20kHz	117dB	124dB
30kHz	117dB	124dB

The excellent phase noise results enabled the channel filter skirts to be measured down to at least –80dB, a result that can only be achieved on very few radios. The shape factors are excellent. The bandwidth figures for the 2400Hz and 504Hz filters are as follows:

Filter	-6dB	-60dB	-70dB	-80dB
2400Hz	2400Hz	2594Hz	2611Hz	2653Hz
504Hz	504Hz	702Hz	718Hz	737Hz

Figure 1 shows the overall selectivity response resulting from the channel filter and reciprocal mixing.

I maintain a league table of dynamic range figures for all radios that I have reviewed focussing on close-in performance. The Perseus receiver is now at the number 1 position, pushing the Elecraft K3 into second place.

INTERFACE BOXES.

To use an auxiliary receiver with a transceiver requires a means of switching the antenna between receiver and transmitter and similarly the audio lines so that the receiver is muted and CW sidetone made audible on transmit. There are two units available which perform these switching functions, the Elad Switchbox and the WoodBoxRadio DSW-150.

The Switchbox contains two relays, one for switching the RF and the other for the

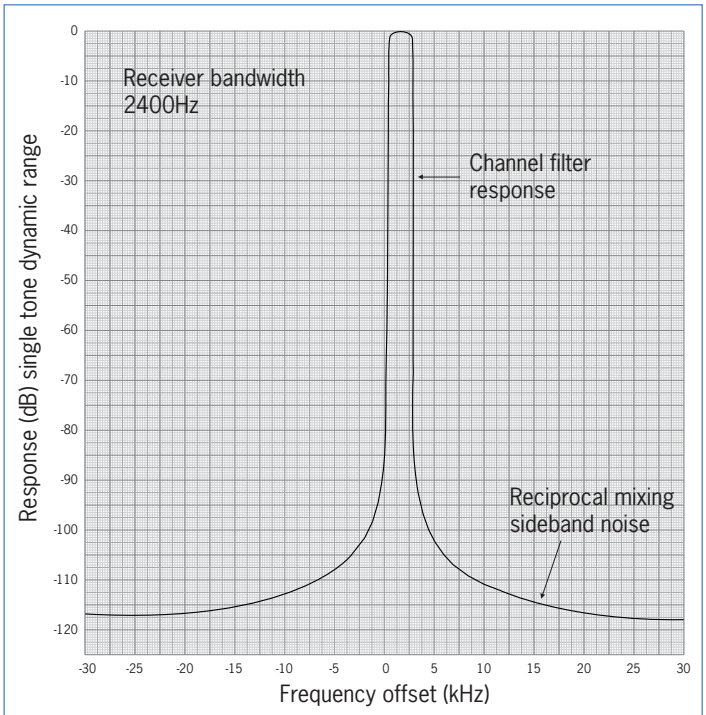


FIGURE 1: Perseus composite selectivity curve on USB.

audio, and sockets for the antenna and audio lines. The audio connections are stereo 3.5mm jacks for connection to the PC soundcard and the transceiver headphone jack, and the switched audio is for driving headphones or PC-style powered speakers. The unit will switch from receive to transmit automatically by sensing the RF power from the transmitter, or alternatively a connection is provided for switching from the PTT or a similar line. A gas discharge protection device is fitted across the antenna connector.

The DSW-150 is manufactured by Elad for WoodBoxRadio and uses the Switchbox for switching functions but with an added power sensor and USB port. This allows the forward and reflected transmitter power to be indicated on the PC display in analogue meter style formats using included software. Both units require a 13.8V supply.

RF sensed switching operates with less than 10mW power (I measured 4mW) and insertion loss on the HF bands is negligible. It is designed for use up to 160MHz at a maximum power level of 150W. The receive antenna port is grounded on transmit and this helps isolation. I measured 90dB isolation on 1.8 and 3.5MHz reducing to about 55dB on 28MHz.

My main concern with RF sensed switching is that 'hot switching' will inevitably occur. The issue is its effect on the transmitter and the life of the relay contacts. I measured 8ms for the time taken for the antenna relay to switch but on CW and RTTY most radios reach full power in around 4ms. On SSB, this is not so much an issue as RF sensing is sufficiently sensitive to switch on background acoustic noise alone, well before you start speaking. I measured the dwell time of the relay box as about 230ms, which is probably about the right value considering the latency/ time delay in the Perseus receiver.

OVERALL SYSTEM RESULTS. *Ham Radio Deluxe* software by Simon Brown, HB9DRV is a comprehensive package providing full PC control of a wide range of radios, and many other features such as logbook, satellite tracking and rotator support. With the associated *DM780* program it provides full support for data modes and SSTV. Several incidences of *Ham Radio Deluxe* can be run simultaneously, with the ability to synchronise operation. One radio is allocated as the master and then the operation of a second or more radios will follow as slaves. Normal transceivers are controlled through PC COM ports, with the Perseus receiver via a virtual COM port set up as software within the PC. I generally had no problems setting up the software but on one particular PC that I tried I could not get the virtual COM port to function until I inserted the port address into the Perseus settings screen (accessed by clicking the blue Perseus icon in the top left corner of the display).

I generally used RF sensed switching with the DSW-150 as PTT control is not so easy to implement in practice. The PTT sockets and connections on most radios are intended as input lines and do not function as output lines. One solution is to use the TX ground line provided for linear control but if semi-break-in is used on CW the dwell time is extended excessively. It is possible in most cases to use this in parallel with linear control. For RTTY it is possible to use PC port control for PTT and for CW if *WinKey* is used (which I thoroughly recommend) there is a suitable PTT socket available.

There are essentially two ways to use the system. The first method is to use the Perseus receiver as the master. All receiving is done on the Perseus, the transceiver is used just for transmit. There is no quick bandchange available and split operation is somewhat limited.

The second method is to use the transceiver as the master, with the Perseus as a second receiver and for spectrum display. A switch connected across the DSW-150 PTT line will switch between the two receivers, and RF sense will ensure the transceiver is connected on transmit.

Overall I found the system rather slow to track but I did not make any attempts to optimise any control aspects. Receiver latency is the main limitation particularly for 'snappy' CW operation and on changeover back from transmit to receive. There is no mute-on-transmit facility with the Perseus so the receiver experiences a high signal input on transmit and it is necessary to use a fast or perhaps medium AGC setting to ensure fastest recovery to receive. I am sure we shall see more of these hybrid implementations in the future and software that is tailored more for this specific purpose. This is just a start. An alternative software package is *BobCat*, which provides a number of additional features such as band buttons, memories and split frequency operation for the Perseus but only for direct linking to Icom radios.

The Perseus receiver really excelled. Its performance on crowded bands was generally excellent, with clean results and superb selectivity. Audio quality was good but seemed more rounded on the transceiver. However, the radio was somewhat let down by the AGC performance. Signals were less readable in noisy conditions compared with the transceiver and the Spk Rej setting imparted distortion and a harsh sound under these conditions. It was necessary at times to switch in some input attenuation particularly in the evenings on 40m but you get due warning, the ADC clip legend starts to flash. The sensitivity on quiet bands such as 10m was barely sufficient but the LF performance was exceptional. It always surprises me why the performance of many expensive transceivers is so poor on the medium and long wave broadcast bands but the Perseus is excellent, clean with a quiet background, and the more distant LF time code transmissions were well received.

CONCLUSIONS. The Perseus receiver is an excellent performer supported by attractive and easy to use software and currently my new number 1 in terms of close-in dynamic range. The overall system combined with a transceiver opens up some interesting possibilities and scope for further experimentation. There are other hybrid implementations appearing such as from RF Space; this is a fast developing area. Prices are currently £699 for the Perseus with the Switchbox at £99 or DSW-150 at £199. Prices include VAT.

My thanks to Martin Lynch and Sons (ML&S) for the loan of the review items.

WEBSEARCH

ML&S: www.hamradio.co.uk
Perseus: www.microtelecom.it/perseus
WoodBoxRadio: www.woodboxradio.com/uk/index.html
HRD: www.ham-radio-deluxe.com

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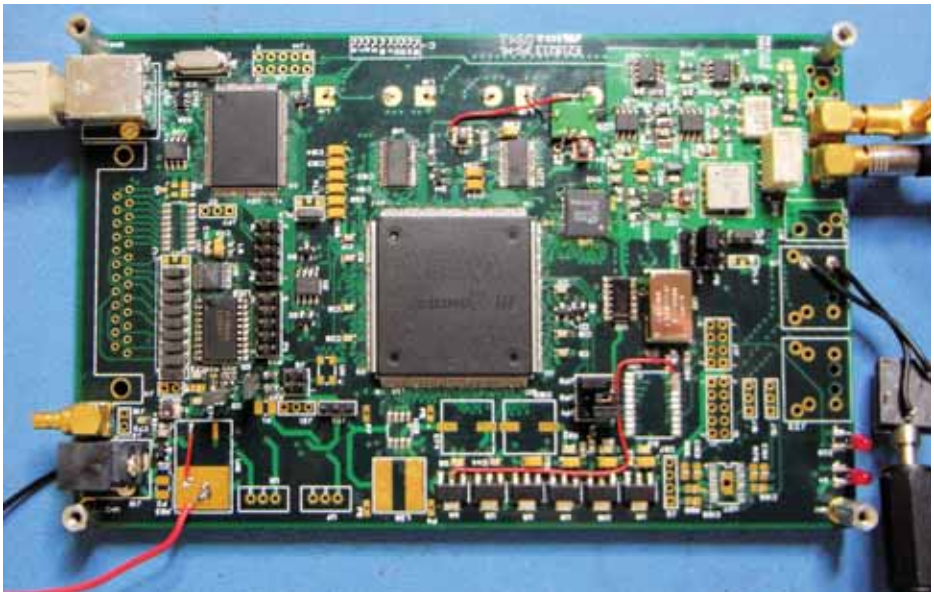

PHOTO 1: Prototype Hermes PCB built by VK6APH.

NEW DEVELOPMENTS. One of the effects of giving up writing our Software Defined Radio column in *RadCom* 18 months ago is that it left us more time to do more practical SDR work. The good news is that 'doing' rather than teaching (or is it preaching?) the gospel of SDR has meant that there are now some new great new developments that VK6APH (alias 'Dr Frankenstein') been involved in to tell our readers about – and VK6VZ (alias 'Igor') has now got pretty near a working full-blown HPSDR on his operating desk.

As many of those who are familiar with our old column will know, VK6APH is one of the pioneers of the HPSDR Project, which is a group of radio amateurs who are interested in pursuing 'leading edge' development of SDR technology [1]. This group contains people from all around the globe – including a large number from the United Kingdom.

ONE-CHIP SOLUTION. Around April last year, Kevin Wheatley, M0KHZ, a highly enthusiastic and prolific homebrewer, put forward a proposal to the HPSDR internet e-mail group that he would like to lead a project to develop a single board HF plus 6m SDR transceiver. This would be based on the digital down conversion (DDC) Mercury receiver and the digital up conversion (DUC) Penelope transmitter technology [2], using a single large field programmable gate array (FPGA) for the digital signal processing.

To use Kevin's words: "Following the outstanding success of Mercury and Penelope and while investigating the Verilog code for both, I had the insane idea of merging the Verilog code of Mercury and Penelope into a single FPGA. The more I thought about it, the more I liked the idea" [3].

Until now, putting together a basic HPSDR transceiver using the third-generation SDR technology [4] had meant purchasing four basic boards – the HPSDR Atlas backplane, Ozymandias (or 'Ozy') PC communications board, Mercury receiver and the Penelope exciter. With these boards being made in small batches and at differing times, it was proving difficult to produce them and keep them in stock to satisfy the demand from the growing number of radio amateurs who had become interested in experimenting with high-performance SDR.

As a single-board transceiver had become the answer at the SoftRock budget end of SDR [5], experimenters had been crying out for something similar with the HPSDR – and Kevin's project would fill this large gap.

BUILDING THE TEAM. A project team was quickly assembled, comprising Antony Taylor, a SDR enthusiast living in Singapore (schematic and PCB production), VK6APH (software and hardware development, especially the FPGA code), Bill Tracey, KD5TFD (component sourcing), Lyle Johnson, KK7P (hardware reviews), Scotty Cowling, WA2DFI (Orcad licensing and general engineering advice) and Graham Haddock, KE9H (hardware development, especially power amplification).

Having a team spanning three continents is nothing new and no big deal for the HPSDR project. By December 2009, all design work was complete and a prototype had been produced. By Christmas, Phil VK6APH had made the first contact with Hermes – to ER5GB in Moldova on 18MHz SSB, using an external power amplifier to increase Hermes' 500mW output to 100W PEP.

DATA TRANSFER. When it comes to connecting with a PC for operational, communications and data transfer purposes, Hermes uses USB 2.0, which is specified at

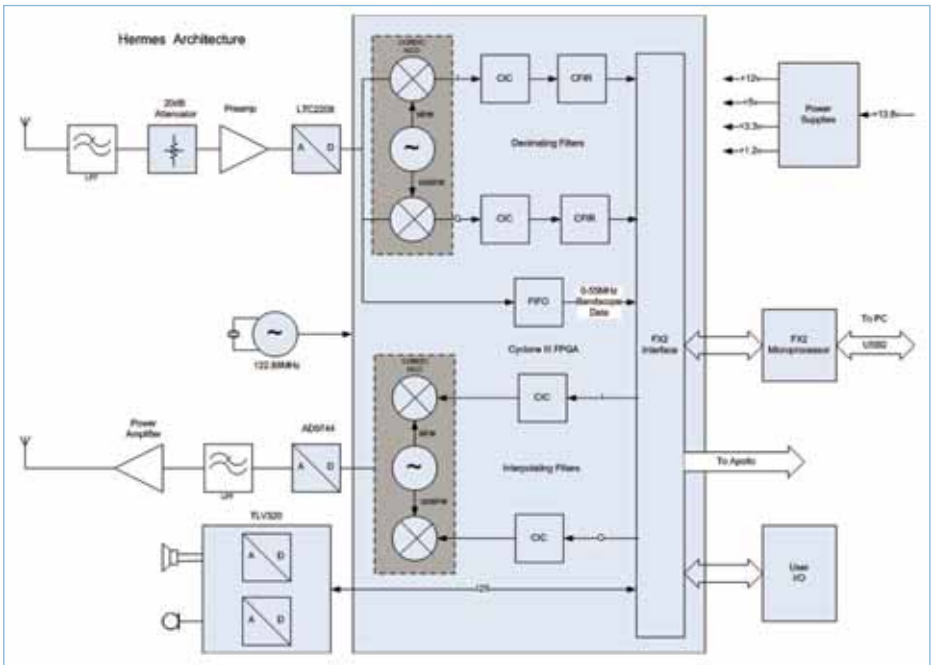

FIGURE 1: Architecture of Hermes.

480Mbits per second. This needs to be split between the transmit and receive functions. VK6APH says that independent tests have shown that on receive a sustained transfer of 35Mbyes per second can be obtained using USB 2.0. This is sufficient to support eight simultaneous 192kHz-wide receivers, each tuned to a different band – very impressive!

Hermes (**Photo 1**) fits on a Eurocard-sized PCB (100 x 160mm). Its companion 15W RF power amplifier, low pass filter, automatic ATU and transmit/receive switching module, Apollo, is built on an identical size board. The two units fit neatly into Hammond series boxes, providing screening and a rugged case. A prototype of the Apollo module, designed by Kjell Karlsen, LA2NI, is shown in **Photo 2**.

Although 15W of power may sound fairly small, this is enough to drive a modern linear RF amplifier using the popular Svetlana 4CX800A (GU74B) tetrode – such as the Acom 1000 and the Alpha 99 – to the UK legal limit of 400W.

Hermes is designed to be full duplex (and hence full break-in on CW) and can transmit/receive cross-band from one amateur band to another. In addition to SSB, its hardware is capable of transmitting traditional narrow band modes such as PSK31 and CW, new digital modes such as ALE and EasyPal digital SSTV, plus wide-band modes such as enhanced SSB (ESSB) or AM – as long as the supporting PC software can generate these modes. If you wish to use Hermes on the amateur bands above 54MHz, the transmit side of Hermes has an 0dBm output, suitable for driving a VHF/UHF transverter.

THE BIG FPGA. The heart of Hermes is an Altera Cyclone-III EP3C40Q240C8N FPGA, whose logical elements interpret, separate, filter and prepare the numerical values decoded by Hermes's ADC for post-processing into a viewable form. Like the HPSDR Mercury receiver, Hermes uses the Linear Technologies LTC2208 ADC, which directly converts analogue RF signals into digital ones – at the rate of 122 million 16-bit samples per second.

Digital signals from the LTC2208 are passed directly to the Cyclone-III FPGA, where they are processed in real time. More information on how FPGAs and ADCs work – and digital down/digital up conversion technology – can be found in the Software Defined Radio section of the latest *Radio Communication Handbook* **[6]**.

In terms of the number of available gates, the FPGA used by Hermes is the largest leaded device presently available. The code for USB 2.0 communications, the transmitter and the receiver occupies only 30% of the FPGA: the really exciting thing is that there is room for an additional seven receivers.

Since these receivers would all share the one ADC, they all share the same antenna. Using a multi-band antenna such as a trapped vertical it is possible to effectively monitor eight amateur bands simultaneously.

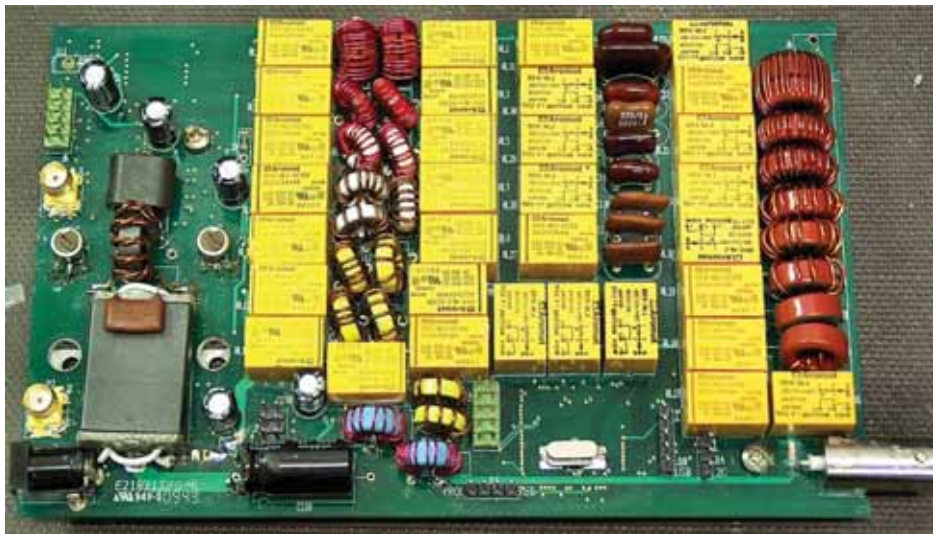

PHOTO 2: Prototype of the Apollo module, designed by Kjell Karlsen, LA2NI.

SOFTWARE. When it comes to PC console software, Hermes can use a specially modified version of *PowerSDR™* **[7]** under Windows XP or VK6APH's open-source *KISS Konsole* **[8]** under Windows XP and both 32 and 64 bit version of Vista and Windows 7. In addition, for those who use Linux, John Melton, G0NRX/N6LYT is developing a client/server version of his *Ghpsdr* console in support of the various HPSDR projects **[9]**.

AVAILABILITY. At the time of publication, the Hermes project team is yet to make a decision on who will sell the PCBs or bare boards. It is hoped a Hermes transceiver and Apollo power amplifier will be on display on the TAPR booth at the Dayton Hamvention® in May.

REFERENCES AND WEBSEARCH

[1] You can subscribe to the HPSDR reflector by going to http://lists.openhpsdr.org/listinfo.cgi/hpsdr-openhpsdr.org

[2] See 'Mercury and Digital Down Conversion' (pages 8.35 to 8.39) and 'Digital Up Conversion Tx – the HPSDR Penelope Exciter' (pages 8.39 to 8.40) in the 10th edition of the *Radio Communication Handbook*.

[3] HPSDR Wiki on Hermes: http://openhpsdr.org/wiki/index.php?title=HERMES

[4] The three 'generations' of software defined radio technology can be described as 1 – the Weaver or analogue phasing method; 2 – the Tayloe or QSD (quadrature sampling detector) method; and 3 - the direct down conversion/ADC method.

[5] Join the Softrock 40 reflector at http://groups.yahoo.com/group/SoftRock40. You will first need to become a Yahoo member.

[6] *Radio Communication Handbook, 10th Edition*, edited by Mike Dennison, G3XDV and John Fielding, ZS5JF, RSGB, 2009, pages 8.1 – 8.56.

[7] The *PowerSDR™* software can be downloaded free at http://flex-radio.com/download_files/index.html

[8] Details of the open source *Kiss Konsole* software can be found on the HPSDR wiki at http://openhpsdr.org/wiki/index.php?title=KISS_Konsole.

[9] John's blog can be found at http://g0orx.blogspot.com/

[10] TAPR website: www.tapr.org

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Portable

A Revolution in Battery Power

Lead-acid gel cell on left and equivalent LiPO battery on right.

BETTER BATTERIES. With over 1,200 people doing SOTA activations, inevitably the search for better technology has resulted in dramatic improvements in portable operating techniques, no more so than in portable power sources. I last wrote about battery technology over two years ago; since that time there have been substantial changes that are worth reporting. Two years ago, the most common battery technology for high power portable operating was undoubtedly lead-acid (usually in the form of gel cells). These batteries are robust, reliable and easy to use. They are, however, heavy and bulky.

The battery technology that has, over the two years or so, become most popular within SOTA is Lithium Polymer (LiPO). Two years ago, LiPO batteries were expensive and seemed unnecessarily hazardous for general use. However, with familiarity and most importantly with proper handling, they have proved to be suitable for a wide variety of portable devices; MP3 Players, SATNAVs and laptops are all making use of this remarkable technology.

LiPO have several advantages over lead-acid gel cells – and indeed most other sorts of batteries. The first is that for a given capacity they are much lighter. For example a 4000mAh lead-acid gel cell weighs 1.6kg. The nearest equivalent LiPO (4200mAh, 14.8V) weighs just 485g; less than a third of the weight of the lead acid battery.

The second advantage is that they are small compared to other battery technologies of similar capacity. This reduction in volume is especially useful for the backpacking radio amateur.

The third advantage is that they are able to deliver very high currents with no loss of capacity. A typical LiPO will deliver fifteen to twenty times its ampere-hour rating. Thus a 4Ah battery with a '15C' rating will deliver up to 60 amps. This is much better than a lead-acid battery, which will only achieve its rated capacity under very specific conditions. This usually means that the actual capacity at high currents is less than you might expect. This characteristic of LiPO batteries makes the use of higher power light-weight operating far easier than ever before. Many SOTA operators now use power levels of up to 100 watts, aided by LiPO technology.

When I last wrote about LiPO batteries in 2007, they were expensive. Since then, mass production has led to a dramatic decrease in price. A check in the internet showed a UK supplier offering a 4500mAh lead-acid gel cell battery costing about £20 delivered. At the same time it was possible to buy 2 x 4000mAh LiPO batteries from Hong Kong for just over £20 delivered.

LiPO batteries have other advantages too. LiPO technology is able to deliver large currents with ease. Maximum currents of fifteen to twenty five times the battery capacity are common. Lead acid batteries compare poorly here with capacity reduced at high current and maximum current limited by their much higher internal resistance. The low internal resistance of LiPO batteries makes rapid charging a realistic option.

So, what are the disadvantages? The first is the cell voltage, which is 3.7 volts. This means that the most useful battery packs for amateur radio are either rated at 11.1 volts (3 cells) or 14.8 volts (4 cells). Neither voltage is ideal for most radio equipment. However, the FT-817 (perhaps the most popular of the portable radios) works quite happily at 10 volts and below so the 11.1 volt packs are perfect for this radio. Many amplifiers work quite happily at this lower voltage too although often with reduced power output and efficiency. Thus the 11.1V batteries have become very popular.

The higher power radios usually need 13.5 volts and the way people achieve this is by putting two diodes in series with a 14.8 volt battery pack. Each diode will drop about 0.6 volts. The diodes need to be rated to withstand the maximum current to be drawn. People usually incorporate ingenious ways to short out the diodes when the battery voltage falls, thus maintaining the voltage to the radio.

The second disadvantage is the rather specialised charging arrangements required for safe charging of LiPO batteries. Most battery stockists recommend charging them outside or in a fire-proof container. Special LiPO chargers are available for around £30. This may sound expensive but these chargers will often charge just about any sort of battery so they may well find other uses in your shack.

Of course, these batteries were never designed for amateur radio use. The main use for the batteries suitable for amateur radio is radio controlled models where their high capacity and light weight has revolutionised powered flight. It is the ability to deliver extremely high current and their amazing energy density that makes them potentially hazardous, of course, so if you do choose to use LiPO batteries, take proper safety precautions – and enjoy the huge benefits that they offer!

Comments and suggestions for future Portable columns are always welcome.

WEBSEARCH

LiPO Safety Information:
www.bmfa.org/resources/lipobatteries.html
Article on LiPO use by Gerald G4OIG:
http://summitsbase.org.uk/tiki-index.php?page=News+June+2009
Video on making LiPO Batteries:
www.youtube.com/watch?v=MqywKcJ0J2M
Good reasons to take proper precautions:
www.youtube.com/watch?v=KpUXuEg3fNE

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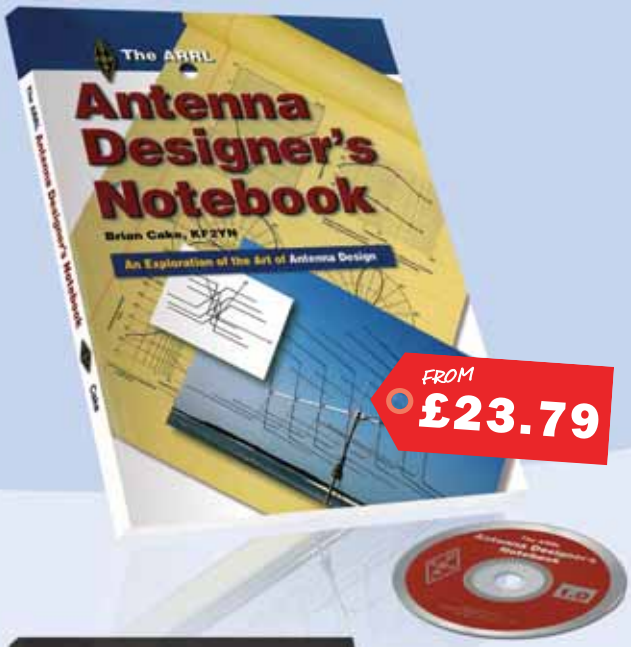

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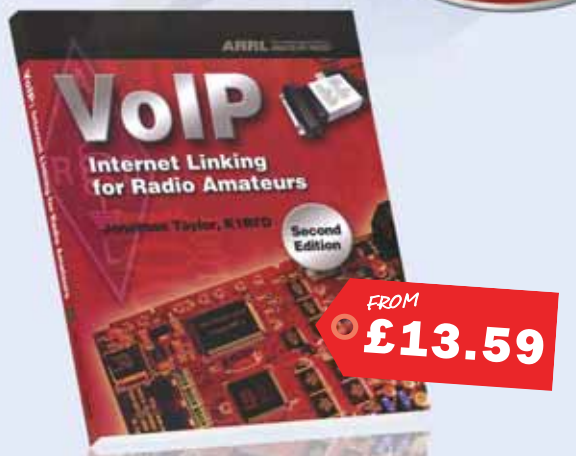

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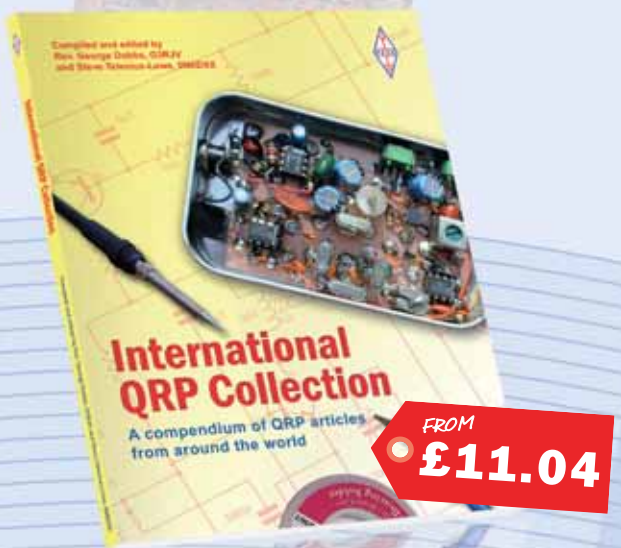

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Antennas

More on the Grid Dip Oscillator (GDO)

PHOTO 1: Q-Max GDO-1A uses a 12AT7 double triode, one half used as an oscillator and the other half as a half-wave rectifier.

GRID DIP OSCILLATOR. A very useful item of test equipment when working with antennas and tuned circuits is the Grid Dip Oscillator, generally known as a GDO. For newcomers who may not know of this device, it is used for measuring the resonance of tuned circuits and antenna elements without actually connecting the instrument to the circuit under test.

When a tuneable oscillator is placed close to a nearby resonant circuit, some of the oscillator power is absorbed when the oscillator is tuned to the same frequency. Some indication of oscillator energy loss is can be used to indicate this condition. The original instruments used a valve with a microammeter connected between the grid and earth, as shown in **Figure 1**. This measured grid current, which is proportional to the peak-to-peak level of the oscillator waveform. In practice a dip in the grid current level is observed as the oscillator is tuned past the resonant frequency of circuit under test, hence the title of this instrument: Grid Dip Oscillator (GDO).

The circuit shown in Figure 1 is from the *ARRL Radio Handbook*, 1947 **[1]**. This instrument is designed as a portable workshop item of equipment for measuring the resonance of tuned circuits. It uses a probe made from a short length of twin transmission line and a loop L2 to access tuned circuits within transmitters or receivers. This GDO was built into an enclosure 150mm (6in) square so was quite different from the shape of GDOs to which we are now accustomed.

It was also used for determining the values of capacitors and inductors using the arrangements shown in Figure 1a and b. The link-coupled probe L2 is used to measure the resonances of tuned circuits in confined spaces. It can also be used to measure the resonant frequency of a tuned circuit where the inductance is a ferrite ring by coupling L2 around the ring. There was no mention in [1] of using this GDO to measure transmission line or antenna element resonances.

An example of a later GDO is shown in **Photo 1**. It is an old Q-Max GDO-1A that operates very well right up into the VHF band. It comprises a 12AT7 double triode, one half used as an oscillator and the other half as a half-wave rectifier for the 330V HT supply.

A FET GDO. These days most of these instruments use solid state devices, usually a FET. In this case we are interested in the variations in gate current so we can still call it a GDO (Gate Dip Oscillator). The subject of GDOs was prompted by a question from Paul Badley, M0PIB, who was building a published version a GDO **[2]**. He wanted to know where he could obtain a dual-ganged 365pF variable capacitor shown in this circuit and the diameter of the coils. The circuit I described in [2] was based on two very similar designs published in *QST*, Technical Correspondence **[3] [4]**. The circuit of my variation of these two designs is shown in **Figure 2**.

This circuit does not measure FET gate current directly; instead it measures the total source current, which is affected by the voltage at the gate of the FET. However, the variation of current through resonance is only a small part of the total source current. The dip is enhanced by offsetting the meter reading using a potentiometer in a bleeder network. This is set so that the meter reads about 75% FSD when the instrument is not coupled to the resonant circuit under test.

I built one version of the FET GDO into a defunct Japanese nuvistor LDM-810 GDO by using the chassis, case, calibrated tuning mechanism and coils. The value of the twin-ganged capacitor turned out to be 120pF as shown in **Photo 2**.

At a later date, G3ZOM used this circuit as a basis for a GDO kit and he specified a two-ganged 365pF polyvaricon variable capacitor together with the speaker DIN plugs as coil formers, shown in the circuit that appears in [2].

A GDO should possess good sensitivity, which can be checked by squeezing the coil of the GDO between the thumb and forefinger and noting the meter deflection; this should dip to at least 50% of the maximum reading. The GDO should also be capable of measuring resonance of a high-Q tuned circuit at a distance of 6 to 7cm (2-3in). I use a parallel tuned circuit, comprising a 5mH inductor with a 100pF capacitance, as a 7MHz standard. The circuit shown in Figure 2 possesses this sensitivity in the HF and lower VHF bands but is unsuitable for VHF without modification to some component values.

A good indication of the resonance dip is important. Some commercial GDOs have small meters, which are a problem for optically challenged old-timers like me. A large meter makes using this instrument much easier. The G3WPO FET dip meter **[5]** uses an audio indication of dip, which is very nice – rather like using a metal detector.

A QUESTION OF VALUES. In answer to M0PIB's question regarding the value of the variable tuning capacitor, various capacitance values have advantages and disadvantages. If a large value of capacitance is used then fewer coils are required to cover a given frequency range. The down side is that the resonance dip will be more difficult to locate because of the large oscillator frequency shift for a give amount of capacitor rotation. If a smaller capacitance is used it gives the frequency dial a bandspread effect and the dip is easier to locate, however more coils will be required to cover a given frequency range. The Q-max GDO uses quite a small dual ganged 40pF capacitor and the frequency coverage 1.5 to 300MHz requires 8 coils. It does make for a readable frequency dial as shown on **Photo 3**.

Building many items of electronic equipment can be likened to following a cooking recipe. You can use the 'Delia Smith method' where you follow the recipe exactly using the exact

PHOTO 2: A FET GDO using the chassis, case, calibrated tuning mechanism and coils of a defunct LDM-810 nuvistor GDO.

PHOTO 3 : Frequency dial of the Q-Max GDO.

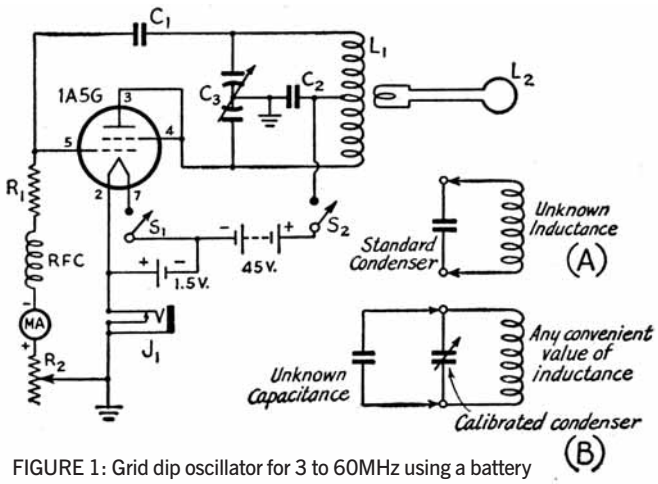

FIGURE 1: Grid dip oscillator for 3 to 60MHz using a battery valve type 1A5G. Reproduced from the *ARRL Radio Handbook*, 1947.

values of specified components. Or you can use the more interesting 'Jamie Oliver approach' where you throw in components whose values or types you know from experience will do the trick. In this way the design can be built around the components from the junk box.

The most important part of a dip oscillator is the tuning capacitor, slow motion drive and if possible a read-out dial that can be calibrated in frequency. Sometimes a whole assembly can be obtained from an old transistor radio. Choose a coil plug and socket arrangement that is practical. The circuit shown in Figure 2 uses 2-pin coils, which allows the use of crystal holders or 2-pin plugs and sockets for the coil.

JUNK BOX GDO. A junk box GDO, using the circuit shown in Figure 2, is shown in **Photo 4**. It uses a two-ganged 60pF variable capacitor for tuning and a crystal holder for the plug in coils. The coil socket should be located as close to the tuning capacitor as possible so that the coil leads can be kept short. The rest of the circuit can be wired around these main components.

