RadCom

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

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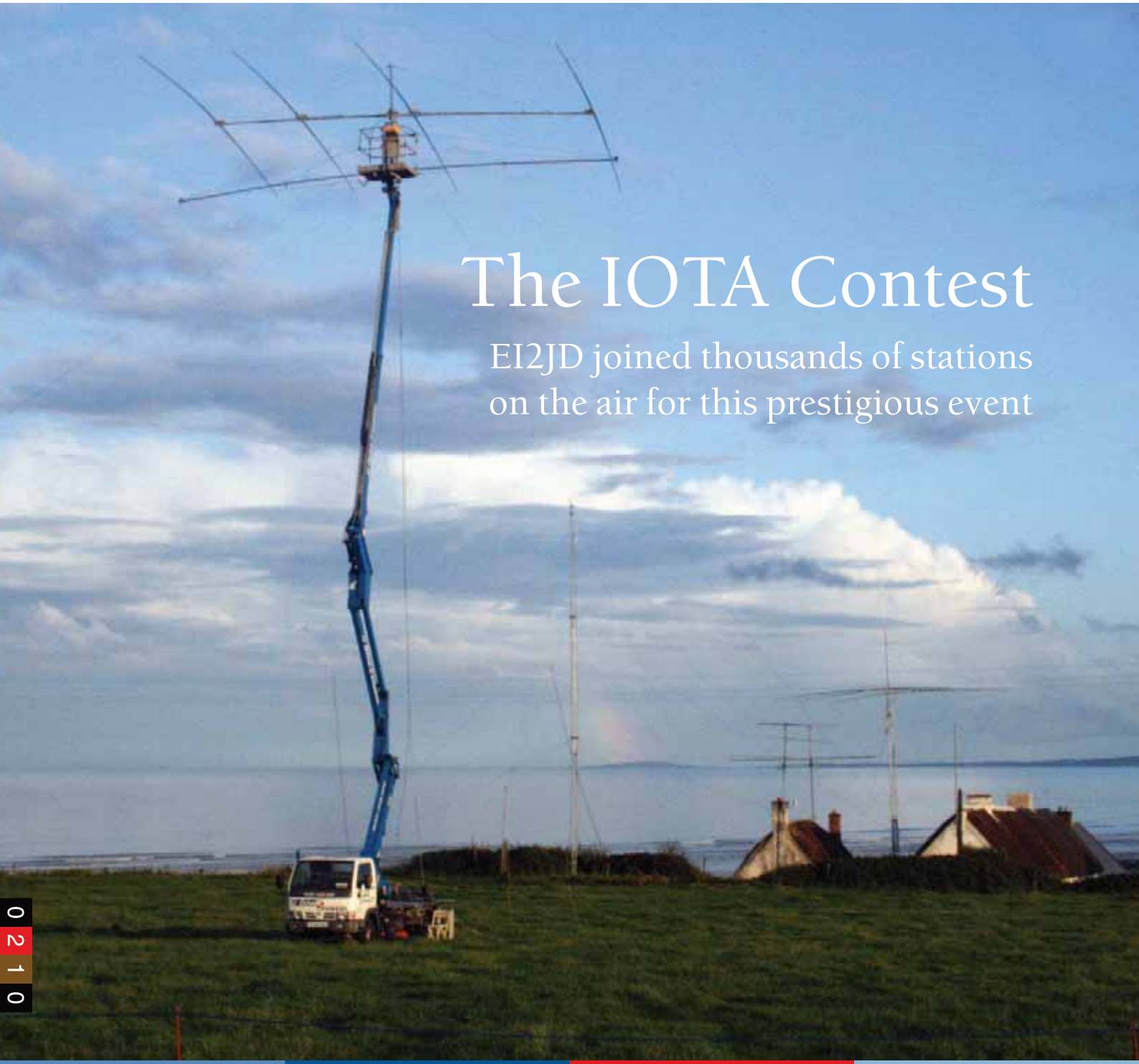

The IOTA Contest

EI2JD joined thousands of stations on the air for this prestigious event

0210

G6PZ

Visiting the Icom-sponsored G6PZ contest station

Homebrew

The MF receiver project continues

136kHz Tx Review

New Japanese LF Tx comes under the microscope

DIY D-Star

A fully-homebrewed, G2-connected D-Star repeater

WATERS & STANTON

SCOTTISH STORE • W&S @ JAYCEE, 20 WOODSIDE WAY, GLENROTHES, FIFE, KY7 5DF - CLOSED MONDAYS
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Flex-3000 *Amazing HF Box*

160m - 6m 100W All Modes Transceiver - Auto ATU

FlexRadio Systems

This is a complete software defined transceiver that connects to your PC via Fire wire. It offers performance that outperforms transceivers costing three times the price. Plug into PC (Windows), load the software, plug mic & antenna into Flex-3000 and you will experience the most amazing receiving and transmitting performance together with a screen display and flexibility others can only dream about!

£1395 D

KENWOOD *No VAT Increase 'til February!*

Classic Base Transceivers - UK's Largest Dealer

TS-2000

Independent reception on 2 bands with a VHF sub band 118 - 174MHz, built-in automatic ATU, built-in TNC for DX alerts, extensive DSP processing and magnificent selectivity. This really is the DC to light rig.

TS-2000 £1479 D
TS-2000X £1745 D

TS-480

The compact TS-480 comes in two flavours, both covering 1.8 - 54MHz. The "SAT" is 100W with built-in ATU and the "HX" is 200 Watts version. without atu. And remember, 200 Watts gives you a 3dB gain over the traditional 100 Watts. That's almost like having a 2 element beam!

TS-480SAT £749 D
TS-480HX £849 D

ICOM

Whether you are looking for a basic HF radio, or the top range IC-7800 transceiver, we can offer the best deal. We really do have the UK's largest stock (fact not fiction!) and the best PX deals, even on your dead old "boat anchor" radios! Give us a call today for a chat and a deal!

IC-7800	Flagship radio 200W 1.8 - 54MHz	**£6599 D**
IC-7400	100W HF - 2m w. large display	**£1329 D**
IC-7000	Great HF-UHF 100W mobile	**£939 D**

The Amazing IC-7200 HF - 6m Transceiver

This is one of Icom's latest radios. An eye catching design with rugged construction and superb ability. **£759 D**

IC-718	100W 160m - 10m	**£449.95 D**
IC-706	100W HF - 70cm up to 100W	**£739.95 D**
IC-7600	100W HF- 6m	**£3365.95 D**
IC-7700	100W HF- 6m Advanced design	**£4999.95 D**

The **IC-7000** is one of the most remarkable radios. It packs a lot of punch into a very small box, yet is full of features. When you consider it covers 160m -70cms and has a large LCD display, it really is remarkable. It is equally at home as base, mobile or standby radio. Check it out!

No VAT Increase 'til February!

FREE 3 Year Warranty!

We are offering a FREE 3 Year Warranty on ALL NEW ICOM, YAESU & KENWOOD HF Tranceivers!

Making now a great time to buy!

Good Times!
It is a great time to buy your gear at W&S - the UK's largest ham radio dealer by far.
FREE WARRANTY - NO VAT INCREASE - GREAT PX DEALS

YAESU

FT-450

£589 D

The most cost effective answer to those wanting HF to 6m. It really is a great package. Many advanced features are included in this radio. Don't be mislead by the price! The basic version has no auto ATU.

FT-450AT As FT-450 but with auto atu built-in **£679.95**

FT-2000

FT-2000	100W HF - 6m 12v DC	**£1899 D**
FT-2000D	200W HF-6m inc AC PSU	**£2399 D**

FT-817ND *SPECIAL OFFER!*

£439 D

The FT-817 is a real classic. All bands in a rig that fits in your brief case. More people own one than any other rig!

W&S EXCLUSIVE OFFER!
This month FREE with FT-817, is the Mini **PS-122** 2.2Amp travel supply - runs rig at full 5 Watts

FT-950

£1099 D

The FT-950 is proving to be a great success. Firmly based around the FT-2000, many enthusiasts are waking up to the fact that this is one very serious radio that offers amazing performance from 160m to 6m. 3 year warranty, great PX + no VAT increase!

Why Buy your FT-2000 from W&S?

- *We are Yaesu UK's largest dealer. That means more customers shop at W&S, which means they like our deal prices and our service.*
- *We offer great part exchange deals. Even if you have some really old ham gear - perhaps not working - we will consider it. Junk to cash!*
- *We offer FREE 3-year warranty which gives you peace of mind.*
- *We give the best package deals. So if you want a load of accessories - Yaesu or otherwise - we can offer you an attractive deal.*
- *Our fast turnover means you get the latest models, the most recent serial numbers and the most recent firmware updates.*

VX-8E *NEW*

Triple Band

The VX-8 is another Yaesu first. APRS and Bluetooth, plus waterproof housing make this a "must have" radio. A barometer is included, plus GPS option and you have dual simultaneous receive.

£379 D

No VAT Increase 'til February!

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

Orderline

01702 206835

Online Catalogue

www.wsplc.com

UK's Lowest Prices

Zero Deposit
Zero Interest

Now In Stock! TX-2200A

NEW

136kHz 100W CW Transmitter

If you are looking for a new challenge or already into LF communications, this new product from Japan could be just the answer. Up to 100W of VFO controlled CW from 135.8 - 137.5 kHz. Beautifully engineered. Another exclusive from Waters & Stanton.

£689.95 D

Tokyo Hy-Power HL-45B

HF/6m linear amplifier
1.8-28.00 & 50MHz
5W in 45W max out

£469.95 D

FAST SAME DAY DESPATCH SERVICE!
Orders must be received before 3pm.

Yaesu
Portable HF Transceivers

Yaesu Warning!
Yaesu equipment on sale at lower prices is thought to be sourced outside the UK - So ***NO*** 2 Year Yaesu Warranty. W&S ***only*** sell with UK Yaesu.

FT-857D
SPECIAL OFFER!

HF/6m/2m/70cm all mode 100W transceiver

Was £569
Now £549

FT-897D
SPECIAL OFFER!

HF/6m/2m/70cm all mode portable 100W transceiver inc TXCO

Was £659
Now £629

Icom
VHF/UHF Mobile/Handy

IC-E208 Dualband Mobile

*Freq range 144-146MHz, 430-440MHz Tx
*55/50W (3 pwr steps each band)
*Wideband Rx 118-173, 230-549 & 810-999MHz

£254 D

IC-910H £1239 D
2m / 70cm 100W Base station all modes with option for 23cm module (UX-910 £359)

IC-910HX £1439 D
As above but with 23cm module ready fitted and a big saving as well.

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

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

IC-E90
6m / 2m / 70cm Handheld Transceiver.

£232 C

Yaesu
VHF/UHF Mobile/Handy

FTM-10SE Dual Band Transceiver

NEW

W&S £269 D

FTM-10SE Motor Sport Radio -
50/40W design with optional Bluetooth, receiver coverage from 0.5-800MHz, PA system, Stereo radio capability

FT-7800E

Dual Band Mobile
*2m/70cms
*50W
*Wide receive inc. civil & military airband
*CTCSS & DCS
*Detachable front panel

£189 D

FT-2800M £124 D
*2m FM Mobile transceiver *High power 65W *Capable of VHF wideband receiver

FT-8800E £289 D
*2m/70cm Dualband FM Mobile transceiver *50W 2m, 35W 70cm *Wideband receiver

FT-8900R £334 D
*2m/70cm/6m/10m Quadband FM Mobile transceiver *Independent dial for each band

FT-1802E £119 D
2m 50W FM Mobile DTMF Mic 138-174 RX

VX-3E

2m / 70cm, wide Rx, Lithium cell.
*Wideband Rx
*Built-in AM Ant.
*SW Broadcast
*Stereo FM
*Lithium Cell

£139.95 D

VX-7R (Black or Silver) £259 C
Wide freq. coverage 500kHz-900MHz

VX-6E £199 C
2m/70cms, 5W Wideband Receive

FT-60E £142 C
2m/70cms, 5W Wideband Receive

VX-170 £95 C
2m 5W handheld with 16-key pad

Kenwood
VHF/UHF Mobile/Handy

TM-V71E

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

£289 D

TM-271E

2m FM 60W Mobile Transceiver. MIL-SPEC DTMF Mic. Built-in CTCSS & DCS encoder / decoder.

£165 D

TM-D710E

Kenwood's new mobile FM station is Great! APRS, Builtin TNC DTMF Mic and Weather Station ready.

£429 D

TH-F7E

• 144-146MHz Tx/Rx: FM
• 430-440MHz Tx/Rx: FM
Up to 6W out with Li-ion battery and **"scanner" style coverage from 100kHz to 1300MHz** including SSB on receive!

£229 D

TH-K2E 2m 5W FM £159 D

TH-K2ET 2m 5W FM £165 D

TH-K4E 70cm 5W FM £159 D

BUY NOW PAY LATER AT BOTH STORES

AVAILABLE ON ALL SALES OVER £200

On most items over £200 in value it is now possible to buy with a finance agreement and pay nothing for 12 months without incurring ANY interest charges. If paid in full within 12 months then a £29 settlement fee is payable. **Typical example** of Buy Now Pay Later: Cash price - £600. Pay no deposit and pay the full amount in 12 months. **Pay no interest – just £29 fee OR - 29.8% APR** - Then repay £30.85 per month for 36 months. No settlement fee. Total amount due £1110.60. Interest is calculated from date of agreement. All finance is subject to status – written quotation on request.

NEW

WATSON

W-2001

Internet Wireless Weather Station

- *5-day Forecast*
- *Date & Time*
- *World Weather*
- *Backlit LCD*
- *Wireless Link*
- *PC Dongle*
- *Outdoor Sensor*

The W-2001 gives a 5-day forecast for anywhere in the world! The clear LCD screen is wireless linked to your PC via a dongle. Just press the LCD screen panel command and it will interrogate your PC, display and store the results on the wireless linked weather display panel. So you can monitor your local weather trends directly and see an accurate 5-day forecast.

Just £49.95 C

Tigertronics
SignaLink SL-1

Compatible with most soundcard programs
- *No serial port required*
- *USB self-powered*
- *Aux output for speaker*
- *Adjustable Rx & Tx levels*
- *Variable transmit delay*
- *Optional leads for different rigs*
- *Accessory kit available*

Just £69.95 C

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

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HEIL SOUND

We are pleased to be appointed Sole UK Distributors!

Meet The Proset

The Proset is a combined headset and adjustable boom microphone offering hands-free, clutter-free operation. It comes with choice of mic capsule. NC-5 is for normal use whilst NC-4 gives treble boost for DX SSB. You will need to purchase an additional matching lead for your radio. These carry the series code: AD-1 and there is one to suit any ham radio transceiver. Each lead has a PTT input for optional PPT switch. Otherwise use VOX or MOX switch on your radio.

Proset-4 & 5

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

£119.95 C

For Icom transceivers, choose the Pro-Set-IC with "Icom" Element £132.95

Proset-Plus

With the Pro-set Plus you have the benefit of dual NC-4 / NC-5 mic capsules that can be selected. Requires AD-1 patch lead.

£189.95 C

Pro-Set-PLUS-IC Icom Element £199.95

AD-1 Connector Leads

There's one to suit any ham radio rig. Just let us know you radio. **£16.95 A**

Mic. Bases

CB-1 (H)
Designed to take all hand and stick mics. **£46.95 C**

CB-1 PTT
As above but with PTT built-in. **£62.95 C**

Quiet Phone Pro

The new Quiet-Phone is a well padded and super noise cancelling headset. The boom mic (MB-1) shown is an optional additional attachment. See below.

£159.95 C

MB-1-4, 1-5 & 1-6

The MB-1 series of attachments comprise a screw-on boom mic. for the Quiet-Phine Pro. The last digit denotes the "NC" insert capsule. The NC-6 is a new capsule choice and is midway between NC-4 & NC-5. **£79.95 C**

Traveller Series

These are intended for use for portable or mobile. The HTSS has a single earpiece, whilst the HTDS has a dual earpiece. Both have boom mics. The cable has an in-line PTT switch and an up/down frequency selector. The latter only works with equipped radios. You will need to purchase the matching HSTA lead to suit your radio.

HTDS £84.95 C
HTSS £69.95 C

HSTA Adaptors £23.95 A

These are purpose made adaptors for the Traveller series above. Quote your radio model when ordering.

Quality Base Mics

PR-781

A high quality microphone for the discering ham, designed by Heil to excel Requires CC-1 cable kit for rig. **£136.95 C**

GM-4 & 5

These "Gold Lime" mics contain the NC-4 or NC-5 capsule. Can be handheld or mounted on a stand (clip supplied). Requires CC-1 cable kit for rig.

