RadCom

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

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0610

FTDX5000D

Yaesu re-defines the state of the art

Europe
President Dave Wilson, M0OBW at the European Parliament

EMC
VHF Gigabit PLT adapters examined

Review
Pro Antennas I-Pro portable vertical dipole

Homebrew
VCO for new VHF DDS/PLL synth project

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- *Receive 10kHz - 60MHz*
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HF Transceivers

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The TS-2000E is the classic all-band, all-mode base station covering HF - 70cms at up to 100 Watts. Includes dual channel receivers and DX-cluster monitor with built-in TNC. £1489 D

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

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** Bom Length: 1.8m*
** Turning Radius: 2.1m*

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This antenna covers 4-bands, 20-6m and has up to 5.5dB gain.
** Element: 3.58m*
** Boom: 1.37m*

£499 D

B-245 TGM 1kW

** 40m - 20m - 17m - 15m - 10m*
** Element Length: 21ft 6in*
** Boom Length: 10ft*
** Turning Radius: 12 ft 8in*

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^ FT-DX5000MP

FT-DX5000MP >

HF Transceivers

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FT-2000D	200 Watt version of FT-2000 with built-in PSU.	£2649.95 D
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FT-450AT	100W HF - 6m with automatic ATU & latest updates	£679.95 D
FT-450	100W HF - 6m transceiver - great value.	£589.95 D
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FT-7900E	*NEW* 2m/70cm Dualband Mobile 50/45W	£249 D
FT-8800E	Dualband Mobile 50W / 30W	£289 D
FT-8900R	10/6/2m & 70cm Mobile	£334 D
VX-3E	2m / 70cm Handheld Wideband receive	£139 D
VX-8DE	*NEW* Triple band 6m-70cms APRS etc	£399 C
VX-7R	Waterproof dualband handy (silver / black)	£259 C
VX-6E	2m/70cms handy, 5W Wideband Receive	£199 C
FT-60E	2m/70cms, 5W handy Wideband Receive	£142 C

< VX-8DE

COMING SOON

FTM-350E *New Dual Bander*

** High Speed Bandscope * Optional FGPS-1 Internal GPS Unit * Optional FGPS-2 Internal GPS Unit * Optional FPR-1 Monitor Unit * 500 + 500 Alpha Memories * Bluetooth Ready * Built-in Barometric Pressure Sensor * Large Dot Matrix Display * Selectable Eight Colour Display * Extended Receive * AM & FM, FM Stereo Broadcast Bands*

Due July/August

FT-2000 ^

< FT-1900E

FT-2900E >

< FT-7900E

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Monitor aircraft live plus worldwide internet data sharing.

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Adds Full Google Earth mapping system to runway level!

Both inc receiver, antenna & USB lead.

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NEW

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CX-SW4N	4-way N sockets	£59.95 C
CX-SW3PL	3-way SO-239	£41.95 C
CX-SW3N	3-way N socket	£49.95 C
CX-SW2PL	2-way SO-239	£26.95 C
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Extremely efficient & use no traps. Large, air-spaced coils are the secret, resonant adjustments can be made at ground level.

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HF-6V	80,40,30,20,15,10m self support 7.9m	£389.95 D
HF-9V	As HF-6V but adds 17,12 & 6m. 7.9m	£449.95 D
HF-5B	5-band beam	£449.95 D

Bencher 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
BY-2	Twin pad. chrome base	£139.95 C
BY-3	Twin paddle, gold base	£299.95 C
BY-4	Twin pad. gold parts	£189.95 C
ST-1	Single pad, black base	£119.95 C
ST-2B	Single pad, chrome b.	£144.95 C
RJ-1	Straight key, black base	£109.95 C
RJ-2	Strght key, chrome base	£129.95 C

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MFJ-998
W&S £649.95 C

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

MFJ-925	Compact auto tuner	£169.95 D
MFJ-927	200W remote auto atu	£249.95 D
MFJ-928	Basic auto atu	£199.95 D
MFJ-931	Artificial ground	£112.95 C
MFJ-932	Mini loop tuner	£139.95 C
MFJ-934	Artificial ground + ATU	£199.95 C
MFJ-935B	Portable loop system	£199.95 C
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
MFJ-1263	Mic control 2in/2 out	£109.95 C
MFJ-1275	Sound card adaptor	£109.95C
MFJ-1625	Window Ant + Tuner	£199.45 D
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

Radio Works Carolina Windom Ants

All windoms include WARC bands

CW-160	160-10m 252' l.	£159.95 D
CW-80	80-10m 133' l.	£129.95 D
CW-80LP	80-10m 133' l.	£119.95 D
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

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 & Motorola.

~~£12.95~~ £8.95 A

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

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NEW

The new compact, yet powerful 2m handheld from Icom.

£119.95 C

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Icom have announced their new IC-9100 "DC to Light" base station covering 160m to 23cms. This will be a mid priced radio that is ideal for those who want everything in one tidy box. Check www.wsplc.com for latest news.

Price Match

IC-7700 200W 160m-6m

The IC-7700 is the base HF radio that will form the control centre for all your HF work. Powerful, crammed full of features, an amazing receiver & display.

£5499 D

IC-7200 160m-6m Transceiver

A rugged, eye catching radio that costs surprisingly little for a radio with this level of performance. This radio is in a class of its own. Compact, functional and having many of the features developed by Icom in their more expensive radios. This technology has now trickled down into a more affordable radio.

£799 D

IC-7000 100W 160m-70cm

If you are looking for a great performer for mobile or portable work - look no further. The IC-7000 has one of the sharpest and clearest displays on the market. But beyond the display you also have a highly specified radio that many use as their prime base station. It's terrific!

£1089 D

IC-7600 100W 160m-6m

Price Match

Only a few years ago, this design would have been beyond the pockets of all but a very few enthusiasts. Today, it brings this kind of performance much closer to an affordable level that dedicated hams are prepared to pay for such performance. Its reputation makes this radio a great investment - the IC-756 series is dead - long live the IC-7600!

£3379 D

ID-E880 D-Star 2m/70cm

NEW

The latest dual band D-Star mobile from Icom. Larger display and 50 channels. Your invite to join the world repeater network with zero noise and great audio quality. And of course you can always switch back to FM.

£499.95 D

IC-E80D D-Star

NEW

If you are looking for a compact D-Star handheld that also includes a 500kHz - 1GHz receiver - here it is! And it also has GPS capability.

£369.95 C

IC-718 100W 160m - 6m

It doesn't cost a lot to own an Icom transceiver. And the IC-718 is a fine example of technology filtering down to the budget class radio. A full 100 Watts of finely engineered RF design that can easily cope with the demands of today's challenging bands.

£519 D

IC-7800	Deluxe HF / 50MHz All-Mode 200W Transceiver	£7999 D
IC-910H	2m / 70cm 100W Base station all modes + option for 23cm	£1249 D
IC-910HX	As above + 23cm module already fitted	£1449 D
IC-2200H	Rugged 2m 55W FM Mobile with digital option	£199 D
IC-E90	6m / 2m / 70cm Handheld transceiver	£234 C
IC-E92	Dualband Handhelld with D-Star	£369 D
IC-R6	*NEW* Handheld scanner 0.1 - 1309..995MHz	£172.95 C
IC-R20	Handheld scanner 0.15 - 3305MHz	£389.95 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	£9799.95 D

IC-E2820 D-Star Mobile

This ground breaking mobile from Icom embraces the latest digital technology. And with the optional module fitted, you can join in the D-Star fun.

£424 C

With D-Star Module £579 C

RadCom

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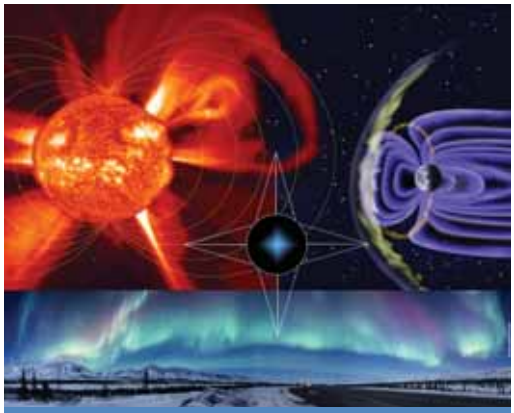
The eagerly awaited Yaesu FTDX5000. Photograph courtesy Martin Lynch, G4HKS.

News and Reports

Reviews



The solar wind and auroras – P64

Features

Intrepid 60m reporter Steve, G4TRA – P52

Competition

Technical Features

I-Pro Traveller reviewed – P70

Regulars

THE JULY ISSUE OF RADCOM IS DUE TO BE DELIVERED BY MONDAY 28 JUNE.

GR2HQ 2010

The UK Headquarters team will again be taking part in the IARU HF Championships this year – from 1200GMT on 10 July until 1200GMT on 11 July. This dual-mode (SSB and CW) HF contest covers all 6 bands 160m to 10m. This is the eighth year in a row that the UK HQ station has been active 'nationwide' – firstly from 2003 until 2006 as GB5HQ, then in 2007 to 2009 as GB7 HQ and now in 2010 using a new unique prefix as GR2HQ. In 2009 GB7HQ was placed fifth in the highly-competitive HQ section of this contest – we hope to improve that position this year.

This year the team has been expanded to include more than 60 experienced contest operators, operating from 16 locations widely-spaced around the UK. For example, the main 20m stations are in Northern Ireland and Orkney. Other stations are on the Isle of Man, in the Midlands, East Anglia, Wales, Somerset etc.

How can you help GR2HQ to do well in this contest? Answer – please try to work the team on as many of the possible 12 band/modes as you can. There is always friendly rivalry to see who can be first to complete 12 QSOs with the HQ station. Contacting another station within the UK on the higher bands (20/15/10m) is often difficult because of skip conditions – please keep trying if you hear GR2HQ, but if signals are weak it might be better to wait until the signals are stronger which will give you a better chance of completing the QSO quickly. On 10m for example, the GR2HQ station will be operating from several different locations during the 24 hours of the contest, so one of these locations might make GR2HQ much easier to work from your location. All stations will be active for the whole 24 hours so there will be quieter spells when you should get through the pile-ups more easily – for example on 160m and 80m late at night or in the early hours of the morning.

In addition to the popular awards programme of certificates, there are new awards available this year – 3 attractive trophies for the 'UK HQ Club Challenge' award. This is for clubs or groups of individuals and again involves working the GR2HQ station on as many bands and modes as possible. There are 3 new trophies available for UK clubs or groups and 3 new trophies for European clubs or groups.

The contest logging software SD by EI5DI supports the IARU Contest. Paul, EI5DI has added a special feature to SD to help you submit an entry for the new UK HQ Club Challenge trophies – you log QSOs as normal under the IARU contest template, then when you wish to create a Cabrillo logfile using SDCheck, you are offered the choice of 'All QSOs' or 'HQ Challenge QSOs' – this second option creates a Cabrillo file containing QSOs with GR2HQ only, which can then be sent to the GR2HQ awards manager. Full details of how to apply for all these awards are on the new www.gr2hq.com website.

All UK stations are encouraged to work other HQ stations and other IARU contest stations, in addition to working the UK HQ station. The full rules of the IARU HF Championships can be found at www.arrl.org/iaru-hf-championship.

The members of the GR2HQ 2010 team are very grateful to our sponsors Martin Lynch and Sons and Icom UK for their financial support for the new trophies, the new website and the QSL card printing. Please send QSL cards for contacts with GR2HQ to the QSL Manager Charles, M0OXO.

Chris Tran, GM3WOJ/ZL1CT
GR2HQ 2010 Co-ordinator

3 x 20m Yagis at the station of G3TXF in Devon - used for GB7HQ in previous years. Photo by G3TXF.

Spectrum Defence Fund

South Essex ARS held a successful radio rally in February and have made a £200 donation to the Spectrum Defence Fund. Norman, M0FZW handed the cheque over to Region 12 Regional Manager, Philip Brooks, G4NZQ on a visit to the Waters & Stanton showroom.

(I-r) Peter Hale, G4OAD, SEARS Committee Member Mark Sanderson, M0IEO, RSGB DGM Region 12 Philip Brooks, G4NZQ, RSGB GM Region 12, Norman Crampton, M0FZW, SEARS Hon Secretary.

Pat Hawker on the Air

Rob Mannion, G3XFD, Editor of *Practical Wireless*, got in touch recently to report on a conversation he had with Pat Hawker, G3VA.

"I was called by Pat, G3VA last Sunday. I've worked Pat on numerous occasions using CW in the past 40 years but have never worked him on SSB. He called me when I had been working a friend up in Lincolnshire on 3.5MHz. He told me he felt the callsign seemed familiar! Eventually we had a good chat. I felt proud to have worked him, it was good to know he's still active after reaching his milestone with TT in *RadCom*.

Correction

In the May ATV column there was an error in Figure 2. The upper diode was shown the wrong way round; the cathode should be on the right.

Trophy Winners

At the recent AGM in Beford, various trophies and awards were presented by RSGB President, Dave Wilson, G0MBW.

Ostermeyer Trophy for best home construction article in *RadCom* : Eamon Skelton, EI9GQ.

Courtney-Price Trophy for the most outstanding published technical contribution to amateur radio: Peter Martinez, G3PLX & Steve Gray, G7LHS.

Norman Keith Adams Prize for the most original article 'Measuring Speech Intelligibility': Mike Bedford, G4AEE.

Wortley-Talbot Trophy for most outstanding experimental work in amateur radio 'Remote Operating': Dave Pick, G3YXM.

Calcutta Key awarded to Gaston Bertels, ON4WF, Chairman of ARISS for their work in fostering International Friendship through the ISS School program.

RAYNET Cup to Greg Mossop, G0DUB for outstanding services to RAYNET.

Don Cameron Memorial Trophy awarded to Angus (Gus) Taylor, G8PG for an outstanding contribution to low power communication.

Founders Trophy awarded to Prof Martin Harrison, G3USF for outstanding service to the RSGB and amateur radio community.

Kenwood Trophy awarded to the Bath Buildathon Team for outstanding contribution to amateur radio training: G0FUW, G3PCJ, G3TKF, G3UHK, G3VTO & G4YTN.

Fraser Sheppard Award to Dr Joe Taylor, K1JT for his work on weak signal digital communication methods.

Certificates of Merit were awarded to Ian Greenshields, G4FSU & Jim Macphee, GM3VNW.

Special RSGB Award to Dr Ian White, GM3SEK for his technical contribution to the Society, especially in regards to the In Practice column that has been running for 17 years.

National Club of the Year: 1st place, Chelmsford Amateur Radio Society.
2nd place Verulam Amateur Radio Club.
3rd place Spalding & District Amateur Radio Society.

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 MB Greenberg	RS20443
Mr G G Kenyon	G3HMF

50 years

Mr C Bowden	G3OCB
Mr DW Bowers	GW4AVC
Dr D J Harvey	RS25435
Mr D J Hoy	RS22775
Mr A E Pritchard	GW3ODB

QSL Matters

It has been a short sorting month for us, due to the Easter holiday week and the May Day break. 10kg packages have gone out to Belgium, Croatia, Hungary, Japan, Poland and Sweden, with an additional 5kg to New Zealand.

April/May is a very heavy time for UK despatches. By the first week of May, we have already despatched around 150,000 cards and are hoping to make the magic 200,000 (that's approximately 650kg) this time around. Have you sent those SAEs to your sub manager yet?

Recently we received an e-mail from Oceania ARDX Group that said that cards sent to the independent TAG QSL Bureau, Box 21 Tambov, Russia are only forwarded to the recipient after a payment has been made. Whilst the RSGB QSL bureau is happy to receive cards destined for UK amateurs from any bureau, it can only support IARU member bureaux in the countries where they exist.

Ham Week

Godfrey Manning, G4GLM will hold an Open Museum day as part of UK Ham Week. Godfrey runs a small but technical Aircraft Museum in the north-west London suburbs and this will be of interest to those who want to know how aircraft function, are flown and navigated. There are no whole aircraft as the site is too small; the emphasis is on practical demonstrations of what goes on in the cockpit. Radio plays an important part for navigation as well as Air Traffic Control and Godfrey also holds a Flight Radio Licence.

Visitors are welcome on Sunday 3 October from 1pm until early evening. It's recommended to ring in advance to confirm, also to arrange talk-in if required on 2m.

63 The Drive, Edgware, Middlesex HA8 8PS, 020 8958 5113.

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.

2E0SLC	Ms S L Croasdale
G0RGF	Mr D G R Anderson
G0VQH	Ms J A Bailey
G1UKU	Mr T Doolan
G7CBI	Mr M K Higgins
G7GCI	Mr M Collett
G7TPL	Mr S Parker
G7VDJ	Mr S Henry
G8LMX	Mr S Smith
K1YM	Mr J James
K5HLZ	Mr R H Nicholas
LB9GE	Mr T Bakke
M0EAW	Mr A Ward
M0GFO	Mr R E Mcdermott
M1APU	Mr M A Buston
M3DVT	Mr D J Bicker
M3SJC	Mr S Croasdale
M3SYM	Mr S Ludlam
M3ZKZ	Mr B T Poulton
M3ZUE	Mr J Slattery
M3ZUY	Mr B Pike
M6BJR	Mr J Barrow
M6BON	Miss S Eyre
M6CLI	Mr C Herlingshaw
M6FAY	Mr M A Furnivall
M6HMS	Mr M W Taylor
M6JBM	Mr J Russell
M6JIL	Ms J Ullersperger
M6JTN	Mr M K Chivers
M6JTW	Mr J Warning
M6JVB	Mr J S Cobb
M6KRS	Mr C D Haigh
M6LKB	Mr C Warburton
M6LXY	Mr M W Oxley
M6MRD	Mr P J Sephton
M6PCX	Mr P Coombes
M6TAG	Mr D Cutter
M6VMP	Mr I Rotheram
M6ZLN	Miss Z L Newell
MI6BGD	Mr B Gilliland
MM0GNH	Mr K Foreman
MM3ZQX	Mr A Falconer
MM6RBC	Mr R Campbell
OY4TN	Mr T Nysted
OZ4P	Mr F Jorgensen
PD1W	Mr W D Eisema
PT9KK	Mr L G Nachif
RS205786	Mr S Lay
RS205789	Mr H Mash
RS205800	Mr N R Waters
RS205813	Mr R Haynes
RS205815	Mr D H Prior
RS205822	Miss P Freeman
RS205824	Mr P A Smart
RS205832	Mr E P Parrish
RS205835	Mr M Henry
RS205838	Mr J Marriott
RS205839	Mr J Scanlan
RS205895	Mr D Murphy
RS205918	Mr J French
RS205920	Mr A Hodgson
RS205928	Mr T Maddocks
VA2WT	Mr G Cossette
WA6AEE	Mr L M Severe
ZL3PBA	Mr P Alce

Isobel – GG100FCB to M6ISO in eight weeks!

Hooked by her first taste of amateur radio as a Guide taking part in Thinking Day On the Air (TDOTA) in February (as reported on p11 of the May *RadCom*), 10-year-old Isobel asked if she could try for her Foundation Licence. Thumbing through *RadCom*, her father (Lee, G0IAY) found that Bracknell Radio Club was running a Foundation Course in April. A quick e-mail secured Isobel a place. Isobel lives in Chippenham, which is 75 miles from Bracknell, so her godparents, Karen and Mike, G4KFK let them stay over the nights before so she could get up bright and early for the 8.30am start.

Isobel joined eight others for the course (she had not travelled the furthest, as one person had come from Sussex!) and spent the two consecutive Saturdays learning the Foundation syllabus, ending with the practical sessions and exam. All passed the course with flying colours!

On Wednesday 28 April, at lunchtime, Isobel was issued with the callsign M6ISO. She had her first QSO as M6ISO with Martin, ON4VMA on 40m at 1903UTC the same day. Isobel went from passing messages via GG100FCB to having her own callsign M6ISO in just eight weeks. Her family are immensely proud of her achievement and congratulate all those on the course and thank Bracknell Radio Club, David M0XDF, Andy M0HAK, and all the people that made the Foundation course possible.

Isobel is already planning for her 11th birthday in May (logbook, HF rig, VHF handheld, etc!) and TDOTA 2011, where she will be able to operate the radios as well as talk to other Guides...

CLARIFICATION

• In May's *RadCom* there was a photo that showed Gary, 2E0OTL assisting at a TDOTA special event station. We would like to point out that Gary was operating the station under supervision of the NoV holder G0IAY. He must have made a good impression as the young Guide has since successfully obtained her Foundation licence - see story above.

PLT-Interference range Contest

The EMC Industry Association is holding a contest to identify the interference range of Power Line Telecommunications - otherwise known as PLC or BPL. Competitors may be individuals or groups. They must demonstrate the presence of interference from a PLT installation – which might for example, comprise Comtrend or BT Vision or Belkin Power Line Adaptors – at the greatest possible distance. Two prizes of VR120 wide-band hand-held Scanner Receivers, kindly donated by Yaesu (UK) Ltd. are to be won.

The 'LDX' prize will go to the entry that, in the opinion of the organisers, best combines distance with technical excellence and credibility to Standards and Regulatory bodies.

The 'MTY' – most typical – prize will be awarded to the entrant whose detection distance is closest to the average distance claimed by all entrants. The organisers hope that this award will encourage everyone concerned to enter.

For details of the rules and how to enter go to www.emcia.org/news.aspx. For technical support and in-depth information about PLT go to www.theemcjournal.com. Entries must be received by Monday 6 September 2010.

W&S Open Day, 30 May

Waters and Stanton are holding their 20th annual Open Day at their Hockley premises from 10am on Sunday 30 May. There will be free food and drink, special offers and representatives from Yaesu, Kenwood, Icom, bhi and others. Details at www.wsplc.com.

Harwell Success

The second Foundation course run by Harwell ARS had four successful candidates. The interest in taking the course and examination followed an Open Day and JOTA weekend held last year.

NEWS IN BRIEF

• The BATC Summer Fun amateur television contest takes place from 1200UTC on 11 September until the same time on the 12th. Operation is fast scan, on all bands from 70cm upwards. The exchange is callsign plus the sum of four digits shown onscreen by the other station. Details and full rules are on the web at www.batc.org.uk. Contact Dave Crump, G8GKQ, e-mail contest@batc.org.uk.

• On 16 – 18 June Dragon ARC hope to re-enact the transmission of the first radio press message to Australia. It was passed from the Marconi Long Wave Transmitting station at Waunfawr near Caernarfon in 1921; the site is now a climbing centre and is used by the Dragon ARC for International Marconi Day each year. For further information please visit http://ggrec.org.au/VK100WIA.

Chorley Foundation Success

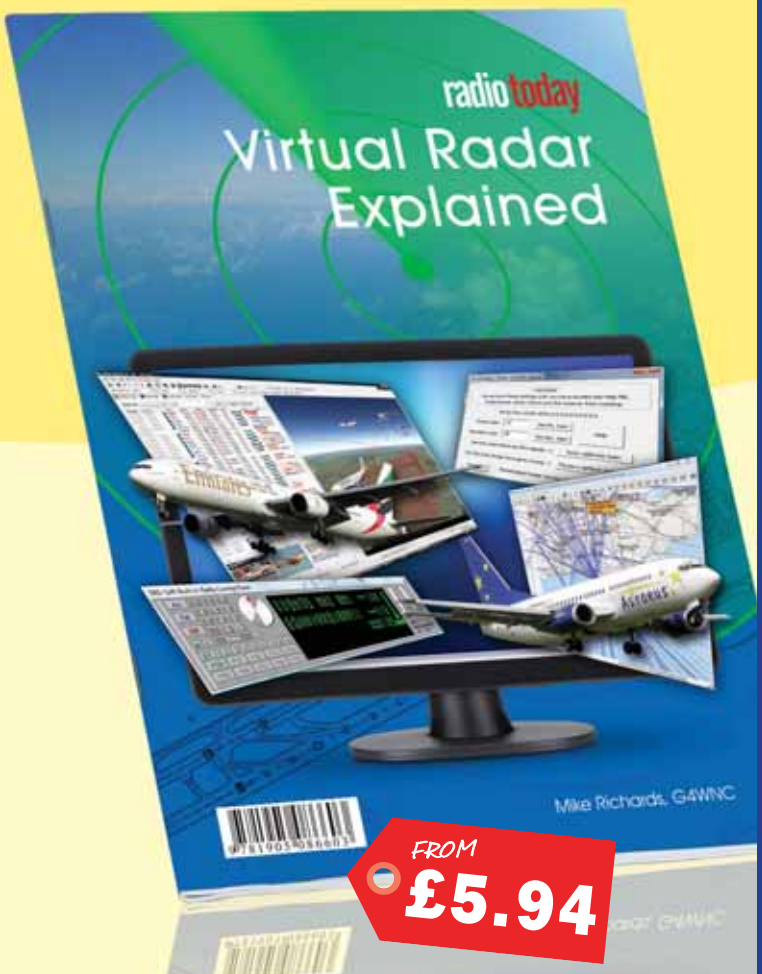
Alex Sorley passed his Foundation exam on 21 April following a course at Chorley and District Amateur Radio Society. He was 8 years old on 30 March and the first to pass an exam at the new venue, Tatton Community Centre. Alex is now the proud owner of M6CDA. He has been guided by Allen, 2E0WXL and Jan, M0GWW and, of course, by his father Doug, G7CDA. May he have many years enjoyment of amateur radio.

Alex with membership secretary Ness, M1NES and his proud dad Doug, G7CDA.

Intermediate Passes at Cockenzie & Port Seton

Cockenzie & Port Seton ARC had another successful Intermediate exam class in April. Left to Right, Derek, MM6DCM, Andrew, MM6AAF, Bob, GM4UYZ (Instructor), Stuart, MM3SWA and Colin, MM6ZGW.

RSGB shop



FROM £5.94

NEW

Virtual Radar Explained

By Mike Richards, G4WNC

Virtual Radar Explained covers the world of aeronautical Virtual Radar which is the common name given to the reception and plotting of ADS-B transmissions from aircraft. The use of ADS-B by commercial air traffic has revolutionised the amount of information available to aviation enthusiasts and this unique book covers the subject from just about every angle.

With the majority of commercial flights broadcasting their position twice a second, ADS-B receive systems can produce a virtual radar display on your home PC. From the early days of the wartime pioneers through to the very latest multilateration systems – it's all in the book. ADS-B and Mode-S signals get special attention with a detailed look at their message and transmission systems.

Virtual Radar Explained provides full details and how to get the most from all of the mainstream hardware and software offerings including: *AirNav Radarbox, Kinetic SBS-1, PlaneGadget* and *PlanePlotter*. There is also coverage of how to install effective antennas and feeders for Virtual Radar systems. For home-brew fans, there is information on the "build your own" options that are available via the internet, along with an explanation of some of the technicalities of ADS-B reception.

This very comprehensive book covers just about every angle of Virtual Radar from historical development through to home-brew. *Virtual Radar Explained* will be of great interest to all the aviation enthusiasts and existing users of Virtual Radar alike.

Size 174x240mm 64 pages, ISBN 9781-9050-8660-3

Non Members' Price £6.99

RSGB Members' Price £5.94

Other radiotoday books

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Non Members' Price £19.99 **RSGB Members' Price £16.99**

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NEWS IN BRIEF

• Preston ARS now has a Facebook page that anyone is welcome join. For further details contact club secretary Richard M0RDZ by e-mail to secretary@prestonars.co.uk.

• Pat Perkins, G3MA (SK) was instrumental in getting the Gloucester radio club up and running again after the war and in 1947 became its secretary – a position he held until 1981. He was well known in the city doing a great deal to promote the club and the hobby. For a period he also acted as area representative for the Radio Society of Great Britain to which he belonged for over 70 years. Many in the Gloucester club will remember his willingness to explain radio principles or the time he spent teaching them Morse code but most of all his passion and enthusiasm for our hobby. He will be sadly missed.

Annual Dinner

The Chiltern DX Club held its Annual Dinner at the Wyboston Lakes Conference Centre on 20 March. Members were able to see a demonstration of the new CDXC membership information system. This included a preview of the new CDXC website.

The CDXC Annual Dinner itself was a sell out with 60 attendees and the after dinner speaker was Ken Cheetham, G4RWD, who presented the work of Ofcom's Baldock Operations Room and the field work that often results from their observations.

CDXC President Neville, G3NUG acts as wine waiter at the CDXC Annual Dinner. Photo by G1VDP.

Foundation Success

Aberdare & District ARS recently ran a Foundation and Intermediate Course and all students were successful in achieving their relevant qualification. Left to right you can see Steve, MW6KED, Martin, MW6BEV, Mark, MW6KAC, Peter, lead tutor and Barry, 2W0PTT.

Contest Operating

Kilmarnock and Loudoun ARC were active as GM7A in the 2010 CQ WPX SSB contest. The team had an enjoyable weekend with contacts from all round the globe. They found the change of rules from the 10 minute rule to the 10 band change took some getting used to. Some of the clubs MM6 members had a first taste of contesting.

Presidential Touch

March saw another successful Foundation course run by the Widnes and Runcorn ARC. The course, organised by lead instructor and RSGB President Dave Wilson, M0OBW, was held over two days at The Premier Inn, Manchester Airport. Premier Inn's Duty Manager Helen Giddings once again offered the use of the hotels conference facilities free of charge in an effort to support The Widnes and Runcorn ARC, which was very much appreciated by all. In total, 6 students studied hard and 5 out of the 6 students passed the Foundation exam, invigilated by Kath, M1CNY and Julian, M0JVW.

Students and instructors from the Widnes & Runcorn exam course.

South Yorkshire Microwave Round Table

The UK Microwave Group and the Finningley Amateur Radio Society have announced that the South Yorkshire Microwave Round Table will take place over the weekend of 10-11 July. It will be held at the HQ of the Finningley Amateur Radio Society, near Doncaster, South Yorkshire. Registration facilities and more information is available online at www.g0ghk.co.uk. Follow the links on the left side of the homepage.

GB0VUL

Newbury & District Amateur Radio Society operated GB0VUL and made 2,660 QSOs, with 73 countries worked and 6,754 hits on QRZ.com and 1303 hits on the VTTS website, which they regard as a success. Working with the Swindon Radio Club, they set up the contact between the Mayor of Newbury at GB0VUL to Rick, G7FCT at RAF Lyneham in front of the Vulcan Bomber hangar!

The contacts that they had on air were very interesting. They worked many ex RAF crew and pilots that have flown the Vulcan Bomber. The good news is that enough funds were raised again to keep the Vulcan flying at airshows around the UK again this year.

Southport Success

Southport and District ARC held a Foundation course in March and all 8 candidates passed. In the photograph you can see Colin Apps, Paul Septon, Patrick Bell, Neil Stuart, Gordon Moon, Alan O'Keeffe, Edward Cherry and Chris Dennis. The instructors are in the background.

NEWS IN BRIEF

• The talk given by Rev. George Dobbs, G3RJV, at the Lough Erne ARC Rally in SHARE titled 'QRP Why and How' can now be watched on the British Amateur Television Club video site. Go to www.batc.tv, click on the 'Film Archive' icon at the top-left and select G3RJV QRP Lecture from the drop-down list.

Dusk to Dawn Challenge

The 24 Hour Dawn to Dusk challenge will involve operating amateur radio from a significant number of Scottish islands in June 2010. In order to celebrate the challenge, an Orkney Crystal Glass Trophy will be awarded to one lucky amateur radio station. This specially commissioned trophy will be awarded to the first station that has worked the challenge on all the islands that are activated or the first to work the most islands activated. All the challenge asks is the recipient funds the appropriate post & packaging. For further details please visit www.gdram.com.

Visit to BY2HIT

During April, Terry Langdon, W6/G3MHV made an official visit to the Harbin Institute of Technology in northern China. He asked the authorities if he could see BY2HIT, the student club station that he had contacted several times. Terry has also made contact over the years with BD2AB and BD2EX in Harbin City.

On arrival at the institute, he was delighted to find an afternoon was set aside for a visit to the club station. This turned out to be a very enjoyable experience with many enthusiastic students. In addition, both BD2AB (now BA2AB) and BD2EX (now BA2EX) came to meet him.

The club station will be operating with the special callsign BT90HIT during the first week of June to mark the 90th anniversary of the founding of the institute.

Transylvania 4x4

From 19 June to 15 August YO/M0GQU will be on air as part of an 'off road' expedition to Transylvania with the 4x4 Vampire Tour. This is an annual event that involves 900km of forest road, meadows and mountain peaks.

The idea is to activate a mobile work station YO/M0GQU/M and base YO/M0GQU. During the day the station will be heard primarily in the band 80m, 20m, and if the propagation conditions allow, on 10m and 6m. All information about this event can be found at www.transylvania.4x4zone.co.uk.

CDXC AGM

The CDXC AGM and Summer Social will be on Saturday 17 July. Yaesu UK have kindly donated a FT-450AT transceiver as the main raffle prize. Details can be found on the new CDXC web pages at www.cdxc.org.uk.

Horndean Exam Success

Horndean & District ARC ran their fifth Foundation Licence class and exam, and their third Intermediate exam in April 2010. Training was supported with equipment bought with their Awards-for-All Lottery grant. All seven Foundation licence candidates passed and both Intermediate licence candidates passed. They congratulate all the successful candidates, and thank the club tutors, Steve, M0RNA (Training Manager) for the Foundation course, and Mike, G4PRG and Gerald, G3COO for the Intermediate course.

The photo shows the Foundation class (L to R) Back row: Darren, Andrew, James, Club Training Manager and Foundation Licence tutor Steve, M0RNA, Mark, M6WSX.

Front row: Karen (now M6KLH), Christine (now M6UBI), Jason.

New DRM for R12

Phillip Brooks, Regional Manager for Region 12 recently announce the appointment of Mark Sanderson, M0IEO as the new Deputy Regional Manger for Essex. Mark takes over from James McGinty, M0ZZO who has provided sterling service across the County but has now moved on to new business opportunities.

Community Grant for Denby Dale

Members of Denby Dale Radio Club are celebrating after receiving £900 for equipment. The grant, given by Kirklees Council to encourage community projects, will go towards a portable station based on an Icom IC-706MkIIG. It will enable the club to widen its activities in school and colleges and at community events. Operators will use the new station, under the callsign GB2HS, for the first time at Honley Show, an agricultural event which draws thousands from across Yorkshire.

Vice-president Brian, G0BFJ and President Lew, G4HKY accepted the cheque at a ceremony in Huddersfield. The bid was put together by Robert, M0PIE and Richard, M0RBG.

Cray Valley Award

Cray Valley Radio Society has re-launched its Cray Valley Award. It is available to any licensed radio amateur or short wave listener who works or hears Cray Valley members, their club call G3RCV, or one of the many special event stations the club has organised in the last 10 years. Full rules are available at www.cvrs.org, where you will find a list of Cray Valley members and their special event callsigns.

The club will be holding an Activity Week from 22 – 30 May to publicise their new award. G3RCV and members' callsigns will be active during the week and there will be some Activity Periods. All profits from award applications received from non-members will be donated to radio related charities.

Chatteris Guides' TDOTA

1st Chatteris Guides took part in the Thinking Day on the Air activities from the Houghton Centre, Houghton, Cambridgeshire. You can see Clive, G3NKQ with 6 year old Katrina, who was the first to volunteer to speak on the radio!

WIA Centenary Celebrations

As part of the celebrations for the Centenary of the Wireless Institute of Australia, the Ipswich & District Radio Club of Queensland, Australia will be hosting the Centenary call sign VK100WIA, on 1 to 3 July. The Ipswich Club plans to be on the HF bands 24 hours a day using a 9-element log periodic and 400 watts. In addition to this the Ipswich Radio Club has produced a collectable Centenary Challenge Coin with the WIA 100 YEAR logo on one side and the Ipswich & District Club crest on the other side. These will be available from their website for AU$10.00 plus postage, and will make a very nice memento for this once in a lifetime event. www.ipswichdistrictradioclub.webnode.com.

Workington's Exam Weekend

The Workington and District Amateur Radio and IT Group had an examination weekend in March. They had eight candidates, four Foundation and four Intermediate. It was a 100% pass rate, the youngest being 8 years old and the oldest in his fifties. In the photo you can see, back row, left to right, Colin, 2E0XSD, Brian, 2E0CBB, Roger, 2E0RTT, Adam, M6AWW, and front row, Kevin, M6KTT, Rebecca, M6RMD, Steven, M6XSF and Derek, 2E0MIX.

Bristol club visits Signals Museum

Members and friends of the Bristol RSGB group had a coach trip to visit the Royal Signals Museum at Blandford Forum in March. Everyone agreed it was an excellent day out and they can highly recommend any other groups thinking of doing the same thing to go ahead. See www2.armynet.mod.uk/museums/royalsignals/museumhistory.htm.

UKSMG's first time at NARSA

This year, for the first time, the UK Six Metre Group was represented at the popular NARSA Exhibition in Blackpool. The stand was manned by Trev, G3ZYY, Clive, G4FVP and Ian, G6TGO, supported by Trish, G4KYY and Grainne. As well as a well-equipped display stand, the group mounted a 50MHz demonstration station using Weak Signal Propagation Reporting (WSPR), operating with a Kenwood TS2000 and 5W to a halo located in between the stands at about 12ft on a tripod.

The team had a very busy few hours, signing up a number of new members and meeting people who dropped in to the stand. There were also many questions about 50MHz propagation, giving the team the opportunity to pass on their enthusiasm for the world of 50MHz and to talk about the effect of solar behaviour on the band as Cycle 24 picks up. The highlight of the day was a visit by RSGB President Dave Wilson, M0OBW, himself a frequent user of 50MHz. For more information on the UKSMG visit the group's website at www.uksmg.org.

Pat Conway Cup

At the Irish Radio Transmitters Society AGM in Dundalk in April, the President, Paul Martin, EI2CA presented the Pat Conway Cup to Herbie Graham, GI6JPO. Lough Erne ARC had recommended to IRTS that it consider Herbie, GI6JPO for one of its awards for service to amateur radio. Announcing the Conway Cup, Peter Grant, EI4HX, Awards Manager, joked that this Cup was the tallest on the table and it would go north this year. He summarised the reasons for the award as Herbie is well known, north and south and has been very involved in the work of his club, its rally and amateur radio for many years. Indeed, he declared, Lough Erne ARC "was Herbie Graham".

Advance Success for Cray Valley

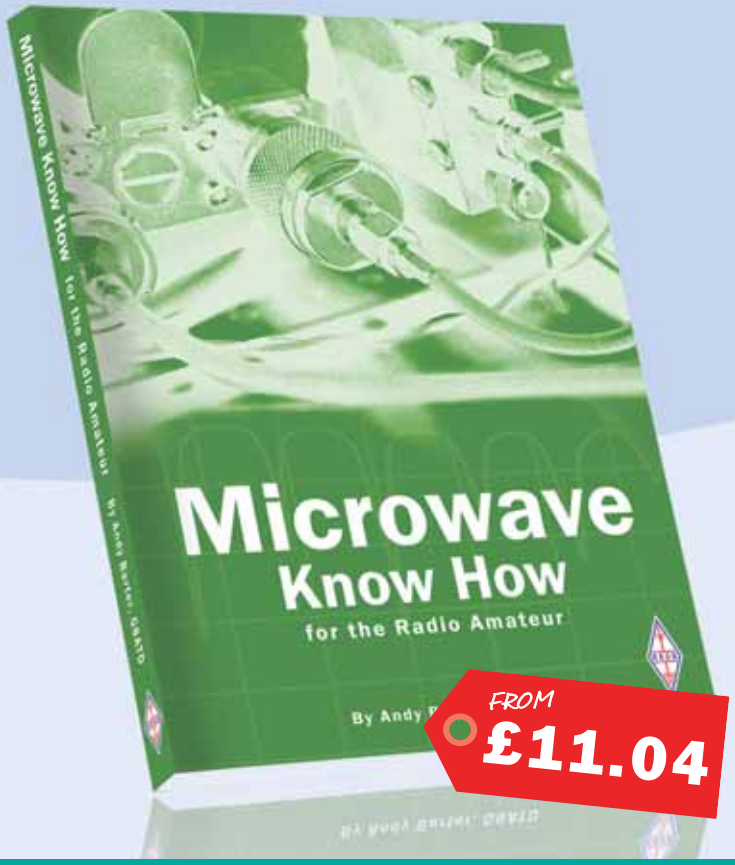
Cray Valley Radio Society held the second of its 'short form' Advanced licence courses for members recently. This type of course has a small number of candidates who are intensely tutored on a schedule and with a number of Saturday short classroom days to iron out any problems. Chris Whitmarsh, G0FDZ organised the course and was helped by a small team of Cray Valley members as tutors – with a far larger number supporting the course as a whole. Six Cray Valley members took the course – which involves a great deal of self-study – and sat the February 2010 Advanced Licence examination. All six candidates passed on the first attempt! This gives Cray Valley RS six new full licence holders; Jim, M0OOD; Ian, M0UAT; Bob, M0MCV; Billy, M0ZWW; Andre, M0PIA and Jasper, M0JDA. Keen observers will notice that Bob, M0MCV is Bob Treacher, BRS32525, who wrote the SWL column in *RadCom* for many years. Congratulations to all the successful candidates – and thanks to the members who supported them during the course, this is the second of Chris' advanced courses with a 100% pass rate.

RNLI Fundraiser

At the recent Norbreck Amateur Radio Rally, members of the SOS Radio Week team handed over a cheque to Lisa Cooke, the Royal National Lifeboat Institution's Fund Raising Manager in the North, for £3,679.78. The money was raised by fifteen individual and groups of amateur radio operators during SOS Radio Week. The participants were sponsored and operated at various times during the week, some operating from home, others establishing special event stations and some activating lifeboat stations around the coasts of the UK and Ireland.

Further information about the event can be found on the SOS Radio Week website at www.sosradioweek.org.uk.

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.

The book includes chapters covering:

- Antennas with designs for 23cm, 13cm, 6cm.
- Power amplifiers for 23cm and 10GHz.
- Measuring equipment, with different ways to use a spectrum analyser and a very useful noise source.
- Filters and design of filters, useful for the accomplished constructor and a Hybrid coupler for 13cm.
- Modifying commercial equipment with details for using surplus equipment to get on 5.7GHz, 10GHz and 24GHz.
- Converter for S band using a YIG LO and a 2m down converter for use with SDRs.
- 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 **RSGB Members' Price £11.04**

NH National Hamfest

October 1st and 2nd 2010
Newark and Nottingham showground

Lincoln Short Wave Club G5FZ • G8COL

RSGB

If you only go to one event this year make sure it's the National Hamfest

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www.nationalhamfest.org.uk

George Stephenson Pavilion, Newark & Nottingham Showground, Lincoln Road, Winthorpe, Newark NG242NY.

Biggest Audience at CARS

In April, Stan Ames, G4OAV gave a talk to the Chelmsford Amateur Radio Society on World War II Wireless Intercept and Secret Stations and he attracted a record breaking audience. In total 114 people attended the meeting and it is believed this is the largest ever attendance that CARS has had in its 74 year history.

Stan enthralled the audience with his talk that described the development of the network of secret wireless stations that intercepted enemy transmissions during WWII. The contents of these messages were subsequently decrypted at Bletchley Park. One of Stan's slides showed a picture of a founder of CARS, Louis Varney, G5RV at one of the secret Direction Finding (DF) stations that were set up across the country. Other slides showed DF equipment that had been built at the Marconi New Street factory in Chelmsford.

There were plenty of questions after the talk and at the end Stan received well deserved applause for what was a fascinating presentation.

GB70BRS at Bawdsey Manor

GB70BRS will be on the air from Bawdsey Manor in Suffolk over the weekend of 5 and 6 June. This event is to mark the nominal start of the Battle of Britain. The June event is timed to coincide with the annual RAF Bawdsey reunion, for personnel who served at Bawdsey at any stage during its military history – there are a small number of folks around who were there during and even before WWII! There will be public access to visit the station and the exhibition which has been set up. Due to the RAF event, public access will be on Sunday 6 June only, between 10am and 4pm – pre booking is essential, as the site is private and the house and grounds will not be open in general. See http://bawdseyresearchstation.org.uk for details.

Saturday afternoon operating team – l to r G3KUM, G3IRQ, G4XVE, G4DDK, G4HUP, G8LBS, M1DUD, G8BLS, 2E0IAF, M0SDY. In the background (growing out of G8BLS's head) is the antenna for his HF backpack! Photo courtesy of M0SUF.

Exam success at MKARS

Congratulations to the four candidates who passed the Foundation Examination following the recent course held by MKARS. The intermediate examination course begins in September.

Braintree's Construction Contest

In April, the Braintree & District Amateur Radio Society annual construction contest took place. This is always a fiercely fought contest and this year was no exception as there were no fewer than seven entries! Marks were given for each project by each of the members present and the winner is decided by the highest points received.

The winner was Howard, G6LXK, returning his name to the trophy after a short break, with his modified version of the MKARS80 80m transceiver, fitted into a slimline PMR mobile case with the addition of some useful extra features. Edwin, G0LPO came in second place, with an audio distribution amplifier, intended for use with the club rig on contest days and special events stations. Other entries included: a switched RF attenuator, several back-up 12V PSUs, a tune-up unit and another MKARS80 kit.

GB2GP on air 19 & 20 June

GB2GP will be on the air from Gilwell Park, the headquarters of the Scout Association, on 19 and 20 June. A team of nine UK radio Scouts from all over the South of England will be running not only the station but also lots of different radio activities including radio orienteering for the Beaver and Cub Fundays at Gilwell Park. Over 5,000 Beavers and Cubs aged 5 - 10½ are expected to arrive at the event from all over the UK. The station should be found at or around the Scout frequencies, the most common of which are 3.690MHz, 7.090MHz and 14.290MHz.

Eigg DXpedition

The trip to Eigg as GM6TW was hampered in the month prior to kick-off due to several adverse factors. Mark, M0UTD had car trouble and Craig, MM0SSG had airplane trouble from South Africa and was unable to join the team. So the Kilmarnock and Loudoun ARC club call, MM0KLR was brought into use for the DXpedition.

The boat departed Mallaig at 7.30am for the sail to Eigg via the other isles of Rhum, Canna and Muck. On arrival at the Island, the FT-100D and a 1/2 G5RV were installed and 33 QSOs were logged on 40m before it was time to return to the pier to meet Gordon, MM0GOR off the boat. His FT-840 was set up with a couple of roach poles and multi-band verticals and networked laptops were used with N1MM.

On Saturday night Gordon was active on 80m but the vertical antennas were not working as well as expected. Sunday morning brought a drop in conditions so an 80m dipole was constructed which marked a great improvement in our signal performance. Sunday night saw a station on 20m and 80m, both working their way through big pile-ups, the 20m station was working into Europe, State-side and also contacts in JA and VK. 80m was kept busy with UK and Europe. Both stations were on the air until 0200.

A total of 744 QSOs were made on 2, 20, 40 and 80m with 86 countries worked across those bands. The team is already arranging the next IOTA trip to the Scottish Islands, and hope to meet you again on the air.

Midlands ARS Foundation Course

The photograph shows the latest passes in the Foundation exam taken at the Midland Amateur Radio Society. You can see mother and son, Emma and Jamie Hallard, with their tutor Jim Moy, M1CPC. A new session will start in May.

MKARS Candidates' Success

Congratulations are in order for the twelve candidates who passed the recent Intermediate examination at Bletchley Park. Martin, M3JZI, Richard, M6RLW, Dimitrios, M3XPY, Jonathan, M6LRW, Tom, M3HTT, Phil, M6ETC, Malcolm, M6MKL, Roy, M6GDH, Brian, M6BMA, Steve, M6SDD, Graham, M3YZT and Stephen, M6SGB. The inserts are the two trainers for the Intermediate and Advanced courses.

Fareham Club visits *HMS Daedalus*

In April, members of the Fareham Radio club visited the HM Coastguard helicopter base at *HMS Daedalus*. A very worthwhile visit enjoyed by all.

New Licensees at South Notts

In April, four candidates attended a Foundation course run by the South Notts ARC with instructors Terry, M0RIA and David, M0BWY. After working hard, all passed the exam, and are eager to get new M6 calls and become active on the air. The photo shows David, Terry, Craig and Stuart with their pass slips shortly after receiving their results.

On to Intermediate for Harrow Students

In March, at the RS of Harrow exam centre, a total of seven Foundation students successfully passed the Intermediate exam. The President of the society handed out the certificates. The Radio Society of Harrow wishes them well in their further studies to obtaining their Full licences and looks forward to hearing them with their new callsign on the air.

L-R: M6EKQ, M3ZGN, M6JFQ, M3YZD, M3YZL, M6CHS, M6BUZ and G0BSP. Photo by G0CAG.