The arrangement shown in Photo 4 was designed for a specific application, measuring the resonant frequency of antenna elements. There are two main departures from the traditional GDO design.

The first is the coil. Coupling a small diameter GDO coil to wire or tubular antenna elements is almost impossible because the coupling is very loose. G6XN suggested using a coat hanger shaped coil where flat section of the coil can be arranged in close proximity to the antenna element. While this is fine for VHF this arrangement is very cumbersome at HF frequencies because of physical size of the coil. A more practical solution is to wind the coil on a rectangular section using several turns to make up the required inductance. This former can be a short wooden board, say, 4 inches wide and half an inch thick.

The coil shown in Photo 4 uses 7 turns of 16SWG (or similar) plastic covered wire, which tunes from 8 to 18MHz, covering the 14MHz band (the band of interest at the time). The other departure from the traditional GDO is the use of a frequency counter instead of a calibrated frequency dial. A frequency counter is a worthwhile investment and has many other uses in home construction projects. If you are using a GDO without a connection for a frequency counter the frequency can be sampled using single turn loop round the GDO coil. The coupling of this pick-up coil to the coil winding can be adjusted with respect to the main winding until just enough energy is available to operate the frequency counter.

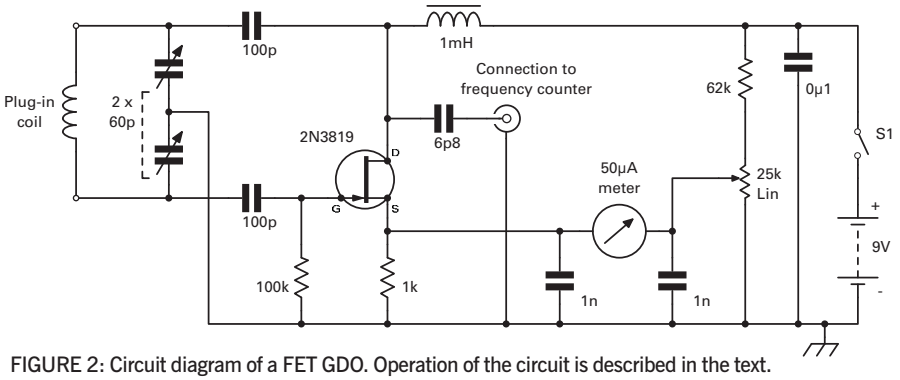

FIGURE 2: Circuit diagram of a FET GDO. Operation of the circuit is described in the text.

The coil former board also provides a platform for the GDO, frequency counter and even a note pad. The flat sided coil couples into any antenna element, with the board providing a stable point to rest the measuring kit against the element while measurements are being made. The coupling between the GDO coil and the wire antenna element is maintained by placing the wire antenna element in the grove formed by plastic wire fixing clips. This is a useful feature if you are balanced on top of a step-ladder trying to measure the resonance of a parasitic quad element.

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[2] *The Antenna experimenter's Guide, Second Edition*, Peter Dodd, G3LDO.
[3] 'Technical Correspondence', *QST* June 1972, Peter Lumb, G3IRM.
[4] 'Technical Correspondence', *QST*, November 1971, W1CER.
[5] 'The G3WPO FET Dip Oscillator Mk2', by A L Bailey, G3WPO *RadCom* April 1987.

PHOTO 4: The antenna element resonance measuring kit. Note the method of maintaining a constant coupling to the antenna element (red wire) and the GDO coil.

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In Practice

Cost-effective ferrite chokes and baluns

PHOTO 1: Clockwise from left: low-bands ferrite choke, mid-bands choke, high-bands choke, the ferrite cores.

NEW DESIGNS. This month I will be describing some new designs of ferrite loaded chokes for suppressing unwanted common-mode currents at HF. The same basic designs can be used in several different ways:

- As choke baluns ('current baluns') for coaxial feedlines
- In the shack, applied to various coaxial, mains and data cables
- Applied to consumer electronics to suppress interference on antenna feedlines, audio/video and mains cables.

These are all different kinds of EMC problems, and the same designs of RF chokes can often be used in a number of situations by simply changing the type of cable involved. An expanded version of this article on the RSGB Members Only website explains much more of the technical background about common mode currents **[1]**. This shorter version tells the other part of the story, the search for RF chokes that have high performance but don't use large and expensive ferrite cores.

How good does an RF choke need to be? To make a good transmitting balun? To suppress RF in the shack? To suppress RF interference to (or from) consumer electronics? The problems of EMC engineering are that every situation is different and there is never enough technical information to be sure of success. We can meet the first challenge by always using high-performance chokes and filters that are capable of handling *almost all* EMC problems. We meet the second challenge by making maximum use of whatever facts we do know. In EMC, and in much else besides, our best and most reliable friend is Ohm's Law.

When we use an inline RF choke to suppress unwanted RF current, we are inserting some additional impedance between two impedances Z1 and Z2 that are already present in the system. **Figure 1a** is highly simplified but it captures the essential features of almost every EMC situation. Looking upstream of where you're going to insert the choke, the unwanted common mode current has some kind of source which we can represent as V1 with an impedance of Z1. Looking downstream, that current is almost certainly 'trying to find earth', along a pathway that has a series impedance Z2. The only things that change between one case and another are the values of V1, Z1, Z2 and of course the unwanted common mode current itself, I_{CM}.

The aim of the RF choke is to reduce I_{CM} to some much lower level that the affected equipment can tolerate. To achieve this (**Figure 1b**) the impedance of the RF choke will obviously need to be much higher than Z1 and Z2 combined – but how much higher does Z_{CHOKE} need to be, to be certain that it will dominate the situation? As I said above, EMC has no universal answers so we have to apply a combination of engineering and experience.

MUST DO BETTER. To provide dependable solutions for a much wider range of practical EMC problems, experience shows that RF chokes need to have an impedance of at least a few *thousand* ohms, maintained across a wide bandwidth [1]. Many existing types of cable chokes fail to meet these criteria, so there are some EMC problems where they fail to work. Air-wound chokes and ferrite loaded chokes have different weaknesses, so I will discuss each kind in turn.

AIR-WOUND CHOKES. These are the simple coils of cable that are often suggested as choke baluns. We tend to think of these coils as inductors, but their high-frequency performance is actually dominated by the distributed capacitance between the turns. For example, take about 2.2m of thin coax like RG8X or RG58 and wind it into a five-turn bundle of about 125mm average diameter (**Figure 2**, inset). This has an inductance of about 6μH, but the capacitance between the turns is equivalent to about 9pF in parallel with the 6μH. So instead of an inductor, what we actually have is a high-Q parallel resonant circuit with the measured impedance characteristics of Figure 2.

This parallel resonant circuit does not make a dependable RF choke. The impedance is only high around the resonant frequency, and much lower elsewhere. The resonant frequency is also quite sensitive to small changes affecting the capacitance between the turns, even how tightly the turns are taped together. But the fatal flaw of these chokes is that their performance is very dependent on the situation in which they're being used. This is because the impedance of the choke consists almost entirely of either inductive or capacitive reactance, at all frequencies except the very narrow region close to resonance as shown in Figure 2. Going back now to Figure 1, the reactive impedance of the choke is in series with the upstream and downstream impedances, Z1 and Z2… which also have inductive or capacitive reactances of their own. You never know from one situation to the next whether Z1 and Z2 are going to reinforce the impedance of the choke or cancel it. "Are you feeling lucky today?" is not my idea of good RF engineering!

In practice, reactive (air-wound) chokes often provide enough impedance to handle 'soft' EMC problems; but they don't have the broad bandwidth that is often claimed, and they can sometimes let you down badly. In a word, reactive chokes are not *dependable* EMC solutions.

FERRITE LOADED CHOKES. To overcome the problem that reactive impedance can sometimes shift or disappear, the impedance of a dependable RF choke needs to be both large and predominantly resistive. The advantages of resistive impedance are that it cannot be cancelled out and it also tends to broaden the useful bandwidth of the choke. Any practical choke will also have some reactance, which is nice in situations where it works for you, but resistive impedance is the only solid foundation for dependable performance.

The only way to create a high resistive impedance is to carefully engineer a certain amount of loss into the choke… and that is why we need the ferrite. Don't panic about 'loss': unlike many other situations, resistive loss in an RF choke *is a very good thing*. We just need to make sure that it appears as a very high value of R in the series impedance, $Z_{CHOKE} = (R \pm jX)$. The resistive (heat) loss in the choke equals I_{CM}^2R, where I_{CM} is the residual level of common-mode current that remains *after* the choke has been inserted. If the choke has successfully suppressed the common mode current (and thus solved the EMC problem) then the residual value of I_{CM} will be very low and you'll be unlikely to notice significant heating in the ferrite. This is why we're aiming for an R value of several thousand ohms, rather than a lower value like 500Ω which experience has proved to be inadequate (see the expanded article).

Ferrite chokes with a resistive impedance less than 1000Ω are at much greater risk of underperforming and overheating. Many of these chokes were designed to meet that inadequate target of 500Ω, and some commercial examples have also suffered further cost-cutting, eg by using smaller quantities of ferrite and failing to use the correct materials. If a ferrite loaded choke begins to overheat, the ferrite may reach the Curie temperature at which its magnetic permeability collapses, allowing I_{CM} to increase and causing further overheating – the choke will almost literally 'crash and burn'. As I said above, these poorly performing chokes may work for 'soft' EMC problems but they don't have enough impedance to handle anything challenging.

CAN DO BETTER. To make a really good ferrite choke, you need to do two things:

1. Choose the right grade of ferrite, one that actually has some loss at the operating frequency.
2. Construct your choke to create just the right amount of coupling between the ferrite material and the magnetic field around the cable.

Neither of those things will happen by blind luck. There are hundreds of different grades of ferrite with widely differing magnetic properties. They all look the same so you have to know exactly what grade you're using. That will mean buying 'named ferrite' from a reliable source. With the help of a Vector Network Analyser, it then becomes quite easy to develop some effective ferrite-loaded chokes [2]. But if you don't have access to that level of test equipment, the only route to dependable performance is to copy someone else's designs.

Most of the published designs [1] originate in the USA and use ferrite cores manufactured by the Fair-Rite Corporation. None of these cores are cheap, and here in Europe they will cost about twice as much due to shipping, VAT and all the other markups and 'handling charges'. We can reduce costs a little by shopping carefully, combining orders with other amateurs and taking advantage of special offers; but the cost of ferrite is always going to be a much bigger consideration on this side of the Atlantic.

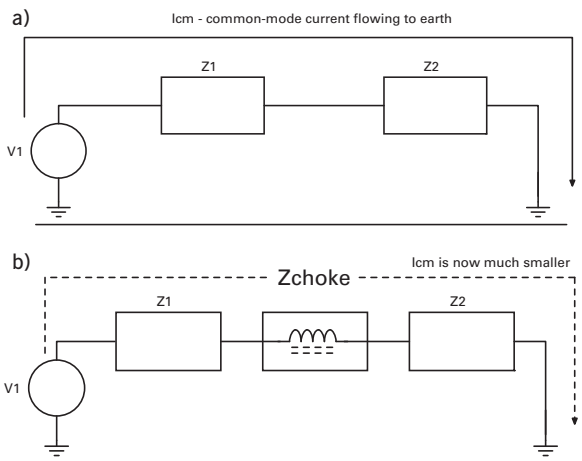

FIGURE 1: An effective common mode choke must dominate the upstream and downstream impedances, Z1 and Z2.

TABLE 1: Dimensions of the three HF ferrite chokes

	Turns	Mean diameter	Cores
Low bands	5	125mm	3
Mid bands	4	85mm	3
High bands	3	Close wound	2, glued side-by-side

All ferrite cores are Fair-Rite 2643167851 = Farnell 1463420. No substitutes allowed!

Jim Brown, K9YC has been particularly active in developing designs for high performance ferrite loaded chokes, and his PDF papers and PowerPoint presentations are essential reading [1]. To make sure that his chokes can handle even the most stressful applications at power levels up to 1500W, K9YC aims for very high values of resistive impedance (preferably 5000Ω or even more). However, that superb performance is achieved by using large ferrite cores, sometimes four or five at a time, which are not affordable at European prices. Thus we are forced to look for alternative designs that cost a lot less but can still handle the large majority of balun and EMC problems. In other words, we're looking for cost-effectiveness.

Strings of ferrite beads are definitely not cost-effective. Ferrite beads can usually take only one 'turn' of cable (one pass through the centre hole = 1 turn) and each individual bead generates quite a low impedance, so a high impedance will need an awful lot of beads in series. Ten or 20 beads will only give enough impedance to handle the easy, soft problems; for dependable performance, think 40 or 50 large beads and then work out the cost! As K9YC and many others have pointed out, the cost-effective way to achieve a high impedance is to use multiple turns through the same core, because the impedance will then increase with the number of turns *squared*. But multiple turns of thick coax, mains or rotator cable will require a large core… and we're straight back into the problem of expensive ferrite.

For some years I have been looking for a way out of this, and inspiration came with the new 2010 *ARRL Handbook*. The Transmission Lines chapter features some new choke designs that use a small number of relatively low-cost ferrite cores threaded onto a coil of cable (**Photo 1**). These cores have an oval central hole, 26 x 13mm, which will take several turns of thin transmitting coax like RG8X, or similar-sized cable of any other type. And although they are made by Fair-Rite in the USA, these particular cores don't have to be specially imported; they are readily available as stock items from Farnell UK at about £2.70 each [1].

That ARRL design concept has opened the way to a range of cost-effective ferrite chokes that can tackle the large majority of balun and other EMC problems across the HF spectrum. The three chokes in Photo 1 are only examples of what can be done; each choke delivers a high resistive impedance over at least a 2:1 frequency range using only two or three of the oval Fair-Rite cores. The performance isn't as good as Jim Brown's biggest and best, but they are a major advance over most of the balun and EMC chokes that we're using at present. Because all these chokes use the same ferrite cores, the most cost-effective strategy is to keep a stock of the bare cores, and then quickly run up a suitable choke for any cable that needs one.

The key dimensions for the three HF-band chokes are given in **Table 1**, and further construction details are on the 'In Practice' website [1].

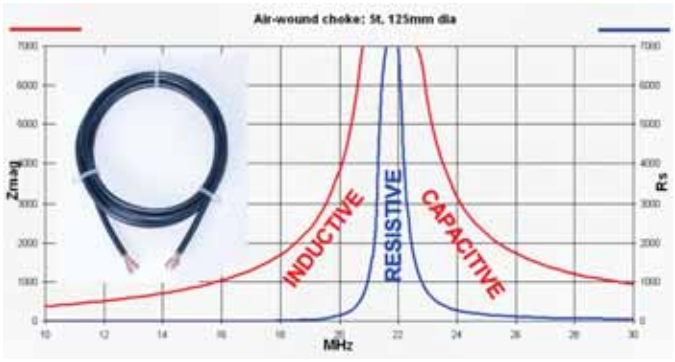

FIGURE 2: Performance of an air-wound choke: notice the very sharp resonance at 21MHz.

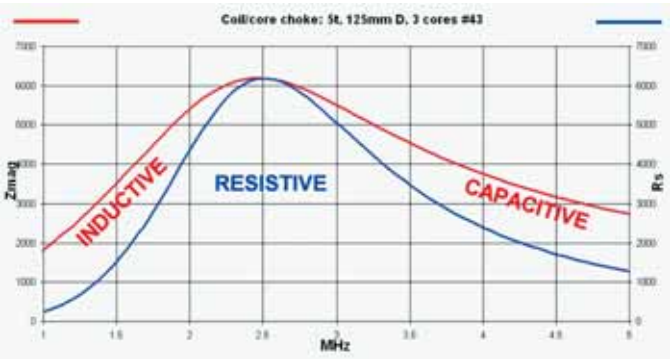

FIGURE 3: Performance of the low-bands choke with three ferrite cores.

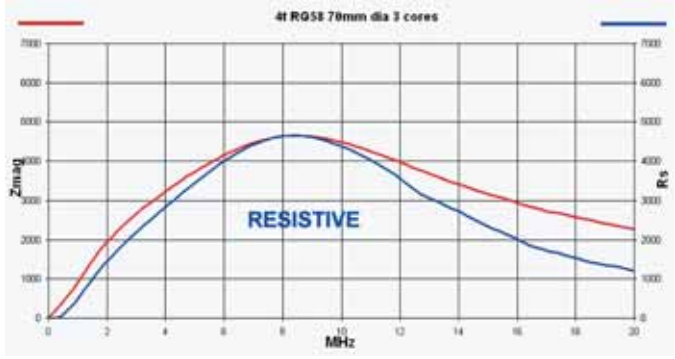

FIGURE 4: Performance of the smaller mid-bands choke with three ferrite cores.

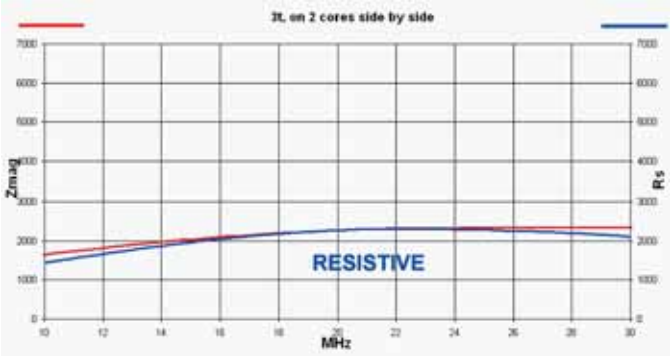

FIGURE 5: Performance of the high-bands choke, wound on two ferrite cores side by side.

LOW BANDS. When two or three of our ferrite cores are threaded onto the flat 5-turn coil that was described earlier (**Photo 1, left**) the narrowband 21MHz choke from Figure 2 is transformed into a broadband choke covering 1.8–3.8MHz. **Figure 3** shows the measured performance. The blue trace is the resistive part of the impedance, which is about 4000Ω on Top Band and 3000Ω on 80m. The total impedance (red trace) includes some additional inductive reactance at lower frequencies and capacitive reactance at higher frequencies, but like Jim Brown I only regard this a bonus – nice to have, but we're not actually depending on it for good performance. Despite the drive to reduce ferrite costs, I found that three cores gave a worthwhile increase in the resistive part of the impedance, compared with the two cores used in the ARRL design.

As you see from Figure 3, the two amateur bands are actually on the skirts of the resonance peak, so that peak needs to be positioned fairly accurately to produce similar performance on both bands. To obtain the correct amount of distributed capacitance between turns of the coil, you'll need to follow the detailed assembly instructions on the website with care.

MID BANDS. To cover 5, 7 and 10MHz, reduce the coil diameter and the number of turns but still use three cores (**Photo 1, top right**). **Figure 4** shows excellent performance across all three bands, and this same choke may also be usable for easier EMC problems down to 3.5MHz and up to 14MHz. For optimum wideband coverage it is essential that the turns of cable are stacked vertically inside the cores with no crossovers, exactly as shown in Photo 1.

HIGH BANDS. For 14 – 30MHz coverage, this design concept is somewhat running out of steam but we aren't beaten yet. If two of the same cores are superglued together side-by-side as shown in **Photo 1, lower right**, three turns will make quite a respectable choke for a 20 – 10m beam. The impedance (**Figure 5**) isn't quite as high as the lower-frequency chokes at their very best, but it is substantially resistive across the whole 14–30MHz range. In terms of 'value for ferrite' this two-core choke will at least equal a straight string of *40 to 50* ferrite beads!

By the way, if you want more impedance or a wider bandwidth, you can cascade any of these chokes in series along the cable. The interactions are quite mild and the impedances always seem to reinforce each other (rather than destroying each other, as always happens with reactive air-wound chokes). Measurement results are available in the expanded article [1].

FURTHER DEVELOPMENTS. We are definitely onto something: this design concept is already delivering high performance at an affordable cost, and more development work will surely drive both factors closer to the optimum. A number of experimenters are already finding other ways to make feedline chokes using these same cores **[3]** and they also show great promise for other applications such as filtering the mains supply to the shack (see the May 2009 column).

The expanded version of this article contains some preliminary conclusions about the relationships between coil dimensions, the numbers of cores and the resulting impedance and bandwidth. This is all wide open for experimentation, using these and possibly some other types of ferrite cores – so if you have the necessary test gear [2], go to it.

On the other hand, if you need some high-performance RF chokes right now, go directly to Table 1. Please check the expanded article and the 'In Practice' website for more details about construction [1], and let me tell you one last time: you must use *only* the specified ferrite cores!

NOTES AND REFERENCES

[1] An expanded version of this article is available on the RSGB Members Only website: www.rsgb.org/membersonly/publications/radcomplus/index.php
There are further notes and web links on the 'In Practice' website: http://tinyurl.com/inpractice

[2] This kind of development work requires a Vector Network Analyser that can compensate for the stray inductance and capacitance of the test jig, and can measure high impedances with verifiable accuracy. Unfortunately this is beyond the capabilities of R-X antenna analysers like the MFJ-259B.

[3] Special thanks to G3TXQ, M0JEK, VK1OD, VK4OQ and K6MHE.

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HF notch filter

Making HF transmitter distortion measurements at low cost using a notch filter

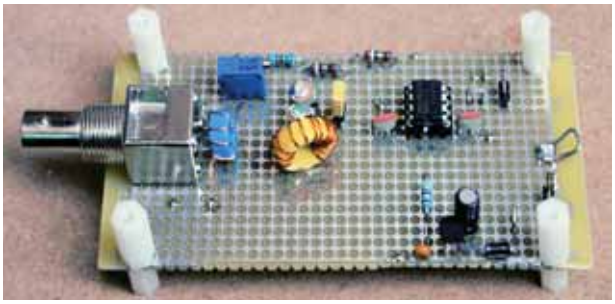

PHOTO 1: The prototype notch filter. Theory this month, project details next month.

INTRODUCTION. This article is aimed at the relatively small number of radio amateurs who build or modify radio transmitters, and who don't have any or sufficient access to a spectrum analyser, the instrument of choice for measuring transmitter spectral purity.

We radio amateurs are ever more hemmed in by sources of electromagnetic noise from electronic devices, increasingly encountered in the home, which limits what our sensitive receivers can achieve. We are also surrounded by more and more potential victim equipment, so it's essential we do our best not to radiate anything we shouldn't.

The notch filter to be described arose from such a need: I was experimenting with a transmitter for the 12 metre band and wanted to check its output purity. The newly-built notch filter immediately showed that performance was nowhere near good enough. Improvements were made until the transmitter was acceptable, proving the worth of the device.

The filter is powered from a battery or small mains adaptor and incorporates logarithmic detection of the radio frequency signal. A multimeter is needed to read the output voltage. Current draw of the prototype is 11mA so a good quality PP3 battery will provide power for more than a day, whereas only a couple of minutes are needed to make each measurement. It is designed to handle 2 watts continuous power (more than most laboratory spectrum analysers), so an external power attenuator is also needed for higher powers. It represents a very modest constructional project which can be completed in a few hours, and does not require special alignment skills or equipment.

HOW IT WORKS. A notch filter rejects a relatively narrow range of frequencies and passes the rest comparatively unhindered. As in the audio 'distortion factor meter' of old, the transmitter signal, appropriately attenuated, is fed through a notch filter which removes the fundamental component of the signal (carrier and any modulation present), leaving noise, distortion, and any spurious outputs that fall outside the notch to be fed to a detector and measured (see **Figure 1**).

If the notch effect is removed, everything – signal, noise and distortion – passes to the detector. Comparison of two measurements allows us to find the ratio of the total signal to the noise and distortion. (In receiver testing, audio measurement provides the ratio of the total SIgnal, including noise and distortion, to Noise And Distortion, generally abbreviated to SINAD, a measure of sensitivity.)

Figure 2 attempts to illustrate the principle. The transmitter output spectrum consists of the wanted signal at frequency f, plus other components, none of which are wanted: harmonics at 2f, 3f and so on, noise, plus – for good measure – a spurious output. This lot is fed through a notch filter with the notch tuned to the signal frequency. The resulting spectrum, which is then detected, consists almost entirely of the unwanted signals. If we take the notch out of circuit so that *everything* is detected and measured, we can note the full signal level and compare the entire transmitter output with the unwanted components. If the unwanted components are much smaller relative to the total, we can have *some measure* of confidence that the transmitter output purity is acceptable.

WHAT THE NOTCH FILTER CAN DO. This device to be described can make a relative measurement of transmitter unwanted output spectrum components which lie outside the notch: that is, they are reasonably far from the wanted signal. The accuracy and dynamic range should be more than adequate for practical purposes, thanks to the use of a logarithmic amplifier, of which more next month.

WHAT THE NOTCH FILTER CAN'T DO. An ideal notch filter would have infinite attenuation over a very narrow frequency range and zero everywhere else. In practice, this measurement technique won't reveal anything about unwanted transmitter modulation such as hum, key-clicks or chirp (to distinguish these from intentional modulation), nor spurious outputs close to the wanted frequency. For this there is no substitute for listening to the transmitter on a receiver, and

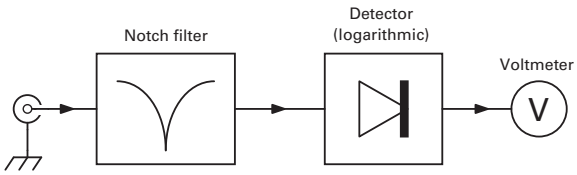

FIGURE 1: Block diagram of a simple notch filter system.

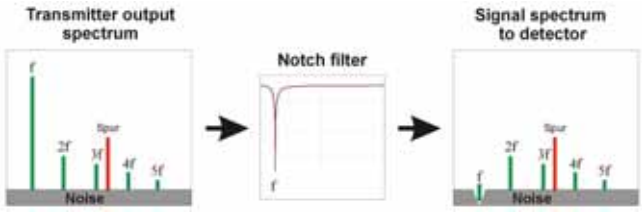

FIGURE 2: Transmitter output passed through a notch filter.

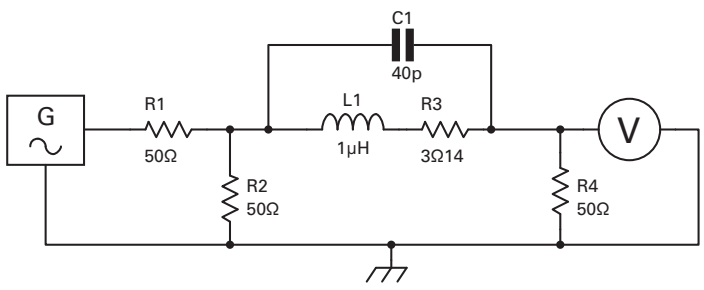

FIGURE 3: Notch filter using a parallel tuned circuit (rejector).

tuning around some way either side of the signal. (Most swept-signal spectrum analysers aren't immediately useful for transient defects like key-clicks or chirp, and only the best resolve hum sidebands well.)

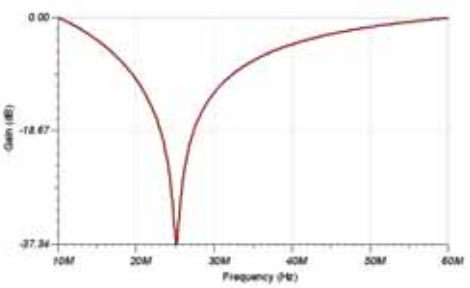

FIGURE 4: Attenuation vs frequency for the parallel tuned notch of Figure 3.

If the notch ilter shows that there is a problem, it can't tell you whether it is due harmonics, a spurious output, or a combination thereof. It is also unable to tell you the frequency of any problematic output.

In summary, regard this as an easy, low-cost, and quick way of giving the transmitter a clean bill of health.

All this noted, the spurious output problem with my transmitter revealed itself on an oscilloscope, and harmonics were tackled by adding a section to the output low-pass filter; it was not necessary to resort to a spectrum analyser.

Note that while the measurement bandwidth for unwanted signals is several hundred MHz, the tuning range of the notch is limited, so you may well need to change inductor and perhaps capacitor values to cover your favourite band(s). This should not present a great challenge if you are already home-brewing. Some outline guidance is given with the construction details next month.

IMPLEMENTATION. Notch filters can be configured in a number of ways. One simple approach is a parallel tuned circuit (rejector) in series with the signal path (**Figure 3**).

For the sake of illustration, R1 is the generator (transmitter) source impedance. At resonance, the parallel tuned circuit appears as a high series resistance, so R2 is included to match the source. The tuned circuit component values shown resonate just a little above 25MHz. R3 is the loss resistance of the inductor which has been taken to have a realistic Q of 50. R4 loads the notch: higher values decrease the notch maximum attenuation, while lower values provide a poorer match to the generator for frequencies outside the notch, so 50Ω is a reasonable compromise. The output is shown being measured by a voltmeter, which is taken to indicate an RF (radio frequency) measuring device. **Figure 4** shows the attenuation versus frequency (all curves are derived from circuit simulations).

This immediately reveals a problem: the rejection of the transmitter's main signal is only 37dB, so we can only be sure that unwanted signals lie below -37dB relative to it, which isn't nearly good enough for modern conditions. Matters could be improved by improving inductor Q, but a figure of 50 is already respectable. Two notches could also be cascaded, but that means two resonant circuits to tune.

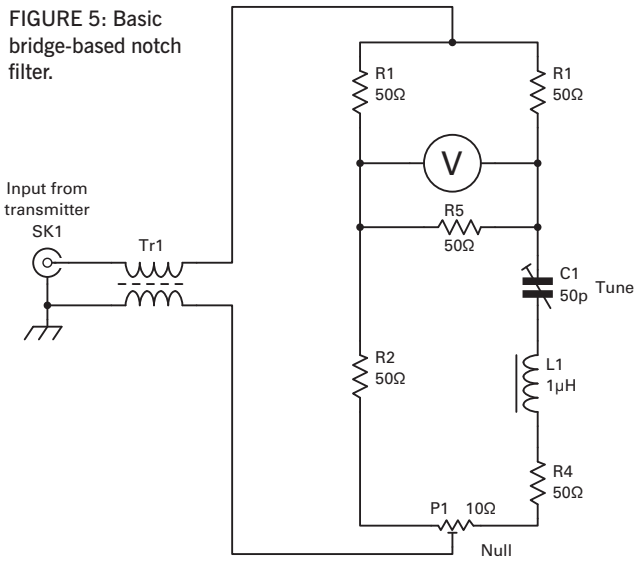

FIGURE 5: Basic bridge-based notch filter.

The approach I adopted was to place the tuned circuit in a bridge arrangement. Bridges, when balanced, are capable of very great attenuation. **Figure 5** illustrates the principle. Take away (short out) the tuned circuit and the preset potentiometer P1, and we have a 'return loss bridge', with a current transformer (choke balun) at the input allowing the bridge to 'float' so that we can place the ground connection at a convenient point. As before, the RF measuring device is represented by a voltmeter symbol. The position chosen for the ground means that the measuring device can be single-ended rather than balanced-input. This also allows the trimmer capacitor rotor to be grounded, reducing susceptibility to hand capacitance.

At the resonant frequency of the capacitor and inductor, the two components are equivalent to a resistance of a few ohms. This unbalances the bridge; balance is restored by operating the potentiometer some way off centre. The degree of balance determines the depth of the null.

(If you are more comfortable with a three-winding voltage balun at the input, please go ahead and use one. The two-winding balun modelled and worked fine.)

Figure 6 shows a direct comparison between the attenuation v frequency curves of the parallel tuned circuit of Figure 3 and the bridge – the latter winning hands down, with a notch that is both deeper and narrower. Note that the same inductor and capacitor have been used in both cases so it is a valid comparison, though the traces have been adjusted to coincide at the extremes of the frequency range.

Figure 7 shows the same curves 1MHz either side of the notch frequency.

As in the case of the parallel tuned circuit, the nulled bridge presents a load resistance very close to 50Ω. Well outside the notch, the worst-case VSWR is 1.7:1. This may not cause a problem, since transmitters are routinely used with resonant aerials or systems with tuners, and the match across a broad range of frequencies may be poor. However, an external attenuator should generally be used to provide a better broadband match and aid measurement repeatability. As little as 3dB attenuation between transmitter and notch filter will reduce the worst-case VSWR seen by the transmitter to 1.3:1, with minimal effect on dynamic range. A 10dB attenuator, which I normally use, brings the theoretical maximum mismatch down to 1.05:1.

Next month we will look at the practical implementation of the bridge based notch filter.

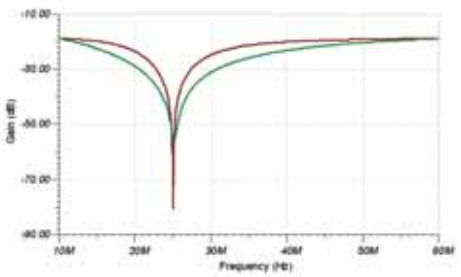

FIGURE 6: Comparison of parallel tuned circuit (wider, shallower notch, green trace) and bridge-based (red trace) notch filters.

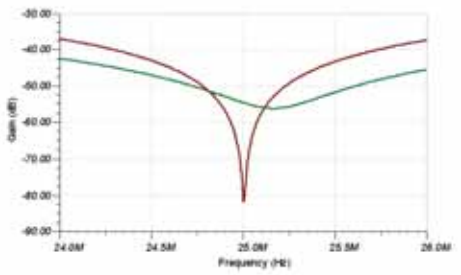

FIGURE 7: The curves of Figure 6, zooming in 1MHz either side of the notch.

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ML&S are pleased to announce their appointment as distributor for RF Space Inc SDR-IQ™ Software Defined Radio, Spectrum Analyzer and Panoramic Adapter. Now available from stock - £469.95

IF-2000
IF Interface board for the FT2k & FT-950. £219.95
See http://www.hamradio.co.uk/acatalog/RF_Space.html for more details. Both on DEMO at Chertsey.

DV-Dongle

Want to dabble in D-Star without the expense of a radio? The new DV-Dongle is ideal.

The DV Dongle connects to your PC or Apple Mac via a USB port and provides encoding and decoding of compressed audio using the DVSI AMBE2000 full duplex vocoder DSP chip. AMBE technology is used in all D-Star radios to provide efficient voice transmissions. It is also used in some HF digital protocols by vendors like AOR. The DVTool application used with the DV Dongle may be installed and run on Microsoft Windows XP/Vista, Mac OS X Leopard, or many flavors of Linux.

In stock, works with MAC or PC. £199.95

HB-1A Ultra Compact 3 Band CW Transceiver

Offering up to 4 Watts output on 40/30/20M Bands, this tiny HF portable is powered by 8 x AA cells and is aimed at the serious QRP enthusiast and has performance similar to that of the Elecraft KX-1.

- 20 meters, 30 meters and 40 meter amateur bands.
- CW Transceive, SSB receive.
- Receiving from 5 MHz to 16MHz.
- Maximum transmission power of about 4 watts on external 12V.
- Weight 350Grams (approximate).
- Battery compartment to hold 8 rechargeable AA cells.
- Built-in auto function keys.
- DDS VFO with 20 frequency storage memory.
- Digital dial with LCD technology.
- Automatic keyer with the CQ programmable with your call.
- RIT 10 Hz, 100 Hz.
- Frequency conversion super- heterodyne receiver.
- Unit will operate with voltage supply from 8-14 VDC.
- Built in AGC function.

ML&S Price: £249.95.

Call or see website for further details.

NOW IN STOCK - very limited quantity.

The SR2000A Frequency Monitor

ML&S: £2295.95

Combines a spectrum display unit and receiver in a single cabinet. Up to 40MHz display bandwidth may be selected and minimum 1kHz RBW. The embedded receiver provides continuous coverage from 25MHz to 3GHz in AM, FM & WFM modes. The FFT SEARCH function enables you to locate elusive transmissions FAST, a free PC package (from the AOR web site) further enriches operation. Video images can be displayed on the LCD (PAL + NTSC). The interconnections are incorporated "in the box" along with an internal speaker.