£119.95 C

HM Compact Handy Mics

A range of compact high quality microphones that can be hand-held or mounted with the supplied stand holder. Require CC-1 cable kit

HM-4 & 5 **£79.95 C**
These have the "NC" series capsule inserts for SSB

HM-Pro **£79.95 C**
A more traditional dynamic insert, great for FM use.

HM-PRO-Plus **£84.95 C**
Recomended for those who want studio quality.

CC-1 Cable Kits - there's one to match avery ham radio rig. Just tell us the radio you need it for. **£29.95 A**

WATSON

Multi-Ranger Mobile / Portable Whips

The Watson Multirangers offer great performance at great value. Use mobile on our 3-way magnetic mount for easy mobile or mount on ground via a suitable SO-239 base with radials.

Quick low loss band changing is achieved with the wander plug system and fine tuning is taken care of with the upper telescopic whip. Choose from two models.

Multi-Ranger-9

A 9-band whip approx 1.9m high with PL-259 base. Handles 125 Watts and covers the bands, 80m, 40m, 20m,15m, 10m, 6m, 2m, 70cms and VHF airband.

£39.95 D

Multi-Ranger-200

A 10-band whip approx 1.9m high with PL-259 base. Handles 200 Watts and covers the bands, 80m, 40m, 30m 20m,17m, 15m, 12m, 10m, 6m, 2m.

£59.95 D

W-300S Mag Mount

The quick way to go mobile. No holes needed. Fitted with SO-239 socket, it comes with RG-58 coax terminated in PL-259 plug.

£39.95 C

FC-130
Frequency Counter

SPECIAL SALE ITEM

- *1MHz-3GHz*
- *Impedance 50 Ohms*
- *LCD readout*
- *10-digit display*
- *16 segment bargraph*
- *BNC Whip Antenna*
- *Black anodised case*
- *1MHz-3GHz*
- *Impedance 50 Ohms*
- *LCD readout*
- *10-digit display*
- *16 segment bargraph*
- *BNC Whip Antenna*
- *Black anodised case*

The Watson FC-130 Frequency Counter has an extended range that covers a respectable 1MHz to 3GHz. It has a clear 10-digit LCD readout providing very accurate frequency readings, a 16-segment bargraph signal strength meter and low battery indicator. You will find the sensitivity more than enough for off-air readings using the telescopic antenna included in the package. Built-in Ni-Cds operate up to 6 hours and are rechargeable through the external charger. Supplied complete with harger and telescopic whip.

£69.95 C

WR-5001
Auto FM Scanner

SPECIAL SALE ITEM

This nearfield receiver locks automatically and instantly on to any FM signal within its frequency range. FM signals are output through its internal speaker or to an external earphone. The SKIP button enables it to resume its search. Its high sensitivity to nearfield signals makes it ideal for RF security, counter surveillance and radio communication testing applications.

- *Frequency range: 30 - 900MHz*
- *Modulation: FM • Deviation: < 100kHz*
- *Sensitivity: < -53dBm at 500MHz*
- *Squelch: Adjustable*
- *Squelch indicator: Displays signal reception*
- *Antenna: 50 Ohms (BNC)*
- *Audio: Built-in speaker, ext. 2.5mm earphone jack*
- *Case: Stamped alloy with black anodised finish*
- *Power: Internal 5 x AA 600mAh Ni-Cad Pack (5Hr)*
- *Size: 100 x 68 x 31mm*
- *Weight: 280g*

£59.95 C

RadCom

THE RADIO SOCIETY OF GREAT BRITAIN'S MEMBERS' MAGAZINE

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

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RSGB MEMBERSHIP – Annual Rates

Full membership . . . . . £48.00 (individual & club)

Family membership £57.00

Paying by Direct Debit saves £4 on the rates above.

Student (21-25) . . . . . Free

Ham Club (under 21) . . . . . Free

Subscriptions include VAT where applicable. Special arrangements exist for visually impaired persons. Details and membership application forms are available from RSGB HQ.

P&P on RSGB orders:
£1.95 for 1 item, £3.50 for 2 or more items. Overseas rates on request.

EI2JD fielded an impressive antenna farm for the 2009 IOTA Contest.

Photo: EI2JD.

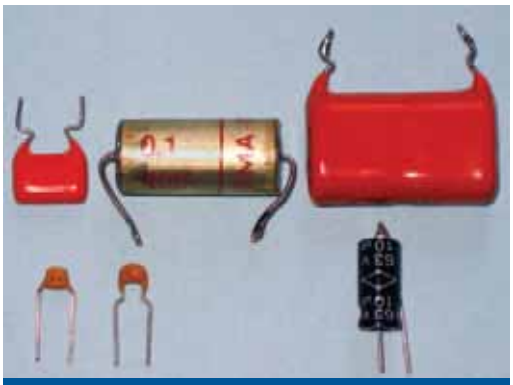
News and Reports

Report from contest station G6PZ. See P64.

Reviews

Features

Technical Features



Power supply decoupling capacitors. See P80.

Regulars

The new Marconi Basic-7 QRP transceiver. See P68.

RADIO SOCIETY OF GREAT BRITAIN

THE NATIONAL SOCIETY WHICH REPRESENTS UK RADIO AMATEURS

Founded in 1913 incorporated 1926.
Limited by guarantee
Member society of the
International Amateur Radio Union

Patron: HRH Prince Philip, Duke of Edinburgh, KG, KT

Membership is open to all those with an active interest in radio experimentation and communication as a hobby. Applications for membership should be made to the Subscriptions Department from which full details of Society services may also be obtained.

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Peter Kirby, FCMI, MISM, G0TWW
Honorary Company Secretary:
Rupert Thorogood, G3KKT
Honorary Treasurer:
Dr R Dingle, G0OCB

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Dave Wilson, M0OBW

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I Phillips, G0RDI
B Reay, G8OSN
J Stevenson, G0EJQ

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H Scrivens, G0UGE - Region 4
T Bailey, M0KMB - Region 5
M Harper, MW1MDH - Region 6
J Sneddon, MW0EQL - Region 7
P Lowrie, MI5JYK - Region 8
A Johnston, G8ROG - Region 9
G Keegan, G6DGK - Region 10
P Helliwell, G7SME - Region 11
P Brooks, G4NZQ - Region 12
J Stevenson, G0EJQ - Region 13

Details of the Society's volunteer officers can be found in the RSGB Yearbook and on the RSGB website.

The above details were correct at the time of printing, 11 January 2010.

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Log-in using your callsign in lower case as the user name, and your membership number (see *RadCom* address label) as the password.

The online *RadCom* can now be found at www.rsgb.org/radcom.

RSGB Band Plan 2010

It has become the custom to reprint the band plan in the February issue of *RadCom*, as well as in the *RSGB Yearbook*, in order to keep members aware of them, see pages 23 – 27. Since the last print in the February 2009 *RadCom* there have only been minor amendments and additions – corrected the QRP frequency on 17m band to 8086kHz and the addition of the 51.510MHz FM calling frequency. However, it is possible that some further changes might be implemented during 2010, particularly in the VHF, UHF and microwave bands a few months after the IARU Region 1 Interim Meeting in February.

Members will recall that this time last year we announced the so called 'new' band plan for 40m that took account of the additional 100kHz of spectrum gained from WRC-07. The new 40m band plan came into force on 29 March 2009, a date timed to coincide with the new schedule for the broadcasters. During the year HQ has received correspondence concerned at the lack of adherence to the band plan, where people have observed that some data mode and SSB operation hasn't moved up from the segments previously allocated for these modes. The suggestion has been that we need to do more to publicise the new plan for 40m. Thus, please make yourself aware of the 40m band plan and show good operating practice and consideration for users of other modes by operating in the appropriate part of the band whenever possible. Changing the 40m band plan was not seen by Region 1 as an easy transition since a number of countries have yet to implement the WRC-07 extension to the amateur band agreed in late 2008. As an example of this, at the time of writing, French amateurs are still awaiting access above 7100kHz. In addition it was foreseen that it would take several years for the band plans in Regions 2 and 3 to harmonise with ours, as each Region would need to wait for their Region's triennial General Conference to discuss the matter. Hopefully, before too long all countries and regions will be harmonised with the change and annoyance over adherence will be a thing of the past; meanwhile please do your best to operate appropriately and help smooth the transition.

Repeaters

The RSGB Emerging Technology Co-ordination Committee has indicated that putting up and maintaining a repeater may soon become more complex as the criteria for processing repeater applications will be tightened. Against the backdrop of low activity levels and poorly performing repeaters, the need to justify new applications is likely to be enforced to a far greater extent. Long term non-operational repeaters, repeaters licensed but failing to commence service and repeaters nominally operational but widely reported as being either deaf or inaccessible for other reasons have become all too prevalent. The recent interest in digital modes, in particular GMSK, has been a welcome boost to the repeater sector of the hobby, but challenges to amateur use of bands above 2m is likely to require even greater proof that we 'need' and value these bands and to support our Society in seeing off commercial interest in 70cm and above. The focus on radio spectrum is going to intensify in the coming decade; we radio amateurs have to be seen to have our house in order and make good use of the valuable bands at our disposal in the so called 'sweet-spot' of the radio bands.

If you would like to comment on this matter, there is a place for views at www.ukrepeater.net/index.html.

Attention G4N's…

Mike Musgrove, G4NVT, QSL sub manager for the G4N series of callsigns is stepping down and his call series is being combined with the G4M group, under the management of Cliff Rowe, G4MAR. The Society would like to thank Mike, G4NVT for his long service to his fellow amateurs and advise all G4N's that all outstanding cards and envelopes have been transferred to the new sub manager. Mr C G Rowe, G4MAR, 29 Lucknow Road, Willenhall, West Midlands WV12 4QF. E-mail g4mar@blueyonder.co.uk.

Details of the changes are available in the members area of the RSGB website QSL section.

Members' Ads free from March

It has been decided to encourage submission of Members' Ads by e-mail and, to this end, the Society is waiving charges for Members' Ads submitted to memads@rsgb.org.uk. Terms and conditions apply; see page 89 for details. Postal submissions will still be accepted, subject to an £5 administration cost, which is less than the current minimum charge. However, during the transitional period from 8 January to 1 March, charges will also be waived for postal submissions.

Are We Ready?

By RSGB General Manager
Peter Kirby, G0TWW

I'm sitting in a nice warm office writing this 'Leader' when outside the roads are covered in ice and the snow is starting to fall again! We are told we are in the grip of the big freeze, the longest spell of cold weather for at least 30 years. People are panic buying in the supermarkets, there is a shortage of grit for the roads and there is a general feeling within the country that we were not prepared for it. Not prepared nationally, not prepared locally and not prepared on a personal level.

Why am I starting with this statement? Because as I sit here I am wondering whether we radio amateurs were, as a community, prepared for it? Right across the country people are cut off, electricity supplies have failed, food supplies and provisions can't get through to rural areas. Some time ago the RSGB tried to carry out an audit of RAYNET capability across all RAYNET groups within the United Kingdom. At the time this was viewed with great misgivings in certain quarters. I know not why, because had that audit been completed and we had a national view of capability, now would have been an ideal opportunity for the RSGB to offer amateur radio services to government and local authorities, not just in isolated pockets across the country as is the case today, but at a truly national level.

In adverse weather, communication is a key element of survival. The mobile phone is much in use and the networks become overloaded. It is in times like this when the true worth of amateur radio can be proven.

Some time ago I had discussions with a radio amateur who serves on the National Contingency Committee. He advised me to tell all RAYNET groups that the best piece of kit they could equip themselves with was their own generator. Why? I asked, and he said it was because the local authorities no longer maintain standby generating power. The responsibility now lies with the power companies and, sure as eggs are eggs, when the time comes the plans will be found wanting. This happened recently in Bedfordshire when a large village was without electricity or communications for over 48 hours because the power company concerned had no plans or provisions to cope with an emergency. Sadly also in that particular part of Bedfordshire where the incident occurred there is no RAYNET cover, so if asked we couldn't have helped anyway.

Radio amateurs across the board have a role to play in the community. RAYNET is a special interest group within the hobby, but in recent times RAYNET groups have found it hard to recruit new and younger members and, because of this, groups are suffering. Their members are getting older and, in some cases, the groups are disappearing altogether. If, like me, you are sitting in the warmth of your office or sitting room at home, think of those folk who are not so lucky, and are stranded without heat and food or communications. Could we help? Could we get off our bums and volunteer our services to our local RAYNET group? Could we, as a community, grow RAYNET so that it does become the truly national facility it should be? If there was a will I am sure we could. So, the next time there is a big freeze – be it four or forty years hence – will we be ready?

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.