Successful First Year for Brigg

Brigg and District Amateur Radio Club has been active barely a year. The first AGM was held on Thursday 1st April chaired by Fred Fenwick, G0AOJ. He noted an enjoyable Windmills on the Air held by the new club last year and two more special event stations to come this year. Fred also applauded the efforts of lead tutor Gordon Griffiths, M0GIQ in tutoring successful Iintermediate candidates John Bennet and Geoffrey Porter and successful Foundation candidate Lee McGraughey during recent months.

Cornish Zeal

Each year on 23 June (St. Johns eve) the Old Cornwall Society holds midsummer bonfire celebrations, whose origins date back over thousands of years. They aspire to keep customs alive for the next generation - a process of 'gathering the fragments' of Cornish culture, language and traditions. Cornish Ex Pats also join in the celebrations making this a global event.

The Callington Amateur Radio Society is co-ordinating special event stations linking the Cornish sites and those in other countries. If you would like to be part of this project please contact Mike Bailiff, M0XGG by e-mail mike@m0xgg.eclipse.co.uk or telephone 01822 834 373.

Listen to *RadCom*

Following discussions with the RSGB, RAIBC – the Charity Working for Radio Amateurs with Disabilities – has taken over the recording of *RadCom*. The recording is available to RSGB members with low vision and is distributed each month on an MP3 CD. There is no requirement to return the CDs each month for re-recording and the ability to easily skip from track to track is greatly appreciated.

The reading team currently consists of Ian, DJ0HF and Andrew, G8GNI, with duplication and distribution being handled by Mandy, 2E1GWO. Other regular recordings include *Practical Wireless, RadioUser and Fists Keynote*. The magazines are recorded directly to a PC in the reader's home and converted to MP3 format. Readers upload their files to a secure Web area, where they are checked for compatibility with older MP3 players and distributed on either CD or on the RAIBC Website.

RAIBC also maintain an audio library, including the three licence handbooks, and equipment manuals. If you feel you can help by reading amateur literature, or by offering assistance, RAIBC is always in need of supporters in all areas of the UK. For further details please check www.raibc.org.uk, ring the helpline on 08000 141743 or e-mail secretary@raibc.org.uk.

Kilmarnock & Loudoun Visit to Stirling

In May, three members of Kilmarnock and Loudoun ARC visited the clubhouse of Stirling ARS. Allan, GM3OZB, Peter, GM7AAJ and Graham, MM0GHM were made very welcome by the Stirling ARS membership. The buffet lunch was excellent and the tour of the club house was very interesting and they have a very impressive antenna farm. They would like to thank John, GM0FSV and the membership for their hospitality and look forward to the return visit to Kilmarnock and Loudoun ARC.

International Marconi Day 2010

Many radio clubs and individuals took part on 24 April and report a very enjoyable time

John, G8DET, Martyn, G1EFL and David, M0BQC operating GX0MWT on 2m.

GB2MT by David Barber, G8OQW. This station was set up in Writtle, Essex, courtesy of the Writtle Agricultural College. It had been the site of Marconi's 2MT broadcast test transmissions between February 1922 and January 1923. It was also the location of a demonstration to Chelmsford Engineering Society in November 1922.

A glorious Spring morning was the setting for the 23rd International Marconi Day on 24 April. I arrived on site in Writtle just before 8am and the silence, sunshine, fresh air and hint of mist framed what could have been a prize watercolour, whilst up above two hot air balloons drifted effortlessly on the cool morning breeze. The antenna, a Comet H-422 HF dipole atop a 6m mast was swiftly erected and the rig, an Icom IC-7700, installed at the operating position. Although using exactly the same setup as last year (right down to the last nut and bolt) it was apparent that an RF feedback problem existed on 40m. This was swiftly resolved with a few cable ties, some excess coax and the assistance of a colleague who was monitoring transmissions several miles away.

Some nice contacts with good signals were made on 20m, however conditions on 40m were extremely volatile making brief contacts a necessity for most of the day. It was certainly much harder going than last year. But it was an enjoyable day with superb weather and a good number of contacts, thank you to all those stations that made contact.

GB5LT by Rod Hickey, G6LVJ. This station was set up at Luttrell's Tower in Calshot. Apparently, Marconi and his wife, Beatrice, had been experiencing tensions in their marriage, which "...became truly serious..." as his eldest daughter Degna recounted later. A friend recommended that, for their future domestic peace, they should find "...a place in the country...". Beatrice found Eaglehurst, which included Luttrell's Tower, at Calshot, Hampshire. Eaglehurst was let to the family in 1911, but the tower, which was originally built by Temple Simon Luttrell around 1730, and involved in smuggling activities, was used by Marconi as a radio laboratory. The family remained in residence until 1916, in which year his then youngest daughter, Gioia, was christened at nearby Fawley Church. That same year, they returned to Italy, where Marconi had been accredited as an officer on the army engineering staff, to inspect mobile wireless units at the front.

In pleasant sunny weather, though with a chilly wind coming up off the Solent, a small group of radio amateurs, in liaison with the Landmark Trust (who own and maintain the tower), set up a special event radio station adjacent to the tower. The station at Luttrell's Tower, GB5LT, was organised for the third time under the auspices of the Waterside New Forest Radio Club, and was set up and operated by Tim Williams, G4YVY, Gordon Stevens, G1ZEC, Robin Brazier, G0OSG, Tony Butler, G6MNL Mel Holdsworth, G0FOH and Rod Hickey, G6LVJ. Two transceivers and aerials were used this year: the club's FT-757 GX II into a G5RV running roughly north–south and Tony's FT-747 into a Carolina Windom half size, running roughly east–west. Over eighty radio contacts were made, and all involved agreed that the exercise had been a great success.

GB0CMS by Steve Nichols, G0KYA. The Norfolk Amateur Radio Club ran the all-day special event station at Caister Lifeboat Visitor Centre to commemorate the village's original Marconi Wireless Station, which was established at Caister in 1900. The station was in a house in the High Street known as Pretoria Villa and its original purpose was to communicate with ships in the North Sea and the Cross Sand lightship.

Local historian Colin Tooke was able to provide the group with more about the historical significance of the site. The Caister station was connected by land line to Gt Yarmouth Post Office and the Caister Coast Guard Station. The main aerial mast behind the house was 150 feet high, the aerial wire being suspended between this and a slightly shorter mast situated on land where Lacon Road was later built.

The large front room of the house contained the main apparatus and was also used as the operating room. The engine for charging the accumulators was situated in a shed adjoining the house and the accumulators themselves were housed in a specially constructed annex. The remainder of the premises were used as a dwelling house for the officer-in-charge.

The range of communication was 150 to 200 miles on the long wave (600m) and 100 miles on the short wave (300m).

In 1909 all the Marconi coastal stations were taken over by the Post Office. In 1911

GX0MWT in Sandford Mill 2MT hut, (l-r) Dave, G3PEN, Harry, G5HF, Geoff, G7KLV, Ken, G0OSI, Bob, G4MDB, Ethel Chinery and Brian, G3CVI.

the Caister station was used to train lightship men in the use of telegraphy equipment. In January 1915 the telegraph equipment on the Cross Sand lightship was transferred to the Parlour lightship and the Caister station was changed to 'general working' and not used for ship-to-shore work. Public use of the telegram facility provided at Caister was suspended for the duration of the WW1.

In 1921 plans were made for the reinstallation of wireless on Trinity House lightships, but this time the new wireless telephony was to replace telegraphy (Morse). New technology made the Caister station out of date and it finally closed in 1929. The masts were taken down and a few years later the house became the village Police Station.

The modern day communicators running GB0CMS managed to contact more than 130 other stations in 29 different countries on Saturday 24 April. Using the call GB0CMS, notable contacts included Queensland, Australia (using CW) and another in Saint Thomas on the US Virgin Islands (SSB). Other contacts varied from a ham north of the Arctic Circle in Lapland to another aboard a yacht in the Mediterranean. The station's signals crossed the Atlantic on three other occasions, making contact with hams in Newfoundland, Massachusetts and North Carolina. Contacts closer to home included a holidaying ham in Caister and numerous other radio amateurs around the UK, shows what you can do with radio using just 100W.

On Saturday, the closest to Guglielmo Marconi's birthday, stations around the world were set up at sites with historical links to the inventor's work. These include Poldhu in England; Cape Cod Massachusetts; Glace Bay, Nova Scotia; Villa Griffone, Bologna, Italy and many others.

The day wasn't without technical hitches, the club chairman got stuck 20 feet up in the air on a 'cherry picker' when its power supply failed!

MN0VFW by Bobby Wadey, MI0RYL. The Mid Ulster Amateur Radio Club enjoyed a very successful Marconi weekend at The Navan Centre, Armagh, NI. The club set up a number of stations covering HF, PSK, 2m and Echolink with very enjoyable results.

Although the members didn't achieve their target number of Marconi stations, they had their hands more than full with many long distance stations calling in. They even managed to cover every continent with stations such as Borneo, Cuba, Russia, Japan, Australia and many more. Of course there were disappointments when MI0RYL and MI0MVP were both pipped at the post by an MI3 station when chasing Borneo, however they did take it in good spirits.

The members had permission too have a barbecue and camp over night allowing for some fun social time in between the hard work and also allowing those with busy lives the opportunity to pop in over the weekend to play radio.

All information, with images and video can be seen at www.muarc.com, and the members are already looking forward to a third year of sunshine and radio.

GB5HF and GX0MWT by M5AKA. The Chelmsford Amateur Radio Society operated three stations at the Science & Industry Museum at Sandford Mill in Essex. Since the museum is only open to the general public for 3 or 4 days each year, CARS decided to make the most of the opportunity and ran three stations. GB5HF, under the guidance of Gwyn Williams, G4FKH, used CW on 20m from the 1st floor of the Mill. This station was also used to 'sharpen' operating skills in preparation for NFD in June and 208 contacts were made with many countries and continents.

On the ground floor GX0MWT operated on 40 and 80m SSB under the guidance of Brian Thwaites, G3CVI, from the famous Marconi 2MT Writtle Hut (now housed inside the museum). The hut was used for some of the first wireless broadcasts by 2MT in 1922/3 from Writtle near Chelmsford. Over 100 contacts were made including many other IMD stations. One visitor, Adrian Soane, M0ABY, came all the way from St. Albans and helped operate the station.

The callsign GX0MWT was also used by the VHF/UHF station operated by Bob Tokley, G4MDB and Norman Crampton, M0FZW. This was located in the museum grounds in a gazebo supplied by John Bowen, G8DET. The VHF/UHF rig was kindly provided by Martyn Medcalf, G1EFL. This station made many contacts on FM simplex and through the Danbury repeater GB3DA and provided talk-in for some of the visitors.

Colin Page, G0TRM displayed the museum's extensive collection of Morse keys and gave his very popular demonstration of an automatic mechanical Morse transmission and reception system. He was assisted by Peter Meadows, M0ZBU, Richard Meadows, M0SBU and Ken Pallant, G0OSI.

Geoff Lovegrove, G7KLV spent many hours arranging a display of broadcast receivers through the ages, demonstrating their development from 1920s crystal sets to the very latest DAB radios. Some hitherto unseen artefacts from the Museum store as well as examples from private collections were on view.

Both the Keeper of the Museum, Dr Geoff Bowles, and Education Officer, Trish Robinson, were on duty and kept busy with the 308 people who visited the museum and the stations. Visitors were provided with refreshments by The Friends of Chelmsford Museums.

(Left to right): Tony, G6MNL, Tim, G4YVY, Gordon, G1ZEC, Robin, G0OSG, Mel, G0FOH, and Rod, G6LVJ behind the camera; Luttrell's Tower in the background.

Malcolm, G3PDH operating GB0CMS from Caister Lifeboat Visitor Centre.

(Left to right): Tony, G6MNL and Rod, G6LVJ operating GB5LT.

Andy, 2E0GOL operating GB0CMS from Caister Lifeboat Visitor Centre.

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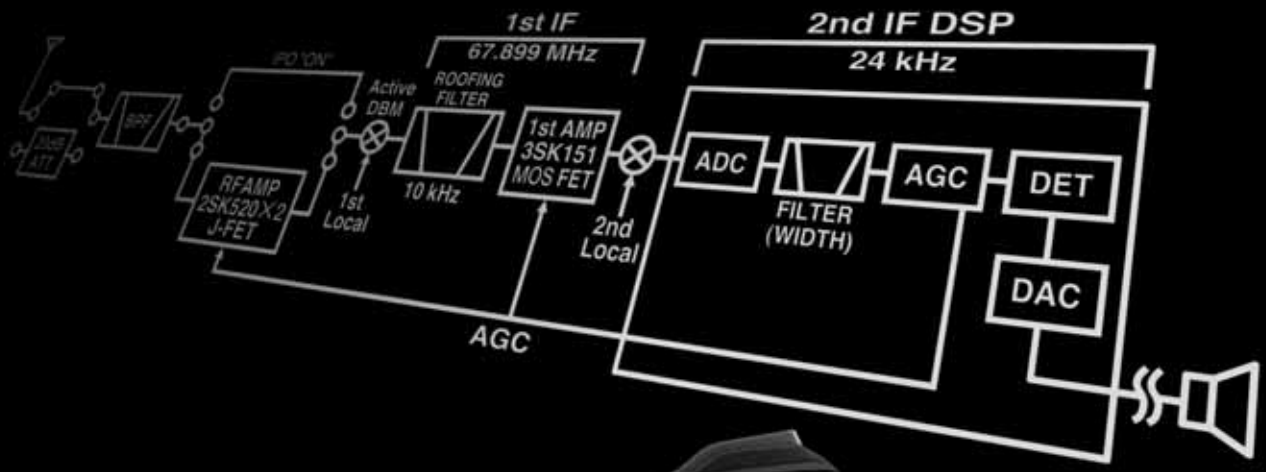

FT-450 / FT-450AT

The FT-450 may be fitted with the optional automatic internal antenna tuner, the ATU-450.
The FT-450AT has the ATU-450 already installed.

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Homebrew

We take a look at VHF frequency synthesisers

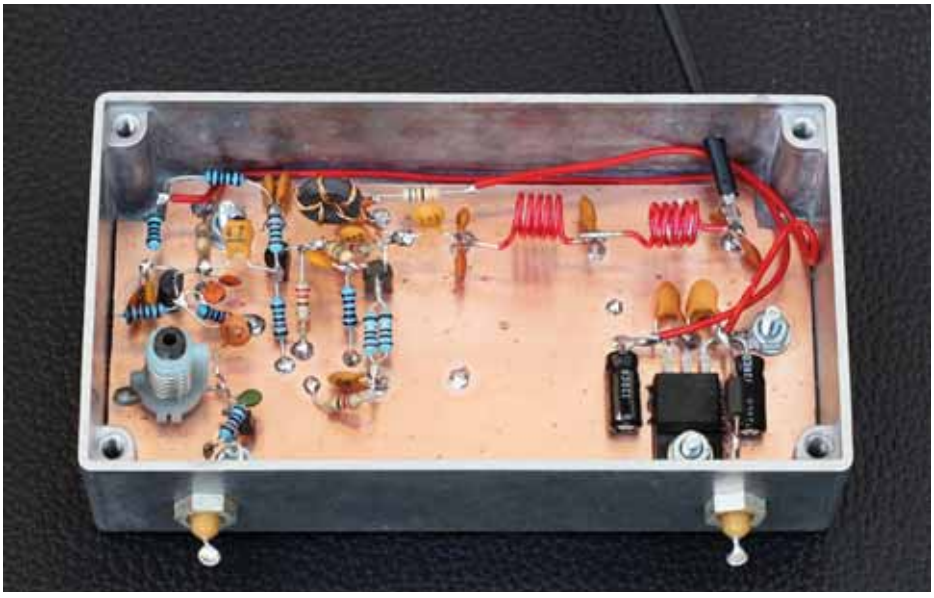


PHOTO 1: The VCO unit that we will be constructing this month.

HOMEBREW RULES OK. The VHF, UHF and microwave bands are a happy hunting ground for the homebrew radio enthusiast. The lack of commercially made equipment for the higher microwave bands means that many operators use home made equipment. Even on VHF, where commercial rigs are readily available, you will often hear amateur stations using home made equipment. Home made Yagi aerials, linear amplifiers and transverters seem to be the favourite VHF projects. All three items have featured in some of our previous Homebrew projects. I have noticed that home made SSB transceivers are very rare on the VHF bands. Many home constructors prefer to build a HF to VHF transverter that uses a home made or commercial transceiver as the back-end (or 'IF'). Converting 28MHz to 144MHz with a local oscillator frequency of 116MHz is one of the most common configurations.

There are good reasons for the popularity of VHF transverters. Before the current generation of synthesised HF rigs, most amateur SSB/CW transceivers used a free-running VFO as the local oscillator. It is relatively easy to build a stable VFO at HF but it is not possible to build a VHF L/C oscillator that is stable enough for SSB/CW. There are a few alternatives that can work well in practice. It is usually possible to pull the frequency of a crystal oscillator by ± a few kHz at HF. This type of variable crystal oscillator (or VXO) can be used to drive a frequency multiplier which will produce a useful tuning range at VHF. A single crystal won't cover the entire band, but a small collection of crystals for carefully selected frequencies will be adequate for most situations.

Another option is to use a frequency mixing scheme where a VHF crystal oscillator is mixed with the output from a HF VFO to produce the desired VHF signal. To achieve adequate image suppression, it is necessary to use a relatively high VFO frequency. This conflicts with the requirement for good frequency stability. Other combinations of these methods can be used: for instance, it is possible to mix the outputs of two crystal oscillators. One or both oscillators can be pulled in frequency. This approach allows a greater number of channels per crystal than using a single oscillator with a bank of switched crystals.

ENTER THE SYNTHESISER. A frequency synthesiser is a device that produces a range of output frequencies that are derived from a fixed reference oscillator. The long term frequency stability of the synthesiser output is as good as the stability of the reference oscillator, for which a crystal oscillator is usually used. Crystal reference oscillators can be free running or they can be controlled by an even more stable reference such as a rubidium standard or a GPS receiver (see the March 2008 Homebrew). The frequency synthesiser offers the stability of a fixed crystal oscillator and the frequency agility of a free-running VFO.

There are several different kinds of frequency synthesiser in common use. The crystal mixing scheme described earlier is one form of frequency synthesiser but it only offers a limited range of output frequencies. This limitation can only be overcome by using two very large banks of expensive crystals. The best known and most commonly used frequency synthesiser is the PLL (phase-locked loop). The PLL uses a phase detector to compare the phase of an oscillator output signal to the phase of a high stability reference. Any phase difference results in the generation of a correcting signal, which is fed back to a frequency control circuit in the controlled oscillator (see the October 2008 Homebrew for more information about PLLs). Another type of synthesiser in common use is the DDS (direct digital synthesiser). The DDS uses a digital-to-analogue converter to synthesise a sine waveform using a table of values stored in ROM (read-only memory). A typical example of a DDS frequency synthesiser is the local oscillator used in our recent LF receiver project **[1]**.

None of these options offers a perfect solution. A well-designed crystal oscillator like the 116MHz oscillator used in most 2m transverters will produce a spectrally pure local oscillator signal. This means that the signal will be almost completely free from random variations in phase and amplitude. A phase locked loop will tend to suffer some degree of phase noise. This is a result of the phase changes imposed on the oscillator by the phase detection/correction circuits in the PLL. (This is an oversimplified description of PLL phase noise; the real situation is a bit more complicated because a PLL can actually *reduce* close-in phase noise that is within the PLL control loop filter bandwidth. However, the overall effect of a PLL tends to result in increased phase noise, at frequencies that are above and below the carrier frequency by an amount that is greater than the control loop bandwidth).

DDS synthesisers can produce a carrier that has very low levels of residual phase noise. In the usual case where the DDS reference clock frequency is much higher than the output frequency, DDS theory suggests that phase noise on the output will always be less than the phase noise of the reference clock. Unfortunately, DDS synthesisers are prone to another type of unwanted output in the form of spurious signals or 'spurs'. Some of these spurious signals are the result of unwanted images or

PHOTO 2: Small RF projects can be accommodated in and screened by commercial project boxes or re-purposed sweet tins.

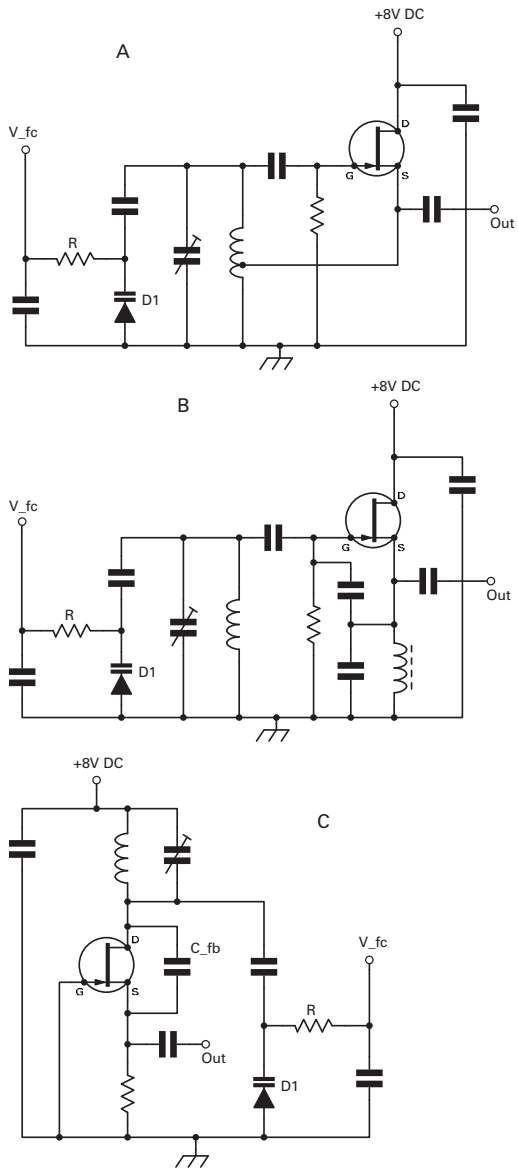


FIGURE 1: Simplified circuits of three different VCO configurations (see text).

'alias' signals caused by mixing of the output signal with the output carrier and its harmonics with the reference clock. The DDS output DAC is not a perfectly linear device; it has limited resolution and other imperfections which will prevent it from producing a perfect sine wave signal. Even if we could find a perfect DAC, high speed switching signals in other parts of the DDS and its microcontroller-based control system will always manage to find their way into the DDS output signal. Spurs caused by lower-order alias signals are quite easy to predict. Such low order spurs can be minimised by using a reference clock frequency which is much higher than the DAC output frequency. Spurs caused by other mechanisms are difficult to predict. The non-ideal nature of the DAC means that all spurs will mix with the refclock, carrier, alias and other spurs to produce more low-level spurs. These low level spurs will probably be at a level which is well below the DDS output carrier level, typically -70 to -100dB/c. This is acceptable for use in a transmitter, but not in a VHF receiver where band noise is very low and receiver gain is very high. DDS spurs will tend to produce 'birdies' in the receiver as you tune across the band. As the VHF and UHF bands tend to be quite wide, 2MHz in the case of 2m, the chances of finding several very strong spurious carriers within the band are quite high. There are some ways of mitigating this problem. For example, SDR (software defined radio) receivers can attempt to calculate the frequencies of predictable spurs and, if necessary, shift the local oscillator frequency so that the spur is pushed outside the receive passband. Even unpredictable spurs can be mapped out by the operator so that they will be suppressed the next time you use the same frequency.

NOW, THE HYBRID. One of the most successful methods of generating a clean local-oscillator signal is to use a hybrid DDS/PLL synthesiser. The very small frequency steps of the DDS gives excellent fine-tuning resolution and the PLL provides a relatively spur-free output. Most of the problems with older PLL designs are a result of using a very low phase comparator reference frequency of 5, 10, 12.5 or 25kHz and the consequent narrow control loop bandwidth. Hybrid DDS/PLL systems can easily use a much higher reference frequency of several MHz. This allows greater flexibility in the design of the loop filter and easy elimination of reference spurs from the VCO output. There are several configurations in common use. One option is to build a standard PLL of conventional design with a programmable divider for coarse frequency tuning steps. The DDS provides the PLL reference signal. Because the DDS output is frequency agile, it can be tuned to fill the gaps between the PLL coarse tuning steps. It is an easy task for the control processor to calculate the correct divide-by-N ratio for the PLL and the corresponding frequency word for the DDS. This approach offers advantages over both the conventional PLL and DDS. Because fine-tuning is handled by the DDS, there is no particular need to use a low PLL reference frequency. As the DDS is only required to produce an output which is within a relatively narrow frequency range; the DAC output can be passed through a band-pass filter instead of the more commonly used low-pass filter. This will reduce the number of DDS spurs reaching the PLL reference input.

The other approach to a VHF hybrid DDS/PLL is to use a VCO (voltage controlled oscillator) as the DDS refclock. The DDS is used as a high precision programmable divider to divide the VCO frequency down to the PLL reference frequency. For example: if the VCO is running at 100MHz and the PLL reference is 1MHz, the DDS tuning steps would be: 100MHz/2^32 = 0.023283064Hz. The DDS frequency word would be 1MHz divided by this value = 42949673. This would usually be expressed in hexadecimal as 0x28F5C29. One important point to note about this scheme is the fact that the DDS frequency step changes with VCO frequency. As we have seen, at 100MHz the DDS step is 0.0233(ish)Hz. At a VCO frequency of 101MHz, the step size will be different (0.02351Hz). Again, this detail can be handled by the microcontroller based

control system which will calculate the DDS step on-the-fly for each new frequency that you require.

This system offers tremendous flexibility for a VHF local oscillator. It is very easy to provide a 1MHz reference. A 1MHz crystal oscillator is the obvious choice. Other frequencies like 2, 4, 8 or 16MHz can be divided down to 1MHz using a binary counter IC. For the ultimate in stability, you could use a 10MHz OCXO, rubidium standard or GPSDO divided by 10 using a decimal counter IC.

VOLTAGE CONTROLLED OSCILLATORS.

VCOs are one of the key components of a PLL. A typical RF VCO is based on a transistor oscillator of the type we have used in many of our previous projects. Bipolar transistors and FETs are both well suited to this application. As the name implies, the frequency of a VCO is controlled by applying a voltage to the control input. There are a few different types of VCO, but the type we will be using uses a varicap (sometimes called a varactor) diode as the frequency control element. All reverse biased junction diodes show a change of junction capacitance with changing DC bias voltage. The varicap diode is designed to have a relatively large range of junction capacitance for a given range of applied voltage. The capacitance depends on the width of the depletion layer at the diode junction. The greater the reverse bias, the smaller the junction capacitance.

Figure 1 shows simplified schematics of some common VCO configurations. FETs are used in all three examples. Oscillator **A** is a common-drain Hartley oscillator, oscillator **B** is similar except that a Colpitts configuration is used and oscillator **C** is a common-gate configuration that is often used in VHF VCOs. As the common-drain FET amplifier has no voltage gain, positive feedback is taken from the FET source terminal back to the FET gate via a tap on the L/C oscillator inductor in oscillator A. This voltage step-up provides the gain of greater than unity condition that is required for continuous oscillation. Oscillator B uses a capacitive tap to achieve a similar result. The oscillator at C is very simple and easy to understand. As the common-gate configuration is a non-inverting amplifier, feedback from drain to source will be positive feedback which will lead to oscillation. The value of the drain to source feedback capacitor is chosen so that it allows just enough positive feedback for reliable starting and continuous oscillation. A capacitor with a reactance of a few hundred ohms will be about right. This is only a few pF at VHF and even less at UHF. This oscillator is a proven good performer in VHF VCOs. The circuit as shown has both ends of the inductor and trimmer capacitor connected to the positive power supply. You might prefer to build the circuit upside-down, especially if the circuit is to be built in a metal enclosure or the inductor is fitted with a screening can. **Figure 2** shows an alternative circuit using a PNP transistor which has the RF components at the ground side of the circuit.

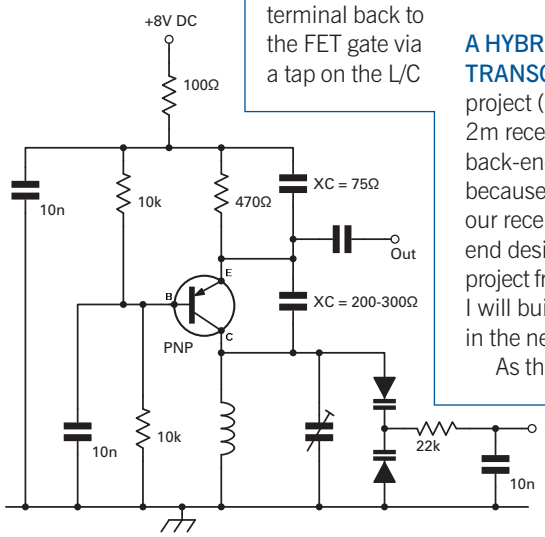


FIGURE 2: Alternative implementation of Figure 1 C with a PNP transistor so that the RF components are on the ground side.

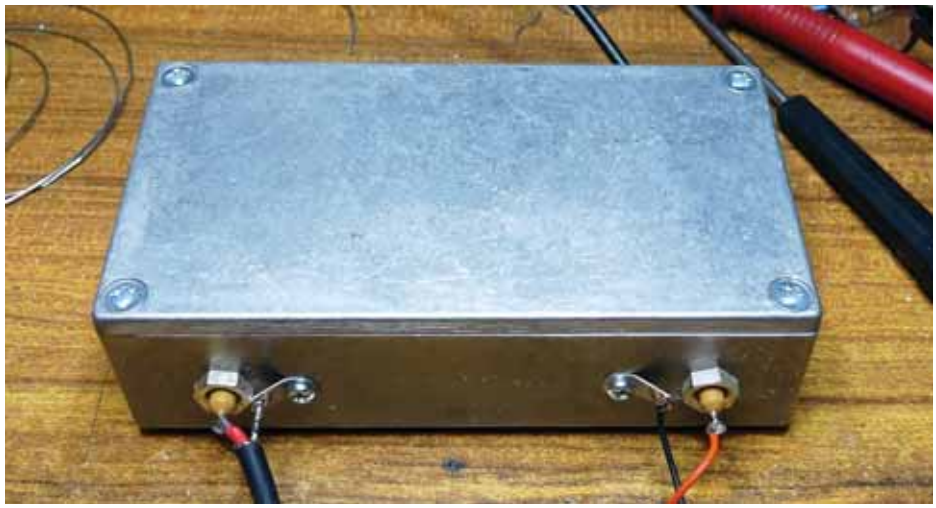


PHOTO 3: The lid of the VCO was screwed down tightly for testing.

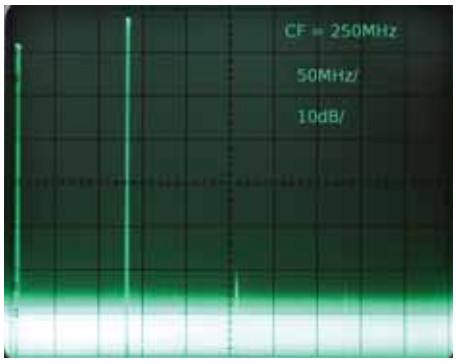


PHOTO 4: The output spectrum of the VCO is pretty clean and free from spurs.

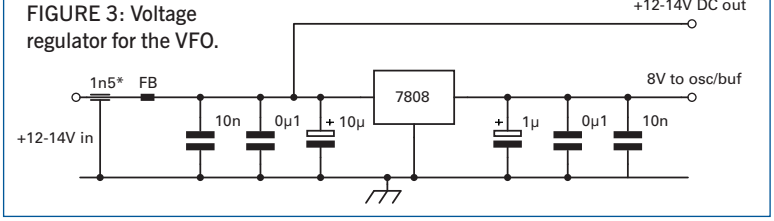
A HYBRID DDS/PLL FOR A 2m RECEIVER OR TRANSCEIVER.

This month's construction project (**Photo 1**) is a VCO unit for use in a 2m receiver. I will not describe the receiver back-end (IF/detector/AF/AGC) in any detail because it is identical to the circuits used in our recent LF receiver project. The RF front-end design is stolen from the 2m transverter project from April-July 2008. Time permitting, I will build a new GaAsFET based front-end in the next few weeks.

As the existing IF strip design has an IF frequency of 10.7MHz, the synthesiser output frequency for the 2MHz-wide band will be 144-10.7=133.3MHz to 135.3MHz. It should be possible to cover the American band of 144-146MHz with very little modification. The synthesiser will use a 133MHz VCO and buffer amplifier as the local oscillator for the 2m receiver. The 133MHz VCO signal will also be used as the REFCLOCK for a DDS. This part of the circuit is lifted directly from the earlier HF DDS design [1]. The DDS will be used to divide the 133MHz VCO down to the PLL reference frequency of 2.500MHz. The PLL reference is a 10MHz OCXO divided by 4 using a pair of flip-flops. Any available 5MHz or 10MHz reference can be used instead.

The VCO is an extremely – and I do mean extremely – critical component in a VHF synthesiser. You can only expect to achieve excellent performance if you pay very close attention to screening, grounding, power supply regulation and keeping all forms of noise and interference away from the VCO

FIGURE 3: Voltage regulator for the VFO.



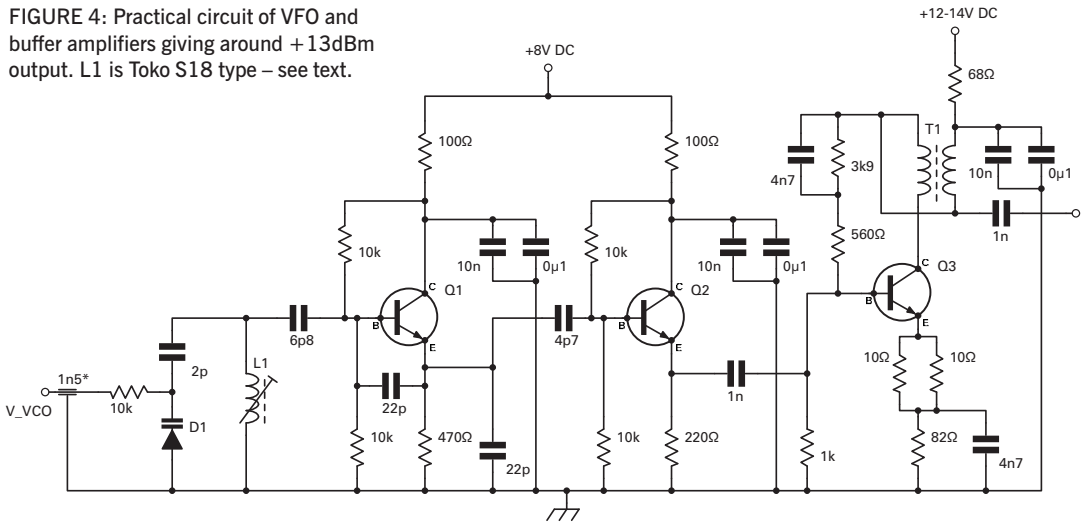


FIGURE 4: Practical circuit of VFO and buffer amplifiers giving around +13dBm output. L1 is Toko S18 type – see text.

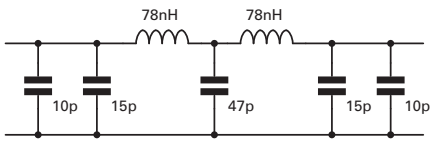


FIGURE 5: Chebyshev low pass output filter with 140MHz cutoff.

frequency control line. The importance of this point can not be overstated. Any noise on the control line will frequency modulate the VCO, which will lead to unwanted phase noise on the synthesiser output. We are looking for phase noise suppression well in excess of 100dBc at frequencies less than 1kHz from the local oscillator. My reference OCXO has a specified phase noise output of -100dBc/Hz at 10Hz, -150dBc/Hz at 1kHz and 160dBc/Hz at 10kHz. This excellent performance will surely be unachievable with a PLL, but we should try to get as near to this level of performance as possible.

SCREENING AND POWER SUPPLY. The VCO should be built in a very well screened enclosure. Some publications suggest an Altoids tin for this purpose. Since I don't actually know what an Altoid is, I shall have to look elsewhere. Some of my Homebrew friends have used tobacco tins as screened enclosures. As several of them have since died from smoking-related conditions, I don't think I will take this route either. Small mint tins as shown in the bottom right of **Photo 2** are ideal for small circuits built from surface-mount components. For larger circuits, boiled sweet tins (bottom left) are a better choice. One advantage of this kind of enclosure is that you can solder components directly to the tin plate. The other enclosures are an aluminium box and the more expensive 'Eddystone' style cast alloy box, both available from Maplin. As I don't have a sweet tooth, I opted for the Maplin N89BQ.

The VCO, buffer amplifiers, LPF and voltage regulator are built on a strip of copper PCB laminate which is bolted to the bottom of the enclosure. I used five M3 bolts, nuts and washers to secure the board. RF and power supply decoupling capacitors are soldered directly to the copper ground plane at strategic points close to the mounting nuts. The power supply and VCO control voltage are fed into the box via bolt-in 1.5nF feed-through capacitors. Solder types can be used with a tin-plate box or sweet tin. The capacitor value is not particularly critical. 1nF or 2.2nF would serve just as well.

The voltage regulator input and output is very well decoupled using several different values of ceramic and electrolytic capacitor. A ferrite bead is fitted to the lead from the DC supply feedthrough capacitor to the regulator input. The regulator circuit is shown in **Figure 3**. The 8V regulator is a standard 7808 TO220 type. I may decide to replace this with a low noise type, if I can find one.

Figure 4 shows the schematic of the VCO and buffer amplifiers. The VCO is a simple Colpitts type based on a BF199 bipolar transistor (Maplin N79AF). The inductor L1 is a Toko S18 type, blue, 6.5 turns, Q=130, 297nH. These are old stock, but they are still available from specialist suppliers. Alternatively, you can use any similar slug tuned inductor with 6 spaced turns. The varicap diode D1 is a VHF type BB831 or similar devices like the BB809. The output of the VCO is buffered by another BF199 configured as an emitter-follower. The VCO and first buffer are both powered by the stabilised 8V power supply. The final amplifier stage (Q3) is a BF199 with a 4:1 transformer in the collector circuit. T1 is 5 turns of enamelled wire, bifilar wound on a FT37-61 toroid core. The 5Ω emitter resistor in this stage is made from a parallel pair of 10Ω metal film resistors. This stage is powered from the 13.8V DC supply. No heatsink is required. The output is filtered by a 5th order LPF. I followed my usual lazy approach to the design of this filter by using the QUCS filter design tool. The initial design was for a 0.1dB ripple Chebyshev LPF with a cutoff frequency of 140MHz. The values were then tweaked slightly to the nearest standard values. The 78nH inductors are each 5 turns of 0.9mm enamelled wire wound on a 5mm former. The turn spacing is slightly more than 1 wire diameter. The LPF schematic is shown in **Figure 5**. Photo 1 shows the assembled VCO unit.

Photo 3 shows the VCO unit under test. Note the careful screening of the control voltage input (bottom left). I used a frequency counter (from February 2008) to measure the output frequency. The DC control voltage was provided by a 10k pot connected from 8V DC to ground. With the DC voltage adjusted to the mid value of 4V, the VCO inductor core (L1) was adjusted for an output frequency of 134MHz. Sweeping the control voltage from 0 to 8V confirmed that the VCO could cover the full frequency span with 1-2MHz extra at each end to allow for thermal drift and ageing. The frequency range is easily adjusted by changing the value of the 2pF capacitor in series with the varicap diode. A smaller value will give a smaller frequency swing; a larger value will allow a greater frequency span. The measured output was 1.4V peak, or almost +13dBm. This is an ideal level for driving a high level diode mixer or a standard level 7 (SBL-1 etc) mixer via a 6dB attenuator pad. **Photo 4** shows the output spectrum of the VCO unit from LF to 500MHz. The second harmonic is at -57dBc; the third harmonic is just visible at the noise floor of the analyser. A close analysis at a narrower span shows no other detectable spurious outputs.

READER FEEDBACK. Many thanks to everybody who has sent e-mail and written comments over the last few weeks. Since my recent moan about the lack of 240Ω resistors in the EI9GQ junkbox, I have had several kind offers of resistors from *RadCom* readers. Thanks also to G0CPP for reminding me that the closest E24 series resistor to 61.111Ω is 62Ω and not 56Ω. If only I could find something as exotic as a 62Ω resistor in my junkbox!

Next month we'll be looking at reference oscillator and PLL circuits for the synthesiser.

REFERENCE

[1] http://homepage.eircom.net/~ei9gq/dds.html and Homebrew, March 2010.

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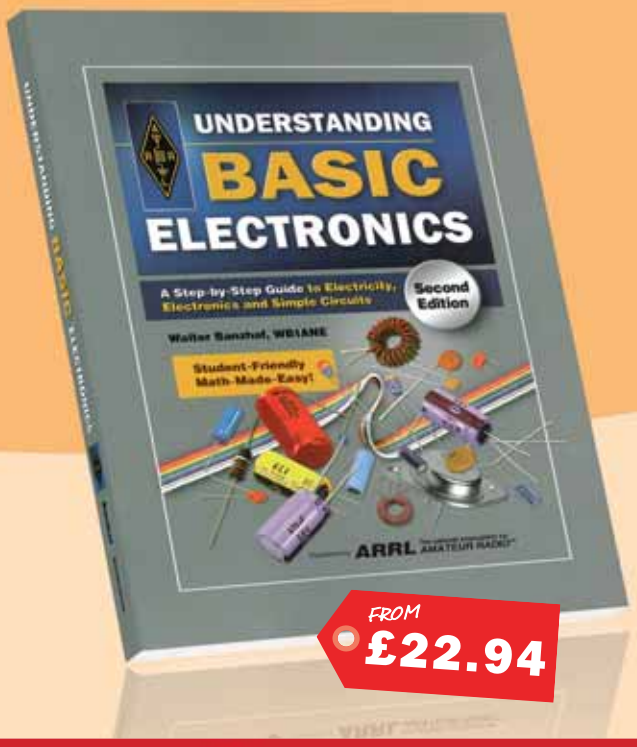

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"As a final postscript, I have been searching for some time for a new main station HF radio as my FT-1000MP is now 12 years old. I think I may have found it - roll on deliveries!!

Peter Hart, RadCom FTdx5000 Review, May 2010.

Last month Peter Hart reviewed the Perseus SDR Receiver and proclaimed to have found a new No.1 in receiver performance. The crown given to Perseus was short lived. The new FTdx5000 grabs the position, ahead of the Perseus SDR, Elecraft K3, Flex-5000, in that order.

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FTDX5000D HF + 6m transceiver

Yaesu's latest radio sets new performance standards.

The Yaesu FTDX5000 transceiver with SM-5000 Station Monitor look superb together.

INTRODUCTION. The FTDX5000 is Yaesu's latest transceiver, an elite class base station radio with a most impressive specification. Based on the FTDX9000 and FT-2000 models, Yaesu has clearly addressed feedback from users and reviewers to develop a radio with outstanding performance and user-friendly ergonomics. Both Ten-Tec with their Orion, and Elecraft with their K3 have been leading the pack for RF performance using down-conversion receiver architectures achieving exceptional levels of close-in dynamic range. Yaesu have now followed suit with a down conversion main receiver, their first for over 25 years, together with selectable high grade roofing filters.

This new model is available with three levels of fitted options. The FTDX5000 is the core radio common to all options. The FTDX5000D includes the separate SM-5000 station monitor that provides spectrum display and dual forward facing speakers. The FTDX5000MP also includes an oven stabilised reference oscillator and the narrowest 300Hz roofing filter. The extra roofing filter and station monitor can be added later to the basic core radio if desired.

The FTDX5000 covers the HF bands and 50MHz and is AC mains operated with a built-in PSU. Twin independent receivers are fitted that can operate on different bands, using different antennas. They can provide separate audio outputs. The transmitter provides 200W output.

The radio is currently undergoing CE qualification and will be available soon in Europe. I was fortunate, with the help of Martin Lynch, to gain access to an early non-CE model to conduct this review. There may be slight accessory or other detail differences for the CE qualified model but I would not expect these to alter the performance.

BASIC FUNCTIONS. The FTDX5000 is a substantial radio measuring 462mm (w) x 135mm (h) x 389mm (d) and it weighs about 21kg. It is somewhat larger and heavier than the FT-2000 but not as large or as heavy as the FTDX9000D. Both receivers tune continuously from 30kHz to 60MHz but the performance is only specified for the amateur bands. Individual buttons select the bands with a triple band stacking register where one of three last used combinations of frequency, mode and other settings is returned for each press of the band key. Separate sets are stored for each receiver. Individual buttons also select the usual modes with both sidebands available on CW, RTTY and PKT, and wide or narrow deviations on FM and FM-PKT.

The front panel is clearly laid out with virtually all functions available from dedicated controls of a good, manageable size. Both A- and B-receivers have separate and fully comprehensive controls for all filtering and signal processing functions and these are laid out in a logical way. The dual receivers, being fully independent through to stereo audio output, allow various diversity modes to be used.

The main display is a multicoloured vacuum fluorescent type and there are three separate sub-displays. One indicates B-receiver frequency and the other two show the settings for channel bandwidth, shift, notch, contour etc for both the A- and B-receivers in graphical and numerical formats. This is a great improvement over the FT-2000. The S-meter for the A-receiver is a large analogue type and for the B-receiver it is a bargraph. Signal path functions for antenna, attenuator, amplifier, filter and AGC settings are portrayed as block diagrams. A handy tuning indicator is provided for accurate CW netting and both A and B frequencies are displayed to1Hz resolution. The displays and LED illuminations are rather dim but have a good viewing angle.

An extensive set-up menu system of 176 items allows for customisation of the various functions and features. This is particularly easy to set with comprehensive readout spread across the three sub-displays. As with other recent Yaesu radios, the built-in firmware is upgradeable. Full details are given on the Yaesu website and there have already been several code upgrades released.

The FTDX5000 can be used in conjunction with the DMU-2000 Data Management Unit that was first introduced for the FT-2000 and which can be connected at the same time as the SM-5000 station monitor. The sharp external μ-tune filters may also be connected.

There are four antenna sockets on the rear panel and additional sockets for separate receive antenna and separate receiver. Any combination of these may be selected for any band and either VFO. There are CW key jacks on both the front and rear panels and these may be configured independently for various internal or external keying options. A standard 8-pin microphone socket is located on the front panel and an MH-31 hand microphone is provided with the unit. An external remote control keypad, FH-2, is also provided and connects via the rear panel. This is used to control the CW memory keyer and voice stores.

Standard DIN connectors provide interfaces for Packet and RTTY purposes, band data for external ATUs and auto-bandswitched linears such as the VL-1000. Mini-DIN connectors provide interfaces to the SM-5000 or DMU, μ-tune filters and Yaesu rotators. Some Yaesu antenna rotators can be controlled from the radio front panel. An array of phono connectors provides PTT, linear control, ALC, audio recording jacks, microphone, transverter drive and other lines. One jack allows an external switch to output a tuning signal for linear amplifier or ATU tune-up independent of mode.

The SM-5000 sits neatly on top of the FTDX5000.

The rear panel holds an impressive array of connections yet is relatively uncluttered.

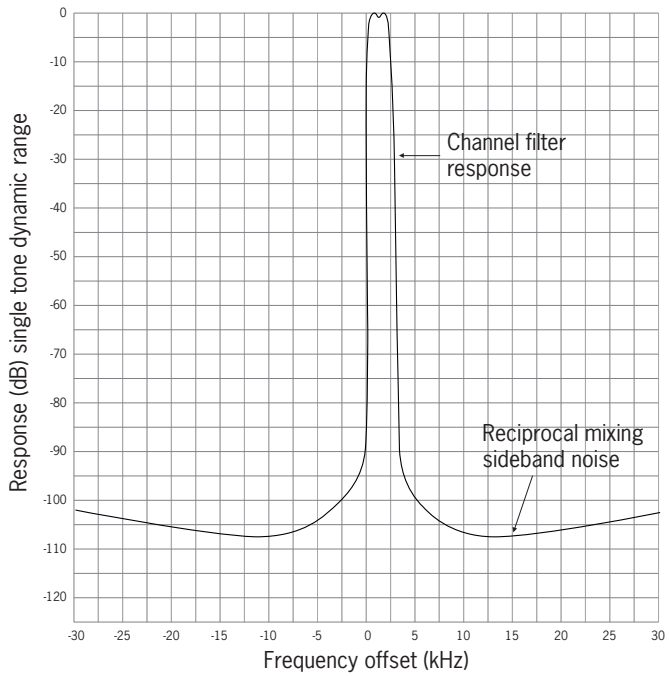


FIGURE 1: FTDX5000 composite selectivity curve on USB. Receiver bandwidth 2400Hz. Sharp response/medium slope. 3kHz roofing filter.

A transverter drive output at about –10dBm is available on the 14, 28 or 50MHz bands and the display can be offset over a limited range to indicate the last two MHz digits, eg '44' for 144MHz or '32' for 432MHz but other bands are not accommodated. The transverter receive path interfaces via the normal antenna connection. To avoid possible damage when not in transverter mode, this would best be connected to the receive-only antenna connection.