VENTUS WX-928-ULTIMATE

The NEW WX-928 really is the ULTIMATE in professional weather stations, offering the usual feature set of the WX-831 but uses a Anemometer with solar cells , Satellite Meteotime forecast over the next 4 days and a massive split screen.

Description

This weather station is as called the ultimate weather station. It provides you with local weather data from anemometer, rain gauge and thermohygrometer sensor. All these local measurements from your garden can you save on your pc by using the pc-software included. Furthermore it receives a 4 days forecast by satellite from cities all around in Europe. Just find your city and the weather station updates automatically.

Intro offer only £199.95 - in stock now!

VENTUS WX-831

This new much improved wireless Weather Station is built to a very high standard and even includes O-Ring seals on battery compartments that are mounted externally. The quality of external hardware is built to last for years and really moves the game on when it comes to "Professional Weather Stations"

ML&S Price: £119.95.

Options: Additional wireless temperature monitors: £24.95. PSU to run the WX-831 from 240V: £19.95

ONLY £49.95

VENTUS G730 GPS-LOGGER

This USB memory stick sized unit is a fascinating pocket device with multiple commercial and personal uses for individual movement tracking. It's very light, extremely easy to use and logs your route automatically. It also adds your GPS location to digital pictures. It presents the route you have taken in 3D via Google Earth™ on your PC and it can export in different formats.

Perseus VLF-LF-HF Receiver

PERSEUS is a VLF-LF-HF receiver based on an outstanding direct sampling digital architecture.

ML&S are Sole Distributors for Perseus in the UK and Ireland NOW IN STOCK!

£699.95

See Peter Hart's review this month. "Currently my new No.1 in terms of close-in dynamic range"

PERSEUS = Pretty Excellent Receiver for Software-Eager Unperceivable Signals

It features a 14 bit 80 MS/s analog-to-digital converter, a high-performance FPGA-based digital down-converter and a high-speed 480 Mbit/s USB2.0 PC interface.

A COMPLETE SDR RECEIVER FOR SHORTWAVES The PERSEUS analog front-end has been carefully designed for the most demanding users and includes a 0-30 dB, 10 dB steps, attenuator, a ten bands preselection filters bank, and a high dynamic preamplifier with a top-class input third-order Intercept Point of more than 30 dBm. The resulting third-order dynamic range is more than 100 dB in SSB and more than 105 dB in CW. Believe us, there's no other so performant and complete shortwave SDR receiver in the market today. The PERSEUS receiver can be operated also in a wide band mode as a 10 KHz - 40 MHz spectrum analyzer with more than 100 dB dynamic range in a 10 KHz resolution bandwidth.

SOFTWARE FOR DEMANDING USERS Being a software defined radio, the PERSEUS receiver relies on software applications to carry out the demodulation process. Besides providing all the required software signal processing for the PC platforms, the PERSEUS software has a comfortable graphical interface, is simple to use and runs under Microsoft Windows 2000, XP and Vista. All the controls a listener is used to see on a radio are there, in the application main window. The interface to third party software is provided in several ways, by means of the Microtelecom Software Defined Radio Developer Kit, virtual audio ports and virtual communication ports.

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DX ENGINEERING

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HF

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K4M QSL card showing the endangered Hawaiian Monk Seal in the Midway surf.

QSL of VK9X/G6AY (operated by G3SWH and G3RTE, see text).

CONTINUING IMPROVEMENTS. The improvement in HF propagation, which I noted last month, seems to be continuing, though the occasional solar flare has knocked the bands out. The north-south path has been pretty reliable, as one would expect. S79GM (GM0GAV and GM3YTS), operating from the Seychelles, was worked from the UK on all bands 160 to 10, for example.

Bob, W7YAQ and Bill, N7OU did a great job from Samoa (5W) and Tokelau (ZK3), with over 20,000 contacts from each location. The best option from the UK seemed to be the morning openings on 40, 30 and 20m, where we often had them almost entirely to ourselves, making for relatively easy contacts. Jim, G3RTE and Phil, G3SWH report that they made 10,256 QSOs with 5,209 unique calls in 102 DXCC entities during their operation from Christmas Island (VK9X, the Australian one). I noted very strong signals from both the Indian Ocean and the Caribbean at times on 12m, and occasionally on 10m too. Let's hope it continues.

DX NEWS. Kaz, ZL3JP/JH1HRJ, plans to operate as ZL7J, a special temporary call for Chatham Island, between 27 April and 4 May. He will be on all bands, CW and SSB. QSL via JH1HRJ, bureau or direct.

Phil, F4EGS is on a two-month work assignment in Chad, which started on 10 April. He plans to operate SSB, CW and some RTTY on 40 through 10m in his spare time. His callsign is likely to be TT8PK, which he used repeatedly in the past. QSL via F4EGS, direct or bureau. Not for nothing are some of these ex-French colonies in Africa known as the 'terrible Ts', as many of them are rarely activated nowadays and therefore increasingly rare. That said, a big operation is promised from Gabon, TR, later in the year – more details in due course.

The 3C0C Annobon Island expedition that I mentioned last month has been postponed as the government of Equatorial Guinea has closed the airport for runway repairs. Keep up to date by watching the team's website.

Members of the Tifariti Gang are heading to Palestine Look for E4X to be active from 28 May to 6 June.

A group of Brazilians is planning to go to St. Pierre and Miquelon where they will sign TO2FP from 19 to 23 May.

Mexican stations are using the special prefix 4B throughout this year to celebrate the bicentennial of Mexico's independence and the centennial of the Mexican Revolution.

QSL cards from last year's Midway Island expedition are now appearing and James, 9V1YC reports that the DXpedition DVD is now available (see website).

The UDXT, Ukrainian DXpeditioners Team, has a new project, 'Pacific Odyssey 2010'. On the team are UX0HX, RK3FA, UT5UY, UT1HF, US7UX, UR3HR and SWL Yuriy Grushevskiy. They plan to be active as 5W0OX on Samoa, 18-19 May, T31X, Central Kiribati, 22 May to 1 June; and ZK3X, Tokelau, 2 to 6 June. T31 is ranked most needed #7 in Europe, #19 worldwide. Tokelau is #29 in Europe and #35 worldwide. See their website for more details.

60m REPORT (from G4TRA). It has been a great month for 60m activity with a number of new countries coming on for the first time including Milan, OK1IF the first Czech Republic 5MHz station, working split as he has permission to use only 5.260MHz. Also 9K2YM has been giving Kuwait to a lucky few on PSK31 and SSB and also for a short period a single station from Bulgaria came on the band too. That brings us to a total of 102 countries that have appeared on 60m.

The Caribbean and South America have been very active with good signals from J7N (Dominica), J68JA (St Lucia), PZ5RA (Surinam), VP2MPR (Montserrat) and 6Y9V (Jamaica) with some of the most gentlemanly and well mannered DX pile ups it has been my pleasure to work. Both HR2J (Honduras) and HK2SM (Colombia) came on for fleeting (and I do mean fleeting, just two QSOs in the case of HR2J) visits, proving that to catch some of the rarer ones you do have to have your wits about you. In the case of WA2YUN/KH9, active mid March, it was a matter of sunset grey lining from the UK to work this rare one on 60m.

Reid, N0RC was due to operate as either OX3RC or OX3/N0RC until 24 April, but it is possible his trip will be extended another four weeks.

Denmark is the latest country to gain a new band on 60m (as opposed to channels) with a 200kHz slot between 5250 and 5450kHz. And, finally, I am informed that Gibraltar now has legal access to the band, but as yet no ZB2 activity has been heard.

DXPEDITION CLASHES? K3LP and YT1AD report that, despite 16 months of planning and the payment of $40,000 in non-returnable deposits for the ship, they are cancelling their planned expedition later in the year to Canton Island now that the Ukrainian group (see earlier) have announced an earlier operation. Instead, they will look at alternative locations for a future trip. This sort of situation has arisen from time to time before and does raise a number of questions.

It is quite understandable that different groups may be planning expeditions to the same rare spots. After all, the 'Most Wanted Lists' are readily available and when the really tough ones (for geographic or political reasons) have been eliminated there are a limited number of potential candidate locations. But occasionally it seems that groups do engage in spoiling tactics when another group targets a particular location, perhaps by changing their plans in some way or making an early announcement.

That said, our own experiences with the Five Star DXpedition Association have been that if a spot is rare enough there is more than enough demand to keep everyone happy. There was a Spanish team in the Comoros (D68) literally the fortnight before we started and yet we made 168,000 QSOs from that location. When we went to St. Brandon (3B7), a Polish group had been active just weeks earlier but, again, we ended with over 137,000 contacts and pile-ups that were barely any less fierce than when we had started.

As I have discussed earlier, there really is a huge interest in DX chasing and the main limitations seem to be how workable the DXpedition is. One man and a dipole in a tree probably won't make many inroads, especially from the Pacific, because many DXers, perhaps limiting themselves to something like a G5RV antenna and 100 watts, will stand little or no chance of making the contact. I use the Pacific as an example because undoubtedly the major populations of DXers are in Europe and the US East Coast, so African and South American DX stations have an easier time being heard. But a well-equipped and well run DXpedition, VP6DI (Ducie Island) the other year being a classic example, will be workable by all budding DXers in the main population centres on multiple bands. Sadly, too many DXpeditions, often for very understandable reasons such as baggage limitations on small aircraft, have to make do with, say, 100 watts and small vertical antenna. The result is that they are workable only by the so-called 'big guns' and leave many feeling frustrated. The good news is that it gets easier for everyone when propagation improves.

CORRESPONDENCE AND TABLES. Peter, G4XEX took a break from working the US during the ARRL DX Phone contest to have a look on 17 and 12. He says, "To my surprise they were both open and had some nice DX on them. On 17m I managed to work C56KR and CN8YE. When I moved up to 12m I came across SV3AQR with lovely 59 signals. It seems that everyone was concentrating on 20 and 15m as there were very few stations on 17 and 12. I now try to have a scan round these bands at least once a week. On the 18th a worked SV5AZP on 12m and on the 21st I worked TL0A, PY2MA and EA8BPK also on 12m. Working DX on 12 and 17m is so much easier than on 20 or 15".

This often happens, especially when a major contest is on, so those bands are well worth keeping an eye on. The table shows what some correspondents have already worked on 10 and 12 this year, with some impressive totals. Peter also reports some nice catches on the contest bands during the WPX SSB contest at the end of March. Apropos of which, I wonder how many readers note the fact that the CQWW and ARRL contests are still described as 'Phone' whereas the CQ WPX Contest is designated 'SSB'. The former predate SSB and the latter was introduced specifically to encourage the use of SSB when it was a new mode and still strongly opposed by many old-timers. I doubt that many contesters try using AM nowadays!

Colin, MU0FAL reports that he found 12m in great shape during the month, but also managed his first Australian contacts on 10m for the new cycle, working into both VK3 and VK6 call areas. Terry, G1UGH reports PY2LSM, VU2GTE, ST2AR, 4Z5LA, SV8FMY and NT2K/NP2 on 12, 7Z1CQ, ZS3Y, ZB2FK, PT7ZT/P, VG3AAO, LU9ESD/W (lighthouse), J5UAP, 6W2SC, 5R8UI, A92IO and ZD7FT on 15m, 9K2OK/NLD, A92GR and VR2XMT on 17m, 4K7Z, 6V7V, YB0LJ and YV5ANF on 20m plus OX3KQ on 40 for a new band. All contacts were SSB. Graeme, G6CSY reports some new ones in the Commonwealth Contest, by way of 5H3EE, 9G5XA and J6/G3PJT on 20m, as well as VK2BJ on 20m for a new mode slot. All worked running just 5W to a trap vertical.

Peter, G3HQT has been enjoying his new FT-2000 and reports working VQ9LA on 10, YB3XM, P43JB, 3B9WR, 3B8CF, ZS6BQI, ZP6CW, V51AS and Z21BB on 12, EX8AB, DV1/JO7KMB, 5X1NH, KL7J, R1FJM on 30, plus J7N, 8P9RY, J88DR, ZL1AZE on 80, all CW. On RTTY he caught VR2XLN on 30.

Rob, GW0RYT sends in several GW scores on behalf of himself and fellow members of the Blackwood and District Amateur Radio Society who are enjoying some internal competition. He mentions that Steve, GW4BLE's 12m score has been achieved using his 2-element 40m beam and with only 50 watts. Which again shows that, on bands that are open and where competition is limited, you can pretty much press anything into service and catch some nice DX. Glyn, GW0ANA has also been busy on 12m, and mentions TL0A and 4Z4TL on SSB plus ST2AR and VQ9LA on CW. Jim, MM0DXH mentions WH2X (Guam) on 15 plus TU5JD, VP50V, FR/TU5KG and TG9IRP on 20, all in the CQWPX contest.

Dave, G3TBK is back from another Caribbean jaunt during which he made 13,485 QSOs as J88DR not counting duplicates, of which, he says, there were too many. Low band openings are particularly short, so it was frustrating, for example, that one Norwegian station worked him five days in a row on 80m, which robs others of a chance. Dave says it was nice to have long runs to Europe on 10 and 12m for the first time in several years. Since arriving home he has worked A33A, FO8RZ and ZK3OU on 20 CW. ST2AR and VQ9LA on 12 plus 3B9WR, V51AS, Z21BB and 7P8AO on 10, all CW.

John, G4ATA mentions ZF2AM, HH2/PA5M, OY3AA, V26M, KP2AD, ZL3FV and C56KR on 80, plus D44AC, R1ANP (CW), J37BO, PJ2/PE2B, YV5JF, 8P6CF, VP9BO, PV8AL and J6/VE3CZF on 40, all SSB except where otherwise stated. He says, "My CW is very poor so it's a last resort for a new DXCC! I am practising though." He uses an FT-1000MP, 400W and full size 4-square on 80m and a pair of elevated, phased quarter wave verticals on 40m, plus a 330ft Beverage for receive on 40m. 80 and 40 are the only bands on which he operates. The moral to this, of course, is that you can do very well on certain bands if you are prepared to forgo others and focus your efforts.

Peter, G4XEX also mentions the upturn in conditions, with several nice ones on 20m including a VK station at midday, plus ZD7FT on 12m.

Finally, Simon, M0VKY says that he put up a full-size delta-loop for 160m for the CQWW 160 SSB contest, which must have been quite something. He has made a video of the effort, which is on YouTube. He also worked 9U1KI on 17, plus 6W/GM4FDM on 40, 20 and 17 for some new slots. Other DX worked included 6V7T on 10, 9X0LX, XV9DX, C5YK and VP8LP (Falklands) on 15, 5X1NH and TI8II on 17, XR9JA on 20, ZL4IV, ZS3D and YC6YUN on 40, ZL1AIX and J79XBI on 80.

2010 ANNUAL TABLE
(starting 1/1/10, sorted by 12m totals)

Call	10m	12m	80m	160m
G3SED	19	77	34	66
MU0FAL	12	41	61	50
G3TBK	14	24	68	98
GW4BLE	25	22	37	57
G3HQT	3	20	81	0
GW0RYT	11	18	6	0
G1UGH	0	15	0	0
GW1PJP	0	12	0	0
GW0LKJ	0	9	0	0
MW0DNF (QRP)	5	7	10	0
G4XEX	0	6	25	1
M0VKY	0	0	13	4
G6CSY	0	0	41	20
G4FVK	0	0	12	0
G4ATA	0	0	68	0

THANKS. Special thanks go to the authors of the following for information extracted: OPDX Bulletin (KB8NW), The Daily DX (W3UR) and 425 DX News (I1JQJ). Please send items for the **July** issue by **Friday 21 May**.

WEBSEARCH
3C0C: www.3c0c-annobon.com
E4X: www.dxfriends.com/e4x
K4M video: www.dxvideos.com/k4mvideo.htm
UDXT: www.uz1hz.com/pacificodyssey.html

VHF/UHF

Just what interests you at VHF and UHF?

The antenna at OA4TT used to work 62 stations on 144MHz EME, including G4ZFJ.

INTRODUCTION. It's a great thrill to have the opportunity to make a guest appearance on these pages. VHF/UHF has always been a particular interest of mine, especially in the field of propagation.

EME. One of the aspects of the VHF/UHF that has really changed in recent years is that moonbounce (EME) is viable for many more stations than it was before. The WSJT software, in particular, has completely revolutionised what it's possible to work. Many stations that are reasonably equipped for tropo contacts report success 'off-the-moon'. Take for example, Ian, G6TGO. Here's what he has to say.

"I had my very first EME success on 2 March 2010, when I copied Lance W7GJ twice on my very first attempt at JT65A (see **Figure 1**) using a single homebrew 2.75m boom 4-ele YU7EF Yagi at 7m off the ground (109m ASL) and a Kenwood TS2000. Although I do not have the Tx power it was a Rx only spot. After the first spot I contacted Lance direct via ON4KST chat and he called me which I copied. I was amazed because I was led to believe I would need to have a large array to be successful but this proved that it is possible with very minimal equipment. Readers may note the time I switched on was 0400 as I could not sleep and the first detection was 0420 when the Moon was at 19.79° elevation and the 0440 spot was detected when the Moon was 17.92°.

"So Lance, W7GJ and Steve, K1SG felt it was worth me sharing this success with the RSGB readership to encourage smaller stations to have a try what I thought the impossible! You may never know if you do not try. I am grateful to Lance and Steve for their encouragement. My thanks to Joe, K1JT for the use of the screenshot."

The ON4KST chat is invaluable for contacting EME stations to arrange skeds or, as Ian did here, report reception. You can find the site at www.on4kst.com - there are facilities for LF, 50, 144 and microwave chats, so you can choose the chat room that is most appropriate to your needs.

Activation of the Arecibo 1000ft dish in Puerto Rico on 432MHz EME by the KP4AO group has caused a real stir! David, G4DHF was one who put them in the log, swapping 59 reports. David was using 2 x 21el Yagis to make the QSO – not a big system by EME standards at all. Other QSOs have been made by stations using a single Yagi. By the time you read this, the next KP4AO activation will have taken place, so we hope that there will be some more contacts to report.

WHAT'S YOUR VHF/UHF? In years gone by, my use of VHF/UHF was purely chasing DX and contesting. But life has changed, my commuting hours have gone up and these days I do a fair bit of VHF/UHF mobile operating from the car. With an FT-8900 I have the 50, 144 and 433MHz bands available and there's always something to work or listen to. And having been doing the commute for a few years now, you get to know what you normally hear and what you don't. One of my regular haunts on 2m is the White Horse repeater, GB3WH. It shares a frequency with GB3PO at Martlesham and it is always interesting when I start to hear GB3PO, suggesting conditions are good towards the east. This usually results in a quick QSY to the shack on returning home and some CQs on 144.300 and 432.200MHz. Once or twice a year, I'll hear the Humberside repeater, GB3HS, indicating great conditions to the north. One year I had the FT-817 in the car and a simple 50MHz whip (do try it if you can, it's really simple to setup and surprisingly effective). It was amazing the number of European stations I worked that Sporadic-E season from the car – and of course, it gave a great 'heads up' as to whether I should get into the shack as soon as possible when I got home! With the FT-8900 in the car, I have 51MHz FM and it's surprising how often you hear Spanish mobiles on 51.510MHz during the Sporadic-E season. So for me, it's not all about huge tropo openings, EME and contesting, but I have found a great deal of pleasure in some more simple operating that allows keeping a careful eye on propagation.

Through Twitter, I have got to know John Blick, MM6KSJ. I asked John about his use of VHF/UHF. "I'm a newcomer to amateur radio and having passed the Foundation licence last year I decided to buy a Yaesu VX-8E - plus all the extras available! Living on the Isle of Bute, Scotland I have been able to QSO with stations on the mainland on 2m and 70cm (Inverkip, Gourock, Troon...). However, through an Echolink repeater at Langbank (GB3PA) I have been able to talk nationwide and worldwide using an HT! The stock antenna was quickly replaced with a Diamond SRH-940 and I gradually bought the speaker/mic, GPS unit and 1800mAh battery. After programming the VX-8E correctly, I've had great fun doing APRS with it, particularly when I go across the water to the mainland. It means that my wife can 'stalk' me, as she puts it while I'm away from home!" John has found the books *GPS and Amateur Radio* by Walter Fields, W4WCF and *APRS Moving Hams on Radio and the Internet* by Stan Horzepa, WA1LOU really good for getting up to speed with APRS.

The SOTA crowd do a great deal for VHF/UHF and even some microwave activity, taking simple and not-so-simple gear to the SOTA summits throughout the UK and beyond. Talking with Richard Marshall, G4ERP recently, I was interested to learn that there's been some 1297MHz FM SOTA activity from the north of England as well as the more conventional 144 and 432MHz FM and SSB activity. Many of us have got VHF/UHF handheld gear – why not stick it in your pocket next time you go for a walk and put out a few CQs from a high point whilst you take in the view?

Graham Boor, G8NWC, from Spalding said, "Poor site, small station and low antenna, don't be put off from enjoying the thrill of VHF/UHF operation. Using a small set up of 50W from a FT-857 and a long 7-ele Yagi (G4DHF design) at 20 feet, many useful contacts have been made to add to the combined score for the Spalding DARS. I'll never be able to compete with the big guns, but search and pounce and looking for the multipliers all helps, join in the fun on the UKAC contests!"

And then there's David Powell, G3XLW, who lives in South Devon in a valley parallel to the sea! I asked David about his use of VHF/UHF, but he can barely hear a thing. Many of us have lived in locations like that, but something is usually possible. Maybe 50MHz Sporadic-E and F2 is the best chance for David – with signals coming in from slightly higher angles. Being in a southerly location always helps too. Let me know if you try it, David.

Elsewhere in Devon at Sidmouth, Ian Kennard, G4PDS wrote, "Took part in the 2 metre UKAC last evening from the Norman Lockyer Observatory (www.GB2NLO.com). We're not the most competitive of stations, but the air of excitement was tangible. We worked 30 stations, but the unpredictability of it seemed to fire up all of those present. The last 10 minutes saw two GM stations worked as they appeared almost magically out of the noise. We never work quite so many from down here in Devon, but the points per QSO rate is always high. It can take quite a bit of persuasion to get people to beam South West ..."

BAND REPORTS.

50MHz. Ian Hogan, G6TGO reports that 50MHz opened to the northern UK on the morning of 19 January that resulted in the following contacts: OH3MF KP20 1780km, ES2QN KO29 1752km, OH6KTL KP02 1669km, OH3SR KP21, SM0CCM JO89 1392 km, SM0GWX JO89 1405km, ES4EQ KO39 1856km, SM5ISM JO89 1,337km, OZ9PP no QRA, SF4J JO79 1244km, worked in three separate openings during the day. On the 21st at 1700UTC: IK0FTA JN61 1687km, IK5RLP JN52 1572km and on the 22nd: I2PJA JN45 1248km, EA6QY JM29 1581km, IW1AZJ JN35 1463km, IZ5HSK JN53 1430km, EA3LL JN01 1381km, IZ5EKV JN53 1463km, IK0FTA JN61 1687km, IK5YJY JN53 1504km. On 30 January to end an exciting month, he worked YU1EU KN04 1883km, S51DI JN76 1504km, OE3DSB JN78 1318km, and YU1FE KN04 1903km - his furthest winter E contact in 5 years!

70MHz. Clive O'Hennessy, GM4VVX (IO78TA) reports some auroral activity on the band. On 5 April, he worked G4PBP on SSB and GW8IZR on CW. On 6 April, Clive heard his first LA on 70MHz, LA4LN, but LA4LN was suffering from a high noise level. QSOs were made with GM3WIL, OZ2LD, OZ3ZW and GM0USI. Clive's using 25 watts into a 6-ele Yagi.

144MHz. Colin Roberts, G4ZFJ has made some interesting QSOs. On meteor scatter, he worked SM4SJT on 27 March. However, on EME there are some really interesting ones, worked with his 4 x 9-el Yagi and amplifier: OA4TT (FH16) was a new DXCC & grid (G - OA 2m 1st). Jack, N6XQ has a second home in Peru and he has just started 2m

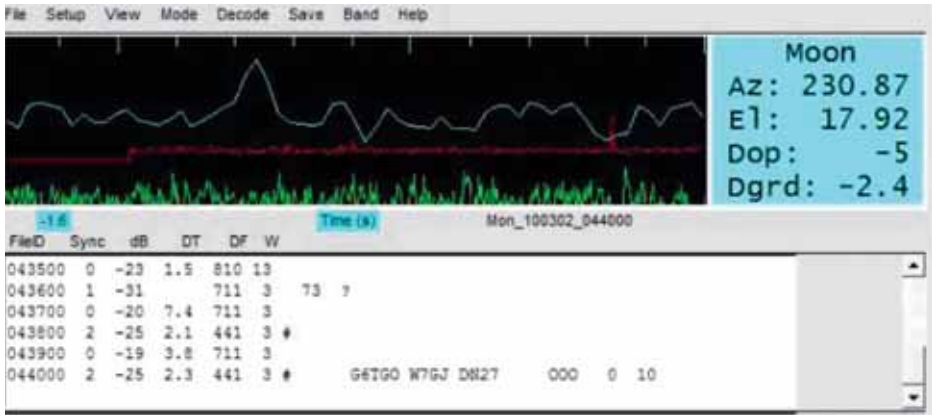

FIGURE 1: G6TGO working W7GJ on WSJT via EME.

EME using a 6 wavelength Yagi, which has a bamboo boom and 550 watts. He was only active for one weekend but managed to work 62 stations.

Colin worked two other new DXCC countries this month: 8Q7QQ (MJ64) on 23 March – an EME DXpedition to the Maldives. They had problems with their 1500W 2m linear on their first day but managed to fix it but at a reduced power of 350W. Nevertheless, they did extremely well, working 207 stations on 2m, 7 on 6m, 12 on 70cm & 14 on 23cm. HS2JFW (OK03) was worked on 30 March (G - HS 2m 1st) He's another newcomer to EME, just using 100 watts at the moment to 4 x 13-element Yagis. In total, Colin worked 12 new initials including UR6EC, LZ1ZX, RN6DJ, N4BH, WF1F, W7OJT and OH9HEU during the month with several new grids.

Clive, GM4VVX makes a very welcome report from the far north of Scotland (IO78TA). He notes that he's not heard an aurora for 14 months, but heard a weak one on 15 February, but no traffic was detected. On 5 April a huge CME event resulted in alarms going off at 0800UTC, followed only a couple of hours later with the SK4MPI beacon going auroral. There were snatches of auroral traffic from mid-day then a full auroral signal at 1500UTC. Au seemed to be strongest down the west of UK, but little activity detected from continental Europe. Strong Au signals, many at 59A, but little traffic. It faded at about 1700UTC, with weak traces for the rest of the evening. QSOs were made with G4HGI, G4PBP, G4RRA, G3LTF, then PA5DD, SM7GVF, DF0MU and G4DEZ all on CW. On 6 April, Clive worked G4KWQ, GM4GUF, DL1AIW, OZ6OL, PA4VHF, PA5MS, G4MKF, G7RAU, GM0USI, LA2Z, G3TA, DG0GM and, finally, as Au faded, G8ZVZ, all on the key.

432MHz. Colin, G4ZFJ reports working a new grid, JN79 – from working OK1DFC on 27 March on EME. Colin was using 180W to a 28-ele Yagi.

GET READY FOR THE ES SEASON!

Although June is often considered the main month for Sporadic-E on 144MHz, May is an interesting month too and often gives some good openings, particularly on the lower VHF bands, 50 and 70MHz. So how can you take advantage of the openings and make some interesting contacts? Your aerials need to be up, your gear needs to be working and you need to be in front of the gear! The best antenna in the world won't be any use to you if it's in your garage or lying on the ground! A particularly useful site for monitoring Sporadic-E openings, but for many other propagation modes as well, is 'DX Sherlock', www.vhfdx.net/spots/map.php?Frec=MUF.

Other online resources such as the ON4KST chat and the DX Cluster are useful and many can be accessed from a mobile phone (check out www.dxanywhere.com) if you're out and about and on the move. If you're miles from your home station, then maybe your mobile station or even a simple portable FM rig is an option.

When keeping an eye out for 144MHz openings, Band II FM broadcast stations are your friend. In the old days it used to be a struggle to identify what you were hearing, but in these days of RDS displays and Google, generally a quick search for the station information that's being displayed will give some good clues as to what's happening. You might find it useful to monitor a Band II frequency that is generally quiet in your area and see what comes up as the band comes alive.

Don't forget, too, that more unusual openings can start to happen. On 50MHz at least, it's not uncommon for a little bit of Es to couple into more long-distance TEP to the south. SV8RX is already reporting via his blog that he's heard signals from Southern Africa on 50MHz this season. All it will take is a little Es to the Mediterranean from here and you could be working them too! Multi-hop Es openings may start to occur too on 50MHz – look for the paths to the Caribbean and North America in particular. Don't think this is beyond your reach – a couple of summers ago, I worked NP4A on 50MHz whilst I was using a few watts to a vertical. NP4A, on the other hand was using a 17-element Yagi!

GHz Bands

First indications of improving springtime conditions on the higher bands

PHOTO 1: G4DZU 3m diameter EME dish with 23cm feed.

BAND ACTIVITY. At last there are some better conditions to report. The all-band contests held across Europe on the weekend of March 6 and 7, together with the UK Microwave Group Contest, held only on the 7th, coincided with some reasonable conditions. A large, 'cold' high pressure system was situated over the UK that allowed signals up to at least 3.4GHz to penetrate over 600km into Europe. This gave an altogether better feel to the contest after a long cold winter which had produced little long distance propagation to talk about.

From Scotland, GM4CXM provides news that there were seven GM stations active in the contest. Robert, GM4GUF, operated portable from Tinto Hill (IO85EO) with 18W and a single 23-element Tonna Yagi. Apparently he went home happy after making 13 contacts and providing a new square for many other operators. Since Robert didn't have ON4KST chat available on the 700 foot summit, Alan, GM0USI provided schedule or 'frequency of activity' information. The PA6NL (JO21) group reported hearing Robert briefly. The signal didn't last long enough to complete a QSO.

Jim, GM3UAG (IO87) is now using a 2m diameter dish and provided a good signal down towards Glasgow and beyond.

Dick, GM4PPT (IO75SK), has taken delivery of four 23 element Yagis, so that will be another GM operational with a good signal in the near future.

From East Anglia conditions were slightly up in most directions, thanks no doubt to the high pressure system. I managed contacts on 1.3, 2.3 and 3.4GHz with DL0R (JN48) as well as DK1VC (JO31) and G3XDY (JO02). PA6NL (JO21) and PI4GN (JO33) were worked on 1.3 and 2.3GHz, whilst G4BAO (JO02) was worked on 1.3 and 3.4GHz. ON4SHF (JO20) was worked on 2.3GHz. Several others, including GM4CXM (IO75), DL3IAS (JN39) and DH2SAV (JN48) were worked on 1.3GHz only.

INCREASING ACTIVITY ON 1.3GHz. There has been a noticeable increase in 1.3GHz band activity in the NW of the UK. This is largely down to the efforts of the members of the Bolton Wireless Club (BWC). I asked Ross, G6GVI, secretary of the BWC what their secret was and he replied with the following information. I think this should not only be an inspiration to the rest of us, but seems to be a proven method to increase activity.

"Nowadays, a few of us are always listening on 1297.5MHz when in our shacks, and never miss answering a 'CQ' call when we hear one – and if we have to interrupt a QSO on another band to do this, then the stations with whom we've been talking become aware that they are 'missing out' on some activity on the higher band!

"We do our best to encourage newcomers to the 23cm band – setting up skeds for them to make sure that they have some early successes, so they are then encouraged to stick at it. For example, last year one of my fellow BWC members had an old Standard handie which could put out only around 40mW on 23cm FM. We still managed some remarkable QSOs with this (having initially made contact with a 'QRO' 1W from my transceiver). He then acquired an old IC-120 mobile set, and now has a MMT1296 transverter.

"Our Club purchased an old MM transverter of our own last June, which together with a 27-ele G3JVL antenna, is available for loan to any of our members to try for a while. Six of them have done so thus far and one of them has even bought a transverter of his own!"

Ross has set up several pages with further information on 23cm **[1] [2] [3]**.

Judging by the number of callsigns of stations in the NW with 23cm capability on [1], the group has been very successful in their endeavours. Thank you for the information, Ross.

EME ACTIVITY. The following 1296MHz EME report comes from Zdenek, OK1DFC. He reports two new initials on CW and 3 on JT65, extending his score to 269 initials on CW and 87 on JT. His tally was OK2DL (#268), RW3BP, UA3PTW, SP6JLW, LZ2US, 8J1AXA, SP7DCS, DL6SH, VK5MC, SV3AAF, OZ4MM, G4CCH, OK2DL CW, SM4DHN, DF3RU, OZ6OL, ES5PC, PA3FXB, G4RGK, OK3RM, UT2EG (#269). He had problems on the evening of 26 February with strong winds and was not able move his dish. However, he did follow up with SP7DCS, UT2EG, LZ1DX, G4CCH, IK5QLO, PY2BS, VE3KRP, K8EB all stations CW, and JT65C UT2EG (#85), DF3RL (#86), W3HMS, N6RMJ (#87). Pat, N6RMJ, has only four 55-element Yagis and 50W RF output. Zdenek worked him during his moonrise at -24dB (reference 2500Hz bandwidth) for speaker copy. Also worked were K8EB, VE7BBG, LU1CGB, OK3RM, and K7XQ. Marek, OK2DL, is newly active OK EME station with a 6m diameter dish and 300W RF output from a SSPA. Marek was reported as very loud at 569 – 579 on CW.

Doug, G4DZU, sent in a short report on his own EME activities in February. He was on for a short time using his SDR-IQ receiver

FORTHCOMING MICROWAVE EVENTS - 2010

Finningley Microwave Round Table, July 10 and 11. Details at www.g0ghk.co.uk/table.php.

14th International EME Conference, Dallas, Texas, 12 – 14 August. Details at www.ntms.org.

55th UKW Tagung (Weinheim), 11 and 12 September. Details at www.ukw-tagung.de.

Crawley Microwave Round Table, 12 September. Details at www.carc.org.uk/modes/microwave.shtml.

RSGB Convention (with VHF and Microwave stream), Horwood House, Milton Keynes, 10 – 12 October. Details at www.rsgb.org/rsgbconvention.

Microwave Update, Cerritos, California, 20 – 24 October. Details at www.microwaveupdate.org.

Martlesham Microwave Round Table, 13 and 14 November. Details from John Quarmby, G3XDY, http://mmrt.homedns.org or G3XDY@BTinternet.com.

PHOTO 2: Ross, G6GVI, operating portable on 23cm and 4m from Winter Hill.

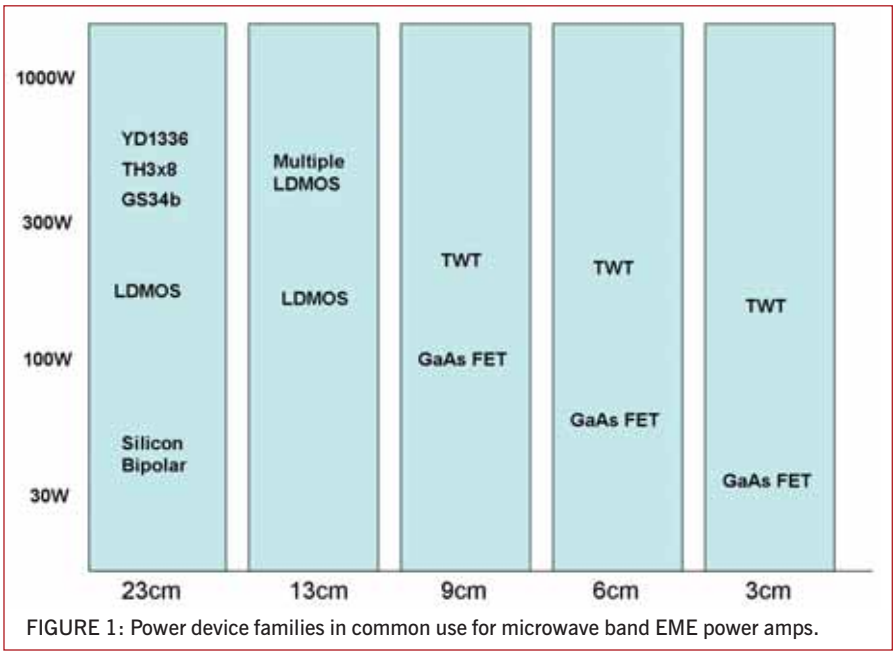

FIGURE 1: Power device families in common use for microwave band EME power amps.

and MAP65-IQ software and a SDR-1000 transceiver on random JT65C with a 3m diameter dish and 400W RF output. He worked DF3RU (JN59), UA3PTW (KO39), UT2EG (KN67), OK1DFC, and OK3RM (JN69). He was called by IK5QLO but was pointing the dish through a tree at the time and couldn't decode the JT65 signals.