2E0AYA	Mr S G Page
2E0AZD	Mr F G Russell
2E0BCD	Mr B J Grice
2E0CTM	Mr C T Meaklin
2E0DJB	Mr D Burden
2E0KEI	Mr K Hastings
2E0KYI	Mr K Armstrong
2E0MRP	Mr M Peters
2E0PLY	Mr D Hensman
2E0RAO	Mr R Thomas
2E0TKY	Mr S J Potter
2E1AXI	Mr F R Preece
2E1FFJ	Miss R Dennis
2E1RED	Mr R Edmondson
2I0BIQ	Mr K Blake
2W0RMR	Mr M R Manley
AE2M	Mr B F Blake
EA3GEG	Mr J Pons
EA3NJ	Mr JBS Bertran
EA4ERL	Mr I B Villa
EA4FSL	Mr AJS Lobo
EC3DR	Mr FAM Bayon
EI2BB	Mr J R Bartlett
EI6AG	Mr A Barrett
EI6FZ	Mr D Flanagan
G0DLC	Mr K J Symonds
G0DLW	Mr J B Goldsmith
G0FEV	Mr E D Kittrick
G0FZN	Mr F Rogers
G0IYH	Mr A J Healless
G0JZT	Mr J F Chappell
G0KCC	Dr W L Randolph
G0LIQ	Mr J G Cunningham
G0LYG	Mr F A Aris
G0NCQ	Mr M Hemmings
G0PVT	Mr D C Henderson
G0RFM	Mr J H Copplestone
G0SIF	Mr K A Pattenden
G0UCC	Mr M Sayegh
G0UGD	Mr N Boyd
G0VJK	Dr MJE Stanton
G0VNV	Mr E Troughton
G0VYB	Mr T J Cleghorn
G0WGH	Mr J G Edwards
G0WJH	Mr JA Kemp
G1AAG	Mr A Withers
G1BCE	Mr B J Brough
G1CEO	Mr RG Day
G1DEZ	Mr P G Baxter
G1DKA	Mr W J Harris
G1FCW	Essex CW ARS
G1HMT	Mr G Gray
G1MVE	Mr G A Tither
G1NRL	Mr S P Allum
G1OBD	Mr R B Weston
G1SMT	Mr CSR Manning
G1VBY	Mr K Moreton
G1VSM	Mr D W Pratt
G1VVL	Mr A E Proctor
G1WRU	Mr J V Jinks
G1YLG	Mr A Hodkin
G1ZIM	Mr S A Agnew
G3HLN	Mr P B Woods
G3RVP	Mr A Mothersdale
G3RXA	Mr J Thomas
G3SYX	Mr R Irving
G3TBF	Mr H K Wilkins
G3UCT	Brig M G Taylor CBE
G3UZW	Mr R V Andrews
G3YZZ	Mr K G Beverstock
G4AWW	Mr N W Shepherd
G4BMU	Mr S East
G4BVI	Mr GA Chenery
G4DCH	Mr C Tucker
G4EHK	Mr D J Goulbourne
G4ESG	Mr D J Neal
G4ETP	Mr T Pinch
G4FMO	Mr C M Palmer
G4FRM	Mr P V Hill
G4GJB	Mr G J Bond
G4GWC	Mr R Young
G4HWV	Mr T W Wiles
G4KNV	Dr D J Wilkinson
G4LQY	Mr P Williams
G4NCP	Mr M Carver
G4NKX	Mr P C Digby
G4NVA	Mr J R Dyke
G4NXL	Mr M D Street
G4PTW	Mr A N Brunning
G4TBG	Mr D F Smith
G4UQE	Mr T J Fitzgerald
G4UXS	Mr L M Moore
G4WWH	Mr P E Pavelin
G4WXG	Mr C M Lees
G4XDC	Mr M Taylor
G4XKK	Mr K D Burston
G4ZAD	Mr G L Kitson
G6EVX	Mr A E Wood
G6EZH	Mr S Pepper
G6GJV	Mr D Willis
G6IOE	Mr G I Crawford
G6ITH	Mr C D Jones
G6IVS	Mr P Brockway
G6KJH	Mr P J Horobin
G6KPX	Mr A C Thorne
G6MJM	Mr S Parker
G6NFR	Mr R L Foden
G6OAS	Mr A W Inglis
G6OXP	Mr D C Doody
G6PHH	Mr P H Dickens
G6UZR	Mr A M Brown
G6YBV	Mr S Hunt
G7FXZ	Mr G E Hodgetts
G7GPL	Mr N Giles
G7GQO	Mr R Harman
G7MPZ	Mr C H Atkins
G7MWU	Mr G Haswell
G7MXN	Mr L J Orchard
G7NDS	Mr M Fry
G7NHR	Mr P R Dunlop
G7OYF	Mr B J Gilbert
G7SSW	Mr JT Haywood
G7VWO	Mr D R Lisle
G8AOI	Mr T A Knight
G8BHK	Mr J D Vickers
G8EZZ	Mr RS Chambers
G8GPF	Mr D Clark
G8ILY	Mr D Henn
G8JCB	Mr P Pullinger
G8MCJ	Mr B Pritchard
G8NSD	Mr F J Taylor
G8SSL	Mr A Marwood
G8TAM	Mr G C Clarke
G8VVZ	Mr A M Stephens
G8WQC	Mr J Maxworthy
G8YNI	Mr J Hancock
GD0TFG	Mr J G Dowling
GD1MIP	Mr A D Morgan
GD3EFD	Mr M A Thompson
GI3TAC	D W Campbell
GI7IVX	Mr R A Connolly
GI7LBI	Mr H Budina
GM0IHD	Mr I Dunn
GM0LFK	Mr G Laird
GM0OTS	Mr W A McIntosh
GM1VDZ	Mr GR Neil
GM3PGY	Mr A McEwan
GM4NFI	Mr DJC Leckie
GM7BOW	Mr R M King
GM7CZC	Mr R W Johnson
GM8SOK	Mr J A Sturrock
GM8TVV	Mr N J Coote
GW0GPZ	Mr T J Jebbett
GW0NNE	Mr R W Hart
GW1SAM	Mr A G Hodgkinson
GW3JGE	Mr V Owen
GW4UWI	Mr J Thorogood
GW6LMI	Mr J Evans
GW7VSO	Mr D A Lewis
GW8THM	Mr M W Griffin
K1NSS	Mr J D Murray
K2ARN	Mr A Nyysla
K2ORS	Mr W Ziegler
K5LWC	Mr L W Compton
KB3D	Mr T J Brady
KB7ZR	Mr R R Smith
KC9QQ	Mr F J Keller
KJ4NAV	Mr R J Moeser
M0BGG	Mr D Rosher
M0CYZ	Mr J R Hillsdon
M0DYO	Mr M Blair
M0GQS	Mr D Roguszczak
M0MPG	Mr W Lowe
M0MYB	Mr H D Ibbitson
M0NRS	Mr N R Stoker
M0SAA	Mr B P Matthews
M0SRV	Mr I Smith
M0VRS	Mr J Strange
M0WBD	Mr D Blake
M1CEA	Mr T V Gladman
M1SEM	Mr S Rear
M1VHT	Mr K Morrison
M3AVZ	Mr R P Henshall
M3GYH	Mr R P Blake
M3IRF	Mr S J France
M3IVX	Mr R J Balm
M3SEN	Mr J A Mortell
M3UCA	Mr FJ Bano
M3VHV	Mr L Kelly
M3WOV	Mr H Lyall
M3WPU	Mr M McHugh
M3WYK	Mr D Urry
M3XOA	Mr W Dunstan
M3YGA	Mr G Aldridge
M3ZID	Mr RAF Farrington
M3ZJV	Mr G J Hewis
M6AAE	Mr A Ellsom
M6ALI	Mr A R Kennington
M6AMP	Mr Whitall
M6BPS	Mr P Dent
M6BPT	Mr A Hood
M6COB	Mr R Williams
M6FMO	Mr O Cook
M6HTM	Mr J Clyne
M6ILR	Miss V Seabright
M6MAY	Mr M A Buist
M6MLA	Mr M A Lovatt
M6NOZ	Mr BAJ Norris
M6PAF	Mr P J Bigsby
M6POM	Mr P A Cowper
M6SAR	Mr P R Saripo
m6ten	Mr N Horton
M6WRW	Mr J Welch
MD3ZHD	Mr W G Callister
MI3AVJ	Mr D Johnson
MI3POY	Mr R Wallace
MICJX	Mr T Cotterell
MM3SLD	Mr J Bradley
MM3YTI	Mr G White
MM6CBE	Mr C B Ellison
MW1AZI	Mr S Dunlop
MW6KGB	Mr W A Oliver
N2WQ	Mr R Bakalov
N3ENU	Mr D Wilkens
N4TRB	Mr B R Page
OH2NZT	Mr R Sjoholm
RS170465	Mr F Thornton
RS182716	Mr L Dean
RS183293	Dr B P D Denyer-Green
RS199775	Mr D White
RS204388	Mr M Watkins
RS204712	Mr E D Rees
RS204713	Mr P A Fahey
RS204726	Mr K A Anderson
RS204901	Mr R M Puebla
RS204907	Mr P Fulbrook
RS204908	Mr P Wiseman
RS204924	Mr G Mather
RS204956	Mr R E Davis
RS204957	Miss A Paterson
RS204992	Mr A McGivern
RS205006	Mr I J Cox
RS205063	Mr H Taylor
RS205065	Mr A Currie
RS205079	Mr M Rainer
RS205082	Mr A Hawkins
RS205115	Mr M Braime
RS205184	Mr N Guthrie
SB6CD	Mr R Gartoft
VK3OM	Mr R S Fisher
WH6AMU	Mr R H Namaka

New Licensees

The Mid Ulster ARC would like to congratulate the six newest MI6 licensees who recently completed their Foundation course with the club.

Club of the Year

Ken, MW0YAC of AA Couriers of Cwmbran has kindly agreed to sponsor the Region 7 Club of the Year for next 12 years. The photo shows Jimmy Sneddon, MW0EQL, Regional Manager Region 7, being presented with the trophy by Ken Smith, MW0YAC of AA Couriers.

ATC Passes

In November 2009, four Air Training Corps cadets and a staff member of No 1 Welsh Wing, ATC completed their Foundation course held at the club HQ of No 1 Welsh Wing ARS. All passed the examination with flying colours and are now looking forward to obtaining their licences and getting on the air.

NEWS IN BRIEF

• Bob Clunn, W5BIG has been awarded a US Patent for his Vector Impedance Measurement System and Method of Using Same, Patent No. 7,629,795. It has taken nearly three years to obtain this patent.

Prize Giving

At their recent EGM, Glenrothes & DARC awarded the Chairman's Cup, Club Shield and GM0UZM Memorial Key. The Chairman's Cup was presented to Tam, MM0TGB for work as Treasurer and getting funds for the Club. The Club Shield was awarded to Geoff, GM3KMF for work as Transport Officer – pulling the two tonne caravan! Finally, the GM0UZM Memorial Key was presented to Doug, GM0AIR for his slow Morse 'broadcasts'.

DXpeditions

Since 1994, Alan, G0RCI has been organising and taking part in DXpeditions to islands within the IOTA programme. Grantham ARC has been involved with the DXpeditions and so far they have visited 12 islands. The most recent trip was to the Welsh Coastal group and Ynys Gybi.

Alan, G0RCI has now designed a badge that has been embroidered onto shirts as a way of saying thank you to the Grantham club members who have put their hands in their pockets and dug deeply to keep these DXpeditions going. RSGB Regional manager, Jim, G0EJQ presented the shirts to the club members. G0RCI would also like to thanks guest operators Richard, G3CWI and Tom, G0PSE.

Anyone who may be interested in taking part in future trips just e-mail Alan at g0rci@yahoo.com.

Exam Success

Midland ARS have had another candidate pass their Foundation exam, Alan, M6ARW. The instructor for this course was Jim, M1CPC.

Whitton Training

Over the last five years, the Whitton ARG have made available training in Foundation and Intermediate courses as well as providing exam facilities for Advanced exams. During December 2009 three more candidates successfully completed the Foundation course.

Dee and Eric Govan already have marine licences and are looking forward to using their amateur callsigns while sailing.

Alison Johnston, G8ROG RSGB Regional Manager commented, "the Whitton club members, particularly Colin, M0DMJ the club's trainer, has put in a lot of hard work and commitment into these important courses and it is refreshing to see a club with such dedication to the hobby, the results over the last few years speak for themselves, 59 passes in total".

L-R: Colin, M0DMJ, Trainer, Marek Kroemeke and Dee and Eric Govan.

CQWW SSB

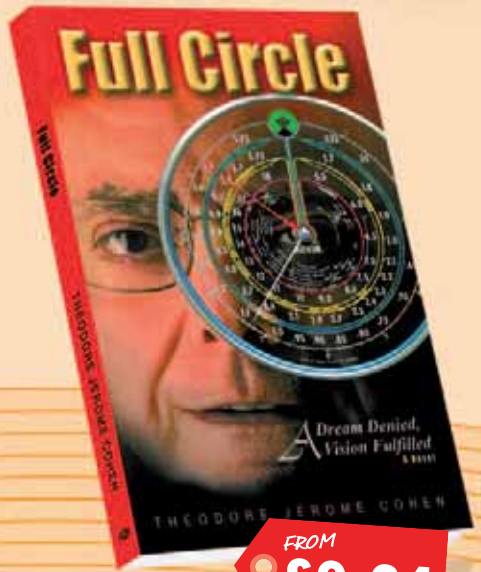
Kilmarnock and Loudoun ARC were active in the CQWW SSB 2009 contest with an improved score over last year from 814 QSOs to 1236 QSOs. The club took part in the Low power Multi-single with their contest call GM7A from the clubhouse in Kilmarnock.

The team was MM0GHM, MM0GOR, MM3DHL, GM3YEH, MM0DHQ, GM7AAJ, MM3VNW and MM6LIL. All are looking forward to the next contest.

RSGB shop

NEW BOOKS

FROM £16.99



FROM £9.34

The Real Enigma Heroes

By Phil Shanahan

The capture of the Enigma codes helped shorten WWII by at least a year. Churchill took a special interest in the information that came out of Bletchley Park's Station X and he guarded his contact well so that the Germans would never find out the source. Without the quick actions of three men from HMS Petard, who clambered aboard a sinking German U-boat, the codes might never have been broken. On the night of 30 October 1942, First Lieutenant Tony Fasson, accompanied by Able Seaman Colin Grazier and Tommy Brown, climbed aboard U-559. Passing codebooks up through the hatch, Fasson and Grazier were caught aboard the sub as she suddenly sank. Brown was saved, along with the code books, and the rest, they say, is history...

It wasn't until 1969 that the men were mentioned for their work in rescuing the Enigma codes. Phil Shanahan tells the extraordinary story of the three men who saved countless Allied lives and shortened the war by a year, as well as the efforts to recognise their bravery.

Size 254x178mm, 240 pages, ISBN 978-0-7524-4472-7

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

Full Circle:

A Dream Denied, A Vision Fulfilled

By Theodore Jerome Cohen

Solly's dream is for his son Teddy to one day become a concert violinist. Eventually he comes to understand and to endure the heartbreak of knowing that the dream never will be realized. As Solly watches, life takes Teddy from gifted violin student to adult engineer and scientist, leaving no time for the career in music Solly so dearly wants his son to pursue. In the end, there emerges the essence of redemption as Teddy returns to the violin late in life and fulfills his and his father's vision. The story, which is a work of fiction based on real events, will fascinate readers from ages ten to one hundred who are interested in radio, communications, and music and in how it was to grow up in a family whose members trace their heritage to that great wave of immigrants that crashed onto America's shores in the mid- to late 1800s.

Size 204x127mm, 216 pages, ISBN 978-1-4490-2914-2

Non Members' Price £10.99 **RSGB Members' Price £9.34**

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

www.rsgbshop.org

E&OE All prices shown plus p&p

Meirion ARS

Meirion ARS attended the North Wales Radio Rally in November at the John Bright School in Llandudno. MARS had a single table in the main hall to promote the club and amateur radio in Wales. Over the rally weekend, MARS members sold raffle tickets to raise funds for the club.

- The custom fleece jacket donated by Gwynedd Graphics was won by GW7BVY.
- The LCR bridge donated by Snowdonia Radio Co was won by MW6TLF.
- The Welsh slate coasters donated by the Welsh Highland Heritage railway Porthmadog was won by MW0JNI.

MARS would like to thank everyone who bought a ticket.

M1DFE Shield

This year the Chelmsford ARS created a new trophy, the M1FDE Shield, in memory of Anthony Martin, M1FDE who passed away in 2008. Anthony was a pioneer of the Personal Role Radio introduced into the British Army in 2002 and was responsible for the RF design of this groundbreaking product that transformed infantry communications. He was an enthusiastic home constructor so it was decided to award the shield to the winner of the annual CARS Constructors Competition.

In 2009 the winner was Richard, 2E0SBU for his magnetometer entry. He was presented with the shield by CARS President Harry, G5HF. Richard became interested in amateur radio when the club ran a Foundation training course for pupils at his school.

Wedded Bliss

Mexborough & DARS would like to congratulate one of their members who got married recently. John, M1EUF will be bringing Samantha along to the next Foundation course run by the club in the New Year – a case of 'if you can't beat them, join them'! All the members and committee would like to wish the happy couple all the very best.

GB6CW

Bob, VP8LP and Janet, VP8AIB at Cromer Windmill. Photo by Martin, M0XJP.

A chance contact with Bob, VP8LP, on 17m in March, led him and his wife Janet, VP8AIB to visit a special event station at Cromer Windmill. Bob was coming to the UK for an operation but as there is no CEPT agreement between UK and Falklands he went on a Foundation course and became M6ALP.

The weather wasn't all that good, the wind was very gusty and it took a long time to put a line over a tree with a bow and arrow in the garden next to the windmill. Three hours later, the 40m half wave, 80m quarter wave end fed aerial was up! The station set up consisted of a TS450s, power supply and tuner, plus the usual bits and pieces required for a portable operation. The supply to the windmill is fed from overhead lines and the 80 and 40m bands were marred by noise being picked up off those lines, making contacts with weak stations almost impossible. The higher bands were easier to listen to and contacts on 20, 17 and even 10m were easier to copy.

Mike, 2E0HOG, one of the members from Stevenage & DARS managed a few CW contacts, but it was hard going. Nicolas, M1HOG, ran a 2m station and passed on details that GB6CW was on 40 or 80m.

By the time you read this Bob and Janet will be back in the Falklands' summer sunshine, his operation having been successful!

Into the Library

Lincoln Short Wave Club recently donated a quantity of books to Kevin Best, the Collections Officer of Lincolnshire Libraries. The photograph shows Jonathan Whiting, G6JUT presenting Kevin Best with the books.

Electronic Activities

Walford Electronics has announced a new event to be held on 18 July at Tim Walford, G3PCJ's Upton Bridge Farm, Long Sutton, Somerset TA10 9NJ. Full details will be provided in the Spring but 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 and buy stall, transformer throwing competition, plus 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. If the weather permits it will be held outside, otherwise it will be under cover in the farm barns.

Please contact Tim Walford, G3PCJ by e-mail to walfor@globalnet.co.uk.

ISS SSTV

Experimental SSTV transmissions from the International Space Station have continued as part of the ongoing MAI-75 project. The transmissions took place over the three day period 9 to 11 December when in range of the Russian ground control and on the usual downlink frequency of 145.800MHz.

Previously, Robot 36 was the mode of choice, however this time PD160 was used delivering a higher resolution picture at the expense of a longer transmission time per image. Discussions with the ground station were heard before and after some of the images.

Images from this and previous periods of activity can be seen at the online ARISS SSTV gallery, www.amsat.org/amsat/ariss/SSTV.

Bawdsey Research Station

In recognition of the historic events that took place in 1935 and 1940, which played a significant part in Britain's war effort, Bawdsey Manor will be activated on three separate occasions during 2010.

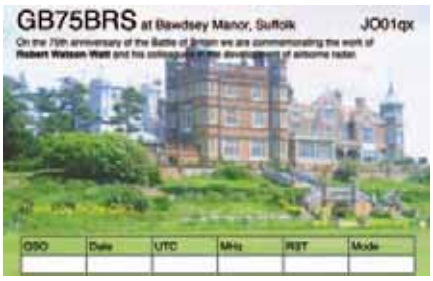
During its time as a radar research centre and as an operational station for Chain Home radar, it was known by the acronym BRS – Bawdsey Research Station. Special event callsigns with BRS as the suffix have been applied for to recognise this.