A 9-pin D connector interfaces directly to a PC serial COM port for computer control. Surely these days it would be better to provide a USB port for PC control and also allow audio for data modes and storage to be interfaced to a computer this way? Technology has moved on, not many new PCs have serial ports now but so far only Icom have moved with the times.

RADIO DESIGN AND ARCHITECTURE. The main receiver in the FTDX5000 using VFO-A adopts a down-conversion double superhet architecture with a first IF of 9MHz and a second IF of 30kHz, directly feeding the DSP for all further signal processing. There are five selectable roofing filters at the first IF with bandwidths of 300Hz, 600Hz and 3kHz using high-grade 6-pole filters, and 6kHz and 15kHz using 4 pole monolithic filters. The 300Hz filter is fitted as standard into the MP model and an optional extra for the others. A 32 bit DSP is used to provide all IF channel filtering, demodulation, noise reduction, audio processing and AGC functions.

The A-receiver front end has two switchable bipolar RF preamplifiers for high or low gain and two levels of straight mixer feed (IPO1 and IPO2) for best strong signal performance. The amplifiers are not selectable below 1.7MHz. Three levels of attenuation may also be inserted. There are 15 input bandpass filters covering the total frequency range of the receiver and a sharply tuned preselector, VRF, for each of the amateur bands except 50MHz. The VRF filters are preset to the centre of the bands but may be manually tuned by a front panel control. The first mixer uses 8 dual-gate FETs in a D quad double balanced configuration for high dynamic range. An IF output prior to the roofing filter is made available for external use such as for spectrum scans and monitoring based on SDR receivers.

The second or sub receiver using VFO-B is an up-conversion triple superhet with IFs of 40.455MHz, 455kHz and 30kHz and feeds a separate, identical DSP for remaining processing. The same DSP processing functions are provided for both A- and B-receivers. 15kHz, 6kHz and 3kHz roofing filters are fitted at the first IF and there is some additional selectivity at the second IF. The B-receiver front-end also contains two preamplifiers for use above 1.7MHz, one level of straight mixer feed (IPO1), 8 input bandpass filters and a separate VRF sharply tuned preselector. The first mixer uses 4 dual-gate FETs in a double balanced configuration.

An oven-stabilised 0.05ppm reference is fitted into the MP version, and a 0.5ppm TCXO into the other models, ensuring excellent frequency accuracy and stability. The various local oscillator feeds and signal sources are derived directly from DDS chips (mainly AD9951) without the usual PLLs. This can result in much better phase noise performance but low-level spurious outputs can be a problem.

The transmitter uses the B-receiver frequency scheme in reverse - 30kHz / 455kHz / 40.455MHz to final frequency. The power amplifier runs from 50V DC, delivering 200W output from a pair of VR150 FETs.

The radio is solidly constructed in typical Yaesu style using a substantial diecast frame on which the circuit boards are mounted, as is the wrap-around case. A single, reasonably sized 8cm speaker fits in the case top. The transmitter PA is fitted with a large finned heatsink and a single fan on the rear cools the unit. This only operates when the temperature rises and is very quiet in operation. Extensible front feet tilt the front panel to improve visibility and operating ease but no carrying handles are fitted.

RECEIVE FEATURES. Most of the receiver functions are similar to the FT-2000 and FTDX9000 but are in general more logically accessed and presented. The radio is fitted with an excellent main tuning drive, 60mm in diameter, with weighted flywheel action and adjustable drag. With 1000 steps per revolution and 10Hz steps it combines precise tuning with fast frequency navigation. 1Hz and 5Hz steps are also selectable with faster rates and different rates on AM and FM. A separate and rather small tuning knob sets the frequency of VFO B, with 1000 steps per revolution. This knob is multifunction, also providing clarifier, memory channel selection and stepping by bands. With band stepping you can skip bands, customising band access (termed MYBANDS) and access transverter operation. The frequency can also be entered directly through the band buttons. The radio provides the usual Yaesu Quick Split feature and TXW for quick monitoring and tuning the transmit frequency during split frequency operation.

There are 99 regular memory channels that also store virtually every receiver setting. Up to six memory groups can be set up but labels are not used. A further nine memory channels hold programmable scan limits, and the usual scan facilities are provided. Another five provide the normal quick access memory bank feature. The US version accesses 60m channels via a separate set of memory channels and

I guess the UK version will do likewise, as is implemented in the FT-2000.

Three AGC speeds are selectable, each programmable in terms of hang time and decay time over wide limits including sloped AGC operation. Sloped AGC allows the audio volume to rise and fall according to signal level. The IF channel bandwidth is adjustable over wide limits, from 200Hz to 4000Hz on SSB, 50Hz to 2400Hz on CW and data modes, 6kHz or 9kHz on AM and 9kHz or 16kHz on FM. A 'Narrow' button selects a narrower bandwidth setting for each mode and the overall filter shape factor and roll-off transition may be tailored. There is the usual IF shift control and on CW a sharp audio filter may be selected. On voice modes, the Yaesu Contour filtering system allows a shallow notch or peak to be rolled over the filter passband, which can enhance readability in some situations. The depth and width of the contour notch/peak is adjustable from the set-up menu. An IF noise blanker is provided removing either short or long duration pulses and the level is adjustable from the front panel. A tuneable IF notch is provided with wide or narrow width setting and a separate digital auto notch. Digital noise reduction with 15 different digital noise reduction algorithms is also provided. Operation of the Contour filter and tuneable IF notch is particularly easy to view if the DMU-2000 accessory is connected.

Top view with covers removed showing filters, TX PA and power supply.

FTDX5000 underneath view with covers removed showing the main RF boards and synthesisers.

TRANSMIT FEATURES. The transmitter contains a 200W power amplifier, reducible down to about 10W. It has a Class A setting for low distortion operation on SSB at a maximum power level of 75W output. VOX, speech processor and a transmission monitor are provided on voice modes and the transmission bandwidth can be adjusted to provide for either higher fidelity or for lower bandwidth, higher talk power, contest operation. A highly configurable three-band parametric microphone equaliser is also included which will adapt to a wide range of microphone characteristics.

On CW there is the usual provision for full and semi break-in and a spot key for accurate netting with a front panel pitch control. The rise and fall times of the CW keying envelope are settable from 1 to 6ms. Switching between semi and full break-in requires menu access but semi break-in drop back delay is adjustable from the front panel control. A full CW message keyer is included with some useful features for contest operation. The keyer operates over the range 4 – 60 WPM with adjustable weighting and a variety of keying paddle arrangements. 5 memories will store 50 characters each with a provision to send automatically incrementing serial numbers and auto-repeat after a time delay in beacon mode. The message stores are programmed either using the keying paddle or in text from front panel controls or FH-2 remote keypad. Control of the keyer and message playback is via the keypad.

A digital voice memory is also provided controlled via the FH-2 keypad. Useful for SSB contest operation, there are five stores each holding up to 20 seconds of voice messages. The voice store can also be used on receive to record the last 15 seconds of audio, perhaps to confirm a missed callsign or serial number.

The radio includes a built-in auto ATU operating only on transmit over the bands 1.8 to 50MHz and will tune antennas with up to 3:1 VSWR. 100 memories store tuning settings to enable rapid and accurate reselection. Metering on transmit uses the analogue meter and indicates power output, SWR, ALC, compressor level, PA voltage or drain current. FM operation allows for separately configured shifts for 28MHz and 50MHz repeaters and includes a CTCSS tone encoder/decoder.

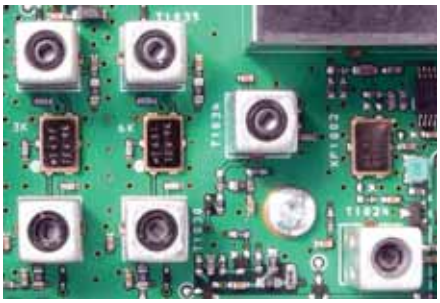
SM-5000 STATION MONITOR. The SM-5000 station monitor sits on top of the case, adding about 45mm to the height and connects via three lines on the rear panel. It provides a spectrum display and contains dual forward facing speakers to provide stereo outputs from the two receivers or mixed outputs as desired. There are four settings for sound quality and a phase inversion setting that claims to add depth to the sound.

The spectrum display operates on the A-receiver and has a displayed range of 80dB. There are three basic modes of operation. In the FIX mode it will scan between two fixed points, separately programmable for each band. In the CTR mode it will scan a range either side of the receiver frequency with selections from ±25kHz to ±2500kHz. The Limited Bandwidth Sweep mode narrows down on the CTR mode to increase the scanning speed and reduce time delays.

MEASUREMENTS. The full set of measurements is given in the table for the main A-receiver with the 3kHz roofing filter selected in most cases unless otherwise stated. Compared with the no amplifier IPO1 setting, the two receiver preamplifiers showed gains of 12dB and 23dB, and the IPO2 setting a loss of 11dB. This is reflected in the sensitivity, S-meter calibration and dynamic range measurements. The receiver is very sensitive, particularly with amplifier 2. It is largely the same with the different roofing filters or with VRF in circuit but is 3dB lower with both receivers enabled. Sensitivity reduces just a little at lower frequencies to 2μV at 136kHz. The S-meter calibration closely followed 3dB per S-unit and was very linear up to at least S9+40. The B-receiver sensitivity was very similar and its S-meter read about 4dB lower than the main receiver.

The 9MHz IF rejection on most bands was greater than 100dB, but on 10MHz it was only 54dB, and on 7MHz it was 74dB. VRF front-end tuning improved these figures by 20dB. The first mixer image was only down by 55dB to 70dB but VRF improved this to better than 75dB. The B-receiver generally measured rather better on these figures with IF and image responses down by over 80dB. Spurs on the synthesiser resulted in a number of unwanted receiver responses, notably at approx ±425kHz from the received frequency at only 65dB

Removing the internal side shield reveals receiver A, mounted on the right side of the radio. The roofing filters (space for fitting 300Hz left) are readily accessible via a small hatch in the side shield.



Roofing filters in the B-receiver.

down on the A-receiver (90dB down on the B-receiver) and at ±40kHz down by 85dB. VRF improves these figures but only marginally on the higher bands.

The AGC performance of both receivers was generally quite clean and decay times reasonably close to the menu set values. A slight hole was observed in the attack response but is much better overall in this respect than the FT-2000 and FT-950 series of radios.

Third order intercept, dynamic range and blocking figures were outstanding with the appropriate roofing filters selected. With 108dB dynamic range in 500Hz CW bandwidth at 1kHz spacing, this is the best close-in figure I have measured for any radio. In IPO2 setting the 3rd order intercept was in excess of +45dBm but with reduced sensitivity the dynamic range was no higher than in IPO1 setting. Reciprocal mixing results were also superb, at least equal to the best I have ever measured, and exhibited a somewhat unconventional characteristic, gradually worsening away from the carrier. As a consequence of the excellent reciprocal mixing results, it was possible to measure at least 80dB down the channel filter skirts and showed that the DSP IF filters were excellent, some of the tightest figures measured for any radio. **Figure 1** shows the composite selectivity curve.

In my league table of receiver performance, based on close-in dynamic range, the FTDX5000 now sits at the number 1 position, ousting the Perseus SDR, Elecraft K3 and Flex-5000 into positions 2, 3 and 4 respectively.

The B-receiver dynamic range is not quite as good as the A-receiver but is still very respectable. 3rd order intercept measured +21dBm in the IPO1 setting outside of the roofing filter bandwidth and about 10dB less dynamic range than the A-receiver. Reciprocal mixing figures were 7dB worse close-in but rather better than the A-receiver further out.

On transmit, two-tone distortion products are generally quite low in Class AB and even lower in Class A. The processor adds some close-in distortion but negligible increase further out and distortion degraded very markedly with overdrive, so keep well within the ALC limit. Harmonic outputs were exceptionally low. The auto ATU introduced negligible loss and the power meter reading was fairly accurate. CW rise and fall shapes were clean with negligible distortion. At 40 WPM there was slight character shortening in full break-in mode but this was negligible with semi-break-in. AM transmit was clean with low distortion.

ON-THE-AIR PERFORMANCE. The FTDX5000 is an impressive-looking radio with a large number of front panel controls. However, the controls are very logical and learning time with the manual is kept to a minimum. As with all Yaesu manuals, descriptions are clear and comprehensive but there are a number of small errors in this early manual release. Control placement and size is excellent but the display and button illuminators in particular are difficult to see under bright lighting. The SM-5000 display is particularly dim. The right hand audio gain knob controls the left hand (A) channel and the left hand knob controls the right hand (B) channel, which is somewhat illogical.

The receiver performed extremely well under both weak and strong signal conditions. The filters were excellent and even at 50Hz bandwidth there was minimal ringing on CW. The notches were excellent, deep, and the auto-notch was fast acting. Digital noise reduction seemed quite aggressive and was effective in some situations as also was the Contour filtering. The audio quality with the internal speaker was good but better and more effective through the SM-5000. I found the Loudness setting gave the best overall sound. With a single receiver channel the audio is shared between both SM-5000 speakers. The phase inversion setting, which puts the two speakers in antiphase, resulted in lack of bass and an acoustic interference pattern as you move in front of the speakers that I found fatiguing. This is not surprising as it goes against all the rules on setting up stereo hi-fi speakers.

I searched for incidences of spurious signal breakthrough at 425kHz off-channel. I could just detect on 7005kHz a broadcast station on 7430kHz running 40 to 50dB over S9 during the evening. No other stations were strong enough for spurii to be heard. To put this into perspective, this is unlikely to cause a problem in practice as the number of such strong signals 425kHz away from the amateur bands is quite small. The VRF preselector should be used if such interference is suspected.

While carrying out the measurements I found that the two receivers, when set nominally to the same frequency (by pressing A=>B), were not quite on the same frequency but differed by a very small amount: about 0.2Hz on SSB and rather less than this on CW. This will however destroy any phase coherence in certain diversity modes and hence the effectiveness of these modes.

The spectrum display on the SM-5000 is quite useful but there is a noticeable delay when tuning in CTR mode and, like all other conventional radios, it is not up to the resolution available on SDR receivers. A combination of FTDX5000 with an SDR on the 9MHz IF output would be a most interesting combination, particularly if coupled with point and click tuning.

The AGC performance under noisy conditions was much better than earlier DSP radios. I found memory operation rather cumbersome compared with many other radios, with rather more button pressing needed. LF performance was clean but a little less sensitive than some other radios and broadcast band performance was generally excellent.

On transmit, audio quality was quite reasonable using the supplied microphone but noticeably better using my Heil. However, it is most important not to overdrive and to keep compression to a minimum. CW keying was clean; there was a slight thump on changeover, which was not distractive.

CONCLUSIONS. The FTDX5000 is a most impressive radio with an excellent set of features, excellent ergonomics and the highest close-in dynamic range of any radio to date. The only area for concern is the receiver spurious signal rejection. With so much effort to achieve unparalleled close-in performance, it is a shame that the out of band receiver spurious responses are not somewhat better. However, the real consequences of this are somewhat unproven.

With a top of the range price tag we will have to wait a little longer for the unit to be available in Europe and the UK.

As a final postscript, I have been searching for some time for a new main station HF radio as my FT-1000MP is now 12 years old. I think I may have found it - roll on deliveries!!

ACKNOWLEDGEMENTS. I would like to express my gratitude to Martin Lynch & Sons for the loan of this radio. For further information please see www.ftdx5000.com.

TABLE 1: Yaesu FTDX5000 measured performance.

RECEIVER MEASUREMENTS, VFO-A

	SENSITIVITY SSB 10dBs+n:n			INPUT FOR S9		
FREQUENCY	IPO1	PREAMP 1	PREAMP 2	IPO1	PREAMP 1	PREAMP 2
1.8MHz	0.8μV (-109dBm)	0.2μV (-121dBm)	0.14μV (-124dBm)	125μV	32μV	10μV
3.5MHz	0.6μV (-111dBm)	0.16μV (-123dBm)	0.09μV (-128dBm)	140μV	35μV	10μV
7MHz	0.7μV (-110dBm)	0.18μV (-122dBm)	0.1μV (-127dBm)	140μV	35μV	10μV
10MHz	0.9μV (-108dBm)	0.22μV (-120dBm)	0.11μV (-126dBm)	140μV	35μV	10μV
14MHz	0.6μV (-111dBm)	0.18μV (-122dBm)	0.09μV (-128dBm)	140μV	35μV	10μV
18MHz	0.7μV (-110dBm)	0.18μV (-122dBm)	0.1μV (-127dBm)	140μV	35μV	10μV
21MHz	0.7μV (-110dBm)	0.18μV (-122dBm)	0.09μV (-128dBm)	140μV	35μV	10μV
24MHz	0.8μV (-109dBm)	0.2μV (-121dBm)	0.09μV (-128dBm)	140μV	35μV	10μV
28MHz	0.8μV (-109dBm)	0.2μV (-121dBm)	0.09μV (-128dBm)	140μV	35μV	10μV
50MHz	1.1μV (-106dBm)	0.3μV (-118dBm)	0.11μV (-126dBm)	140μV	35μV	8μV

AM sensitivity (28MHz) Preamp 1: 1.3μV for 10dBs+n:n at 30% mod depth
FM sensitivity (28MHz) Preamp 1: 0.4μV for 12dB SINAD 3kHz pk deviation
AGC threshold Preamp1: 2μV
100dB above AGC threshold for <1dB audio output increase
AGC attack time: 1-2ms
AGC decay time: approx as specified
Max audio at 1% distortion: 3.5W into 4Ω
Inband intermodulation products: -40 to -50dB

S-READING (7MHz)	PREAMP 1
S1	2.8μV
S3	5.6μV
S5	8.9μV
S7	18μV
S9	35μV
S9+20	350μV
S9+40	3.5mV
S9+60	28mV

BANDWIDTH/ROOF	BANDWIDTH			
SET TO	-6dB	-60dB	-70dB	-80dB
2.4kHz/3kHz roof				
Steep	2507Hz	3044Hz	3101Hz	3142Hz
Medium	2561Hz	3249Hz	3344Hz	3442Hz
Gentle	2683Hz	3710Hz	3889Hz	4097Hz
500Hz/600Hz roof				
Steep	525Hz	660Hz	683Hz	767Hz
Medium	535Hz	709Hz	745Hz	849Hz
Gentle	558Hz	788Hz	852Hz	1020Hz

INTERMODULATION (15kHz tone spacing) 2400Hz bandwidth 6kHz roof USB

	IPO1		PREAMP 1		PREAMP 2	
Frequency	3rd order intercept	2 tone dynamic range	3rd order intercept	2 tone dynamic range	3rd order intercept	2 tone dynamic range
1.8MHz	+33dBm	101dB	+21dBm	101dB	+1dBm	90dB
3.5MHz	+34.5dBm	104dB	+22.5dBm	104dB	+11dBm	99dB
7MHz	+37.5dBm	105dB	+26dBm	105dB	+18dBm	103dB
14MHz	+36dBm	105dB	+24dBm	104dB	+12dBm	100dB
21MHz	+36dBm	104dB	+24dBm	104dB	+13dBm	101dB
28MHz	+35dBm	103dB	+22.5dBm	102dB	+12dBm	100dB
50MHz	+38dBm	103dB	+25dBm	102dB	+12dBm	99dB

CLOSE-IN INTERMODULATION ON 7MHz BAND 500Hz bandwidth CW IPO1

	15kHz ROOFING		6kHz ROOFING		3kHz ROOFING		600Hz ROOFING	
Spacing	3rd order intercept	2 tone dyn range	3rd order intercept	2 tone dyn range	3rd order intercept	2 tone dyn range	3rd order intercept	2 tone dyn range
0.5kHz	-8.5dBm	77dB	-8.5dBm	77dB	-5dBm	80dB	+30.5dBm	104dB
1kHz	-8.5dBm	77dB	-8.5dBm	77dB	+6.5dBm	88dB	+36.5dBm	108dB
1.5kHz	-8.5dBm	77dB	-8.5dBm	77dB	null	null	+37dBm	109dB
2kHz	-8.5dBm	77dB	-4dBm	80dB	+33.5dBm	106dB	+37dBm	109dB
3kHz	-8.5dBm	77dB	+3.5dBm	85dB	+36.5dBm	108dB	+38dBm	109dB
4kHz	-2.5dBm	81dB	+24.5dBm	99dB	+37dBm	108dB	+38dBm	109dB
5kHz	null	null	+39.5dBm	109dB	+38dBm	109dB	+38dBm	109dB
7kHz	+21.5dBm	97dB	+39dBm	109dB	+38dBm	109dB	+38dBm	109dB
10kHz	+38dBm	108dB	+39dBm	109dB	+38dBm	109dB	+38dBm	109dB
15kHz	+38dBm	108dB	+38dBm	108dB	+38dBm	109dB	+38dBm	109dB
20kHz	+38dBm	108dB	+38dBm	108dB	+38dBm	109dB	+38dBm	109dB

FREQUENCY	RECIPROCAL MIXING FOR 3dB NOISE 500Hz BW		BLOCKING AMP1		
OFFSET	VFO-A	VFO-B	15 kHz ROOF	6kHz ROOF	3kHz ROOF
0.5kHz	86dB	not meas	-32dBm	-32dBm	-32dBm
1kHz	96dB	89dB	-32dBm	-32dBm	-32dBm
2kHz	104dB	97dB	-32dBm	-32dBm	+6dBm
3kHz	107dB	100dB	-32dBm	-32dBm	+14dBm
5kHz	112dB	104dB	-32dBm	-15dBm	+14dBm
10kHz	114dB	108dB	0dBm	+14dBm	+14dBm
15kHz	112dB	109dB	+4dBm	+15dBm	+15dBm
20kHz	111dB	109dB	+13dBm	+15dBm	+15dBm
30kHz	106dB	109dB	+15dBm	+15dBm	+15dBm
50kHz	103dB	108dB	+15dBm	+15dBm	+15dBm
100kHz	98dB	106dB	+15dBm	+15dBm	+15dBm
200kHz	96dB	107dB	+15dBm	+15dBm	+15dBm

TRANSMITTER MEASUREMENTS

	CLASS AB POWER	CLASS A POWER	INTERMOD. PRODUCTS		
FREQUENCY	OUTPUT	OUTPUT	--CLASS AB-- 3rd/5th order	---CLASS A--- 3rd/5th order	HARMONICS
1.8MHz	200W	75W	-34/-46dB	-40/-56dB	<-70dB
3.5MHz	208W	76W	-40/-45dB	-40/-58dB	<-70dB
7MHz	202W	76W	-42/-44dB	-42/-54dB	<-70dB
10MHz	204W	76W	-43/-43dB	-42/-54dB	<-70dB
14MHz	204W	75W	-50/-50dB	-41/-56dB	<-70dB
18MHz	208W	77W	-34/-43dB	-40/-54dB	<-70dB
21MHz	208W	77W	-32/-47dB	-42/-54dB	<-70dB
24MHz	207W	76W	-36/-43dB	-38/-52dB	<-70dB
28MHz	205W	77W	-40/-44dB	-41/-55dB	<-70dB
50MHz	205W	76W	-30/-46dB	-40/-56dB	<-70dB

Intermodulation product levels are quoted with respect to PEP.

Microphone input sensitivity: 0.2mV for full output
FM deviation: 2kHz narrow / 4kHz wide
SSB T/R switch speed: mute-TX 40ms, TX-mute 4ms, mute-RX 60ms, RX-mute 4ms

NOTE:
All signal input voltages given as PD across antenna terminal. Unless stated otherwise, all measurements made on USB with receiver preamp switched out (IPO1), 2.4kHz IF bandwidth and 6kHz roofing filter.

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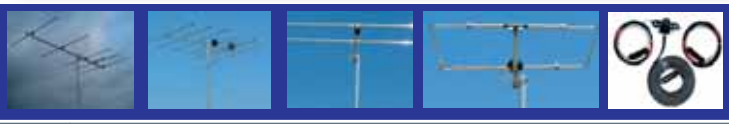

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Amateur Radio in the European Parliament

Explaining to our leaders the importance of our hobby



1 RSGB President Dave Wilson, M0OBW and Graham Shirville, G3VZV (IARU Region 1 Satellite Frequency Coordinator). Graham was talking to delegates about the FUNCube satellite, which is an educational single cubesat project with the goal of enthusing and educating young people about radio, space, physics and electronics. **2** A model of the Oufti-1 satellite was on display. Oufti-1 will be the first satellite to test the use of the D-Star communication protocol in space. It will use 435MHz for the uplink and 145MHz for the downlink. **3** The RSGB President took the opportunity to present the Calcutta Key to Gaston Bertels, ON4WK, Chairman of ARISS, for his work in fostering International Friendship through the ISS School program.

TO BRUSSELS. At the end of April, various European amateur radio societies put on an exhibition in the European Parliament building located in Brussels, Belgium. Using the motto *European Amateur Radio Benefiting Society*, the event was sponsored by the IARU Region 1 EUROCOM Working Group and European Parliament Member (MEP) Birgit Sippel, who supports the goals and the importance of amateur radio. The RSGB has a prominent role in the work of EUROCOM and RSGB General Manager Peter Kirby, G0TWW, is the committee's vice chairman.

"Even though the amateur radio service has been around since 1908 and many countries even have special laws to regulate it, the service is often unknown in public," said EUROCOM Working Group Chairman Thilo Kootz, DL9KCE. "In the European Union alone, about 350,000 people of all ages are fascinated by this hobby. A combination of communication, technology and sports bonds them together and makes amateur radio unique."

Through personal contacts and demonstrating practical examples, the exhibitors illustrated the amateur radio service and its structures and benefits for society. Young people who are interested in space exploration are drawn to amateur radio, as it allows them to actually communicate via satellites and even speak to the International Space Station (ISS). But according to Kootz, a contact to the other side of the globe with self-built equipment and limited antennas fascinates youngsters, as well: "These technology-loving youngsters are likely to become engineers or high tech specialists, benefiting the wealth and growth of the EU." The exhibition also showed the MEPs how amateur radio helps in emergencies, using the recent earthquakes in Haiti and the 2006 tsunamis in the Indian Ocean as examples. Visitors to the exhibition were able to test their Morse code skills – one to the easiest modes of short wave operation in low signal conditions.

During the exhibition, 10 students from a school in Brussels contacted the International Space Station. ISS veterans Roman Romanenko of Russia, Canadian Robert Thirsk and Belgium's own Frank De Winne were in Parliament to open the exhibition. When in orbit they regularly spoke to school children via radio.



4 As one of the aspects of the exhibition was space exploration. Visitors to the exhibition included former astronauts Roman Romanenko, Robert Thirsk and Frank De Winnie. All three astronauts regularly spoke to school children using amateur radio during their space missions. **5** The amateur radio demonstration station, which comprised a TS-480 control head and microphone, remote rig box and a computer for controlling the SteppIR 3 element beam and amplifier that were located in Munich. Mitch Wolfson, DJ0QN kindly provided the station that gave licensed visitors the chance to operate his station in Munich whilst at the exhibition in Brussels. **6** The European Space Agency was represented for its links to the amateur satellite programme. **7** Thilo Kootz, DL9KCE, Chairman of the IARU Region 1 EUROCOM Working Group and German MEP Birgit Sippel who sponsored the exhibition in Brussels.

Antennas

Is this the ultimate indoor antenna?

PHOTO 1: The large barn that houses W1GN's HF beam antenna.

THE ULTIMATE INDOOR ANTENNA. I often join the midday Mid Sussex Amateur Radio Club net on 21MHz. The net is run by Ken, G3WYN and many of the club members join in. I am some distance away down on the coast but I can just make it on ground wave.

David, W1GN (ex G3HWU) located in New Hampshire has, when conditions are favourable, been joining the net for some years now and is considered an honorary member. He puts in quite a good signal and, as it turned out, has a very interesting antenna arrangement. It seemed to me the ultimate indoor antenna.

W1GN uses a full size three-element single band Hy-Gain LJ-153BA Yagi, located in a barn. This is no ordinary barn, being some 75ft long (22.8m) and 45ft (13.7m) wide, as shown in **Photo 1**. The roof ridge is at 48ft (14.6m) above the concrete base. The covering consists of strips of galvanized metal with assumed poor electrical bonding. All walls, flooring, roof trusses and sheathing are made of wood.

The horizontal plane of the Yagi is 27ft (8.2m) above the concrete basement and is suspended by ropes at the barn's north end, across the 45ft width, with the director 2ft (0.6m) away from the wall as shown in **Photo 2**. The boom is about 21ft (6.4m) beneath the apex of the roof. The suspension ropes are attached to a short wooden boom, which is mounted on the metal boom, one at each end. There is no contact between the ropes and antenna elements.

However, the adjacent soil grade level with respect to the concrete base varies from 2ft (0.6m) to 6ft (1.8m). This reflects the natural, gently west to east sloping topography of this property. New Hampshire sits on granite and is known as the Granite State for good reason. Elevation is approximately 800ft ASL.

W1GN puts a good signal into Europe with this arrangement, which is quite surprising. My experiences of some roof antennas in some QTHs I have operated from are very varied. The slate roof of one QTH acted as a complete screen to RF – perhaps there was a lead content in the slate.

I wondered about the effect of a metal roof so I made a computer model, as shown in **Figure 1**. This model is very much simplified. The enclosure has for example a flat roof. I found constructing a sloping roof with an apex a bit beyond me! Even so, this simplified roof comprised a mesh of 170 wires with 700 segments. This method of modelling a sheet of metal is now well known and practised. In this model, the roof is 42ft (12.8m) high with the beam antenna 25ft (7.6m) high, about 17ft (5.2m) below the roof.

The result can be seen in the elevation diagram shown in **Figure 2**, which shows only a small 1dB loss in gain caused by the roof, provided the wall is transparent to RF, and the suppression of a high angle lobe. The probable reason the metal roof does not affect the elevation polar diagram that much is that this field strength pattern is formed by interaction with the earth at an area well clear of the building.

SKELETON SLOT ANTENNA. John Farrer, G3XHZ, e-mailed me about a HF skeleton slot he was considering building as per G3VCG 's website **[1]**. I checked out this website and found the antenna G3VCG had constructed based on a computer model was the same as one I described in *The ARRL Antenna Compendium, Vol. 6*. As my antenna was also based on a computer model, it is not surprising that the dimensions were the same.

The skeleton slot is very easy to construct and is a simple design with no traps or critical adjustments. This antenna has a turning radius of only 1.5m (5ft) although it is 14m (47ft) tall. However, its construction means that it has a much lower visual impact than a conventional multi-band beam. The antenna is bi-directional and has a calculated gain, over average ground, of 8dBi on 14MHz and 11dBi on 28MHz.

As far as I am aware, the skeleton slot antenna was proposed by Bill Sykes, G2HCG. This element was originally designed to be resonant on one frequency and formed the driven element for two stacked 144MHz 5-element beams **[2]**. An HF non-resonant version was built and documented by Bill Capstick, G3JYP **[3]**. His antenna was also the same size, achieved without the benefit of computer modelling.

My version of the HF skeleton slot uses wire for the vertical elements, resulting in a more simplified and rugged construction. I was at first concerned that this method of construction would not work because [3] gave minimum tube diameters for the elements. However, computer modelling with *EZNEC2* reassured me that this method of construction would be suitable for this particular application so I went ahead.

The antenna essentially comprises three aluminium tube elements fixed to the mast at 4.6m (15ft) intervals, with the lowest element only 4.6m from the ground. The mast is an integral part of the antenna, as a boom is to a Yagi. The general construction is shown in **Figure 3**.

The centre element is fed in the centre with balanced feeder and the upper and lower elements are fed at the ends by copper wire

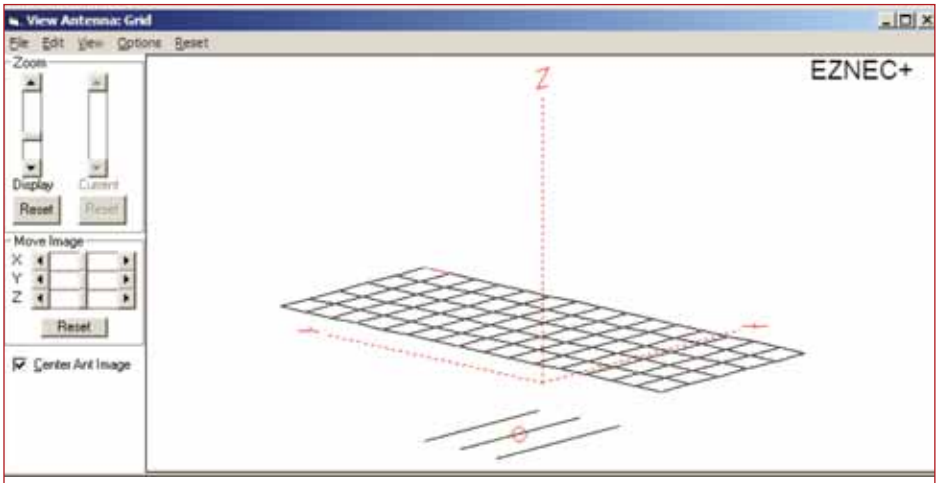

FIGURE 1: Computer model of 21MHz three-element beam located under a sheet metal roof.

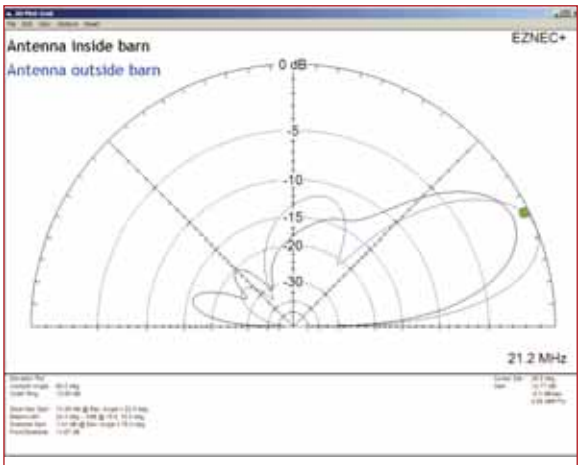

FIGURE 2: Comparison elevation diagram of a normally mounted three-element beam compared with one located in a building with a metal roof.

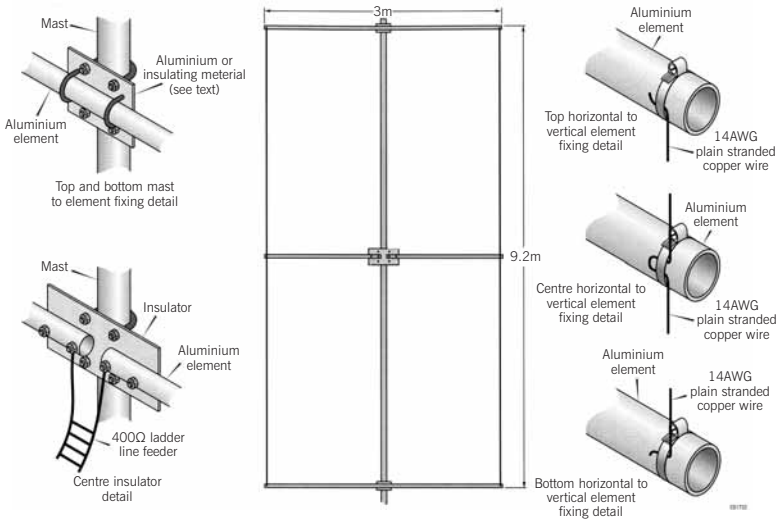

FIGURE 3: The G3LDO multiband skeleton slot antenna for 14 to 28MHz. The elements are fixed to the mast and the whole mast is rotated.

from the driven dipole. The aluminium tubing and copper wire are fixed using hose clips. These dissimilar metal connections should not present corrosion problems provided they are well coated with grease to keep moisture out.

The centres of the upper and lower elements can be fixed directly to a metal mast using an aluminium plate and U-bolts as shown in Figure 3. The dimension of this antenna regarding aluminium tube/wire diameters and length are not critical.

The antenna requires a balanced feed such as 450Ω slotted line, although the feeder impedance is not critical. The feeder should be fixed on standoff insulators about 6in (150mm) from the mast until clear of the lower element to prevent it blowing about in the wind and affecting the impedance. An ATU with a balanced output is required when using this arrangement. I tried various ATUs located at the bottom of the mast because it was inconvenient to bring a balanced feeder all the way from the antenna to the shack. Another way of feeding the antenna is to use a good quality coax from the ATU to the antenna feedpoint with a current choke (balun) at the feedpoint. The feeder from the ATU to the antenna feedpoint should be as short as practicable to reduce the SWR losses.

The dimensions shown in Figure 3 seem near optimum for the five higher HF frequency bands, see the elevation diagrams in **Figure 4**. While the DX performance of this antenna is good up to 30MHz it deteriorates at frequencies higher than this. The azimuth diagram is very similar to a dipole, with deep side nulls that can be used to minimise QRM from some locations.

When this antenna was first used in 1995, the sunspots were reasonably high and the conditions on the upper HF bands were good. On the 21, 24 and 28MHz bands the antenna performed very well, particularly when conditions were marginal. On 21MHz, DX stations consistently gave 2 S-points better than received when using a linear. Early morning contacts with the Pacific had noticeable echoes, possibly due to the bi-directional nature of the antenna.

G3XHZ asked if the dimensions of this antenna could be increased so that it would give a reasonable performance on 7MHz even at the expense of the higher frequencies. The existing dimensions will allow this antenna to work on 7 and 10MHz but the performance is not too good. I consulted *EZNEC* again and found that increasing the dimensions by a factor of 1.5 resulted in reasonable performance on 7MHz and that the upper cut off frequency occurred just above 21MHz.

The only downside to this antenna is that it really has to be mounted on a rotatable self-supporting mast. However, some guying can be accommodated because the antenna can obtain full coverage with a rotation limit of 90°.

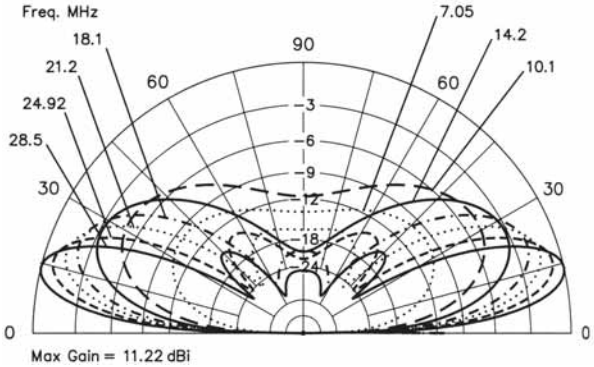

FIGURE 4: Elevation diagrams for the HF skeleton slot using the dimensions shown in Figure 3.

NEIGHBOUR WARS. Those of us who live in suburban houses with a garden often don't realise the difficulties some radio amateurs have with difficult QTH-related antenna problems.

One such gentleman wrote to me recently. He is a keen HF operator who lives on the third floor of a multi-storey block. There is no balcony. He has been experimenting with various antennas and one of these was a top fed quarter wave vertical. It consisted simply of a quarter wavelength of wire hanging from the window, fed against radials (presumably routed around the floor of the apartment). This arrangement worked reasonably well until he moved to a lower frequency band, necessitating a longer piece of wire.

PHOTO 2: W1GN's full sized three-element single band Hygain LJ-153BA indoor Yagi.

The end of the wire now ended against a neighbour's window on a lower floor. This neighbour reacted by grabbing the wire and giving it a good tug, which resulted in some of the amateur's radio equipment being pulled off the operating table and on to the floor.

He is now considering a more compact loaded antenna system.

REFERENCES

[1] www.drwilks.freeuk.com/
[2] *Skeleton Slot Aerials*, B. Sykes, RSGB Bulletin (forerunner of *RadCom*), January 1953
[3] *The HF Skeleton Slot Antenna*, Bill Capstick, G3JYP, *RadCom* June 1996.
[4] *The ARRL Antenna Compendium, Vol. 6*

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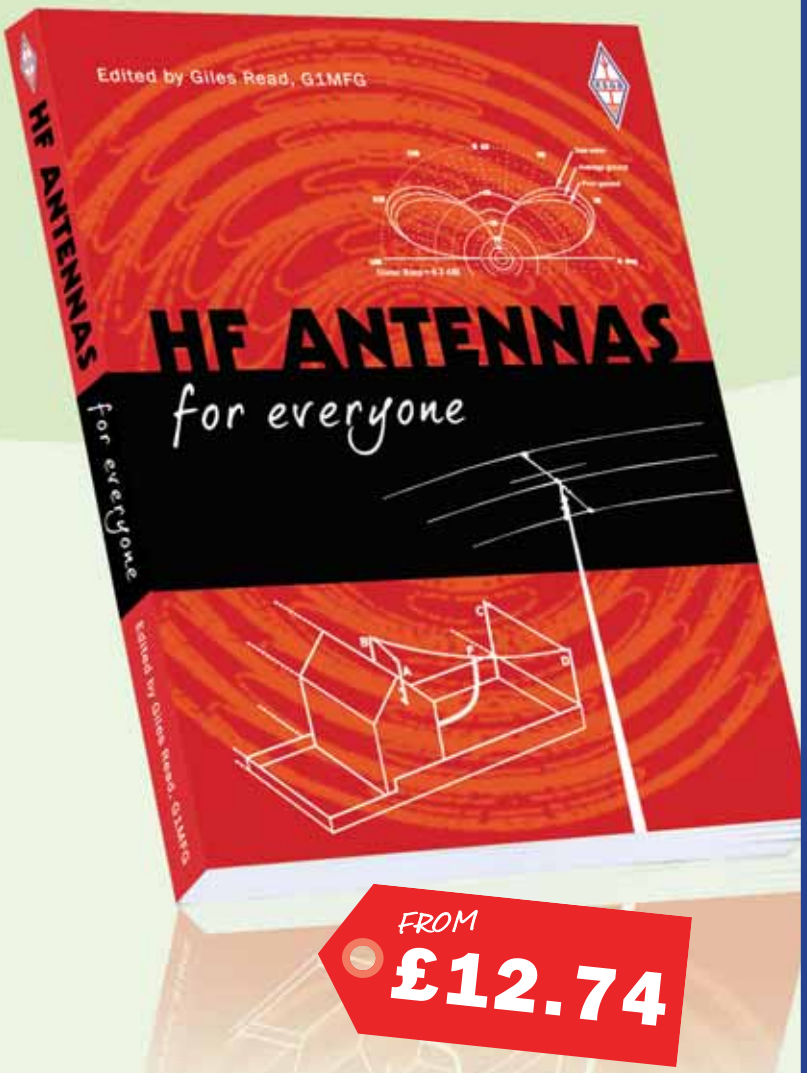

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In Practice

Care and feeding of VHF/UHF long Yagis

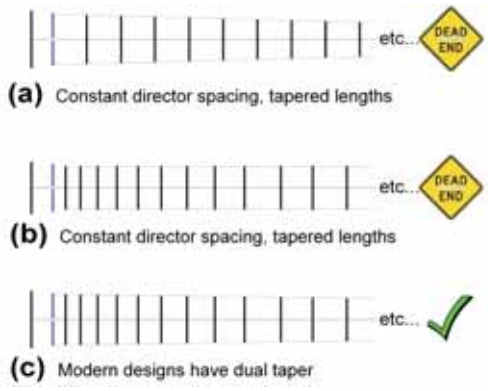

FIGURE 1: Director tapering schemes (exaggerated in drawings).

Q: What is the optimum feedpoint impedance for a VHF/UHF long Yagi?
A: As usual, it depends what you really mean by 'optimum'! If you can think clearly about that part of the puzzle, the factual part will fall into place.

I have covered the various aspects of VHF/UHF long Yagi performance in September 2004 and November 2009 **[1]**. There have been huge developments in the 40+ years that I have been involved with the subject, but much of the amateur folklore about Yagi design is still stuck in the past. From a more modern perspective, and very briefly, the aspects we need to consider are:

- Forward gain – the most wanted, but not absolutely the most important. Many Yagi designs have gone astray because the designer single-mindedly tried to maximise the forward gain, particularly in the early days when the only 'optimisation tools' were the hacksaw and drill. Today's designers forgo the last few tenths of a decibel of forward gain, to let other desirable performance parameters come through.
- Gain bandwidth – typically specified as the frequency range across which the forward gain remains within 1dB of its maximum value.
- Radiation pattern – considered in detail in the two columns referenced above.
- Pattern bandwidth – how consistent the radiation pattern remains as the frequency is varied.
- Ease of computer modelling and whether a design can be converted into real-life hardware with a minimum of uncertainty.
- Ease of feeding from 50Ω coax, although that doesn't always mean a direct 50Ω connection.
- VSWR bandwidth – typically the frequency range within which the VSWR remains below 1.5. This article is about the last two points: feed methods and VSWR bandwidth.

BANDWIDTHS. Most VHF/UHF long Yagis are much more broadband than you might imagine, at least in terms of gain bandwidth. Unfortunately this is very difficult to measure because the VSWR changes at the same time. Accurate gain measurements are already difficult enough; re-matching at every frequency in a swept gain measurement would be a nightmare. Therefore gain bandwidth is usually determined by computer modelling which completely removes the impedance matching issue.

We then discover that the gain bandwidth of well-optimised long Yagis can be much greater than people used to believe… because many of our long-established beliefs turn out to be based on very old Yagi designs that were actually rather poor. Some of the earliest long Yagis had either a fixed spacing between directors with gradually reducing director lengths (**Figure 1a**) or fixed director lengths and progressively increasing spacing (**Figure 1b**). Both of these 'tapering' **[2]** schemes are now seen as evolutionary dead-ends because they fail to produce the expected increase in gain with boom length. They also tend to have a highly asymmetric gain bandwidth curve like **Figure 2**, which increases gradually from the low frequency side but 'falls off a cliff' on the high side. Tuning the antenna for maximum gain at your favourite frequency (blue line) has a very undesirable side-effect because raindrops, frost and ice will lower the resonant frequencies of all the elements and thus shift the whole gain curve to the left (red line). That in turn causes a marked reduction in gain along with drastic changes in the radiation pattern. In other words, Yagis tuned for maximum gain have a high risk of being unusable in bad weather. It is far better to sacrifice a small amount of forward gain by positioning the entire gain curve further to the right, on the 'safer' side of the curve (Figure 2, green line).

The breakthrough in gain bandwidth came from Günter Hoch, DL6WU, who first proposed the idea of simultaneously tapering the director lengths and spacings (**Figure 1c**). This produced an immediate increase in gain bandwidth. The DL6WU designs were also dimensioned to be well on the 'safer' side of their gain curve, making them very tolerant of rain, ice and other disturbances. All modern designs taper both director lengths and spacings; there are countless different approaches to this, but all the good ones give quite similar results. With the help of computer optimisation, gain bandwidths of several percent are now regarded as normal and readily achievable without undue sacrifice of forward gain. The asymmetric gain curve of Figure 2 is still slightly apparent, but it tends to affect the details of the radiation pattern more than the forward gain itself.

That brings us finally to VSWR bandwidth. This is often the bottleneck in practical wideband Yagi design because there are several different ways of feeding and matching a Yagi, and some have notably better bandwidth than others.

If a Yagi is designed without any thought about its feedpoint impedance, it will almost certainly come out lower than 50Ω, often in the region of 20 – 30Ω. Direct 50Ω feed is achievable – lots of Yagis do it – but this higher feedpoint impedance requires some deliberate action on the part of the designer; it isn't likely to happen on its own.

When we adjust the Yagi for minimum VSWR at some chosen frequency (either on the computer or in real life) we normally adjust the length of the driven element. If the feedpoint impedance is (R ±jX), the reactance X is the part that varies most rapidly with frequency or element length, and when we minimise the VSWR we are mostly adjusting X to zero. This leaves us with a value of R that varies much more slowly with frequency or element length, and must now be matched to 50Ω. We then have two ways forward. Do we let the feedpoint impedance go where it will, adding a separate matching device to transform the R value to 50Ω; or do we redesign the whole Yagi structure to create a 50Ω impedance at the feedpoint? Either way can be made to work very well indeed.