Note: (#number) denotes a new and unique station worked off the moon.

GETTING STARTED IN MOON BOUNCE

part 9. Many radio amateurs associate moon bounce (EME) with high power valve amplifiers, running 1kW output, and requiring a special NoV from Ofcom in order to run this sort of power. Whilst it is true that there are a few EME amateurs who do have a 'high power licence' that is not the case for the vast majority because EME is entirely practical on the microwave bands well within the permitted power limits of the UK Full and Intermediate amateur licences.

EME is all about generating sufficient EIRP (Effective Isotropic Radiated Power) to overcome the huge path losses encountered on the moon path (typically 271dB at 1296MHz). Since EIRP comes from radiated power multiplied by antenna gain it is possible to produce the required EIRP at reasonable transmitter output power by increasing antenna gain. Of course, this trade-off cannot be carried too far because of other constraints such as antenna size.

Given that a RF power of 400W is sufficient, when used with an appropriate size antenna, how can the required power level be generated? Across the frequency range from 1.3GHz to 10GHz the type of device used to generate transmitter power changes significantly. **Figure 1** shows some of the typical device families used today. At the lower end of the spectrum RF MOS transistors are beginning to replace thermionic valves such as the 2C39 triode, with the occasional bipolar amplifier, using multiple 'bricks' such as the Mitsubishi M57762, giving way to the later RF MOS RA18H1213G 'bricks'. Even more popular are amplifiers produced by combining individual RF MOS devices such as the MRF286, MRF9060 etc into modules. Typically these consist of two devices combined as a single amplifier module. Pairs of these modules are then combined to form larger amplifier units capable of between 200 and 500W output. Kits for 1.3GHz RF MOS power amplifiers are available from WA6PQL, AD6IW, G4BAO and others. Ready built modules are available from DB6NT, DL2AM and PE1RKI.

Cooling these large solid state amplifiers is usually by the use of large heat sinks with several large blowers to increase the flow of cold air. More recently liquid cooled amplifier modules have started to appear.

Very high output powers are usually the province of valves, such as the TH3x8 series, YD1336 and GS34B etc. Not everyone likes playing around with high voltages, however! RF MOS amplifiers tend to be 28V working.

Moving on to the 2.3GHz band and we find that valves have been largely superseded by RF MOS (LDMOS) based amplifiers. There are a great many ex-3G power amplifiers and ex-MMDS power amplifiers available on the surplus market for relatively little money and yet capable of between 150 and 350W output in the frequency range from a little over 2GHz up to about 2.5GHz. These, again, consist of combined lower power modules on a common heat sink. For even higher output, which is often needed to overcome the greater coaxial cable feeder losses, two or more such amplifiers can be combined to achieve 500 – 600W output. Surplus power amplifiers to look for are Spectrian, Ericsson and Powerwave, to name but three. As with 1.3GHz, there are a number of commercial power amplifiers, made especially for the amateur market, available from well-known manufacturers such as Kuhne Electronic and DL2AM.

At 3.4GHz current RF MOS devices and thermionic valves are not particularly effective. The power devices of choice tend to be power GaAs FETs and Travelling Wave Tube Amplifiers (TWTA). Because single device GaAs FETs tend to be limited on power output to around 50W, combining two amplifier modules is common. The Toshiba UM2683A is a fairly common surplus amplifier module that can provide about 45 to 50W output. These amplifier modules can be combined to produce between 90 and 100W output.

Another popular 3.4GHz power amplifier configuration is to combine two (or more) ex-Ionica 15W GaAs FET amplifier modules. These have the advantage of low cost and easy availability in the UK.

At higher levels than 100W the TWTA tends to be the preferred amplifier and a variety of these are also available on the surplus market.

A TWTA is the most common power amplifier at both 5.7 and 10GHz, although there are a considerable number of both surplus and amateur commercial GaAs FET amplifiers coming into use at between about 10 and 50W output. Even as surplus, these can be expensive. Their big advantage is that they can usually be mounted right at the dish feed point to reduce feed-line losses. This is also possible with TWTAs, but the size of complete units often makes this impractical.

Next month will be the 10th and concluding part of this series on starting on EME.

ERRATA. In my March 2010 *RadCom* article describing construction of a 144 to 28MHz receive converter I inadvertently gave the wrong Coilcraft part number. The correct part number is 165-07A06L with a nominal inductance of 92nH. My apologies for the error.

WEBSEARCH
[1] http://homepage.ntlworld.com/rossjwilkinson/g6gvi/23cm.html
[2] http://homepage.ntlworld.com/rossjwilkinson/g6gvi/23cmmobile.html
[3] http://homepage.ntlworld.com/rossjwilkinson/g6gvi/djg7.html

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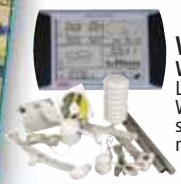

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Short Circuits

Amazingly useful RF components are available off the shelf.

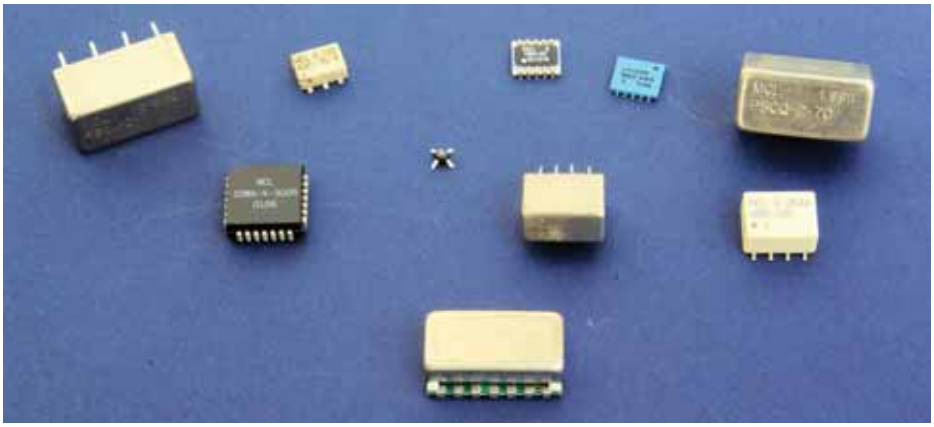

PHOTO 1: A range of MiniCircuits devices. From left to right, top to bottom: 1-1000MHz 180° splitter, 15dB 5-100MHz directional coupler, 3 – 4GHz x2 multiplier, 1.5 – 2.2GHz quad hybrid, 40-70MHz quadrature hybrid, 4-way switch DC – 4GHz, MAR-2 modamp, 0.1-450MHz splitter, 120-180MHz quadrature hybrid, 75 - 150MHz VCO.

READY-TO-GO RF. Many amateurs will be aware of the range of ready made RF components that can be slotted into circuits to make life easier for constructors. Packaged double-balanced mixers such as the venerable SRA-1 have been used for decades, and the MAR series of 50Ω modamp gain blocks have been covered in this column in some depth - see particularly the May 2008 issue for the latter. But mixers and modamps form just a small subset of a huge range of RF plug-and-play building blocks with a massive variety of useful functions. MiniCircuits [1] are not the only company producing pre-packaged components but they are easily the best known in this area, and are quite happy to supply small quantities against a credit card order [2]. They have a UK distribution centre and will take orders over the phone, although a subsequent confirmatory e-mail is advisable. Their website has a well organised catalogue and allows selection of devices by function, package, type and frequency range. Full data sheets in .pdf format are downloadable for every component and there is even a price shown for most. This is in US dollars and shouldn't be taken as the value that will be quoted from the UK suppliers, but it is a useful guideline and isn't usually too far out.

Photo 1 shows several components in a variety of packaged formats. You will see there are two main types of construction. These are referred to as surface mount and plug in by the catalogue. Generally, the surface mount parts are cheaper than the plug in versions, typically being around half the price, although internal functionality is nearly identical between the two construction types. There is also a third type of construction: packaged. Here, the components have been mounted inside a milled aluminium case with connectors, usually SMA or BNC, fitted to allow them to be interconnected with coax cables. These packaged versions cost much more – sometimes ten times as much – but tend to be a firm favourite amongst commercial, industrial and military users due to the speed of assembly such construction allows. For this reason, the connectorised packages often appear on the surplus stands at rallies and radio boot sales – frequently second hand at prices not dissimilar to new SMT ones!

Let's look at a range of these other blocks and show how they can be used and interconnected to give complete RF systems with little effort having to be applied to their integration.

POWER SPLITTERS AND COMBINERS. The simplest splitter divides the power into one input port equally between two output ports, with the power out of each being 3dB down on the input so there is no net loss in signal. Provided all ports are properly terminated, ie they each work into a nominal 50Ω source or load impedance, the two output ports are isolated from each other. Being completely passive devices (no active gain stages) they can be used backwards as combiners. In this case the common port contains the sum of the powers into each port, but reduced by 3dB. So two signals of 0dBm each will result in an output power of 0dBm [3].

Such a simple two port splitter could be used, for example, to supply both receive and transmit mixers in a transverter from a common local oscillator, or to combine the output from two oscillators while preventing the signal from one feeding back into the other. An example is the LRPS-2-4 which is specified over the frequency range 10 – 1000MHz.

The 180° hybrid, such as the SCPJ-2-750 covering 30 – 750MHz is a different type of splitter/combiner, having two input and two output ports. One input port (called the sum port) gives two equal amplitude outputs with zero degree phase shift, exactly like the three port splitter. The other input (the difference port) again splits the power with equal amplitude between the two outputs, but this time there is a 180° phase shift between them. Both input ports, as well as both outputs are isolated from each other provided all are operated into matched 50Ω loads.

The 90° hybrid, such as the ADQ-180 (covering 120 to 180MHz) is also a four port device but this time phase shifts of 90° are introduced on the two outputs. Let's call the two inputs 1 and 2 and the outputs A and B. An input signal to 1 gives equal amplitude outputs on A and B, but the phase of B leads A by 90°. An input on 2 also gives two outputs where now A leads B by 90°. In other words, the phase relationship has swapped.

Figure 1 shows the circuit diagram of a direct conversion 144MHz RF upconverter using some of the components so far described. (Note that grounding pins are not shown on the splitters and mixers – refer to their respective data sheets for the full connections). An RF source (crystal oscillator, synthesiser, DDS etc) is amplified and split into 0° and 90° paths to feed a pair of identical mixers. The IF ports of these are fed with 90° shifted I and Q audio channels, which may come from a stereo soundcard output from software designed for I/Q channels such as that in [4]. Alternatively a polyphase or all pass network such as those described in Homebrew in recent months can deliver the dual audio inputs. The opamp buffers and 100Ω resistors are needed to ensure the mixer IF ports are correctly terminated in 50Ω right down to DC. The outputs from the two mixers at F_{RF} + IF and F_{RF} - IF, are summed in a combiner with the result that one product is cancelled out and the other added. A breadboard version of this design, but made using different versions of the components can be seen in **Photo 2**. Unwanted sideband rejection was measured at around -40dB.

If the IF signal is generated by another 90° hybrid instead of audio quadrature drive signals, the result is another standard building block, known as a single sideband – or image cancelling – upconverter. Not unsurprisingly these are also available ready made, but are often semi-customised to users' frequency

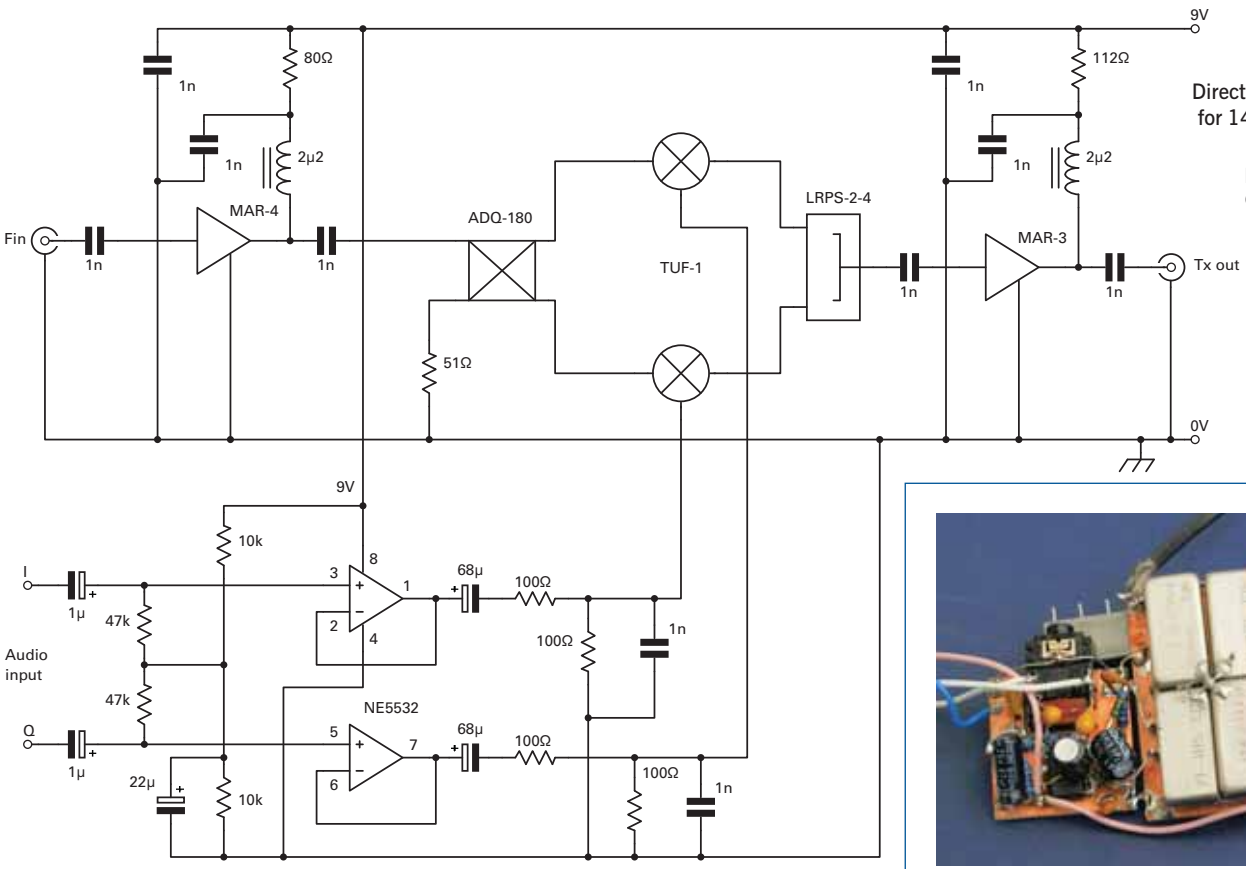

FIGURE 1: Direct Upconverter for 144MHz using MiniCircuits packaged RF components.

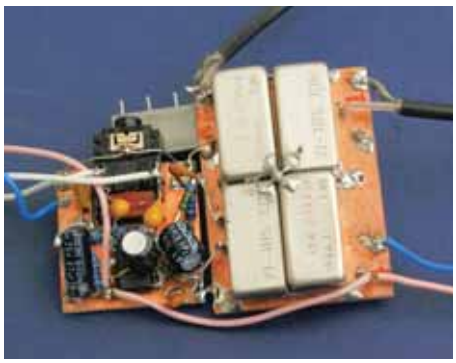

PHOTO 2: Breadboard 144MHz upconverter

bands and other requirements and therefore cost appreciably more than if they were to be made up from basic building blocks. But take a look at the JCIQ-176D for a moderately priced version that covers the 2m band.

OTHER COMPONENTS. Ready made transformers, with fixed winding ratios such as 1:1, 1:1 centre trapped, 2:1, 3:1 etc can be more convenient than winding toroids with bifilar twisted wire, especially if you need to find the right ferrite material for a particular frequency band. The T1-1T device, for example, is a 1:1 50Ω device with centre tap working over the range 80kHz to 200MHz. Price is quoted at $4.45.

Directional couplers are an interesting little item. They are three port devices, with input, output and coupled ports. A fixed proportion, for example -20dB, of the signal flowing from input to output is coupled to the third port. But if the signal flow is reversed, from output to input ports, nothing appears at the coupled port. Now, imagine one of these operating backwards with a properly matched load at its (officially the input) port and ideally nothing coming put of the third port. Now introduce a mismatched load with a VSWR of say 2:1. This mismatch causes approximately one tenth of the power (-10dB) to be reflected back to the source and in passing through the directional coupler (now in the designated proper direction). -20dB of this reflected power will appear at the third port. So we now have an indication of a mismatch. Use two directional couplers back to back, measure the ratio of forward to reflected powers at the two coupled ports and… Sounds familiar? That's exactly what the well known SWR bridge does. See for example the SDC-20-4, for a 5 to 1000MHz model with -20dB coupling. Such ready made packaged directional couplers form the basis of more than one type of low cost vector network analyser as well as several antenna analysers.

A few other components that may be of use to amateurs include:

- RF Switches – PIN diode and GaAs FET for frequencies from HF to microwaves
- Frequency doublers – effectively mixers with the input fed to two ports so the output is twice the input frequency
- Voltage controlled oscillators

MiniCircuits also provide other more specialised modules that frequently need to be customised to users' requirements. The cost of these is therefore considerably more and almost certainly not worth it for amateur projects. But when these items reach the end of their life they often end up at rallies!

CAVEATS. All the descriptions above are for ideal devices. It is important to remember that all RF components are subject to various capability limitations and manufacturing tolerances. Also beware of power ratings, accuracies of quadrature and 180° splits and mismatching of components that may *need* to be matched to give good nulling.

Having said all that, spend some time browsing the catalogue, look at their whole range of products and see if you can't come up with a novel project.

CORRECTION. One sharp-eyed reader spotted a mistake in **Figure 3**, the PN Generator in March *Short Circuits*. The 10µF capacitor between pin 12 of the fourth shift register stage and the opamp input is shown the wrong way round. One side has 0/5V on it, the other approximately 6V of mid-rail bias. In defence I can only say the breadboard (**Photo 1**) had it the right way round, but when I got round to doing the drawing…

G3RUH also pointed out that in the equation for software generated noise, a second valid random value is obtained by taking the SINE of the same angle as well as the COS. Thus two RND calls will generate two valid random noise values.

REFERENCES

[1] www.minicircuits.com
[2] Note that although there is no minimum order quantity, there is a £5 delivery fee on orders under £50. Above this value delivery is free – so it may well be worth topping up to have a few spares on the shelf ready for future projects.
[3] This is the situation with two incoherent signals. If the same, coherent, signal is applied to the two inputs, they will sum vectorially. If the two signals are in phase, the summed output will be 3dB up on either one, or 0dB on the total. This is the exact corollary of the splitter action. If the two inputs are 180° out of phase but of equal amplitude, complete cancellation will occur and no output will result.
[4] www.g4jnt.com/SDRTxSW.htm

Homebrew rotator

Made from junkbox parts and powerful enough for small HF beams

INTRODUCTION. This article describes the construction of a homebrew rotator that has been in use for over 18 months and has survived a winter with temperatures below -30°C. It can be made using a drill press and hand tools, but access to a metalworking lathe was useful in one or two situations. The rotator is based on a worm gear sandwiched between two aluminium discs. Use of a worm gear provides the benefit of not requiring a braking system, which was the major source of problems in my previous efforts to build a rotator. It is not likely that it can be copied exactly, because many parts were obtained from local scrap metal and surplus dealers, but it is hoped that there are enough ideas in this project to lead others to try and make their own rotator. The pictures should show most of the necessary constructional information.

CHASSIS. The main chassis frame consists of two thick 8 inch diameter aluminium discs separated by six metal spacers arranged around the perimeter. **Photo 1** shows the general form of the construction. The main drive shaft rises up through the centre, passing through both discs. To achieve accurate alignment of the shaft holes and the spacer holes, the two discs were clamped together during the drilling process. The discs were marked in order to maintain alignment of all the holes during assembly. Other holes were drilled in the bottom disc, as needed, for other parts of the rotator.

DRIVE SYSTEM. With the exception of the worm gear on the output shaft, all parts of the drive system are mounted on the bottom disc, as shown in **Photo 2**. The drive train comprises a surplus 24V DC motor and gearhead that drives the worm via a series of spur gears. The spur gears were selected to give a convenient linkage between the motor and the worm and to provide a final rotation speed of about 1 RPM. A single start, single throated worm gear was used. Single start is important in order to gain maximum self braking, and single throated gives added strength. With 32 teeth, the worm gear gave a speed reduction of 32 to 1.

The worm was mounted between two L-shaped brackets, which needed careful placement to keep backlash low. It is also very important that these brackets are made as strong as possible to avoid movement and distortion from the high stresses imposed by movement of the beam.

The shaft for the worm was made from $^5/_8$ inch steel rod. The ends were turned down to $^1/_4$ inch, using a lathe, to fit the spur gear and to provide shoulders on the shaft. A small ball race was inserted between each shoulder and the L-brackets in order to reduce the friction from the lateral thrust. A slot for a key also had to be cut in this shaft.

The worm gear is mounted on the main drive shaft, which in this case was the front fork of an old bicycle. The worm gear is held in place with a one inch length of $^1/_4$ inch keystock and a set screw. The slot for the keystock was cut in the drive shaft using a cut-off wheel on a Dremel tool.

POSITION INDICATOR. A 10 turn 5kΩ potentiometer was coupled to the main drive shaft via two spur gears, which provided approximately 5 turns of the potentiometer for one full turn of the beam. The larger gear was screwed, with ¼ inch spacers, to the upper surface of the worm gear. The smaller gear was mounted on to the potentiometer shaft. This arrangement is shown in **Photo 3**, which also clearly shows the substantial worm gear. The potentiometer mounting bracket was made of thin steel to provide some flexibility. This spring action ensured constant meshing of the two gears. It also facilitates setting the potentiometer.

LIMIT SWITCH ASSEMBLY. The limit switches and associated cam are used to prevent over-rotation of the beam. The cam also serves as a spacer between the worm gear and the top disc. It is fastened to the main shaft with a set screw. In my prototype, the notch in the cam is positioned to stop the beam either side of due south. The limit switches were mounted on a plate screwed to the tops of the worm L-brackets. **Photo 4** shows the switches and cam in position, along with an upper bearing race. The control cable with connector can also be seen.

FINAL ASSEMBLY. The completed (but un-cased) assembly is shown in Photo 1. The U shaped shaft is a fork from an old bicycle. The flange at the bottom of the fork conceals a ball race, through which most of the vertical load is transferred to the upper aluminium disc.

Six long $^1/_4$ inch bolts hold the complete assembly together. The heads are covered with silicone sealant to help keep out moisture.

A cover for the rotator was cut from paper-

PHOTO 1: General view of the completed rotator, less covers.

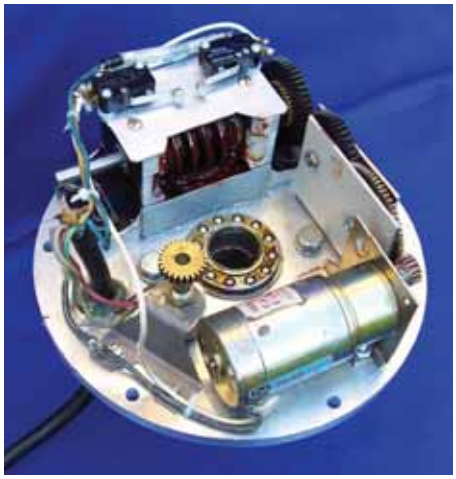

PHOTO 2: The base plate holds the motor, gear train and feedback pot.

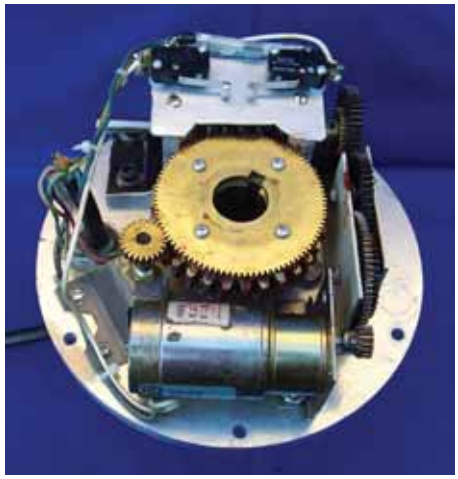

PHOTO 3: Adding the worm gear and feedback gear.

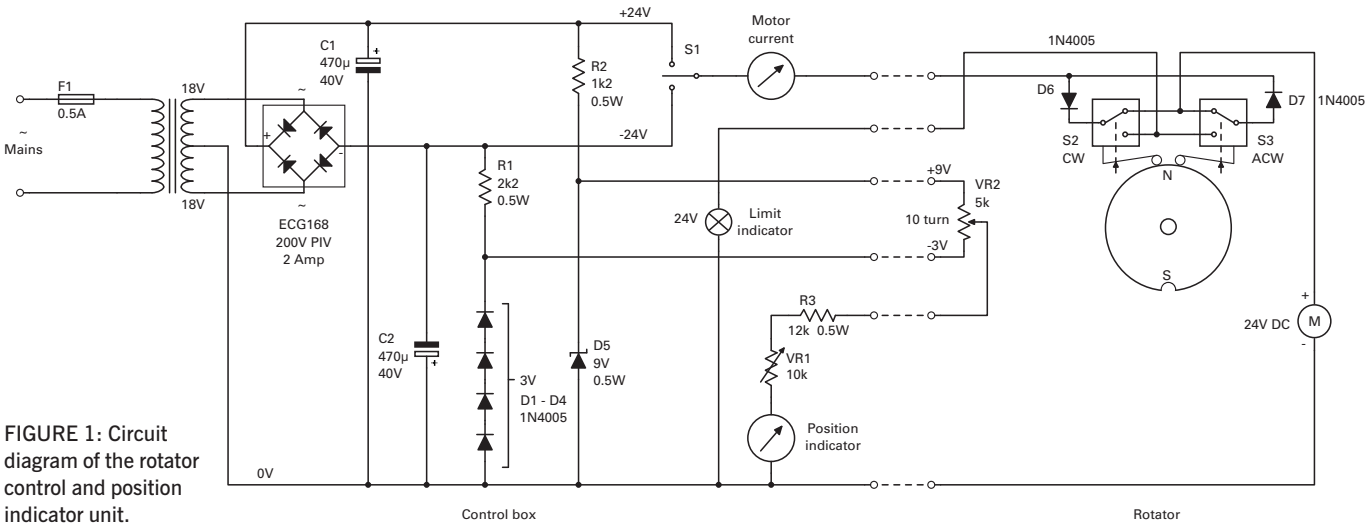

FIGURE 1: Circuit diagram of the rotator control and position indicator unit.

thin aluminium and wrapped around the assembly. Silicone sealant was used for waterproofing and the cover is held in place by two hose clamps. This arrangement can be seen in **Photo 5**.

ATTACHING THE ROTATOR TO THE MAST.

A four inch pipe flange was bolted to the underside of the bottom disc. This was used to screw the rotator on to a threaded 1½ inch aluminium pipe. The original arrangement used a set screw to discourage the pipe from unscrewing itself, but this was found to be inadequate so three struts, made from electrical conduit, were added. Photo 5 shows the details.

ROTATOR CONTROL BOX.

A simple control circuit (**Figure 1**) was developed to operate the motor. The circuit produces an unregulated ±24 volt supply, which is used to drive the rotator motor via centre off, momentary, two position switch S1. Motor current is indicated by a centre-zero meter wired in series with the motor. The meter is shunted with a suitable length of nichrome resistance wire so that the normal motor operating current indicates about half scale.

Power to the motor is fed via steering diodes D6 and D7 and through the limit switches S2 and S3 to the motor. When a limit is reached in either direction, the voltage is fed back to the control box to light a 24 volt incandescent lamp. Both limit switches are in the depressed state except when the rotator reaches one of the limit points near due south.

To measure the position a 12V span was required, arranged as +9 and -3V. The +9V supply is derived from the +24V supply by R2 and Zener diode D5, while the -3V supply comes from the -24V rail via R1 and four forward-biased 1N4005 diodes. The 12V supply is fed to the position indicator pot, VR2, located in the rotator. As mentioned earlier, VR2 is a 10 turn potentiometer, geared so that there are five turns of VR2 for one revolution of the rotator shaft. It is best to have these five turns in the centre of the VR2 to avoid any risk of over running the ends of travel. The meter zero point is on the left hand side, so the -3 volts elevates the 0V point above the bottom end of VR2 by about 2½ turns. Series resistors R3 and VR1 are chosen to suit the current rating of the meter used for position indicator. VR1 sets the span. The zero volts point of the potentiometer, relative to the main drive shaft, is set by pulling the two gears apart and turning the gear on VR2. These are bench adjustments made before the rotator is installed.

Photo 6 shows the prototype controller. This case also contains a control circuit to elevate the mast; the rotator controls and indicators are on the left. There are two meters associated with the rotator; the upper one shows direction and the lower one indicates motor current. A lamp indicates when the rotator has reached a limit.

FINAL REMARKS.

The weight of the rotator worked out to about 7kg. The bronze worm gear is the heaviest component. It was surprising how the small elements added up in the final assembly.

A shaft collar was fitted below the bottom disc (located inside the 1½ inch aluminium pipe) to help restrict vertical movement of the main drive shaft.

Set screws were treated with thread locking compound, and self-locking nuts were used whenever possible.

Ball bearings were not used in the aluminium discs, in order to simplify the machining. As previously mentioned, most of the vertical load is taken by the bicycle fork bearing. Considering the slow rotation speed and infrequent use, it was thought that the steel drive shaft against the well-greased bare aluminium plate would be OK. Keep an eye on the motor current; a rise in current indicates that all is not well and the internals of the rotator should be investigated.

I hope that this report shows what can be done with a little skill and some determination, and inspires you to have a go at making something mechanical yourself.

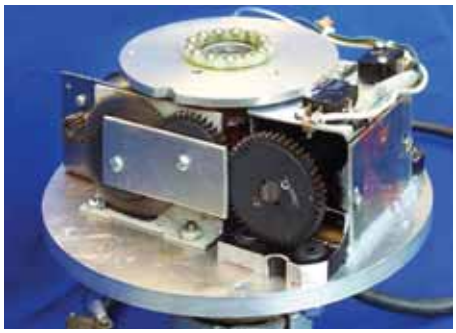

PHOTO 4: Detail of drive train and limit switches, including cam.

PHOTO 5: Looking up the mast, showing the foot plate and anti-rotation arms.

PHOTO 6: The control box. Rotator controls are on the left side.

Membership Focus

IOTA and the IOTA Contest

The 2008 GJ6YB group (the 'Dirty Dozen') comprises from R to L: G4CLA, M0WLF, M0MAT, M1EBV, G3TKF, G3XSV, G3YHV, G3ZVW, G4FKA, G7TWC, G3YIQ and M0WYB. The take-off to the North West is behind the group.

ISLAND OPERATIONS. In these days of seamless international communications, whether by phone or Internet, amateur radio sometimes seems to have lost its allure. But it is still possible to get a buzz from hearing and talking to someone who is operating from an island, whether a palm-fringed beach or a rocky outcrop off the Scottish coast. Maybe it's because islands have always had romantic associations, whether in the context of amateur radio or otherwise.

The late Geoff Watts, a very active short wave listener, recognised this when he founded the Islands On The Air programme back in 1964. Unlike DXCC, which is based largely on political boundaries, IOTA is very much grounded in the concept of recognised islands and island groups – the Scillies, the Andamans, the Balearics and suchlike.

Over the years, firstly under Geoff and then, for the past 25 years, under the auspices of the RSGB and IOTA Manager Roger Balister, G3KMA and his team, IOTA has become second only to DXCC as a popular awards programme, with a constant succession of expeditions to islands near and far. Some of the stories are quite hair-raising as readers of this magazine's IOTA column will be well aware.

IOTA CONTEST. In the early days of IOTA, Geoff organised the first IOTA contest to provide a focus for island activators and island chasers. The contest lapsed after a few years, presumably due to Geoff's limited resources to run it, but was resurrected by the RSGB's Contest Committee in 1993. From 308 entries in that first event, it has grown in popularity to the point where last year it attracted over 2000 entries. More to the point, 198 island groups were active over the contest weekend, making it easily possible to achieve a basic CC-100 (100 islands) award within the 24-hour contest period.

Indeed, the IOTA contest is notable for the way in which it attracts both contesters and IOTA enthusiasts who simply see the event as a way of increasing their totals or, in a very welcome number of instances, of giving them a reason to choose an island location for their summer holiday. Not for nothing is the contest scheduled for the last full weekend of July, nicely in the holiday season. Many folk find it possible to squeeze a contest entry into their family holiday. Some clubs make the contest an excuse for a club social event, maybe taking a ferry to somewhere like Guernsey or the Isle of Wight, though the nice thing about the contest is that all UK amateurs are, by definition, operating from an island location.

VOLUNTEERS & SPONSORSHIP. Like all RSGB contests (and many of its other member services) the IOTA Contest is managed entirely by volunteers, though funding for trophies comes not only from individuals but also from Icom UK sponsorship of the IOTA programme as a whole. The voluntary effort required to run a contest of this size is substantial, starting with agreeing the rules (though these days they stay fairly constant from one year to the next) to publicity, a certain amount of monitoring while the contest is in progress, receipt and acknowledgement of the logs (including quite a lot of correspondence where there are problems or queries, for example in connection with the log format or the section entered), cross-checking of well over half a million logged contacts, calculation of final scores, publication of results and issue of trophies and certificates. In many respects the process is easier than in days gone by, as much of the routine work can be automated but, typically, something like 2-3% of contacts (maybe 12,000 in all) need to be checked manually where there is a mismatch between logs that the automatic routine is unable to resolve. Paper logs are still accepted for the IOTA contest, too, though again this requires volunteer effort to type them up for cross-checking so computer-generated logs are preferable, either submitted as a Cabrillo log (supported by most contest logging programs) or by a QSO-by-QSO upload to the WA7BNM website facility.

PLAN YOUR STRATEGY. As always with contesting, it pays to start early in terms of planning and preparation, so if you have thoughts of entering this year's contest (24/25 July, midday to midday UTC), start thinking now about whether you will be coming on from home or maybe from a holiday or portable location. What section will you enter (there are single- or multi-mode sections, 12- or 24-hour, QRP, Low and High Power)? Read the rules carefully.

Plan your strategy – although non-island contacts count for points, island contacts are worth substantially more and each new island worked on each band/mode is a multiplier, giving a substantial boost to your final score. Do you need to make changes to your station? The contest runs on 80, 40, 20, 15 and 10m, with the majority of contacts to be made around Europe (though this will change as sunspot numbers continue to increase). So the ability to put a good signal into Europe on all those bands is important, bearing in mind especially that the contest often enjoys Sporadic-E propagation on 10m, allowing lots of close in European contacts on that band (and even on 15m).