Over the weekend of 26 to 28 February, amateurs will be on the air on HF, 6m and VHF, operating CW, SSB and possibly some digital modes too. The callsign requested is GB75BRS, since this operation will commemorate the 75th anniversary of the Daventry Experiment, which resulted in radar development in the UK being based first at Orfordness, then at Bawdsey.

Later in the year the group will operate on two weekends to commemorate the 70th anniversary of the start and end of the Battle of Britain in 1940. The callsign GB70BRS has been requested. These weekends will be 5/6 June, and 18/19 September. Operating bands and modes will be as for the February event.

Members of the public and students from the school now based at the Manor, will be welcomed at any of the events, where there will also be display materials relating to Bawdsey's history during this period.

A special QSL card will be issued to those making contact with either of the stations, and a parchment certificate will be available on request to stations who make contact with both callsigns – information about the stations, operation and QSL arrangements can be found on the website at www.bawdseyresearchstation.org.uk.



GB2CW

John Ellerton, G3NCN has ceased his GB2CW broadcasts until May as he has to have a major operation and will not be well enough until then to resume. We wish him well with the procedure.

Recognition

Eagle Radio Group recently made a presentation to outgoing chairman John Gregory, M3ERG. He was presented with an illuminated certificate by the new chairman for 2010 Charles Wilkie, G0CBM, in recognition of his 12 months at the helm.

Generosity

1st Ringmer (E.Sussex) Air Scouts were devastated earlier this year when their headquarters were burgled and their complete amateur radio station was stolen. The equipment was, unfortunately, not specified on their insurance policy and was, thus, uninsured.

Recently, Gavin Keegan, G6DGK, the RSGB Regional Manager received an offer from John Denton – who is the son of Colin Denton, G3DSX (now a SK) – in which John offered the whole of his fathers' radio station to be passed on to a good home. The offer was accepted with alacrity! G6DGK collected the station from Hampshire delivered it to the Air Scouts as pictured below.

As you may imagine, the Scouts were delighted with this extremely kind gift from the Denton family and, once suitable insurance has been arranged, they will be putting their station back on the air using their special callsign – G0RSG. If you hear them on the air, please give them a call. G6DGK would like to add his thanks to the Denton family for their great generosity in donating this working station to the Air Scouts - a really welcome gift!

BARAC Rally

The Bishop Auckland ARC Rally was held in November and the club was pleased to see another successful event. Numbers were about the same as last years for both traders and visitors, many of whom were returning yet again to a favourite event. Traders were setting up from 7am and a healthy queue was outside waiting for the 10am opening. The organisers would like to say thank you to traders, visitors and club members who were there to help on the day. Next year's rally has been booked for Sunday 28 November.

Bright Sparks Quiz

The 2009 Bright Sparks Quiz run by Kilmarnock and Loudoun ARC was held at the Hurlford Bowling green club. This year's winners were Ayr Amateur Radio Group and runners up were Stirling and District Amateur Radio Society. The one-off Rabbie Burns 250th Anniversary Trophy was won by Kilmarnock and Loudoun ARC.

The club wish to thank all who travelled in the awful weather conditions and Allan, GM3OZB for arranging the venue and the catering, Barry, GM3YEH for being the quiz master and Steve, GM4OSS for keeping the scores.

Gary, GM3MQO receiving the 2009 Bright Sparks Winners Trophy from Eddie, GM6WTH. Photo by Graham, MM0GHM.

NEWS IN BRIEF

• The 61st Annual International DX Convention sponsored by the Southern California DX Club will be held at The Holiday Inn Hotel & Conference Center Visalia April 16, 17, 18, 2010. Preregistration begins December 1st 2009. Top DX operators from around the world will be there. Details at www.dxconvention.org.

On the Air

Members of the Mid Ulster AR Club recently took to the airwaves in a completely different way. They were invited to be interviewed on Xtreme FM, a radio station run by a local group of young people for three weeks each year. The questions centred on amateur radio as a hobby full of fun and learning and the clubs activities in the area, all of which younger listeners enjoyed, with the highlight being a Morse message sent out wishing everyone a Happy Christmas and a Happy New Year.

Thanks For Life

The multi million pound 'Thanks for Life' campaign is part of a worldwide attempt by Rotary International to rid the world of polio and is supported by the Bill & Melinda Gates Foundation. A radio station will be set up on a stall in Knaresborough Market place on Wednesday 24 February. Wednesday is Market Day in Knaresborough. There will be a fundraising component to the station which will be operated by G3XZV using a special commemorative callsign – GB0TFL. The station will be using an FT1000MP running 100W SSB on the 80 and 20 metre amateur bands and it's hoped that full sized half wave dipoles, 12 metres high will be erected to radiate a decent signal. The station will be active all day on Wednesday 24 February.

75 Years of Radar

On 26 February a group of radio amateurs will re-create the birth of one of the most important ever developments in radio. It was a British team led by Robert Watson-Watt that refined a detection system using radio waves for defence purposes. Thus the first 'Radio Direction Finder' was born, later to become known as RADAR - RAdio Detection And Ranging.

75 years on, the group is planning to gather in the same field, in the same model of flat nose Morris van, to detect a specially arranged fly-by of light aircraft that is being organised by Giles, G0NXA, who is himself a pilot. The radio equipment will be slightly more up to date than that used by Watson-Watt in the original experiment, using signals on 2m.

Visitors to the site will be welcome by prior arrangement – but no pets please! For more details, contact Brian, G8GMU 07801 862686 or info@andrewphotographic.co.uk, and if you're a pilot who would like to take part in the fly-by, contact Giles, G0NXA via QRZ.com.

CW Skills

The Mid Ulster Amateur Radio Club recently had another successful pass in the Foundation exam. Andrew Cummings, a local teenager from Keady, was very excited to be able to finally get on the bands and use some of his recently learned CW skills.

NEWS IN BRIEF

• Special Event Call GB2EI, standing for Great Britain to Ireland, will be operating to celebrate the reintroduction of the Swansea to Cork Ferry. A similar station, EI2GBW, will also be operating from Cork. The original service commenced in 1896. Both special event callsigns will be operational until 31 March 2010. Further details are available from qrz.com.

• The Oban Annual Bash will be held in the Lancaster Hotel, Oban on 27 February by the Lorn Radio Amateur Club. Anyone in the area is welcome to attend. More details at www.gm0lra.freeuk.com.

• Mexborough & DARS will be starting an Advanced Course on 12 February. E-mail M0boh@aol.com for further details.

• Friskney & East Lincolnshire Communication Club is a new radio club. Their website is www.felcc.webs.com. The club is hoping to appeal to people interested in all forms of communications, be it radio – amateur, CB, PMR, marine band – computers or just simply short wave listening. The next meeting is on 2 February at Friskney Village Hall, Church Road, Friskney, Nr Boston, Lincolnshire. For further details contact Chris, M0MFP by e-mail to creedmfp0@hotmail.com or on 01507 442240.

• Tom Morgan, G0CAJ, ZS1AFS, ZT1T is trying to work the rest of the UK from ZS1. He needs to make skeds with GD, GJ, and GU. His e-mail address is info@onboardpublications.co.za or he can be contacted on Skype as tom.zs1afs.

Stirling Success

The most recent batch of Foundation and Intermediate candidates to pass their RCE's at GM6NX in Stirling can be seen in the photo. Front row, l-r, are husband and wife team Laura and Mike Quin then Paul Holmes and John Cairney. Congratulations to them all. Thanks to Jim, GM4VGR and Wullie, GM0MZB who held the exam (pictured back row).

New Products

Kuhne Electronics have updated the TR 1296 H transverter and many suggestions from customers have been include in the new unit. The frequency stability of the newly designed oscillator is ±0.1 ppm without the external reference frequency and gives the user best performance for EME and WSJT working. The design of the TR 1296 H-28 IF interface ensures compatibility with almost all HF transceivers with a transverter interface.

Alinco now have an HF 100W all mode transceiver available, the DX-SR8. It is compact and easy to operate with a detachable front panel and front-facing speaker. The transmit side covers the 160 to 10m bands with SSB, AM, FM and CW all available and the general coverage receiver covers 135kHz to 30MHz. Priced at £499.95 and available from Nevada, look for a review in *RadCom* soon.

RSGB shop

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Old Timers' Honour Roll

On 31 December 2009, the following had unbroken membership of the Society for 50 years or more.

85 YEARS
RS2627 Mr W S Eadie

77 YEARS
G0BXB Mr R E Wilkinson
G5RL Mr B K Rowell

76 YEARS
G2HW Mr H Whalley
G3AWA Dr A J Woiwod

75 YEARS
EI3G Mr T W D Aliaga-Kelly
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74 YEARS
G2AVV Mr G E Evans
G2CIL Mr G A Hook
G2HV Mr J Dickson
G3LX Mr H P Arnfield
G3WP Mr J H Brazzill
G8CXL Mr N K Read
G8GP Mr E V Neal
G8QM Mr V J Flowers
VE3XE Mr E C Ilott

73YEARS
G2ARU Mr R A Loveland
G3HN Col J W W Cock
G3VA Mr J P Hawker MBE
G8FC, G8RAF, GB2RAF Royal Air Force ARS
G8VL Mr J I Sinclair
GW3SB Mr T C Bryant
RS2692 Mr E M Frost CEng MIET
ZL1AH Mr J D Wightman

72 YEARS
G2BTO Mr G Openshaw
G2DTQ Mr A Goode
G3OEP Mr D J Buddery
G8GEA Mr K T Warriner
G8RW Mr R W Standley
GI3VQ Mr J K Thompson

71 YEARS
5B4AGP Dr T A Appleby
G2CXT Mr A R Richardson
G2HKS Mr R P B Udall
G3CQ Mr A J Hallett
G3ENI Cdr A J R Pegler
G4DR Mr D P Urquhart
G8CK Mr W E Bartholomew
GM3CFK Mr P Harrison
GM3UM Mr G P Millar
GW2DHM Mr W D Andrews

70 YEARS
G2ART Mr F H P Cawson
G2CVO Mr F H Osborn
G2FSI Mr L W Smith
G3AIK Mr K N Watkins
G3AQM Mr F J Gregory BEM
G3BWV Mr F E Springate
G3SZ Mr A Chilvers
GM2BMJ Mr T D Jardine
GM3AKM Mr L R Richardson
GW3ZV Mr J Banner
RS37399 Mr D H Tomlin

69 YEARS
G2BLA Mr M A Pyle
G3DVV Mr J O Brown
GW3ARS Mr J Sagar

68 YEARS
AB4SW Mr I T Haynes
G2FGB Mr S R Minson
G2FUU Mr T Knight
G2FXQ Mr S W Saddington
G2FXZ Mr J B Hodgetts
G2HAX Mr S P Shackleford
G2HDU Mr C W Cragg
G3DAM Mr H Barnett
GJ3EML Mr J H E Watson
GW2HFR Mr A Ellis
RS4590 Mr A J W Rozelaar

67 YEARS
G2HKU Mr E H Trowell
G3ALK Mr E J Holmes
G3ASE Mr H S King
G3DRN Mr E G Allen
G3GBN Mr S H Feldman
G3GJX Mr E B Grist
G3GYE Mr P T Pitts
GM0IJA Mr B C Skinner
RS5272 Mr C L Chappell

66 YEARS
G3AAZ Mr G G Gibbs
G3AKU Mr R A Harding
G3ANG Mr J W Emmott
G3BPM Mr P J H Matthews
G3CXP Mr R A Gill
G3GHS Mr J G Holland
G3LIA Mr R J Rogers
G3PQE Mr J Thorn
RS6181 Mr R P Hope
RS6464 Mr E Valentine

65 YEARS
G0RVQ Mr A J W Harrison
G2DGB Mr A G Short
G2FQP Mr L J Avory
G3ADQ Mr A W Walmsley
G3BVU C J Beanland
G3CJD Mr L F L Allen
G3CWW Mr A W W Timme
G3FDG Mr R G Morris
G3HKT Mr A R Partner
G3IRM Mr P Lumb
G3YLR Mr F R Blake
GW3HGL Mr B Clark
RS558 Mr R D Thomas
RS8618 Mr A R Cameron
RS8896 Mr J Crabtree
ZL1AOA Mr J R Whitney

64 YEARS
G0AEW Mr D T Arlette
G0TTK Mr M A Chatfield
G2ADR Mr E Parvin
G2FQS Mr R L Barrett
G2HCG Mr B Sykes
G3AMF Mr K G Thompson
G3BJC Mr R E Sparry
G3BNE Mr G W Alderman
G3BVB Mr D R J Adair
G3CSC Mr S J Roddan
G3DNJ Mr G F Weller
G3DWQ Mr G Lancefield
G3EFS Mr W H Borland
G3FPN Mr J R Davey
G3IJS Mr J F Stratfull
G3INN Mr N S Lilley
G3TXT Mr R T Laing
G8PG Mr A D Taylor
GW3CZC Mr P J Williams
GW3JGA Mr J E T Lawrence
RS10128 Mr A C Lees
RS10548 Mr J B Gurney
RS20428 Mr A R A Bunnage
RS9475 Mr J Smith
RS9710 Mr F W Adderley
W2CIH Mr N A Champness

63 YEARS
5Z4DV Mr T H Hutchinson
G0TTG Mr M Warriner
G2AFV Mr P Carbutt
G2CHI Mr W G Bailey
G2CQX Mr P V Pugh
G2DZF Mr J H English
G2FCA Mr A E Burnard
G2FKZ Mr C E Newton
G2MJ Mr R T Hunt C Eng, MIEE
G3AGF Mr R L Edginton
G3AIO Mr S Fenwick
G3ASH Mr R A Jackson
G3BHF Mr EC Hasted
G3BHK Mr L R Mitchell
G3BXS Mr A G Stacey
G3CHD Mr S R Barker
G3CRH Mr H H A Sanders
G3CTQ Mr H Westwell
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G3EBP Mr P E R Courcoux
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G3HJS Mr R V Woodford
G3ODH Mr S B Smythe
G3PFJ Mr J D Harris
G4FM Mr R H Kelsall
G4KEE Mr V A Tomkins
G8ACR Mr R W Yates
G8MVD Mr K Wilks
GD3AHV Mr G W Ripley
GW3JBH Mr J S Hammond
RS12840 Mr J L Butcher
RS14170 Mr D H Clements
RS644 Mr H J Darling
VK6PZ Mr P Zeid OBE Fisp

62 YEARS
G2XP Sutton & Cheam RS
G3BDH Mr R R Flaum
G3BDQ Mr J D Heys
G3BFP Mr J N Headland
G3BMI Mr A Bolton
G3BRW Mr R G Wyatt
G3CMH Yeovil ARC
G3COY Mr V J Reynolds
G3DJK Mr K Rosier
G3DPW Mr R L Knight
G3DSV Mr R W P Wilson
G3DWW Mr G Cripps
G3ECM Mr P W Bowles
G3EDM Mr G L Mills
G3EDS Mr K G Perkins
G3EFK Mr W T Clegg
G3EFP Mr J C Pennell
G3EKD Mr A A Sparrow
G3EVT Mr R J Mutton
G3FMT Mr D W Robinson
G3GGL Mr G Wormald
G3GIH Mr J C Bird
G3GIQ Mr H F Lewis
G3GOT Mr B W Legrys
G3HCT Mr J Bazley
G3HGM Mr J A Ewen
G3HHU Dr J C W Ickringill
G3IIV Mr A Davies
G3IIY Mr E C Clayson
G3IJE Mr M J Powell
G3IVF Mr H E Smith
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G3NTA Mr G A Couzens
G3SKI Mr R A Bravery
G3VHP C B H Bradshaw
G4CCA Mr M J L Fadil
G4LKX Mr D C Hepworth
G5MS Manchester WS
G8TB Mr B W Wynn
GM3EDZ Mr T P Hughes
GW3FPH Mr J W Hayes
GW3ITT Mr J Cairns
HB9ALV Mr K J Marley
RS15845 Mr L Grout
VK2AYD Mr D A Pilley
VK6RV Mr R G B Vaughan