MATCH A LOW IMPEDANCE. Exploring the matching route first, if the R part of the feedpoint impedance is in the region of 20 – 30Ω, we can home in on some specific values that offer easy methods of matching to 50Ω. One of these is 28Ω, which can be matched using a quarter-wave section of 37.5Ω line, easily made by paralleling two pieces of good quality 75Ω coax (**Figure 3a**). Martin Schreyer, DK7ZB, was one of the first to exploit this '28Ω feed' in a systematic way, and his website contains some excellent designs with plenty of practical information [1]. I have also found feedpoint impedances conveniently close to 28Ω when designing shorter Yagis for 50MHz. Another nearby target is 25Ω which can be matched using alternating short sections of 50Ω and 25Ω coax, the latter being made by paralleling two lengths of 50Ω cable (**Figure 3b**). At HF, the continuously adjustable SteppIR Yagis aim for 22Ω because that can be conveniently matched to 50Ω by a 3:2 broadband transformer (**Figure 3c**). Each designer follows his own path, but he has done much the same things for the same reasons: after optimising for a particular blend of gain and radiation pattern, the 20–30Ω region of

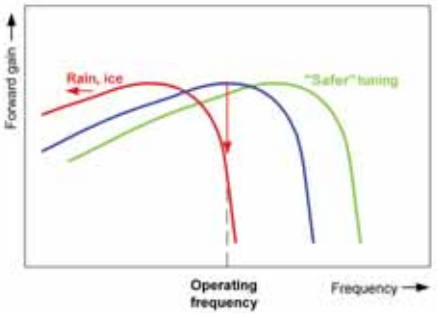

FIGURE 2: Maximising forward gain (blue line) makes the Yagi vulnerable to detuning by rain, snow and ice (red line).

feedpoint impedance is where the Yagi happened to have arrived. It then needed only a minor readjustment to reach exactly 28Ω, 25Ω or 22Ω without upsetting the optimised design.

Justin Johnson, G0KSC, has recently investigated the long Yagi designs that led to a much lower feedpoint impedance [1]. An obvious design target is 12.5Ω because this can be matched to 50Ω using two paralleled quarter-wavelengths of 50Ω coax (**Figure 3d**) or with a folded dipole. These very low feedpoint impedances used to be associated with high element currents, high I^2R losses and narrow bandwidths but G0KSC's computer analysis shows that these fears were much exaggerated. With modern optimisation techniques, Yagis with very low feedpoint impedances can be designed with very similar gain, radiation patterns and gain bandwidths to those of Yagis with higher feedpoint impedances.

But whenever a very low feedpoint impedance needs to be matched to 50Ω, that still leaves the problem of VSWR bandwidth. Some matching systems are inherently more narrow-band than others so we need to choose very carefully. Broadband matching transformers based on magnetic cores are used at lower frequencies, but are not really suitable for VHF or above. Probably the best choice for VHF and UHF is the coaxial line transformer of Figure 3d, which has a reasonably broad bandwidth and is very easy to build. I don't like T and gamma matches because the amateur cut-and-try approach can easily lead to an unnecessarily high operating Q and a reduction in the VSWR bandwidth.

DESIGN FOR DIRECT 50Ω FEED. We now turn to methods of achieving a direct 50Ω feedpoint impedance within the structure of the Yagi itself. Many features of Yagi design have been discovered and rediscovered several times over and in my view the credit shouldn't always go to the people who discovered these things first – the true credit belongs to the people who were first to understand what they had found, then made some systematic use of it.

The most common method of raising the feedpoint impedance to 50Ω is to add a closely spaced first director (**Figure 4a**). I believe that DL6WU was the first to have understood exactly

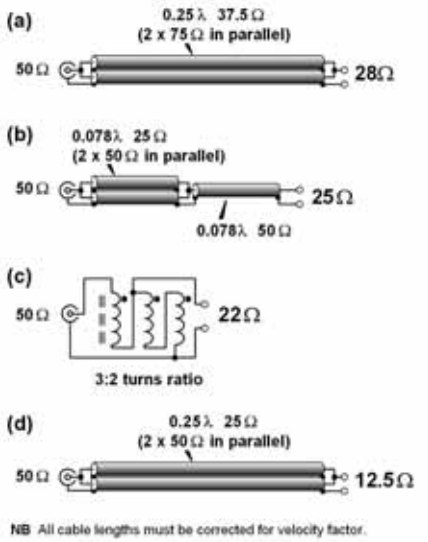

FIGURE 3: Four values of low impedance that can easily be matched to 50Ω.

what this would do: he used a first director spacing of 0.05λ, which makes the director and driven element carry almost equal and opposite currents. This increases the feedpoint impedance in a very similar fashion to a folded dipole (we will return to that comparison shortly). The resistance and the reactance at the feedpoint will then be affected by the length and spacing of that closely coupled director, as well as by the dimensions of the driven element.

The same idea was then discovered independently by Jim Breakall, WA3FET, in a design concept that he called the 'Optimized Wideband Array' or OWA [1]. Although the DL6WU Yagis had been developed by practical experiments, while the OWA family were developed a generation later with the help of computer analysis and optimisation, it isn't at all surprising that both techniques led to similar features such as the closely spaced first director (**Figure 4b**). The OWA concept has given rise to several excellent designs for the HF and lower VHF bands, including some multiband designs that combine two or more monoband Yagis on the same boom, sharing a common 50Ω feedpoint (for example, G0KSC has published 2- and 3-band designs covering 28, 50 and 70MHz). Follow this month's web links for more details. However, the OWA concept can also be used for much longer monoband Yagis; both G0KSC and the late L B Cebik, W4RNL, have developed a series of monoband OWA long Yagis aiming to achieve even greater gain bandwidths and pattern bandwidths that the DL6WU concept.

Another method of achieving a direct 50Ω feedpoint is G0KSC's 'Loop Fed Array' or LFA (**Figure 4c**) [1]. The width between the two legs of the driven loop is similar to the spacing of the first parasitic director in OWA and DL6WU Yagis, and has a similar effect of raising the impedance at the feedpoint. This method of feeding should not be confused with a folded

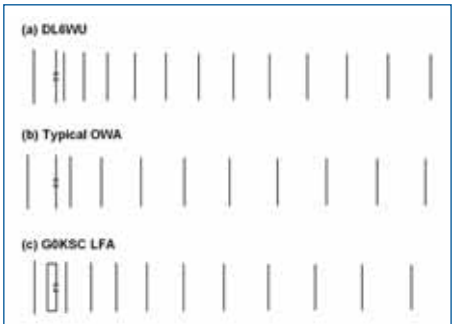

FIGURE 4: Three different ways to achieve a direct 50Ω feedpoint. As well as the obvious differences in element spacings, each design requires small but important differences in element lengths.

dipole; the width of the loop is significantly greater. Like the closely spaced parasitic director, the loop feed requires some space along the boom, and that in turn requires a significant reorganisation of all the other element lengths and spacings. However, the different method of excitation creates its own characteristic effects on the performance of the Yagi and by careful optimisation G0KSC has created a new range of direct feed Yagis that have excellent gain, pattern and bandwidths.

CONCLUSIONS. We have reached the stage where all competently designed and computer-optimised long Yagis for VHF/UHF are pretty darn good. Raw forward gain isn't really a deciding factor any more, because all good designs deliver the amount of gain that we should expect from their overall boom length, within a few tenths of a dB. The differences are now in more subtle areas such as minor lobe suppression and the ways that the forward gain, pattern and VSWR vary with frequency. These are all tradeoffs, depending on the combination of properties desired.

Turning to the specific point about feedpoint impedance, if you follow up the references [1] you will see that it isn't a major factor in the overall performance of these Yagis. Although many designs come out in the 20–30Ω region, Yagis with equally good overall performance can be designed for direct 50Ω feed and also for feedpoint impedances as low as 12.5Ω.

STAND BY FOR THE FINAL. When I stepped out onto the tightrope as a freelance technical writer, one of my business goals was to retire at age 60-65 like any normal person. Somewhat to my surprise, that time has now arrived, so the next In Practice will be my final one, with a look back at more than 200 monthly columns.

NOTES AND REFERENCES

[1] Please follow this month's links from the 'In Practice' website: http://tinyurl.com/inpractice

[2] In VHF/UHF Yagis, progressive changes in director lengths and/or spacing are often called 'tapering'. Not to be confused with a tapered or stepped reduction in the element diameter, which is often necessary at HF for mechanical reasons.

National Coastwatch Institution

Being interested in amateur radio has influenced G3NPB to become a watchkeeper

Senior Watch Manager Ian Ross (left), Ian Hogan, G6TGO with Assistant Watch Officer David Blackford, G3NPB (far right).

VISIT TO ST IVES. I was privileged to meet David Blackford, G3NPB (who is the local RSGB news reader) after we had a 50MHz QSO. David invited me to visit the National Coastwatch Station in St Ives, Cornwall where he is a volunteer watch officer.

During this visit I was given a tour of the facilities by David and Ian Ross, the Senior Watch Manager. They gave me a detailed account about the history and the functions of this worthwhile charity.

HISTORY. In 1994, two fishermen lost their lives off the Cornish coast below a recently closed Coastguard lookout. Many small Coastguard stations had closed due to spending cuts. Local people decided to restore the visual watch facility. The National Coastwatch Institution (NCI) was started to provide this visual watch along the UK coastline with the first station at Bass Point on the Lizard.

Over the next ten years other visual watch stations opened and there are currently 40 operational stations (with more under negotiation). Each station has a trained team that watch over its own area. Although technology at sea has improved immensely, accidents do happen and the NCI have an important role to play. New technology doesn't necessarily spot flares, for example.

THE TOUR. During my tour around the St Ives lookout, I had a good look at the equipment they had. There was a dedicated marine transmitter/receiver on a local channel and a scanning receiver listening to the Coastguard working frequencies as well as the calling frequency (Channel 16, 156.800MHz) and the small craft safety frequency (156.375MHz).

The St Ives lookout has a modern radar that covers 30 miles in a 360° arc and they have a visual range (dependant of sea state) of 28 miles! The Universal Automatic Information System (AIS) is a relatively new navigational development that's primarily used for collision avoidance in busy waterways. The service operates in the VHF marine band using Channels 87B and 88B, employing high speed data modulation. Ships equipped with AIS broadcast the details of their position, speed, heading and other information every few seconds, thus providing far more detail than that which is available from conventional radar systems. During my visit there was a VHF lift that resulted in information being received from vessels as far away as Falmouth Bay.

As well as the technology, the station has a wealth of current manual and charts and a dedicated Aldis lamp, which proves that the old ways of communication are still in use today.

David and Ian's primary role is to observe safe movements in, on and around the harbour and bay and to look for distress flares on the horizon – computers cannot see those, hence the need of a 'mark one eyeball'.

THE WORK OF THE NCI. Each of the NCI stations are manned 365 days of the year providing a daylight watch. You'll find everything from telescopes and binoculars to radar and weather instruments are in use, as well as a telephone link to the Maritime Coastguard Agency. The watchkeepers of the NCI come from all walks of life and their full training makes sure that all the volunteers can provide an excellent service.

They keep a log of all water-based activities during each watch and they can provide weather data to yachtsmen and fisherman if wanted. In fact, some stations have webcams that give an indication of the sea state.

G3NPB'S STORY. David Blackford became G3NPB in 1959 when he moved to North Riding as Head of Science. His head teacher at the time was keen for him to start a school radio club, which he did. A year later, he was promoted and started running a City & Guilds course for the RAE. David continued running C&G course when he moved to St Ives in Cornwall in 1965.

After 21 years and 100 successful candidates, David retired from RAE work – and found he missed the challenge! Following a QSO with Peter Caldwell, G4PAC, who turned out to be the Deputy Manager of the St Ives NCI, David was persuaded to join. This, he says, gave him the challenge he was looking for.

David, G3NPB is now the St Ives Communications Officer and has set up the radio system so that they can communicate with local vessels from St Ives and Hayle. Another role is running courses for radio competency for the NCI members locally. David also runs the Short Range Certificate courses for local boat owners. During a typical watch, G3NPB and his fellow watchkeepers, keep a listening watch on all VHF maritime frequencies, in particular, their allocated frequency of 160.975MHz. David says that he is enjoying using his radio expertise for the benefit of NCI St Ives.

The St Ives station and seascape.

David, G3NPB in contact with a local vessel, which is, of course, what they are licensed for .

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Solar solutions at Silverthorn

Some experiences and thoughts on solar panels for powering amateur gear

PHOTO 1: My 8W solar panel with cased 17AH SLA battery and multimeter to monitor charge.

INTRODUCTION. Solar panels seem to be an attractive option for the amateur radio enthusiast in the field. Rather than taking a noisy generator that you have to keep refuelling, just point your panels at the sun and get a nice quiet source of electricity for free. But what is the reality? I took an informal look at some solar solutions during the annual camp of the Silverthorn Radio Club during the last weekend in July 2009. Prime sunshine weather!

PANELS IN USE. I took my own 8W panel type TPS-102-8W (**Photo 1**) that I bought from Maplin on special offer for £40. I used this to charge a 17Ah sealed lead acid (SLA) battery. Rob, G0CGH was using a TPS-946 panel (**Photo 2**, £10 at Maplin) rated at 1.5W to trickle charge his batteries. Chris, G0LXA was using two of these for the same purpose. More ambitious was Roy, G0PRK who used two folding 20W panels (**Photo 3**) from Allsolar, which cost him about £225. Each charged a 110Ah battery in his caravan.

SO WHAT IS INVOLVED? Most of the solar panels I saw were intended for (trickle) charging leisure-type or sealed lead acid batteries. None had a regulator (see later) but all came with various options for connection to a battery. Mine had a useful 3.7m long lead that had three connector cables: battery clips, a cigarette lighter plug (not socket) and eyelets for bolting to a battery. Assembly of the panel was very quick and easy. It took just a few minutes, required no tools and simply involved fitting the two supporting rods that let you optimally adjust how the panel faces the sun. The panel has a non-reversible connector into which the 3.7m cable fits; I then used the clips to connect to my 17Ah battery. Others said their panels were similarly easy to use.

PERFORMANCE. My panel is rated at 8W and, in bright sunshine, I measured an output of 500mA into a 13.8V load. This equates to 6.9W, so it was not far off the specification. The open-circuit voltage was 21V. This could pose a problem if the panel was left permanently connected to a nominal 12V battery as a float charger because the battery would be overcharged. This is where a charge regulator comes in: the simplest ones are a shunt regulator such as a hefty Zener diode (eg 15V, with two diodes following to drop the output to 13.8V to suit a SLA battery) or one of the commercially-available regulators that can be a bit more sophisticated. Some of the latter include switch mode circuits to boost voltage on really grotty days so you get at least some charge; all provide overvoltage and overcharge protection. A quick look on eBay in mid-April revealed that ten pounds or so can buy a basic 12V solar regulator suitable for small and medium size solar panels.

If you decide not to use a regulator then you'll need to keep an eye on the battery voltage to avoid overcharging.

CHOOSING A PANEL. So what issues that affect the amateurs' choice of solar panels for field use? The first is clearly portability. The larger and heavier the array, the more difficult it is to move around. Conversely, the smaller the panel the lower the rating. Some panels can quite easily be fitted to the back of a backpack, eg for use with SOTA, while others would be more suitable for a caravan for club or RAYNET activities. Solar arrays are used to supply electrical power for most spacecraft. In space, the incident power from the sun is approximately 1300W per square metre. On the surface of the earth this reduces to approximately 1000W per square metre, the difference being due to the losses through the atmosphere. Does that mean we can have the equivalent of a one bar electric fire as an energy source for 24 hours a day? The answer is certainly no – and not just because the sun doesn't shine 24 hours a day! Not only is the actual amount of sunlight variable during the day but solar panels are relatively inefficient. The best commercially available panels are no more than 20% efficient; most are in the 10-15% range. A 15% efficient panel produces 150W of electricity when illuminated by 1000W of sunlight.

Assuming 8 hours of good sunshine per day, this gives 8 x 150 = 1200Wh per square metre per day. But things change dramatically in winter. It is reckoned that the effective strength of the sun drops by up to 80% in winter. And, of course, there are fewer hours of daylight.

If the brightness indeed drops by 80%, we have only 200W of sunlight per square metre. At 15% panel efficiency, that's just 30W of

PHOTO 2: Rob, G0CGH used this 1.5W trickle-charge panel from Maplin.

PHOTO 3: Roy, G0PRK used twin 20W panels to charge a pair of 110AH batteries in his caravan.

PHOTO 5: This neat solar-powered charger reckons to charge a pair of 500mAH AA batteries in 3-6 hours. 2500mAH NiMH cells would take 15-30 hours of sunlight to recharge from flat.

electricity. Assuming a winter's day can muster 3 hours of good sunlight, we are now only getting a maximum of 3 x 30 = 90Wh of electricity per day. That's just 7.5% of the summer figure – and doesn't take into account those sunless, grey, overcast days that seem to go on forever. An avid caravanner once told me that his 1m square solar panel gave him 'electricity to burn' in summer, but in winter there was barely enough power to overcome the batteries' self-discharge.

Turning to my own practical experience on the campsite, I used a rechargeable battery as the 'prime mover' and the solar panel to keep it topped up. My 17Ah SLA battery has a capacity of 12V x 17Ah = 204Wh. This means the battery could, in theory, supply a 20W load for about 10 hours. (Battery capacities are often specified at the 20 hour discharge rate which would, in this case, mean 10W for 20 hours. As you increase the load the battery becomes less efficient, resulting in sometimes dramatically reduced capacity as the current drain increases).

The next step is to look at the rating of the soar panel. Mine was outputting about 7W, so multiplying this by the expected number of hours of sunshine – say 5 – and then by a charge-discharge loss factor (say 0.85) gives us a figure of 7 x 5 x 0.85 = 30Wh per day. This is ample to supply a small hand held transceiver such as an IC-2E (rated 1.5W at 8.4V) which is indeed what I used during the weekend.

COSTS. A quick look around the web in April 2010 showed that the cost of solar panels varied considerably. The easy way to level the cost of panels is to divide the cost by the power produced. For example, a 5W panel priced at £50 would result in a cost of £10 per watt. In a couple of hours I found examples ranging from £10 per W down to £3.33 per W (a 60W panel on special offer from Maplin for £200).

OTHER APPROACHES. Once we understand the limitations on solar panels, we can look for ways of augmenting them. One excellent example of this is the repeater GB3JB. This uses solar panels and a wind turbine for its operation. According to its webpage there are times the system provides so much surplus energy that power needs to be dumped onto a load. It's certainly one way to reduce running costs.

While solar panels have their advantages, one has to consider the capital cost and alternatives, particularly for temporary installations such as field days. A small, quiet 1kW generator can be bought for £250 on eBay. This will produce more than enough power for your 100W radio plus a laptop and some lights (say 500W total, or 12kWh per day). The running cost is under £1 per hour – and the generator works just as well at night. To equal this performance with solar panels, assuming 8 hours of summer sunshine, you would need to be able to produce 1.5kW continuously during the day and store 8kWh for overnight use. 1.5kW of solar panels would set you back about

PHOTO 4: G0LXA used solar-powered lights to mark tent guy lines – useful to stop people tripping over them in the night.

£5000; lead-acid storage of 8kWh (~660AH at 12V) would be another £600 or so – and about 150kg of dead weight. In winter, you'd need five times the number of solar panels and probably a lot more batteries as well to tide you over the dull days. The Rappenecker Hof hikers' hotel in Germany is an example of an 'off the grid' building powered almost exclusively by solar and wind power (it has 49kWh of battery backup and a fuel cell too) – see Websearch for more details.

CONCLUSION. The key advantage to the solar systems being used at the Silverthorn club camp were that there were no ongoing running costs, unlike a small generator. There were also important safety benefits such as a total absence of exhaust fumes, no flammable fuel, no noise, minimal maintenance and so on. It's very much a case of set up and leave to charge (not forgetting to tuck away any trailing cables), although for optimum performance the panels should be readjusted to point back towards the sun every hour or two. On the safety front it should be noted that there have recently been some additions to the 17th edition wiring regulations in respect of solar panels for fixed sites. In such cases a competent electrician should be consulted. So there you are - a small introduction to the world of solar panels. Yes, they do have limitations but provided these are understood they do work very well indeed.

WEBSEARCH AND FURTHER READING

Solar panels at Maplin:
www.maplin.co.uk/Search.aspx?criteria=solar%20panel
Solar panels at Allsolar:
www.allsolar.co.uk/prods/pc2.html
Rappenecker Hof hikers' hotel technical info:
http://tinyurl.com/rappeneckerhof
GB3JB repeater website:
www.gb3jb.blogspot.com
How sunlight is attenuated by the atmosphere:
http://pvcdrom.pveducation.org/SUNLIGHT/AIRMASS.HTM
General info on solar cells:
http://en.wikipedia.org/wiki/Photovoltaic_module

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MH-36E8J DTMF Mic	£71.48
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MD-200A8X Super Deluxe Desk Mic	£199.95
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All FT-950s supplied by ML&S are latest PEP factory

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DVS-6 Voice Memory Unit **£44.90**

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MTU-30/20 External µ-tuning unit for the FT-2000 on the 30/20 meter band. This MTU unit requires the external µ-tuning base kit. **£449.51**

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See Website for details of these new Yaesu mobiles

Yaesu FTM-10R. ML&S £269.95

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High-power FM on 10m, 6m, 2m & 70cm. When your local repeater is busy, slip onto 10m & work DX!

Yaesu FT-897D
High Power version of the FT-897. Use as a transportable, (20W) or as a base/mobile (100W) **Bundle Price: £CALL (Rig only: £669.95)**

Yaesu FT-857D The Ultimate HF Mobile Installation! Plus ATAS-120D 40m-70cm Auto Antenna
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The world's only all-band portable transceiver.

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D-Star Mobile, D-Star as standard **£439.95**

The E880 has been improved with a larger LCD display and a high speed scan capability of up to 50 channels a second.

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Brand new IC-7400 **Only £1359.95** with matching SM-20 Desk Mic & SP-21 base Speaker worth £243! **First come first served.**

NEW Icom IC-9100 All-Rounder HF through to 23cms Base Transceiver

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See: 439.4625MHz
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£CALL TODAY

Have a rig to part exchange? Ring the ML&S Sales team and get an instant part ex price. You could have the 7600 in your shack sooner than you think.

The successor to the IC-7565Pro111, the eagerly awaited new mid-range HF/6M Transceiver will try and set another bench mark like that of its predecessor.

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IC-7200	Mr T's choice for tough HF/6M Operation	**£775.95**
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IC-7400	100W HF/6M/2M Base, full DSP, Auto ATU	**£1199.95**
IC-7600	100W, Twin RX, Huge Display. No psu	**LAST FEW AT OLD PRICE £3149.95**
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IC-7800	Icom's Flagship radio has gone up again	**New RRP £7995.95 £Call!!**
IC-PW1Euro	1kW Fully automatic HF/6m Linear Amp	**£Call!!**

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IC-R9500	Flagship Base Receiver, 50kHz-3335MHz	**£Call!!**

Icom V/U Products

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IC-E2820	Proper dual band, dual display, remote etc	**£425.95**
IC-E2820+D	Supplied with UT-123 D-Star board	**£589.95**
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IC-910X	As above but with optional 23cm UX-910	**£1469.95**

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Icom IC-R1500 & IC-PCR2500
All Windows XP, Vista or Windows 7 Controlled via USB

IC-R1500	10kHz-3300MHz All Mode with remote head	**£449.95**
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KENWOOD

Kenwood HF Products

TS-480SAT	Remote head HF/6m 100W inc ATU Transceiver	**£749.95**
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KENWOOD

TS-2000E

PLUS HS-5 FREE

For those of you that really want a one stop solution to HF though 23cm all mode operation, the TS-2000E is the rig for you. Twenty five years ago this type of frequency operation would have filled a shack – you can now have it all in one neat desktop package.

ML&S Only £1499.95 with **FREE HS-5 Headphones** (while stocks last)

See www.hamradio.co.uk for more details on all of these items ... and much, much more! E&OE

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Beautifully constructed.
Benchmark perfomance.
Cross Needle SWR Power Meters

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Daiwa	CN-801VN	140-525MHz, 20/200W	£99.95
Daiwa	CN-801HP	1.8-200MHz, 20/200/2kW	£99.95
Daiwa	CN-101L	1.8-150MHz, 15/150/1.5kW	£89.95
Daiwa	CN-103LN	140-525MHz, 20/200W	£89.95

NEW Mini VNAPro
Now with Bluetooth!

The new miniVNA PRO, the big brother of the well-known miniVNA, is an extraordinary and unique handheld vector network analyzer that makes available a multitude of new features and capabilities which are perfect for checking antennas and RF circuits for hams and commercial users. Together with your PC/Laptop, you can add to your laboratory the further advantages of having this first-class VNA instrument. This is the first world's wireless analyzer able of scanning and sending the data using an integrated Bluetooth module to a remote PC/Notebook up to 100 meters from the miniVNA PRO's location. This makes real-time antenna setup easy!

Only £349.95

MiniVNA original still available (without Bluetooth): £259.95

New! Alinco DJ-G7E
2m/70cm/23cm Handie Transceiver. Simultaneous full duplex operation between any two bands. £299.95

MicroBit Remote Rig Interface

ML&S are the sole UK & Ireland distributor for Microbit.

Imagine going on holiday but missing your HF system back home. Well no more! Using the RRC-1258 system all that is required is for you to take the head unit of say your IC-706 or TS-480 together with one half of the RRC-1258, plug into a LAN connection connected to the web and within seconds you are "ON AIR" as if you were sitting in your shack at home. (Minus the cat, TV and any other external interference!)

The previous model is still available.
Microbit-1258 mkI £349.95. Including Lead Set
Microbit-1258 mkII £399.95. Leads included
For more info see **www.hamradio.co.uk/rrc-1258.shtml**

Latest version of the Remote Rig.
One version for ALL radio models.

Like the original RRC-1258, the MkII is sold in pairs, assembled and tested but not configured. Included in the package is one USB cable, Power cables (2 pc), Cat 5 cable for making IC-706 cable and a 2xRJ-45 extender.

A complete remote control system for Amateur radio
Using Microbit's advanced technology, full remote control of your rig is available today.

Flex SDR Radio

Flex 5000A Ultimate, fitted Second Receiver & Internal Auto ATU	£3395.95
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Flex 1500 New!	£549.95

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Miracle Antenna is back!
With some important Hot New products.
Introducing the New MMD Mixed Mode dipole.
The first and only electrically centre-fed mechanically end-fed dipole ever offered to the Ham Radio market, the MMD provides a host of benefits never available in an end-fed dipole.

** Tunes its main band with no tuner - tunes other bands with a regular tuner*
** Feedline not frequency-dependant - may be lengthened or shortened at will*
** Feedline currents and RF in shack eliminated without extra chokes or baluns*
** No tension required to support feedline - opens endless installation possibilities*
** Common-mode noise eliminated for the quietest receiver performance ever*
** Connector and 16-ft feedline included - ready to operate right out of the box*

MMD-17 17M MIXED MODE DIPOLE, + 5 BANDS WITH ATU		£89.95
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MMD-30 30M MIXED MODE DIPOLE		£99.95
MMD-40 40M MIXED MODE DIPOLE		£99.95
Miracle Ducker iL	HF-70cm Mini ATU with BNC	£109.95
Miracle Ducker	HF-70cm with PL-259	£109.95
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Wonder Wand Antennas U.K.

The UK's favourite rig-mounted antenna system

NEW! WonderWand Widebander
1.8-460MHz with Monster 1.8M Whip! £119.95
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7-432MHz antenna with 1.8m Whip £89.95
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Yaesu VL-1000 Quadra	£3799.95
Icom IC-PW1Euro	£3979.95
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Linear Amp Ranger 572B	£1275.00
Linear Amp Challenger Mk1V	£2295.95

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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

NEW

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.

BACK IN STOCK!

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 in May 2010. "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.

Begali

For the entire range with choice of bases and contacts and prices please see our website or BEGALI on www.i2rtf.com

The finest range of keys available today.

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Begali Signature

Begali Camel Back

Begali chose ML&S because they wanted a quality company to sell the very best Morse Keys in the World.
ML&S are sole distributors for these beautifully crafted keys in the UK.
For full details see our website or send 40p in stamps for full colour catalogue.

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Begali Camel Bac	Straight Key black base	**£126.87**
Begali Blade	Straight Key black base	**£218.34**
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Begali Simplex-Mono	Mono Paddle gold base, palladium contacts	**£180.44**
Begali Simplex-Mono	Mono Paddle palladium base, gold contacts	**£180.44**
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Begali HST	Single Lever Paddle black iron base, gold contacts	**£218.34**
Begali Simplex-Dual	Dual Paddle gold base, silver contacts	**£133.32**
Begali Simplex-Dual	Dual Paddle gold base & contacts	**£163.92**
Begali Simplex-Dual	Dual Paddle palladium base, gold contacts	**£163.92**
Begali Classic	Iambic Magnetic return, gold base, silver contacts	**£196.29**
Begali Classic	Iambic Magnetic return, palladium base, silver contacts	**£196.29**
Begali Classic	Iambic Magnetic return, gold base & contacts	**£226.75**
Begali Classic	Iambic Magnetic return, palladium base, gold contacts	**£226.75**
Begali Signature	Iambic Magnetic return, gold base silver contacts	**£265.62**
Begali Signature	Iambic Magnetic return, palladium base, silver contacts	**£265.62**
Begali Signature	Iambic Magnetic return, palladium base, gold contacts	**£296.09**
Begali Signature	Iambic Magnetic return, gold base & contacts	**£296.09**
Begali Traveller Light	Iambic Travel Key with gold contacts	**£235.11**
Begali Pearl	Iambic Magnetic return, palladium base, gold contacts	**£297.74**
Begali Contour	Iambic Magnetic return, gold base & contacts	**£286.71**
Begali Graciella Jnr	Iambic Magnetic return, palladium base, gold contacts	**£341.85**
Begali Sculpture	Iambic Mag return Carbon Fibre, stainless base, gold C	**£410.72**
Begali Intrepid	Semi-Auto Bug, magnetic return, black base, gold C	**£457.64**

Kent Morse Keys

The best British range of keys money can buy!

The Kent twin paddle Morse key. £84.95. Kent Single Paddle Key. £72.85. Kent KT-1 Professional. £79.90.

DX Engineering Products stocked at ML&S!

New! DXE-UT-8213 Coax Cable Stripper ONLY £45.99!

This tool prepares RG-8, RG-213, 9913F7, LMR-400 (not LMR-400UF) and other similar size coax cable for installation of a PL-259 connector - or DXE-N1001S two-piece Type N connector (requires a slight additional trimming of the cable center conductor length).

See www.hamradio.co.uk for more details on all of these items ... and much, much more! E&OE

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New! GAP Antennas Available from stock

Eagle-DX 6-Band, 40-10m 2kW .....Only £325.95
Titan-DX 8-Band, 80-10m 2kW .....Only £345.95
Voyager-DX 4-Band 160-20m, 2kW 45ft tall!.....£385.95
Challenger-DX 8-Band 80—2m (no 17).....£295.95

Alpha Delta Antennas

Alpha Delta are a USA Manufacturer of high quality coax switches, lightning (surge) protectors and the best wire antennas money can buy.

Delta-2B	2-way position SO-239 switch (1kW) for use up to 1.3GHz	£54.15
Delta-4B	4-way position SO-239 switch (2kW) for use up to 500MHz	£75.60
Delta-4BN	4-way position N-type switch (1.5kW) for use up to 1.2GHz	£86.80
AD-ATT3G50	0MHz to 3GHz (200W) surge protector. N-Female Connector	£49.95
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AD-ATT3G50U	0MHz to 500MHz (200W) surge protector. SO-239 Connector	£39.95
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Mark, G8AWO showing off the assembled 10/15/20 & 40/80m Combo Isotron's before mounting on the roof at ML&S HQ.

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LF

It just goes to show, 9kHz dreams do come true

Cold and damp March weather didn't deter Stefan, DK7FC.

NZ ON 500kHz. Following submissions from NZ Association of Radio Transmitters (NZART), all ZLs have had access to 505 - 515kHz from 1 March. This temporary allocation has been granted "pending an international allocation to radio amateurs". Progress towards a universal 500kHz allocation is currently very slow, so this could be quite a long time! ZLs can operate on a strict non-interference basis with an EIRP of less than 25W and a bandwidth of no more than 200Hz.

A few days after the announcement, a group of ZL amateurs made a test transmission on 512kHz from the old Auckland Radio/ZLD site.

DREAMS DO COME TRUE. In the last LF column I featured the plans of Stefan, DK7FC to radiate a signal on 8.97kHz. His chance of success was considered so slight that the sub-9kHz band was christened 'The Dreamers Band' by some.

On 1 March, Stefan went out to a portable site to fly his kite. Things didn't go entirely to plan, with only 1.6kV on the aerial Stefan calculated that his signal was about 23dB down on the expected level. Even so, the signal was received at a distance of 16km by Bernd, DF8ZR. Not exactly DX but the signs were good. If such a low ERP could make 16km then Alexander, RA9MB had calculated that 200km should be possible if Stefan's kite aerial could be made to perform efficiently.

Meanwhile Markus, DF6NM was transmitting from home using his normal LF aerial. It isn't all that big and has an effective height of only 9m with a capacitance of 200pF. This low capacitance meant that 1.4 Henries of inductance was required to resonate it! Markus wound his coil on seven buckets connected in series. With a 35W car-stereo amplifier driving the system via a 1:32 ferrite transformer (calculated EMRP 1.3μW), Markus went out to see how far he could receive the signal. His receive setup was a 6m portable vertical with a series inductor fed into the sound card of a laptop computer. Using the *Spectrum Lab* program with software noise-blanking and 15mHz bandwidth his best result was a 5dB signal-to-noise ratio at 12.1km.

The next weekend, after long hours spent winding an enormous coil on a water butt, Stefan went out kite-flying again. With this improved setup he was now getting almost half an amp of aerial current and about 15kV on the wire. Markus was in receive mode and picked up Stefan's more powerful transmission at a distance of 180km. Even more interesting was the fact that listener Paul Nicholson in Todmorden noticed a very pronounced peak on his frequency scan, at exactly 8.97kHz. The distance to Stefan's site near Frankfurt is 858.7km.

This was starting to grab people's attention and receivers all over Europe were focussed on 8.97kHz on the weekend of 21 March when Stefan's third attempt was made. Despite rain curtailing the activity, some good reports came in from Germany, Italy, The Netherlands and England. Jim, M0BMU, who was out at a quiet receiving site, was best DX at 658km and had a reasonable copy of part of Stefan's ID. The dreamers had been vindicated, it is possible for an amateur enthusiast to radiate a long-distance signal on VLF.

Since Stefan's pioneering tests Paul, W1VLF has decided to join the party with another giant loading coil wound on a 1ft diameter 4ft long cardboard tube. Paul has some pretty big aerials at his QTH so doesn't need to go out portable to run tests. So far he has been received at 5km (W1VD) with a very strong signal, and is working on a more powerful amplifier. Could there be a trans-Atlantic QSO in the future? We can only dream.

136kHz ACTIVITY. With all the excitement of the VLF experiments stealing the limelight it was nice to see some solid activity on 136kHz recently. On 4 April Mike, G3XDV reported good signals from OE5ODL and DJ6GT in the morning followed by a collection of signals from the East during a UA activity weekend. There were about 10 Russian stations on the band and Mike copied UA0AET, RA3YO, RN3AGC, UA4WPF and EW6GB. UA0AET is some 5641km away.

JA7NI has been copied by Scott, VE7TIL. He is only the second JA to cross the Pacific on 136, the first being JH1GVY. JA7NI has a 45m high T aerial for LF but Japanese amateurs can only run 100W on 136 so the aerial needs to be efficient. Scott is now gearing up for a QSO attempt with JA; he still has that big amplifier he used for the ZL tests. His beacon transmissions have been copied around the USA and Canada.

ANOTHER NEW MODE. LF operators are always keen to try new low-signal modes and the latest on the scene is ROS, a new digital mode developed for moon-bounce and other weak-signal paths. Several stations have been trying it out on 500kHz and it seems to perform quite well with UK stations being copied in France, Belgium and Germany at very low power. In the USA, the FCC have outlawed ROS. They classify it as a 'spread spectrum' mode, which is not allowed on HF. I can't see that it is any more 'spread spectrum' than SSB, being either 500Hz or 2250Hz wide, but it does take up a fair chunk of the tiny 500kHz band so must be used with care. In fact, LF stations in many countries have a bandwidth limit of 100 or 200Hz, which would rule the mode out. Another problem is the fact that the source code is not available and in some countries it is considered a 'secret code or cipher', however the software is free to download and use. See this month's Data column for more on ROS.

ALAN'S PROPAGATION REPORT. Alan Melia, G3NYK has been persuaded to reinstate his LF propagation predictions, which are very useful if planning a DX test. Find the latest one by clicking 'Propagation Popup' on the wireless.org.uk page.

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HF

Try the 10 and 12m bands now we are in the Sporadic-E season

Steve, G4TRA, the author of our 60m report, in his shack.

SPORADIC-E SEASON. We still don't seem to be quite there in terms of improved HF propagation. Some high scores are already being reported on 12m for 2010, but dramatically lower on 10m. So I guess the answer is to focus your DXing on 15 and 12m for now, and hope to see some serious DX on 10m in another year or so. Meanwhile, though, we are now into the Sporadic-E season, so 12 and 10m should be full of strong short-haul signals on more or less a daily basis for the next two or three months. It's a great opportunity to fill some of those tricky band-slots, which would normally be in the dead zone and you don't need a lot of power or a big antenna to enjoy Sporadic-E propagation. Indeed, by its very nature it suits high arrival angles, so a low antenna can be more effective than a high one.

DX NEWS. There seems to have been a flurry of pre-announcements of major expeditions scheduled for later in the year. Of particular interest, especially if you need to book your holidays well in advance, are Kermadec (ZL8X) by a large German group from 19 November until 5 December, along with Jarvis Island (KH5) by Radio Expeditions Inc., the team that mounted the record-breaking VP6DX effort, from (roughly) 17 November until 1 December (who also promised another announcement at the Dayton Hamvention in May). And, if that wasn't enough, SP5DRH and SP3BQ are going to Temotu Province (H40), for two weeks in October, targeting the low bands, 160 and 80, while the Microlite Penguins DXpedition team will be activating the South Orkney Islands (DXCC VP8/O, IOTA AN-008) from 27 January to 8 February 2011. All in all, the autumn/winter DX season looks to be getting pretty exciting. More news on all these nearer the time.

Some Greek amateur radio operators recently visited Monk Apollo, SV1ASP/A, the only station active from Mount Athos. They have posted a video to YouTube – search for MountAthosDX.avi. While they were there they were able to repair his beam antenna and the rotator cable. Apollo can now use his A3S beam again on 10, 15, 20 and 30. SV2ASP/A had been using a vertical in the past and now has a much better signal with the beam. Soon the monastery where Apollo lives and operates his station will be undergoing renovation and the SV2ASP/A shack will need to be moved. At the moment it is not known how this will affect his operating activities.

Gildas, TU5KG, has been issued the calls FT5WQ for Crozet Island and FT5XT for Kerguelen Island for the remainder of this year. Gil works on a fishing boat that travels throughout the FT5 waters. He usually operates with one of his FT5 calls stroke /MM in his spare time and occasionally gets the opportunity to land on one of the islands for a short operation.

CHAGOS, VQ9. Tim, G4FJK, VQ9JK kindly sent this report about VQ9 activity. "If you worked Chagos for a new one on various modes from 160m through 2m EME or the satellites during much of the last decade, you probably worked one of these VQ9 ops (see photo). Gathering for a recent meeting at the 'Seamen's Club' on Diego Garcia are: (L-R) Larry VQ9LA (N0QM), Jim VQ9JC (ND9M), Tim VQ9JK (G4FJK), and Jeremy VQ9ZZ (N1ZZZ). Note that VQ9JK returns home to the UK soon, and VQ9LA leaves in December 2010 after 8 years on Diego Garcia, so don't be surprised if VQ9 climbs the Most Wanted DXCC lists".

60m REPORT (from G4TRA). Lots of news this time, starting with three new European countries that have been activated on 60m. In the Czech Republic Milan, OK1KF, has given many another new European country on the band. OK1KT is reportedly coming on too. There has also been the first ever operation from Bulgaria briefly earlier in the year. From further North, Jan, OY3JE in the Faeroe Islands came on for the first time too. Denmark incidentally has gained a 200kHz slot from 5250 to 5450kHz, the same as Norway. It would be great if the UK authorities saw fit to allow UK radio amateurs similar privileges.

From Central America HK2SM, YS1CF and XF3PAS have all been heard in the UK with good spring-time signals, and the news is that this month 60m authorisation has been granted to Grand Cayman too, with ZF2UL and ZF1EJ showing up after midnight.

Canada has re-applied to gain access to the band. A few years ago VO1MRC, The Marconi Radio Club of Newfoundland, was regularly heard, but in recent years access has been rescinded. If all goes well we should hear Canada back on 60m before the end of the year.

Finally if we do manage to gain another extension to our NoVs after 30 June then San, K5YY will be activating Belize with the callsigns V31YY from 12 to 19 July. Listen on 5.4035MHz at the top of each hour around midnight. Good luck!

(I want to thank Steve for his regular reports on 60m activity. I have taken the opportunity to include, this month, a photo of Steve in his shack. While the UK 60m allocation has been focused on NVIS experiments, propagation on 5MHz is such that many of these overseas operations have been heard, and indeed worked, from the UK. News of the future of the 5MHz allocation will hopefully appear shortly – G3XTT).

RUSSIAN PREFIXES. RA3AUU and others report that there are some significant changes to Russian callsign allocations, which took effect from 23 January. The changes are partly to take account of changes to the Russian administrative districts (oblasts, krais etc), and because there were not enough calls available in some areas. The following summary should cover it – for "UA" you can also assume UV, UW, etc; the changes apply primarily to the first part of the suffixes. UA8V, 8T oblasts no longer exist, they have been merged with another oblast. Kaliningrad is now only UA2F and K, while the remainder of UA2 prefixes are now allocated to UA3 region (eg UA2U is the same district as UA3U, etc). UA5 prefixes allocated to UA3 region (eg UA5L is the same district as UA3L, etc), UA7 prefixes allocated to UA6 region (eg UA7U is the same district as UA6U, etc), UA8 prefixes allocated to UA9 region (eg UA8R is the same district as UA9R, etc).

Note that existing callsigns that conflict with this scheme will be retained, so logging software will need to treat these as callsign exceptions.

CORRESPONDENCE AND TABLES. The 9-band table appears again this month, thanks as ever to Henry, G3GIQ. The next deadline for updates is 8 July. On that occasion, please send separate CW and SSB totals to Henry, and the tables will appear in the RSGB Yearbook, rather than in this column.

Terry, G1UGH worked just EA8YB 12m, but 15 yielded V26DZ, ZS10WCS and YI9PSE, while 17 produced VR2XMT and 7Z1CQ. Meanwhile 20m, always the reliable fallback, gave him QSOs with YI9GYS, 9Z4CT, 9V1SV, V21ZG and TF/PD9DX. All were, as usual, on SSB.

Peter, G3HQT is busy with an 18ft top-loaded vertical for 30m, and has worked 75 countries on the band since mid-March. These include LU/LA9SN, S79GM, 8Q7QX, J6/VE3CZF, YI9PSE, 5R8GZ, E20AS, 9V1PC and 3W6C on CW, V21ZG on RTTY and KP4ED plus UN8GZ on PSK. VP5/W5CW is the only other contact Peter mentions, on 12 CW. Robert, GW0RYT kindly sent in his usual score update on behalf of himself and his fellow GWs, and mentions that he caught ZP6CW on 12m CW for an all-time new one on the band.

Bob, MD0CCE has been busy this year, with 94 to date on 12m and over 100 on Top Band. He caught 3B9WR (G3LZQ) and YI9PSE on both 80 and 160, and S79GM on 160 for a new one. ZK3OU and ZK3AY put in consistently good signals and were worked on several bands although, he says, sadly not on 12m or 10m! The T32 IOTA trip was worked easily when on Christmas Island, but more difficult on Malden and Caroline Islands, where Bob worked them on 30m, but then left for holiday so missed the last half of their trip. OD5/DL6SN was a new one on 12m, as was TR8CA.

Simon, M0VKY enjoyed the ARRL DX Phone contest as an opportunity to work some of the louder US contest stations on 40, 80 and 160. Other than that, he mentions an early morning session on 15, which produced JO7CVU, H44MS, 6K5YPD and ZL1T. XX9LT was also worked on 15, while ZL4M and ZL2SQ were put in the log on 40 and ZL1GQ on 80, all SSB. Finally, Jim, MM0DXH mentions FO4BM as an all-time new one on 20, plus 9G1AA on 15, S21RC also on 20 and ZC4ESB on 40, all SSB.

SILENT KEYS. Several notable HF operators passed away recently, but I wanted to mention two in particular. First, Alf, 5B4AFB (G3PGG, GI3PGG, EP2TW and ZC4AW), after a long illness. Alf was 75, and a keen DXer with 337 countries and 915 IOTA counters to his credit. Secondly, Vince, K5VT, who passed away at the age of 67 after a short illness. I first worked Vince as S9VCT back in 1981, when he used to make regular trips to Africa, working as a doctor with the World Health Organisation. I later had the pleasure of teaming up with him at 9M0C, where he was our team medic, and on Voodoo Contest Group trips to Niger (5U5Z) and Guinea (3X5A). Vince was a great operator as well as being a larger than life character in every way.

THANKS. Special thanks go to the authors of the following for information extracted: OPDX Bulletin (KB8NW), The Daily DX (W3UR) and 425 DX News (I1JQJ). Please send items for the **August** issue by **Friday 25 June**.

9 BAND TABLE NO 74

CALL	1.8	3.5	7	10	14	18	21	24	28	TOTAL	MODE
G3KMA	280	310	336	336	337	336	337	328	333	2933	Mixed
G4BWP	264	308	335	327	338	332	336	320	327	2887	Mixed
G3XTT	256	291	327	311	337	327	335	306	315	2805	Mixed
G3SED	269	302	323	319	329	324	321	291	295	2773	Mixed
GW3JXN	233	284	317	314	335	326	328	303	307	2747	Mixed
GM3YTS	242	289	322	327	336	319	325	280	301	2741	Mixed
G4OBK	242	270	313	320	334	321	324	310	304	2738	Mixed
GM3POI	281	310	320	320	327	305	307	270	272	2712	CW
G3TXF	194	270	319	320	331	315	326	295	301	2671	CW
G3GIQ	160	256	309	288	337	329	335	313	329	2656	Mixed
G0JHC	191	223	294	313	307	323	327	295	311	2584	Mixed
G4PTJ	127	249	288	282	332	293	327	280	308	2486	Mixed
GM3PPE	153	241	275	297	326	279	285	249	230	2335	Mixed
G3IFB	70	243	299	261	325	263	310	253	289	2313	Mixed
G3VKW	48	216	272	214	336	291	328	276	312	2293	Mixed
G4DYO	73	203	269	143	331	294	328	242	319	2202	Mixed
G0EHO	112	200	237	258	310	271	290	237	250	2165	CW
G4EZT	148	219	272	266	289	273	257	201	234	2159	Mixed
G4OWT	95	164	242	181	324	243	306	171	273	1999	Mixed
G0BNR	110	159	248	238	292	265	238	169	155	1874	Mixed
G4NXG/M	43	74	168	0	307	256	296	210	257	1611	Mixed
G4FVK	45	90	122	78	211	115	202	88	180	1131	Mixed
2E1RDX	41	60	130	63	220	148	213	133	116	1124	Mixed
M0CNP	17	71	106	23	207	126	181	85	130	946	Mixed
AVERAGE	154	221	268	242	311	278	298	246	269	2287	

Gathering for a meeting at the 'Seamen's Club' on Diego Garcia.

VHF/UHF

What propagation to look out for this summer

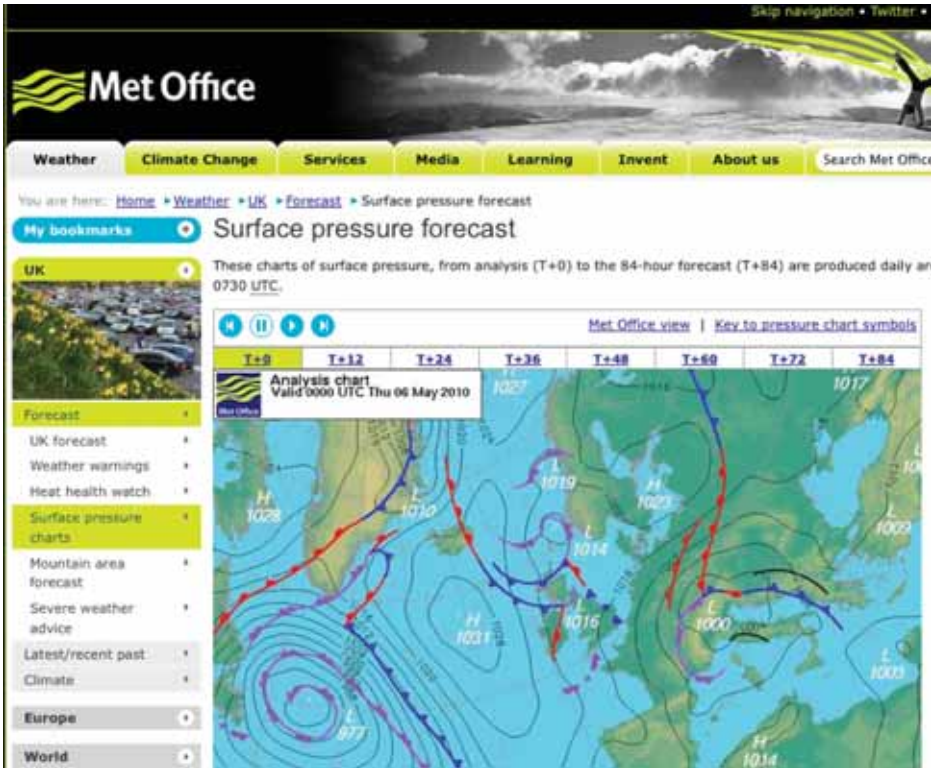

FIGURE 1: Met office website showing isobars.