One of the added benefits is that confirmed contacts in the contest (ie ones where the adjudicators have both your log and the other party's and are the contact checks out) can be used to claim IOTA awards, without the necessity of chasing QSL cards.

IOTA CONTEST 2010. We look forward to seeing you active in the contest – don't forget to send in your log, full details in the rules (www.rsgbcc.org/hf/rules/2010/riota.shtml). To whet your appetite further, do check out the photos and Soapbox comments from previous years' events (2009 reports are at http://iotacontest.com/contest/iota/2009/finalScore.php).

The GJ6YB Run Station antennas. Photo by G4CLA.

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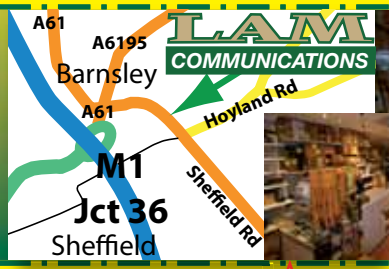

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'I am the Platform's Radio and Telecomms engineer and work MM0GKB/P when on rota 2 on and 3 off, the locator being IO98UK. The performance is excellent with max VSWR on a few bands approx 1.5 : 1, radio is KW 570DGE @ 100W o/p and I use CW only. You will notice near base of antenna a slight bend this due to a whack from a container on crane some time ago, must say the antenna is one hell of a strong 'beast' taking into consideration the batterings it takes from the weather'.

CHA 250B Wide-Band Vertical

Covers 80m to 6m with no ATU and no gaps

The Comet CHA 250B vertical covers all the way from 80m through to 6m with a VSWR of less than 1.5:1. It's probably the easiest vertical to install, simply mounting on any pole and requiring no radials. If you are restricted for antenna installation space, the CHA-250B could be the perfect answer.

- Mounts at any height - needs no radials
- Transmit 80m through to 6m
- Receive 2 MHz - 90 MHz
- Transmit VSWR better than 1.5:1 throughout
- Rated at 250W PEP
- Only 7.2m high, weighs a mere 3.2kg
- Great performance on all bands
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- Freq bands: 7, 14, 21, 28 MHz
- Impedance: 50 Ohms nominal
- Input connector: SO239
- Power rating: 1kW PEP
- Max wind speed: 35m/sec
- Length: 10.4m (straight), 7.4m (V)
- Weight: 5.4kg
- Suitable mast dia: 38-62mm

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These antennas are perfect for Portable, Travel and Dxpedition use, being lightweight with butterfly nuts, for quick assembly. Dual driven elements, give 50 - 53.5 MHz coverage with low SWR.

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- Measures PEP

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1kW (PEP) 1:1 .....£35.95
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£22.95 *P&P £5*

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- Freq: 1.8 - 60 MHz
- Power: 300W (SSB)
- Impedance: 10 – 60 Ohms

~~*£189.00*~~ ***£159.95***

CAT-10
- Freq: 3.5 to 50 MHz (in 7 bands)
- Power: 10W
- Impedance: 50 – 600 Ohms

~~*£99.00*~~ ***£79.95***

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1.78 mtrs long.....£89.95
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2.42 mtrs long.....£109.95

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0.39 mtrs long.....£37.95
SB94 Gain: 2.15dBi/5.1dBi/7.2dBi
0.6 mtrs long.....£39.95
SB97M Gain: 3.0dBi/6.8dBi/9.6dBi
1.32 mtrs long.....£44.95

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WFF

Just what is the World Flora Fauna award programme?

Ian, M0IAA operating as GB0WFF.

WFF STATIONS. Many active operators worldwide will by now have seen the 'spotting' of 'WFF' stations on the DX Clusters, heard the weird callsigns ending in 'FF' and the odd reports of 'UR 599 73 & 44' or indeed may have worked them. But I wonder how many of you really know what it is all about? Have a quick read through this article and even if you aren't interested, at least you'll be a bit wiser!

Whilst in the bottom of the sunspot cycle and with activities from the regulars such as DCI (Italian castle) IOCA (Islands of Croatia) and other awards programs being very quiet as regards activations due to the dire conditions, WFF was born. With the intention of generating a little more activity on the bands under the motto 'Saving the Green Planet Earth', amateurs had a new program to ignite their enthusiasm again. At the same time, by highlighting areas of natural beauty around the World, portable stations became active in a big way, an upward trend still continuing today.

World Flora Fauna (WFF) is an international award programme that aims to unite nature conservation for flora and fauna and amateur radio. It is organised to attract the attention of the World to the problems of protected areas and to provide them with feasible practical support, to waken a feeling of pride in the minds of the Earth's population for natural and cultural heritage, for visiting national parks and nature reserves and also making contacts with them from the amateur radio prospective.

ACTIVATING STATIONS. The programme was launched in 2008 under the auspices of International Foundation World Flora Fauna and RRC. For you to get a WFF award you need to contact (or activate) locations possessing an official status of National Parks, nature reserves etc that are listed in the WFF programme and their directory.

National Parks of the UK are managed areas of outstanding landscape where habitation and commercial activities are restricted. Almost all of the land in the UK National Parks is privately owned and managed. There are 14 National Parks in the UK at present with 9 in England covering 7% of England's land area, 3 in Wales covering around 20% of the land area of Wales and 2 in Scotland covering just over 7% of the land area of Scotland. There are currently no National Parks in Northern Ireland though there are controversial moves to establish one in the Mourne Mountains. Control of national parks in the UK is a devolved matter with each country having its own policies and arrangements. The WFF Program also includes many national nature reserves, many of which also fall under the ownership of other bodies such as National Trust or indeed RSPB Reserves. In total the UK has just under 400 areas that qualify for the WFF program.

REFERENCE NUMBERS. During a QSO each of the countries provides a unique reference number, for example: GFF-013 (UK), RFF-002 (Russia), UNFF-003 (Kazakhstan) etc, which corresponds to a particular national park or nature reserve. Moreover, the internet site contains a database (which is continually being updated and added to with your information) that has an indication from which location one or another station is working. We welcome any help possible in WFF database formation based on the past experience of work valid for the WFF programme. There is also a comprehensive LogSearch system provided by Igor, EW4DX (www.ew4dx.org/WFFsearch.html).

Have a look at the link and, having entered your callsign, you will see immediately how many WFF areas you have knowingly or unknowingly worked! Awards are available for both 'activator' and 'chaser' from WFF and also most countries now have their own domestic awards to add even more interest. Claiming them, again couldn't be simpler, when you have attained a level whereby you qualify for any award, you will find a self-generated spreadsheet with everything included that is automatically forwarded to the appropriate award manager and if any payment is required a PayPal facility is also offered, couldn't be easier! You will find most stations congregate around 7.144, 14.244, 21.244MHz bands, the '44' being a specific greeting given by operators of WFF areas.

In the UK, 'we' have now activated over 30 different GFF areas within the last 12 months. One of the more high profile activations in the UK came from the Strumblehead DX Group when they visited Ramsey Island in Wales for last year's RSGB IOTA event. There were also activations of areas including Yorkshire Dales (highest pub in Britain – nice social event too!) and Holy Island by the Wakefield & District Radio Society.

Scotland has featured heavily too with regular activations of areas within the Scottish Highlands by Jurij, MM0DFV (GMFF Coordinator) and his colleagues - and don't forget the DX locations. Falkland's Islands (VP8), Pitcairn (VP6), Christmas Island (VK9X) and Aves Island (YV0) are just a few others also applicable for the programme. It would also help the programme and its followers if we could persuade DXpeditions to submit their logs to the logsearch too.

LISTEN OUT. Finally, please listen for all the WFF Teams on the air, your call and comments on WFF are always welcomed! Some stations like a chat, others like to rattle through the contacts, something we should bear in mind as, in the main, portable generators and fuel constraints preclude the natural history lesson! Don't forget, the operators need to work you as 'activators', just as much as you need to work them as 'chasers'! We are actively encouraging activations in and around the UK as well as other activities such as SOTA and WAB to include GFF references as a matter of course in their operations as we do theirs.

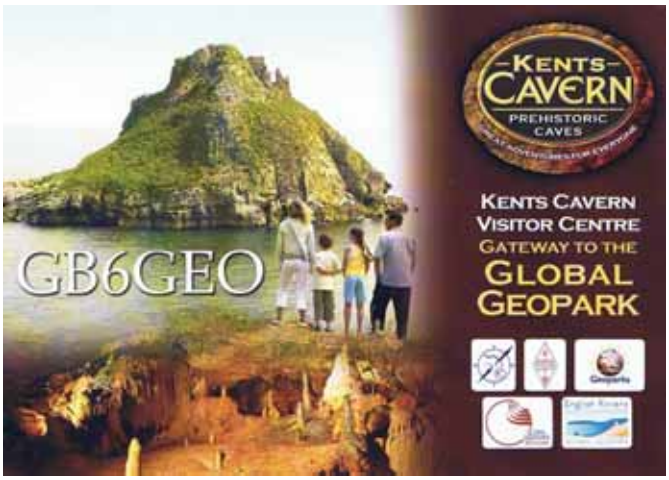
If you require any further information check out the links below where you will find activity reports and location information from both GFF, GMFF & GWFF areas. Alternatively, you can drop me a line and I will help and advise you about how to organise your activity and to get the prior publicity required to make it a worthwhile and enjoyable event. It isn't everybody's cup of tea but does it really hurt or cause hardship just to give any portable station a quick report and support his/her activities – not really!

Take care and enjoy World Flora Fauna!

WEBSEARCH
www.m0oxo.com
www.gmff.org
http://wff44.com/en

The GMFF team.

Geoparks Communication Weekend



GB6GEO operates from Kent's Cavern in Torquay.

GEOPARKS. In 2010, amateur radio stations from around the world will be exchanging greetings with GB6GEO at the English Riviera Global Geopark in May as amateur radio operators transmit live from Kent's Cavern in Torquay. There are now 53 Geoparks around the world and visitors will be able to link up with several other Geoparks by radio over the weekend 22 and 23 May.

Many Geoparks also have show caves and those participating so far include Smoo Cave in the North West Highlands Geopark in Scotland, Marble Arch Caves Geopark in Northern Ireland and Unicorn Cave in the Harz Mountains in Germany. The 2010 event will run from 0900 on 22 May, through the night to 1600 on Sunday 23 May.

BACK TO THE BEGINNING. It all started after a Torbay Chamber of Commerce AGM hosted at Kent's Cavern on 19 March 2008, followed by a Geopark awareness lecture by Nick Powe (the 5th generation owner of Kent's Cavern underground caves). I thought that this would be the ideal opportunity to stage a special event station, in conjunction with Torbay Tourism, so members of the public could send greetings from our English Riviera Geopark to all around the world (or at least Europe!). I also had another idea that it would be even better, if only I could get other radio amateurs interested in operating from other Geopark regions of the world…

It took many e-mails and much searching to contact the local clubs in the right areas. My next step was to get our own special callsign. I choose the number 6 because the English Riviera Geopark is the 6th Geopark in the UK to be awarded status by UNESCO, and naturally I choose GEO for its suffix. In the UK, Denny, GM1BAN told me that he had applied for GB2GEO and he would be going to Smoo Cave at the NW tip of Scotland. Alan, GI6PYP, applied for GB1MAC for the Marble Arch Caves in Northern Ireland and Roger, G4ROJ applied for GB1GEO at the Malvern Hills in Worcestershire. We also had Ralf, DK5AN with DK0GEO, Mark, EI7AS with EI2GEO, Periklis, SV8DVD with J48GEO, Wayne, VK5ZX with VK5SR and Fairus, 9W2FRS with 9M2MRC.

With some other Geoparks on board it was now time for another meeting with Nick at Kent's Cavern to organise the hardware and see how Kent's Cavern was going to accommodate our event station. Three of us met with Nick and discussed antennas and location of the station. Nick actually encouraged the erection of our antennas so the public could see there was a radio station in the grounds. He also offered to have the QSL cards designed and printed for us.

The next stage was a talk to the Torbay Amateur Radio Society from Nick about Geoparks. The club kindly loaned equipment, extra club operators were press-ganged into operating the station and we were offered the club crank-up tower too.

On 24 May 2008 we all met in the car park of Kent's Cavern and it was 'all hands to the pump'. We rigged the tower and 2m beam, erected the clusters of dipoles from the top of the tower to a cottage just the right distance away and secured everything. Next we installed the radio equipment (in a semi-temporary fashion!). The club's Yaesu FT-847 was used as the main HF rig, while M1AGY's Icom IC-746 was used for the 2m station. We had two linears standing by, the club's 2m linear and M1EIW's HF linear just in case.

John, G7HIK kicked us off at 1315 local, on 40m, and we heard GB1GEO on the Malvern Hills operating with a kite antenna. Unfortunately during the night the driving wind blew the rain in at the top of our tent. Regrettably the shack – and the operators – became very damp indeed, but in the true sprit of the hobby, the guys battled on, making the contacts regardless.

Sunday was another day of operating, and this was the day the visitors would arrive for Geopark cave activities. Sure enough the visitors poured into the caves bright and early – coach loads of them. Amongst the visitors, we had a station visit by Mike, G4EZV, whom we had worked the day before (one QSL less via the bureau!).

We actually worked four other Geopark stations: EI2GEO, GB1MAC, GB2GEO and J48GEO. We could not make contact with the Malaysian station, or the Australian Geoparks group.

The de-rig was very smooth, with the rigs boxed, cables stowed, antennas and towers all down very quickly.

BUILDING ON THE SUCCESS. In 2009 the Geoparks event took place on 23 and 24 May. There were more participants from different Geoparks, which included CS8GEO in Portugal, DK0GEO, DD0D, DF0ERZ, DR9VAURS/P in Germany, EI2GEO in Ireland, GB2GEO in Scotland, GB5GEO in Wales, GB2MAC in Northern Ireland and YP2GEO in Romania.

There were many other attractions at the Torquay Kent's Cavern site, including cave radio from inside by the Devon Cave Rescue


View of the station at the old copper mine at Tankardstown, Co. Waterford.

GB2GEO at Smoo Caves in the North West Highlands led by Denny Morrison, GM1BAN.

Alan, GI6PYP and Michael, MI5MTC operating GB2MAC. Photo by Herbie, GI6JPO.

Organisation using 87kHz Hey phones. The signal originated from deep down in Kent's Cavern underground caves and was received in the radio shack outside the cave at the entrance by another Hey phone. The signal was re-transmitted on 2m to the Paignton link/gateway MB7ITB.

AWARDS. For amateur radio stations and SWLs around the world who contact or hear Geopark stations, the English Riviera Geopark is offering a various award certificates. If you put GB6GEO into your favourite search engine, you'll find all the necessary details.

GB5GEO. In 2009. Jimmy, MW0EQL, and friends operated GB5GEO from the Brecon Beacons. They worked most continents except VK but quite a few JA stations and 4X4 stations as well as usual European ones. All operators really enjoyed themselves, sitting and operating in glorious sunshine.

EI2GEO. In 2009, the South Eastern Amateur Radio Group (SEARG) operated EI2GEO from Tankardstown, Bonmahon on the Copper Coast Geopark in Co. Waterford. The Copper Coast is an outdoor geology museum. Operators were EI8IG, EI5GOB, EI5GRB, EI8JA, EI7IG and EI3IQ and they also had a few visitors throughout the weekend. Although band conditions were bad, a number of very enjoyable QSOs were had. SEARG would like to thank everyone who participated, provided equipment, erected antennas, those who visited over the weekend, the Copper Coast Geopark management and notably EI8IG who supplied a camper van and EI7IG who provided an FT-1000 MP.

GB2MAC. In 2009, Michael, MI5MTC reported from a special station at Marble Arch Caves Global Geopark. Lough Erne Amateur Radio Club made 40 world-wide contacts with Australia, USA and Europe during the weekend. GB2MAC exchanged greetings with two other Geopark stations, GB6GEO and EI2GEO. Visitors to the station included an amateur from the USA.

GB2GEO. In 2009, Denny, GM1BAN operated with colleagues from Smoo Caves. They braved the elements in the open air with no cover. Despite gales and showers, they still made 47 contacts. The team found conditions worse than the first year, but nevertheless they all enjoyed the challenge.

DA9VARUS/P. In 2009, Mario, DC7CCC was on the air on 23 May using CW and SSB from the Terra Vita Geopark. Mario made many contacts from his location.

DK0GEO, DF0ERZ and DD0D. In 2009, Ralf, DK5AN and Andy, DK6AN were very active with their stations from the Harz Mountains Geopark. They were active on SSB, CW and data modes, making around 200 contacts.

CS8GEO. In 2009, Carlos, CT1END and Jose, CT2HIV organised the Portuguese Natur Tejo Geopark at the Chapel of Saint Martin at Castle Branco. There is a CS8GEO video produced by Joao, CT2GSN on YouTube.

YP2GEO. In 2009, Pit, YO3JW helped organise the Romanian Hateg Country Dinosaurs Geopark events with the Silver Fox Club of Romania. They made over 2000 contacts over the weekend.

Why not take part in the 2010 event?

ATV

Setting the Deviation

PHOTO 1: Simple test signal generator.

UNDER- AND OVER-DEVIATION. Incorrect deviation can spoil your picture quality in different ways, not forgetting that high deviation also uses more RF spectrum. With a 'low' deviation level the picture is usually dark (as though the lights are turned low). Colour may be lost and the picture may 'roll' vertically if the monitor loses sync lock. Subject to the receiver bandwidth, the signal to noise ratio is degraded with weak signals. With 'high' deviation the picture tends to 'white out'. Picture content such as vertical edges may 'ripple' or 'tear' and any movement in the picture changes everything again.

SETTING YOUR DEVIATION. Setting up correct deviation can be surprisingly simple. There are several methods but the 'carrier null' approach **[1]** using an appropriate frequency source is straightforward. You will need the simple signal generator (**Photo 1**) described here, your transmitter, an ATV receiver (or a SHF comms receiver with an S-meter) and a multimeter.

THEORY. The method in [1] is the correct theory, but has two anomalies. First, as corrected in a subsequent article, no adjustment was considered for a pre-emphasised video signal and, highlighted when proving the test signal source shown in **Figure 1**, the effect of having an audio sub-carrier had also been omitted. Useful additional reading is 'Setting FM Levels' by John Stockley, G8MNY **[2]**, which describes an alternative method of measuring the modulated carrier shift with a spectrum analyser.

The system bandwidth, BW = 2 f_m(mp-1), where f_m is the maximum modulation frequency and mp is modulation index.

mp = f_d/f_m, where f_d is peak system deviation.

In the original article, BW was assumed to be 16MHz and f_m was 4.43MHz, the colour burst frequency. Rearranging the formula, f_d = 3.56MHz (peak to peak deviation).

Next, we make use of a phenomenon known as the *first Bessel function* and the fact that, as the modulation index is increased, power in the sidebands increases and there is a point where the carrier effectively nulls out. The first occurrence of this is when m_p = 2.405. Again, adjusting the formula, the appropriate setup modulation frequency f_m is found to be 3.65/2.405 = 1.485MHz.

How can you set the test source to this frequency accurately? Fortunately, there are several UK medium wave stations on 1485kHz so, with a short wire attached to the output of the test source, its frequency can be adjusted close to zero beat with the radio station using an HF receiver or domestic broadcast receiver.

PROBLEMS AND SOLUTIONS. The value of f_m is technically not 4.43MHz but actually 6MHz – the audio sub-carrier frequency. Redoing the calculations produces BW = 19MHz, f_d = 3.5MHz and f_m = 1.455MHz.

In practice the peak 'video' component is typically 75% of the total modulation waveform and an examination of a well set up ATV transmission shows that the average/effective bandwidth can be as little as 12MHz. Retaining the 1.485MHz test frequency has the advantage of making it easy to set it onto frequency. The compensation for the different value for f_m and the increase due to the pre-emphasis at the test frequency is simply to choose an appropriate increase of the normal 1V peak to peak video input level when using the test source.

From calculation and comparison with alternative methods of setting up deviation, the required test signal level was found to be 1.8V peak to peak into a transmitter with a 75Ω video input.

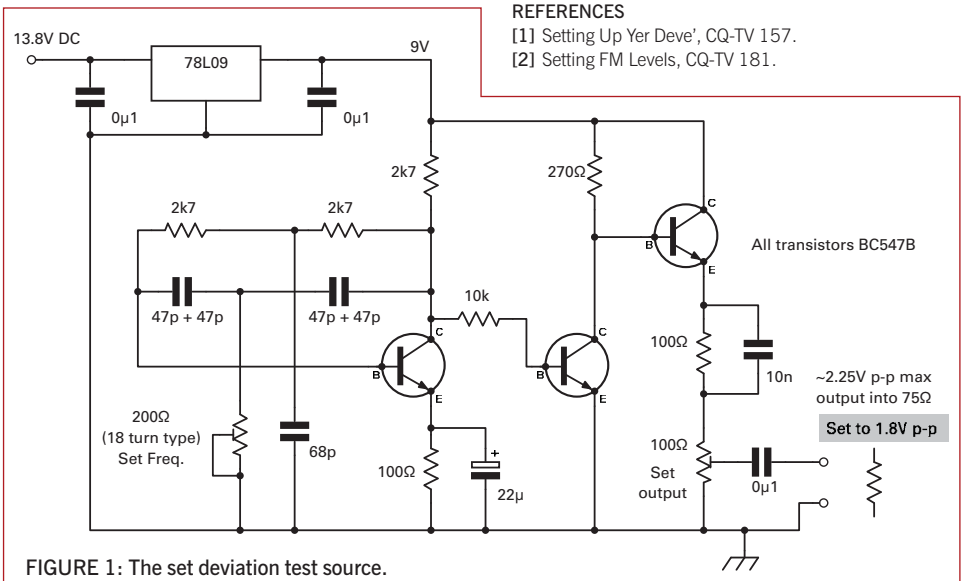


FIGURE 1: The set deviation test source.

Ah! But how to set the test source RF signal level, armed only with a multimeter? If the preferred method is not available (an oscilloscope terminated with a 75Ω resistor), the simple diode circuit of **Figure 2** can be used. All things being equal and assuming a typical high impedance digital multimeter is used, adjust the test source output control to give a DC reading of 1.0V. This should correspond to the required RF level of 1.8V peak to peak.

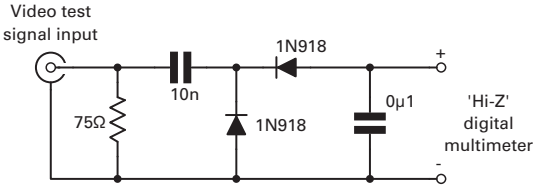


FIGURE 2: Test source output level checker.

SETTING IT ALL UP. To finally set up the transmitter, just connect the calibrated test source to the video input and, whilst watching the receiver's signal level meter, adjust the deviation control on the transmitter from zero to a level where the first signal null occurs. Replace the test source with a camera and adjust the video output level of the (pre-emphasised) receiver for best picture. Now both are set up properly.

Note: If using 'off the shelf' Comtech 23cm receiver modules, an S-meter output is available from pin 9 of the metal module, but requires a link inside the RF screen box. The 13cm receiver module has a (resistor) link already fitted.

NEWS. Poor weather conditions recently means there has been little /P ATV operation. I understand that Rob, M0DTS and Richard, G8BYI have had some success in 'taming' software I/Q modulation for digital transmission. On the analogue front, GB3HV is still trying hard to find a new home on or near the High Wycombe ridge, having lost its previous site. Can anyone help?

Did you know that it is not just the film industry that has resurrected 3D? A recent BATC article (*CQ-TV* 228) described ATV experiments using two 'phase combined' camcorders to produce 3D video.

REFERENCES

[1] Setting Up Yer Deve', CQ-TV 157.
[2] Setting FM Levels, CQ-TV 181.

Book review

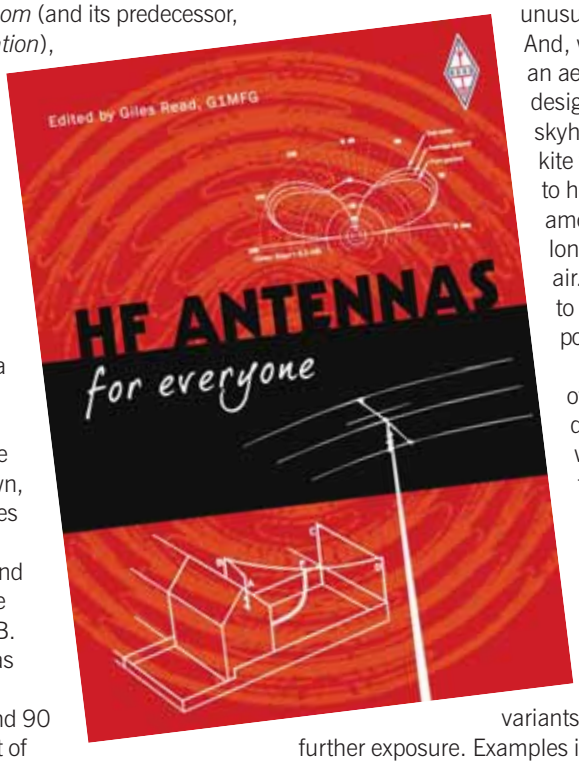
A fantastic new book on HF antennas comes out this month

HF Antennas for Everyone

Edited by Giles Read, G1MFG

Sometimes an antenna book comes along that makes you really sit up and take notice. HF Antennas for Everyone is just such a book.

The clue really is in the title: it is, quite simply, a comprehensive look at the art and science of antenna designs over the last 40 years or so. Drawing exclusively on material published in *RadCom* (and its predecessor, *Radio Communication*), it features articles by such antenna greats as Louis Varney, G5RV – and not just writing about the antenna that bears his callsign. But, of course, some of the most innovative antenna design work has come from people whose names were previously unknown, toiling away for ages until they got their design 'just right' and unleashed it on the world via the RSGB. And those antennas are here too.



There are around 90 articles in all, most of which describe at least one practical antenna design. In order to create some semblance of order, the articles are grouped into chapters covering Horizontal, Vertical, Loop and Stealth antennas, plus an extra chapter on feeders and feeding – an often-overlooked part of the antenna system. Each chapter has a short introduction by the Editor, which sets the tone for the subsequent articles. Chapters start with relatively simple designs, becoming more complex and involved as they progress. The idea seems to be to introduce the antenna type relatively gently before going on to more complex and involved variants. All in all, the approach seems to work quite well.

Some of the thinking is quite unconventional. Traditional wisdom, for instance, says that a vertical antenna requires a ground plane in order to function. Yet there is at least one novel vertical design that claims good performance without any ground plane. At the other end of the scale, the verticals chapter also contains several ground plane designs – portable and permanent – plus a variety of monopole, T and other structures with a large vertical component. There is even a mobile trap vertical for non-harmonically-related bands, which is quite unusual in itself.

And, while not strictly an aerial, there is a design for a 'miracle skyhook': a lifting kite that can be used to hoist significant amounts of wire a long way into the air. Definitely one to consider for portable operations!

The selection of antennas is quite eclectic, which adds to the appeal of the book. Whilst there are some 'old favourite' designs, there are also a lot of rarely-seen variants that deserve further exposure. Examples include the 'hula hoop' directional discontinuity ring radiator and the G2AJV toroid, both of which are compact enough to use mobile as well as in difficult locations.

Given that not everyone has the space or permission to erect the sort of antenna they might like, the Stealth antennas chapter is particularly intriguing. In these days of ever-smaller domestic gardens and increasingly restrictive planning requirements, it is good to see a book that tackles these issues head-on. In this chapter you will find ways of using stealth and sleight of hand to get on the air in even the most restrictive environment. How about hiding an HF wire Yagi in your loft, or putting up a normal-looking TV aerial where the feeder is actually your radiating element and the TV aerial a capacity hat? Some remarkable – and fully practical – possibilities are discussed.

I liked this book because it has something in it for everyone. Whether your back garden is the size of a small postage stamp or large enough that it is frequently mistaken for an entire county, there is an antenna in this book for you. Even the designs that don't suit your circumstances are sure to get your grey matter going.

If you only buy one antenna book, then this is definitely the one to go for.

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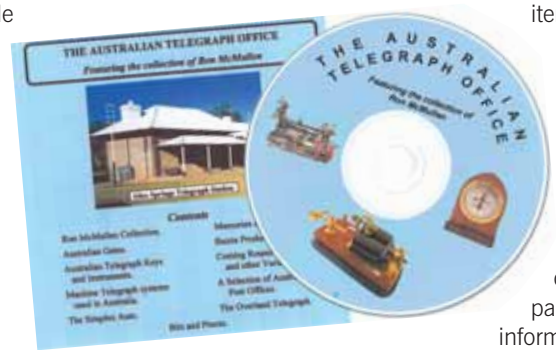
Continued overleaf ▶▶

The Australian Telegraph Office

featuring the collection of Ron McMullen

If you are one of the many people who appreciates fine Morse keys and telegraph history, you need look no further than this CD. As its title suggests, the material is firmly centred on Australia but is perhaps the more fascinating for that. A simple description ("an eclectic collection of 11 Morse- and telegraph-related pdf files") completely fails to do it justice: in fact, it could almost be considered to be eleven books in one. The main treat has to be the hundreds and hundreds of high quality, high resolution photos of a huge number of Morse keys and associated telegraph items including such things as sounders, galvanometers and even antique uniform buttons. Each is supported by descriptive text, sometimes just a name but often several paragraphs of information. Machine telegraphy is also covered in some detail, supported by contemporary and vintage photos.



I found the 'human' side of the work to be quite fascinating. There are several sections on the people, posts and exploits of telegraph workers. These range from the antics of junior postal officers (telegraph messenger-boys) through to a heart-rending story of a 'bush doctor' performing emergency surgery under the instruction of a qualified doctor 3000km away – all done by Morse code over the telegraph.

This is a fascinating mix of images and text that sheds new light on a lost era. Very thought-provoking and informative.

CD with files in PDF format
Published by R McMullen

Available from the author,
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RSGB BOOKSHOP

If you haven't already tried the RSGB Bookshop online at www.rsgbshop.org then you may be missing out. The online book shop contains a vast array of publications on amateur radio and you'll sometimes find special offers that don't always appear in the printed version of *RadCom*. You'll discover full details of other special RSGB items such as callsign badges, clothing and members' offers.

More PLT at the ITU

Another RSGB volunteer represents amateur radio at an ITU meeting

Peter, G3RZP (l) and Erik, PA3DES (r) discussing PLT and SRD issues at the Anglo-Dutch dinner.

ITU MEETING. ITU-R Working Parties 1A, B, and C met in Geneva from February 1 to 10. The main areas of interest for amateur radio was continuing work on PLT and Agenda Item 1.22 of the 2012 WRC – to examine the effect of emissions from short-range devices on radio communication services in accordance with Resolution 953. So far, the ITU-R work on this subject has only looked at the spectrum up to 80MHz, but we were informed that the ITU-T has produced and approved a standard for PLT up to 200MHz. Further, the power spectral density allowed is significantly higher than that on which studies have been based, and apparently with no knowledge even of the existence of the ITU-R report SM.2158 on the protection of radio communication services from PLT. As can be imagined, this news caused a degree of consternation, and it has been suggested that Joint Rapporteurs Group between ITU-T Study Group 15 and ITU-R WP1A to work on suitable protection measures for radio communication services. This will mean that some input from the IARU will be needed: another input that needs preparing is material on the effects of intermodulation in reducing the effectiveness of 'notching' the amateur bands, as shown in a recent *RadCom* EMC column.

Work continued on a Proposed Draft New Recommendation on PLT, although Japan is very much against such a Recommendation, and it is not exactly clear as to what use such a Recommendation could be put.

The IARU proposal to change SM.329 with regard to Unwanted Emissions in the Spurious Domain as it applies to the amateur and amateur satellite services was discussed, and it was felt that in fact it would be better if the material was incorporated into ITU-R Recommendation SM. 1539, so there is another input paper to prepare!

The work on Agenda Item 1.22, known as 'AI1.22' led to some difficulties. It is widely recognised that some common frequency bands for Short Range Devices (SRD) is highly desirable but, at the moment, only the ISM bands at 13.5, 27 and 40MHz and 2.4, 5.8 and 24GHz are common world-wide. Compatibility problems have already been found between radio local area networks (RLAN) and some military systems in the 5GHz region, which provides further problems. So it is important to attempt to ensure that any suggestions of using an existing amateur band are fought very rapidly. Text is being prepared for the Conference Preparatory Meeting (CPM) on emissions from SRD and on emissions from ISM equipment – AI8.1.1 of the WRC. This text will need finalising at the June 2010 meeting of WP1A and the need to press on with the work led to a Sunday meeting.

A traditional feature of these meetings is the Anglo – Dutch dinner: this year saw additional nationalities – Canadian and French – and a weak showing from the UK, with some of the possible candidates being in other meetings in other countries. It does give the opportunity to make a case in informal surroundings and one of the Dutch Administration delegates is Erik Van Maanen, PA3DES. This time, the meeting moved from its traditional Thai restaurant to Korean one.

It was, all in all, a relatively quiet meeting, but one that has thrown up a requirement for further work preparing input documents for the June meeting. A nice touch with Geneva meetings is the free public transport ticket, which makes getting around much easier, although experience suggests that Geneva trams in the middle of summer can be somewhat uncomfortable.

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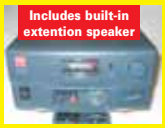

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MX-72 144/430MHz.....£34.99
MX-72 "N" 144/430.....£35.99

MOBILE ANTENNAS Del £10.00

DB-7900 2m/70cm (5.5/7.2dB) 1.6m (PL-259).....£39.99
DB-770M 2m/70cm (3.5/5.5dB) 1m (PL-259).....£24.99
Diamond HV-7CX 7/14/21/28/50/144/430 .....£129.99
Diamond CR-8900 10/6/2m/70cm (1.26m) £99.99
Diamond AZ-506 2m/70cm – only 0.67m long.....£39.99
PL-62M 6m/2m (1.4m) PL-259 .....£23.99
PL-627 6m/2m/70cm (1.7m) PL-259.....£44.99

LIGHTNING ARRESTER

SP-350V

Replacement fuses £5.00

DC-1000MHz (400W through power). SO-239 fitting. **£24.95** P&P £3.00

Station log books:- 3 for £10

ALLUMINIUM POLES

20 foot (collection only) 2".....£49.99
10 foot (collection only) 2".....£29.99
2.4m (2") Ally pole.....£29.99
5 foot x 2" pole.....£14.99

COPPER ANTENNA WIRE ETC

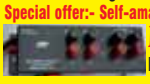
Hard drawn (50m roll).....£40.00 P&P £7.50
New: 50m roll, stranded antenna wire.....£19.99 P&P £7.50
Flexweave (H/duty 50 mtrs).....£44.99 P&P £7.50
Flexweave H/duty (18 mtrs).....£21.99 P&P £7.50
Flexweave (PVC coated 18 mtrs).....£24.99 P&P £7.50
Flexweave (PVC coated 50 mtrs).....£59.99 P&P £7.50
Special 200mtr roll PVC coated flexweave .....£180.00 P&P £10.00
Copper plated earth rod (4ft).....£14.99 P&P £8.00
Copper plated earth rod (4ft) + earth wire.....£24.99 P&P £8.00
New RF grounding wire (10m pack) PVC coated .....£14.99 P&P £5

METALWORK & BITS (Del Phone)

2" mast-floor base plate.....£14.99
6" stand off brackets (no U-bolts)..... £8.99
9" stand off brackets (no U-bolts)..... £10.99
12" T & K brackets (pair) £18.99
18" T & K brackets (pair) £22.99
24" T & K brackets (pair) £26.99
U-bolts (1.5" or 2") each £1.50
8mm screw bolt wall fixings £1.70
8-nut universal clamp (2" to 2").....£7.99
2" extra long U-bolt/clamp £6.99
2" crossover plate with U-bolts £14.99
15" long (2") sleeve joiner..... £18.99
3-way guy ring £5.99
4-way guy ring £6.99
Heavy duty guy kit (wire clamp, etc.) £49.99
Set of 3 powder coated heavy duty fixing spikes (~0.7m long).... £29.99
30m pack (4.4m) 480kg B/F nylon guy..... £12.50
Roll of self-amalgamating tape 25mm x 10mtr..... £8.99
Special offer:- Self-amalgamating 3 rolls..... £20.00

All bracket measurements are from wall to end of bracket

MFJ-1117



DC High current distribution unit..... £59.99

MFJ-1118 metered

High current distribution unit £99.99

RH-9000 BNC

40cm flexible whip for the ultimate in gain. **£29.99** P&P £5.00
Tx:- 2m + 70cm (Rx:- 25MHz-2.9GHz).