61 YEARS
EA7FSF Mr F Pilkington
G2ACN Mr B J Bale
G2DJ Derby & DARS
G2HBA Mr C H Spencer
G3BON Mr W J Rawlings
G3BYG Mr N L H Williams
G3DCZ Mr R G McDonald
G3DDA Mr K W Dyson
G3DGW Mr D Early
G3DNQ Mr D H Maclean
G3DPX Mr C E Pollard
G3DQY Mr J Vaughan
G3DVQ Mr R H Pounder
G3EDD Mr B A Armstrong
G3EGV Mr R Staniforth
G3EHZ Mr A H Wreford
G3EOQ Mr M Flinn
G3FFY Mr M H Stedman
G3FHL Mr G C Bagley
G3FIA Mr A D Lowden
G3FKI Mr E C Lambert
G3FNZ Mr J A Lambert
G3FYP Mr P S Robson
G3FZW Mr E A Matthews
G3GBU Stoke on Trent ARS
G3HAT Mr M C Hately
G3HBN Mr J R Bolton
G3HPM Mr P J Mullock
G3HTA Mr J D Forward
G3HZW Mr D C Mainhood
G3ISD Mr E J Hatch
G3IWT J P Hewitt
G3KKD Mr I M Waters
G3KXE Mr E W Bettles
G3NEO Mr P Bagshaw
G3NOX Mr J R T Royle
G3NWR Wirral ARS
G3ORC Mr R R J Caines
G3WUZ Mr P H Brown
GD3FLH Isle of Man ARS
GD3FXN Mr A D Radcliffe
GM3COQ Mr D Oswald
GM3DEE Mr R P Russell
GM3ENJ Mr K Street
GM3HOM Mr J Reilly
GW3EJR Mr J B Armstrong
RS17032 Mr B M Collings
RS17058 A M C Macklow-Smith
RS17624 Mr F J Shepherd
RS4190 Mr F J W Trollope
VE3EAB Mr W A Cheek
VK3XX Mr G S Bracewell
VK6HD Mr M E Bazley

60 YEARS
G3EPV Mr R D Emes
G3ETH Mr J L Goldberg
G3FFH Mr J Frings
G3FPK Mr N A S Fitch
G3FRX Mr J A Wilkes
G3GVV Mr R J Hughes
G3GZJ Mr F J Crisp
G3HZT Mr P S Fraser
G3JNW Mr H L Fleming
G3KQF Mr J Anthony
G3LMR Mr J K Eley
G3SOL Mr J B G Parker
G3SVC Spen Valley ARS
G4CDB Mr G Lindsay
G8CDW Mr E H Double
GI3FJX Mr J Davidson
GM3EWC Mr R B Irvine
GM3JIJ Mr J D Hague
GM3OBC Mr R Thomson
GW3GEN Mr C F Cole
VK3ADW Dr D A Wardlaw

59 YEARS
G1KEP Mr J G Houghton
G3CZU Dorking & DRS
G3DNH Mr J A Spicer
G3GEJ Mr L M Airey
G3GGS Mr W E Waring
G3GJW Mr T I Lundegard
G3GKI Mr F V Kershaw
G3GLB JE Lacey
G3GLL Mr T N Green
G3GMY Mr F E A Green
G3GRO Mr D Atter
G3GRV Mr G Halse
G3GVM Mr F Robins
G3HEA Mr J U Burke
G3HJK Mr B J Mitchell
G3HMF Mr G G Kenyon
G3HQX Mr J Brodzky
G3HRK Mr D F Willies
G3IAS Mr A M Smith
G3JJA Mr E F Steventon
G3KDP Mr A G Bounds
G3KGW Mr J D Smith
G3KPU Mr E Prince
G3MGW Mr R Wheeler
G3MVV Mr Norman Miller
G3OCA Mr K Frankcom
G3OEG Mr E F Harverson
G3PMW Mr K W Dews
G3RQS Mr R A Rimmer
G3WKS West Kent ARS
G3YJJ Mr R T Palmer
G4IER C D Colbeck
GM3DDL Mr J Jackson
GM3IBU Mr A W Wright
RS18978 Mr R G Clement
RS20443 Mr M B Greenberg
VK6PG Mr A J Gibbs

58 YEARS
G2XV Cambridge & DARC
G3FAU Mr V Cundall
G3FJE Shefford & DARS

G3GGO Mr C N Wridgway
G3GMM Mr E McFarland
G3GYF Mr A J F Powell
G3HIA Mr H C Young
G3HKO Mr D A Wood
G3HKQ Mr L V Westmoreland
G3HRE Mr F Watson
G3HVX Mr W H Wells
G3HYH Mr S P Hay
G3IFX Mr A R Cooke
G3IJA Mr J Allan
G3IJW Mr G S Garrett
G3IMG Mr R Turner
G3ISX Mr C J Leal
G3IUZ Canon H R Davis
G3JIE Mr D C Youngs
G3JMX Mr PC Hayward
G3KHR Mr J W Fox
G3KKP Mr J Burgess
G3LMX Mr T W Mitchell
G3MEA Mr S Harle
G3MZO Mr D Rosen
G3TOK Mr J L Hall
G3VRB Mr J D Nias
G8BOP Mr M J Palmer
G8HLE R E W Marshall
GM0UPE Dr G R Sutherland
GW3FPF Mr P F Jones
VE3EZP Mr J C Watson
VK6LK Col G R K Lyon

57 YEARS

G0FMU Mr A J Turner
G2HDR Mr C N Chapman
G3EHP Mr J Wilmot
G3HBW Mr A L Mynett
G3HUL Mr D M Mallett
G3HWW York ARS
G3ICH Mr P N Pitt
G3IEW Mr S J Heard
G3IFB Mr F H Bliss
G3IGU Mr K H Coates
G3IGV Mr J W Birkbeck
G3IGZ Mr D W Bruce
G3IIN Mr M J Griffin
G3IKL Mr R T Craxton
G3INL Mr A A Chisholm
G3IOI Mr N R Pascoe
G3IPV Mr P W Haylett
G3ITH Mr R D Franklin
G3ITP Mr J T Parker
G3JHL Mr J H Lepper
G3JKF Mr K V Franklin
G3JKV Mr W F Blanchard
G3JLN Mr F G Blain
G3JQS Mr J Guttridge
G3JTJ Mr T Jones
G3JYG Mr J Kirby
G3KSP Mr P O Hooper
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G4DMP Mr D M Pratt
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G8IDL Mr D A D Smith
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GM3MGT Mr A W Hope
GM3NYG Miss J G Fish
GW3JSV Mr D A S Holmes
GW3MDK Mr R Jones
RS19615 Mr M Addicott
RS21683 Mr J C P Sharp

56 YEARS

G3IHX Mr N J Bond
G3IKR Mr J P Moore
G3INU Mr R J Appleby
G3IYF Mr D E Baker
G3IYT Mr S R Walker
G3IZJ Mr M J Faulkner
G3IZQ Mr H Hyman
G3JFR Mr N B Cottrell
G3JHP Mr E W G Allen
G3JIP Mr J W Hill
G3JME Mr M Watson
G3JNB Mr V E Brand
G3JNM Mr T R Whittaker
G3JVL Mr M H Walters
G3KDA Mr M G Rimmer
G3MBL Mr A G Edwards
G3MCW Mr R A E Fronius
G3MDM Mr G J McGee
GW3KJW Mr P E W Allely
GW3LQE Mr A M Ernest
GW3MPP Mr G C Price
GW4BYA Mr P A Braham
GW4HXO Mr M Probert
RS20103 Mr A J Kightley

55 YEARS

G3JIR Mr J A Hardcastle
G3JJG Mr G F Gearing
G3JNJ Mr D A Platt
G3JOT Mr F G Whatley
G3JUL Mr G C Voller
G3JYL Mr R M Woodman
G3JYO W J Grainger
G3JYP Mr W B Capstick
G3KAY Mr R J Lang
G3LCH Mr M Pharaoh
G3LSQ Mr P J Aitchison
G3MCA Mr D F Owen
G3MPB Mr A R Smith
G3NDO Mr P Sorab
G3SNN Mr A B Woolford
G3TGR Mr J J Woods
G4IUH Mr R J Pye
G8BFL Mr B J Jayne
G8CJ Mr F Ellesmere
GM3JQJ Mr G Moore
GM3LKY Mr P Cohen
GW3JXN Dr J E Tindle
RS20249 Mr M Harrington
RS20323 Mr L Foster
VK3CEC Dr H Maclean

54 YEARS

5B4AGF Mr I Cable
G0VEH Mr J E Mulye
G2AIW Mr M E Lambeth
G3DVK Mr F F Oldfield
G3EGC Mr J V Hoban
G3JJZ Mr D J S Newton
G3JKK Mr R M Allen
G3JWI Mr R M Page-Jones
G3JZF Mr J E Smith
G3KAX Mr G E Mackrell
G3KDN Mr D L Roberts
G3KEL Mr R Bray
G3KGB Mr R Robson
G3KGM Mr D Maclennan
G3KJX Mr B Alderson
G3KJY Mr J A York
G3KLH Mr D G Alexander
G3KLL Mr B Mercer
G3KLZ Mr D G Enoch
G3KRZ Mr J Greenwood
G3KTJ Mr G P Rigby
G3KUG Mr H Peabody
G3LAS Mr J B Butcher
G3LGA Mr M Hayward
G3MDC Mr G H Taylor
G3MZU Mr F B Breedon
G3NRZ Mr C A Hogg
G3PLR Mr D A Skye
G3RSB Mr R Scaife
G3TOE Dr T R Skrbic
G4DOE Mr J C Alford
GI3KYP Mr A D Patterson
GM3OYO Mr T I Kennedy
RS20842 Mr J H Birkett
W1JR Mr J H Reisert

53 YEARS

G2DGF Mrs D Sullivan
G3BRS Bury RS
G3CCX Mr P Craw
G3EBE Mr H G Wells
G3JFS Mr P C Cole
G3JIX Dr K L Smith
G3JKX Mr M J Street
G3JPB Mr C H Noden
G3KIP Mr K G Grover
G3KMG Mr D H Plumridge
G3KRX Mr W T Addy
G3KTU Mr J T A Ault
G3KZE Mr J D G Davies
G3KZN Mr D W Blakeley
G3LBA Mr R T Greenwood
G3LCB Mr R E Wolpers
G3LCS Mr D A Shepherd C.Eng. MIEE
G3LDI Mr R J Cooke
G3LDJ Mr K Day
G3LEQ Mr G L Adams
G3LGS Mr C B C Hill
G3LHJ Mr D Webber
G3LHZ Dr M J Underhill
G3LKZ Mr O Jackson
G3LLJ Dr A J Hodgkinson
G3LNM Mr R Scrivens
G3MFH Mr G Dale
G3NBQ Mr P T Burt
G3NUG Mr E N Cheadle
G3NWG Mr D W Stevens
G3RCU Mr C B Jones
G3RKQ Mr A J Balmforth
G3RXS Mr W G Scarlett
G3YNT Mr A R Stevenson
G4YAG Mr F A G Belfield
G5MW Medway ARTS
G8BTK Mr C W Harlow
G8FKY Mrs B A Long
G8HTN Mr A Kettlety
GI3CWY Mr E S Wilson
GJ3LFJ Mr H R Mesny
GM0UMJ Mr SFC Heerma Van Voss
GM3JKS Mr F Claytonsmith
GM3OWU Mr VW Stewart
VO1FB Dr JC Craig

52 YEARS

G2LW Crystal Palace REC
G3HKH Mr M Harrison
G3HMR Mr G B Moser
G3KKB Mr K D Hallam
G3KZX Mr L J Loveland
G3LAZ Mr R L Gerrard MBE
G3LDG Mr B E Gee
G3LDY Mr R D Taylor
G3LHN Mr R D Muir
G3LLK Mr J Gale
G3LLS Mr H Stockley
G3LOX Mr B M Johnson
G3LPS Mr E Pickering
G3LRP Mr P N Ackley
G3LUO Mr C H Evans
G3LYW Mr J F R Weston
G3MED Mr F A Griffiths
G3MES Mr A V Tillin
G3MGL Mr A V H Davis
G3MMK Mr M Firth
G3MPN Mr D E Johnson
G3MSW Mr K Ashcroft
G3MVZ Mr F E Garrett
G3NBN Mr R J Weaving
G3NCX Mr J H W Broomhead
G3NKQ Mr C R Burchell
G3NKS Mr D Thom
G3NML Mr M E Slater
G3NUA Mr J Hogg
G3NWU Mr J W Thompson
G3NXC Mr A B Plant MBE
G3NXT Mr W H Fletcher
G3OAG Mr S J Gilbert
G3OAK Mr C J Dempster
G3OEF Mr R M G Maule
G3OJQ Mr E D Wilson
G3OXG Mr D W Thompson
G3PEN Mr DJ Penny
G3PWJ Mr R W Fisher
G3RYQ Mr J G Eason
G3SUL Mr D E Waller
G3UHK Mr J E C Baldwin
G3XWK Mr W J C Pinnell
G3ZZX Mr A V Evans
G4MXU Mr J Juleff
G5XV Newbury & DARS
G8KZN Mr W Clinton
G8VMY Mr D B Whitfield
GM3LRG Mr J F Gray
GW3GRY Mr F L Wiseman
GW3LCQ Mr M Williams
GW3LXI Mr G H Price
ON4FP Mr H Mulkens
RS21408 Mr J E Orme
RS22834 Mr D A Dyke
RS25982 Mr R N Jones
SM7COS E Belrup
SP5HS K J Slomczynski
VK5QG Mr G E Southgate

51 YEARS

AP2NK Mr N H Khan
G0EVW Mr G R Watts
G0FXI Mr R J Oram
G0TKT Mr P K Hamblett
G2DQU The Lord Rix, CBE, DL
G2OA Southport & DARC
G3FOZ Mr J D Slater
G3FYX Mr R W Emery
G3GHN Clifton ARS
G3HTF Prof L W Barclay
G3HVA Mr D G Pinnock
G3IRQ Mr P M Rackham
G3IXZ Mr R T Bowden
G3JUY Mr A Mallinder
G3JVC Mr J E Cleeve
G3KUE Preston ARS
G3LNN Mr J E Symes
G3LQP Mr R Brown
G3LTF Mr P K Blair
G3LVW Mr R W B Smith
G3LWT Mr P W Buck
G3LYP Mr M D Scott
G3LYU Mr D T Price
G3MBM Mr J D Masters
G3MCV Mr B Vaughan
G3MCX Mr W J Kennedy
G3MEC Mr J S E Pearce
G3MEH Mr R E Piper
G3MEV Mr C N Cory
G3MGB Mr D B Smart
G3MHQ Mr E W Holt
G3MHT Mr E J Landon
G3MHV Dr T G Langdon
G3MLS Mr D Nappin
G3MMQ Mr J A Hedges
G3MMS Mr GA Whiting
G3MNB Mr H J Benjamin
G3MND Mr C B Wells
G3MRB Mr T L W Puryer
G3MRT Mr R A Strafford
G3MTR Mr B S Wolfe
G3MUO Mr G F Gott
G3MWO Mr D A Beales
G3MWQ Mr P J Groves
G3MWV Mr D G Blake
G3MXK Mr D R Paice
G3MXR Mr J Wood
G3NAE Mr C K Richardson
G3NAK Mr G Mallinson
G3NBC Mr K A V Hurrell
G3NBL Dr J E Larson
G3NCC Mr D J Cousins
G3NDI Mr C R Fry
G3NFB Mr J T Leviston
G3NNG C L Desborough
G3NNO Mr M T George-Powell
G3NRU Mr D B Foster
G3OBX Mr D A Bemister
G3OFX Mr R P Welch
G3OGE Mr J Rose
G3OHH Mr R A Hargreaves
G3OJI Mr J H Sleight
G3OJL Mr M W Plaster
G3OJX Mr A J Hobbs
G3OZY Mr G R Sweet
G3PSM Mr C J Thomas
G3PWB Mr I G Dufour
G3REP Mr R E Parkes
G3RKH Rev J L Marshall
G3RZG Mr M S Box
G3THM Mr L P Best
G3TUU Mr C R Keeble
G3UZB Mr J R Shewan
G3VGW Mr R I Buckby
G3WMQ Mr M D Watson
G4AZN Mr B M Crook
G4BP Scarborough ARS
G8HVV Mr C M Goadby
G8IXP Mr R J Lister
G8TVW Mr D H Young
GM3MXN Mr T Sorbie
GW3GFM Mr A N Lawes
GW3MZY Prof J D Last
GW3NJW Mr C Whelan
GW3PEX Mr L France
M0CTM Mr R D Pearson
RS26142 Mr W J M Hume
VK5NN Mr P M Williams
W7ACD Mr A C Doty Jr
ZS1PM Mr J R Blackman