ROLL ON SUMMER. While HF propagation pundits are concerned with the ionosphere, VHF/UHF enthusiasts generally have their sights set a little lower – on the troposphere. With the summer on its way, and hot sunny days, complete with high pressure guaranteed (I wish), this is a good opportunity to look at the mechanisms behind VHF and UHF propagation.

Under normal or flat conditions most VHF and UHF communications are generally thought to be line of sight. Conventional wisdom has it that the higher your antennas the better. Fortunately, reality is actually a little different thanks to the way VHF and UHF signals can be refracted. This process is the same as that seen with light. Put a pencil in a glass of water and it seems to bend. Look along a hot asphalt road in the middle of summer and it looks like water in the distance. Both of these phenomena are due to the way that the velocity of light waves changes in different media.

Another way of looking at it is that different materials have different refractive indices. The same process applies to radio waves, which are electromagnetic and therefore part of the same 'family' as light waves. If our radio wave travels from a medium with one refractive index to another bending or refraction will occur. The amount of bending will depend on the differences in the two refractive indices.

Our lower atmosphere isn't a static, single temperature environment. It is a swirling mass of gases, all at different pressures and different temperatures. There is also varying amounts of water vapour in the atmosphere as well.

As Ian Poole, G3YWX points out in his book *Your Guide To Propagation*, the dielectric constant of air is usually taken to be one, but in reality it changes very slightly. The average value is about 1.00030, but it can vary between 1.00027 and 1.00035. The area of highest refractive index is near the earth. This causes radio waves to bend towards the area of higher refractive index and helps the signal to follow the earth's curvature.

The net effect is that VHF and UHF radio signals generally travel around one third further than our strict line of sight calculations suggest they should.

But it gets better!

TROPOSPHERIC ENHANCEMENTS. Under certain conditions the refractive index along the path of our signals can increase. If this rate is high enough signals that would otherwise not follow the curvature of the earth and be lost into space are instead returned to earth at much greater distances than you would expect. They can even be trapped in an elevated duct where they can travel for hundreds of kilometres without being audible on the ground below – a similar effect to having a skip or dead zone on HF.

While these effects are less obvious in the VHF spectrum than on the lower bands, they can be very pronounced at 144 (2m) and 430MHz (70cm).

So how do we predict these and what should we be looking for? As the effects occur in the troposphere it should come as no surprise that it is the weather that affects propagation in this region. By studying weather maps and the forecast you should be able to predict when good conditions may occur, although there are always surprises. One of the main things to look for is a temperature or humidity inversion. Normally the temperature in the troposphere decreases with height. But under certain conditions an inversion can occur with a corresponding sharp change in the refractive index.

Look for a high pressure area over the UK or our near European neighbours. The Met Office has a useful chart at www.metoffice.gov.uk/weather/uk/surface_pressure.html.

This is useful as it indicates what is 'high' and what is 'low'. You might also want to look at www.meteorologica.info/Euroisobars.htm.

Better conditions can occur when a high pressure area is present and particularly in the summer when temperatures are higher and there are higher levels of humidity. High pressure areas are usually quite stable and good conditions can last for a few days. Oddly, the best conditions can also occur as the pressure starts to fall. So look for high pressure regions in or around Europe and UK and a falling barometer.

Interestingly, as I am writing this the weather is clear, bright and sunny, but a low pressure area is sitting over the UK – conditions on 2m are as flat as a pancake!

You can also get a temperature inversion with the approach of a cold front. This occurs as warmer air rises over the colder air beneath creating the inversion. This is normally associated with fast-moving fronts and any lift conditions may be over quite quickly.

Other inversions in the summer can occur near sunrise as air at higher altitudes is heated first. Fog and mist in the mornings can also be signs of temperature inversions.

Unfortunately, not all high pressure systems bring good conditions. It is up to you to monitor other indicators such as beacon and repeater reception. In days of old patterning on UHF TV was a good sign of a decent lift, but digital TV has put paid to that!

You can also get enhanced propagation across the sea. Temperature inversions occur frequently along coastal areas bordering large

bodies of water. This is the result of the movement of cool, humid air shortly after sunset when the ground air cools more quickly than the upper air layers. The same action may take place in the morning when the rising sun warms the upper layers. This area can be very close to the water, which means that stations near the water's edge at sea level get good conditions while those on the top of hills don't.

There are other propagation modes available to VHF operators including aurora and meteor scatter. Microwave specialists can also include troposcatter and rain scatter in their armoury. But given the time of year we really mustn't forget Sporadic-E.

SUMMER SPORADIC-E. The period May to mid August is best for Sporadic-E (Es), which can affect signals on all bands from 14-144MHz, although it is most commonly noticed on 28MHz and 50MHz. Sporadic-E openings on 2m are rarer, but do occur. Last summer there was a good opening to Spain that I only noticed as I was testing a portable radio and noticed Spanish radio stations booming in around 100MHz. I switched on my 2m radio and was greeted by signals from the Spanish Costas.

But what is Sporadic-E and how can we predict it?

We know what Sporadic-E is, but its exact causes are still up for debate. It is an unusual form of radio propagation where signals are refracted or bounced off fast-moving 'clouds' of unusually ionised atmospheric gas in the lower E region (located at altitudes of approximately 90 to 160km).

Short skip Es occurs when patches form in the E layer of the ionosphere. This layer normally refracts short wave and medium wave signals, but is transparent to VHF radiation. The ionisation patches drift westwards at speeds of a few hundred km per hour. Es events usually begin mid morning, and there is a peak in the afternoon with another peak in the evening. Es propagation is usually gone by local midnight.

The cause of Es ionisation is not precisely known. Some people have tried to connect it with thunderstorms, but there are plenty of incidences of Es where no thunderstorms were in the area. The best theory at the moment is that it is caused by wind shear in the upper atmosphere. You can get very fast-moving winds moving in different directions. Now, inject some ions into these winds and they will be forced up or down as they interact with the earth's magnetic field. You can imagine a situation where some ions are forced upwards and some (in winds moving in the other direction) are forced downwards. The net result is a patch or cloud of ionisation.

These can be relatively long-lived, or come and go quite quickly. What we do know is that they move quite quickly and the propagation mode is characterised by very strong signals, rapid QSB and signals that appear and disappear from areas as the clouds move. The propagation range for Es single-hop is typically 1,000 to 2,000km, but with multi-hop, the distances can be increased.

Now you are probably wondering where these ions come from in the first place. One theory is that they are heavy metallic ions from meteor debris.

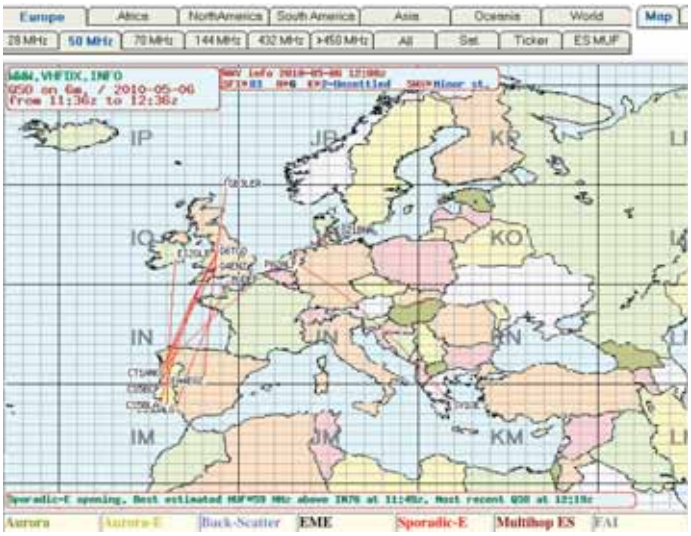

FIGURE 2: www.vhfdx.info screen grab showing real-time Es on 6m.

I was lucky enough to hear a talk by Jim Bacon, G3YLA, who is a professional meteorologist. He has looked very closely at Sporadic-E and has also managed to link it with weather patterns and high-level winds moving across the mountainous areas of Europe, including the Alps, the Harz mountains and the Pyrenees. He thinks that these winds over the mountains create gravity waves that move upwards, helping to compress the ionisation. There is still room for research on Es, but for the radio ham, how do you make the most of Sporadic-E?

First, keep an eye on 28MHz and 50MHz. These will be the first bands to show the effects of Es. If you are away from the radio also check out www.vhfdx.info, which has real-time maps of Es activity.

This isn't a complete guide to VHF/UHF propagation, but it at least gives you a flavour of two modes to look out for this summer.

BEACON NEWS. The low power 70.031MHz beacon On Bell Hill , Dorset (locator IO80UU), sending callsign G4JNT/P has been replaced with a cleaner improved unit sending PSK31. It is intended primarily for relaying telemetry from the GB3SC# microwave cluster, but also serves as a propagation beacon and has been received via Sporadic-E at considerable distances. Full details can be found at www.scrbg.org/g4jntp.html and www.scrbg.org/New70MHzTelemetryBeacon.pdf.

REPORTS. Paul Higginson, GW8IZR wrote to say that he was amongst those who had a 70cm SSB QSO with KP4AO via EME on 17 April. He was using 400W to 4 x 21 ele on a temporary az-el frame in a field. The KP4AO station was put on the air by the Arecibo Observatory Amateur Radio Club using the 1000-foot radio telescope.

Geoffrey Weale, GW3LEW dropped the column a line to say that he is back on 4m after an exhausting time rebuilding the transverter, PSU etc. He is now looking forward to catching up on the new countries available. He's not in an ideal location for 23cm but has decided to give it another go this summer. Geoffrey returned to live in Wales when he retired in 2000. Since then he's managed to work 63 prefixes on 70MHz, 571 on 50MHz, 261 on 144MHz, 45 on 70cm and 4 on 23cm – this despite a 'quiet VHF location'!

Another reader who worked the Arecibo Observatory station was Colin Roberts, G4ZFJ (JO01HO). He says that, "after 3 days of trying to work them on SSB and CW he finally managed to work them 20 minutes before the end of the experiment using JT65 mode. It helped that Joe Taylor, K1JT, operating the station during the JT65 session, knows me and picked out my call from the huge pile up!" This gave him a new DXCC and grid square.

On 70MHz, Colin has finally got his 4m station operational and it has produced some good results. On 17 April he worked LA4ANA (JO59) for a new DXCC and grid as well as LA4YGA (JO48) for a new grid. Then on 1 and 2 May he worked LA4LN (JP50), OZ1DJJ (JO65) and GS3PYE/P (IO67) all new grids. Moving to 144MHz EME, there was RK9AT on 15 April and ZL3CU (RE66) on the 18th, this was a new DXCC and best DX of 18,932km. Between 19 and 24 April, the pick of the bunch were SV2DCD (KN00), T70A (JN63), UY9VY (KN68), LU7FA (FF96) and K7ULS (DN41), all new grids.

Changing to meteor scatter Colin worked IS0AWZ (JM49), T7/PA2CHR (JN63), IS0/I2SVA (JN40) and IC8/PA2CHR (JN60). Finally, he caught two aurora openings last month, which is good as he's a fair way south. On 6 April it was CW with GM4VVX (IO78) and SM7GVF (JO77). Then on 2 May, it was CW with OZ2TF (JO46), OZ1HDF (JO55), LY2WR (KO24) and OZ1FDH (JO65).

Please keep your reports coming in to radcom@rsgb.org.uk.

IOTA

Updates on the latest IOTA DXpeditions and news of those happening soon

VY0V, the QTH of Cezar, VE3LYC on East Pen Island.

THOUSANDS OF QSOs. The most ambitious IOTA trip for many years has just drawn to a successful conclusion. The team of Derek, G3KHZ, Steve, G4EDG, 'SSB Steve', 9M6DXX and Mike, K9AJ, returned to Christmas Island on April 18 after a 2000 mile trip around the Kiribati T32 Line Islands. According to their website updates they made 9,000 QSOs from Malden Island OC-279, 11,000 from Caroline Island OC-281, 5,500 from Flint Island OC-282, and 8,500 from Starbuck Island OC-280. Calls were T32MI, T32CI, T32VI, and T32SI respectively. Their original plan to land on Vostok Island was thwarted by dangerously heavy surf and they moved to Flint Island in the same IOTA group, but 100 miles further away.

Sadly for IOTA enthusiasts in the UK, propagation conditions during the trip varied from mediocre to impossible. The sunspot count declined steadily after they set out and the biggest magnetic storm of Cycle 24 coincided with the team's arrival on Flint Island. I would be surprised if any UK stations worked Flint – though there may have been a small window of opportunity during our afternoon on 10MHz. At the other destinations they were weakly audible on 7/10/14MHz for a few hours after breakfast and again on 14MHz during the afternoon and early evening. Well sited stations may have also heard them around 1730Z on 18MHz.

Three out of four of these islands had never been on the air before but Caroline Island appears to have been activated in the early 1990s by Ron Forester, a Scot who lived there for three years with his wife and two young children. According to his book he was a regular on the 'coffee klatch net' but as he was unable to send any QSLs he doesn't feature in the IOTA database.

VOTE OF THANKS. Long-time IOTA supporter Nils, SM6CAS, provided most of the funds for this costly operation and was planning to go himself but had to pull out because of close family health problems. We owe him a big vote of thanks for maintaining the funding in those circumstances. It will probably be a long time before these islands are activated again.

RARE ISLAND. Apart from Kiritimati Island OC-024, which is occasionally active as people can fly in from Hawaii, there is another rare T32 island – Fanning OC-084. Chuck Corbett, T32NCC is a resident but his novice licence only allows him to use 28MHz and above so we only hear him around sunspot maximum – either short path in the late afternoon or long path after dawn. He has an amateur radio page at http://fanning-island.com/_wsn/page13.html and appears to be offering trips to Fanning from Kiritimati in his sailboat.

COLD AND WET OPERATIONS. Another major effort drew to a close in April when Cezar, VE3LYC, finally succeeded in activating the Pen Islands in Hudson Bay just off the coast of Ontario after years of trying. Using the call VY0V he was QRV for around 4 days – though the trip lasted longer than he had planned when an expected changeover of local guides failed to take place and he found himself alone on the island with no generator fuel. A sudden thaw had taken the local Cree First Nation community by surprise and travel overland had become very difficult in the melting snow. In response to Cezar's battery-powered call for help he was airlifted out to Fort Severn by a plane that flew in from southern Ontario for the rescue. The picture on this page shows his snowy QTH with the antenna bending in the gale force winds. The antenna later broke into three pieces and had to be patched together for the end of the operation. The tent is supported by tree branches, which had to be cut on the mainland and dragged to the island over the ice.

SUCCESSFUL TRIPS. Further to the north-west John Boudreau, VE8EV was active during April from Greens Island, NWT, as CK8G and seemed to be doing a good trade on 20 metre SSB. I hope to have more details and a photo in the next column.

The 3W6C team showed up from the very rare Vietnamese Con Co Island on schedule in mid April and was active simultaneously on the HF and LF bands. Local officials clearly had some concerns about such an unusual radio activity and intervened midway through the operation to close down two of the remote sites and confined the team to a single location. Nevertheless, the trip was very successful and introduced several local operators to DXpeditioning. They made almost 18,000 QSOs – mainly with Europe and Asia.

Mike, V63MY and Jan, V63TO sailed to the very rare Oroluk Atoll OC-260 in Micronesia in early March and were active for about 10 days. Hopefully they can be persuaded to visit Vostok or Flint Island at some time in the future to provide a contact for all the EU stations that missed the T32VI operation.

NEW DXPEDITIONS. Looking forward, a number of interesting IOTA and DXCC islands are due up. It looks like Marion Island (ZS8) off South Africa will be activated for a year from early May by one of the new scientific crew. And in the Antarctic there will be a major operation from the South Orkney Islands during the next Antarctic summer. According to Clublog, a wonderful tool created by Michael Wells, G7VJR, these are 8th and 7th in the Most Wanted lists. See www.clublog.org for more information.

The Russian Robinson Club is planning to activate another new one, NA-235, the Semidi Islands in Alaska. Expected operation dates are in the second half of August 2010. They are looking for extra operators, so do a quick online search for their contact details if you are interested in joining them. They also hope to visit the Seal Islands, NA-239, which were activated for the time last year by N6PYN who made relatively few EU contacts. Check the somewhat misleadingly titled www.na-234.com for more details on NA-235 and NA-239.

Finally, keep an ear out for the very rare Flannan Islands, EU-118, in the Outer Hebrides. The call will be MS0INT and the activation will be from 18 to 21 June – weather permitting.

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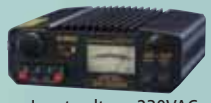

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GHz Bands

Final instalment of the EME series

PHOTO 1: G4ALY/P operating portable on 10 and 24GHz from Kithill in Cornwall. The 10GHz portable system (with19dB gain horn) is on the ground and the 24GHz system is on the tripod.

BAND ACTIVITY. Conditions on the higher bands have continued to improve during March and into April following the long cold UK winter. Whilst high pressure systems have come and gone, none has produced a big tropospheric enhancement during the spring months. A few surface ducts have appeared across the North Sea, with 10GHz beacon DB0GHZ (JO34WE) on 10368.810MHz received in East Anglia on a number of occasions.

I am pleased to have a received a report from Ralph, G4ALY (IO70), about a test he ran with Peter, G3PYB, on 24GHz when Peter recently visited Cornwall.

On 6 April Ralph was located at Kithill (IO70) at a height of 330m ASL with Peter located 74km away at Span Head on Exmoor (IO81) at approximately 400m ASL.

Ralph placed his old 10GHz system, giving 4.5W output to a 19dB horn, on a small rock. Peter initially heard the 10GHz signal at 59+, requiring Ralph to off-point the horn by 45° in order to reduce the 10GHz signal sufficiently to permit Peter to align his dish on the correct bearing. Once the dishes were aligned they switched over to 24GHz and following the initial 'dots' transmission they were able to make an SSB contact with signal levels around 58 both ways. Switching to FM, they were then able to continue in that mode with a 'fully quieting' signal that indicated 59+ for much of the time. **Photo 1** shows Ralph's system set up on Kithill, with the 10GHz system at ground level and the 24GHz system on the tripod.

G3PYB's 24GHz transmitter runs about 300mW output and Ralph's about 500mW. With decent gain dishes the effective isotropic radiated power (EIRP) is over 1kW from each system.

The weather during the tests was described as winter-like with strong winds. It was cold and damp and visibility was poor. Good portable weather!

Thanks to Ralph and Peter for their most welcome report.

BEACONS. Ruud, PE1BTV and Hans, PH0V report that two of the new beacon cluster beacons at PI7ALK (JO22IP) came into service on 10 April.

The 2.3GHz band beacon is on 2320.920MHz and runs 18W ERP to an omnidirectional antenna. The 10GHz beacon is on 10.368.92MHz and runs 4W ERP, also to an omnidirectional antenna. The remaining beacons in the cluster will enter service later this year.

GETTING STARTED IN MOON BOUNCE (EME) part 10. In this concluding part of the series I will be covering two topics. The first is modulation, about which there is a lot to say, but here I will confine myself to a brief discussion on the modes in use. I will have more to say about modes in a later column. The second subject is band allocations used for EME communications. Again, this is a subject I will return to in a future column.

EME MODES. Without doubt the simplest and most effective mode in use is CW. Probably more than half of all EME contacts (QSOs) take place using CW. It is easy to generate and, because of the low duty cycle of his mode, it places a lower thermal strain on the power amplifier, allowing the transmitter to run at a higher peak output. CW overs are usually no more than 2 minutes long.

EME contacts generally take place at very low receive signal levels and, because of libration fading, CW characters can be broken up such that dashes can appear as a short string of dots. To overcome these effects shortened characters are often used for the reporting system. T, M and O are relatively easy to pick out even with severe libration. Similarly, acknowledgement of successful receipt of the report is done by sending a string of Rs as these can easily be copied by the rhythm of the character. Both callsigns do have to be copied fully and EME operators are quite strict about this requirement being met, in addition to the reports and final R (for Roger) for a full EME QSO to be complete. Your own callsign is often relatively easy to copy but full copy of a new and strange callsign, such as OH0/DL1YMK, can take many overs to copy fully. It undoubtedly helps to have a list of possible callsigns to hand, if not in your head, and then mentally check the possibilities.

When signal levels are high (in EME terms) the TMO and reports are replaced by full RST reports. Occasionally both TMO and RST will be sent when an operator receives back a good RST report in response to his or her own TMO sent report, assuming such a report is justified.

In the last few years, digital modes such as JT65C have become more common since the

FORTHCOMING MICROWAVE EVENTS - 2010

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

Crawley Microwave Round Table, 12 September 2010. Details at www.carc.org.uk/modes/microwave.shtml.

14th International EME Conference, Dallas, Texas, 12 – 14 August 2010. Details at www.ntms.org.

55th UKW Tagung (Weinheim), 11 – 12 September 2010. Details at www.ukw-tagung.de.

RSGB Convention (with VHF and Microwave stream), Horwood House, Milton Keynes, 10 – 12 October 2010. Details at www.rsgb.org/rsgbconvention.

Microwave Update, Cerritos, California, 20 – 24 October 2010. Details at www.microwaveupdate.org.

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

Principal EME frequency allocations between 1.3 and 10GHz used around the world. The list is not comprehensive.

Country/Region	Band									
	1.3GHz	2.3GHz				3.4GHz		5.7GHz	10GHz	
Europe	1296MHz			2320MHz		3400MHz		5760MHz	10368MHz	
Africa	1296MHz			2320MHz		3400MHz		5760MHz	10368MHz	
USA	1296MHz		2304MHz			3400MHz	3456MHz	5760MHz	10368MHz	
Brazil	1296MHz			2320MHz		3400MHz		5760MHz	10368MHz	
Japan	1296MHz				2424MHz					10450MHz
VK	1296MHz	2301.95MHz				3400MHz		5760MHz	10368MHz	

use of these modes allows greater path loss capability than CW. Depending on operator skill at CW JT65C can provide up to about a 10dB improvement over CW. This can translate to the use of smaller dish antennas or lower transmit power. This can make EME a much bigger attraction for those with smaller gardens or more limited transmitter (power) means. Successful QSOs have taken place between stations where one end of the QSO has used a dish of little more than 2m diameter and a power output of less than 50W.

I don't wish to get into the debate about the QSO being made by computer to computer, other than to say that this sort of comment is very demeaning to those who have built the equipment and the antenna and who then use these modes. And it can be very discouraging to newcomers.

SSB tends to be limited to those with access to larger dishes, since the path loss budget needs to be much higher than for CW or digital modes. In spite of this there is a very popular SSB EME contest held each spring and this gives many operators the opportunity to listen to 'distant voices' and even communicate with these larger stations using SSB both ways or SSB to CW. In 2009 the 'Voices of Apollo' commemorative activities on 1296MHz were very popular, with many ex-commercial and larger amateur dish-equipped stations being active using both SSB and CW.

FREQUENCY ALLOCATIONS. When the licensing authorities agreed our current amateur bands it was not envisaged that microwave communication would be an everyday international occurrence. Consequently common frequency allocations were not felt necessary between continents or Regions. We now know differently!

On the 1.3GHz band there is no real problem since everyone uses the same frequency allocation. You will find almost all activity between 1296.000 and 1296.100MHz. The same is true at 3.4GHz and 5.7GHz, where almost all activity is in the 100kHz above 3400MHz and 5760MHz, respectively. The only exceptions are maybe a few QSOs at 3456.000MHz, but these are increasingly rare.

The real problems are the 2.3 and 10GHz bands (for the purposes of this series I am assuming that 24GHz and above are not for beginners).

There are four separate allocations in use at 2.3GHz, as shown in Table 1. This can cause problems for the beginner and the unwary. By far the most commonly used are the 2304MHz and the 2320MHz sub-bands. The reasons for this division are now historic. Much of Europe and the rest of Region 1 use the 2320MHz sub band since the 2304MHz allocation were lost in parts of the Region in the last 20 or 30 years. In the Americas, 2320MHz is not available as it is used by satellite broadcasting (Sirius). The satellite causes considerable interference to 2320MHz reception since the 2332.5MHz-centred satellite transmission just covers 2320.000MHz on its lower edge.

Japan is limited to an allocation at 2424MHz. Since this is in the middle of the ISM/WiFi/Bluetooth/Video sender band, low noise reception can be a challenge in Europe and the Americas.

Australia was limited to this same 2424MHz allocation until recently when an astute VK found that there was still access to a PRIMARY narrow allocation between 2300 and 2302MHz. Australians now use 2301.975 or 2301.950MHz as the centre of their EME activity. Interestingly, this same allocation is still available in some parts of Region 1.

On 10GHz the problem is that Japan does not have access to 10368MHz, having instead an allocation at 10450MHz. Again, some Europeans choose to transmit at 10450MHz rather than 10368MHz when trying to work Japanese stations.

Working 'cross-band' between the various allocations on the 2.3GHz band is not too big a problem as long as you have a receiver that will tune 125MHz to 144.1MHz in CW and SSB modes, in Europe, or 142MHz to 160.1MHz in the USA. Why?

Most transverters for the 2.3GHz band have a wideband IF and wide RF filtering. Using as an example a 2320MHz transverter in Europe, the local oscillator (LO) will be on 2176MHz, producing the 2320MHz IF at 144MHz. To tune 2304MHz, merely tune the IF radio to 126MHz. For 2301.975MHz, tune the IF radio to 125.975MHz.

This also works for the USA where the transverter LO will be on 2160MHz, so now 2301.975MHz is tuned at 141.975MHz, whilst 2320MHz is tuned at 160MHz.

PHOTO 2: Testing the gain of a dual band 10/24GHz feed mounted on a Sky minidish at the recent RAL Microwave Round Table antenna measurement session. Left to right, Christian, F1DLT; John, G4BAO and Brian, G4NNS. A full report on RAL will appear in the next column. Photo: G4ALY.

Operating split or using two receivers (one must be a transceiver) is normal.

The problem for everyone is 2424MHz. One solution is to use an old S-band down converter such as the Drake 2880, suitably crystalled to give a 2280MHz LO so that 2424MHz produces an IF output at 144MHz. It is unlikely that any common 2320MHz transverter will have enough bandwidth to cover as high as 2424MHz. There are some other solutions, but I don't have enough space to cover them here.

Although not currently implemented, at the time of writing it would appear that by consensus you should only transmit in the 'normal' allocation used for EME in your region. For Europe that will mean 2320MHz (and 10368MHz) and not in the allocation of the DX station, even though you may have a local footnote allocation that allows you to do so.

Clearly, there is still much that could be covered in a series such as this. When I started I had intended it would be no more than in 6 parts. That just wasn't possible.

I hope you have found it interesting. I may produce a similar series for one or more of the microwave bands, but with a terrestrial emphasis. I will also return to the subject of EME in future columns. Even if you do not currently 'do' EME I suspect many microwave operators aspire to having a go. The series should have given you much to think about and, hopefully, will have encouraged you to give it a try.

EMC

Home powerline networking reaches up into VHF

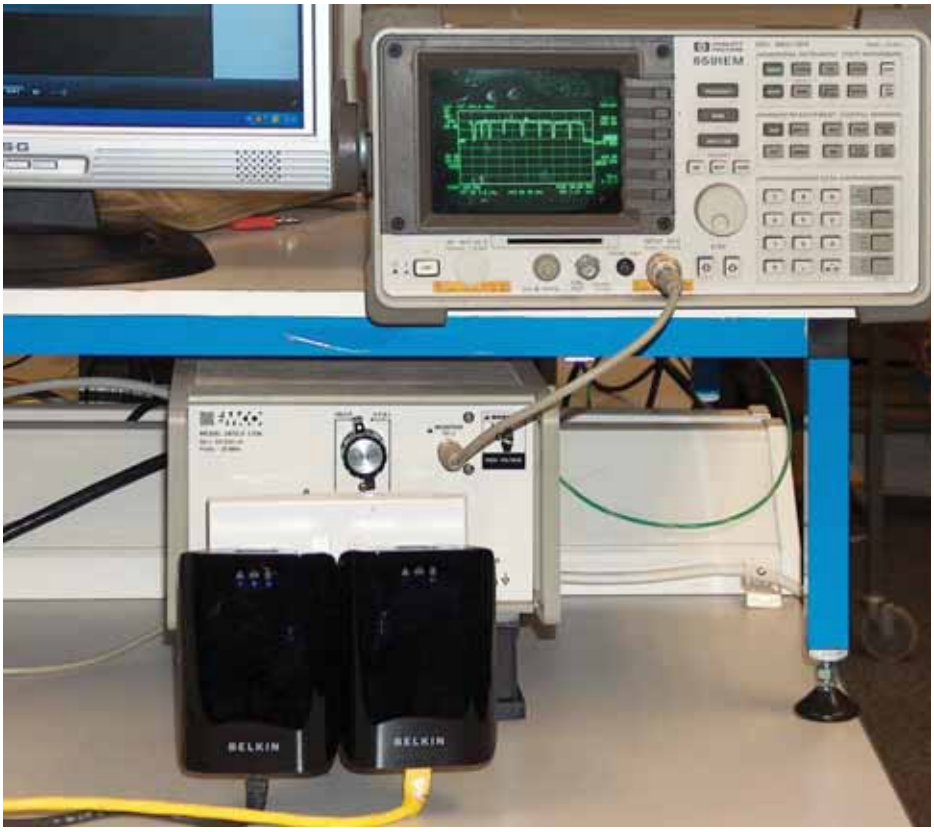

PHOTO 1: Laboratory testing of Gigabit Powerline Adaptors at HF.

OFCOM ASSESSMENT METHOD. Ofcom has informed RSGB of its trial using 6dB above the amateur's 'receiver noise floor' as an indicator of the severity of interference. RSGB has not agreed this. Indeed the Society has concerns over the apparent methodology and that some Ofcom field staff are taking this as an established level to decide whether or not to conduct interference investigations. The latter concern has already been expressed to Ofcom - and we are surprised to hear that this situation continues. Meanwhile we are examining the basis of Ofcom's trial and intend to publish further information when it is available.

GIGABIT POWERLINE NETWORKING. Powerline networking adaptors (PLAs) have appeared on the market that transmit computer network data via mains wiring at bit rates that are described as 'Gigabit'. This relates to the claimed maximum 'raw' or unformatted bit rate, which is higher than the bit rate seen by the user. One such product is the Belkin F5D4076 Gigabit Powerline HD Starter Kit. This product is intended for computer networking or multi-user high definition video streaming using existing electrical power wiring. It uses the mediaxtream™ chip from Gigle Semiconductors. It must be emphasised that a bit rate of 1Gbit/s via the mains (if it can be achieved in practice) does not necessarily require 1GHz of RF bandwidth as it depends on the type of modulation used. Nevertheless, such devices do extend the frequencies used for mains transmission up into VHF. Following reports of VHF interference from Belkin Gigabit powerline networking adaptors, several groups are undertaking a variety of tests on these devices. The RSGB EMC Committee has performed EMC tests at HF and VHF.

HF TESTS. Below 30MHz, a conducted emission test was performed using a Line Impedance Stabilisation Network (LISN). This measures the RF emissions into the mains supply from the equipment under test (EUT). The Belkin F5D4076 PLAs emit significantly more RF when transferring data then when idle, unlike some other types of PLA that emit much the same level at all times. For this reason, a pair of F5D4076 was tested while communicating via the mains and transferring data in the form of a high definition streaming video file. A special type of double mains socket adaptor was constructed where one socket is fed directly from the mains input but the other socket is fed via a network that passes the 50Hz mains but introduces approximately 20dB of RF attenuation. This simulates loss in mains wiring and it also means that the emission measurement is primarily from one of PLA devices, rather than both. The double socket adaptor was plugged into a LISN as shown in **Photo 1**.

Figure 1 shows the conducted emission spectrum measured with peak detection and peak hold of multiple traces. The amplitude units are dB(μV), which is dB relative to 1μV. The purpose of this test was to show the general shape of the RF emission spectrum up to 30MHz but the results are not directly comparable to the EN 55022 Class B Quasi-Peak (QP) limit of 56 - 60dB(μV) at HF. This is because the standards use a different type of detector. It can be seen in Figure 1 that that the emission is reduced in amateur bands below 30MHz, including the experimental 5MHz allocation. The notches do not appear to be as deep as with other PLAs but this may be due to the use of a peak hold function.

VHF TESTS. Above 30MHz, EMC standards such as EN55022 specify limits for radiated emissions from the equipment under test rather than conducted emissions into the mains. Consequently, conducted emission testing is not normally performed above 30MHz but for this type of product that uses the mains for communications, VHF conducted emission tests up to 300MHz give an indication of the general spectral characteristics. A standard LISN is only intended for use up to 30MHz so to achieve repeatable results up to 300MHz, a LISN was constructed specifically for VHF use.

The VHF LISN is shown in **Photo 2**. This type of LISN should only be constructed and used for laboratory tests by suitably qualified persons and an additional insulating cover should be fitted over the capacitors. The operating principle is the same as the type of LISN that is used up to 30MHz. There is an RF choke in series with the phase and neutral wires and there is a capacitor from phase to a BNC socket and from neutral to another BNC socket. This allows the RF emissions on phase or neutral to be measured using a spectrum analyser or measuring receiver. The other output that is not being used must be terminated with a 50Ω load.

The earth pin of the mains socket is bolted directly to the copper ground plane. The capacitors are 4.4nF each side, consisting of two 2.2nF 400V AC Class 'Y' capacitors in parallel. Such capacitors are safety critical

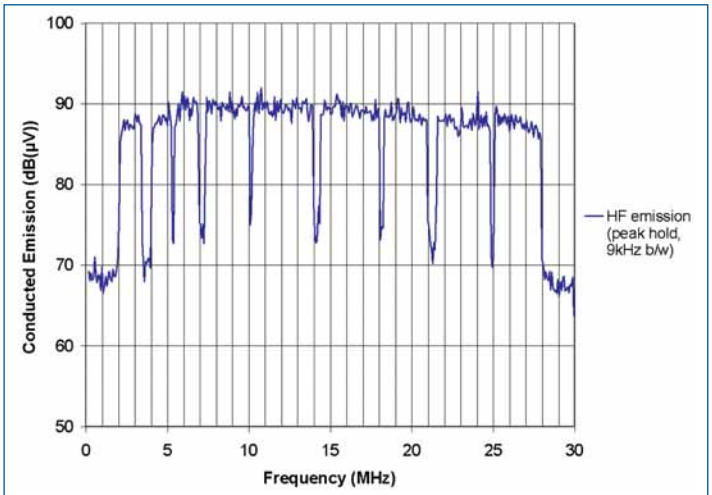

FIGURE 1: Gigabit PLA conducted emission spectrum, 150kHz - 30MHz.

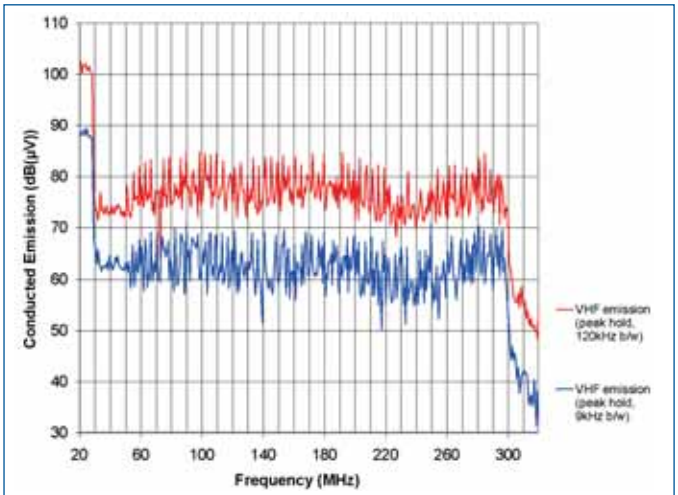

FIGURE 2: Gigabit PLA conducted emission spectrum 20 - 320MHz.

and must be Class 'Y' type, even although this type does not have ideal RF properties at VHF. The smaller clip-on ferrite cores are TDK ZCAT2032-0930 with three turns of wire (cable passes through core aperture three times). Each ferrite core introduces an impedance of 200-500Ω over the range 20-320MHz. The larger clip-on ferrite core is a TDK ZCAT3035-1330 but this can be omitted with little effect on performance.

Before use, the VHF LISN was calibrated using a network analyser and the small loss (up to 3dB at 300MHz) was factored in to the results. The PLAs were then tested as shown in **Photo 3**. The PLA at the front is the 'local' PLA whose emissions are being measured using the VHF LISN. The PLA at the back is the 'remote' PLA. The chokes in series with the phase and neutral wires also attenuate the RF signals passing between the two PLAs but enough signal passes through to allow them to communicate.

The results are shown in **Figure 2**. These show the conducted emission spectrum measured with peak detection and peak hold of multiple traces. The vertical scale is dB(μV). This gives an indication of the amplitude of signals that are emitted into mains wiring and could potentially be radiated but the results are not comparable to the limits given in any EMC standard because above 30MHz, standards such as EN55022 specify radiated emission tests rather than conducted and use a different detector. Nevertheless, the purpose of this test was to show the general shape of the RF emission spectrum from 20 - 320MHz and the ratio of HF to VHF emissions.

Two different measurement bandwidths were used at VHF: 120kHz, the standard EMC measurement bandwidth above 30MHz, and 9kHz, the standard EMC measurement bandwidth below 30MHz. There is a difference of approximately 11dB for the two different bandwidths, which would be expected with a broadband noise-like emission. Figure 2 includes part of the HF emission, from 20 - 27MHz and above this there is a VHF emission in a sharply-defined range between 50MHz and 300MHz. This range includes the FM broadcast band, civil aviation, mobile services and DAB as well as the 50MHz, 70MHz and 144MHz amateur bands. When the HF and VHF emissions are measured in the same resolution bandwidth, the VHF emission is approximately 20 - 25dB lower than the HF emission but the VHF emission may still be significant to radio users because man-made and natural atmospheric noise levels are lower at VHF than at HF.

EMC COMPLIANCE. Some professional measurements of the Quasi-peak radiated emission on an open area test site have been made to see whether Belkin F5D4076 PLAs comply with the EN55022 Class B (Domestic and Light Industrial) limits. Initial results show peaks at certain spot frequencies that exceed the general level of emissions but the amplitude of these peaks may depend on the configuration of the mains supply wiring to the equipment under test on the test site. Belkin's Declaration of Conformity (see Websearch) claims conformity with EN55022:2006 A1:2007 - Class B and this would apply to HF and VHF.

There is no sign of any 'notches' to reduce emissions in the VHF amateur bands but the designers of this product may have considered these unnecessary if they were aiming to comply with the EN55022 Class B emission limits across the range 50-300MHz. Nevertheless, any radiated emission that approaches the EN55022 Class B limit in a VHF amateur band is likely to be a large signal in comparison to the minimum discernable signal in an amateur band. In the case of most other electronic products, the radiated emissions are only likely to approach the EN55022 radiated emission limit at a few spot frequencies such as clock harmonics, with nearly all other frequencies being well below the limit. In the case of VHF PLAs however, the broadband nature of the emission could potentially affect a whole amateur band rather than being confined to narrowband signals on a few spot frequencies. An 'on-air' assessment of the effect of these devices in VHF amateur bands is being performed for a future EMC Column.

PHOTO 2: A VHF LISN for EMC conducted emission testing up to 300MHz.

PHOTO 3: Laboratory testing of Gigabit Powerline Adaptors at VHF.

WEBSEARCH

Belkin EC Declaration of Conformity for Gigabit Powerline Adaptor Type F5D4076 - www.belkin.com/doc/docs/CE_DOC_F5D4076.pdf

Bharathi Prasad, VU2RBI

Chief Coordinator for the National Institute of Amateur Radio in India

Her Majesty the Queen meets Bharathi Prasad, VU2RBI.

INTRODUCTION. Bharathi, VU2RBI is probably one of the most well-known ladies in amateur radio. She was part of the Andaman DXpedition team that, following the earthquake and tsunami that devastated South Asia, swiftly shifted from the role of the DX operation into an emergency communication link with India's mainland. For this activity she won the ARRL's 2005 International Humanitarian Award. Recently she was invited to London to take part in the Commonwealth Observance Day where she was presented to Her Majesty, the Queen. It was shortly after this ceremony that I caught up with her.

BACKGROUND. Bharathi comes from a large family – 7 sisters and 4 brothers! Her brother-in-law was involved with the National Institute for Amateur Radio and encouraged her to move to the city and get her amateur radio licence. She had trained to be a teacher and had seen that as her future. But, her brother-in-law was persistent! There were no Indian ladies in amateur radio at that time and he felt that Bharathi would be able to achieve many things within amateur radio. So she left her teaching job and joined NIAR. She learned her subject well, having a background in science teaching, and passed all her exams to get a full licence.

Her first project was to train girls in amateur radio. She trained 30 ladies with the help of the Andhra Pradesh Amateur Radio Society. This meant teaching them English, maths and science as well as amateur radio. They all got their licence and some joined the NIAR as they were offered employment. She also went on to train almost 200 engineering students in amateur radio in the coastal region during 1982.

The second big project that Bharanthi got involved in was the Asian Games, also in 1982. She chose 60 people to come to Delhi – mainly young people – who used amateur radio between the various stadiums and a control station. It was a very successful time. Overseas amateurs appreciated the opportunity to talk to Shri.Rajiv Gandhi, VU2RG – he's been very supportive of amateur radio in India. The amateurs passed messages that showed amateur radio in a very good light as a secondary means of communication.

MORE PROJECTS. In 1983, the Commonwealth Meeting was held in Goa and once again Bharathi took young people to provide communications and demonstrate amateur radio. Once again they provided a good demonstration of the benefits of amateur radio not only within India but within the wider Commonwealth.

She was part of a DXpedition to Lakshadweep Island that made her well known in the amateur radio community. She spent many hours on the radio and followed the DXpedition with lectures.

One of the events that Bharathi is most proud of happened in 1984 when she was able to use amateur radio to help someone. She was able to save four foreigners who were in the middle of the Bay of Bengal. Their ship was sinking and the only communications they had were amateur radio because one of the crew had an amateur licence. He sent an SOS on 7.040MHz, very low power, that Bharathi picked up. She was able to contact the Naval authorities (with the help of Mr Suri, the founder of NIAR) and the crew of the ship were saved.

A QUIET TIME. For the next seventeen years her amateur activities were much quieter as she got married and had a family to look after. But once they were all grown up, Bharathi was soon back in the thick of amateur radio in India. Sadly, in recent years no other groups had managed to get permission to visit Andaman and Nicobar islands with a DXpedition and they were very high on the 'Most Wanted' list. She was persuaded to try and put a DXpedition together. So she started contacting people she knew within the relevant government departments. Permission from four different ministries is needed for a trip to Andaman and Nicobar as there is a military base there – Defence, Home Affairs, External Affairs and Communications. She wrote to all the Ministers and visited hri.Rajiv Gandhi and, eventually, got the chance to put her case forward for the DXpedition. After she had explained what amateur radio was and its uses – for 2 or 3 hours – the ministries were convinced and gave the necessary permissions.

DISASTER RELIEF COMMUNICATIONS. In 2004 the DXpedition set off for Andaman island. Once again she took many young people who were inexperienced amateur. They proved to have lots of stamina and were able to operate for long periods, so that was a success.

All was well until 26th December, by which time they had made 35,500 QSOs. Bharathi was on the air from her hotel room when the earthquake hit – she was running one of three stations operating on the island. She had started operating at around 4.30am because she wanted to work Top Band and 80m to Asia. From the hotel window she watched as the sea changed colour and the tsunami wave appeared. As soon as the hotel generator was working, Bharathi got on the air and turned the beam to the mainland. The DXpedition was over and relief communications had begun. The DXpedition continued this work for the next 20 days.

COMMONWEALTH OBSERVANCE DAY. During her speech at the Commonwealth Observance service, Bharathi said, " Even in 2010, it's a fact that telecommunication is still a rare service in many parts of the world, which has lead to a great divide between nations and even within nations themselves. It is also a fact that billions of dollars are being spent in the name of developing communications by various countries but simple technologies, such as amateur radio, have been put on the back burner. It is critical to promote amateur radio as a second line of communications as it is a time tested means in case of emergencies as well as being a scientific hobby."

Bharathi is a remarkable lady, working tirelessly for amateur radio and the benefits that it can provide to society. Our meeting was very enjoyable indeed.

Left to Right, Roger, G3LQP with Bharathi, VU2RBI and Roger, G3KMA.

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Start Here

We look at auroral propagation

FIGURE 1: A composite image of the active sun and an artist's impression of it coupling into the Earth with the resulting aurora below. Image courtesy SOHO (ESA & NASA).

SOLAR CYCLE PICKS UP. Now that we're seeing sunspots pop up on a somewhat more regular basis, it's time to consider how they can affect our communications. In this article, we look at how the sun can impact radio signals through aurora.

WHAT ARE SUNSPOTS? Sunspots are large regions on the surface of the sun that are cooler and have a stronger magnetic field strength than the surrounding areas. This allows them to carry highly ionised plasma above the surface of the sun, forming prominences - see **[1]** for some fascinating satellite images. These can last from a few hours up to a week or so before decaying - or hurling the plasma into space in the form of a coronal mass ejection (CME). As the plasma is not an electromagnetic wave it can take several days for the CME to reach Earth (assuming it was ejected in the right direction). The time taken depends on the magnitude of the CME and the speed of the solar wind. Once the plasma reaches the Earth it interacts with the magnetic field, causing the ionosphere around the poles to become highly ionised. This creates the possibility for radio signals to be affected (see **Figure 1**).

WHAT BANDS ARE AFFECTED? On HF, days following a sudden ionospheric disturbance (SID) tend to have a lower maximum usable frequency; this causes a radio blackout across most of the bands. When this happens, you can either switch to a lower frequency or, depending on your latitude and the strength of the aurora, you can try to use it to reflect your signals in an unusual manner. This is more common on 28MHz and VHF as stations tend to be better equipped to direct their signals towards the aurora. Generally, auroral signals sound quite garbled. This is due to Doppler shifts changing how the signal sounds. There are some excellent example auroral audio files at **[2]**.

CAN I WORK AURORA? Most auroral activity is limited to the higher latitudes. The closer you are to a pole, the more often you will benefit. There are several websites that provide up to date information about auroras and the chance of them occurring. The NOAA website **[3]** provides a visual display of the aurora oval (see **Figure 2**) based on the latest satellite data, giving an estimate of strength plus a measure of how confident the estimate is.

To be able to work aurora, you normally need the auroral oval to be fairly close to your QTH and as strong as possible. The Spaceweather website **[4]** gives an overview of solar activity and is a good source of information about possible auroral activity in the next few days. Finally, don't forget that the DX cluster, discussed in earlier articles, can alert you to auroral opportunities. Spots that are aurora related usually contain AU> between locators (if given) and signal reports have A appended for aurora. As an aurora intensifies, stations further south (in the northern hemisphere) become able to make auroral contacts. Looking at the cluster, you should be able to make contacts when you see stations at a similar latitude or further south than you making QSOs.

DO I NEED ANY SPECIAL EQUIPMENT? This is a tricky question to answer as the better your equipment is, the more likely you are to make contacts. If the aurora is very strong you don't need anything extra. Since the aurora spreads down from the poles, it is useful to be able to direct your signals towards the pole by using a beam. The point at which your signal is reflected may not be that obvious, so turning the beam slowly can help find the strongest signals. As a rule of thumb, starting with your antenna within ±30° of north is good. As an auroral opening intensifies the aurora oval moves down, so you may be able to beam more away from the North and work a different set of stations. It is worth remembering the polarisation loss between a contact with a vertical antenna at one end and a horizontal antenna at the other. Due to the unusual signal reflections, the signals can be quite weak, so it's best to use antennas that are polarised in the same way as most amateurs on the band. Finally, it may be useful (particularly at high latitudes) to have some degree of elevation control for your aerial. This is because as an aurora moves south, the reflection/scatter point appears to move further above the horizon.