RH-9090 SMA

40cm flexible whip that is ideal as replacement. Tx:- 2m + 70cm.
Rx:- 25MHz-2.9GHz **£34.99** P&P £5.00

Powerex MH-C9000

The Powerex MH-C9000 WizardOne Charger/ Analyser can independently charge from one to four AA or AAA batteries.

CLOSER LOOK. Back in November 2008 we took a quick look at two different battery chargers. With the opportunity of a Members' Special Offer, this is our chance to take a much closer look at the WizardOne to see just what it can do. The use of rechargeable batteries is more economic than disposable alkaline cells and is also kinder to the environment. The WizardOne NiMH charger promises to get the best from your collection of rechargeable AA and AAA cells.

ABOUT RECHARGEABLES. Older NiCad cells operate by combining a cadmium based negative electrode with a nickel based positive electrode, both of which are connected by an electrolyte. During the charging process, the applied electrical energy is converted into chemical energy. When the cell is required to provide electrical energy the flowing current stimulates the chemical reaction that releases the stored energy. The cell voltage during discharge is reasonably constant at a nominal 1.2 volts.

An irritating problem directly linked to the use of cadmium is the memory effect. This results in the cell's capacity reducing to match the way in which it is used. Therefore, if you regularly recharge your NiCads before they expire or like to keep them topped up, you will find that the capacity will gradually dwindle.

NiMH cells were developed to overcome the cadmium related problems by replacing the cadmium positive terminal with a hydrogen absorbing alloy. This new technology also provided a higher charge density with NiMH cells having typically a 40% higher capacity than their NiCad counterparts.

CHARGING ISSUES. One of the many differences between NiCad and NiMH cells is the heating effect that occurs during charging. Whereas NiCads are endothermic and cool during charging, NiMH cells are exothermic and heat up during charging and will always feel warmer than a NiCad during the charging cycle. Both types of cell are very sensitive to overcharging and are easily damaged. Over-charging a NiMH cell causes the internal release of oxygen and hydrogen. Whilst modern cells include a catalyst to re-absorb these gasses, the catalyst can only cope with the low levels that are released from trickle charging. At higher charging currents, pressures will quickly build up inside the cell and excess gas will be vented through the safety valve. The loss of gas causes permanent damage to the cell and a loss of capacity. It is therefore vitally important you only use chargers with overcharge detection systems that can stop the charging. With NiCads, the fully charged point is often detected using what's known as the minus delta bump. This is a where the cell voltage dips slightly when full charge is reached. This drop is caused by the build-up of oxygen on the terminals. Although successful with NiCads, the minus delta bump method is not reliable with NiMH cells as the bump is far less well defined and is temperature dependent. The problem is further compounded as NiMH cells often show voltage dips early in the charging cycle that may cause premature shutdown of the charger. A more reliable end of charge indicator is to monitor the cell temperature change during charging.

Once the cell is fully charged, the continued charging current causes the release of hydrogen and oxygen which is absorbed by the catalyst and converted into heat. This causes a sharper rise in cell temperature that can be detected and used to signal the end of the charging cycle. In more advanced charging systems such as the WizardOne, the charger may use a combination of time, temperature and voltage detectors to determine the end of the charging cycle.

DISCHARGE ISSUES. The majority of equipment that makes use of AA or AAA cells employ a number of cells connected in series to derive the required operating voltage. In this situation there is a significant risk that any weak cells could be driven in to negative polarity by the other cells in the chain. This reverse polarisation causes irreparable damage to that cell and so must be avoided. There are two approaches to dealing with this problem. The first is use cells in sets from the same manufacturer and with matched capacities – this also provides the maximum operating time. Equipment designers also have a role to play and can ensure that their equipment shuts down when the NiMH discharge threshold of 0.9V per cells is reached.

WizardOne CHARGER. Having examined the charging requirements for NiMH cells, let's take a closer look at the WizardOne NiMH charger and see just how it shapes up. As you can see from the photo, the WizardOne features a large LCD panel for the display of comprehensive charging information. Power for the charger comes from a separate mains pack (supplied) that provides a 12V DC supply to the coaxial power socket on the rear panel. The use of a 12V supply makes the charger great for mobile/caravan/marine use as it can be fed by a cigar lighter adapter or similar power take-off point.

At the heart of the WizardOne is a microprocessor that controls all the charging programs and display features. The four charging bays have full independent control and can accept either AA or AAA cells from 100mAh to 20,000mAh(!) capacity. The use of independent control provides great flexibility as it is possible to run entirely different charge or discharge programmes for each bay. A look under the bonnet also shows that power FETs are used to control the charging rate to each bay. The WizardOne features five charging programmes that should cope with just about any situation. An array of four push buttons at the bottom of the display provide for selection of the operating mode, charging currents, etc.

CHARGING. For many, the most common operation will be to charge a cell and this is the first and default option for each bay. As soon as a cell is dropped into a charging bay, the cell is detected and a pointer appears on the screen underneath the bay number. The display will also show a list of the charge/discharge modes available for that bay. Choose Charge using the Up and Down arrow keys on the front panel and the display will change to charging current selection which can be set between 200mA and 2000mA in 100mA steps, thus providing great flexibility. That's all that's required to initiate a simple charge and the display will then cycle through the following values: charging current, elapsed time, cell voltage and charge delivered in mAh. When you have more than one cell being charged the display sequentially steps through all the cells showing the information pertinent to that bay. If you don't want to wait for the display cycle

to get to a particular bay, you can use the Slot button to step on to the required bay.

You will recall from the introductory section that detecting the end-of-charge point for NiMH cells is not a simple process. However, the WizardOne uses a combination of Negative Delta Voltage, Zero Delta Voltage, Peak Voltage, time and temperature to determine the end-of-charge point. The cell temperature is detected using a metal clip located at one end of the charging bay. This wraps around the side of the cell as it is inserted and conducts heat from the cell to the PCB-mounted sensor. The end-of charge detection appeared to work extremely well and I found that you could drop a partly charged cell into the charger and it would automatically bring it up to capacity. However, when doing this you should heed the advice to charge NiMH cells at a rate between 0.3 and 1C (where C is the rated capacity of the cell).

REFRESH & ANALYSE. The WizardOne includes this programme to revitalise batteries that have been left unused for up to 3 months. This mode charges the cell at a selectable rate between 200mA and 2000mA and rests the cell for two hours. Next, the cell is discharged at a rate between 100mA and 1000mA. At the end of this cycle, the cell is again rested for two hours then re-charged. At the end of the cycle the charger reports the cell capacity. I found this cycle particularly useful for assembling sets of similar capacity cells.

BREAK-IN. For a more thorough wake-up call for new cells or those that have been in storage for a while, the Break-in mode works well. This delivers a 16-hour charge at 0.1C, rests for an hour and then discharges at 0.2C before recharging at 0.1C again. This is a long process that can take around 40 hours to complete but I was achieving around a 10 to 15% capacity increase in cells that had been in my junk-box for a fair while. This Break-in mode closely follows the IEC61951 guidance for measuring rechargeable cell capacity so is very useful for checking the condition of cells compared with the quoted capacity. However, you need to remember that the capacity quoted on a rechargeable cell is a typical value based on the best of 5 measurements using the IEC process.

DISCHARGE TEST. The discharge mode does exactly that and provides programmable discharge of the chosen cell. Discharge rates can be set in 100mA steps from 100mA to 1000mA. The discharge terminates when the cell voltage reaches 0.9V and the capacity calculated capacity during discharge is shown on the display.

CYCLE. For a more rigorous or customised charge/discharge programme, the Cycle mode should be used. This provides a programmable charging and discharge rate that can be automatically repeated for up to 12 cycles.

SUMMARY. The WizardOne is an extremely versatile and powerful charging system that should help you get the best from your AA and AAA NiMH cells. The crucial charge completion detection system worked very well and this should extend the life of the cells whilst ensuring they are charged to maximum capacity. The capacity analysis was extremely useful and I was amazed at the wide capacity variation of cells over time. Although the test cells had been sourced from the same manufacturer, they had been subject to different uses. It would have been very easy to just pick a set of these cells charge them and drop them into a piece of kit and then be disappointed by the poor battery life. The WizardOne's capacity measurement helped me distil-out a set of matched capacity cells that would work well together.

My thanks to Nevada for the loan of the review model.

Sport Radio

Computerised adjudication and contesting via the Internet

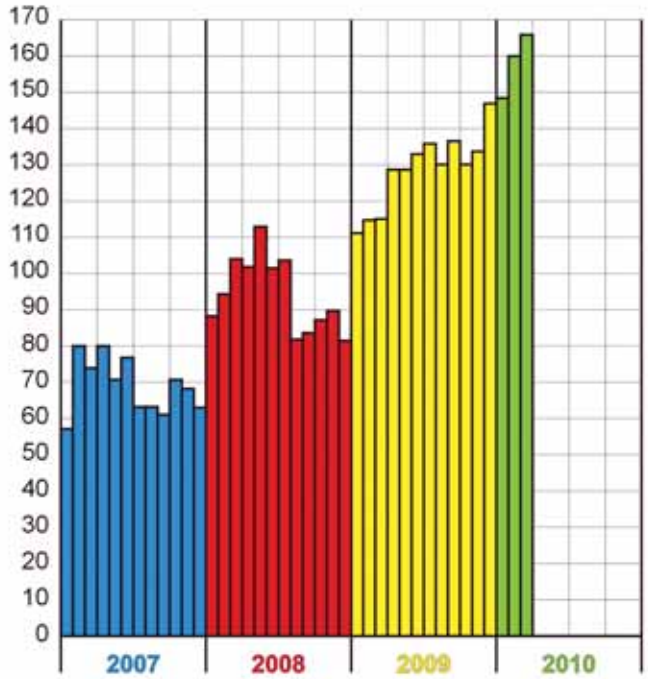


FIGURE 1: Monthly participation figures for the 2m UKAC, January 2007 - March 2010.

MODERN ADJUDICATION. In recent columns Pete Lindsay, G4CLA described the function of the robot that contest logs are now uploaded to. Now, Ian Pawson, G0FCT describes how events are adjudicated.

"After the contest closing date (midnight, seven or sixteen days after the end of the contest – depending on the contest), the adjudicator downloads all of the log files from the Contest Committee's ftp server. The log files are imported into a specially written software application called adjSQL. This software runs on Intel based computers running Windows XP, Vista or 7. It is written in C++ using C++ Borland (now Embarcadero) Builder and uses the open source database Firebird V2.0. In the long term, the whole program may be ported to a free compiler and graphics toolkit (possibly gcc and Qt); the database is already portable. This will allow adjSQL to be built and run on Linux and Mac platforms as well as Windows, and make it easier for other people to support and maintain it.

"AdjSQL has been written by a professional software engineer (who is also licensed). It has been in use by the Contest Committee in one form or another since August 1997 – when it was used for the first time to help in the adjudication of the VHF NFD – and is constantly reviewed and refined to add new contests and facilities.

"In the early days, the biggest problem was that very few logs were submitted electronically and the adjudicator had to produce electronic logs from the paper logs. Another problem was the immense variety of formats of electronic logs. All these problems are now well and truly in the past and the adjudicator downloads a complete set of logs in the correct format from the robot that load straight into the adjudication program.

"Over the past two years, since the merging of the HFCC and the VHFCC, various HF contests have been added to this software's repertoire – and the list is steadily growing. In the very near future, all RSGB contests (HF and VHF) will be adjudicated using this software (except IOTA, which has its own system).

"The software uses the HF and VHF calendars (as published on the RSGB Contest Committee website) to configure the application to process different contests – date, start time and duration of contest, band(s), mode(s), exchange, scoring and multiplier system etc. The adjudicator can also configure the database manually. This can be used to investigate how changes in scoring and multiplier systems alter the results; very useful when considering the impact of potential rule changes!

"After the logs have been imported, adjSQL automatically cross checks every part of every QSO with the corresponding information in the matching log. Dummy logs are also fabricated from the QSOs in the received logs, for stations that have not entered. Using the real and fabricated logs, the software identifies the errors in the real logs. The software also enables the adjudicator to view the information in the logs in different ways; errors in individual logs, unique callsigns present in individual logs, reconstructing an entrant's log from information in other entrant's logs (very useful for identifying stations that do not accurately log what they send) – in all thirty different views.

"The database is only used to store the current set of logs and the adjudication work done on them; no attempt is made to keep a database of past contacts from previous contests.

"The human adjudicator now verifies every error with the help of the software. This software is very good at finding errors. However, the human adjudicator always has the final say!

"After the adjudication is complete the software re-scores every log, so any scoring differences between logging programs is eliminated and the results tables are then produced. The adjudicator produces the text that provides the context for the results and finally uploads it and the result tables to the Contest Committee website for all to see."

So there you have it. The robot checks logs for validity of format when they are uploaded, making life much simpler for the adjudicator. Then adjSQL goes through the logs with a fine-toothed comb and flags up all the mistakes and irregularities. The combination of these two bespoke processes has literally revolutionised contest adjudication. Years ago it was not uncommon for it to be many months after an entry deadline for the results of a contest to be announced. Now it is usually no more than a few weeks before results appear on the Contest Committee website.

All this talk of automating adjudication is in stark contrast to the contents of an e-mail message I received from Eddi Ramm, DK3UZ, who said "As an adjudicator I feel entitled to say the rules of sportsmanship should equally apply to the adjudicator(s). They should spot the errors by themselves instead of having them spotted by a machine. This of course makes it necessary for the adjudicator to participate in 'his' contests, because he will then already know many of the culprits before their logs arrive." As I see it, this might be feasible for small events, but certainly not large ones. Besides, I have never seen a rule that says an adjudicator actually needs to be an active contester.

TUMBLING RECORDS. As I predicted in last November's column, by the end of 2009 the total number of entries to the UKACs beat all previous years – and not by just a little. 2010 started with 148 stations entering the 2m UKAC on 2 January, which also set a new record for entries received to a single UKAC session. Two weeks later, 25 people entered

RSGB HF EVENTS

Date	Event	Times (UTC)	Mode(s)	Band(s)	Exchange
May 3	80m Club Championships	1900-2030	SSB	3.5	RS + SN
May 12	80m Club Championships	1900-2030	Data	3.5	RST + SN
May 20	80m Club Championships	1900-2030	CW	3.5	RST + SN

RSGB VHF EVENTS

Date	Event	Times (UTC)	Mode(s)	Band(s)	Exchange
May 1	432MHz Trophy	1400-2200	All	432	RS(T) + SN + Locator
May 1-2	432MHz-248GHz Trophy	1400-1400	All	432-248	RS(T) + SN + Locator
May 4	144MHz UKAC	1900-2130	All	144	RS(T) + SN + Locator
May 9	70MHz CW	0900-1200	CW	70	RST + SN + Locator + Postcode
May 11	432MHz UKAC	1900-2130	All	432	RS(T) + SN + Locator
May 15-16	144MHz May Contest	1400-1400	All	144	RS(T) + SN + Locator + Postcode
May 16	1st 144MHz Backpackers	1100-1500	All	144	RS(T) + SN + Locator
May 18	UHF UKAC	1900-2130	All	1.3/2.3	RS(T) + SN + Locator
May 23	70MHz Cumulative #3	1000-1200	All	70	RS(T) + SN + Locator
May 25	50MHz UKAC	1900-2130	All	50	RS(T) + SN + Locator

BEST OF THE REST EVENTS

Date	Event	Times (UTC)	Mode(s)	Band(s)	Exchange (info)
May 1-2	ARI International DX	2000-2000	CW, SSB, RTTY	1.8-28	RS(T) + SN (I's send Province code)
May 8-9	Volta DX RTTY	1200-1200	RTTY	3.5-28	RST + SN + CQ Zone (UK = 14)
May 16	WAB LF Phone	1000-1400	SSB	1.8-7	RS + SN + WAB area
May 22-23	EU PSK DX	1200-1200	PSK63	3.5-28	RST + EU Area Code
May 29-30	CQWW WPX CW	0000-2359	CW	1.8-28	RST + SN
May 30-Jun 5	Bath Buildathon	Various	Phone	3.5	RST + make + model + power

Italics indicate that provisional information only was available at the time of writing.

the 2.3GHz UKAC session – another record. January's 2m record didn't last long, because when the February 2m UKAC took place it was promptly broken. And guess what happened in March… it was broken again. As **Figure 1** shows, in the last three years entries have roughly doubled. On HF, the 80m Club Championships are also enjoying increased participation, with the January and February SSB entries both up on any month of 2009.

INTERNET REMOTE CONTESTING. An e-mail posted on the UK Contesting Reflector by G3TXF on 1 February opened the door to a lively debate on remote operation in contests.

In it, Nigel said; "The last weekend in January is traditionally busy for contesters, with several contests running in parallel, including the CQWW CW 160m and the REF CW. However, the ever-interesting postings on 3830 reveal that the internet remote contesting age has really arrived.

"There's a W4 (sitting in a warm shack in Florida or somewhere?) who entered the REF-CW Contest as F/WA4PXP and the CQWW-160m Contest as DL/WA4PXP through separate remote stations in France (F4JRC) and Germany (DJ3AA). Presumably somewhat tongue in cheek, Jim, WA4PXP, comments 'Operating in Europe is non-stop action!'"

All this has been made possible by communicating live over the internet. Although remote operation of this type is beyond the capability of most people at the moment, for how long will this remain the case? With the increasing introduction of Software Defined Radios, I'd say not long. On the reflector it wasn't long before the subject of being able to win by spending a lot of money was raised, but spending money to give your station a competitive advantage is an argument as old as the hills. What could be new is that enterprising, well-equipped licensees might see the opportunity to make money from their hobby by renting internet airtime on their stations.

All contest organisers are going to have to review their rules (some already have), to clarify whether remote operation or remote listening – if legal – puts an entrant into a different category, because this is not a topic that's going to go away.

THIS MONTH'S EVENTS. As regards RSGB HF events, the only ones this month are 80m Club Championships; SSB first (on Bank Holiday Monday 3rd), Datamodes on Wednesday 12th and CW on Thursday 20th.

If you're a VHF/UHF enthusiast it's a completely different story, with no fewer than ten RSGB events to enjoy. Contesting begins on Saturday 1st when the 432MHz Trophy Contest and the 432MHz-248GHz contest start simultaneously. The 432MHz Trophy Contest ends at 2200, while the 432MHz-248GHz Contest continues for 24 hours. After that it's the 2m UKAC on the 4th. On the following Sunday the 70MHz CW Contest takes place. With increasing numbers of countries having access to the band and it being well within the Sporadic-E season, there could be some interesting DX to work. It's back to the UKACs on the 11th, this time on 432MHz. On 15-16th the 144MHz May Contest takes place. Its last three hours coincide with the first three hours of the First 144MHz Backpackers, which continues for one hour after the first contest ends. After the 1.3/2.3GHz UKAC on Tuesday 18th the third 70MHz Cumulative takes place on Sunday 23rd. The final RSGB VHF event of the month is the 50MHz UKAC on Tuesday 25th.

Internationally, the month begins with two Italian events. The first is the ARI International DX on 1st-2nd. Work anyone on CW, SSB or RTTY, and give them RS(T) and a serial number. Expect Italians to give you a 2-letter Province code instead of the serial. On 8-9th the Alessandro Volta DX RTTY Contest takes place. Work everyone except your own country. In each of these events there is no distinction between power levels, so expect lots of strong signals. On Sunday 16th the event of note is the WAB LF Phone. Exchange a signal report, serial number and your WAB square. For the uninitiated, WAB squares are the first, second, third and sixth digits of your National Grid reference. For example, NN456789 becomes NN47. The EU PSK DX Contest on 22-23rd is unusual in that it is for BPSK63 only. There are no fewer than 22 categories to enter, with the maximum permitted power in any of them being 100 watts. The exchange is also unusual in that it requires entrants to send their European Area Code. Click on the link at http://eu.srars.org/index.php for a full list. This is followed by the CW leg of CQ WW WPX on 29-30th. This is a follow-on event from the SSB leg held at the end of March, so please see the March column for further info. Finally, a very different event. The Bath Buildathon Contest is primarily intended to activate the radios built at the Bath Buildathon events, although it is open to all. The maximum power is 10 watts. The full rules can be seen on page 11 of April's *RadCom*.

ARDF

Amateur Radio Direction Finding in Schools

Year seven 'Gifted and Talented' students work together to hunt down the hidden transmitters. The audio from the receiver was split between the two pairs of headphones so that both were able to contribute to finding the transmitters.

TRAINING STUDENTS. "Somewhere in the depths of Cornwall, not far from the pasty mine, strange signals have been heard on the 80m band. A shady figure, wandering around Callington Community College has been hiding miniature radio transmitters. Fortunately a team of Gifted and Talented students from year 7 and 8 have volunteered to help find them…"

Not quite what you may expect when you think of ARDF or FoxOring, but the college science department wanted to spice things up a little for the first event in their Science Week program. I had been reading about ARDF in *RadCom* but was not really sure how to go about trying it out, so I arranged for the loan of the RSGB ARDF demonstration kit. The Chairman of the RSGB ARDF Committee, Bob, G3ORY, provided both 80m transmitters and PJ-80 receivers for a couple of weeks, even including a set of orienteering control clips.

To find out how the apparatus worked, Callington Amateur Radio Society agreed to devote their March meeting to ARDF. (It's always best to be at least one lesson in front of your students!)

The eagerly awaited parcel arrived on the appointed day and to our surprise (and delight) we discovered that we did not need 50m of wire for the antenna. (Don't believe everything you see on the net!). Just as well since there is a distinct lack of trees from which to hang such things in this part of Cornwall. The transmitter (housed in a small sandwich box) required just a short (25cm) antenna.

CARS members went out to locate a couple of transmitters that had been discreetly hidden in the car park. At this time of the year it gets dark and cold before club night starts (and members do not want to wander too far from the tea urn). We soon discovered that the limited range of these devices would make it possible for us to hold a DF contest within the confines the college sports field. Another plus was that we would not need to file pages of risk assessments to take students on an offsite activity!

On a bright Saturday morning early in March, parents delivered their youngsters for 'Special Agent training'. Selected for their quick thinking and teamwork, these students were welcomed as members of KERNO (Key Expert, Radio Navigation Operative). Once they had been sworn in, and issued with their Secret Agent ID badges they were ushered in to Spy Master H's briefing room.

First task was to find out about how a simple radio could be used to locate the direction that a radio signal was coming from. (H is a great believer in 'you **should** try this at home' science). After a short presentation about polar diagrams, the Special Agents were issued with their PJ-80 receivers. It did not take them long to get the hang of using the ferrite rod to find 'dip' and the sense button to determine the general direction of our demonstration transmitter.

Agents, divided into teams were issued with a satellite picture of the campus showing the approximate location of the six hidden transmitters.

Members of CARS were on hand to guide the 'Secret Agents' as they DFed their way to the first hidden transmitter. After that they were on their own.

On their return to base, each team was de-briefed about where the transmitters had been found and asked to return their clip card, duly punched, just to prove that they really had visited the site.

The morning was rounded off with Gary's, KN4AQ, ARVN introduction to ARDF **[1]**. Who knows, you may one day see a team from Cornwall at a FoxOring event.

I am indebted to Bob, G3ORY, for his unstinting support, advice and the loan of equipment. Thanks also go to members of CARS for acting as guinea pigs and for their support on the day. Also to Agents, Smith, Maunder, Harris (Mrs) and Munton who assisted on the day. For security reasons they are not present in the photographs…

WEBSEARCH

[1] www.arvideonews.com/ardf/index.html

ARDF EVENTS:

Saturday 24 April: Leith Hill Surrey 144 and 3.5 MHz. Car park at TQ132541.

Friday 21 May: British ARDF Championships Day 1 – FoxOring at Frimley Lodge Park SU888562.

Saturday 22 May: Day 2 – 144MHz race at Star Posts, Bracknell SU8766.

Sunday 23 May: Day 3 – 3.5MHz race at Star Posts Bracknell SU8766

Sunday 13 June: Tandle Hill, Rochdale. 144 and 3.5MHz. SD951100

Newly qualified 'Special Agents' show off their diplomas and PJ-80 receivers after an interesting and successful day at the start of Science Week 2010.

TDOTA

GG100GN braves the odds for Thinking Day on the Air!

It's melting and we are feeling warmer.

SNOW NOTWITHSTANDING. The 77th Northampton Guide Group braved the weather to set up a Thinking Day on the Air amateur radio station over the weekend 20 and 21 February. John, M5TTT and Andrew, M3DZZ erected antennas in the snow and sleet on the Thursday. A full size G5RV dipole was slung between the trees and a SOTA 2m beam, a 2-ele 70cm Yagi and a Diamond 2m/70cm vertical were erected on masts. The two amateurs left at lunchtime to defrost and dry out! On the Friday in the snow John managed to get up the 200 yard farm track – after six runs at it in a Transit van. When he finally got to the hut, he set up Kenwood TS-870 on HF and an Icom IC-E2820 rig on GB3NH, GB3NP, GB3TO and digital GB3JF. After checking the bands, tuning and earthing the radio sets he left to warm up with hot soup at home in the knowledge that things would be easier for the weekend. Famous last words!

Saturday morning dawned and John set off at 8am because there had been some more snow on top of the ice from the previous night's frost. The track to the site was easier to get up after a few stops and starts. He tried turning on the water supply only to find the outside toilets and central heating were frozen. With 25 Guides, Brownies and Leaders arriving in an hour's time, this became the first priority. He managed to get the cold water running and the hot water working too; things were looking a little better. Ten Guides and their leaders were due to sleep in the hut overnight, which was going to be cold. Things started to look up when the accumulated body heats started to warm the building up but they also had an offer of LPG heaters from a local company via John.

At 10am Alan, VK5PBZ came on the air, through GB3NH, from Lincoln on the South Coast of Australia, as scheduled through IRLP. Alan had visited the Guide Group in the autumn after speaking to the girls on the air previously. His wife had also been a Guide Leader in Australia. The girls queued up to speak to him - a great start to the day.

Next, at 10.52am, fellow Girl Guide Centenary Station GG100PG was in the log and the station was busy from then on. Clifford, M6LKB a young Scout arrived with his sister and took over on the repeaters. Chris, M0DOL arrived and took up the HF station. The central heating and toilets defrosted and gurgled into life and the girls talked to local contacts through the repeaters. Then Brownie Kyla, M3NNH (just 7 years old) came on the local repeater whilst on her way to a dancing lesson and the girls queued for a chat. The number of amateurs wanting to speak to the special callsign GG100GN on HF made the shack buzz and by 11am the log book pages had started to fill up. The signal reports from the home made G5RV were stunning. Judith Ross came to visit from 1st Boughton Guides with Guides Emma, Catherine and Ellie, and the organisers started to explain amateur radio, Morse and phonetic language and it wasn't long before they were on the air along with our own group.

The bands were open and with the exception of a short dinner break, courtesy of Sue, M5AFY's daughters, the group carried on until 6.40pm. They had been talking to Helen, VA1YL Guide Station in Nova Scotia, for an hour and ten minutes, with the Guides exchanging greetings with her Guides.

MORE SNOW. Sunday morning brought more snow! Sue, M5AFY got stuck in the snow on the road to the site and had to have assistance. John, M5TTT managed to get his Transit van up to the shack, but still doesn't know how. Everyone else left their vehicles at the bottom of the farm track. Alas the outside toilets had frozen again so it was crossed legs again… At least inside the shack it was warm, as the Guides had slept over and kept the heating on. The smell of tea and toast was delightful.

At 8.27am on the Sunday the first contact on 20m was RU3FN, followed by IV3BAW and OK2BPV. The station was off and running again with the bands open. By 10am they had a Japanese Scout station, JE7YSS, at 5 and 5 with a signal report of 5/9 in return for the G5RV with 100 watts. Apparently he had been trying to contact the group for over an hour. Motoi, whose own callsign is JK2PNY, was so pleased to speak to the group and tell them that his wife was a Guide Leader. He followed up the QSO with an e-mail not to forget his QSL card as it would be very special for his wife.

Signals continued and they worked seven GG100 stations and numerous European Scout and Guide stations until 1pm when the States came booming in. By 3pm on Sunday they had 300+ contacts and some of the Guides had spoken to over 40 contacts.

TIME TO PACK UP. The sun was shining, the snow was melting away and the girls were still in high spirits. At 5.00pm they left the site exhausted and with 300+ QSO cards to write!

A big thank you from the 77th Northampton Guides to all those operators out there that took time to talk them. This is what memories are made of! They are starting a new Guides Foundation course through popular demand shortly.

Chris, M0DOL and Sue, M5AFY with 77th Northampton Brownies and Guides.

77th Northampton Brownies looking for VK5PBZ's QTH.

Start Here

How filters can help remove interference from outside the amateur bands

A selection of VHF and UHF filters.

FILTER TYPES. You'll encounter four main types of filter: low pass, high pass, band pass and band stop/reject filters. Each type of filter has its own characteristics and usefulness. Before we discuss each in turn, it is helpful to note some conventions when dealing with graphs for filters. We measure the performance of a filter over a wide range of frequencies, say 0–100MHz. This is displayed on the horizontal axis. It's worth checking here first to get an idea of what range of frequencies a filter claims to perform over. On the vertical axis, we record the level of reduction in signal strength (attenuation); usually this is measured in decibels (dB) – a logarithmic scale. Note that convention has it that 0dB (no attenuation) is at the top of the axis, and the values increase as you go down the axis. This is because as you have more and more attenuation, the smaller the strength of signal at the end. We're now ready to explore the four filters mentioned above.

LOW AND HIGH PASS FILTERS. Low pass filters pass frequencies below a given frequency and attenuate signals above that frequency (see **Figure 1**). This type of filter is often used on HF to attenuate any harmonics that your equipment may produce. It may also be used to reduce interference due to exceptionally strong commercial users operating at frequencies above HF. Low pass filters have the advantage that you can operate across a fairly wide range of frequencies without having to change the filter.

High pass filters are essentially the opposite of a low pass filter, attenuating low frequency signals up to a certain point and passing higher frequencies (see **Figure 2**). These are useful for reducing sub-harmonics (unwanted radiation at a lower frequency than your operating frequency) and also for reducing the strong signals from nearby out of band stations below your frequency. However, they aren't as useful on HF because the cut off point would have to be very low in order to not have to change filters when changing bands.

BAND PASS FILTERS. These combine the best of both high and low pass filters, passing only a selected range of frequencies (see **Figure 3**). You need a band pass filter for each band you operate on and a way of switching between them. Luckily most HF radios have bandpass filters built in and use miniature relays to switch automatically to the correct filter when you change bands.

BAND STOP FILTERS. These are the opposite of a band pass filter. They attenuate signals over a window of frequencies. As amateurs, we tend not to use these unless we want to specifically remove a strong out of band station, such as your local FM radio station so that you can monitor the broadcast band for more distant stations. Manufacturers of some broadband over powerline devices use several band stop filters to try and minimise emissions in the amateur bands.

WHAT SHOULD I LOOK FOR IN A FILTER? There are a few factors that define a filter. The first are its 3dB points, where the signal is reduced to half of its original strength (see Figure 3). The closer this is to the range of frequencies over which you want the filter to operate, ie the steeper the curve, the better the filter. Also, filters tend to have less attenuation at harmonics of the frequency it was designed for. A good filter will have plenty of attenuation at harmonics of your operating frequency. If your 2nd or 3rd harmonic has only 10dB of attenuation then you could be in trouble as any emissions aren't being reduced much and could cause interference to other users, eg 50MHz has its 2nd harmonic at 100MHz – in the FM broadcast band!

Another important factor is its insertion loss. Loss? Yes, since these filters are dealing with radio frequencies they are located between the antenna and the radio. This means you are putting something extra in the path of the signal, so even the wanted signals are attenuated somewhat. A good filter has very low insertion loss. It is worth noting that insertion loss increases with frequency so it isn't a worry much on HF, but definitely is when you reach UHF! Likewise you probably have more insertion loss on 10m compared to 80m for a HF low pass filter.

Further, filters tend not to have a small constant insertion loss across all wanted frequencies and infinite attenuation across the rest. Instead they tend to behave something like **Figure 4**. The insertion loss varies slightly ▸▸

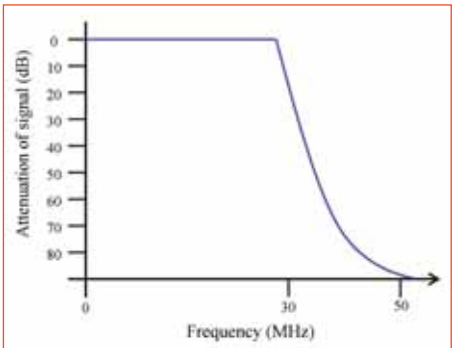


FIGURE 1: Frequency response of a good low pass filter.

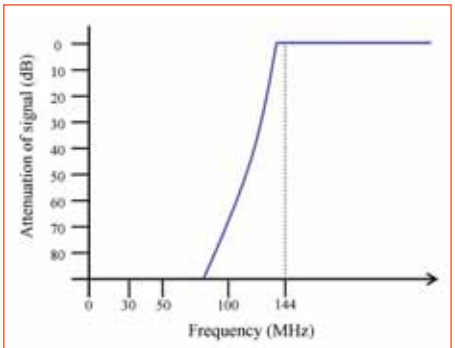


FIGURE 2: Frequency response of a good high pass filter.

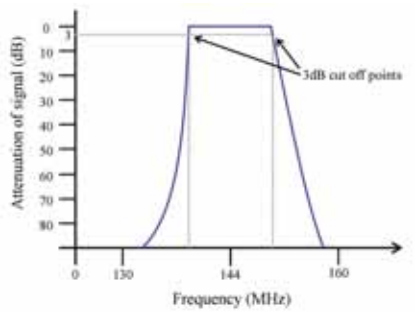


FIGURE 3. A 144MHz band pass filter with 3dB cutoff points marked (50% reduction in signal). Note that the filter does not behave identically above and below the centre frequency.

Communications Museum

If you are visiting the Shetland Isles, there is a museum there that's well worth a visit.

The Hoswick Visitor Centre is a striking mix of modern and more traditional architecture.

Just part of the communications equipment on display in the museum.

LOCATION. Situated in the historic little village of Hoswick is a visitor centre that contains more than meets the eye. Not only are visitors to the centre able to find out something of the history and culture of the area from the interpretative displays but there is also a communications museum inside that's been established for over a decade.

DISPLAYS. The collection was started more than forty years ago and consists of a broad range of equipment, much of it saved from going in – or even retrieved from – skips. The collection is so large now that, unfortunately, some pieces of equipment are in storage due to lack of space.

You will find displays of domestic broadcast receivers from the start of commercial broadcasting – crystal then valve sets, including home made equipment through the decades to transistor receivers and early mobile phones. There's amateur radio equipment from the 1950s and 1960s too, including Panda 120, Heathkit DX100, Tiger 200 transmitters and KW SSB equipment.

For those interested in maritime receivers and transmitters there's a marine crystal receiver from the Titanic era as well as a pristine example, in working order, of a Collins HF radio installation used in Motor Torpedo Boats (MTBs) and the 'Shetland Bus' sub chasers during the later stages of WWII. (By the way, if you want to know more about the Shetland Bus you can check the internet, as there's lots of information there.) There's 7 foot rack containing the Marconi HR21 SSB receiver used by BT at their remotely-operated station at Radio Norwick on Unst, Britain's most northerly inhabited island, as part of their North Sea ship-to-shore MF communications at the start of the oil exploration boom in the 1960s.