50 YEARS

G2FFO Mr R Johnson
G3BIK Mr E Chicken MBE
G3BWY Mr W J Crossan
G3CPN Mr M J Stevens
G3CWV Mr C Wallis
G3EFX RS of Harrow
G3IOM Mr R L Chidzey
G3JDM Mr P J Wright
G3KKJ Mr A Shannon
G3KQQ Mr C A Mattacks
G3MME Mr P A Whitford
G3MPW Mr A S Walker
G3MWS Mr J T C Sladden
G3NAQ Dr G H Grayer
G3NDK R K Webb
G3NFP Mr L R Beckwith
G3NHX Mr G L Quarterman
G3NIL Mr G C W Munden
G3NKW Mr H White
G3NLY Mr R Smethers
G3NMH Mr H E Perkins
G3NPF Mr A C Wadsworth
G3NPL Mr E H Matthews
G3NQV Mr E S Collin
G3NSY Mr F J Hall
G3NXD Mr R C Shuck
G3NYX Mr J W Heaviside
G3OGP Mr R J Powell
G3OMS Dr R A Simpson
G3OND Mr J C Denman
G3OOU Mr R F Burns
G3OUF Mr D A Evans
G3OVT Mr F Collett
G3OYF Mr J G Wilcox
G3PDG Mr G J Petrie
G3PEK Mr B D Simpson
G3PGG Mr T A Wilson
G3PJK Mr J V Mee
G3PTB Mr A W Tomalin
G3PTM Mr A Griffiths
G3RBG Mr A L Gray
G3RGD Mr R G Dobdinson
G3RVD Mr I D Macey
G3SAS Mr J A Strutt
G3SVD Mr A P Hewitt
G3TTJ Lt Col J G Barber
G3TVW Mr H M Davison
G3UKM Mr M D Leighton
G3USC Mr M A Hall
G3UYM Mr H J Groves
G3VOF Mr M G Foster
G3WVY Mr P Beecroft
G3YEC Mr R H Edmondson
G3ZPB Mr PLA Burton
G4AFY Mr H R Perrin
G4DZW Mr A M Hockey
G4MAW Mr M A W Marment
G5LK Reigate ATS
G6GS Guildford & DRS
G8AGN Dr B Chambers
G8ALB Mr M J Bonner
G8ATK Mr M Hearsey
G8AXA Mr M G Wallace
G8BCA Mr R H Chambers
GM3NEC Mr C S Miller
GM3NHQ Mr T Harrison
GM3PIP Mr P I Park
GW3LNR Mr A E Gwynne
GW3NAS Mr W K Ginder
GW3OCD Mr V A Davies
GW6TM Conwy Valley ARC
HB9ANY Dr B G Taylor
KG6XF Mr E J Kelly
R.S.Z. RS of Zambia
RS22502 Mr G G Gemmill
RS25603 Mr H J Randall
RS27261 Mr D M Willoughby
VK3AVT Mr P Cheung

WATERS & STANTON

W&S working in harmony for Ham Radio

MFJ *The world's largest ham radio accessory manufacturer.*

BS OHSAS 18001:2007 REGISTERED FIRM

"For The 5th Year, The World's Largest MFJ Dealer!" *says Martin Jue, MFJ President.*

MFJ ask all customers to check the UK warranty card & serial number are in the box. It is your safeguard for correct operation. UK accessories & warranty.

Waters & Stanton are pleased to be able to offer you New Lower Prices on many MFJ products!

MFJ-269 HF/VHF/UHF ANALYSER

* *Frequency Coverage 1.8-4, 4-10, 10-27, 27-70, 70-114, 114-170, 415-450MHz*
* *Frequency Counter*
* *LCD readout*
* *SWR & impedance meters*
* *Connectors: N-socket (Ant), BNC (Counter)*
* *Supply: AAx10 Cells or ext. 12V DC*
* *Size 103 x 173 x 60mm*
* *Weight 750g*

W&S £349.95 C

MFJ-259B DIGITAL SWR ANALYSER

* *Frequency Coverage 1.8-170MHz*
* *Frequency Counter*
* *LCD readout*
* *SWR & impedance meters*
* *Connectors: SO-239 (Ant), BNC (Count)*
* *Supply: AA Cells or ext. 12V DC*
* *Size 103 x 173 x 60mm*
* *Weight 750g*

W&S £279.95 C

MFJ Dummy Loads

MFJ-260C

MFJ-267

MFJ-260C	0-500MHz 300W SO-239	£44.95 C
MFJ-260CN	0-600MHz 300W "N" type	£53.95 C
MFJ-264	0-600MHz 1.5kW S0-239	£75.95 C
MFJ-264N	0-650MHz 1.5kW SO-239	£84.95 C
MFJ-267	0-60MHz 1.5kW with meter	£159.95 C

MFJ Indoor Loop Tuners

These loops rival full-size dipoles and are extremely quiet.. Our director, G3OJV, has worked VKs and Ws using 50W indoors on SSB!

All tuners cover 7-30MHz 300W

MFJ-933 (top) 7 - 30MHz loop tuner **£194.95 C**

MFJ-935B (middle) similar to MFJ-933 + with meter **£212.95 C**

MFJ-936B (bottom) for home or portable with large cross-needle meter **£249.95 C**

Just add a wire loop for 1.5 frequency span. eg 13ft of wire bent into loop = 30-20metres.

MFJ-57B 20/15m loop **£36.95 C**

MFJ-58B 20-10m loop **£54.95 C**

MFJ-962D 1.5kW 1.8-30MHz ATU

- *Standard 'T' network*
- *VSWR meter*
- *0-200/0-2kW*
- *6-way Antenna/load switch*
- *Balanced feeder terminals*
- *Roller coaster Inductor*

W&S £289.95 C

MFJ-969 300W 1.8-54MHz ATU

- *'T' match network*
- *Coax, balanced and end fed antennas*
- *Built-in dummy load*
- *Roller coaster inductor*
- *Very accurate Average/ PEP meter*
- *3-way antenna switch*

W&S £209.95 C

MFJ-902 TINY TRAVEL TUNER 1.8-30MHz

This Ultra compact tuner covers 3.5-30MHz up to 150W and matches coax or wire. Size: 11.5 x 5.7 x 5.7cm

W&S £99.95 C

MFJ-904 TINY TRAVEL TUNER 1.8-30MHz

The same as the MFJ-902 above but with large cross-needle VSWR/PWR meter.

W&S £129.95 C

MFJ-941E 1.8-30MHz ANTENNA TUNER

* *300W*
* *Cross needle meter*
* *VSWR & 30/300W pwr meter*
* *Size 260x180x70mm*
* *Weight 1.6kg*

W&S £139.95 D

MFJ-945E 1.8-54MHz MOBILE ATU

* *300W max*
* *Cross needle meter*
* *VSWR & 30/300W power meter*
* *Size 210 x 150 x 60mm*
* *Weight 865g*

W&S £129.95 C

MFJ-976 BALANCED LINE ATU

* *1.8MHz - 30MHz * 1500W PEP*
* *Matches 600 Ohm open wire, 450, 300 Ohm ladder lines, 300/72 Ohm twin, coax & random wires*
* *Size 310x180x410mm*
* *Weight 4kg*

W&S £469.95 D

MFJ-921 2m VHF ATU 200W

W&S £96.95 C

MFJ-924 70cms UHF ATU 200W

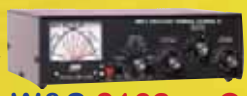
W&S £96.95 C

MFJ-834 RF CURRENT METER 1.8-30MHZ

* *Current: 0.3A, 1A, 3A*
* *Sockets: SO-239*
* *Calibrated RF ammeter (3in meter)*
* *Size: 140 x 86 x 79mm*
* *Weight: 425g*

W&S £84.95 C

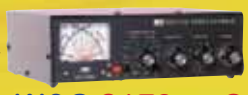
MFJ-948 1.8-30MHz ANTENNA TUNER



* *300W*
* *Large cross needle meter*
* *30/300W PEP power meter*
* *Size 260 x 190 x 83mm*
* *Weight 1.65kg*

W&S £162.95 C

MFJ-949E 1.8-30MHz ATU / DUMMY LOAD



* *300W*
* *Large cross needle meter*
* *30/300W PEP power meter*
* *Size 260 x 190 x 83mm*
* *Weight 1.8kg*

W&S £179.95 C

MFJ-901B 1.8-30MHz "VERSA TUNER"

* *200W rating*
* *Size 135 x 150 x 60mm*
* *Weight 760g*

W&S £109.95 C

MFJ-704 LOW PASS FILTER

* *1.8-30MHz 1kW max*
* *Less than 0.5dB loss*
* *SO-239 Sockets*

W&S £66.95 C

MFJ AUTO ATUs

The Inside Story!
MFJ are the largest ham radio tuner manufacturer. The atu insertion loss is extremely low when compared with other models - something not a lot of people appreciate! So the largest manufacturer with the widest range and the lowest loss makes sense!

MFJ IntelliTuners™ from USA

"The world's fastest ultra wide tuning range"

All models offer coax, wire and balanced

MFJ-998E *1.5kW AUTO TUNER*

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

W&S £649.95 C

MFJ-926 AUTO TUNER 1.8-30MHz 200W

Tough all-weather tuner for hams and marine use. Ideal for end fed wires, this is really fast! Requires 10W min input.

W&S £419.95 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-925 AUTO TUNER 1.8-30MHz 200W

The new ultra small auto atu that sits snuggly with IC-706, FT-857, IC-7000 etc. Use with coax or wire. Great for mobile or base station use.

W&S £169.95 C

MFJ-991B AUTO ATU 1.8-30MHz

* *Frequency: 1.8-30MHz*
* *150W SSB, 100W CW*
* *Matches 6 - 3200 Ohms*
* *Cross needle SWR/PWR meter*

W&S £209.95 C

MFJ-993B AUTO ATU 1.8-30MHz

* *Frequency: 1.8-30MHz*
* *300W SSB, 150W CW*
* *Matches 6 - 1600 Ohms*
* *Cross needle SWR/PWR*

W&S £249.95 C

MFJ-994B AUTO ATU 1.8-30MHz

* *Frequency: 1.8-30MHz*
* *600W SSB, 300W CW*
* *Matches 6 - 800 Ohms*
* *Cross needle SWR/PWR meter*

W&S £339.95 C

Branches:

Hockley
Waters & Stanton, 22 Main Road, Hockley, Essex, SS5 4QS.
Tel: 01702 206835 Fax: 01702 205843 Email: sales@wsplc.com

Glenrothes
W&S @ Jaycee Electronics, 20 Woodside Way, Glenrothes, Fife, KY7 5DF
Tel: 01592 756962 Fax: 01592 610451 Email: jayceecoms@aol.com

HF Antenna Selection

Diamond BB7V

* *HF 2 - 30MHz Base Vertical*
* *No radials needed*
* *250W PEP 6.7m length*
* *VSWR less than 2:1*
* *Weight 2.3kg*
* *50 Ohms SO-239*

Ideal antenna where space is restricted & no ground plane available, Erects in minuites.
£325.95 D

Diamond BB6W

* *HF 2 - 30MHz End Fed Wire*
* *No radials needed*
* *250W PEP 6.4m length*
* *VSWR less than 2:1*
* *Weight 0.8kg*
* *50 Ohms SO-239*

This is a beautifully engineered end fed wire system that is very compact and could also be great for indoor attic use.
£194.95 D

Diamond W-735 Short 80/40m Dipole

This is a superbly built loaded dipole for 80 and 40m. Overall length reduced from normal dipole dimensions by use of load coils rather than traps. Antenna contains all parts from load coils, pre-cut antenna.
£99.95 D

Radio Works USA G5RV-PLUS

£79.95 C

* *80 - 10m (Inc WARC)*
* *Length: 31m (102ft)*
* *Feeder: 50 Ohms*
* *Matching: Y1-5K Precision Balun*
* *Transmatch: Required*
* *SWR: Low • Power: 1.5kW*
* *Extra strong ladder line: 9.4m (31ft)*

Well engineered, tough design, 1kW balun & proper feeder!

Radio Works USA Carolina Windom CW-80

The most famous all-band windom ever. A coax fed dipole that is fed off centre, with kW balun, line isolator & works all bands (inc ARC) 80m-10m. No traps. The short vetical feed section is forced to radiate & gives great low angle radiation. Total length approx 134ft. Can be bent to fit garden.
£129.95 D

WDC-50 Dipole Centre

A dipole centre piece with SO-239.
£6.95 A

WDC-300 Ribbon Centre

Dipole centre piece for 300 Ohm ribbon feeder.
£5.95 A

INSUL-8L Insulator

Dog bone insulator.
£1.50 A

BU-55 Balun

Combined dipole centre & balun. 1kW 3MHz - 75MHz.
£44.95 A

High Sierra Mobiles

^ PLATINUM ANTENNA **^ SIDEKICK**

The world's finest automatic mobile antennas with a radiation efficiency unmatched by any other!

The **SIDEKICK** fits any car in seconds **£399.95 D**
This antenna includes 12V electronic control box & cable. Mount it on our three-way mag mount - its that easy!

* *3.5-60MHz*
* *1.5:1 or less typical SWR*
* *200W to the antenna*
* *High-Q phenolic coil*
* *Black Hawk MotorTM*
* *Control box and filter*
* *Standard 3/8in base*
* *Remote control Box*
* *Stainless steel whip*
* *DC cable assembly*
* *Requires 12V DC*
* *Size: 1.2 - 1.37m*
* *Weight: 907g*

W-300T 3-Way Mag Mount for Sidekick **£39.95 C**

The 2KW **PLATINUM** **£549.95 D**
From 80m to 6m with VSWR of 1.5:1 or better, it outclasses everything - includes control box & cable.

The HS-1800/Pro is High Sierra's very latest version of their "all-band" 80m to 10m variable frequency mobile whip. With a coil nearly 5cm (2in) diameter, and a matching unit built into the Universal Mount Bracket, nothing out performs it and nothing approaches its standard of engineering. This really does radiate a potent signal. With 100 Watts, contacts are as easy as from a base station. The secret is in its amazing efficiency. We measured up to 6dB power gain compared with a simple helical - and you don't have to get out of the car to change bands!

GAP Antennas

Challenger-DX 8-band HF-VHF(illustrated)

* *Bands: 80, 40, 20, 15, 12, 10, 6, 2m. • 2kW PEP SSB*
* *VSWR: Better than 2:1 • 3/8 wave basic concept*
* *Height 9.6m (31.5ft) • Radials 3 x 7.6m (25ft)*
* *3ft drop-in ground socket supplied*
* *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 3 x 17.4m (57ft) • Requires guys - brackets supplied • 2ft ground pivot assembly included*
* *Weight 13.6kg*

£389.95 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*
* *Support pipe user supplied (31.75mm max)*
* *Weight: 4.9kg.*

£329.95 D

MFJ Compact Loop Antennas

MFJ-1788X £489.95 D

* *7 - 22MHz (40 - 15m)*
* *Size: <1m (36in) loop*
* *Feeder: 50 Ohms*
* *Power: 150W*
* *Remote control included*
* *Auto band selection*
* *Dual Fast/Slow tune buttons*
* *Built-in cross-needle VSWR/Wattmeter*

MFJ-1786X

* *10 - 30MHz*
* *Size: <1m (36in) loop*
* *Feeder: 50 Ohms*
* *Power: 150W*
* *Remote control included*
* *Auto band selection*
* *Dual Fast/Slow tune buttons*
* *Built-in cross-needle VSWR/Wattmeter*

£449.95 D

Watson Antennas Bargain Prices!

Pre-tuned & Weather Sealed Fibre-glass Encapsulation

W-30 2m/70cms 3/6dB length 1.15m 150W SO-239 **£49.95 C**

W-50 2m/70cms 4.5/7.2dB length 1.8m 150W SO-239 **£54.95 C**

W-300 2m/70cms 6.5/9dB length 3/1m 150W SO-239 **£74.95 D**

W-2000 6m/2m/70cms 2.15/6.2/8.4dB length 2.5m 150W **£89.95 C**

Watson Mobile Whips Bargain Prices!

Watson mobile antennas are made to a high specification and employ stainless steel whip sections with SO-239 receptors. All models are pre-tuned and will withstand at least 100 Watts RF.