HOW DO I MAKE AURORAL CONTACTS? Auroral signals can be quite garbled, to say the least! For this reason, many operators prefer to use Morse. Although it is distorted, it can still be understood by thinking of it in terms of a sound being switched on and off. Due to the levels of distortion, Morse code speeds tend to be slower than usual, perhaps 10-15 words per minute to permit accurate copying. Voice contacts can be made, though they do require a good ear and patience. Speaking clearly and relatively slowly will help significantly.

Once you have located a station, you need to remember that there may be some Doppler shifting of the signal. This isn't normally a problem on 10m and 6m, but as you go higher in frequency it becomes more pronounced. An aurora on 432MHz can produce Doppler shifts as much as 4-5kHz and there has even been a report of aurora on 1296MHz with a Doppler shift of 12kHz! Bearing this in mind, it may take a while, using your Receiver Incremental Tuning to listen to the station while varying your transmit frequency until they hear you.

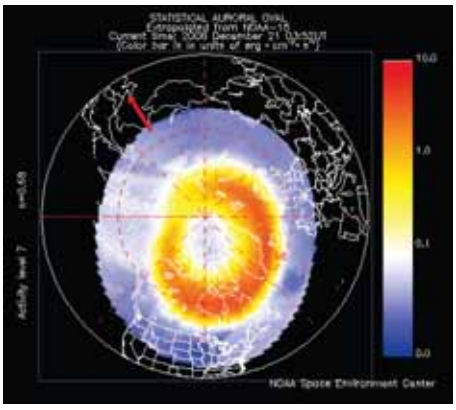

FIGURE 2: The strong auroral oval in the Northern hemisphere on 21 December 2006. (NOAA image).

WEBSEARCH

[1] http://sohowww.nascom.nasa.gov/gallery/bestofsoho.html
[2] http://la8aja.com/vhf-stuff/soundclips-6m/
[3] www.swpc.noaa.gov/pmap/pmapN.html
[4] www.spaceweather.com/

Win a solar panel!

High quality 8W solar panel up for grabs

READ ALL ABOUT IT. This month's article on solar panels (p42) features an 8W panel – and you can win it! Ideal for keeping 12V batteries topped up from sunshine, this conveniently sized panel easily provides enough power to operate a low power radio for an extended period of time.

Featuring an easy-connect system and a long 3.7m lead, the solar panel system comes complete with three output connectors. The battery clips readily attach to most sizes of battery terminal, ranging from small sealed lead-acid up to larger 'leisure' units. For batteries with boltable terminals, ring terminals are supplied that can easily be firmly attached in parallel with existing connections. The third option is a male cigarette lighter plug that can be inserted into a suitable socket to help keep a vehicle battery topped up, which could be particularly useful for extended periods of static mobile operation.

When illuminated by typical British mid-day summer sunshine, the solar panel produces around 500mA at 13.8V. This is plenty of power to top up a battery being used to power a small transceiver such as a handheld or QRP radio such as an FT-817. Even if the consumption of the radio exceeds that produced by the solar panel, its power output will provide a useful boost to the battery's operating life.

Unlike some less comprehensively specified solar panels, the one we're giving away includes adjustable rods so that you can adjust its operating position. This means that you can set it to the optimum position to receive the best possible illumination from the sun. There is also provision to permanently fix the solar panel to a structure if you intend to use it in one place. Note that if you intend to use the solar panel as a permanent float charger for a battery you will need to buy or build a charge regulator (see article).

The possibilities for a solar panel like this are endless. It could provide power for radio operations or keep a caravan, boat or vehicle battery topped up. Another common use for solar panels is to provide an off-the-grid power solution. When teamed with a good-size deep discharge battery, you can have an immediate power reserve in the most remote location. Whether a garden shed or a barn on a remote moor, there are many places that could usefully benefit from a self-replenishing electrical system. Apart from the familiar 12V caravan-style striplights, there is now a new generation of energy-efficient 12V compact fluorescent lamps available at reasonable prices. These look, and behave, just like their mains-powered counterparts except that they operate from 12V DC (at about 1A or so). Used for six hours daily, one 110AH leisure battery could power one of these lamps for well over a fortnight – even if there wasn't a single minute of sunshine! And if you add an inexpensive inverter you can even create your own 240V supply to run small mains-powered items.

THE COMPETITION. All you have to do to win this fantastic prize is answer the following three questions.

QUESTIONS

1 – If the output power of a solar cell is 6W at 12V, what is the current?
a – 1 amp
b – 5 amps
c – 0.5 amp

2 – What length is the cable that comes with the solar panel that we are offering as a prize?
a – 10 feet
b – 3.7 metres
c – 37 centimetres

3 – Assuming standard British summer sunlight conditions and a solar panel efficiency of 15.3%, how many 10W solar panels will be required to fuel a 10,236 BTU/h gas heater?
a – 300
b – 1,960
c – Don't be silly, the heater runs on gas

HOW TO ENTER

The competition is open to all RSGB Members who are current on 1 May 2010. No Member may enter more than once. Write your answers (eg 1-A, 2-A, 3-A), name, address and callsign on a postcard or the back of a sealed-down envelope (do *not* enclose any correspondence – letters will *not* be opened).

Send your entry to:
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The winner will be the first correct entry drawn 'from the hat' after noon on Monday 1 June and will be announced in the August RadCom. The Editor's decision is final and no correspondence will be entered into. E&OE.

HF notch filter

Part 2: the practical implementation

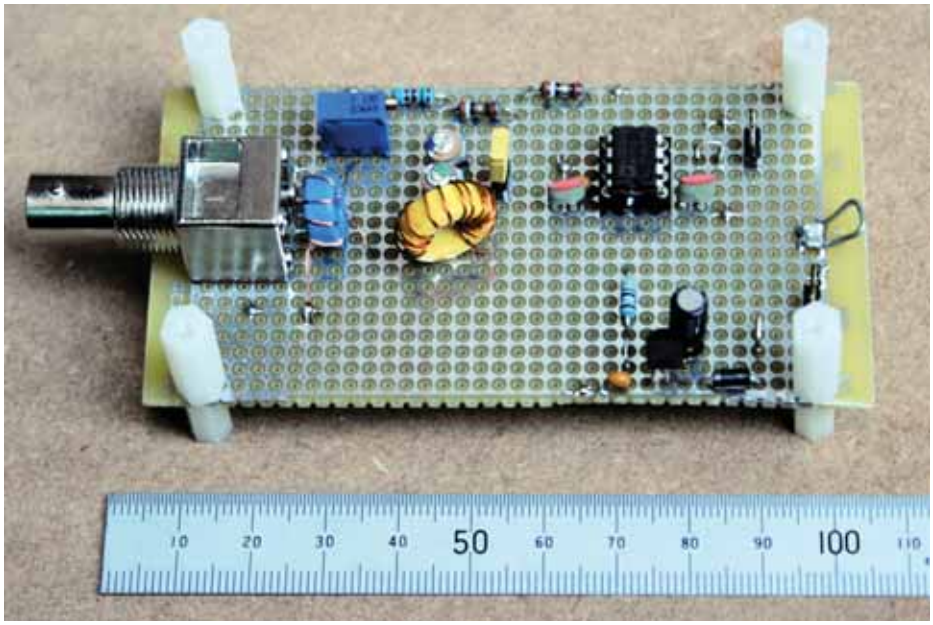


PHOTO 2: Notch filter board component side.

INTRODUCTION. Last month we looked at the theory of using a balanced bridge to measure HF transmitter distortion. Now we describe a practical project.

CIRCUIT DESCRIPTION. The notch filter achieves a high dynamic range by using a logarithmic amplifier (log amp). The principle of the log amp is that its (DC) output voltage changes in steps proportional to the factor by which the RF signal voltage at its input changes. The AD8307 log amp used here has a 'slope' of 25mV per dB, meaning that if the input signal voltage increases by a factor of ten (20dB), the output voltage increases by 500mV (ie 20 x 25mV). This means that a very wide range of RF input voltages can be scaled to a much smaller DC output range without significantly sacrificing accuracy.

For those interested, there is a very good description in the datasheet (see references) not only of the particular device used, but of log amp principles. Tribute is due to the ingenuity of Analog Devices' engineers for this very sophisticated device, made available to us in an 8-lead package at very reasonable cost.

The complete circuit diagram is given in **Figure 8**, which I hope will appear agreeably uncomplicated. Very few external components are required for the log amp. Its maximum operating input level is +17dBm (50mW). I decided on a maximum continuous input power as 2 watts, or 33dBm. The bridge minimum loss is 12dB. A 6dB attenuator ('pad') is included prior to the log amp, so its maximum input with 2 watts at the input socket will be 33 – 12 – 6 = 15dBm, nicely within range. Sharp-eyed readers may spot that the 6dB pad output resistor doesn't have the textbook value. This is because the log amp input impedance is much higher than 50Ω, at around 1kΩ, so a 50Ω load is 'absorbed' in this output resistor. Coupling and de-coupling capacitors plus a 5V regulated supply are also provided for the log amp. A 9V PP3 battery makes a suitable power source and a series input diode gives reverse polarity protection.

The bridge resistors are parallel pairs capable of dissipating the maximum 2W input power. I used suitably rated 1206 size surface mount components for the bridge, which should give it a wide bandwidth, but I suspect that other options such as metal film resistors would be fine. I used a pair of pins and a jumper connector which, when removed, takes the notch out of circuit thus passing the full signal spectrum to the log amp.

I would always encourage experimentation, but to anyone wanting to increase the on-board maximum input power, I would counsel against this. The null is narrow at maximum rejection, and heat will make the input components drift, shifting the balance point (the resistors are more likely susceptible than the tuned circuit components). I reckon it's better to use external attenuators to absorb higher powers.

COMPONENT SOURCING. A well-stocked junk box should provide some of the components. All the components can be obtained from Farnell but are also available from many other sources.

CONSTRUCTION. I built the prototype (see **Photo 2** and **Photo 3**) on a 0.1" matrix prototyping board with isolated solder pads on one side and a ground plane on the other. This is very good for high frequency work and has proved successful up to hundreds of megahertz. This design is simple enough that it occupies less than half a new board.

The first job is to drill appropriate holes for the few components that need them, such as the BNC socket and perhaps the trimmer capacitors (depending on their type). Leaded components have their leads bent and pushed though the holes and soldered to the pads. Surface mount resistors, if used, can be soldered directly to the pads.

Uninsulated connections are made using 0.2mm diameter tinned copper wire strands extracted from normal stranded insulated hook-up wire. Connections to the ground plane can be made very short and direct with a bare wire strand soldered to the pad to be grounded, pushed through an adjacent hole, and soldered immediately to the ground plane.

Insulated connections, such as those that cross over others, are made using insulated wiring pen wire, the insulation of which burns off when heated by the soldering iron bit for a few seconds. This does take practice, and should not be done in poorly-ventilated conditions.

The log amp is relatively expensive and I fitted mine in an IC socket.

TR1 requires a bifilar winding. Since the core used has very high permeability, only a five turns of this bifilar wire are required. **Photo 4** shows a detailed view. One end of the winding goes to the input socket signal and ground connections: the other end supplies the bridge. Provided this is followed, no other connection detail matters: for example swapping the bridge connections has no effect on operation, provided the two wires are from the same end of the winding. Just follow the illustration.

The tuned circuit inductor depends on the band(s) in which you are interested. For the 12 metre (25MHz) band, my inductor consisted of 14 turns wound on a T50-6 toroid.

I added some corner holes and nylon pillars to give some measure of protection to the board, but have never felt the desire to put it in a case; you may be less lazy than me.

TESTING, COMMISSIONING AND USE. It is always worth giving a finished board a visual inspection, and checking connections with a multimeter that has an audible continuity tester, or an ohmmeter. This is particularly recommended for wiring pen connections since it is quite easy to embed the wire in solder without properly burning off the insulation, thus failing to make a connection.

Next (and with the log amp out of circuit if socketed), add the battery and check that the

5V rail is correct and goes to the correct log amp pin. Remove the battery, put the log amp in its socket, and power up again, measuring the battery current, which should be close to 11mA.

Attach a multimeter set to DC volts to the output; the output voltage with no input signal should be in the region of 200 to 300mV.

Arrange for the transmitter signal (continuous, un-modulated, or with a constant sine-wave modulation) arriving at the board to be no more than 2W. Connect it to the notch filter input and remove the series tuned circuit from the circuit. If you have made yours like mine, this just means pulling off the jumper connector. Note the output voltage, which should be quite steady. On my unit, 0.5W input produced a reading around 2.5V. I'll refer to this later as the 'full signal reading'.

Put the series tuned circuit into operation and adjust the coarse trimmer capacitor: you should see the output voltage dip at some point, where the tuned circuit frequency is equal to that of the transmitter. An analogue voltage indication can be preferable to digits for this part of the process. Do the best you can with the coarse trimmer, then adjust the fine trimmer for minimum reading. Depending on the trimmer value and type used, this can be quite tricky and requires patience as the notch minimum is explored. When the minimum is found, transfer your attention to the potentiometer. You will typically find you can obtain a deeper minimum still. The capacitor and potentiometer adjustments are largely independent, but a little iteration can be worthwhile. If the fiddliness of adjustment does tax your patience, there is some good news: a deep notch means a good quality transmitter output. Equally, if you become frustrated at being unable to obtain a deep notch with any amount of adjustment, I'm afraid this indicates that unwanted transmitter output signal components are present.

When you are satisfied that you've obtained a minimum, note the reading.

Subtract this reading from the full signal reading. To obtain the unwanted output suppression in decibels, divide this by 25mV, equivalent to multiplying by 40:

Unwanted signal suppression, dB = (Full signal reading [V] – minimum reading [V]) x 40

Example: full signal reading = 2.1V, minimum reading = 0.65V, difference = 1.45V, so suppression = 1.45 x 40 = 58dB.

Inspection of the datasheet shows that while the nominal sensitivity is 25mV per dB, this can be between 23 and 27, so the suppression derived above could be from 54 to 63dB. That noted, I tested a log amp with a signal source and professional quality switched attenuator, using an assumption of perfection on the part of the attenuator. Using 25mV/dB, the biggest discrepancy over a 70dB range was 1.2dB, which is not bad at all. If you have a good quality switched attenuator, you can do this check for yourself. The bulk of devices shipped will be very close to 25mV/dB; such is the nature of chip mass production spreads.

When measuring transmitters opened up on the bench, it is probably a good idea to space the notch filter away by a couple of metres to avoid coupling with the transmitter circuitry, which could give an erroneously poor result.

SOME RESULTS. I tested my IC703 on the notch filter, running about 5W output at 24.906MHz and obtained a figure of close to 63dB unwanted signal suppression (2.44V full signal, 0.87V at notch minimum). The specification states that spurious suppression is better than 50dB below 30MHz and better than 60dB above 50MHz, so measurement and specification are compatible.

My homebrew transmitter produced readings of 2.56V full signal, no notch, and 0.75V at notch minimum, a difference of 1.81V, indicating an unwanted signal suppression of 72dB, which is a pleasing result. That this is a somewhat better figure than for the Icom is no surprise: my transmitter is essentially a crystal oscillator and amplifier for one band. The Icom is vastly more versatile and complex as a result and complexity generally compromises signal purity. That noted, simple and relatively simple homebrew equipment should not automatically be regarded as inferior to commercial gear, despite the latter's considerable development effort by clever people.

COVERING OTHER BANDS. To cover any particular frequency, appropriate values of L1, C1 and C2 need to be used. The frequency of the notch is given by:

$$f = \frac{1}{2 \cdot \pi \cdot \sqrt{L \cdot C}}$$

where is the notch frequency in hertz, L the inductance of L1 in henries, and C the sum of the capacitance of C1 & C2, in Farads.

Continued on page 69 ⏩

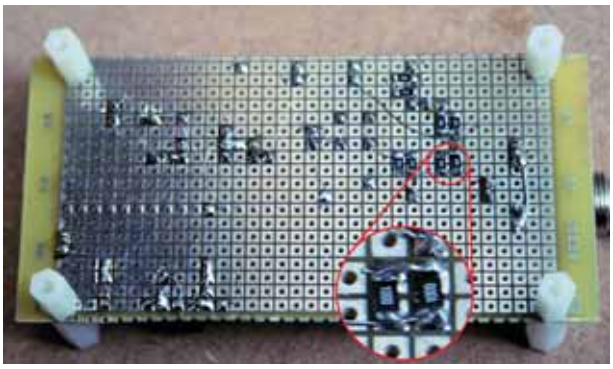


PHOTO 3: Notch filter board underside with (inset) example of how the surface mount resistors were fitted.

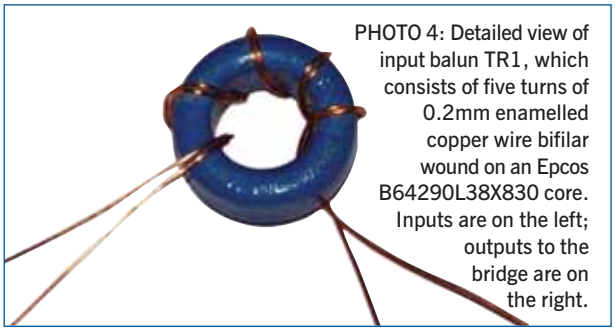
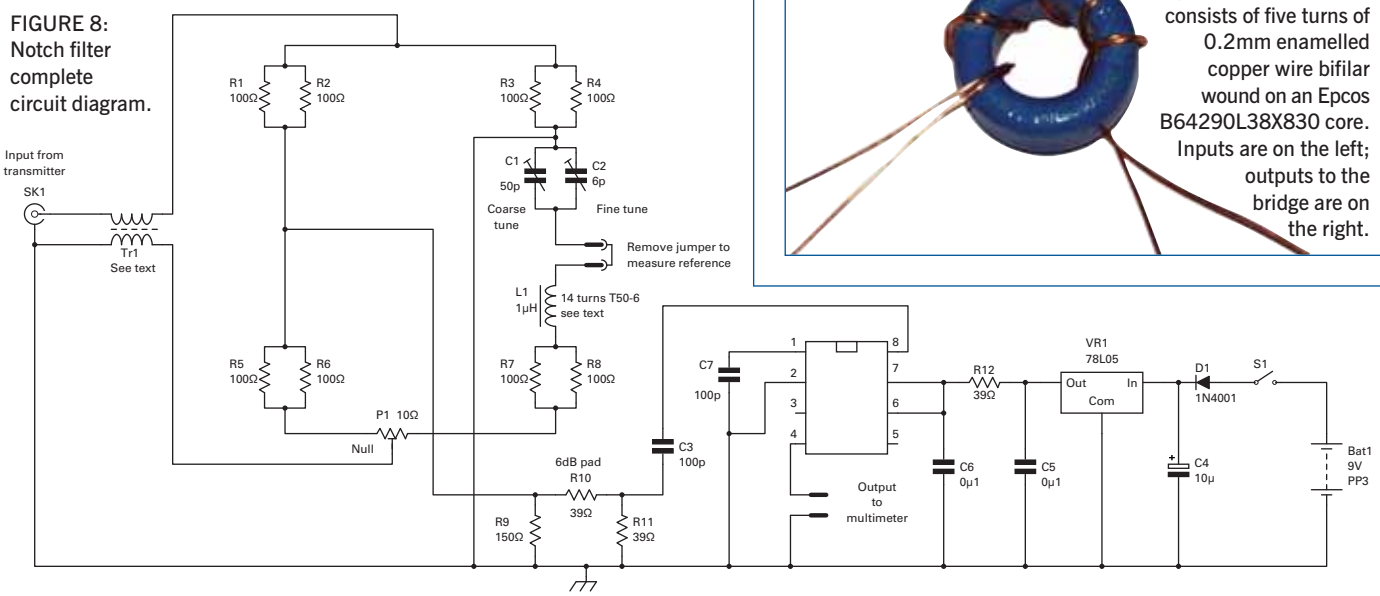


PHOTO 4: Detailed view of input balun TR1, which consists of five turns of 0.2mm enamelled copper wire bifilar wound on an Epcos B64290L38X830 core. Inputs are on the left; outputs to the bridge are on the right.

FIGURE 8: Notch filter complete circuit diagram.



VISTA aerial

The Variable Inductance Small Telescopic Antenna – nothing to do with computers!

PHOTO 1: The complete VISTA antenna, shown with the two 1.3m long 10 section telescopic dipole elements retracted. Extended, the antenna is just over 2.6m wide.

WHY SMALL? The fun of low power (QRP) communication has much to do with achieving more with less. The same goes for experiments with small antennas. If they can be carried about it is easy to accept a degree of inefficiency in exchange for convenience of use.

This compact antenna design uses a ferrite rod and so it is suitable only as a low power experimental device. Whilst not an efficient radiator, it is very handy, needs no pole or guys to keep it up and requires no separate matching unit. It also needs no counterpoise or earth connection.

HOW IT WORKS. The VISTA is a centre loaded shortened dipole. The ferrite rod increases the 'Q' of the inductor but it is unclear whether the small associated increase in radiation resistance is of practical use. Some RF radiation is detectable with an absorption wavemeter along the coaxial feed to the VISTA, but the strongest field is around the inductor and proximal third of the telescopic elements. As the feed line falls away at right angles from the dipole there should be minimal interaction between them.

ORIGINS. The idea came from a simple antenna matcher **[1]** that used a ferrite rod to vary the inductance of a self-supporting coil. It occurred to me that something similar might be useful to resonate a small dipole. Initially I took two telescopic lecture pointers (each about 60cm long) and wound a loading coil at the centre. The coil was loop coupled via a length of RG174 coaxial cable to a bi-directional (Stockton **[2]**) power meter and a SoftRock/Power SDR transceiver tuned to the 14MHz band.

As the ferrite rod brought the system to resonance there was a gratifying increase in the basal noise trace and several CW signals could be tuned in on the receiver. Even more encouragingly, with a series capacitance of about 80pF included in a central coupling link, it was possible to achieve a 1:1 match to the 50Ω transceiver output. With minor changes, similar results were obtained on each band from 7 to 28MHz.

Still with the short 'pointer' elements in place and with the antenna in a ground floor room, I heard a strong CQ call on 18MHz from a station near Kiev, Ukraine. No one answered, so I called him back. He copied my callsign and gave a 339 report. Output power was 2W and the antenna was just 1.3m above floor level.

It seemed worth exploring further, so I built two separate units for the HF range. More switched taps on the coil would have allowed wider coverage but I was keen to keep things as simple as possible. I later found that the series capacitor could be omitted if a single turn coupling coil was wound at the 'ferrite end' of the loading coil.

CIRCUIT. The circuit of the VISTA antenna is quite simple. The central components are L1 and L2 that are coupled to a varying degree by the ferrite rod. Variable capacitor CT provides matching to the incoming 50Ω line (supplemented by an additional 100pF for the lower frequency version). L1 directly drives the telescopic elements of the antenna, with a couple of taps at one end selected by switch S1. **Figure 1** shows the circuit diagram and **Table 1** gives component values for the low- and high-band versions.

The main difference between the low- and high-frequency versions is the coil L1. The coil for higher frequencies has 14 turns tapped 4 from the end, wound on a 2.5cm plastic tube. The lower frequency coil had 30 turns, tapped 10 from the end. The series capacitor Ct can be a pre-set trimmer or a small variable (eg Maplin FT78K) mounted inside the box. In the lower frequency version it may be beneficial to add a 100p capacitor in parallel with the trimmer for the lower frequency bands (see Table 1).

In a later development of the high frequency version I used thicker wire, oval in cross section and equivalent to about 16 SWG. Twenty turns will resonate at 14, 18, 21 and 24MHz. If the coupling winding is placed a few mm to the right of the loading coil (ie the end first entered by the ferrite rod on its insertion) it is possible to achieve a 1:1 match with no series capacitor. A further refinement, leading to only a small increase in size, was to build the unit into a 'Double Mounting Box' with the coil and tuning mechanism in the lower compartment. This had the advantage that there was negligible 'hand capacitance' effect when making adjustments to the tuning.

ASSEMBLY. In place of the original pointers I used the Maplin 10 section telescopic (1.3m) antennas (code LB10), which have a hole in the base tapped to take an M4 bolt. Most of the hardware came from B&Q and Homebase. A major 'find' was the 'Single Mounting Box' made from a synthetic plastic material for domestic electrical use. It comes 25 or 30mm deep and has sheer rectangular sides. With suitable precautions it can be hand drilled, and might have been expressly designed for the VISTA antenna.

In the past, the action of a lipstick cylinder

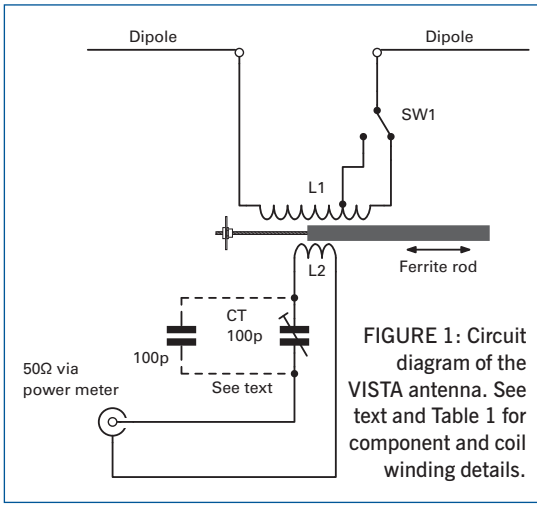


FIGURE 1: Circuit diagram of the VISTA antenna. See text and Table 1 for component and coil winding details.

has been used as a way of moving inductor cores, but it brings its own problems. My wife, who has no particular fondness for either lipstick or amateur radio, suggested the mechanism in **Photo 2**. This turned out to be ideal. A 40mm long, 3.5mm diameter machine screw is threaded through a cup formed from a piece of graduated rubberised cable protector. The screw thread then passes through a nut secured with cyanoacrylate adhesive (or, better still, a stripped-down and slightly crimped stereo jack socket) in the case wall, so that the ferrite rod is held firmly. Its other end protrudes through a hole drilled in the opposite side of the box as shown in the figure. The rod can be moved in and out by rotating the screw or the rod itself, allowing precise and stable tuning.

OPERATION. The VISTA antenna will tune to give a 1:1 50Ω match on any of the HF bands in its range. I use 4m of RG174 to connect it to the power meter and transceiver. In use, the antenna is set up on a suitable support and peaked for maximum receiver noise level. It is then adjusted for zero reverse power on transmit. The series capacitor can be pre-set to about 80-100pF for 14MHz, a bit more for 7MHz and much less for the higher bands. It need only be adjusted once for each band. Antenna resonance is affected by proximity to the operator, so it is necessary to tune in increments and check several times. If peaked for the middle of the 20m CW section it is possible to operate from 14.000 to 14.060MHz without retuning. Alterations to the length of the coax feed made no difference to antenna resonance. A 4m length was enough to site the antenna clear of obstructions but within easy reach to make adjustments.

Remember, **this is a QRP-only aerial**. Do not attempt to drive it with more than 5W.

TABLE 1: Component values for lower- and higher-frequency versions.

	LF version	HF version
Ct (nominal)	80pF	60pf
Additional capacitor	100pF	none
L1	10 turns	14 turns
Tap L1 at	10 turns	4 turns
L2	2 turns	2 turns

RESULTS. With the VISTA in a downstairs room I have had six brief CW contest exchanges with east coast USA and Canadian stations. One of these was with 2W and the others between 3.5 and 5W. Two more US contacts were made with the antenna sited in the roof space and 4.5W. Curiously, I didn't get the impression that the increased height and 10-12m of extra feed line made any difference to my footprint in the USA. Aside from contests, there have been several contacts round Europe lasting for 5 minutes or more and limited as much by my indifferent Morse as by the signal strengths.

CONCLUSION. This is another small antenna that works. Limitations? It is not an efficient radiator, though this would be improved if its electrical length were increased, perhaps with capacity hats at the ends. It does need to be retuned if its height above the ground is altered, but you do need to check the reflected power during operation. I should also mention that my home station is on a sandstone ridge between the Mersey and Dee estuaries so it has some natural advantages.

What is new? Well, it is quick and unobtrusive to set up and it fits not just in a briefcase, but in a sponge bag if you dismantle it. As it works indoors it might do even better on top of a small mountain.

PHOTO 2: Mounting arrangements for the ferrite rod and dipole elements.

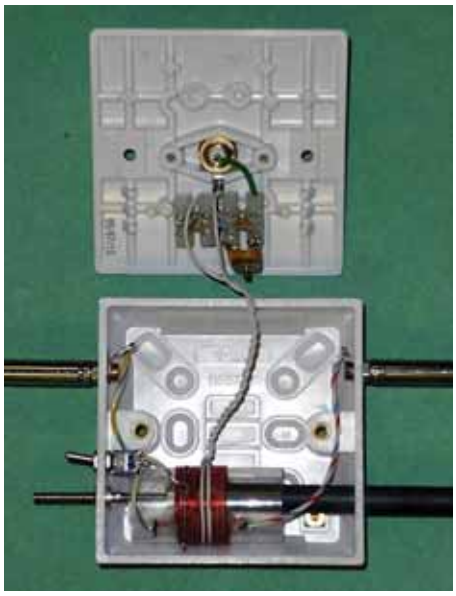


PHOTO 3: General view of the completed HF version. The LF version is similar.

REFERENCES
[1] No Cost ATU, Tony Haas, G4LDY, *Sprat* 28 Autumn 1987
[2] Bi-directional Wattmeter, David Stockton, GM4ZNQ, Sprat 61

There is a fair bit of latitude: my choice of about 1μH for L1 was somewhat arbitrary, and a lower value could have been used. At 25MHz, 1μH has a reactance of 157Ω. I reckoned on an inductor Q of about 50, giving a series loss resistance of about 3Ω, well within the 10Ω range of trimmer resistor P1.

Table 1 gives a suggested set of inductance values and types for the bands from 1.8 to 30MHz. Please note that while I believe they should work, I haven't actually built them. Please see Websearch for useful information on inductances of dust-iron toroids. The inductor doesn't have to be toroidal and may be air-cored for example, but toroids do have the advantage of neatness and reduced coupling to the outside world.

Worked example – 40 metre band: A nominal 2μH inductor is chosen, with 21 turns on a T50-6 toroid. The capacitance required to resonate with this at 7MHz is, from the earlier formula, 258pF. For this band, I would be inclined to use a 220pF fixed capacitor (use a low temperature coefficient type such as polystyrene) in parallel with a 50 or 65pF trimmer for C1, and a 10 or 22pF trimmer for C2. As long as you can obtain a convincing null without the variable capacitors right at the end of their adjustment range, all should be well.

CONCLUSION. I hope you have found this an interesting read, and that some of you will build your own and find it useful for a modest outlay in time and money. More than anything though, I hope it will spark some better ideas or applications.

TABLE 1: Suggested inductor and capacitor values for various frequency bands (see text).

Frequency (MHz)	L1 range (μH)		
Dust iron core type	No. of turns		
1.8 to 3.5	4 to 8	T68-2	26 to 37
3.5 to 7	2 to 4	T68-6	21 to 29
7 to 14	1 to 2	T50-6	15 to 21
14 to 30	0.5 to 1	T50-6	10 to 15

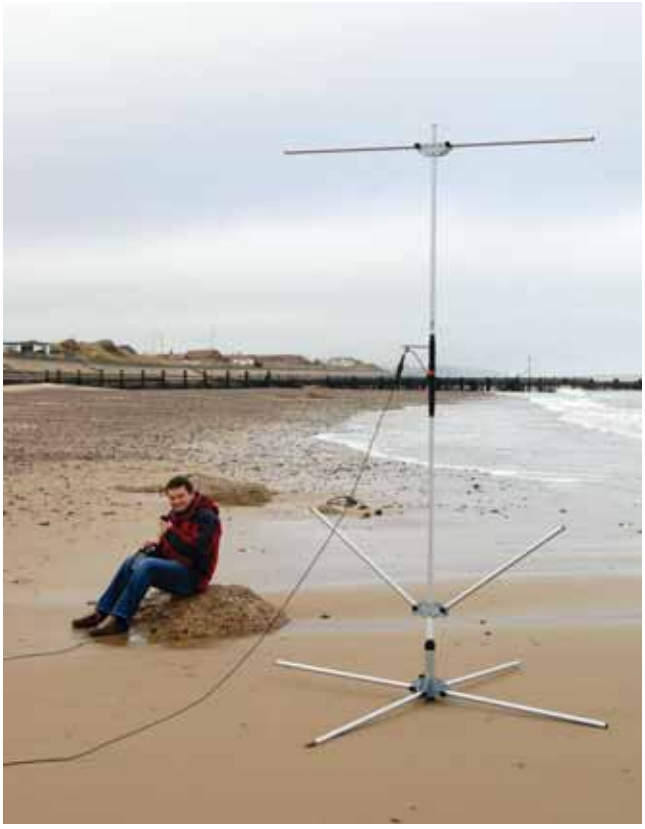
WEBSEARCH

Log amp datasheet: www.analog.com/en/rfif-components/log-ampsdetectors/ad8307/products/product.html or www.farnell.com/datasheets/26144.pdf

Inductance of dust-iron toroidal windings: www.chemeng.ed.ac.uk/people/jack/radio/design_toroid.html (on-line calculator) or www.electronics-tutorials.com/basics/toroidcharts_mcq.htm (inductance chart)

I-PRO Traveller

A vertical dipole from Pro Antennas



DX on the water's edge - the whole antenna is very light and can be moved around easily.

PORTABLE OPERATION. I was really looking forward to reviewing the I-PRO Traveller, a vertical dipole antenna from Pro Antennas. I reviewed that manufacturer's DMV Pro antenna in the May 2009 edition of *RadCom* and was very impressed. The Traveller is a new design from Carl Kidd, G4GTW and promises great things for the portable DXer or home-based amateur with little garden space.

The antenna is a centre-fed half-wave vertical dipole with capacity hat end loading. Capacity hat loading was chosen to keep the inductive loading to a minimum and so minimise losses. The added benefit is that you have an antenna that can cover 40m-10m without an ATU, but which stands only 3m tall. The other bonus is the antenna doesn't need any form of ground plane or radials to work.

The Traveller power specification is 1200W PEP 20m-10m and 1000W PEP on 40m.

NEAT FIT. The antenna comes packed in a sturdy cardboard box. Once everything is pulled out you are left with a selection of components, including the star-shaped quad-leg base, the two capacity 'hats' and the multi-band centre matching section. You can opt for the 10-20m or 40m versions, or buy the separate optional loaded dipole centre piece and have two antennas in one.

All of this fits neatly into a 1m long custom-built black nylon holdall, which can easily be carried around or put into a car boot. The Traveller also lends itself to explore portable operation overseas as it is easily transported in its compact carrying holdall.

The dipole pieces are made of high-quality anodised thick-walled aluminium stock, with right angle bracing and thumbwheels to enable a) the four legs to be adjusted on uneven ground and b) the lower capacity hat legs to be moved upwards to tune the antenna – this is especially important on 12-10m.

All nuts bolts and screws are stainless steel with plating and anodising protecting bracketing and tubing. This means that it can be left outside as a permanent installation.

The quad-legged base allows the Traveller to be used with the ground sloping by as much as 30°.

CONSTRUCTION. The first stage of construction is to set up the quad-legged based. To help with this Carl supplies a small spirit level that plugs into the base and helps you get the whole thing truly upright. Once you have done that you can slot in the lower capacity hat, multi-band centre matching section and top capacity hat all in one go. This sounds quite complex, but only takes a few minutes.

The capacity hat sections are a slot fit into the centre pieces, with small stainless steel press button clips to lock them into position. If you are likely to leave the antenna up in your back garden you can use the supplied screws as well. We found that the pieces were a very tight fit indeed and disassembling the antenna in cold conditions was quite difficult. A smear of Vaseline or something similar would help no end.

You then fit a small 30cm long 8mm thick fibreglass support piece which supports the coax feed at right angles to the antenna. Now, you are almost done – you just need to decide what band you wish to use.

Carl supplies the antenna with a coax patch lead. This is fitted with an S0239 socket on one end and plugs on the other and a convenient weatherproofing boot. You then have to decide what band you wish to use and plug the fly lead in to the gold-plated sockets accordingly – this selects different loading coils on the lower bands. He supplies a small laminated instruction sheet with the tapping points shown which makes life simpler.

These tapping points give the rough points for each band. You then tune the antenna to resonance by moving the bottom capacity hat sections up or down, so making them into a V-shape.

The whole assembly weighs around 6kg and can easily be moved around by one person.

Using a Timewave analyser Chris, G0DWV and I were very quickly able to resonate the antenna on each of the bands from 20m - 10m.

The bandwidth of the antenna was very impressive – we were able to get SWR lows of around 1:1.10 - 1:1 in the middle of each and concur with the I-PRO Traveller specifications that you should be able to get the following 1:1.5 bandwidths:

20m – 300kHz
17m – 500kHz
15m – 900kHz
12m – 1800kHz
10m – 2200kHz

An antenna analyser is not required to set up the Traveller - the built-in SWR metering in

The antenna packs away neatly into its own carrying case.

Set up on a very windy Norfolk beach took just a few minutes - This is Chris G0DWV checking the SWR.

The antenna comes with a spirit level to ensure that you get it perfectly upright.

most radios will be fine. The choice of transceiver is made easy because no ATU is required.

We were able to use the antenna without an ATU, only having to move the arms up or down to centre the lowest SWR point on the portion of the band we wished to operate.

If you wish to operate 40m you remove the centre multi-band centre matching section and replace it with a dedicated 40m section, complete with loading coils. We were able to achieve a 1:1 match on 40m with about a 70kHz bandwidth between 1:1.5 SWR points.

The whole structure is quite sturdy and survived gale force winds during the test period without guying, but make sure you fully tighten the thumbwheels that hold the base legs in place.

But what you really want to know is how does it perform?

PERFORMANCE. To give the antenna fair test we pitted it against a wide range of antennas – and even took it to a very cold and windswept Norfolk beach in January (not recommended!).

We first tested it against Chris, G0DWV's Cushcraft A4S tri-band beam, which had been lowered to around 25ft due to high winds. We also compared it against Chris's 132ft doublet at the same height. We then tested it against my dipoles and 132ft OCF dipole (Windom) at 25ft and a 65ft inverted L with 9:1 UnUn and ground system.

At Chris's we found that the antenna performed pretty much the same as the 132ft doublet on 20m and 17m. Sometimes it was slightly better and sometimes slightly worse. What was gratifying was that the noise level was lower on the Traveller by about 2-3 S-points. The similar reports on the two antennas were confirmed by a contact with a station in Italy who couldn't tell the difference between the two antennas.

We also listened to CW from a station in 8P9 (Barbados) and there was no difference. Chris's beam was consistently 2-3 S-points better, which was to be expected.

With the 40m centre section fitted Chris was able to take part in our Norfolk Amateur Radio Club's 40m net with a station in Koblenz, one of Norwich's twin cities, receiving 59 reports each way with 100W. In these tests the Traveller was down slightly on the 132ft doublet on 40m, but that is hardly surprising given that the antenna is only 3m tall – a fraction of the full 40m wavelength.

At my QTH the Traveller was quite competitive on a closing 20m band. Signals were roughly equal to my dipoles and 132ft off-set centre fed dipole, sometimes slightly weaker as propagation varied. The antenna was more than capable of working across the Atlantic to the USA, Canada and the Caribbean.

It was around 2 S-points down on my 65ft inverted L with 9:1 UnUn with the top at 9m, which is a good DX performer on HF.

On 17m the I-PRO was either equal to or outperformed all my other antennas by about 1 S-point.

We then took it to Walcott on the North Norfolk coast and set it up right next to the sea's edge. Carl is a keen advocate of waters-edge DXing and we soon saw why. The sea acts as a giant ground plane which, coupled with the zero degree takeoff stretching out to the horizon, guarantees Yagi-like performance.

We were soon listening to VK (Australia) stations aplenty on 20m, and had a genuine 57-59 short-path QSO with Mike, VK3XL near Melbourne, straight out across the North Sea.

Mike was using a two-element tribander and 200W, but switched to a quarter-wave vertical and we were still able to continue the conversation. That's amazing performance and I had to video the QSO as I couldn't believe it.

Mike also said that we were the only station he could hear out of the UK. We also logged VK3BCY and VK3VBC and could easily hear many of the IBP beacons on 14.100MHz, including LU4AA in Brazil. Unfortunately, 17m (18MHz) was dead.

We then swapped over to 40m and had solid 59+ QSOs with a lot of European stations. All this with an antenna just 3m high.

Both Chris and I are now sold on the enhancement to be had from sea's-edge locations and will be returning to the beach – but perhaps when it is warmer!

What did strike me during the tests was how easy the Traveller is to erect and, as it is freestanding, how effective it is without needing high supports or ground radials. This really can be put up in a small back garden or park, or on the beach, for an afternoon's HF DXing without too much trouble.

I do urge you to try HF operation from the sea's edge – I would not have believed what you can work if I hadn't seen it with my own eyes.

The Multi-band I-PRO Traveller costs £279.95 for either the 20-10m or 40m version. You can add the other bands to either version by buying the alternative centre matching section for £119.95. The only other option is the custom-designed I-PRO branded nylon carrying holdall at £19.95.

For more information about the antenna see www.proantennas.co.uk or call 01489 789960. My thanks to ProAntennas for the loan of the aerial.

Designer's comments

The I-Pro traveller was designed to meet my own portable demands. I think the end result is a robust, go-anywhere, self-contained antenna that provides low visual impact, ease of use and high performance.

I am pleased that Steve got the opportunity to go portable. He experienced the effects of 'adding a little salt water' to an antenna that has low angle performance. The addition of a salt water ground plane is dramatic and should come with a health warning, 'highly addictive'. Thanks for braving the winter elements!

Carl Kidd, G4GTW
Pro Antennas

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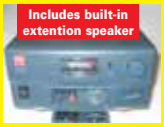

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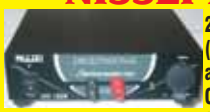

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+ FREE 6m/2m/70cm mobile antenna

Includes DTMF mic + wideband receive

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SPECIAL PACKAGE OFFER VX-8E + extra battery.....£319.99

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Easy to use ATU. SALE PRICE **£239.99**

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MFJ-260C 300W dummy load.....£49.99
MFJ-264 1.5kW dummy load.....£79.99
MFJ-969 Rollercoaster ATU (300W).....£199.99
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New "3D" tracking system. Designed by professional pilots. See traffic in real time. Internet data sharing. Track aircraft worldwide.

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Very heavy duty. Available:- SO-259 or 3/8 – specify. **£44.99**

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● No cable connection needed ● Touch LCD screen ● Atomic locked Date & Time ● Indoor/ Outdoor Temperature (C or F) ● Wind Speed & Direction (mph or kmph) ● Rain gauge (inches or mm) self emptying ● Indoor/Outdoor Humidity ● Barometer Pressure with trends ● Forecaster & Weather Alarm ● USB connection to PC ● PC "EASYWEATHER" software programme ● Historic data storage & display ● LCD panel wall mounts or desk mounts ● Batteries last over 12 months
Professional version OUR PRICE **£79.99**

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Simply close shut over cables and notice the difference! Will fit cables up to 13mm diameter. Ideal on power supply leads/mic leads/audio leads/phone leads.

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£74.99 each. TWO FOR £135.99 DEL £15.00

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500kg brake winch. BARGAIN PRICE

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(Now includes cable grip)
Winch wall bracket.....£22.99

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PL-259 - PL-259	0.6m	£9.99
PL-259 - PL-259	1m	£11.99
PL-259 - PL-259	4m	£14.99
PL-259 - PL-259	20m	£49.99
BNC - BNC	1m	£9.99

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P&P £4.00

DB-770H (BNC)

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Includes 5m cable **£29.99**

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WOW **£309.99**

G-650C extra heavy duty rotator + 25m cable..... £349.99
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GS-065 thrust bearing..... £54.99
GC-038 lower mast clamps £32.99

AR788

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OUR PRICE **£79.99**

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X-627 GF 50/144/70, 2.15/6.2/8.4dBi (2.4m)....£89.99

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

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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
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12" T & K brackets (pair) £18.99
18" T & K brackets (pair) £22.99
24" T & K brackets (pair) £26.99
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2" extra long U-bolt/clamp £6.99
2" crossover plate with U-bolts £14.99
15" long (2") sleeve joiner (1.5" also available)..... £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

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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

Data

News of a brand-new data mode…

FIGURE 1: The ROS user screen.

ROS. In February a new digital mode appeared. Called ROS after its designer, José Ros, it is described as a "digital spread spectrum mode, but with a narrow total occupied bandwidth of about 2.2kHz". The first contact using ROS took place on 18 February 2010 at 2056UTC on 7.065MHz from Vitoria in Spain to the University of Twente in the Netherlands, a distance of 1265km. ROS can be downloaded free of charge from **[1]**. Some limited documentation is supplied as a .PDF file.

Few technical details are given in the accompanying documentation, but we can ascertain that ROS employs 16 tone MFSK waveform and that the frequency is stepped pseudo-randomly over the occupied 2200Hz bandwidth to reduce the effects of interference. Two rates are supported, 16 Baud and 1 Baud, to cope with different band conditions and signal strengths. It can automatically synchronise to any symbol rate.

The documentation appears to suggest that ROS offers weak signal advantages over current established HF data modes. Initial reports talk of it being able to copy signals so weak that they don't show up on the waterfall display, and there are early indications that it is several dB better than Olivia. However, HF is a hazardous environment for digital signals with its fading, Doppler, multipath and interference and only time will tell how well ROS performs against the other modes.

With 16 MFSK giving four bits per symbol, before any error correction is added, this suggests the higher data rate could approach 64 bits per second. Assuming a rate ½ FEC (no details of any FEC are given, but this is a reasonable assumption for most good data modes designed for weak conditions) then it suggests a typing rate of about 32 bits/second. Again, we don't know anything about source coding, ie whether it's straight ASCII or a variable length coding as in PSK31. Assuming the former, 32bps offers a typing speed of about 4 – 5 characters per second. At the lower 1Hz symbol rate this will reduce accordingly.

When ROS was first introduced there were several technical and operational issues – not least that the recommended frequencies caused interference to other established digital mode operation. There was also severe interference to stations monitoring the International Beacon Project chain on 14.100MHz, particularly because 14.098MHz had originally been recommended as one of the ROS operational frequencies. To the ROS users' credit, this frequency was changed as soon as the interference was reported and 14.102MHz now seems to be the centre of activity for the mode. **Figure 1** shows a screenshot of the ROS user window. The HF frequencies currently used for ROS are 3.600, 7.053, 14.102 and 28.300MHz, USB.

WIDEBAND DATA MODES. ROS is a typical example of modern HF digital communications practice in that it spreads the signalling energy well outside the 'necessary bandwidth' needed for communication. Necessary bandwidth is equal to or higher than the symbol rate (imagine a continuous 101010… pattern being sent, the alternate high and low parts of the waveform, after filtering, each constitute a half cycle of a sine wave). As a rule of thumb it is often taken as being equal to the symbol rate – here defined as 16 Baud or 16Hz. For multi-symbol modes like MFSK or QPSK, several bits are sent for each symbol so the data rate is proportionately higher.

In environments like HF where mutipath, scattering, Doppler and QRM are prevalent the transmitted signal is usually expanded over a significantly wider bandwidth than necessary to minimise the damage done by the interference mechanisms. These can often be observed as the classic HF fading, often noticeable as a deep audio null drifting through an SSB or AM voice channel over a period of a few seconds. By spreading out the data over the bandwidth occupied by a typical voice signal, 2 – 3kHz, the effects of the moving null are reduced.

There are many different ways of spreading the energy. Modern single tone modes like the established Stanag 4285 / MIL-STD -110A waveforms use an underlying 2400 baud symbol rate modulated with 8 PSK (3 bits per symbol) then use massive redundancy, error correction and interleaving to encode a lower data rate robustly. Other schemes use a lower symbol rate, but hop a single tone over the band in different ways. ROS uses a pseudo random spreading code with an underlying simple 16 FSK modulation. Contrast with K1JT's JT65 code in WSJT, where 65 tone slots are directly used (64 are allocated to data at 6 bits per symbol, with one more used for synchronisation). Reed Solomon error correction is directly applied to the tones to be able to cope with several being lost in QRM. Modern schemes such as OFDM transmit thousands of tones simultaneously, each one modulated at a low rate with the total being the combination of all individual data streams summed. All these techniques have appeared on the amateur bands, and many have been described in the past in this column.

In 1948 Claude Shannon derived a theoretical proof that data could be optimally sent over noisy channels only at bandwidths arbitrarily wider than the symbol rate. He defined an absolute lower limit on bandwidth,

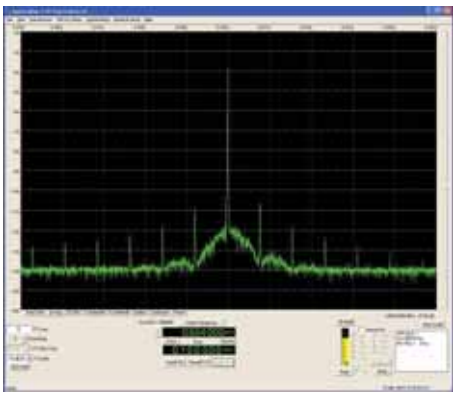


FIGURE 2: Off-air measurement of the G4JNT 503kHz directly generated PSK31 spectrum.