Also on display is a Redifon GR161B, the last AM radiotelephone used in the Muckle Flugga Lighthouse.

For the military enthusiast, there's plenty of WWII comms gear to see as well as test and calibration equipment. An interesting donation was a VHF Rx and amplifier that came from either a Hurricane or Spitfire, the equipment having been introduced just after the Battle of Britain. Another interesting piece is an OP3 clandestine receiver designed in 1944 at the Polish Radio Centre Workshops in Stanmore. You'll also find vintage LF radio beacon monitoring and VHF homer receivers once used at Sumburgh Airport.

VISTOR CENTRE. The centre also is home to vintage weaving machinery used in the building when it was a purpose-built weaving mill, where high quality Shetland tweed was produced in the 1960s through to the 1980s. There is also photographic and text interpretation of local heritage.

The whole organisation, which is a charitable company, incorporates a cafe selling home baking and local craft work, is totally managed by volunteers. There is no admission charge and last year they greeted 10,000 visitors. The centre is open from May to September from 10am to 5pm Monday to Saturday and 11am to 5pm on Sundays and you'll be made very welcome if you pass by on your travels. Contact details are on the VisitScotland website, accessible at http://tinyurl.com/radcom-hoswick.

E-MAIL: JAC69@ST-ANDREWS.AC.UK START HERE

over the band and then we have a decent amount of attenuation over the out of band frequencies. In particular, for a band pass filter, it may exhibit good attenuation near to the band you want to pass, but check that is has good attenuation at the 2nd and 3rd harmonics as well as this is probably where you want it to be doing some work!

Finally, the physical construction of a filter is very important. For good performance, each section of a filter should be properly shielded, grounded and wiring kept as short as possible, particularly as for VHF and up filters. Likewise, don't forget to use good quality connectors with a low insertion loss filter otherwise you introduce unnecessary additional loses.

WHERE DO I PUT MY FILTER? It is pretty rare for a manufacturer to offer an upgrade low/high/band pass filter so unless you're designing and building your own transmitter, you're going to have to place the filter between the radio and the antenna, preferably connected to each via the highest quality coax and connectors you can get. Nearly all filters are designed to be symmetrical so it doesn't matter which end goes where in general. If it does, it should be clearly marked to avoid damage to equipment.

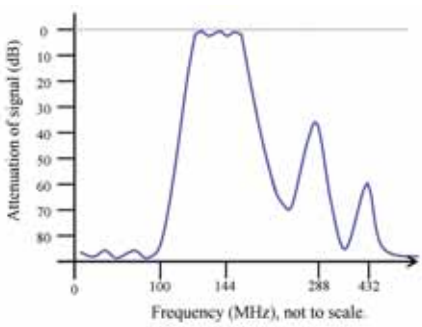


FIGURE 4. A more realistic 144MHz band pass filter. Notice the tendency for the filter to attenuate less at the harmonics.

Operating

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Worldwide ham radio operating and the ARRL DXCC Award

By Jim Kearman, KR1S

The Thrill of Working DX! DX in ham radio shorthand means distance, literally talking to people in distant lands. Many radio amateurs enjoy the lure of DXing, seeing how far away we can communicate with other Amateur Radio operators. It's a way of determining how well our stations and we, the operators perform. DXing is a full-time goal for some hams and a just-for-fun challenge for others.

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Size 135x210mm, 176 pages
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NEW Revised Edition
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By Fred Handscombe, G4BWP

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Size 297x210mm (landscape), 80 pages
ISBN 9781-9050-8624-5

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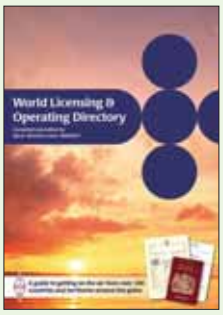

World Licensing and Operating Directory

By Steve Telenius-Lowe, 9M6DXX

If you have ever thought of taking your radio on holiday or organising a DXpedition, the *World Licensing and Operating Directory* is the guide for you. Written by well known DXer Steve Telenius-Lowe, 9M6DXX who has visited 83 DXCC entities and operated from 37 of them, this book has been meticulously researched and has input from nearly 100 contributors. There is all the information you need to get on the air from over 200 countries and territories around the globe.

The World Licensing and Operating Directory is lavishly illustrated throughout with over 230 photographs and maps. There is information on how to obtain an amateur radio licence in almost every country in the world - but this is only part of the story. There is information on organising a DXpedition and "All you wanted to know about licensing (but were afraid to ask)". There is also a major section of the book that provides full details of how to rent more than 75 amateur radio stations around the globe - from Europe to the Pacific and from the Arctic to the Equator! There is a 32-page full-colour section with spectacular photographs of rental stations, including some of the most impressive antenna set-ups in the world.

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Radio Orienteering - The ARDF Handbook

By Bob Titterington G3ORY, David Williams, M3WDD & David Deane, G3ZOI

Amateur Radio Direction Finding (ARDF) - also known as Radio Orienteering - is an outdoor pursuit which combines orienteering with the amateur radio skill of direction finding. Competitors use their skills to locate a number of hidden transmitters within a given time limit. This book is aimed at giving readers everything they need to become involved in this fascinating sport.

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Size 175x240mm, 112 pages, ISBN 9781-9050- 8627-6

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1 SCOTLAND SOUTH & WESTERN ISLES

REGIONAL REP: LEN PAGET, GM0ONX, GM0ONX@RSGB.ORG.UK

AYR ARG
Charlie, MM0GNS, 01563 551704, cgnstewart@hotmail.com
12 Bletchley Park
26 Construction night

COCKENZIE & PORT SETON ARC
Bob, GM4UYZ, 01875 811 723
7 Normal club night
14 144MHz DF hunt

KILMARNOCK & LOUDOUN ARC
Graham, MM3GDC, mm3gdc@btinternet.com
11 Antenna Modelling by Barry, GM3YEH
25 Club night

LIVINGSTON & DARS
Norman, 07740 946192, uk.groups.yahoo/group/ms0liv
4, 18 Club evening
11 Operating evening
25 Morse code practice

LOTHIANS RS
Andy Sinclair, lrs_secretary@moosedata.com
12 SDR by MM0GFS/DL1DBS
26 DF hunt with Peter, GM4DTH

PAISLEY (YMCA) ARC
Bill Anderson, 2M0BZZ, 01505 613633, bill@3bis.co.uk
12, 26 Training

2 SCOTLAND NORTH & NORTHERN ISLES

REGIONAL REP: DENNY MORRISON, GM1BAN, GM1BAN@RSGB.ORG.UK

ABERDEEN ARS
Lewis, GM4AJR, 01224 575 663, www.radioclubs.net/aars/
6 Junk sale
13 Building Stuff by Tony, GM4HTU
20 VHF fox hunt
27 NFD planning and equipment check

3 NORTH WEST

REGIONAL REP: KATH WILSON, M1CNY, M1CNY@RSGB.ORG.UK

BOLTON WIRELESS CLUB
boltonwireless@gmail.com
10 The 4m band by Ross, G6GVI
24 2m DF hunt

CHESTER & DARS
Barbara Green, 07957 870770, www.chesterdars.org.uk
4 Radio picnic at Hanmer Arms
18 Radio operations / kit building
25 Annual dinner at Cheshire View, Christleton

MID-CHESHIRE ARS
Peter Paul Fox, G8HAV, 01606553401
5 Build & install a mobile antenna
12 General chat evening
19 Committee meeting, club project

PRESTON ARS
Richard, M0RDZ, 07855873566, secretary@prestonars.co.uk
20 A talk on Morse keys by John, G3OWO

SOUTH CHESHIRE ARS
Chris Wiseman, G0RDK, 01782 773185
6, 20 Club net on 2m
13 Junk sale
27 Intermediate course

SOUTH MANCHESTER R&CC
Ron, G3SVW, 0161 969 3999
6 A 60kHz off-air frequency standard by Ged, G8RSI
13 Antenna clinic, Ron, G3SVW
20 AGM
24 Monthly technical forum
27 Who really invented wireless? G3YQD

THORNTON CLEVELEYS ARS
John Foster, 2E0EZY, 01253 399377
10 Natter night/club on air
17 ATC on air - Roy Walker
24 Bicycle mobile by Dave, G4AKC

4 NORTH EAST

REGIONAL REP: HAROLD SCRIVENS, G0UGE, G0UGE@RSGB.ORG.UK

ANGEL OF THE NORTH ARC
Nancy Bone, G7UUR, 0191 477 0036, nancybone2001@yahoo.co.uk
8 Weekend event Mills OTA
10, 24 OTA, natter night
15 Tyne and Wear Repeater Group auction
17 Mike Taylor on electrical safety

EAST CLEVELAND ARC
Alistair, G4OLK, 01642 475 671, alistair.mackay@talk21.com
7, 21 Night OTA
14 Bring in something interesting evening
28 Radio components catalogues evening

HALIFAX & DARS
Anthony Vinters, 01422 822636, tony@g0wfg.demon.co.uk
18 Club/P working followed by pie feast

HORNSEA ARC
Gordon MacNaught, G3WOV, 01377 240573, gmacnaughtwov@yahoo.co.uk
3 80m CC - SSB - home stations
5, 19 Fox hunt - G4YTV- G3RMX
12 80m CC - DATA - club station
17 SARS/HARC G3GBH cup
20 80m CC - CW - home stations
26 Committee meeting

SHEFFIELD ARC
Trevor Wood, M0TWS, trevorwood6@yahoo.co.uk
3 Social night & RSGB 80m CC SSB
10 Being a rare DX station by G4FAL
17 Hip replacement & vacuum plasma spraying by G0OUG
24 Contest workshop, VHF NFD & IOTA
31 Social night

5 WEST MIDLANDS

REGIONAL REP: TREVOR BAILEY, M0KMB, M0KMB@RSGB.ORG.UK

COVENTRY ARS
John, G8SEQ, 07958 777363
7 The work of the IWA, Ian Fletcher
14 1st round G4ZMC Trophy
21 Wine & cheese evening
28 Radio workshop, VHF/UHF operating

GLOUCESTER AR&ES
Anne, 2E1GKY, 01452 548478, daytime, www.g4aym.org.uk
3 Crickley Hill operating, demo on kite flying by Roger, G4ROJ
10 HF operating
17 Workshop/construction
24 VHF operating
31 Bank holiday Crickley Hill operating

KIDDERMINSTER & DARS
Barry, G4CTU, 01562 823966
4 Nostalgia evening

MIDLAND ARS
Norman, G8BHE, 01214 229 787
5 Rag chew, training and Morse classes
9 Visit to Newhall Water Mill
12 Committee meeting, training & Morse classes
19 OTA, training & Morse classes
26 Laptop computer training & Morse classes

MID-WARWICKSHIRE ARS
Don, G4CYG, 019 2642 4465
11 Satellite presentation
25 Arduino boards

SALOP ARS
www.salop-ars.org.uk
13 Fox hunt, Glenda, G1YJB
20 Natter night plus Foundation course

SOUTH BIRMINGHAM RS
Don, 0121 458 1603
5 Lecture in main hall
7, 14, 21, 28 Construction evening
10 Contest meeting & rag chew
17 Committee meeting
24 Field day planning meeting

STRATFORD UPON AVON DRS
G0CHO, 01608 664488, cousbey@theiet.org
10 AGM &surplus sale
24 Informal/video evening

TELFORD & DARS
Mike, G3JKX, 01952 299 677, mjstreetg3jkx@blueyonder.co.uk
5 Open house / HF OTA / committee
11 Hamfest committee meeting
12 Surplus equipment sale, G8UGL
17 Quiz and curry night, G3JKX & M0TAW
26 Our sun & propagation, G3UKV

6 NORTH WALES

REGIONAL REP: MARK HARPER, MW1MDH, MW1MDH@RSGB.ORG.UK

DRAGON ARC
Stewart Rolfe, GW0ETF, 01248 362229
3 NFD planning / RSGB CC SSB event
17 Junk sale

MEIRION ARS
John, MW0VTK, 07772 720099 tawelfan@talk21.com
1 Weekend special event at the Welsh Highland Heritage Railway Porthmadog
6 Talk and demonstration of amateur TV by John, MW0VTK

WREXHAM ARS
Glyn, MW0BNB, www.qsl.net/wars/
4 Club website upgrade & control
18 OTA

7 SOUTH WALES

REGIONAL REP: JIMMY SNEDDON, MW0EQL, MW0EQL@RSGB.ORG.UK

ABERDARE & DARS
www.radioclubs.net/aadars
14 Committee meeting

CARMARTHAN ARS
Alastair Underwood, GW0AJU, 01267 290822, alastairu@btopenworld.com
4, 18 Exam tuition

CHEPSTOW & DARS
Wil Oliver, MW6KGB, 01291 621342
4 DX on VHF & up by Chris, GW4DGU

LLANELLI ARS
Craig, MW0MXT, 01269 840292, craig@mw0mxt.co.uk
10 Club raffle & antenna inspection
17 OTA
24 Junk sale

MARCHES ARS
Dave MW0AYM, 01691 777242
11 Mark Harper – RSGB presentation
25 Club antenna erection

8 NORTHERN IRELAND

REGIONAL REP: PETER LOWRIE, MI5JYK, MI5JYK@RSGB.ORG.UK

BANGOR & DARC
Mike, GI4XSF, 028 4277 2383
13 Operating evening

9 LONDON & THAMES VALLEY

REGIONAL REP: ALISON JOHNSTON, G8ROG, G8ROG@RSGB.ORG.UK

AYLESBURY VALE RS
Roger, G3MEH, 01442 826 651
12 Home networking by Phil, M0PSH

BROMLEY & DARS
Andy, G4WGZ, 01689 878089
18 EMC

BURNHAM BEECHES RC
Dave, G4XDU, 01628 625 720
17 Propagation by G4XDU

CHESHAM & DARS
Terry, G0VFW, 01442 831 491, cdars.club@ntlworld.com
5 General meeting + WOTA
9 Lacey Green windmill day GB0LGW
12 Principles of DF with Phil G8BLB
19 Boot sale planning
23 Sunday Luton boot sale
26 Construction project evening

COULSDON ATS
Andy, G8JAC, g8jac@btinternet.com
10 DVD: The Bletchley Park Story (pt 2)

DORKING & DRS
Garth, G3NPC, 01737 359472, garth@swansons.org.uk
25 Prof Tony Davies on the British army's battlefield radio in WW2

EDGWARE & DRS
Mike, G4RNW, 020 8950 0658, michael.stewart5@ntlworld.com
13 Lightning and you, Steve, G0PQB
27 Constructors contest

MILTON KEYNES ARS
www.mkars.org.uk
4, 24 General chat night
8 Tottenhoe Windmill for WOTA
10, 17 Shack open night

NEWBURY & DARS
Richard, G3ZGC, 01635 46241, richard.jolliffe@vodafone.com
26 AGM

RADIO SOCIETY OF HARROW
Linda, G7RJL on 0208 386 8586, www.g3efx.org.uk
3 GX3EFX/P Harrow Museum
14 Astronomy through radio eyes
22 Bentley Priory GB1RBP
28 French evening

READING & DARC
Pete, G8FRC, 01189 695 697
13 2m DFing by David, G3ZOI
27 Specialised data surprise by Des Howlett, G8FIF

SHEFFORD & DARS
David, G8UOD, 01234 742 757, www.sadars.co.uk
13 Operating on 500kHz by Dennis, M0JXM
20 2m DF, Steve M0DYR & Brian M0HAS

SOUTHGATE ARC
David Sharp, M0XDS, david.sharp1@tesco.net
5 Operating at Hailsham shack
8 WOTA GB2PW at Polegate Windmill
10 Spark gap Tx demo
12 OTA

SURREY RADIO CONTACT CLUB
Ray, G4FFY, 01732357474
10 Project evening
24 Club fix-it & natter night

SUTTON & CHEAM RS
John, G0BWV, 020 8644 9945, info@scrs.org.uk
20 AGM

VERULAM ARC
Ralph, 01923 265572, g1bsz@aol.com
18 Contesting by G3YYD

WEY VALLEY ARG
www.weyvalleyarg.org.uk
7 Sound recording, John, G0GNA
21 The Hernia Cup inter club comp

WHITTON AMATEUR RADIO GROUP
www.warg.info
14 Satellite working for beginners
28 Prep for CQ WPX CW contest

WIMBLEDON & DARS
Jim, M0CON, 020 8874 7456, www.gx3wim.org.uk
14 VHF DF hunt
28 Vintage rig evening

10 SOUTH & SOUTH EAST

REGIONAL REP: GAVIN KEEGAN, G6DGK, G6DGK@RSGB.ORG.UK

BASINGSTOKE ARC
Clive, G4ODM, 01256 326050
8 WOTA at Longbridge Mill
17 Loopzilla v long wire by Garry M0TIG

BREDE STEAM ARS
Steve, 01424 720815, M0NUC@aol.com
1, 4, 11, 18, 25 At the shack

FARNBOROUGH & DRS
Derek, G3OFA, mail@farnboroughradio.org.uk, www.farnboroughradio.org.uk
12 Talk by Kevin, G7BCS
26 Junk sale

HARWELL ARS
Malcolm, G8NRP, 01235 524844, info@g3pia.org.uk
11 DXpedition to Bhutan by Vincent, G0LMX
25 Shack activity night

HASTINGS E&RC
Gordon, 01424 431 909, gordon@gsweet.fsnet.co.uk
www.herc.uk.net
26 Construction projects

HORNDEAN & DARC
Stuart, G0FYX, 023 9247 2846, www.hdarc.co.uk
4 Natter night/social evening
25 IBP by Leslie Butterfields, G0CIB

HORSHAM ARC
www.harc.org.uk
6 GB7HQ and the IARU contest by John Warburton, G4IRN
13 Social, The Royal Oak, Rusper
27 Fox hunt

ITCHEN VALLEY ARC
Charlie, M0WYM, 02380 439560, secretary@ivarc.org.uk
14 The Alinco QRP transceiver by Andre Ravary, M0RAV
28 Military comms, Brig. Ted Flint

LYMINGTON ARS
Keith, M0LCC, m0lccandg8mzf@googlemail.com
7 The BBC by Tony Crake, G0OVA

MID-SUSSEX ARS
Peter, G4AKG, 01444 239371
7 Radio night
14 Radio night & prep for mills w/end
21 Talk on bats
28 Radio night & table top sale

SWINDON & DARC
Den, M0ACM, 07810 317750, www.sdarc.net
6 DF hunt and social evening
13 Prep for 144MHz contest
20 Quiz
27 Natter night

TROWBRIDGE & DARC
Ian, G0GRI, 01225 864 698, E/W
5 Disaster response in Sumatra – Mike, M0ALW
19 Natter night

WATERLOOVILLE ARC
Rich, G4IBW, 02392680852, g4ibw1@ntlworld.com
3 CW night
10 Club talk
28 EGM

WORTHING & DARC
Roy, G4GPX, 01903 753 893
5 My life as a Time Lord, G1EXG
12 Electrical oddities by John Narborough
19 Discussion evening
26 GX3WOR OTA & discussion

11 SOUTH WEST & CHANNEL ISLANDS

REGIONAL REP: PAM HELLIWELL, G7SME, G7SME@RSGB.ORG.UK

APPLEDORE & DARC
Brian Jewell, M0BRB, 01237 473251
17 Role of ATU & modulation, G4HXK/G4CHD

BLACKMOOR VALE ARS
Tony G0GFL, 01258 860741
4 VHF evening in the shack
8 WOTA at Sturminster Mill
11 Video Papua New Guinea
18 HF evening in the shack
25 Natter night

BRISTOL RSGB GROUP
Robin, G3TKF, 01225 420442
31 Weather forecasting by BBC West TV presenter

CALLINGTON ARS
Chris Harris, G7UDX, g7udx@me.com, 07973 418 371
5 Shack night

CORNISH RADIO AMATEUR CLUB
Steve, G7VOH, 01209 844939, G7VOH@btinternet.com
4 Committee meeting
5 ILS by Graham, G3LAI
10 Computers & music, Peter, G3WKP

NORTH BRISTOL ARC
Dick 01454 218362 or e-mail g0xay@aol.com or www.nbarc.org.uk
7 Bring & buy
14 Operating evening
21 Echolink by Paul, G8YMM
28 Operating evening

SALTASH & DARC
Brian, M0BHG, 01752 844321
7 HF operating evening

SOUTH BRISTOL ARC
Len, G4RZY, 01275 834 282
6 Workshop - Morse code
13 Sprint table top sale
20 Club evening DX challenge
27 OTA with by David, G7PKJ

TAUNTON & DARC
William, G3WNI, 01823 666 234, g3wni@btinternet.com
5 WSPR by Dave Wickens, G6WZA
12, 26 Operating club station

THORNBURY & SOUTH GLOUCESTERSHIRE ARC
Tony, G0WMB, 01454 417048, tonytsgarc@btinternet.com
5 Slideshow: Egypt by Stan, G0RYM
12, 26 OTA
19 Video night

TORBAY ARS
Dave, G6FSP, g6fsp@tars.org.uk
7, 21 Natter night
14 Operating night
28 90/10 sale

WEST DEVON RC
Jules Cuddy, M1AGY, 01752291588
4 Bring & buy, natter, tea & coffee
18 VHF antenna construction night

YEOVIL ARC
Steve Crask, G7AHP, steve@g7ahp.co.uk
6 OTA, committee meeting
15 QRP convention briefing
29 AGM

12 EAST & EAST ANGLIA

REGIONAL REP: PHILLIP BROOKS, G4NZQ, G4NZQ@RSGB.ORG.UK

BRAINTREE & DARS
John, M5AJB, 01787 460 947
3 Equipment testing part 2, Mills weekend planning
17 AGM

CAMBRIDGE & DARC
Lawrence Micallef, M0LCM, 07941 972724, events@cdarc.co.uk
7 Planning for Mills OTA
8 Weekend event Mills OTA, Cattells Windmill

CHELMSFORD ARS
Martyn, G1EFL, 01245 469 008, www.g0mwt.org.uk
4 T1154, R1155 and CR150 by Peter, G3SUY
8 WOTA: GB5SM at Stock Windmill
11, 18, 25 Club net night
12 Committee meeting

DARENTH VALLEY RADIO SOCIETY
Ray, G0FDU@G0KDV.com
12 Radar by George, G3BNE
26 Visit to Chatham Docks

DOVER RC
Brian, G4SAU, g4sau@darc.org.uk
5, 19 Natter and operating evening
12 Manpack radio by Ian, G3ROO
26 Talk on pirate radio

FELIXTOWE & DARS
Paul, G4YQC, pjw@btinternet.com
3, 31 Closed
9 GB2WTM Woodbridge Tide Mill
17 ESWR planning

GORLESTON ARS
David, G3OEP, QTHR, 01493 662 323
29 Lunch meeting at the Short Blue Hotel

HARWICH ARIG
Kevan 2E0WMG 07766543784
kevan2e0wmg@live.co.uk
12 Model trains by John, G3YYZ

LEISTON ARC
Dave, G4HUP, 01473 737 717, g4hup@btinternet.com
4 The RA by Laurie Newell

LOWESTOFT & DISTRICT PYE ARC
Phil, G0JSG, 01502585448, phillip.holden@virgin.net
6, 20, 27 Club night at shack
13 GB3YL & LO repeater group AGM

NORFOLK ARC
Chris Danby, G0DWV, 01603 419204, cmdanby@btinternet.com
5 Club quiz night
12 Informal / construction / workshop
19 GB3NB AGM
26 Informal, construction, workshop and bright sparks evening

PETERBOROUGH & DARC
David Howlett, M0VTG, padarc@tesco.net
26 The EMCARS80 Xcvr by Steve, G6ALU

SOUTH ESSEX ARS
Norman, M0FZW, 01268 692776, secretary@southessex-ars.co.uk
8 Rayleigh Windmill (WOTA)
12 VOIP by Norman, M0FZW

13 EAST MIDLANDS

REGIONAL REP: JIM STEVENSON, G0EJQ, G0EJQ@RSGB.ORG.UK

BOLSOVER ARS
postmaster@g4rsb.org.uk, www.g4rsb.org.uk
5 Natter night
12 50MHz by Don, G4KXW
19 DF practice night
26 Committee meeting

DERBY & DARS
Richard Buckby, radio@dadars.org.uk
4 Junk sale
11 Committee meeting
18 Video show
25 OTA

EAGLE RG
Terry, G0SWS, 01507 478590
11 British Relay, the cable vision experiment by Neville, G3VDV

FRISKNEY AND EAST LINCOLNSHIRE CC
Chris M0MFP, 01507 442240
4 AGM

HINCKLEY ARS
John, M0JAV, m0jav@lowgables.co.uk, 07836 731544
5 Social evening
12 Cobweb omni for HF
19 OTA
26 Contesting by Mack, M0CUS

LINCOLN SHORT-WAVE CLUB
Pam Rose, G4STO, 01427 788356, pamelagrose@tiscali.co.uk
1, 5, 8, 15, 22, 29 G5FZ OTA
12 SSB and CW QRP experiment night
19 Quiz night
26 G5FZ OTA & natter night

LOUGHBOROUGH & DARC
Chris, G1ETZ, 01509 504 319
4 Early radar by George, G4EUF
11 Walking 2m DF, Glenmore centre
18 Demonstration of 160m aerials. Brian, G4JCH & Art, G3KWY
25 Practical evening

MELTON MOWBRAY ARS
Geoff, G3STG, 01664 480 733, G3STG@btinternet.com
21 Annual construction competition

NUNSFIELD HOUSE ARG
Ken Frankcom, G3OCA, 01332 720976
7 Egg race by Ken Clarke
14 Les, G4CWD on his new aircraft
21 Planning club program
28 Shack & natter night

RAF WADDINGTON ARC
Bob G3VCA, g3vca@pyewipe.co.uk
6, 20, 27 Shack & chat night
13 Talk by Bryn Llewellyn, G4DEZ

SOUTH NOTTS ARC
Terry, M0RIA, www.radioclubs.net/snarc
4 2m contest
5 Video night G3MOT
8 Mills OTA GB2GG
12 Coffee and QSL cards
19 Component theory – inductors
26 Open forum (members only)

SPALDING & DARS
Graham Boor G8NWC, 07947 764481, secretary@sdars.org.uk, www.sdars.org.uk
4 144 UKAC at the Portakabin
21 Alan North from South Holland

WELLAND VALLEY ARS
Peter D Rivers, G4XEX, QTHR, 01858 432105, g4xex@fsmail.net
17 Talk on DF by Bob, G3ORY

HF F-Layer Propagation Predictions for May 2010

Compiled by Gwyn Williams, G4FKH

	3.5MHz	7.0MHz	10.1MHz	14.0MHz	18.1MHz	21.0MHz	24.9MHz	28.0MHz
Time	000011111220	000011111220	000011111220	000011111220	000011111220	000011111220	000011111220	000011111220
(UTC)	246802468020	246802468020	246802468020	246802468020	246802468020	246802468020	246802468020	246802468020
*** Europe								
Moscow	5.....278	85.....5888	57..3..48887	..577777883.	...6776677..	.....	.....	.....
*** Asia								
Yakutsk	.....	.....	53.....4665	.3665566757.	.....	.....	.....	.....
Tokyo	.....	.....3..	.....	.....	.....	.....	.....	.....
Singapore	.....22.	.....787.	.....53..	.....	.....	.....	.....	.....
Hyderabad	.....	455	3555	.....2343.	.....	.....	.....	.....
Tel Aviv	93.....899	994....28999	.45....58884	...3...488..	.....66..	.....	.....	.....
*** Oceania								
Wellington	.....	.....	.....	.....	.....	.....	.....	.....
Well (ZL) (LP)	.1.....	686.....473	899.....898	778.....698	.....7.	.....5.	.....	.....
Perth	.....	5642	.....55.3	.....	.....	.....	.....	.....
Sydney	.....	.....67..	.....277..	.....4...	.....	.....	.....	.....
Melbourne (LP)	.....	5897.....	88994.....8	7.88.....78	78	.....7.	.....	.....
Honolulu	.....	.....	..3.....	....3.....	.....	.....	.....	.....
Honolulu (LP)	.....	.....	.....	.....6...	.....	.....	.....	.....
W. Samoa	.....	.....	.....	....3.....	....44.....	.....	.....	.....
*** Africa								
Mauritius	1.....22	5.....5777	7775	.....575..	.....54...	.....	.....	.....
Johanesburg	.....	222	.3.....8877	..3....683..	.....	.....	.....	.....
Ibadan	21.....11	77.....667	674.....3777	..73...3787.	..56...678..	...6...778..	.....76..	.....4...
Nairobi	1.....	5.....445	64.....2666	6664	..4....566..	.....467..	.....4...	.....
Canary Isles	77.....377	877.....2788	8885...37888	..85...38887	...99899998.	...77777997.	.....56..	.....
*** S. America								
Buenos Aires	.....	434.....3	667.....78	..4.....576	.....	.....	.....	.....
Rio de Janeiro	.....	54.....36	765.....788	886	.....4..	.....	.....	.....
Lima	.....	433.....3	6564.....78	...4.....76	.....	.....	.....	.....
Caracas	.....	44.....4	8875.....78	..455....688	.....5.	.....	.....	.....
*** N. America								
Guatemala	.....	222.....	6563.....7	45	.....	.....	.....	.....
New Orleans	1.....	763.....	774.....6	56	.....	.....	.....	.....
Washington	42.....	775.....4	774.....37	....33..3567	.....4..	.....	.....	.....
Quebec	62.....2	774.....7	3.....67	.....56.	.....	.....	.....	.....
Anchorage	.....	.....	543.....4	.....4456.	.....6.	.....	.....	.....
Vancouver	.....	.....	.....	.....	.....	.....	.....	.....
San Francisco	.....	.....	.....	.....	.....	.....	.....	.....
San Fran (LP)	.....	.....	.....	.....	.....	.....	.....	.....

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 30% of days, etc. No signal is expected when a '.' is shown. **Black** is shown when the signal strength is expected to be low to very low, **blue** when it is expected to be fair and **red** when it is expected to be strong. The RSGB Propagation Studies Committee provides propagation predictions on the internet at **www.rsgb.org.uk/propagation/index.php**. An input power of 100W and a dipole aerial has been used in the preparation of these predictions; therefore a better equipped station should expect better results. The predicted smoothed sunspot numbers for May, June and July are respectively (SIDC classical method – Waldmeier's standard) 17, 19, 21 and (combined method) 29, 33, 37. The provisional mean sunspot number for March was 15.4. The daily maximum / minimum numbers were 25 on 4 March and 0 on 6, 9 & 10 March.

RadCom

FREE MEMBERS' ADS

Charges are waived for Members' Ads submitted by e-mail to memads@rsgb.org.uk. One ad per member per month; other important terms & conditions apply (see grey box on page 89).

FOR SALE

40' TRIANGULAR TOWER, five aluminium sections, rotor plate, top-sleeve, heavy base-plate. Offers?. Buyer collects, M25 junction 9. Roger, G3SXW, 07836 612972 (Chessington).

6 BED HOUSE IN ORKNEY IS. Recently fitted new kitchen & living room. 1 large & 1 small garage, 1 outbuilding that might convert to chalet with appropriate permission. Various antennas presently installed for HF. OIRO £130,000. W Caithness, MM3LQK, 01857 616220, williamcaithness@btinternet.com.

AMATEUR RADIO FROM FRANCE! Fully equipped self-catering Gite, sleeps 3-5, located in SW France (Chatente Maritime) 1km from beach near the Ile D'Oleron (S of La Rochelle), including use of radio shack/workshop (not transceivers – bring your own HF rig) and aerials – Versatower, Carolina Windom, and VHF whip.

Long garden for experimental antennae – come and try it! Excellent sea path to west/southwest (S America, S Atlantic), also all Europe. Gite has TV (inc satellite), DVD, VHS, stereo, computer on broadband ADSL. Available all year, prices on application – call Tim & Monica Cherry, 0033 5 46854480 or email Robert.cherry@wanadoo.fr.

AMATEUR RADIO WORLD PREFIX MAP. Brand new never used no creases, will post in a postal tube. £6.50p + £3.50p recorded delivery postage. Total cost including postage (recorded delivery) £10.00 which includes insurance. Michael Whitehead, GM0PHW, 01501 822016 (Strathclyde).

AVO VALVE CONDITIONER, working and in good condition complete with original Valve Data Manual 14th edition. £450 OVNO. Frank Burrow, G8BME, 01524 423526 (Morecambe).

EDDYSTONE 504, complete but not 100%. Someone interested? Sell or exchange. Mamiro, PY2DM, yoshizawa@terra.com.br (Brazil).

EDDYSTONE 880U UHF RX £55. Eddystone EC10 Mk 2 with Eddystone mains PSU, £120. Racal RA117 with cabinet, £150. Racal RA17L, £80. RC Young, 01637 875848 (Newquay; collection from Bournemouth also possible).

EPIPHYTE EP 2 80m xcvr. Excellent little 12V SSB transceiver. Continuous tuning over 80m. Digital readout, custom aluminium case. £65.00. Adrian, G4UVZ, 01823 421 751, adrianwhatmore248@btinternet.com (Taunton).

FOR THE AMATEUR that may "have everything": vehicle registration number HF02 UHF. Perfect gift for the mobile operator. On V750. £1299. Les, MW0AQZ, 01407 760968, mw0aqz@tiscali.co.uk (Holyhead).

FOUR BED DETACHED HOUSE with P60 Versatower in Luton, Bedfordshire. Well established radio station. 0.3 mile Leagrave rail station, easy commute to London. £240k. Details George, G3NMZ, 01582 613501, g3nmz@georgebath.co.uk (Luton).

FREE TO GOOD HOME. I have a lot of Bulletins and RadComs, many complete years. If anyone wants any, please get in touch – the magazines are free on collection, or postage at cost. Derrick, G4LNM, dsbrown26@btopenworld.com (Kent).

GAP ANTENNA EAGLE DX 6 band, brand new, still in box. Collect only. Brian, G4XVR, 07740 824044, brian211hughes@btinternet.com (Malpas, Cheshire).

HOLIDAY WITH YOUR AERIALS. Self-catering, smoke-free studio cottage near the middle of a long 3-acre garden. Sleeps 2. Peaceful, electrically quiet rural area; non-amateur owner is happy for you to put up temporary aerials. Under £200/week, less in low season. Diana, 01308 485301 (W Dorset).

ICOM 746 exc condx - recently serviced by Castle Electronics. Original box with manual. £450. Dennis, M1BXO, 01903 772563 (Littlehampton).

ICOM 751 HF TRANSCEIVER, excellent condition, £400. Kevin, G4AES, 01422 365990 (W. Yorks).

LDG AT-100 PRO autotuner, as new, box & manual, 155. Yaesu MD-1C8 desk mic, box, manual, good condx, £50. John, GW8IQC, QTHR, 01633 664482 (Newport, Gwent).

LINEAR AMPLIFIER EXPLORER 1200. Runs 3-500ZGs finals. Perfect order, 1kW out. Buyer inspects collects £600. Also a matched pair of RF-Parts new unused 3-500ZGs, £200 (or £150 if bought with linear). Robin, G3LBA, g3lba@campionhouse.co.uk, 01865 821503 (QTHR, Oxfordshire).

MFJ-949E VERSA TUNER II, excellent condition, some light scratches to front plate, 0-30MHz, dummy load, 2 coax connectors, built in 4:1balun for wire feedline. Switch between 0-30W and 0-300W, average or peak hold. £70 inc p&p. Hugh, M0ACF, 01480 394679 (St. Ives (Cambs)).