W-2LE	2m 0dBv length 0.48m	**£10.95 C**
W-285	2m 3.4dBv length 1.33m	**£14.95 C**
W-77LS	2m/70cm 0/2.4dBv length 0.43m	**£14.95 C**
W-770HB	2m/70cm 3/5.5dBv length 1.1m	**£19.95 C**
W-7900	2m/70cm 5/7.5dBv length 1.58m	**£31.95 C**
W-627	6/2/70cm 2/4.5/7.2dBv length 1.6m	**£34.95 C**

WSM-270 Dual Band Mag Mount whip.
Ideal for use with handhelds or for occasional mobile. Just place it on the roof of the car and connect the 3m thin RG coax cable (terminated in BNC connector) to your radio. (cable adaptors available for all radios - extra).
£19.95 C

SGC Auto ATU

SG-237

* *Frequency 1.8 to 60MHz*
* *Power input 3-100W (PEP) 40W max CW*
* *VSWR: <1.4:1 (typical)*
* *Antenna: Min length 2.4m 3.5-60MHz, min length 7m 1.8-60MHz*
* *Input impedance range 45 - 55 Ohms*
* *Output: Ceramic terminal*
* *DC supply 13.8V DC 0.3A*
* *Fully waterproof housing*
* *Size: 178 x 229 x 38mm*
* *Weight: 0.9kg*

£319.95 C

Hustler Antennas - New Low Prices!!!

Largest Stock Of Hustler Antennas In The UK!

HF Vertical Antennas

Works amazingly well even without any radials. Just insert a 1m earth stake into the ground and enjoy DX from the smallest of Gardens.

Spec.	6-BTV	5-BTV	4-BTV
No. Bands	6	5 4	
Bands	80,40,30,20, 15,10m	80,40,20, 15,10m	40,20,15, 10m
Width	Full	Full	Full
Width 80m	100kHz	100kHz	N/A
VSWR	1.15:1	1.15:1	1.15:1
Power	1kW	1kW	1kW
Base (mm)	44.45	44.45	44.45
Height (m)	7.3	7.64	6.52
Weight (kg)	7.48	7.7	6.8

6-BTV Was: £289 **Now: £249**
5-BTV Was: £249 **Now: £219**
4-BTV Was: £209 **Now: £179**

Hustler Antennas

A complete range of single band antennas. Purchase a base whip section and then as many resonators as you need. These are amazingly efficient and rated at 200W.

Base Whip Sections

Model		
MO-1	137cm Folds 1/3rd Up	**£38.95 C**
MO-2	137cm Folds Halfway Up	**£38.95 C**
MO-3	137cm Non Folding	**£29.95 C**
MO-4	67cm Non Folding	**£26.95 C**

Resonator Heads

Model	Band	Bandwidth	
RM-10	10m	150-250kHz	**£21.95 C**
RM-11	11m	150-250kHz	**£21.95 C**
RM-12	12m	90-120kHz	**£21.95 C**
RM-15	15m	100-150kHz	**£21.95 C**
RM-17	17m	120-150kHz	**£26.95 C**
RM-20	20m	80-100kHz	**£26.95 C**
RM-30	30m	50-60kHz	**£29.95 C**
RM-35	40-30m	7-10MHz	**£29.95 C**
RM-40	40m	40-50kHz	**£29.95 C**
RM-50	60-40m	5-7MHz	**£29.95 C**
RM-60	60m	5MHz	**£32.95 C**
RM-80	80m	25-30kHz	**£32.95 C**

Fact Not Fiction -

We Stock The Range Of Hustler Products - We're Not Cherrypickers!

H422 Rotary Dipole
Covers 40/20/15/10M

Assemble in either "V" or Horizontal ("H") configuration, 2 kW Balun and heavy duty Hardware included.

Both lightweight and compact it's the perfect choice for Home, portable, or Dxpedition use.

- Freq bands: 7, 14, 21, 28 MHz
- Impedance: 50 Ohms nominal
- Input connector: SO239
- Power rating: 1kW PEP
- Max wind speed: 35m/sec
- Length: 10.4m (straight), 7.4m (V)
- Weight: 5.4kg
- Suitable mast dia: 38-62mm

£269.95
P&P £10 (UK Mainland only)

Tri-Band Antennas
Covering 144/430/1200MHz

Base

GP93 Gain: 4.5/7.2/10.00 dBi
1.78 mtrs long.....£89.95

GP95 Gain: 6.00/8.6/12.80dBi
2.42 mtrs long.....£109.95

Mobile

SB92 Gain: 0/2.15/5.5dBi
0.39 mtrs long.....£37.95

SB94 Gain: 2.15dBi/5.1dBi/7.2dBi
0.6 mtrs long.....£39.95

SB97M Gain: 3.0dBi/6.8dBi/9.6dBi
1.32 mtrs long.....£44.95

CWA 1000
Trapped Dipole

- Operating bands: 80, 40, 20, 15, 10m
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'I am the Platform's Radio and Telecomms engineer and work MM0GKB/P when on rota 2 on and 3 off, the locator being IO98UK. The performance is excellent with max VSWR on a few bands approx 1.5 : 1, radio is KW 570DGE @ 100W o/p and I use CW only. You will notice near base of antenna a slight bend this due to a whack from a container on crane some time ago, must say the antenna is one hell of a strong 'beast' taking into consideration the batterings it takes from the weather.I have been in the radio industry approx 40 years built my first record player at age 13, went to sea for some time merchant navy as radio & electronics officer, worked in television engineering for some time and eventually ended up in the oil industry looking after radio systems, sat comms etc'.

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The 2009 RSGB IOTA Contest

The IOTA contest proved more popular than ever, with over 2000 entries received

Members of the NA-128 Contest Group put CG200I on the air from Ile Verte in the IOTA Contest to commemorate the 200th anniversary of the lighthouse.

BETTER CONDITIONS. For once the propagation gods smiled on the contest, at least in Europe, with rather better conditions on the high bands than we have seen in recent years, mainly due to some fortuitous Sporadic-E bringing 10m to life. Things were harder for stations entering from other parts of the world and several West Coast US stations remarked on the lack of Pacific contacts to be worked. Most transatlantic contacts took place on 20 and 40m, while there was a reasonable 20m opening to Japan from the UK on the Saturday evening.

STATISTICS. The improved propagation was probably one factor that propelled the number of entries to more than 2000 for the first time (2028 at the final count). IOTA certainly ranks nowadays as one of the leading multimode contests in the international calendar. 275 photos were uploaded, along with 1109 geo-Tags (links to Google maps). The database contains 588,237 QSOs, of which 324,082 were on CW and 264,155 on SSB, an interesting statistic considering that the IOTA Contest started as an SSB-only event and CW was something of a later addition. 20 and 40 metres carried the bulk of the QSOs (291,334 and 149,420 respectively) although some 29,326 QSOs took place on 10m, despite the lack of F-layer propagation. 198 IOTA references appeared in adjudicated logs, so there was plenty of scope to add to your island scores for the various IOTA awards. We were able to adjudicate 69.4% of QSOs in the database (because we had logs for both sides of these contacts), a similar figure to the previous year. As in recent years, the logs will be uploaded to the IOTA awards database so that validated contest QSOs can be counted towards IOTA awards. Unfortunately, we cannot help if you are wanting to claim a contact with someone who hasn't submitted a log, so do encourage fellow participants to upload their logs after the contest.

RESULTS. Having won the island multi-op category last year, the Bristol Contest Group, once again operating as GJ6YB from Jersey, EU-013, were squeezed into second place by the IS0/OM8A team, operating from Sardinia, EU-024. It was tight, though. The Sardinian group were ahead by a reasonable margin on claimed scores, but after adjudication it was down to a margin equivalent to one QSO or a single multiplier. This was real nail-biting stuff. Sadly, Jozef, OM3NA, one of the IS0 team members, died just a week after the contest. The next three scores in the multi-op section were also made from the British Isles, MD4K (Isle of Man EU-116), M8C (Scillies EU-011) and GM7V (Benbecula EU-010), so Jersey, Isle of Man, Scotland and England all appeared in the top five, quite a change from those years when the contest has appeared to be dominated by teams operating from southeast Europe. Of those five, all but MD4K qualified as expeditions under the quite stringent expedition rules. It's quite a task to mount an expedition for the weekend and still come out ahead of so many well-equipped permanent stations. Low power expeditions are a different sort of challenge, given that they are limited to 100 watts and single-element antennas. The leading stations were UU7J/P (Kosa Tuzla EU-180), CR3R (Chao, AF-046) and AM1M (Mouro EU-142) respectively, a very different geographic spread from the high-power leaders, perhaps suggesting that it's tough to command the bands from more northern climes when you have less power and antenna gain at your disposal.

Congratulations also to all the leading stations in the various single-operator and non-island categories. A full results listing will appear in a forthcoming Sport Radio Yearbook, and can also be found on the IOTA contest website.

Looking through the results and Soapbox comments, a number of themes become apparent. While discussions on the various contest reflectors sometimes seem to suggest that the only reason people enter contests is to win, this is far from being the case, at least in IOTA. Many come on to add to their island scores or to give an extra slant to their summer holiday by activating an island, even if in a modest way. And it's certainly not true that the majority of entrants are running high power and big antennas. By far the majority, in fact, are running 100 watts or less and using wire antennas and/or verticals. A remarkable number were using the popular FT-817 or other QRP rig, with 104 QRP entries in all. Several of these boasted solar

Nobby, G0VJG on the run station at M8C.

Juri, ES5GP activated the island of Kihnu as ES5GP/8.

DXpedition from EU-031 Capri Island callsign IC8/IW8EHK.

F/OT3T (Chausey Island) DXpedition with Jacques, ON5OO, Carine, ON7LX and Jean-Jacques, ON7EQ.

energy as their power source. But bear in mind that verticals close to salt water work amazingly well, with several dB additional gain (or, perhaps more accurately, lower loss) compared with their land-bound counterparts, and the IOTA contest is an ideal occasion to play this to advantage.

While some major contests wrestle with the possibility of separate sections for entrants who do not have a full 48 or 24 hours available, the 12-hour sections in IOTA are now well established and continue to be extremely popular and, indeed, help to keep the contest interesting as there is a steady influx of 'new blood' as the contest progresses. There is quite a strategy element to the 12-hour sections, too, deciding when to operate and when to take off times. Given that, within Europe, you really need to catch those close-in multipliers, the night hours on 80 and 40 are especially important. Getting the strategy between 'running' and 'search-and-pounce' can also be particularly difficult to get right in the 12 hour section.

We do thank those rarer stations who come on for the contest and this year VK9IR (Norfolk Island) was especially noteworthy, the VK9NI team taking time out of their expedition to hand out some contest contacts. It continues to be tough entering the IOTA contest from these more distant parts and it will certainly be nice when we get some long-haul propagation back on the high bands, 15m in particular. Apart from the UK, the other major centre of amateur activity where all the amateurs are on an island is Japan, and it does help when European entrants have good JA propagation. Mind you, I was a bit mystified by the Japanese entrant who said he planned to operate from an island in future IOTA contests – as I say, Japanese amateurs share, with UK, Australian and New Zealand entrants (among others), that they are, by definition, on a valid IOTA counter.

DISCUSSIONS FOR THE FUTURE. Which raises an interesting question. A few entrants each year query why, in an IOTA contest, contacts between non-island stations count for points. The main reasoning is that, for those who are a long way from island activity, there is something to keep their interest level up when they have no propagation to any islands. But maybe now that the contest is so popular, with a constant stream of stations to work, the time has come to review this rule. Your thoughts are always welcome. There are also occasional calls for a multi-multi category, to allow island expeditions to give out a much larger number of contacts in the course of the weekend. Again, this is subject to review but we have tended to fight shy of such a move to avoid the situation that prevails in some international contests where the big multi-multis seem to occupy every slot on every band.

One of the most consistent entrants in the contest, Murphy, once again put in an appearance. Indeed, he showed up at a number of stations judging by their Soapbox comments. He seems to have an effect on transceivers, linears, antennas and, perhaps most of all, on PCs. He must be quite a character!

Once again, the Mediterraneo DX Club of Italy ran an SWL competition in parallel with the IOTA contest and results appear on their website. We thank them for taking on this activity.

This short report can only give a flavour of the event and the results. Full results were posted on the Internet some time ago, along with soapbox comments, photographs and links to both *Google Maps* and *YouTube*.

OBSERVATIONS. The reduction in the submission deadline to three weeks didn't seem to present any problems, with by far the majority of logs arriving within the first few days after the contest. This is good for everyone, as we are able to start the adjudication process as soon as we have more than one log in the database. As a result we were, once again, able to have preliminary results available for the RSGB Convention.

Generally speaking, logs continue to improve year on year, in that there are fewer where we need to contact the senders for clarification or other issues. One recurring theme, though, is that some 12-hour entrants turn out to have operated for rather more than the 12 hours. This is almost always because they are using a logging programme that recognises breaks of 15 minutes or more as an 'off' time, whereas the IOTA contest rules specifically require off times of at least an hour. As always, it pays to read the contest-specific rules beforehand.

One issue that was quite critical this year, as it could have changed some leading positions, was that a few key QSOs in leading logs were disallowed because they did not appear in the corresponding station's log. There is evidence that at least some of these QSOs actually took place but were probably omitted from the other (multi-op station) log because they were inadvertently made by the multiplier station and later found not to be multipliers. A weakness of the Cabrillo format is that it does not allow a QSO to be marked

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M8C antennas, with the sea-path to the east just beyond. Several team members camped in the field. L to R: TET tribander up 50ft, 6m Yagi, Butternut spotting antenna, 10/15m quad up 40ft.

Lisa Leenders, PD2LLS (now PA2LS) operating from Waspik in The Netherlands.

as non-scoring but we would ask, please, that entrants leave all QSOs in your logs and, if necessary, make a note in the Soapbox that certain QSOs should not be scored.

SDI by EI5DI was by far the most popular logging program, with N1MM and Win-Test also in use (mainly by multi-op stations, which SDI does not support). Paul, EI5DI has always supported the IOTA contest very well, including creating a master file of announced expeditions prior to the contest and deserves our thanks for his continued efforts.

As always, please ensure that you check the rule changes before this year's contest though, at the time of writing, no changes are anticipated.

2010 CONTEST. The 2010 contest takes place, as always, on the last full weekend of July, 24th / 25th, from midday UTC on the Saturday for 24 hours. Make a note in your diaries now.

THANKS. My thanks to all who helped make the 2009 IOTA contest a success, including MM0BQI, G0WWW/5B4WN, GM4UYZ, G4OGB, G3YMC, G3LZQ, IK2QEI, MDXC, the RSGB Contest Committee, the various trophy sponsors including principal IOTA sponsor Icom, Alison at HQ, to those who sent in checklogs and, of course, the entrants themselves.

WEBSEARCH

RSGB Contest Committee: www.rsgbcc.org
IOTA Awards Programme: www.rsgbiota.org
MDXC: www.mdxc.org/
Results Page:
http://iotacontest.com/contest/iota/2009/finalScore.php

QTH at EU-177 Aspo of SM5ELV/5.

SOAPBOX EXTRACTS

The teams who go out to islands to put them on the air for this contest deserve special praise – there were some big signals from portable efforts and this makes the contest all the more fun. Thanks to everyone who made the effort to go somewhere special and to everyone for the QSOs. A great contest, which should be mind-blowing when we get some sunspots back. – G3BJ.

We are not world beaters but by heck we do have fun. That's what radio contests should be. – GW8K.

C6APR entered the Multi-Op Expedition category. It was the team's third IOTA contest from the Crooked Island Lodge at Pittstown Point, Crooked Island. Each year we try different rigs and antennas. This time we had a 3-element beam at 40 feet fixed on Europe and another 3-element beam at 30ft fixed on US/Japan. For 10m and 15m we had phased R5s. We caught some 10m opening this year. Again the 40m phased Butternuts performed very well. For 80 we had a 55 foot mast. Being on a peninsula (FL22tt) helps our signal too. The 40m and 80m night time QRN made digging out the calls a challenge. Our raw score is up almost 30% over last years raw score. The rigs were two K3s and the software was N1MM Logger. The staff at Crooked Island Lodge were very accommodating. We had excellent meals and the management and staff were very friendly. – C6APR

(The C6APR operators were W2GJ, K3IXD, W3PP and K4QO. All four died in a plane crash on 21 October while returning to Crooked Island for the CQWW Phone Contest – RIP.)

RSGB Band Plan 2010

The following band plan is largely based on that agreed at the 2008 IARU Region 1 General Conference with some local differences on frequencies above 430MHz.

EFFECTIVE FROM 1ST JANUARY 2010 UNLESS OTHERWISE SHOWN.

136kHz	NECESSARY BANDWIDTH	UK USAGE
135.7-137.8kHz	200Hz	CW, QRSS and Narrow-Band Digital Modes

Licence Notes: 1W (0dBW) EIRP
R.R. 5.67B: The use of the band 135.7-137.8kHz in Algeria, Egypt, Iran (Islamic Republic of), Iraq, Lybian Arab Jamahirya, Lebanon, Syrian Arab Republic, Sudan and Tunisia is limited to fixed and maritime mobile services. The amateur service shall not be used in the above-mentioned countries in the band 135.7-137.8kHz and this should be taken into account by the countries authorising such use (WRC-07).