ACRONYMS USED THIS MONTH:

ASCII	American Standard Code for Information Interchange
MFSK	Multi Frequency Shift keying – more than two tones, eg 16 MFSK = 16 tones
OFDM	Orthogonal Frequency Division Modulation (or Multiplexing)
USB	Universal Serial Bus
VOX	Voice Operated Transmit
WSJT	Weak Signals by k1JT (Weak Signalling Software)
RTS/DTR	Request To Send / Data Terminal Ready (signal pins on the RS232 serial interface)

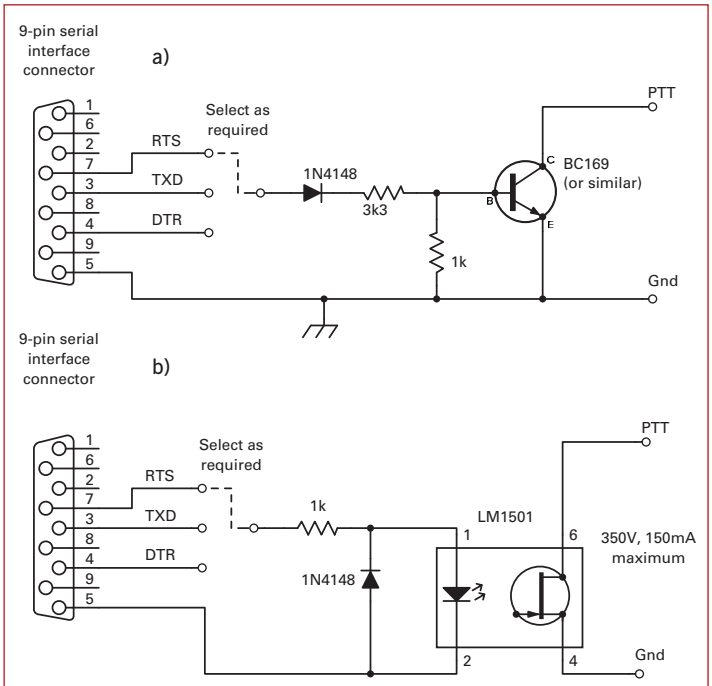


FIGURE 3: Two circuits for interfacing the RS232 serial port to control transmit switching.

signal rate and S/N. It is only in recent years that this limit has been approached – we are now believed to be within 0.5dB of it. More on Shannon's formula and its implications will be covered next time.

SOCIAL ISSUES. Commercial and military users are nearly always allocated their frequencies in 3kHz chunks – corresponding to a single voice channel. Witness the several 5MHz channels made available to amateurs in recent years. With a guaranteed clear channel, all the advantages of the relatively wide band can be used for robust low data rate communications, often with the overall data throughput being adjusted automatically in response to band conditions. Stanag 4285 automatically adjusts over the range 4800 down to 75 bits per second as propagation alters. But on a crowded amateur band, with many different and incompatible modes each vying for space, it doesn't work. If users try to stay in the segments allocated for data modes then narrowband modes like PSK31, RTTY and MultiPSK have to fight for their patch, with the wideband modes obliterating several of the narrow ones.

Ideally, experimenters wanting to use the full 3kHz bandwidth for their data should really use the SSB part of the band but problems occur here as well – not least SSB operators objecting to data transmission in 'their' segments and the all-too-frequent heavy occupancy of this part of the band during contests. This all goes to suggest that while wideband data modes have their place in the experimental scheme of things in amateur radio and offer very clear advantages in communications reliability over their narrowband cousins, their place on the narrow and mostly de-regulated amateur bands really needs to be considered carefully. And should a new wideband mode be suddenly released for free download, knowing many operators will immediately want to try it out without fully appreciating the QRM implications?

DDS POLAR GENERATION UPDATE. In the novel DSP transmitter architecture described last time, G3PLX raised a valid point that I had omitted to cover properly. In Figure 1 of that article, the reconstruction filters that are usually integral to the D/A conversion and that ensure no sampling frequency components reach the RF upconversion are not shown. In the polar scheme as proposed by M0GJR, there is no way of even adding any reconstruction filtering, so the continuous reprogramming of the DDS in both frequency and amplitude can, and will, lead to sidebands at the sampling frequency. Peter states *"you cannot start from Figure 1, assuming that the DACs have low-pass filters, then morph that into the DDS polar modulator which has no low-pass filters"* – and he's quite right.

What happens in practice, though, is that for the polar scheme to work with acceptably low levels of generated sidebands the sampling rate needs to be considerably higher than that of the bandwidth of the modulating signal. Alex had assumed a sampling rate of 48kHz, with the widest signal type being voice with its 3kHz bandwidth. The resulting heavy oversampling means that the change in signal amplitude or phase from one sample to the next is therefore small. By keeping successive changes small enough, the level of sidebands generated is low. Theoretically, sampling sideband levels will be reduced very approximately by the ratio of sampling rate (and its harmonics) to bandwidth. When expressed in dB the equation becomes 20 log (N x Fs / Fm). So, for a 3kHz bandwidth signal sampled at 48kHz, the first set of sidebands at the sampling rate should be 20 log(48/3) = 24dB. This is not at all good in QRM terms, but in practice things will not be so bad. It does assume a full amplitude 3kHz bandwidth input and in practice few signals will be anywhere near this. Voice has most of its energy concentrated at low frequencies in the hundreds of Hz. Low data rate signalling will be generated at baseband rather than by an audio carrier, so its fundamental will be centred around zero, at the signalling rate. For a 300Hz bandwidth signal, the sidebands reduce to 44dB – somewhat more reasonable, and just about within acceptable limits for out of band interference.

As stated last time, this concept has not been tested in practice – yet – but on reading Peter's comments I did measure the levels of my own PSK31 generation scheme. This works by directly programming an AD9852 DDS in real time. It has been in use continuously on my 503.7kHz beacon for some time and, several years ago, with GB3SSS on 1.9MHz and 3.6MHz from Poldhu. The sampling rate is 7.8125 kHz and each PSK31 symbol is formed by reading 250 points from an 8 bit lookup table. Theoretically, sidebands ought to start off at a level of 20 log(7812.5/31.25) = 48dB, spaced at 7.8kHz intervals. **Figure 2** shows the actual off-air measurement of my beacon transmission as received on an SDR-IQ SDR and it is clear the sidebands are significantly lower than expected – more than 20dB lower in fact – with the first set being at -70dBc. This may be due to the antenna bandwidth at 504kHz only being a few kHz and filtering out the adjacent signals. More testing is clearly necessary.

KEYING RIGS VIA THE COM PORT. Several operators report software problems with various data mode software packages when trying to use the traditional COM or serial port control for Tx/Rx switching, usually via interfaces like those shown in **Figure 3**. With modern PCs an external USB serial interface module has to be used, adding further complication. Often the rig will fail to switch with some software packages, other times it will go into transmit spontaneously – like when the PC is booted up. There is also the problem as to whether the software uses the RTS or DTR, or both, or the serial data line on the RS232 interface; sometimes even which polarity is used.

For preference, audio derived switching should be used to control the transmitter, but many rigs do not offer VOX controlled transmit when audio is applied to the line interface input rather than the microphone connection. An external audio switch such as that described in this column in April 2008 can be the solution. The original circuit diagram for this, as well as an alternative version can be found at **[2]**.

REFERENCES

[1] ROS Download and details http://rosmodem.wordpress.com/

[2] Audio derived Tx/Rx switching www.g4jnt.com/projects.htm

Sport Radio

Proof that VHF antenna polarisation really matters, and QRP operation in CW NFD.

PHOTO 1: M5AEO's coat hanger omni antenna for 2m.

NO APRIL FOOL. Following the item on antenna polarisation in the April column, Jonathan Kempster, M5AEO, wrote to say; "Like your correspondent Ron, GW4EVX, I too am active as a 'home portable'. I wanted to do my bit to activate the VHF/UHF bands during the Tuesday evening UKACs, but I only had a small mobile whip on my apartment balcony. Aerials are not allowed in the lease, but there's nothing to prevent temporary installations so I constructed a coat hanger omni for 2m and another for 70cm – total cost about 60p! I'm enclosing a picture, **Photo 1**, of the 2m version on its 7m fibreglass mast.

"As you suggested in your column, switching to horizontal polarisation has made all the difference. I am now averaging 25 QSOs on a Tuesday, as opposed to about eight to ten with the whip.

"Last year I entered the *Practical Wireless* QRP contest as /P from my balcony, on battery power with the SOTA beam, and I had a great time. Home portable is certainly good fun, but it also gets one thinking about proper portable."

I was pleased to see that Jonathan didn't attempt to position his antenna right at the top of the telescopic fibreglass pole, because although it is lightweight these poles are too thin and flexible at the top to support anything much. Having said that, my personal experience is that – from average sites – antenna height above ground can make a big difference at VHF/UHF, so as long as the installation is safe it pays to place the antenna as high as possible.

A TIMELY REMINDER. Summer is the peak season for portable operation. Groups and individuals who are experienced at operating portable will need few reminders about the process, but those new to it or just considering starting it might. For you, some useful tips can be gained by reading *The Countryside Code.*

I'm not going to attempt to repeat or précis the whole thing here; you can read it on the Natural England website (www.countrysideaccess.gov.uk). The points I would like to stress are:

1: Permission is required to use someone's land.
2: Portable sites should be treated with respect and left clean and tidy.
3: There are safety aspects to consider. You don't want to suffer a medical incident, maybe going out without appropriate clothing or footwear; and you don't want to cause anyone else to have an accident, maybe by tripping over a guy rope.

There are amateur radio aspects to consider as well. Make enquiries to see if another group or individual already uses the site you're considering. If they do, it would be discourteous not to speak to them beforehand, to determine if they intend using it when you do.

NATIONAL FIELD DAY. One of RSGB's flagship events takes place on the first weekend of June, namely NFD. Its enduring popularity and the impression that some hold of it being run by pipe-smoking old boys belies the fact that it is in fact hotly contested. Here, Dave Lawley, G4BUO, tells of Cray Valley Radio Society's entry in last year's event.

"We had placed well in the Restricted section in 2006, 2007 and 2008, but I developed back trouble in May 2009 and could not face long periods in the chair, so we decided to give the QRP section a try, with its 12-hour time limitation. The equipment was the same, FT-1000MP and 270ft doublet in a field next to The Ship pub in the village of Hextable in north Kent. We also took the opportunity to enter the 6m contest, which lent the event more interest among those club members that don't talk CW.

"Simon, 2E0CVN, and Mark, M0DXR, pictured in **Photo 2**, did the bulk of the operating on Saturday, and the 12-hour time limitation made for some interesting strategic choices. We decided to start our operation at the beginning of the contest period, to make sure to catch as much activity as possible on 10m, and we were surprised that with the Yaesu set to 10W we were able to run quite successfully on 20m. We had set an aggressive target of 500 QSOs and after two hours of operation we took an off period, with 83 QSOs in the log. Off periods have to be a minimum of one hour, and we were somewhat distressed to find after the minimum off time that 10m had opened up short-skip into Europe. With double points on offer we returned to the rig and made the most of the opening, though we don't know how many potential QSOs we may have missed during the off period.

"We stayed at the rig until the early hours of the morning, with Mark having departed for home at midnight. We made the most of 160m, another double point band, and when we went QRT after a little under ten hours operation, we had already reached our targets, with 503 QSOs in the log including 123 on Top Band. Both Simon and I were able to get some sleep, an unusual luxury in field day, though I was woken later by heavy rain drumming on the roof of the car and Simon who was sleeping in the operating tent woke up with a very soggy sleeping bag. More importantly, the rig remained dry.

"In the remaining two and a quarter hours we raised the QSO total to 618 and we were able to achieve a few short runs, but most QSOs were search and pounce. We went QRT with a little more than three hours of the contest remaining, and I arrived back home before the contest itself had finished! We ended very happy, with 61.8 QSOs per watt for what we believe is a record score in the QRP section of NFD of 2,578 points."

THIS MONTH'S EVENTS. RSGB HF events begin with the ever-popular CW NFD on 5-6th. One of the trophies awarded for this event is the Frank Hoosen, which incorporates a mechanical bug key. In **Photo 3** G3RWL can be seen using it in his shack, after the contest group he operates for (Hadley Wood CG) won it in 2009. After that we enter the penultimate month of the 80m Club Championships, with data on the 7th, CW on the 17th and SSB on the 24th.

VHF-wise it's a five Tuesday month, with

RSGB HF EVENTS

Date	Event	Times (UTC)	Mode(s)	Band(s)	Exchange
Jun 5-6	National Field Day	1500-1500	CW	1.8-28	RST + SN
Jun 7	80m Club Championships	1900-2030	Data	3.5	RST + SN
Jun 16	80m Club Championships	1900-2030	CW	3.5	RST + SN
Jun 24	80m Club Championships	1900-2030	SSB	3.5	RS + SN

RSGB VHF EVENTS

Date	Event	Times (UTC)	Mode(s)	Band(s)	Exchange
Jun 1	144MHz UKAC	1900-2130	All	144	RS(T) + SN + Locator
Jun 8	432MHz UKAC	1900-2130	All	432	RS(T) + SN + Locator
Jun 13	144MHz Backpackers #2	1100-1500	All	144	RS(T) + SN + Locator
Jun 15	UHF UKAC	1900-2130	All	1.3/2.3	RS(T) + SN + Locator
Jun 18-20	50MHz Trophy	1400-1400	All	50	RS(T) + SN + Locator
Jun 22	50MHz UKAC	1900-2130	All	50	RS(T) + SN + Locator
Jun 27	70MHz Cumulative #4	1000-1200	All	70	RS(T) + SN + Locator
Jun 29	70MHz UKAC	1900-2130	All	70	RS(T) + SN + Locator

BEST OF THE REST EVENTS

Date	Event	Times (UTC)	Mode(s)	Band(s)	Exchange (info)
May 30-Jun 5	Bath Buildathon	Various	Phone	3.5	RS(T) + make + model + power
Jun 5-6	UKSMG Summer E's	1200-1200	All	50	RS(T) + SN + Locator + Member Nr.
Jun 6	PW 4m Low Power	1200-1700	All	70	RS(T) + SN + Locator
Jun 12	BARTG 75 Baud Sprint	2000-2359	RTTY	14-28	SN
Jun 13	WAB 6m Phone	0900-1500	Phone	50	RS + SN + WAB square
Jun 13	PW 2m QRP	0900-1600	All	144	RS(T) + SN + Locator
Jun 19-20	*All Asian DX*	*0000-2359*	*CW*	*1.8-28*	*RST + age*
Jun 26-27	XIV Marconi Memorial	1400-1400	CW	1.8-28	RST + SN

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

PHOTO 2: M0DXR operating G3RCV/P in NFD last year.

PHOTO 3: G3RWL operating the Frank Hoosen Trophy.

UKACs on the 1st (2m), 8th (70cm), 15th (23/13cm), 22nd (6m) and 29th (4m). The other RSGB VHF events are the Second 144MHz Backpackers on Sunday 13th, the 50MHz Trophy on 19-20th and the fourth session of the 70MHz Cumulatives on Sunday 27th. June is the peak month for Sporadic-E propagation, so participants to VHF events could find themselves experiencing a DX treat. 6m is the most likely VHF band on which Sporadic-E DX will occur. On many days the band is likely to be wide open for several hours at a time. On 4m it is also quite possible, but less than 6m (and for shorter periods). On 2m it is much less likely, with openings lasting typically for a few minutes. The peak times seem to be around 11am and 4pm, but any time during the daylight is possible. Sporadic-E does not extend to UHF or above.

As regards non-RSGB events, the Bath Buildathon Contest continues every day until the 5th. The weekday legs are 1800-2000 and the final one on Saturday is 1000-1200GMT. The maximum power is 10 watts and the full rules can be seen on the Internet. Over the weekend of 5/6th June the UK Six Metre Group's Summer Es Contest should see some DX being worked – after all, the date is chosen specifically to coincide with the peak of the Sporadic-E season. On Sunday 6th the PW 4m Low Power contest takes place. The maximum power is also 10 watts. Moving on to the next weekend, on Saturday 12th the BARTG 75 Baud Sprint is a new contest. This is a try-out event, to test if there is sufficient support and interest to make it worthwhile BARTG adding it to their calendar annually. There are only two classes of entry, each for single operators. Exchange serial number only. I must say that I'm puzzled at the choice of bands on which this event takes place. 14MHz might to be open for business for the duration and 21MHz should carry some traffic, but I'll be surprised if much is worked on 28MHz. The WAB 6m phone follows on Sunday 13th. Exchange a signal report, serial number and WAB square. Please note that this is not a 'points per km' event. Multipliers are WAB squares and DXCC countries. On the same day there's the PW 2m QRP contests. The power limit is 3 watts and multipliers are locator squares. The penultimate event of the month is a 48-hour biggie – The All Asian DX. Exchange a signal report and your age (YLs send '00'). Finally, the XIV Marconi Memorial HF CW, in which there are sections for three differing power levels and single- and multi-operator stations.

QRP

QRP in the Country – a new event

Roy Lewallen, W7EL, (left) with G3RJV. Roy is to be a guest speaker at the G QRP Club Convention in October.

NEW EVENT. Walford Electronics announced a new event to be held on 18 July at Tim Walford G3PCJ's Upton Bridge Farm, Long Sutton, Somerset TA10 9NJ. A wide range of electronic activities are anticipated, including an opportunity to operate the G3GC replica 1938 Tx, informal home construction competition and advice clinic, Somerset Range kits to operate (and buy!), Bring & Buy stall, transformer throwing competition, with food and drink from local sources. For partners, Janet Walford will be leading short farm tours. The event is free and West Country clubs are invited to let Tim know if they would like a free table (numbers are limited) for displays or Club sales etc. If the weather permits it will be held outside, otherwise it will be under cover in the farm barns. This new event looks interesting and fun. For further information please contact Tim Walford, G3PCJ by e-mail to walfor@globalnet.co.uk.

THE NORTH AMERICAN QRP CW CLUB. I always thought I had my finger of the QRP pulse so I was surprised when I received details of a QRP organisation claiming to be the largest QRP group in the world. For some reason I had never heard of them. The North American QRP CW Club claim 4,525 members in all 50 US states, 9 VE Provinces and 88 Countries. The club charges no membership fees and is open to any licensed radio amateur or short wave listener worldwide with at least some interest in CW/QRP operation. There is no requirement to be a 100% CW or a 100% QRP operator. Perhaps the easiest way to describe the club is to quote some of the information I was sent.

Their publicity reads, "Want to be part of the largest QRP CW club in the world? Perhaps you are looking for someone to 'Elmer' you? Then we have just what you need to develop and improve your CW skills, including QRS nets perfect for the new CW operator. Or maybe you would like to volunteer your time and become an 'Elmer' to help one of those fellow hams new to Morse code. How about a Sprint or two thrown in for good measure? We have them too, for those of you who like a little friendly contesting. Our sprints now rival many others in the amount of participation. Want something that lasts a little longer than a sprint? We have challenges that last a whole month with a different theme each month. If you like awards, our extensive awards program has something for everyone. Many of our sprints, challenges, awards and other club activities involve handsome prizes donated by our members. Best of all, lifetime membership is free!! As different as we may be, we all share one thing in common and that is our love for CW. Now is the time to get involved! Join our group that includes 'Big Gun' contesters, hard-core QRPers, experimenters, ragchewers and SWLers; young and old alike. We welcome all who want to help support CW and have at least some interest in using QRP from time-to-time. Help us on our mission to preserve and encourage CW activity on our amateur bands. Sign up today and help keep CW alive and well. Visit http://home.windstream.net/yoel/ to sign up and receive your free lifetime membership number and certificate."

GM3OXX WINS THE G4DQP TROPHY. Towards the end of each year in this column I usually mention the G QRP Club Winter Sports. It is one of the most popular QRP operating events. Between Boxing Day and New Year's Day, members of the club come on the bands and attempt to contact as many other club members as they can. From time to time I have mentioned individual results and achievements. This year I thought it worth mentioning the results of that doyen of QRP operators, George Burt, GM3OXX. In spite of mediocre conditions, George made fruitful use of his 1 watt signal. The event is a 'QRP Gathering' rather than a contest. However, the Club offers the G4DQP trophy each year to the member submitting the best log of QRP contacts made during Winter Sports. The 2009/2010 trophy was awarded to GM3OXX.

In his citation, the G QRP Club Communications and Awards Manager, Peter Barville, G3XJS, wrote, "I know that nobody would argue that, once again, the outstanding QRP station on the air was George, GM3OXX. He has a remarkable signal with his homebrew 1 watt transceiver and wire antenna, and has become the true internationally renowned QRP beacon. His presence on the bands is unrivalled. During Winter Sports he had a total of 276 QSOs which included over 30 on 160m, over 70 on 80m, over 50 on 30m and nearly 100 on 20m. Contacts included PY4ZO 2-way QRP on 20m and W6QUV (San Francisco) who called George on 30m. I'm sure you will agree, that is one impressive log and well deserving of the G4DQP Trophy".

RE-LAUNCH OF KANGA PRODUCTS IN THE UK. For many years Kanga Products offered a range of kits for QRP fans in the UK. Many of the Kanga kits were popular with beginners or less experienced radio constructors. In more recent years Kanga kits have not been available in the UK, although Kanga US run by Bill Kelsey, N8ET, has continued to offer its own range of kits in the USA. The good news is that Dennis Anderson, G6YBC, has revived Kanga Products and is building up a range of kits. A fledging website can be found at www.kanga-products.co.uk, where new kits will be featured as they are available.

LATEST NEWS. Roy Lewallen, W7EL, the well known antenna guru and author of the EZNEC antenna software has accepted an invitation to speak at the G QRP Club Annual Convention in October. The convention is on Saturday 23 October at the Rishworth School on the A672 (Ripponden) road from junction 22 on the M62. Further details and updates can be found on www.gqrp.com.

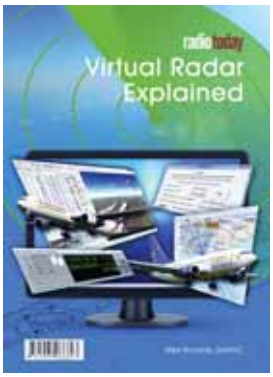
Is this really a QRPers workbench! The KLOS workshop as featured in the Soldersmoke blog.

Book review

The world of virtual radar, basic electronics – and a new IOTA mug!

Virtual Radar Explained

Mike Richards, G4WNC



The use of Automatic Dependent Surveillance-Broadcast (ADS-B) by commercial air traffic has revolutionised the amount of information available to plane spotters and radio enthusiasts alike. This unique new book describes the world of aeronautical virtual radar, which is the common name given to the reception and plotting of transmissions from aircraft. With the majority of commercial flights broadcasting their position twice a second, ADS-B receive systems can produce a virtual radar display on your home PC. In this book, the author provides comprehensive review of the development and operation of modern aircraft radar systems ranging from wartime pioneers through to the latest multilateration based systems. ADS-B and Mode-S signals get special attention with a detailed look at their message and transmission systems.

In addition to the technical details, the book includes full reviews of all the currently available hardware and software systems including the AirNav Radar Box, Kinetic SBS-1, PlaneGadget receiver and PlanePlotter software. The reviews look at each package in detail and are supported by plenty of screen shots and advice on getting the best results.

ADS-B operates at 1090MHz so antenna and feeder selection is critical. To help with this the author provides a separate chapter on antenna systems that is packed with advice on how to choose and install your antenna system. There is also some sound advice on receiver location with a number of suggestions to help reduce the feeder length.

Multilateration is the topic of the moment in aeronautical radar circles and the book includes a separate chapter that explains the workings of the system with simple examples. The chapter continues with a fascinating look at how commercial multilateration systems are being deployed.

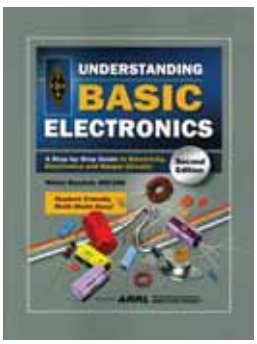
For the keen home constructor, there's even a chapter that give an introduction to a number of home-brew options that are available via the Internet. Whilst home-brew at 1090MHz is a challenge to some, a number of practical solutions are presented. In this section you will also find some more detailed information on the technical make-up of the signals and the stages necessary to decode the data.

This very comprehensive book covers just about every angle of Virtual Radar from historical development through to home-brew. The book is a great read and will be of interest to the casual observer, existing users of Virtual Radar and those considering buying a system.

Virtual Radar Explained
64 pages, 195 x 261mm
Published by RSGB
ISBN 978-1-90508-660-3
Non Members' price £6.99
Members' price £5.94

Understanding Basic Electronics, 2nd Ed.

Walter Banzhaf, WB1ANE



The original edition of Understanding Basic Electronics became a firm favourite across the world. It has now been revised and updated, making this second edition even better.

This is the ideal book for someone who is approaching electronics for the first time. It assumes little or no prior knowledge, and does a very good job of introducing the basic concepts.

Starting with the pretty big question, "Electronics – what is it good for?" the book examines the fundamental requirements that have led to the development of electronics. Within a few pages it moves on to concepts of analogue and digital.

One of the nice things about the book is that after the introduction it splits the subject into three basic areas: DC circuit concepts, AC circuit concepts and active device concepts. This seems to work pretty well, with each section building on its predecessor.

Within each section (or 'unit' as they call themselves) there are lots of sub-sections that deal with small elements one at a time. Every so often there are some review questions on the material that has just been covered, followed by fully worked-out answers. This method of breaking down learning into bite-size chunks seems to work very well, particularly when introducing completely new subjects.

Banzhaf's style and approach is quite refreshing. Explaining how current moves in a wire, he points out that a current of 1A requires 6.24 x 1018 electrons per second. And he also observes that although it seems like a large number, there are a lot more electrons than that in the cross-section of any real-world wire. It is very accessible and although it does include some necessary maths, it tries very hard to explain everything before resorting to the language of numbers. Wherever possible, illustrations are used to get concepts across.

Supplementing the main text are six appendices that contain notes on such things as scientific and engineering notation, common circuit symbols and a glossary of terms that would probably be very useful for someone just starting out in our hobby.

Overall, this book is a great way of kick-starting someone's interest in basic electronics.

ISBN 978-0-87259-082-3
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RadCom

HF F-Layer Propagation Predictions for June 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	66	75......3688	87......7888	.4777757787.	...777..77..	.....	.....	.....
*** Asia								
Yakutsk	.....	.....	3.......4554	566666667777	....4.....	.....	.....	.....
Tokyo	.....	.....	.....	.....	.....	.....	.....	.....
Singapore	.........22.	........676.	........22..	.....	.....	.....	.....	.....
Hyderabad	.....	255	2565	4554	.....	.....	.....	.....
Tel Aviv	9........799	982....28999	474....47888	...4....785.	.........6..	.....	.....	.....
*** Oceania								
Wellington	.....	.....	.....	.....	.....	.....	.....	.....
Well (ZL) (LP)	.1.....	68.......375	997......699	886.......99	66	.....	.....	.....
Perth	.....	5644	........45.6	3	.....	.....	.....	.....
Sydney	.....	........37..	........67..	........33..	.....	.....	.....	.....
Melbourne (LP)	.....	6995........	99973......9	889.......79	79	8	.....	.....
Honolulu	.....	.....	.....	...33.....	...45.....	.....	.....	.....
Honolulu (LP)	.....	.....	.....	.3......3...	.....	.....	.....	.....
W. Samoa	.....	.....	.....	...33.....	...454.....	.....	.....	.....
*** Africa								
Mauritius	1.........22	3.......5776	7763	.......474..	.......3....	.....	.....	.....
Johanesburg	.....	.....	........864.	..3....67...	.....	.....	.....	.....
Ibadan	2.........11	76.......566	673.....3777	..73...37876	..66....885.	...7....78..	........67..	.........5..
Nairobi	.....	5........455	63......2666	.5......6664	..4....566..	...4....64..	.....	.....
Canary Isles	76.......277	876......788	8875...27888	5385....8888	..7998989997	...87777898.	.........6..	.....
*** S. America								
Buenos Aires	.....	55.........4	876.......78	5........487	.....	.....	.....	.....
Rio de Janeiro	.....	65........26	87.......589	5........787	..........3..	.....	.....	.....
Lima	.....	543........3	8773......68	5.43......77	.....	.....	.....	.....
Caracas	.....	33.........3	8874......68	64744....588	..........5.	.....	.....	.....
*** N. America								
Guatemala	.....	331........	777........7	4.3.......47	.....	.....	.....	.....
New Orleans	.....	652........	765........5	4.........56	.....	.....	.....	.....
Washington	3.....	763........3	8763......37	53..433.4577	..........6.	.....	.....	.....
Quebec	4.....	76.........7	755.......67	674	.....	.....	.....	.....
Anchorage	.....	.....	33.....	..55.3566666	........667.	.....	.....	.....
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 June, July and August are respectively (SIDC classical method – Waldmeier's standard) 19, 21, 23 and (combined method) 32, 36, 41. The provisional mean sunspot number for April was 7.9. The daily maximum / minimum numbers were 25 on 4 April and 0 on 14-20, 23, 24, 26, 27 & 29 April.

Getting listed here and on GB2RS is easy. E-mail details of your meetings as early as possible to GB2RS@RSGB.org.uk and we'll do the rest. We need to know your club name, RSGB Region number, contact name & phone number, date of meeting and detail of meeting. Example: South Bristol ARS, Region 11, Len, G4RZY, 01275 834 282, 29 October, On the Air. It's that simple. The deadline for the July *RadCom* is 1 June and for the August edition it's 1 July. For GB2RS, the deadline is 10am on the Tuesday for the week of broadcast.

1 SCOTLAND SOUTH & WESTERN ISLES

REGIONAL REP: LEN PAGET, GM0ONX, GM0ONX@RSGB.ORG.UK

AYR ARG
Charlie, MM0GNS, 01563 551704, cgnstewart@hotmail.com
9 AGM
23 Summer wind-Up

COCKENZIE & PORT SETON ARC
Bob, GM4UYZ, 01875 811 723
4 Normal club night
13 PW 144MHz QRP contest
19 Museums on the Air Weekend - GB2MOF, Museum of Flight
23 20m activity night 19:00 to 22:00
25 Normal club night - NOTE CHANGE OF NIGHT

KILMARNOCK & LOUDOUN ARC
Graham, MM3GDC, mm3gdc@btinternet.com
8, 22 Club night

LIVINGSTON & DARS
Norman, 07740 946192, uk.groups.yahoo/group/ms0liv
1, 15, 29 Club evening
8 Operating evening
22 Morse code practice

LOTHIANS RS
Andy Sinclair, lrs_secretary@moosedata.com
9 AGM
23 BBQ

PAISLEY (YMCA) ARC
Bill Anderson, 2M0BZZ, 01505 613633, bill@3bis.co.uk
2 AGM

WEST OF SCOTLAND ARS
Fred Coombes, 2M0BIN, 01415715512, www.wosars.org
2, 9 Homebrew, construction & training
4, 11 Main club meeting

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/
3 Junk sale
5 Weekend event – CW Field Day
10 Construction, OTA, beginners' CW
17 Preparation night
19 International Museums Weekend, Bennachie Visitor Centre

3 NORTH WEST

REGIONAL REP: KATH WILSON, M1CNY, M1CNY@RSGB.ORG.UK

BOLTON WIRELESS CLUB
boltonwireless@gmail.com
14 The story of U-543 by Steve, M1DOT
28 Prep for VHF National Field Day

CHESTER & DARS
Barbara Green on 07957 870770, www.chesterdars.org.uk
2 Bring and tell
22 Outside portable operations at Yeld or Frodsham Hill
29 A new "The Other Man's Shack" video

MID-CHESHIRE ARS
Peter Paul Fox, G8HAV, 01606553401
2 40 yrs of Jodrell Bank, by Nick
9 NFD planning, OTA, testing new 6m antenna
16 LAN management for NFD
23 General chat evening with shack operations
30 New club project - freq counter; committee meeting

MORECAMBE BAY ARS
Martin Hazel, M0ZIF, 01524 848193, martin@mbars.internationalham.com
1, 29 Social evening
8 Film night: DF

PRESTON ARS
Richard, M0RDZ, 07855873566, secretary@prestonars.co.uk
10 Junk sale
17 Clansman radio by Martin, M0LCY

SOUTH MANCHESTER R&CC
Ron, G3SVW, 0161 969 3999
3 Computerised logging by Ron, G3SVW
10 Aerial analysers analysed by Dave, G4UGM
17 Arduino, Embedded Microcontrol by Mike, G8HBR
24 Summer solstice BBQ
28 Monthly technical forum

THORNTON CLEVELEYS ARS
John Foster, 2E0EZY, 01253 399377
7 OTA
14 Quiz with Mick, G4EZM
21 BBQ with John, G4FRK
28 Tech talk

WORKINGTON & DAR&IT GROUP
Barry Easdon G0RZI, 01946 812092
7 Presentation
21 Vertical antennas by Steve, G0MTD

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
7, 14, 21 OTA, natter night
28 Exotic aerials by Bill Gleave, G8YWK

DENBY DALE RC
Gerald, G3SDY, 01484 602905
12 GB2HS from Honley Agricultural Show

EAST CLEVELAND ARC
Alistair, G4OLK, 01642 475 671, alistair.mackay@talk21.com
4, 18 OTA
11 Technical forum
25 Radio components catalogues evening

HALIFAX & DARS
Anthony Vinters, 01422 822636, tony@g0wfg.demon.co.uk
15 Microwaves talk by Peter Day, G3PHO

HORNSEA ARC
Gordon MacNaught, G3WOV, 01377 240573, gmacnaughtwov@yahoo.co.uk
2 The 1154 TX by Ken, G4KCF
4 Setting up for HF Field Day
5 HF Field Day
7 80m CC - Data - home stations
9 Industrial Trust by Paul Booker
16 Activity 80m CC - CW - Club
23 Fox hunt with G4YTV/G3RMX
24 80m CC - SSB - home stations
30 Activity-shack-workshop-DVD

SHEFFIELD ARC
Trevor Wood, M0TWS, trevorwood6@yahoo.co.uk
7 Making your own equipment by G0IYV. RSGB 80m CC (data)
14 Construction comp for G4EJL Memorial Trophy
21 Amateur radio in Germany by Roland Karin, M0NUE
28 VHF & IOTA contest planning meeting

WAKEFIELD & DRS
Ken, 2E0SSQ, 07900 563117
6 Fox hunt
10 Mock Advanced exam
17 Committee meeting, table-top sale prep & poss. Advanced Exam
24 Table-top sale, BBQ & Treasurer's birthday celebrations

5 WEST MIDLANDS

REGIONAL REP: TREVOR BAILEY, M0KMB, M0KMB@RSGB.ORG.UK

COVENTRY ARS
John, G8SEQ, 07958 777363
4 Portable aerials by Carl Peake, G0NZI
11 Bunkers on the air – Harbury, Bulkington & Napton
18 2nd Round G4ZMC Trophy – Hatton Locks
25 Radio workshop HF/VHF/UHF

GLOUCESTER AR&ES
Anne, 2E1GKY, 01452 548478, daytime, www.g4aym.org.uk
7, 28 Informal meeting
14 Airborne aerials, Roger Stafford, G4ROJ
21 Longest day outdoor field operating/draw

KIDDERMINSTER & DARS
Barry, G4CTU, 01562 823966
1 CW evening and VHF NFD preparation

MIDLAND ARS
Norman, G8BHE, QTHR, 01214 229 787
2 Ragchew, training & Morse classes
9 Committee meeting, training & Morse classes
16 Shack OTA, training & Morse classes
23 Laptop computer training, training & Morse classes
30 Contest meeting, training & Morse classes

MID-WARWICKSHIRE ARS
Don, G4CYG, 019 2642 4465
8 Antenna measurements by G8UKT
22 Picnic at Bidford-on-Avon, arrive 10.30

SOUTH BIRMINGHAM RS
Don, 0121 458 1603
2 Lecture in main hall
4, 11, 18, 25 Construction evening
7 Contest planning meeting & ragchew
14 Shack on the air
21 Committee meeting
28 Field day planning meeting

STRATFORD UPON AVON DRS
G0CHO, 01608 664488, cousbey@theiet.org
14 Pre 2m fox hunt kit check - G6MMD
28 2m fox hunt

TELFORD & DARS
Mike, G3JKX, 01952 299 677, mjstreetg3jkx@blueyonder.co.uk
2 Committee /A
9 6m Trophy prep / social event
16 QRP/P – QRP in the village field
17 Visit to RAF Shawbury (AM)
19 Weekend event 6m Trophy, Long Mynd
22 VHF Field Day prep; guess the oddity night
30 BBQ in the park; 3cm Rx testing

6 NORTH WALES

REGIONAL REP: MARK HARPER, MW1MDH, MW1MDH@RSGB.ORG.UK

DRAGON ARC
Stewart Rolfe, GW0ETF, 07833 620733
7 Visit by RSGB RM Mark Harper, MW1MDH
21 N1MM contest logging primer

MEIRION ARS
John, MW0VTK, 07772 720099 tawelfan@talk21.com
3 Annual foxhunt and BBQ

WREXHAM ARS
Glyn, MW0BNB, www.qsl.net/wars/
1 SDR radio by John
15 Morse night

7 SOUTH WALES

REGIONAL REP: JIMMY SNEDDON, MW0EQL, MW0EQL@RSGB.ORG.UK

CHEPSTOW & DARS
Wil Oliver, MW6KGB, 01291 621342
1 RAYNET by Mike Biddiscombe, GW3YKZ

MARCHES ARS
Dave MW0AYM, 01691 777242
8 Fox hunt
22 Kite antennas by Roger, G4ROJ

8 NORTHERN IRELAND

REGIONAL REP: PETER LOWRIE, MI5JYK, MI5JYK@RSGB.ORG.UK

BANGOR & DARC
Mike, GI4XSF, 028 4277 2383
3 BBQ in Crawfordburn Country Park

9 LONDON & THAMES VALLEY

REGIONAL REP: ALISON JOHNSTON, G8ROG, G8ROG@RSGB.ORG.UK

AYLESBURY VALE RS
Roger, G3MEH, 01442 826 651
9 PW 144MHz Contest prep, Les, G0DFC
13 PW 144MHz Contest 0900-1600

BROMLEY & DARS
Andy, G4WGZ, 01689 878089
15 DF hunt

BURNHAM BEECHES RC
Dave, G4XDU, 01628 625 720
7 Fox hunt
21 RSGB rep visit, G8ROG

CHESHAM & DARS
Terry, G0VFW, 01442 831 491, cdars.club@ntlworld.com
2 General meeting + CW training session
9 PW 144MHz QRP planning
14 Sunday PW QRP contest 0900 - 1600
16 OTA + CW training session
23 Construction project evening
30 Pedestrian DF hunt around Chesham, 145.550MHz FM

COULSDON ATS
Andy, G8JAC, g8jac@btinternet.com
14 Annual DF hunt

DORKING & DRS
Garth, G3NPC, 01737 359472, garth@swansons.org.uk
22 Air Traffic Control by Ross MacDonald of NATS, Gatwick

EDGWARE & DRS
Mike, G4RNW, 020 8950 0658, michael.stewart5@ntlworld.com
10 Surplus equipment sale

NEWBURY & DARS
Richard, G3ZGC, 01635 46241, richard.jolliffe@vodafone.com
20 Newbury Radio Rally & boot sale
23 EM theory without maths

READING & DARC
Pete, G8FRC, 01189 695 697
10, 24 Cinema Sounds by Dr Graham Creasey

SHEFFORD & DARS
David, G8UOD, 01234 742 757, www.sadars.co.uk
10 Mobile Top Band DF hunt, Andy, G8ATD

YOUR RSGB SUPPORTING YOUR CLUB

17 Visit to Kelvedon Hatch Bunker
24 VHF NFD Planning, Ken, G4YRF

SOUTHGATE ARC
David Sharp, M0XDS,
david.sharp1@tesco.net
9 Propagation, Leslie Butterfields, G0CIB

SURREY RADIO CONTACT CLUB
Ray, G4FFY, 01732357474
7 Construction contest
21 Club fix-it and natter night

WEY VALLEY ARG
www.weyvalleyarg.org.uk
4 AGM
18 OTA evening out

WHITTON AMATEUR RADIO GROUP
www.warg.info
11 Prepare for CQ WPX CW contest
25 Contest logging software

10 SOUTH & SOUTH EAST

REGIONAL REP: GAVIN KEEGAN, G6DGK, G6DGK@RSGB.ORG.UK

BASINGSTOKE ARC
Clive, G4ODM,
01256 326050
5 Weekend event HF CW Field Day
7 Satellite access by Frank, M0AEU

BREDE STEAM ARS
Steve, 01424 720815,
M0NUC@aol.com
1, 5, 8, 15, 22, 29 At the shack

HASTINGS E&RC
Gordon, 01424 431 909,
gordon@gsweet.fsnet.co.uk
www.herc.uk.net
23 BBQ & /P Operation (all day)

HORNDEAN & DARC
Stuart, G0FYX,
023 9247 2846,
www.hdarc.co.uk
1 Natter night/social evening
22 Volks Electric Railway by Ian Gledhill

HORSHAM ARC
www.harc.org.uk
3 Travels with my radio by Roger Western, G3SXW
17 Social at The Countryman Inn, Shipley

MID-SUSSEX ARS
Peter, G4AKG, 01444 239371
4 Treasure hunt
11 Fox hunt
18 Radio night and table top sale
25 Windmills evening at Jack and Jill Windmills

SOUTHDOWN ARS
John, G3DQY, 01424 424 319
2 Operating at Hailsham
7 John, G3DQY on the Saxon Wetlands, bring & buy sale

SWINDON & DARC
Den, M0ACM, 07810 317750,
www.sdarc.net,
deryckg3ykc@btinternet.com
3 AGM
10 BBQ
17 Talk
24 Natter night

TROWBRIDGE & DARC
Ian, G0GRI,
01225 864 698, E/W
2 Kite aerials by Roger Stafford, G4ROJ
16 Natter night
19 Southwick & North Bradley Scout Fete
27 West Rally, Cheese & Grain, Frome (Club table)

WORTHING & DARC
Roy, G4GPX, 01903 753 893
2 Quiz night
9 PW 2m QRP Contest planning
16 RAF Truleigh Hill Radar Station
23 Discussion evening
30 GX3WOR OTA & discussion

11 SOUTH WEST & CHANNEL ISLANDS

REGIONAL REP: PAM HELLIWELL, G7SME, G7SME@RSGB.ORG.UK

APPLEDORE & DARC
Brian Jewell, M0BRB, 01237 473251
21 Mobile rally event

BRISTOL RSGB GROUP
Robin, G3TKF, 01225 420442
28 Radio Astronomy by Andrew Burns, Chair of Wiltshire Astronomical Society & co-founder of the Griffon Educational Observatory in Spain

CALLINGTON ARS
Chris Harris, G7UDX,
07973 418 371, g7udx@me.com
9 The Secret Life of Violette Szabo by Tony Helm, G4BCX
23 St. Johns eve bonfire on Kit Hill with Old Cornwall Society & special event station

CORNISH RADIO AMATEUR CLUB
Steve, G7VOH, 01209 844939,
G7VOH@btinternet.com
2 A talk about the SAS
14 Computer section meeting

NORTH BRISTOL ARC
Dick, 01454 218362,
g0xay@aol.com or www.nbarc.org.uk
4 Members' vintage radio evening
11 Committee meeting
18 Digital demonstration
25 Prep for West of England Rally

SALTASH & DARC
Brian, M0BHG, 01752 844321
4 Field Day planning evening

SOUTH BRISTOL ARC
Len, G4RZY, 01275 834 282
3 Video - DX Radio
10 QSL card evening
17 BBQ
24 OTA with David, G7PKJ

TAUNTON & DARC
William, G3WNI, 01823 666 234,
g3wni@btinternet.com
2 Prep for NFD
5 NFD
9 NFD debrief
16, 30 Operating club station
23 Mobile aerials by Chris, G4DCH

THORNBURY & SOUTH GLOUCESTERSHIRE ARC
Tony, G0WMB, 01454 417048,
tonytsgarc@btinternet.com
2 Visit to model flying club
9, 23, 30 OTA
16 Video night

WEST DEVON RC
Jules Cuddy, M1AGY, 01752291588
1 Testing VHF antennas & try to work Jersey or Guernsey repeater
15, 29 OTA, try your equipment on the club antennas, homebrew welcome

YEOVIL ARC
Steve Crask, G7AHP,
steve@g7ahp.co.uk
3 Radar part 2, G4DCH
10 4m, G7AHP
24 Committee meeting & OTA

12 EAST & EAST ANGLIA

REGIONAL REP: PHILLIP BROOKS, G4NZQ, G4NZQ@RSGB.ORG.UK

BITTERN DX GROUP
Linda, G0AJJ, 01692 404154,
secretary@bittern-dxers.org.uk
10 AGM
18 Weekend event, GB2OH Oxborough Hall

BRAINTREE & DARS
John, M5AJB, 01787 460 947
21 BBQ

COLCHESTER RADIO AMATEURS
Kevan, 2E0WMG, 07766543784,
kevan2e0wmg@live.co.uk
17 CW for everyone by Jonathan, G0DVJ

DARENTH VALLEY RADIO SOCIETY
Ray, G0FDU@G0KDV.COM
9 Natter night & OTA
23 Prep for VHF Field Day

FELIXTOWE & DARS
Paul, G4YQC, pjw@btinternet.com
13 ESWR Rally
28 UK Radio Astronomy Group update by Laurence Newell

GORLESTON ARS
David, G3OEP, QTHR,
01493 662 323
26 Lunch meeting at the Short Blue Hotel

HARWICH ARIG
Kevan, 2E0WMG,
07766 543784,
kevan2e0wmg@live.co.uk
9 Radio from the past by Monty, 2E0MGD

HAVERING & DARC
John, M0UKD,
07817365354,
john@m0ukd.com
2 More on coils & inductors by Oliver, G3TPJ
9, 23 Informal evening
16 The ins and outs of Council Tax by Diane Curtis
30 VHF Field Day chat

LOUGHTON & EPPING FOREST ARS
Marc Litchman, G0TOC,
020 8502 1645
4 Bring & buy table-top sale
12 Weekend event GB2AVF, Abridge Village Fete
18 HF OTA
19 International Museums Weekend - GB2NWA, North Weald Airfield

LOWESTOFT & DISTRICT PYE ARC
Phil, G0JSG, 01502585448,
phillip.holden@virgin.net
3, 10, 17, 24 Club night at shack

NORFOLK ARC
Chris Danby, G0DWV,
01603 419204,
cmdanby@btinternet.com
2, 30 DF fox hunt prep & equipment testing
6 National Field Day HF weekend
9 Friendly fox hunt
16 Informal, construction, & workshop evening; RSGB clubs contest
23 Barford Rally final prep
26 3 day Friedrichshafen radio rally

PETERBOROUGH & DARC
David Howlett, M0VTG,
padarc@tesco.net
23 Kite-born antennas, Roger, G4ROJ

SOUTH ESSEX ARS
Norman, M0FZW, 01268 692776,
secretary@southessex-ars.co.uk
9 Air band monitoring by Bob, M3OBO
19 Field event: Bay Museum, Canvey Island (MOTA)

13 EAST MIDLANDS

REGIONAL REP: JIM STEVENSON, G0EJQ, G0EJQ@RSGB.ORG.UK

BOLSOVER ARS
postmaster@g4rsb.org.uk,
www.g4rsb.org.uk
2 Natter night
9 2m antenna talk, David, M3VKS
16 Fred's Antiques Roadshow, Fred, G7GSX
23 Fox hunt
30 Committee meeting

Continued on page 86

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

4 BEDROOM HOUSE in 2 acres. Elevated south coast seaside location with clear takeoff for HF and VHF DX. Seeking £600K+. Existing Strumec P60, smaller 25ft tiltover tower and antennas may be sold separately. G3FFH, 01297 445518, jon.g3ffh@btinternet.com (Lyme Regis).

60ft HEAVY DUTY VERSATOWER trailer tower with integral cage and sleeve bearings also carrying boxes, £3,750. Part finished 45ft trailer tower with cage. Needs finishing, £900 (the steel cost more than that). Trev, G2KF, 07974 892179 (Cornwall).

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.

ALINCO DJ580, VHF/UHF handheld transceiver with three sets AA size NiMH batteries. Tx fault but excellent Rx. Offers to R T Irish, G4LUF, 01668 283623 (Wooler, Northumberland).