MICROSET AMPLIFIER MOD R50. Freq 144-148MHz, low noise RX preamp, gain 18dB. Input 1-7W, Output 50W. 13.5V DC. As new boxed, never used. £75.00. Gordon, G7MHQ, 01484 329886 (Huddersfield).

MINI HF BEAM. 6 band 3 element TGM-MQ36SR less than 6 months old little use £400. Create rotator RC5-3 controller adaptor and cable £300. Tennamast 10m wall mounted £250. Vince, G0CMP, 07533 647970 (Northants).

PIRATE RADIO 1960S, 1970s. Sounds, pics of Caroline, London, 270, Scotland, City, 208, Manx Radio, RNI. Real memories of the offshore stations in jewel case. From 99p. Dave, G8ZRE, g8zre@hotmail.com, 01244 316673 (QTHR, Chester).

R209 MK 2 RX £125. R216 + original mains PSU £125. FRG100 receiver £125. BC221 wavemeter £30. TU9B ATU £20. All good condx & working. Buyer collects or pays carriage. John, G6SGW, 07786 425262 (QTHR, Portsmouth).

SILENT KEY SALE. FT480R 2M Multimode £90. FT 790R 70cm multimode £70. MM 70cm 30W linear amp £20. Yaesu FRG-7 Rx £90. Daiwa CN620A SWR / power meter £20. MM MorseTalker £20. Hi Mound HK-705 Morse key £20. FT77 HF Tx/Rx fault with CW £80. Hi Mound Twin paddle key £30. D M Browning, G3UEY, 01386 553037 (Pershore).

TRIO 9R-59DS, GWO, with SP-5DS loudspeaker, £35. Prefer buyer inspect and collect. Les Arnold, G8AHE, 0121 458 2406 (Birmingham).

TS450S. Sorry no box but have manual, £320 + P&P. FT221R with Mutek front end, manual, no box, £110 + P&P. Both sets working OK. Trev, G2KF, 0797 489 2179 (Cornwall).

YAESU FT 757-GX £245 ono. Also two Racal receivers, valves have been checked and replaced where necessary: RA17 £95 ono, RA17L £125 ono. Duncan, G8ATH, dtelf@talktalk.net (Merseyside).

YAESU FT-690 MK II VGC, can be tested on air. Pics can be sent via email. £150 ono or LDG autotuner in exchange. Jon Barden, G6UWK, 01255 870 690, jobarden422@msn.com (Wix, near Harwich).

YAESU FT-767GX HF TRANSCEIVER all-mode, 100W, fitted with additional 6m & 2m modules. Mains powered with internal ATU. Late model in excellent condition - includes Yaesu hand mic. £450. Prefer buyer collects. Martin, G3XZO, 01789 740073 (Stratford-upon-Avon).

YAESU FT897D wideband TX, ready for 60m NOV or whatever? Exc condx, perfect in every way. Happy to demonstrate. From clean non-smoking home. Double boxed with mic, manual etc. £525 OVNO. Collect, or postage £15. Paypal, cheque or cash. Ian, M0IAA, 07929 505683, iastley@yahoo.com (W Yorks).

WANTED

80 AND 40m ANTENNA. Can collect near Hastings. Paul Wiseman, 0750 466 8366 (Hastings).

C11/SSB, 5MHz reference oscillator/oven assembly or your old chassis with intact oscillator, to complete my project. Rick Speller, G3LZR, 01255 812779, rick.speller@hotmail.co.uk (Clacton on Sea, Essex).

COLLINS KWS-1, KWM-2A, 516F-2, 30S-1, 30L-1, 270-G etc. All items for own use and a good home will be provided. Will collect and pay cash. Steve, G3YFG, 07793 665000, g3yfg@btconnect.com (Clitheroe).

FT243 XTALS for 80m / 40m LF (CW) end of band. Also, 6AG7 valve. R107 RX for rebuild project. Postal replies ONLY please. Mr. A. Hawkins, High Hazelwood, Loddiswell, S. Devon, TQ7 4DZ.

HEATHKIT SB200 LINEAR AMPLIFIER. Good cosmetic condition, complete, need not be operational. Collect reasonable distance. Mike, G3NKR, 01962 861575, g3nkr@ivarc.org.uk (Winchester).

ICOM 275H AND ICOM 475H, ideally fitted with narrow CW filters but not essential. Also wanted, MuTek front end board for FT225RD. Roger, G0BSU, roger@g0bsu.net (Cheshire).

KURT FRITZEL ANTENNA. Offers invited / swap Kurt Fritzel tri-band Yagi in excellent condition. Would consider a vertical 80-6m. Buyer collects. James, G0GFY, 0208 689 5149 after 7pm (Croydon).

KW E-ZEE MATCH, KW add on VOX unit suitable for KW 204. V Waddington, G4JSS, 01924 267451, g4jss@tiscali.co.uk (Wakefield).

MORSE KEYS wanted please. Avid collector looking for straight keys, bug keys, spark keys etc. In particular Marconi. John, G0RDO, 01626 206090, john@morsemad.com (Newton Abbot).

OLD THERMOCOUPLE RF AMMETER up to 3 amps or more working. Reasonable price paid + cost of shipping. G3RKP, 01234 853554, don-evetts@lineone.net (QTHR, Kempston, nr Bedford).

PICATUNE PARTS KIT. I already have the cct boards. I am interested in obtaining the components to build the Picatune ATU and would be happy to buy them all, as a parts kit, from anyone who previously purchased them. Don, M0CVZ, 07947 886931, m0cvz@hotmail.com (Croydon).

RESISTORS, 30W OR MORE, non-inductive, 400Ω and 500Ω. C Ledger, G3UBL, 01548 844186 (Devon).

SILENT KEY CLEAROUT or just not needed. I collect QSL cards for their historic interest, preferably from periods before 1970. Please don't throw them away. I can collect or arrange collection. Tony, G4UZN, AQuest1263@btinternet.com, 01132 693892 (Leeds).

TEN TEC SCOUT 555 ideally equipped for 40 & 80m in GWO with mic etc. British military R106 mk 2 (HRO - 5) with coils for low bands. Mac laptop in usable condition. John, G3GTJ, 01963 240319 (Somerset).

US BC-348 RECEIVER or accessories, anti-shock mounting plate, dynamotor etc. Good prices paid. Bob, G8LAN, 01275 792370 or 07710 850539, bob.garner@blueyonder.co.uk (Clevedon, Somerset).

VALVE VT50 or equiv. Single directly heated triode on B4 base. John Goodman, G3WOA, 01579 320 468 (Liskeard, Cornwall).

RALLIES & EVENTS

Members of the RSGB Regional Teams will be at the rallies this month that are marked with a diamond.

2 MAY – **DAMBUSTERS HAMFEST** – Thorpe Camp Visitor Centre, Coningsby, Lincs LN4 4PE. Car boot style rally. Entry £3.50 inc museum entry. C, free CP, OT 10.30. Tony, G3ZPU, 01507 527835.

3 MAY – **DARTMOOR RADIO RALLY** – Tavistock College, Crowndale Rd, Tavistock, Devon, PL19 8DD. OT 10.15/10.30. TS, B&B, TI S22 (V44), CP, DF, C, FAM. Details Peter, M1AYI, 01822 860277.

9 MAY – **MAGNUM RADIO RALLY** – Magnum Leisure Centre, Harbourside, Irvine, Ayrshire, KA12 8PP. Free CP, OT 10.30, £4. TS, B&B, SIG, WIN, C. Details Helen, MM0HLN, 0787 332 7597, Helen@magnumrally.co.uk [www.magnumrally.co.uk].

14-16 MAY – **DAYTON HAMVENTION®** – Hara Arena, Dayton, Ohio, USA. 3 day pass $20/$25 on door. CP, TS, FM, SIG, DF, LEC, C, CBS, WIN [www.hamvention.org].

15-16 MAY – **NEUHOFEN RALLY** – Neuhofen on the Ybbs in lower Austria. TI 438.85MHz (R78) through OE3XOA. TS, C, FM, WIN. Details www.oaft.com.

23 MAY – **DUNSTABLE DOWNS RC** – National Amateur Radio Car Boot Sale – Stockwood Park, Luton (M1 J10 then follow yellow DDRC signs) or satnav LU1 5NR, TI S22 (V44), CP £2, OT 9.00. C. [www.ddrcbootsale.org].

29 MAY – **MID ULSTER AMATEUR RADIO CLUB RALLY AND BOOT SALE** – Drumgor Youth Centre, Drumgor Heights, Craigavon, BT65 4AP. OT 11.00, CP, TI, B&B. Bobby, 2i0ULL, 02838 348451 [www.muarc.com].

6 JUNE – **BRITISH AMATEUR TV CLUB BIANNUAL GENERAL MEETING** – Hellidon Lakes Hotel, nr Daventry, NN11 6GG. OT 9.00, exhibition, LEC 10.00-14.00, BGM 14.30. NO TRADING. Contract secretary@batc.org.uk [www.batc.org.uk].

SILENT KEYS

We regret to record the passing of the following members:

Dr MW Dixon, G3PFR	17/3/2010
Mr J Challenger, GW4FPX	20/2/2010
Mr RA Jackson, G3ASH	11/3/2010
Mr W Foulsham, G0MWF	16/2/2010
Mr RJ Rogers, G3LIA	27/1/2010
Mr P Dent, 2E0RCJ	5/3/2010
Mr P Avill, G3TPX	10/2/2010
Mr WP McConachie, MM0WPM	12/3/2010
Mr BK Rowell, G5RL	9/12/2009
Mr J Owens, G4TIU	16/2/2010
Mr D Haller, G1KJY	
Mr JA Sole, G3NEZ	3/3/2010
Mr HH Dyball, G4FOJ	24/2/2010
Mr GE Southgate, VK5QG	
Mr RN Lawson, G5ZK	
Mr PF Rushton, G7PMZ	
Mr BV Eames, G3SBF	12/3/2010
Mr RM Allen, G3JKK	26/12/2009
Mr PF Linsley, G3PDL	7/3/2010
Mr CJ Adams, G0YCA	
Mr BJ Phillimoore, G4VXT	2/3/2010
Mr RB Suddaby, GW8FEY	26/2/2010
Mr ARD Murray CBE, G4KEO	17/10/2009
Mr JA Edwards, G8WXR	6/3/2010
Mr WA McLean, GM0PKB	25/11/2009
Mr JB Jones, G4JYI	2/4/2010
Mr JM Docking, M0JMD	28/3/2010
Mr DT Peace, G4KKM	8/8/2009
Mr CL Call, G4JGT	

6 JUNE – **RED ROSE QRP FESTIVAL** – Formby Hall, Alder Street, Atherton, M46 9EY. Free CP, TI S22 (V44). DIS, C, LIC, OT 11.00, £2. TS, SIG, B&B. Details Les, G4HZJ, 01942 870634, g4hzj@ntlworld.com.

6 JUNE – **SPALDING & DARS ANNUAL RALLY** – The Sir John Gleed Technology School, Halmer Gardens, Spalding, Lincs, PE11 2EF. TI S22 (V44), free CP. OT 10.00, TS, C, CBS. John, G4NBR, 0794 630 2815, rally-secretary@sdars.org.uk [www.sdars.org.uk].

6 JUNE – **NEWHAVEN FORT ARG RALLY & FORT OPEN DAY** – Newhaven Fort, East Sussex. CP, £2, OT 10.30, CBS, DF, FAM, CS, SIG, C. Eddie, G0ECW, 01273 300772, eddie@zamboodle.demon.co.uk.

13 JUNE – **EAST SUFFOLK WIRELESS REVIVAL (Ipswich Radio Rally)** – The Orwell Crossing Lorry Park, A14 Eastbound, Nacton, Ipswich, IP10 0DD. CBS, B&B, SIG, LRC, RSGB Bookstall, GB4SWR HF station, C, CP, TI S22. OT 9.30, £1. Contact John, G3XDY on 07710 044858 or Steve, M1ACB on 07711 329624 [www.eswr.org.uk].

13 JUNE – **JUNCTION 28 QRP RALLY** – SNADARC & G-QRP Club, Alfreton Leisure Centre, Church Street, Alfreton, Derbyshire DE55 7AH. 10 mins from M1 J28 & the A38. OT 10, TS, B&B, SIG, C. Russell, G0OKD, 01773 783658, russell.bradleyG0OKD@ntlworld.com [www.snadarc.com].

20 JUNE – **NEWBURY RADIO RALLY AND BOOT SALE** – Newbury Showground, next to M4 J13. Big display area of amateur radio stations, exhibitions, special groups, clubs and societies. TI S22 (V44), free CP, OT 9.00, £2, TS, C, DF, FM, SIG. Details rally@nadars.org.uk [www.nadars.org.uk].

25-27 JUNE – **HAMTRONIC SHOW, FRIEDRICHSHAFEN** – Messe, Friedrichshafen, Germany. TS, FM, CP, SIG, LB, C, DF, LEC, CS. Large RSGB bookstall [www.hamradio-friedrichshafen.de/html/en].

27 JUNE – **WEST OF ENGLAND RADIO RALLY** – "Cheese & Grain", Bridge Street, Frome, Somerset BA11 1BE. TS, RSGB Books, C, CP, DIS. Contact Shaun, G8VPG, 01225 873 098, rallymanager@westrally.org.uk [www.westrally.org.uk].

SAT 3 JULY – **1ST STOCKPORT RALLY**

3 JULY – NEW DATE – NEW VENUE – **BANGOR AND DISTRICT ARS RALLY**

4 JULY – **BARFORD NORFOLK RADIO RALLY**

11 JULY – **CORNISH RAC 47TH MOBILE RALLY**

18 JULY – **HOT IRON QRP DAY**

18 JULY – **MCMICHAEL RALLY AND BOOT SALE**

18 JULY – **MACMILLAN [NORTHAMPTON] HAMFEST**

25 JULY – **HORNCASTLE SUMMER RALLY**

25 JULY – **COLCHESTER RADIO AMATEURS ANNUAL RALLY**

31 JULY - 1 AUGUST – **AMSAT-UK INTERNATIONAL SPACE COLLOQUIUM**

HELPLINES

IMPORTANT NOTICE

RESPONDENTS ARE ADVISED NOT TO SEND ORIGINAL DOCUMENTS, BUT TO COPY THEM AND SEND THE COPIES.

Helplines is a free service that can be used to ask other members for help on amateur radio related matters. Items for inclusion can be e-mailed to radcom@rsgb.org.uk.

• Tom Berg, VK6ZAF seeks details, or references, regarding the Moonbounce experiment at the 1951 Festival of Britain. Frequency, power, receiver, aerial and moon tracking mount are all of interest. Also, who engineered the system? Have there been other visitor-triggered moonbounce radars for public open days? Tom Berg, 43 Fifth Street, Bicton, Western Australia, 6157, Australia, tel. 0061 8 93191469.

• Graham Stones, G7KYX is looking for assistance or advice on winding small coils using 0.16mm wire. Any help would be most welcome – please telephone 01205 871624. *[Apologies to anyone who tried to phone last month – we got Graham's number wrong. Ed.]*

• Does anyone have any information about or handbooks for the Racal Messenger ATU VRA 4556A? Please e-mail g0nxa@hotmail.co.uk.

• Manual and a pen required for Princeton Applied Research Model RE0073 X-Y recorder, plus any other available information. All costs met. Ray, 01207 235258, raym5abt@talktalk.net.

• CHASE GPR4403 laboratory test receiver - does anyone have the service manual for this instrument, or have first hand experience of repairing 'UNCAL' fault? All costs reimbursed. Dave, G6UWO, daveb@ihr.mrc.ac.uk.

• I have acquired my second SEM Z-Match ATU. It is very different to my first unit. The new one has only one set of terminals, not two; it also has top band and a 'straight through' setting. I cannot find any information on what I think is one of the later models. Please can anyone help? I have a UK address and will defray any expenses if I can receive copy of the circuit and instruction manual. Tom Morgan ZS1AFS/G0CAJ/ZT1T, info@onboardpublications.co.za.

• I found this during a house clearance and the only markings are "6.0 Volts" on the strap bar on the front, "Switch" scratched next to the top terminal on the front of each wooden section, "SP" on each of the black insulators on the front and "Earth" scratched in to the wood adjacent to the cross strap. Can anyone help me identify it? Bob, GM8JUY, GM8JUY@aol.com.

1 AUGUST – **KING'S LYNN ARC RALLY & CAR BOOT**

1 AUGUST – **LORN RADIO AMATEUR RALLY**

8 AUGUST – **FLIGHT REFUELLING ARS HAMFEST**

13 AUGUST – **COCKENZIE & PORT SETON ARC MINI-RALLY NIGHT**

15 AUGUST – **FRISKNEY & EAST LINCOLNSHIRE COMMUNICATIONS CLUB RALLY**

22 AUGUST – NEW VENUE – NEW DATE – **RUGBY ANNUAL RADIO RALLY**

29 AUGUST – **MILTON KEYNES ARS RALLY**

30 AUGUST – **HUNTINGDONSHIRE ARS BANK HOLIDAY MONDAY RALLY**

5 SEPTEMBER – **TELFORD HAMFEST**

12 SEPTEMBER – **BOOT FAIR/OPEN DAY AT THE MUCKLEBURGH COLLECTION**

12 SEPTEMBER – **TORBAY ANNUAL COMMUNICATIONS FAIR**

13-18 SEPTEMBER – **THE 15TH WORLD ARDF CHAMPIONSHIPS**

18 SEPTEMBER – NEW RALLY – **THE FOG ON THE TYNE RALLY**

19 SEPTEMBER – NEW DATE – **GREAT NORTHERN HAMFEST**

RSGB MEMBERS' ADVERTISEMENTS

RSGB members wishing to place an advertisement may do so free of charge by e-mail, or by post provided the advertisement is accompanied by a payment of £5.00 to cover administration costs.

The following terms and conditions apply to all Members' Advertisements.

1) In order to qualify for free insertion, Members Ads must be submitted by e-mail to memads@rsgb.org.uk. Please ensure you include .uk on the end of the email address.
2) **Your advert must clearly show whether it is For Sale or Wanted and must include your name, callsign or membership number, telephone number and postal town, in that order.**
3) The Ad may not contain more than 40 words, excluding the information in (2), and may be edited for readability at our sole discretion. Longer ads may be accepted if there is a good reason, eg a shack clearance on behalf of a SK member; e-mail us and ask.
4) Not more than one ad per month will be accepted from any member. 'Recurring' ads will not be accepted, but members may re-submit the same advert each month if they wish.
5) E-mailed adverts may optionally include one photograph of the item(s) being offered. Images must be attached as a jpg file, at least 800 pixels wide and of good quality. By submitting any image you warrant that you own the copyright and that you permit the RSGB to use it in any way. We will endeavour to publish photographs with ads as space permits but cannot guarantee to publish any particular photograph.
6) Adverts will be published at the first available opportunity but no guarantee can be given as to when a particular ad will appear.
7) The RSGB believes that it is inappropriate for members trading in radio equipment in any way to place members' ads. We therefore regret we are unable to accept such ads, although we do welcome these in the 'Classified' advertising section of *RadCom*.
8) The RSGB accepts no responsibility for errors or omissions, or for the quality of goods for sale or exchange.
9) Members' Ads are accepted and published in good faith.
10) Members' Ads are accepted at the sole discretion of the Editor, whose decision is final.

WARNING

Members are advised to ensure that the equipment they intend to purchase is not subject to a current hire purchase agreement.

The 'purchase' of goods legally owned by a finance company could result in the 'purchaser' losing both the goods and the money paid.

Members' Ads also appear on the Members-Only website at www.rsgb.org/membersonly/membersads.

1 & 2 OCTOBER – **NATIONAL HAMFE\ST**

3 OCTOBER – **AUTUMN MILITARIA & ELECTRONICS & RADIO AMATEUR HANGAR SALE**

8-10 OCTOBER – **RSGB CONVENTION**

17 OCTOBER – **BLACKWOOD AND DISTRICT ARS RALLY**

17 OCTOBER – NEW DATE – **HORNSEA AMATEUR RADIO CLUB RALLY**

17 OCTOBER – **GALASHIELS AND DISTRICT ARS RADIO RALLY**

30 & 31 OCTOBER – **NORTH WALES RALLY**

7 NOVEMBER – **WEST LONDON RADIO & ELECTRONICS SHOW (Kempton Rally)**

21 NOVEMBER – **33RD CATS RADIO & ELECTRONICS BAZAAR**

21 NOVEMBER – **PLYMOUTH RADIO CLUB RALLY**

28 NOVEMBER – **BISHOP AUCKLAND RADIO AMATEURS CLUB RALLY**

This list shows all rallies and events we are aware of as at 3 May 2010 . If your rally or event is not listed, TELL US ABOUT IT! Send an e-mail to GB2RS@RSGB.org.uk and your event will appear here and on GB2RS. It's free! Guidelines for submissions: Please let us know your event details as early as possible. If you submit by e–mail (to GB2RS@RSGB.org.uk) then we suggest you set your e–mail program to request a 'read' receipt so you can be sure we've seen the details.

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.

CLASSIFIED ADS

Classified advertisements 58p per word (VAT inc.) minimum 14 words £8.12. All classified advertisements must be prepaid. Please write clearly. No responsibility accepted for errors. Latest date for acceptance is 1st of the month prior to publication.

Copy to: Chris Danby G0DWV, Danby Advertising, Fir Trees, Hall Road, Hainford, Norwich, Norfolk, NR10 3LX Tel: 0870 904 7377 Fax: 0870 904 7378 E-mail: adsales@rsgb.org.uk

Payment to: RSGB, 3 Abbey Court, Priory Business Park, Bedford, MK44 3WH

FOR SALE

ISOLATED DATA INTERFACES for PSK31-SSTV-RTTY-CW-FSK-WSJT etc. ALL PREVIOUS MODELS STILL AVAILABLE, See RSGB Reviews SEPT 09 RADCOM. AVAILABLE. PAYPAL REGISTERED. www.g3liv.co.uk johnny@melvin.com 0191 2843028

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WANTED

Unwanted valve amplifiers, working or not. Known makes only (Kenwood, Yaesu, Drake, Linear Amp, etc), not homebrew. Cash paid. Contact Peter G3ZRS on 01482 862323 or e-mail: g3zrs@hotmail.co.uk

AERIALS

G4TPH PORTABLE MAGLOOPS Talk about portable, 600grams, no ATU, ground or counterpoise needed. Full details at: www.g4tph.com

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ECOFLEX ULTRA LOW LOSS COAXIAL CABLES & connectors, now available at NEVADA www.nevadaradio.co.uk

BIRD THROUGH LINE WATT METER & elements, Signal generator & other used bargains at www.nevadaradio.co.uk

COMPUTER SOFTWARE

MEMORY MANAGEMENT SOFTWARE FOR YAESU RADIOS. http://www.g4hfq.co.uk bob.freeth@g4hfq.co.uk (01425) 618092

MISCELLANEOUS

CALL IN ON THE UK 'GOOD NEWS' CHRISTIAN NETS! Every Sunday morning at 8am local on 3747kHz, 2pm on 3747 or 7147Khz (propagation) and 144.205 SSB at 3pm sharing Christian fellowship. Go to www.wacral.org for more information or contact G3XNX at 51 Alma Road, Brixham, South Devon, TQ5 8QR, Tel: 01803 854504 or derekg3xnx@talktalk.net

ACCOMMODATION NORTH COAST SCOTLAND. Self catering, B&B, camping. Discounts for licensed amateurs. GM4JYB Tel: 01847 851774. Web: www.dunnethead.iberacal.com Email: briansparks@dunnethead.co.uk

WEST COAST OF SCOTLAND SAILING Join sailing yacht 'Damsis' for coastal cruising and enjoy use of onboard HF station. Become MM for your holiday. GM0FFB. Tel 01505 704976. Web: www.clydeskipperedcharters.co.uk

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BUSINESS CARDS

CLASSIFIED ADS

IMPROVING HF DX OPERATING BEHAVIOUR

Bob Whelan, G3PJT, President, FOC

I am writing to raise a matter of increasing concern about the standard of on the air operating. As President of The First Class CW Operators' Club (FOC), I and Randy, W6SJ, in partnership with leading DX operators, have decided that we will take the initiative to encourage all DXers to work together in order to improve standards. To this end we have created the following simple DX Code of Conduct. If we all pull together to improve standards then we will all be able to work more DX and have more fun on the air. More information is available at the FOC website www.g4foc.org.

DX Code of Conduct

1: I will listen, and listen, and then listen some more before calling
2: I will only call if I can copy the DX station properly
3: I will not trust the Cluster and will be sure of the DX station's callsign before calling
4: I will not interfere with the DX station nor anyone calling him and will never tune up on the DX frequency or in the QSX slot
5: I will wait for the DX station to end a contact before calling him
6: I will always send my full callsign
7: I will call and then listen for a reasonable interval. I will not call continuously
8: I will not transmit when the DX operator calls another callsign, not mine
9: I will not transmit when the DX operator queries a callsign not like mine
10: I will not transmit when the DX station calls other geographic areas than mine
11: When the DX operator calls me, I will not repeat my callsign unless I think he has copied it incorrectly
12: I will be thankful if and when I do make a contact
13: I will respect my fellow hams and conduct myself so as to earn their respect

THANKS TO THE BERU CONTESTERS

Mark Taylor, G4OBC

Through The Last Word I would like to thank the G stations who stood by to allow me to complete a QSO with VP9HW on 80m on Sunday 14 March at 0608UTC during the RSGB CW Commonwealth Contest. Due to limited garden space, I do not have my dipole for 80m in the best configuration and consequently I know I do not put out a strong signal to distant stations on this band. During the QSO, VP9HW was obviously struggling with my signal but not only did other G stations on the frequency stand by, they told another G station, who prematurely tried to call VP9HW before we had exchanged serial numbers correctly, to stand by as well, thereby enabling us to complete our contact.

There are many occasions when I have despaired at the behaviour of some radio amateurs during contests and DX pileups but the restraint and courtesy shown by the G stations concerned on this occasion has given me hope for the future. Thanks guys! It is because of you and people like you that the Commonwealth Contest maintains its reputation as one of the most gentlemanly contests around.

BUILDING YOUR OWN

Stu Nutt, G3OCR (ex-G8ILJ)

When I saw the cover of this month's *RadCom*, I almost salivated at the sight of a PA section that was obviously designed for VHF – it could be a construction article for a low-VHF linear amp and I'd love to be able to put out more power on lower VHF frequencies. Sadly, it was a review of a commercial amp. Although Linear Amp UK's offering looks a lovely piece of engineering, I'd have far preferred to have found a 'Homebrew' article on the subject as almost 2 grand is way above my budget.

There's little opportunity these days for most of us to homebrew all-mode, multi-band transceivers, but a linear is something that many of us would be 'up to'. I'm sure that I remember some 30 years ago that there were more articles on home brewed 'major' items but I've not seen so much since I have been reading *RadCom* lately.

The attenuator design in the Homebrew column is something that I will be adding to my shack's equipment and saves a lot of money against a commercial model (thanks, Eamon, EI9GQ), but it would be great to have a design for something like a linear amp - I'd be up for one for 50MHz or 432MHz if somebody has built one (200 to 500 watts?) and cares to send in a constructional article!

In the past year we have featured amplifier designs for 6m, 4m and 23cm. I'm pleased to report that we are currently looking at a solid state legal-limit-plus HF amplifier design that is based on a mixture of commercially available modules and new thinking.
Giles Read, G1MFG,
RadCom Technical Editor

ICE WINS

Trevor Beamond, G3VLF

You published a photo of my burst mast in March 2010 *RadCom*. I have had many e-mails and the score is ice - 22; stress corrosion - 1; lightning - 0. It seems the ice has it! Several people have suggested that this is quite common and that drain holes should be present in all hollow structures.

QSL MORAL

Colin Hall, GM4JPZ

I received a Christmas present in the post of a DX QSL card for a contact made in 2006. However, as there was no postage on the envelope (and no sign of there ever having been any), I had to go to the local Royal Mail office and pay £1.30 to receive it. So, that QSL cost me an international stamp to the original manager (a Russian station), US$2, then £1.30 surcharge. Strangely enough, the QSL was actually posted by a G3 station. I may just be an old cynic, but is it in order to ask whether anyone else has had a similar experience recently. Or should I just be glad I received a QSL card at all?

USEFUL PROPAGATION TOOL

G3WRT

The Australian government has put on the web a very useful HF propagation tool; www.ips.gov.au/HF_Systems/7/3. UK authorities eg Rutherford and Appleton labs also make daily measurements, as do many other UK and European locations. But as far as I know they do not make them available as a free website. I am sure there is wide interest in the RSGB membership for this real time information. Might it be possible for the RSGB to make a formal request for a similar website to be made available in reciprocation to the very welcome Australian website? I am quite happy to make such a request myself but I am sure an RSGB request would be more likely to result in a positive response.

While Europe does not provide an exact parallel to the excellent Australian pages, a wide and comparable range of information is collected on the PSC's web page (www.keele.ac.uk/depts/por/psc.htm) A new (to me) site that looks promising is the recently developed DIAS network (www.iono.noa.gr/DIAS).
Martin, G3USF,
RSGB Propagation Committee Chairman

RE: REDUCING LOCAL NOISE ON 80m

David, G3ZPF

EI5DI's response to my letter contains statements unrelated to the situation I described.

The use of datamodes is a matter of personal choice. Whilst I share Paul's lack of interest in datamodes, I made it clear that my suggestion was an item of last resort, not a personal choice.

Perhaps EI5DI has the luxury of a relatively 'RF-quiet' QTH and has no concept of the reality that many people face.

The inherent uncertainties of wireless propagation he speaks of, and which I'm fascinated with, are unrelated to the fairly certain S7 to S9+10 man-made local noise that my suggestion was made to avoid.

Paul claims I asked for multiple receivers, but I suggested just one.

He claims that my suggestion is not 'real' radio, but avoiding local QRM is part of what our hobby is about. Some of us have to compromise the 'purist' ideal to be able to use the hobby at all.

Letters published in 'The Last Word' do not necessarily reflect RSGB policy. 'Last Word' letters may be e-mailed to radcom@rsgb.org.uk Please note that letters submitted for 'The Last Word' may not be acknowledged. The RSGB reserves the right not to publish any letter, with no reason being given. It is a condition of publication that all letters may be edited for grammar, length and / or clarity. Due to the limited space available, please keep letters as short as possible. Additional letters may be published on the RSGB members-only website at www.rsgb.org/membersonly/lastword.

Sam, G4UQB

It's not just that I agree with Paul EI5DI (*RadCom* Apr, 2010), it is more than that – he is absolutely *right*, in stating that this is not amateur radio. Amateur radio is not just about communicating. It is more than that, it is about 'wireless' operating, radio equipment, antennas, field days, radio equipment construction, junk sales, rallies and much more to do with this 'technical' hobby that the RSGB was set up to cater for.

If one were only interested in communicating then there is much out there for that person to pursue: semaphore, e-mails, internet forums, D-Star, internet chatrooms, EchoLink, Facebook, (even the telephone!) etc. None of which is amateur radio per se. I acknowledge that there are many genuine radio amateurs around who wish to communicate in this way around the world with their friends, but what they are doing over the internet through their computers and telephone wires is not in any way remotely connected to our hobby as outlined in my second paragraph above.

Not so long ago while working on 20m through a dipole I managed to work a W1, not a mean feat with my lowly set up. He gave me S4, which to me in my euphoria equated to 10 over 9! Believe me I was hopping! Then right at the end of the QSO he said he was operating via (Echolink?) through a remote station in Austria – I just sat their dumfounded… and switched off – cold shower and straight to bed, sick as a pig. I felt cheated through that W1's dishonesty. No other way to put it. Where is my hobby going?

Ray J Howes, G4OWY

Paul, EI5DI, is absolutely right (The Last Word, "Reducing local noise on 80m", April 2010), using the internet for HF receiver access is 'no longer amateur radio', even though the suggestion by G3ZPF makes perfect sense for all those other less fortunate people within our hobby who, for reasons sometimes beyond their control, can no longer enjoy amateur radio in the same way as the majority take for granted.

Paul's argument although based upon a reasonable premise, that amateur radio is somehow denuded and less desirable as a result of the internet, simply because 'we as radio amateurs' only communicate via non-wired systems - courtesy of those still misunderstood and beguilingly attractive electromagnetic waves, is of course, missing the essential point entirely. The point being, are we to exclude those other amateur radio operators who, through no fault of their own, find themselves in an impossible position whereby they cannot continue to be part of the camaraderie of amateur radio unless they embrace the frontiers of D-Star or Echolink, etc?

It was blindingly obvious even to the most ardent and entrenched Luddite, or should have been, that just 20 years ago or so, the advent of amateur radio type communication via the internet, would be *de rigueur*. D-Star and EchoLink are but a natural outcome of the predicted technology. After all, is not Morse code a very basic form of digital communications? Spark wasn't.

With all due respect to Paul (and I suspect many other people feel much the same way), he probably regrets the implications of digital technology and its creeping influence on how amateur radio has become saturated with its spawn. The internet is merely another convenient conduit to exploit for amateur radio purposes.

Amateur radio has been beset with all manner of prophets proclaiming its dreadful downfall since its inception - but it is still here, far different and still resplendent. Only three things will kill amateur radio; apathy, Governmental QRM and non-compliance to the inevitable.

MEMBERSHIP

Freddy McGavin, EI4GMB

I would like to thank you for the excellently and very professionally presented membership pack that I received from the RSGB this morning. I feel joining the RSGB does indeed provide great value for money and I look forward to a long association with your great and highly esteemed organisation.

Once again, many thanks and kind regards.

POWER PUZZLE

Danny, M6DPK

I've been wondering for a while now why full licence holders are only allowed 400W whereas various other countries are allowed 1.5kW for their full licence holders. Why can't we harmonise the full power level with everyone else? You could even up it to 500W for all full license holders and they can apply for a NoV with Ofcom to run higher powers to say, 2kW if they wish to for any reason. But what about EMC and other issues with running a few kilowatts?

You could argue that you could get a higher ERP by feeding your transmitter into an antenna like a Yagi. But there will be circumstances where this is not an option.

With the current lack of any sunspot activity, a bit of extra power would certainly help bring in the DX contacts.

SPECTRUM DEFENCE FUND

Ian D Brown, G3TVU

Whilst 'putting the world to rights' on our weekly visit to the Short Wave Arms, our discussions moved on to HF interference. One of my colleagues had noticed that the new 'noises' were notched out on most of our HF amateur bands, and this then lead to a discussion about the Spectrum Defence Fund and how much we should donate to this cause.

The most pertinent comment that arose was that as we now didn't have to pay for our amateur licenses - how about paying one year's old annual licence fee of £15 into the fund! We were always willing to pay this each year for our licences and it would be a small price to pay to help gain more protection of the HF bands.

So that is what I have done - what do the rest of you think?

WHAT HAPPENED TO ROGER?

Ragnar Otterstad, LA5HE

Some of us were not born in an English-speaking country and had to learn the language the hard way. In amateur radio many of us are therefore using a less than perfect English. An easy way out is to use internationally recognised 'buzzwords', Q-code etc. What puzzles me, though, is that Brits and Americans, who are supposed to have the language as their mother tongue are not speaking plain English when on the air.

When I started in amateur radio as a boy, my main motivation for building a modulator and working phone was to practice a foreign language. I had a great advantage compared to my classmates, as I spoke to gentlemen like G4CP (SK), who was very keen on helping me to improve my English. I owe it to him that I knew expressions that were not in our textbooks, for example 'to have bees in the bonnet'!

A common word was 'ROGER' to acknowledge receipt of a transmission, and 'OVER' when turning the mic back to the other station.

The irony is that now the Q-code, designed for telegraphy, is widely used by people who never have used anything but telephony. I have noticed that *many* newcomers are using QSL when they actually mean OVER. And they also use QSL when they mean ROGER!

Perhaps somebody can explain this phenomenon to us foreigners?

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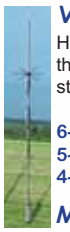

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