AVO VALVE TESTER CT160, £375 comp with tech data, operating instructions and valve data. Mike, G4HUQ, 01254 813757 (QTHR, nr Preston).

FT102 complete with ATU, matching speaker and manuals, £400. Sigma long wire multi-band half-wave trap dipole antenna, £150, little used through moving house, all guys included. Ron Hamstead, G4RTH, 01692/406923 (North Walsham, Norfolk).

FTV-107R TRANSVERTER with 2m & 70cm modules fitted, £130 + postage or collect. GWO, VGC. View at www.g0jlx.co.uk. Andy, G0JLX, 07768 282880 (QTHR, Winchester).

G-QRP CLUB CQ40 CW transceiver kit, up to 7W, not started, many extras, vernier dial, pots, plugs and sockets, components for mods ect. Complete with aluminium box and instructions, also articles from other sources. £50 inc p&p. Hugh Philps, M0ACF, 01480 394679 (St. Ives, Cambs).

HEATHKIT DX-100 100% duty cycle AM rig. AM/CW/SSB TX; VFO/Xtal. With or separately for sale SB-10 phasing SSB adapter + cables. Near-immaculate front panel & cabinets. RF o/p can be demonstrated. Premium price for near-perfect original. Collector's item. Original or copy manual available. Offers by email only please: G3WRT@yahoo.com.

HIGH POWER LASER. Gas tube HeNe laser with telescopic sight and tripod mount. Simple to modulate HT & use as a comms link. Adrian, G4UVZ 01823 421751, adrianwhatmore248@btinternet.com (Taunton).

HI-MOUND MK701 Sideswiper Manipulator Morse key, good condition, £30 OVNO + postage. Rare RAF Blinker Key, ex Lancaster Bomber etc, good condition, £50 OVNO + postage. Selling both for an amateur friend. John, MM0LBX (ex 2M0MAV), 01241 830243, MM0LBX@talktalk.net (Arbroath).

IC22A 2m XCVR, fitted tone burst, with instruction manual, M/Ant, monopole ant, RG213/U coax, inspect and collect £80. Prefer exchange HW8 in gwo with handbook. G3ZOF, 01366 388031 (West Norfolk).

IC260E 2m MULTIMODE - no microphone, 2 x SMC 254L8 unboxed, 2 x SMC 545L1, SMC 1045L2, SMC 251L4, 2 x SMC 2546L8, all boxed. Microwave Modules 2m to 70cm 10W transverter. Datong Auto-Notch Filter. Roger, G4HZA, 01483 210246, g4hza@tesco.net (Guildford).

ICOM IC706 MK II G as new, purchased just before Christmas, boxed, manual etc £500 ono. Mr E P Ashley, G0BIN, 07841 871768 (Bedworth).

KENWOOD HF XCVR TS940S, Kenwood linear amplifier TL922, Nevada transmatch TM1000 Tuning Unit. £1000 ono. Silent key (G4JZK) sale. Michael Flinn, G3EOQ, 01993 812313 (Woodstock, Oxon).

LARGE SELECTION OF 'OLD' VALVES, WW2 vintage (store soiled, not boxed). Many USA metal type. £30 plus P&P. Also one RCA 21fpb 21 inch round colour CRT, 1960 vintage. Free to a collector, suitable for a museum display. Ring to discuss. Ted, G4TLY, 01666 822935, g4tly.ted@virgin.net (QTHR, Malmesbury).

MFJ-931 artificial RF ground, boxed, manual, unused, £50. MFJ-910 mobile antenna matcher, boxed, unused, £15. Hi-Mount MK-704 twin paddle Morse key, boxed, £15. MFJ-462B multi-reader, audio rig lead, instructions, £100. Realistic PRO-2025 scanner, manual, leads, boxed £30. Bill Wrench, G7AKJ, 01395 568503 (Budleigh Salterton).

N3ZN Z1a IAMBIC KEY (magnetic) made to order for myself £90, excellent condx. MFJ989c 3kW ATU, reasonable condition, £80. Phil, 2E0BBP, 01642 809346, b.aldpatch@ntlworld.com (Stockton on Tees).

NEW AND UNUSED Mullard QQV07-50 VHF/UHF double beam power tetrode transmitting valve. £10. M L Burgess, MM0MLB, 01383 733550 (Dunfermline, Fife).

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, 01244 316673, g8zre@hotmail.com (Chester).

SHACK CLEARANCE. HP8568 spectrum analyser, HP8444-059 sweep generator, PM3217 oscilloscope, Marconi 2022 signal generator, Farnell AP70/30 programmable power supply, Yaesu FT-920 & VX-6, Kenwood TR-9000. Too much to list here, so please email don.kees@talktalk.net for details and very reasonable prices. Don, M0DKS, 01277 622181 or 07501 444954 (Billericay).

SILENT KEY SALE FOR G3WDV. Yaesu FT200 HF transceiver, mic, manual, boxed. Trio TS711E 2m multimode 25W, mic, manual, boxed. Kenwood R2000 general coverage Rx. Gould OS3351 30MHz ex-BBC TV oscilloscope, manual. Maplin Colorotor antenna rotator & remote PSU/controller, boxed, unused. Offers accepted all items. David, 01476 585262, david199@tiscali.co.uk (Grantham).

SK SALE: complete amateur radio station. Yaesu FT-897D, 3 years old, little used, Matching LDG AT897 aerial tuner, MyDel MP8230 12V 23A PSU. £495 the lot. bhi NEIM1031 noise eliminating in-line module £60. Other equipment including antenna (in situ), headphones, Morse keys, Sinclair TM351 digital volt/amp meter available. Full details on request. Property of the late David, G4KKM. S Peace, 0208 892 7585, Shirley@peace2724.freeserve.co.uk (East Twickenham).

SONY ICF XW55 SW Rx, boxed, £180. Sony ICF-SW100E SW Rx, boxed, £80. Sony AN 102 wide range ant, boxed, £40. Kantronics KAM XL multi mode controller, boxed, £200. B2 spy set, Tx only, with 1 coil – offers? Tony, G4KHT, 01482 843018, g4kht@g4kht.karoo.co.uk (QTHR, Cottingham).

YAESU FT 757 MK-1 HF Transceiver, TX on general coverage, good condx, complete with power lead, hand mic and instruction manual. No box. Just been checked over. £230 ono. Fred Shead, G4VVQ, 01245 233566 (Chelmsford area).

YAESU FT1000 classic HF xcvr, 200W. Hand mic MH-31, manual, excellent condition, non smoker operator. £1150 + carriage or collect. FIF-232C Cat system, £65.00. Ken, GM7TYN, 01592 757831, gm7tyn@yahoo.co.uk (Glenrothes).

YAESU VX-2E 2m/70cm handy. Absolutely mint and in full working order. Bought as back-up radio but had very little use. £75 ono. Tony Prior, G4UWW, g4uww@homecall.co.uk, 07818 445422 (Ipswich).

ZX3 50MHz 3 ele Yagi, £40. Wolf 800 petrol generator, as new, £40. Graham Badger, G3OHC, 01757 705869 (Selby, not QTHR).

Continued on page 88

CLUB CALENDAR

DERBY & DARS
Richard Buckby, radio@dadars.org.uk
1 Junk sale
8 Committee meeting
15 Video show
22 Quiz night
29 OTA

EAGLE RG
Terry, G0SWS, 01507 478590
8 Ham Radio in New Zealand by Tony, G3RKL/ZL2RKL

FRISKNEY & EAST LINCS COMMS CLUB
Chris M0MFP, 01507 442240
1 Morse by Ant, M0HAZ
13 Running a working station at the Friskney Show

HINCKLEY ARS
John, M0JAV, 07836 731544, m0jav@lowgables.co.uk
2 Social evening
9 HF magnetic loop by John, M0JAV
30 Junk sale

LINCOLN SHORT-WAVE CLUB
Pam Rose, G4STO, 01427 788356, pamelagrose@tiscali.co.uk
2, 12, 19, 23, 26 G5FZ OTA
5 Party in the Park, Grimsthorpe Castle - GG100PIP, 100 years of Girl Guiding
9 Talk on AWACS
16 G5FZ OTA & natter night
30 G5FZ OTA & BBQ

MELTON MOWBRAY ARS
Geoff, G3STG, 01664 480 733, G3STG@btinternet.com
18 Annual fox hunt

NUNSFIELD HOUSE ARG
Ken Frankcom, G3OCA, 01332 720976
12 Committee meeting/shack night

RAF WADDINGTON ARC
Judy Rowlands, M6LQO, 07544 456422, j.rowlands2@ntlworld.com
3, 17, 24 Shack and chat night with radio and antenna play
10 Talk on antennas by Bob, G3VCA

SOUTH NOTTS ARC
Terry, MORIA, www.radioclubs.net/snarc
2 Next construction project
13 Junction 28 Rally
16 OTA
23 Members' ten minute talks
30 Inductors by G4EDX

SPALDING & DARS
Graham Boor G8NWC, 07947 764481, secretary@sdars.org.uk, www.sdars.org.uk
1 144UKAC at the Portakabin
6 SDARS Rally, Gleed School

WELLAND VALLEY ARS
Peter D Rivers, G4XEX, QTHR, 01858 432105, g4xex@fsmail.net
12 Weekend SES GB0BON (Battle Of Naesby), Ruperts Viewpoint
21 Visit to Kettering Club

ICOM

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- Free Programmable Software*
- Optional GPS Speaker Mic
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New! ID-E880 VHF/UHF Dualband Mobile

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- Improved User Interface
- Wideband Receiver
- 1052 Alphanumeric Memory Channels
- Large LCD Display
- Detachable Controller
- Free Programmable Software*

(*Free programming software for both radios is easily downloadable from: www.icom.co.jp)

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WANTED

CERAMIC OR SIMILAR double pole change over knife switch for use with 600Ω balanced feeder line. Reasonable price paid, postage. Mr David Blake, G3MWV, 01263 512872 (Cromer).

DISABLED FAN OF OLD DAYS seeks pre 1975 QSLs, magazines, etc. Mike, 8 Windsor Road, Reydon, Southwold, Suffolk IP186PQ.

FOLLOWING A THEFT from our equipment store, Colchester Contest Group is in need of LDF 5-50 Heliax (or similar 7/8" Cellflex). LDF 4-50 in long lengths also considered. Cash waiting. Please contact us by email initially with a description and offer. Dave Gilligan, G1OGY, G0VHF@m1cro.org.uk (Colchester).

KENWOOD TSU-6 CTCSS UNIT (aka KQT8 I believe). Ian Gordon, G6ENU, 01276 501360, ian@g6enu.net (Camberley).

SILENT KEY CLEAROUT or just not needed. I collect QSL cards for their historic interest, preferably from periods before 1970. Please don't throw them away. I can collect or arrange collection. Tony, G4UZN, 01132 693892, AQuest1263@btinternet.com (Leeds).

SKANTI 8XXX SERIES HF RADIO. Remote control protocol info wanted, particularly how to read the active settings and memories etc. (I can successfully send it commands and settings.) Dave Baxter, G8KBV, 01280 816271, dave@g8kbv.demon.co.uk (Buckingham).

TENNAMAST 10.3m tilt-over or Hilo (or similar) pneumatic mast, 10m minimum when extended. Must accept 2" rotator mounting. Duncan, G3WZD, 07515 869977, duncan.fisken@blueyonder.co.uk (Frome).

TRIO TX-310 HF Tx or JR-310/TX-310 pair. Allan, GM4TEF, 01224 735321 (Aberdeen).

WANTED TO PURCHASE OR COPY, Owners Manual (not Service Manual) for Trio TS-500 transceiver. Also interconnecting cable for Trio TS515-PS515. Peter, G3TZL, 07880 933244, (Petersfield)

WODEN UM3 QRO modulation transformer or, if I am very lucky, a UM4 or similar American equivalent by Thordarson, UTC, Hammond or Triad etc. I am prepared to pay a premium price for the right transformer. Ross, GW3NWS, 01633 880146, ross.clare@btinternet.com (Monmouthshire).

RALLIES & EVENTS

Members of the RSGB Regional Teams will be at the rallies this month that are marked with a diamond.

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, Graham, G8NWC, 0794 776 4481, e-mail rally-secretary@sdars.org.uk [www.sdars.org.uk].

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, e-mail g4hzj@ntlworld.com.

6 JUNE - **NEWHAVEN FORT AMATEUR RADIO GROUP RALLY AND FORT OPEN DAY** - Newhaven Fort, East Sussex. CP, £2, OT 10.30, CBS, DF, FAM, CS, SIG, C. Sellers tables £7 each, set up 9am. Eddie, G0ECW on 01273 300772, e-mail eddie@zamboodle.demon.co.uk.

6 JUNE - **BRITISH AMATEUR TV CLUB BIENNIAL GENERAL MEETING** - Hellidon Lakes Hotel, nr Daventry, NN11 6GG. Gala dinner 5 June. OT 9.00, exhibition, LEC 10.00-14.00, BGM 14.30. NO TRADING. Event streamed live at www.batc.tv. £4 for non BATC members (fee includes annual membership). Contract secretary@batc.org.uk [www.batc.org.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 - **9th JUNCTION 28 QRP RALLY** - South Normanton Alfreton and District Amateur Radio Club (SNADARC) in association with the G-QRP Club. Alfreton Leisure Centre, Church Street, Alfreton, Derbyshire DE55 7AH. Just 10 minutes from M1 J28 and the A38. OT 10, TS, B&B, SIG, C. Russell Bradley, G0OKD on 01773 783658, e-mail russell.bradleyG0OKD@ntlworld.com [www.snadarc.com].

SILENT KEYS

We regret to record the passing of the following members:

Mr C A Luke, G4JEH	4/4/2010
Mr CW Halling, G3RPQ	
Mr H N Wilmington, GW0BOJ	
Mr D Clamp, G7BZG	27/3/2010
Mr F G Wingfield, G4KVV	31/3/2010
Mr E M Frost, RS2692	20/2/2010
Mr L E Ashworth, G0KSF	21/4/2010
Mr W L Lowson, GM2BFV	2/3/2010
Mr K A Haddington, G1OBU	
Mr D A Ashton, G4HRV	22/4/2010
Mr W K Owen, G3CSS	255/3/2010
Mr S J Mccrory, 2I0KWS	17/3/2010
Mr IHM Kluiters, RS47169	12/4/2009
Mr EA Perkins, G3MA	2010
Mr G Foster, G3POD	19/3/2010
Mr E Cooper, G0ZEC	22/4/2010
Mr R T Hicks, G0GJF	6/2/2010
Mr D A Salisbury, M3FDZ	2010
Mr D A Haller, G1KJY	30/3/2010
Mr I N Nathan, RS180015	1/2/2010
Mr W J Seeney, G8RFN	2/3/10

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. Sellers have access from 8am and pitches cost £10. Details from 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, e-mail rallymanager@westrally.org.uk [www.westrally.org.uk].

3 JULY - **1st STOCKPORT RALLY previously known as REDDISH RALLY** - Walthew House, Shaw Heath, Stockport SK2 6QS. OT 10.00, £1, TS, DIS, CP, C. Tables available £10 each. Details Bernard, G3SHF, 01625 850088 (daytime) or Nigel, G0RXA, 0161 428 8413 (eves), info@reddishrally.co.uk [www.reddishrally.co.uk].

3 JULY - NEW DATE - NEW VENUE - **BANGOR AND DISTRICT ARS RALLY** - Donaghadee Community Centre, County Down BT21 0HB. OT 12 noon, TS, free B&B, SIG. Bill GI4AAM 028 9181 6707, e-mail bill.langtry@btinternet.com [www.bdars.com].

4 JULY - **BARFORD NORFOLK RADIO RALLY** - Barford, 9 miles SW of Norwich close to A11 and A47. OT 9am (traders from 8am), £1, CP, TI, CBS, B&B, C. Contact David, G7URP, 01953 457322 or e-mail radio@dcpmicro.com [www.norfolkamateurradio.org].

11 JULY - **CORNISH RAC 47th MOBILE RALLY** - Penair School, Truro, Cornwall, TR1 1TN. TS, B&B, C, TI, CP. OT 10.30, £2. Details Ken, G0FIC, 01209 821073, e-mail ken@jtarry.freeserve.co.uk. [www.cornishamateurradioclub.org.uk].

18 JULY - **HOT IRON QRP DAY** - Upton Bridge Farm, Long Sutton, Langport TA10 9NJ. SIG, B&B, LEC, C, LB, FAM. Free entry. Tim Walford, G3PCJ, 01458 241224, e-mail walfor@globalnet.co.uk [www.walfordelectronics.co.uk].

18 JULY - **MCMICHAEL RALLY AND BOOT SALE** - Reading Rugby Club, just off the A4 east of Reading, £2, TI, CP, LB, C, SIG, WIN, TS, CBS. OT 9.30. Details Pete, G8FRC, 01189 695697, e-mail g8frc@radarc.org [www.McMichaelRally.org.uk].

18 JULY - **MACMILLAN [NORTHAMPTON] HAMFEST** - Roade Village, Northamptonshire. No entry fee, no traders fee, only donations to Macmillan. All refreshment monies to Macmillan too. Contact G6NYH on 01604 234333 [www.tetra2000.com].

25 JULY - **HORNCASTLE SUMMER RALLY** - Horncastle Youth Centre, Willow Road, Horncastle, Lincolnshire LN9 6DZ. £1.50, DF, C. Tony, G3ZPU, 01507 527835.

25 JULY - **COLCHESTER RADIO AMATEURS ANNUAL RALLY** - St Helena School, Sheepen Road, Colchester CO3 3LE. OT 10.00, TI, CP, TS, FM, CBS B&B, SIG. Details Brian 01206 822547 brianfitz@aspects.net.

31 JULY - 1 AUGUST - **AMSAT-UK INTERNATIONAL SPACE COLLOQUIUM** - Holiday Inn Hotel, Egerton Road, Guildford, GU2 7XZ. Presentations on amateur satellite communications and meet the satellite builders. GB4FUN in attendance. Details at www.uk.amsat.org/content/view/704/283/.

1 AUGUST - **KING'S LYNN ARC RALLY & CAR BOOT** - King's Gaywood Community Centre, PE30 4DZ. OT 10.00, £1.50, TS, CBS, B&B, C, CS (by prior arrangement). Ray, G3RSV, 01553671307, e-mail ray-g3rsv@supanet.com [www.klarc.org.uk].

1 AUGUST - **LORN RADIO AMATEUR RALLY** - Crianlarich Village Hall, Crianlarich, near Oban FK208QN. OT 10.30 TS, C, WIN. GM0ERV, e-mail gm0erv@sky.com or MM1AVR, e-mail stewart.mciver@btinternet.com.

8 AUGUST - **FLIGHT REFUELLING ARS HAMFEST** - Cobham Sports and Social Club Ground, Merley, Nr. Wimborne, Dorset BH21 3AA. Details Mike, M0MJS, 01202 883 479, e-mail hamfest@frars.org.uk [www.frars.org.uk].

13 AUGUST - **COCKENZIE & PORT SETON ARC 17th ANNUAL MINI-RALLY NIGHT** - Community Centre, Main Hall, Port Seton. Bring along your own 'junk' and sell it yourself. Tables on first come first served basis. £2 for everyone. OT 18.30 to 21.30.

15 AUGUST - **FRISKNEY & EAST LINCOLNSHIRE COMMUNICATIONS CLUB RALLY** - The Frisknet Village Hall, Church Road, Friskney, Lincs. 6.5 miles south of Skegness. OT 10.00 to 14.30, £1.50, CP, C, WIN, TI S22, DIS. Details Bren, 2E0BDS, 01754 820204, e-mail felcc@btinternet.com [www.felcc.webs.com].

22 AUGUST - NEW VENUE - NEW DATE - **RUGBY ANNUAL RADIO RALLY** - Princethorpe College, Princethorpe, Rugby CV23 9PX (SP395710). OT 10am - 4pm, £2, pitches £14 on the day. Contact Tony, 07759 684411. [www.rugbyats.co.uk].

29 AUGUST - **MILTON KEYNES ARS RALLY** - Bletchley Park, Sherwood Drive, Bletchley, Milton Keynes MK3 6EB. TI S22, TS, SIG, £2 (50p for 14 years and younger). OT 9.30. Why not make this a family day and visit the Betchley Park museum too? Steve Goodall, G6KJU, 07866 673 192, e-mail rally@mkars.org.uk [www.mkars.org.uk].

30 AUGUST - **HUNTINGDONSHIRE ARS BANK HOLIDAY MONDAY RALLY** - St Neots Community College, Barford Rd, St Neots, PE19 2SH. OT 10.00, TI, CP, CBS, B&B, C, TS, RSGB bookstall. E-mail hunts.hams@yahoo.co.uk [www.hunts-hams.co.uk].

5 SEPTEMBER - **TELFORD HAMFEST** - Enginuity Technology Centre, Coalbrookdale, Telford TF8 7DU. OT 10.30. TI S22 & GB3TF 433.200MHz. TS, SIG, discounted admission to Enginuity Centre. Details from Martyn, G3UKV, 01952 255416 [www.telfordhamfest.co.uk].

12 SEPTEMBER - **BOOT FAIR/OPEN DAY AT THE MUCKLEBURGH COLLECTION** - Muckleburgh Collection military museum, Weybourne, Norfolk. For one day only, admission to the museum, restaurant and shop will be free, providing an unusual opportunity to visit the country's largest privately owned military museum without charge and a great day out for groups, individuals and families. Radio clubs, individual amateurs, military enthusiasts and general stallholders welcomed. Pitches £5.00 payable on the day. No traders. All enquiries to Bob Finch, G0HYZ, 01263 838198.

12 SEPTEMBER - **TORBAY ANNUAL COMMUNICATIONS FAIR** - Newton Abbot Racecourse, Newton Abbot, Devon TQ12 3AF. TS, B&B, C, DF. Details by e-mail to rally@tars.org.uk.

13 - 18 SEPTEMBER - **THE 15th WORLD ARDF CHAMPIONSHIPS** - Opatija, Croatia [www.ardf2010.com].

18 SEPTEMBER - NEW RALLY - **THE FOG ON THE TYNE RALLY** - Whitehall Road Methodist Church Hall, Bensham, Gateshead NE8 4LH, organised by Angel of the North ARC & South Tyneside ARS. £1.50, C. Nancy Bone, G7UUR, 0191 477 0036 (eves).

19 SEPTEMBER - NEW DATE - **GREAT NORTHERN HAMFEST** - Metrodome Leisure Complex, Barnsley S71 1AN. OT 11.00, DF, TS, SIG. Details Ernie, G4LUE, 01226 716339.

SPECIAL EVENT STATIONS FOR JUNE 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
01/06/2010	GB5EPC	European PSK Club	Berkshire	TLHV	M0TLN
	GB1EPC	European PSK Club	Glasgow	TLHV	MM0DFV
	GB4EPC	European PSK Club	South Lanarkshire	TLHV	GM0SDV
	GB8EPC	European PSK Club	Essex	TLHV	G6XOU
	GB2EPC	European PSK Club	Glasgow	TLHV	GM0WRR
	GB0EPC	European PSK Club	Dunfermline, Fife	TLHV	GM0IXO
	GB6EPC	European PSK Club	Craigavon, Northern Ireland	TLHV	GI8HXY
02/06/2010	GB0BAW	Bath and West	Shepton Mallet, Somerset	LH2	G0ECX
04/06/2010	GB70BRS	Bawdsey Research Station	Suffolk	TLHV27	G8BHC
	GB8WOL	War On Line	Ropley	TL	G8YFH
	GB4DTD	Dawn To Dusk	Scottish Western Isles	LH	GM0DEQ
05/06/2010	GB0BON	Battle Of Naesby	nr Naesby, Leics.	TLHV27	G4XEX
	GG100PIP	Party In the Park	Grimsthorpe, Lincs	LH27	G4STO
07/06/2010	GB2HC	Harrogate College	Harrogate, Yorks	LH2	G3XWH
	GB4FF	Flag Fen	Peterborough	TLHV27	M0VTG
11/06/2010	GB0NOP	Nil Obstare Potest (514 Sqn Motto)	Waterbeach	L	G4KCF
12/06/2010	GB2AVF	Abridge Village Fete	Abridge, Essex	V2	G0TOC
	GB2CWM	Cold War Museum	Woodbridge, Suffolk	LH	G4XVE
16/06/2010	GB0ZLB	Zetland Life Boat	Redcar, Yorks	LH2	G4OLK
	GB2OH	Oxburgh Hall	Kings Lynn, Norfolk	TLH27	G7VRK
17/06/2010	GB0RMM	Royal Marines Museum	Southsea, Hants	TLH27	G0FYX
	GB1BPS	Bratch Pumping Station	Staffordshire	TLHV27	G7DMO
	GB1HBS	Hundred Bromsgrove Scouts	Worcestershire	TLHV27	G4HFP
18/06/2010	GB1HES	Eastbourne District Scouts	Hailsham, Sussex	LH	M0LRE
	GB2SMF	Shorwell Midsummer Fair	Shorwell, Isle of Wight	LH2	M0PBN
	GB0AWS	All Wales Scout	Llanelwedd, Builth Wells	LH27	GW7VJK
	GB2PLF	Project Luton Factories	NGR: TL 162 212	LH2	G4PLW
	GB2MOF	Museum Of Flight	East Fortune, East Lothiah	LH	GM4UYZ
	GB0WAM	Wickenby Air Museum	Langworth, nr Lincoln	LHV27	M0OOO
	GG100GGR	Girl Guiding Renfrewshire	Carn A'GHEOIOH	LH27	MM1AWV
	GB1AMB	Avoncroft Museum of Buildings	Bromsgrove, Worcs	LHV27	G6NYS
	GB0BMM	Bentley Motor Museum	nr Lewis, Eat Sussex	TLHV27	G6UBM
	GB2SSB	Scotlands Secret Bunker	Anstruther, Fife	TLHV27	MM0TGB
	GB0GCR	Great Central Railway	Ruddington, Notts	LH2	M0GWR
19/06/2010	GB1HA	Headcorn Aerodrome	Headcorn, Ashford, Kent	TLHV27	G0UXG
	GB2RRM	Ramsey Rural Museum	Huntingdon, Cambs	TLHV27	G8AKL
	GB2BM	Bay Museum	Canvey Island, Essex	L2	G4UVJ
	GB2MBA	Museum Of Berkshire Aviation	Woodley, Berks	LHV27	M0LUV
	GB4WWM	Wellesbourne Wartime Museum	Warwick	LH2	G0MRH
	GB4BAH	Bedworth Alms Houses	Bedworth	LH2	G8GMU
	GB4NBS	Newbury Boot Sale	Chieveley, Berkshire	LHV2	G4TPH
	GB2NWA	North Weald Airfield	North Weald, Essex	LH2	G0TOC
	GB0THR	Tanfield Heritage Railway	Tyne & Wear	LH27	G7ESY
	GB2VCB	Visitor Centre Bennachie	Inverurie, Aberdeenshire	TLHV2	GM4AJR
	GB4SMH	Signals Museum Henlow	RAF Henlow, Bedfordshire	LHV27	G3USE
21/06/2010	GB5AFD	Armed Forces Day	Sully, Vale of Glamorgan	TLHV27	GW4XKE
	GB4HFH	Help For Heroes	Sully, Vale of Glamorgan	TLHV27	GW4XKE
25/06/2010	GB4AFD	Armed Forces Day	Woolwich, SE London	LHV27	M1CCF
	GB4BRV	Brading Roman Villa	Brading, Isle of Wight	LH2	G0VZV
26/06/2010	GB2CCM	Clasic Cars & Motorcycles	Preston, Lancs	TLHV2	G3UCA
	GB4SMH	Signals Museum Henlow	RAF Henlow, Bedfordshire	LHV27	G3OXG

1 & 2 OCTOBER - **NATIONAL HAMFEST** - brought to you by the RSGB in association with the Lincoln Short Wave Club. George Stephenson Pavilion, Newark and Nottinghamshire Showground, Lincoln Road, Winthorpe, Newark NG24 2NY (close to junction of A1/A46/A17). TS, B&B, CB, C, SIG, Morse proficiency tests on demand, RSGB Bookstall, RSGB Services & Committees, DF, FM [www.nationalhamfest.org.uk].

3 OCTOBER - **AUTUMN MILITARIA & ELECTRONICS & RADIO AMATEUR HANGAR SALE** - Hack Green secret Nuclear Bunker, Nantwich, Cheshire, CW5 8AL. OT 10.00, £2.50. Contact Rod Siebert, 01270 623353 or e-mail coldwatr@hackgreen.co.uk [www.hackgreen.co.uk].

8 - 10 OCTOBER - **RSGB CONVENTION** - Full convention programme with lectures for all interests and all levels of technicality [www.rsgb.org/rsgbconvention].

17 OCTOBER - **BLACKWOOD AND DISTRICT ARS RALLY** - Coleg Gwent, Risca Road, Cross Keys NP11 7ZA.TI S22, CP, OT 10.30/10.40, £2. TS, B&B, SIG, C, WIN. Details Dave, GW4HBK, 01495 228516, e-mail gw4hbk@talktalk.net [www.gw6gw.co.uk].

17 OCTOBER - NEW DATE - **HORNSEA AMATEUR RADIO CLUB RALLY** - Floral Hall, 7 The Esplanade, Hornsea, East Yorks HU18 1NQ. OT 10.30, CP, TS, B&B, SIG RSGB, RAFARS, LB, C, DF, WIN. Details from Rick, M0CZR by e-mail to R106221@aol.com or Duncan, G3TLI, e-mail g3tli@hotmail.co.uk [www.hornseaarc.co.uk].

17 OCTOBER - **GALASHIELS AND DISTRICT ARS RADIO RALLY** - The Volunteer Hall, St Johns Street, Galashiels, Scottish Borders TD1 3JX. OT 11.00/10.45, £2.50. B&B, TS, C, WIN. Details from Jim, GM7LUN on 01896 850245 or e-mail mail@gm7lun.co.uk.

30 & 31 OCTOBER - **NORTH WALES RALLY** - John Bright School, Llandudno. TS, RSGB Bookstall, CP. Details from Liz Cabban, GW0ETU on 01690 710257 or e-mail lizcabban@vodafoneemail.co.uk.

7 NOVEMBER - **WEST LONDON RADIO & ELECTRONICS SHOW (Kempton Rally)** - Kempton Park racecourse, Staines Road East, Sunbury on Thames, Middlesex TW16 5AQ. OT 10.00. TS, FM, DF, CP free, RSGB, LEC, TI S22 (V44). Paul, M0CJX, 0845 165 0351, info@radiofairs.co.uk [www.radiofairs.co.uk].

13 NOVEMBER - **ROCHDALE & DISTRICT RS TRADITIONAL RADIO RALLY** - St Vincent's Church Hall, Caldershaw Road, Rochdale OL12 7QL. OT 10.15/10.30am, £2.50 concessions for under 12 and seniors, B&B, C, Tables only £5 and they encourage all vendors to bring along all their radio related 'junk' with construction in mind. No computers (well, maybe a couple!). NB This is a Saturday Rally!! Details Dave, G0PUD, QTHR, 07710 243107, e-mail dave.shaw1@sky.com. [www.radars.me.uk].

21 NOVEMBER - **33rd CATS RADIO & ELECTRONICS BAZAAR** - 1st Coulsdon Scout HQ, r/o Council Car Park, Lion Green Road, Coulsdon, Surrey. 10.00-13.00, £1, B&B, C, DIS, DF, CP free. Details Andy, G8JAC, e-mail secretary@catsradio.org.

21 NOVEMBER - **PLYMOUTH RADIO CLUB RALLY** - Elm Community Centre, Leypark Walk, Estover, Plymouth PL6 8UE. CP, TI, OT 10.00, £2, TS, B&B, C, WIN.

28 NOVEMBER - **BISHOP AUCKLAND RADIO AMATEURS CLUB RALLY** - Spennymoor Leisure Centre, Co Durham DL16 6DB. CP, TI S22 (V44), OT 10.15/10.30, £1.50 (U14 free). TS, B&B, C, LB, DF, FAM. Details Mark, G0GFG, 01388 745 353.

6 FEBRUARY 2011 - **26th CANVEY RADIO & ELECTRONICS RALLY** - 'The Paddocks', Long Road, Canvey Island, Essex SS8 0JA [southern end of A130]. Free CP, OT 10.30, £2, C, DF, TS. Dave, G4UVJ, 01268 697978 (evenings), [www.southessex.ars.btinternet.co.uk].

This list shows all rallies and events we are aware of as at 7 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.

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.
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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.

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

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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

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BUSINESS CARDS

CLASSIFIED ADS

FAITH RESTORED

Graeme Stoker, M0EUK

Like many of us I suspect, the time demands of work with lots of travel and two young kids means little time to play radio, and so on an odd snatched half hour here and there is all I manage. During my time on the radio I love a good chat on HF and get so frustrated by the seemingly constant '59, QRZ' QSOs and endless contests (not that I'm anti-contest, but please leave some room for the rest of us). To add to it, the attitude of some hams seems a disgrace – I was recently verbally abused by a Slovenian operator for not sending him a QSL card some 5 years back (I don't collect QSL cards and always say not to send them to anyone who offers and I state this on QRZ.com). So, of late I've been getting pretty despondent about radio and really not making so much effort to get on the air.

This past week, however, I've been operating /P from EA3-land, with a basic setup of IC-706 MK2 and combination of Buddistick compact vertical and a long wire. I have to say, my faith in amateur radio is totally restored. Although I've only managed 30 or so QSOs once the kids have gone to bed etc, I've been so impressed by the number of genuinely lovely people I've been lucky enough to talk to, many of whom have been back in the UK. I've tried a little 'pidgin' Spanish and French, and even managed a little DX. It seems that the old amateur spirit is indeed well and truly alive – I'm inspired to turn the radio on with renewed passion from home.

Thanks to all the operators who keep our hobby the friendly and inviting place that I always believed it was.

MORE ANTENNA CONSTRUCTION PLEASE

Jon Barden, G6UWK

I am reading with great interest the Start Here covering modern filtering as I recently purchased a new Yaesu FT-450 transceiver and it has modern filtering in abundance, which I am just beginning to learn, my previous HF rig being a venerable but still working FT-101E, I am very impressed with the FT-450 by the way.

As you may have gathered I have been away from the bands for a few years, as many of us do due to having a young family, which brings commitments but the children have grown up and I am now back on the air. I have noticed that in a recent pile up for a station from Borneo how many stations were running amplifiers that were being over run as they were spattering 10kHz above and below the centre frequency. I am not looking through rose tinted spectacles and saying it was never thus, rather I would praise the Foundation licence with its reduced power and encouraging better antennas, indeed lets face it 26dBW is small compare to that Eastern European station running 2kW into a beam at 30m.

My main radio is as I have said the FT-450 which supplies a off centre fed dipole (Windom type) and for a wire antenna I am impressed with it, it is multi band and is simple to make, there are plans on the net, for the cost of a couple of toroids, a reel of enamelled wire, a plastic/ABS box and a SO239 connector you can be on the air with a good signal, total cost less than £15 all in, yes you can buy an antenna but it is much more fun making your own and getting good signal reports using it, 4500 miles maximum so far in 2 months on 100 watts, I copied one state side station who was running 10 watts with an honest 5-7 signal report.

The point I am trying to make in my roundabout way is radio is about fun, for some it is collecting QSL cards and sometimes these people think high power is required, for others it is construction for others it is something else. Whichever interests you; high powers are not required. All you need is determination, skill and just a little luck!

Look forward to hearing you on the air.

OLDEST STUDENT

John Barton, M0JJB

I read with interest the letters from your young whippersnappers in their late seventies and eighties regarding who is the oldest to pass his Foundation exam. It gives me great pleasure to announce that my friend George Cross, M3ZXH sat his Foundation exam and passed in January 2008 at the grand age of ninety one years old. To top all of this, George is now ninety three and still races motorbikes! George is very active most evenings on the no nonsense net on 80m (3.7770MHz). I do hope George is the oldest.

RE: LIMITATIONS OF FILTERING

Dave Skye, G3PLR

I read with interest the article on filtering in April's Start Here column. The article was easy to understand and informative, but I picked up on just one point.

In the section titled 'Limitations of filtering', Jonathan talks about using a directional aerial to improve effective filtering by turning it towards the station in which you are interested. However, with most directional aerials the null is much sharper than the maximum, so it is usually more effective to turn the aerial to NULL out the UNWANTED station. This will give a higher ratio of wanted to unwanted signals. This is the same principle used in LF direction finding where the very sharp null gives the direction of hidden transmitter along the axis of the ferrite rod (in conjunction with a 'sense' aerial to determine which of the two possible directions gives the broad maximum).

GREAT SERVICE

Martin, M0CMH

Last July I bought an HF linear amp from Waters & Stanton in Hockley, Essex. I am a disabled amateur operator and medically retired, so money is sometimes a problem. I have been having problems with this amp at home so I took it back to their workshop and Zippy went though the amp with no problems. When I tried it at home the problems came back. Waters and Stanton have been great trying to help me, but after all this time I decided to take the amp back as it was just not working properly for me. I phoned and e-mailed asking about my options and was amazed at the help I received from them. They gave me a full refund of the deposit and cancelled all my finance details for me. I would like other amateurs to be aware of what fantastic customer care they have at Waters and Stanton and I will be back shopping at their store when needed.

ARECIBO EME TRANSMISSIONS

David Barber, G8OQW

Initial reports from Arecibo of an amplifier failure reducing the available power at the feed to around 20W seemed to rule out any chance of hearing signals with my hastily assembled setup. For the first 45 minutes of the scheduled operation I heard nothing but at 1725UTC out of the noise came the unmistakeable sound of CW, which continued to be audible for over an hour.

My equipment is a salvaged 19-element Tonna mounted on a 4ft high tripod feeding an IC-910 via a SB-7000 preamp. This was setup at the bottom of the garden, being the only position from which I could 'see' the Moon for the required period. Azimuth was set with a compass and elevation with a protractor and piece of weighted string attached to the antenna, all adjusted as necessary by hand. Accuracy didn't seem to be too much of a problem, I found anywhere in the general 'ballpark' produced adequate results and at times the signals were just strong enough to be heard without the preamp.

Day two didn't disappoint either. Within minutes there was KP4AO on SSB, not strong but readable. For the first 45 minutes signals averaged about R3 S1 with the odd ping to S3. However as the evening progressed signals improved and for over an hour they averaged R5 S5 with the odd burst to S7.

SSB contacts continued back-to-back until they switched to CW just before 2000UTC and I decided it was too cold to sit in the garden any longer. It was good to hear a number of UK stations complete QSOs, congratulations to them and everyone who made contact.

I hadn't intended to listen on Sunday 18 April but curiosity got the better of me and I wondered if there really was any chance of hearing KP4AO on a handy especially as they were rumoured to be running up to 500W.

Using an FT-817 coupled via a very short piece of coax to a Diamond A430S10R (a

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small 10-element beam modified for handheld use) and with headphones on I wandered outside. Pointing the antenna at the now visible moon I tuned around their frequency where to my utter surprise they were just audible on SSB completing a QSO with PI9CAM, they then went on to call CQ for several minutes with no replies before further stations were worked.

When they switched to CW about 20 minutes later the signal became perfectly readable with little loss of copy although at no time was there any signal strength indication on the FT-817.

So there it was, what had been promised in the lead up to the activity - that it would be possible to hear signals with such a setup - had been fulfilled.

All in all a very interesting weekend.

RADAR RE-ENACTMENT

Bill Purser, G2AXO

Your news item in the May *RadCom* does not stress the vital part radio amateurs played on the original trials 75 years ago.

I was present on that day as a novice G2AXO with my mentor Ray, G3PZ. We heard the aircraft and listened to the reflections. I cycled with our reports and gave them to Arthur Wilkins in the vehicle that Watson Watt had already left.

At the re-enactment I was present again.

WHAT HAPPENED TO ROGER

David Craggs, G3RYP

Ragnar, LA5HE raises a very interesting point. I'm sorry he finds the use of English on the air to have deteriorated. He is not alone. There are several factors at play in the difficulties he experiences.

The general standard of literacy in the UK is not what it was. For example: the possessive of 'it' (belonging to 'it') is its not it's, but half the English-speaking world (including some professional journalists who should know better) is unable to grasp this simple concept. How many know the difference between 'uninterested' and 'disinterested' or 'infer' and 'imply'? How often have you seen 'shouldn't of' when what is meant is 'shouldn't have'? *RadCom* is not free of solecisms (grammatical errors - if you didn't know).

When the attainment of an amateur licence depended upon writing an understandable answer to a question in essay form it was necessary to express oneself in English. Ticking boxes does not require this skill.

For some strange reason (and I suspect it's something to do with CB) many current operators think it is necessary to use an arcane form of language when on the air. This explains the 'QSL' phenomenon and a few more besides. Why, why, why do they have to say 'this side' or 'this way' and why are they unable to form a sentence without using 'there' at least five times even when they mean 'here'? What on earth are 'working conditions'? Can you imagine introducing yourself to a man in a pub with the words 'the personal this way would be Albert'? So why do it on the air?

No doubt everyone will take these opinions as anti Foundation Licence. This is not the case. I write out of love for the English language and I'm ashamed that it takes a Norwegian to point out how badly we abuse it.

Tim Jebbett, GW0GPZ

I was interested to read Ragnar Otterstad's comments in the May issue's Last Word column concerning the misuse of Q codes by amateurs these days. I was reminded of an amusing incident I overheard one evening. One operator apparently heard another attempting to break in to the contact. His answer went thus: "the QSK, can you QSO, QSL?" At this point I picked myself up off the floor where I'd collapsed in a heap of laughter and switched the wireless off!

DX CODE OF CONDUCT

H Wood, G7NAL

Reading the May issue I came across the letter regarding the DX Code of Conduct. I agree 100% with the author but I think the culprits are in the minority. I have yet to hear a UK operator break *all* these rules even in pile ups and contests. But the Code is just what we need on the HF bands.

The main thing I object to is operators tuning up on the DX frequency. It is frustrating not only to QRP stations but to stations who run 100 watts and who can't increase their output power for various reasons.

I wish you luck gentlemen and I am sure all *RadCom* readers will adhere to the 'rules'. If so, that would be a great start and I hope other countries will abide by them.

HEALTH & SAFETY

Martyn Vincent, G3UKV

A bit of timely H & S advice is offered to readers. Having just put up a brand new 5-element Eagle Yagi for 50MHz recently, I was carefully monitoring the sections of the Versatower extending as I slowly wound the winch mechanism, to ensure none of the numerous wires and feeders tangled with each other. It was about two-thirds extended (about 45ft high) when I chanced to look around at a wider field of vision, and what I saw is shown in the accompanying photos. Apart from some surprise, I mused about what textbooks offered in the way of advice for ladder feeds - could this be a novel approach that others may wish to emulate? Anyway, I thought I should investigate, so carefully reversed the winch, and eventually my step ladder inverted itself and returned to earth, or more accurately into a blossoming red-currant bush. Where can I buy a good hard hat?

L: Antenna ladder feed at QTH of G3UKV.
R: What goes up must come down!

ICE WINS

Bill Ferguson, GM4AGL

Regarding G3VLF's 'Ice Wins' letter, this was my experience.

On 3 January, having just finished a QSO with V51AS on 17m I noticed that my Butternut vertical seemed to be lying at an odd angle. Despite my various attempts at waterproofing the joints, this is what I discovered.

The 2ft base section had been full of water, which subsequently froze. This left a column of solid ice, which expanded and pushed the top 23ft of the antenna up about 4 inches and out of the base tube. The retaining jubilee clip was still tight, but the force of the ice was strong enough to displace the top sections of the antenna. The antenna is self supporting but fortunately I had secured it to my shed using cable ties otherwise the whole lot would have come down with an almighty clatter (despite the ice, as you can see it still had metal to metal contact). I have since drilled a small drain hole!

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GAP Antennas
HF Verticals for DX

Challenger-DX 8-band HF-VHF
• Bands: 80, 40, 20, 15, 12, 10, 6, 2m • 2kW PEP SSB • VSWR: Better than 2:1 • Height 9.6m (31.5ft) • Radials 3x 7.6m (25ft) • Can be mast mounted • Weight 8kg **£299.95 D**

Voyager-DX 4-Band LF
• Bands: 160, 80, 40, 20m • 2kW PEP SSB • VSWR: Better than 2:1 • Height 13.72m (45ft) • Radials 3x 17.4m (57ft) • 2ft ground pivot assembly inc • Weight 13.6kg **£399.95 D**

Eagle-DX 6-Band
• Bands: 40, 20, 17, 15, 12, 10m • 2kW PEP SSB • VSWR: Better than 2:1 • GAP centre fed • Height 6.4m (21ft) • 2m (80in) 3 x counterpoises • Weight: 4.9kg **£339.95 D**

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

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AT-100proII NEW	Desktop tuner covering all frequencies from 1.8-54 MHz	£199.95
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As reviewed by Steve White in Radcom
"A real bargain when compared to its obvious USA competitor" "Well built & performs impressively"
Steve White, Radcom November.

MyDEL CG-3000

ML&S: £289.95

With 200W and 200 memory channels.

- Tunable frequency: 1.8 - 30 Mhz with long wire antenna from 8 meters
- Input impendence: 50 ohms
- Input power: 10 - 200W PEP
- SWR: <2:1
- Power supply voltage: 12V +/- 10%
- Current consumption: <0.8A
- Auto tuning time: Approx. 2 seconds (first time tuning)
  Less than 1 second (return to memory frequency)
- Memory channels: 200
- Weight: 1.8 KG
- Size: 310 x 240 x 72mm (L - W - H)

NEW! Remote control for the CG-3000 and CG-5000. £39.95

CG-3000 shown with optional remote switch.

CG-5000MkII

At last! 600W PEP High Speed Remote Tuner from MyDEL

Specifications:

- Tuneable frequency:
  1.8 - 30Mhz with long wire antenna from 8 meters
- Input impendence: 45-55 ohms
- Input power: 10 - 600W PEP
- SWR: <2:1
- Power supply voltage: DC 13.8V
- Current consumption: <1.5A
- Memory channels: 800
- Auto tuning time: 0.5-6 seconds (first time tuning), less than 0.2 second (return to memory frequency)
- Weight: 3 Kg.
- Size: 385mm x 280mm x 110mm (L - W - H)

ML&S: £559.95

Palstar

NEW SHIPMENT JUST ARRIVED!

New! Palstar AT-2KD.
Replaces the AT-1KP & AT-1500DT.
160-6M 2kW. ML&S: £429.95

New!
Palstar Commander HF-2500 1.5kW Amplifier

Palstar are pleased to announce a new range of HF Linear Amplifiers built to the highest standard. We have started with the "Commander HF-2500" which is available from stock. The 2m & 6m versions will be available during early 2010. ML&S: £3499.95

AT-500 600W PEP Antenna Tuner ..... **Special Price £349.95**
NEW AT-Auto Now handles a massive 1500W **£1099.95**
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DL-1500 (1.5KW) **£119.95**
DL-2K (2kW) **£229.95**
DL-5K (5kW) **£349.95**

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Palstar R30A, fitted Collins filters for SSB & AM **£649.95**

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SP30 Matching Desk Speaker **£69.95**
AA30 Active Antenna Matcher 300kHz-30MHz **£109.95**

PALSTAR AT-500 600 Watt PEP Antenna Tuner

Covering 160 to 6 Meters, the AT-500 features a differential tuning capacitor with 2 stators and 1 rotor, a precision ceramic body roller inductor, and a 4:1 ferrite current balun for balanced line feeds.

The AT-500 utilises only 2 controls to operate for tuning, providing maximum ease of use in a manual tuner. A small-sized roller inductor operates all the way up to 6 Meters, while a relay-switched add-on inductor allows 160 Meter operation. The AT-500 also features Pastar's active Peak and Peak Hold dual cross-needle metering, chem-film treated aluminum metalwork and durable powder coated finish on the front panel and top cover. You'll have a tuner that will grace your shack for years to come.

ML&S PRICE: £349.95

PALSTAR AT-2KP 2000 Watt PEP Antenna Tuner

A newly-designed, smaller roller inductor allows the AT2K to tune 6 Meters, while a relay-switched toroid adds the extra inductance needed for 160 Meter coverage. Newly designed capacitors feature lower minimum capacitance for improved high band performance, while maximum capacitance has been increased to 400pF for better low band performance. In addition, the Peak/Peak Hold metering from the PM2000 has been incorporated into the AT2K.

ML&S PRICE: £459.95

PALSTAR BT-1500A Balanced Antenna Tuner

The BT1500A is a dual-roller balanced L antenna tuner that fills the void for a matching network up to 1500 watts pep for balanced line antennas. For ease of use the BT1500 utilises only 2 controls to operate for tuning with two direct-coupled precision ceramic roller inductors.

ML&S PRICE: £579.95

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