1.8MHz (160m)	NECESSARY BANDWIDTH	UK USAGE
1810-1838kHz	200Hz	Telegraphy
1838-1840	500Hz	Narrow Band Modes
1840-1843	2.7kHz	All Modes
1843-2000	2.7kHz	Telephony (Note 1), Telegraphy 1836kHz QRP (low power) Centre of Activity, 1960kHz DF Contest Beacons (14dBW)

Note 1: Lowest LSB carrier frequency (dial setting) should be 1843kHz. AX25 packet should not be used on the 1.8MHz band.
Licence Notes: 1810-1850kHz – Primary User. 1810-1830kHz on a non-interference basis to stations outside of the UK. 1850-2000kHz – Secondary User.
Notes to the Band Plan: As on page 27.

3.5MHz (80m)	NECESSARY BANDWIDTH	UK USAGE
3500-3510kHz	200Hz	Telegraphy - Priority for Inter-continental Operation
3510-3560	200Hz	Telegraphy - Contest Preferred. 3555kHz - QRS (slow telegraphy) Centre of Activity
3560-3580	200Hz	Telegraphy 3560kHz - QRP (low power) Centre of Activity
3580-3590	500Hz	Narrow Band Modes
3590-3600	500Hz	Narrow Band Modes - Automatically Controlled Data Stations (unattended)
3600-3620	2.7kHz	All Modes - Automatically Controlled Data Stations (unattended), (Note 1)
3600-3650	2.7kHz	All Modes - Phone Contest Preferred, (Note 1). 3630kHz - Digital Voice (DV) Centre of Activity
3650-3700	2.7kHz	All Modes - Telephony, Telegraphy 3663kHz may be used for UK Emergency Comms Traffic 3690kHz SSB - QRP (low power) Centre of Activity
3700-3800	2.7kHz	All Modes - Phone Contest Preferred 3735kHz - Image Mode Centre of Activity 3760kHz - IARU Region 1 Emergency Centre of Activity
3775-3800		Priority for Inter-Continental Telephony (SSB) Operation

Note 1: Lowest LSB carrier frequency (dial setting) should be 3603kHz.
Licence Notes: Primary User. Shared with other user services.
Notes to the Band Plan: As on page 27.

7MHz (40m)	NECESSARY BANDWIDTH	UK USAGE EFFECTIVE 29 MARCH 2009
7000-7025kHz	200Hz	Telegraphy, Contest Preferred Segment
7025-7040	200Hz	Telegraphy, 7030kHz – QRP (low power) Centre of Activity
7040-7047	500Hz	Narrow Band Modes
7047-7050	500Hz	Narrow Band Modes - Automatically Controlled Data Stations (unattended)
7050-7053	2.7kHz	All Modes - Automatically Controlled Data Stations (unattended), (Note 1)
7053-7060	2.7kHz	All Modes, Digimodes
7060-7100	2.7kHz	All modes, digital voice 7070kHz, SSB QRP Centre of Activity 7090kHz, SSB contest preferred
7100-7130	2.7kHz	All Modes, 7110kHz - Region 1 Emergency Centre of Activity
7130-7200	2.7kHz	All Modes, SSB Contest Preferred Segment, 7165kHz - Image Centre of Activity
7175-7200	2.7kHz	All Modes - Priority For Intercontinental Operation

Note 1: Lowest LSB carrier frequency (dial setting) should be 7053kHz.
Licence Notes: 7000-7100kHz Amateur and Amateur Satellite Service – Primary User.
7100-7200kHz Amateur Service – Primary User.
Notes to the Band Plan: As on page 27.

10MHz (30m)	NECESSARY BANDWIDTH	UK USAGE
10,100-10,140kHz	200Hz	Telegraphy (CW) 10,116kHz - QRP (low power) Centre of Activity
10,140-10,150	500Hz	Narrow Band Modes Automatically Controlled Data Stations (unattended) should avoid the use of the 10MHz band

Licence Notes: Amateur Service – Secondary User.
Notes to the Band Plan: As on page 27.
The 10MHz band is allocated to the Amateur Service only on a Secondary basis. The IARU has agreed that only CW and other narrow bandwidth modes are to be used on this band. Likewise, the band is not to be used for contests and bulletins. SSB may be used on the 10MHz band during emergencies involving the immediate safety of life and property, and only by stations actually involved with the handling of emergency traffic. The band segment 10,120-10,140kHz may only be used for SSB transmissions in the area of Africa south of the equator during local daylight hours.

14MHz (20m)	NECESSARY BANDWIDTH	UK USAGE
14,000-14,060kHz	200Hz	Telegraphy - Contest Preferred 14,055kHz - QRS (slow telegraphy) Centre of Activity
14,060-14,070	200Hz	Telegraphy 14,060kHz - QRP (low power) Centre of Activity
14,070-14,089	500Hz	Narrow Band Modes
14,089-14,099	500Hz	Narrow Band Modes - Automatically Controlled Data Stations (unattended)
14,099-14,101		IBP - Reserved Exclusively For Beacons
14,101-14,112	2.7kHz	All Modes - Automatically Controlled Data Stations (unattended)
14,112-14,125	2.7kHz	All Modes (excluding digimodes)
14,125-14,300	2.7kHz	All Modes - SSB Contest Preferred Segment 14,130kHz - Digital Voice (DV) Centre of Activity 14,195 ±5kHz Priority for DXpeditions 14,230kHz - Image Centre of Activity 14,285kHz - QRP (low power) Centre of Activity
14,300-14,350	2.7kHz	All Modes 14,300kHz - Global Emergency Centre of Activity

Licence Notes: Amateur Service – Primary User.
Notes to the Band Plan: As on page 27. 14,000-14,250kHz Amateur Satellite Service – Primary User.

18MHz (17m)	NECESSARY BANDWIDTH	UK USAGE
18,068-18,095kHz	200Hz	Telegraphy - 18,086kHz QRP (low power) Centre of Activity
18,095-18,105	500Hz	Narrow Band Modes
18,105-18,109	500Hz	Narrow Band Modes - Automatically Controlled Data Stations (unattended)
18,109-18,111		IBP - Reserved Exclusively For Beacons
18,111-18,120	2.7kHz	All Modes - Automatically Controlled Data Stations (unattended)
18,120-18,168	2.7kHz	All Modes, 18,130kHz SSB QRP (low power) Centre of Activity 18,150kHz - Digital Voice (DV) Centre of Activity 18,160kHz - Global Emergency Centre of Activity

Licence Notes: Amateur and Amateur Satellite Service – Primary User.
Notes to the Band Plan: As on page 27. The band is not to be used for contests or bulletins.

21MHz (15m)	NECESSARY BANDWIDTH	UK USAGE
21,000-21,070kHz	200Hz	Telegraphy 21,055kHz - QRS (slow telegraphy) Centre of Activity 21,060kHz - QRP (low power) Centre of Activity
21,070-21,090	500Hz	Narrow Band Modes
21,090-21,110	500Hz	Narrow Band Modes - Automatically Controlled Data Stations (unattended)
21,110-21,120	2.7kHz	All Modes (excluding SSB) - Automatically Controlled Data Stations (unattended)
21,120-21,149	500Hz	Narrow Band Modes
21,149-21,151		IBP - Reserved Exclusively For Beacons
21,151-21,450	2.7kHz	All Modes 21,180kHz - Digital Voice (DV) Centre of Activity 21,285kHz - QRP (low power) Centre of Activity 21,340kHz - Image Centre of Activity 21,360kHz - Global Emergency Centre of Activity

Licence Notes: Amateur and Amateur Satellite Service – Primary User.
Notes to the Band Plan: As on page 27.

24MHz (12m)	NECESSARY BANDWIDTH	UK USAGE
24,890-24,915kHz	200Hz	Telegraphy 24,906kHz - QRP (low power) Centre of Activity
24,915-24,925	500Hz	Narrow Band Modes
24,925-24,929	500Hz	Narrow Band Modes - Automatically Controlled Data Stations (unattended)
24.929-24.931		IBP - Reserved Exclusively For Beacons
24,931-24,940	2.7kHz	All Modes - Automatically Controlled Data Stations (unattended)
24,940-24,990	2.7kHz	All Modes, 24,950kHz SSB QRP (low power) Centre of Activity 24,960kHz - Digital Voice (DV) Centre of Activity

Licence Notes: Amateur and Amateur Satellite Service – Primary User.
Notes to the Band Plan: As on page 27. The band is not to be used for contests or bulletins.

28MHz (10m)	NECESSARY BANDWIDTH	UK USAGE
28,000-28,070kHz	200Hz	Telegraphy 28,055kHz QRS (slow telegraphy) Centre of Activity 28,060kHz QRP (low power) Centre of Activity
28,070-28,120	500Hz	Narrow Band Modes
28,120-28,150	500Hz	Narrow Band Modes - Automatically Controlled Data Stations (unattended)
28,150-28,190	500Hz	Narrow Band Modes

28,190-28,199		IBP - Regional Time Shared Beacons
28,199-28,201		IBP - World Wide Time Shared Beacons
28,201-28,225		IBP - Continuous-Duty Beacons
28,225-28,300	2.7kHz	All Modes - Beacons
28,300-28,320	2.7kHz	All Modes - Automatically Controlled Data Stations (unattended)
28,320-29,200	2.7kHz	28,330kHz - Digital Voice (DV) Centre of Activity 28,360kHz - QRP (low power) Centre of Activity 28,680kHz - Image Centre of Activity
29,200-29,300	6kHz	All Modes - Automatically Controlled Data Stations (unattended) 29,210kHz - UK Internet Voice Gateway (unattended) 29,290kHz - UK Internet Voice Gateway (unattended)
29,300-29,510	6kHz	Satellite Down-links
29,510-29,520		Guard Channel
29,520-29,550	6kHz	All Modes - FM Simplex - 10kHz Channels 29,530kHz - UK Internet Voice Gateway (unattended)
29,560-29,590	6kHz	All Modes - FM Repeater Inputs (RH1-RH4)
29,600	6kHz	All Modes - FM Calling Channel
29,610-29,650	6kHz	All Modes - FM Simplex - 10kHz Channels 29,630kHz - UK Internet Voice Gateway (unattended)
29,660-29,700	6kHz	All Modes - FM Repeater Outputs (RH1-RH4)

Licence Notes: Amateur and Amateur Satellite Service – Primary User. 26dBW permitted. Beacons may be established for DF competitions except within 50km of NGR SK985640 (Waddington).
Notes to the Band Plan: As on page 27.

50MHz (6m)	NECESSARY BANDWIDTH	UK USAGE
50.000-50.100MHz		Telegraphy
		50.000-50.080MHz Propagation Beacons only
	500Hz	50.090MHz Telegraphy - Centre of Activity
50.100-50.500	2.7kHz	All Narrow Band Modes 50.100-50.130MHz Intercontinental Telegraphy & SSB (Note 1) 50.110MHz - DX Calling (Note 2) 50.150MHz - SSB Centre of Activity 50.185MHz - Crossband Centre of Activity 50.200MHz - MS Centre of Activity 50-210-50.250MHz - JT6M 50.230MHz - JT6M Calling Frequency 50.250MHz - PSK31 Centre of Activity 50.400MHz - WSPR Beacons
50.500-52.000	12.5kHz	All Modes 50.510MHz - SSTV (AFSK) 50.520MHz - Internet Voice Gateway (10kHz channels), (IARU common channel) 50.530MHz - Internet Voice Gateway (10kHz channels), (IARU common channel) 50.540MHz - Internet Voice Gateway (10kHz channels), (IARU common channel) 50.550MHz - FAX Working Frequency 50.600MHz - RTTY (FSK) 50.620-50.750MHz - Digital Communications 50.630MHz - Digital Voice (DV) Calling 50.710-50.910MHz - FM/DV Repeater Outputs (10kHz channel spacing) 51.210MHz. Can be used by RAYNET 51.210-51.410MHz - FM/DV Repeater Inputs (10kHz channel spacing) (Note 4) 51.430-51.590MHz - FM/DV Simplex (Note 3) (Note 4) 51.510MHz FM Calling Frequency 51.530MHz - GB2RS News Broadcast and Slow Morse 51.910-51.950MHz - Internet Voice Gateways (10kHz channels) 51.950-51.990MHz. Can be used by RAYNET

Note 1: Only to be used between station in different continents.
Note 2: No QSOs on this frequency. Always QSY when working intercontinental DX.
Note 3: 20kHz channel spacing. Channel centre frequencies start at 51.430MHz.
Note 4: Embedded data traffic is allowed with digital voice (DV).
Licence Notes: Amateur Service 50.0-51.0MHz – Primary User. Amateur Service 51.0-52.0MHz – Secondary User. Available on the basis on non-interference to other services (inside or outside the UK).
Notes to the Band Plan: As on page 27.

70MHz (4m)	NECESSARY BANDWIDTH	UK USAGE
70.000-70.050MHz		Propagation Beacons Only
		70.030MHz - Personal Beacons & WSPR Beacons
70.050-70.250	2.7kHz	Narrow Band Modes 70.085MHz - PSK31 Centre of Activity 70.150MHz - MS Calling 70.185MHz - Cross-band Centre of Activity 70.200MHz - SSB/CW Calling
70.250-70.294	12kHz	All Modes 70.260MHz - AM/FM Calling
70.294-70.500	12kHz	All Modes Channelised Operations Using 12.5kHz Spacing 70.3000MHz - RTTY/FAX Calling/Working 70.3125MHz - Digital Modes 70.3250MHz - DX Cluster 70.3375MHz - Digital Modes 70.3500MHz - Internet Gateway. Can be used by RAYNET 70.3625MHz - Internet Voice Gateway 70.3750MHz - Can be used by RAYNET 70.3875MHz - Internet Voice Gateway 70.4000MHz - Can be used by RAYNET 70.4125MHz - Internet Voice Gateway 70.4250MHz - FM Simplex. Used by GB2RS News Broadcast 70.4375MHz - Digital Modes (special projects) 70.4500MHz - FM Calling 70.4625MHz - Digital Modes 70.4750MHz 70.4875MHz - Digital Modes

Licence Notes: Amateur Service 70.0-70.5MHz – Secondary User. 22dBW permitted. Available on the basis of non-interference to other services (inside or outside the UK).
Notes to the Band Plan: As on page 27.

144MHz (2m)	NECESSARY BANDWIDTH	UK USAGE
144.000-144.110MHz	500Hz	Telegraphy (including EME CW) 144.050MHz - Telegraphy Calling 144.100MHz - Random MS Telegraphy Calling (Note 1)
144.110-144.150	500Hz	Telegraphy and MGM 144.138MHz - PSK31 Centre Of Activity EME MGM Activity (Note 7)
144.150-144.180	2.7kHz	Telegraphy, MGM and SSB
144.180-144.360	2.7kHz	Telegraphy and SSB 144.175MHz - Microwave Talkback 144.195-144.205MHz - Random MS SSB 144.200MHz - Random MS SSB Calling Frequency 144.250MHz - GB2RS News Broadcast and Slow Morse 144.260MHz USB - Can be used by RAYNET 144.300MHz - SSB Calling
144.360-144.399	2.7kHz	Telegraphy, MGM, SSB 144.370MHz - MGM Calling Frequency
144.400-144.490		Propagation Beacons Only
144.490-144.500		144.4905MHz ±500Hz - WSPR Beacons and Beacon Guard Band
144.500-144.794	20kHz	All Modes 144.500MHz - SSTV Calling 144.525MHz - ATV SSB Talkback 144.600MHz - RTTY Calling 144.600MHz - RTTY Working (FSK) 144.6125MHz - UK Digital Voice (DV) Calling (Note 9) 144.625-144.675MHz - Can be used by RAYNET 144.700MHz - FAX Calling 144.750MHz - ATV Talkback 144.775-144.794MHz - Can be used by RAYNET
144.794-144.990	12kHz	MGM Packet Radio 144.800-144.9875MHz - Digital Modes (including unattended) 144.8000MHz - Unconnected Nets, APRS, UiView, etc 144.8250MHz - Internet Voice Gateway 144.8375MHz - Internet Voice Gateway 144.8500MHz - AX25 BBS User Access 144.8625MHz - Available for Nodes and BBSs on Application 144.8750MHz - TCP/IP User Access 144.8875MHz - AX25, Priority for DX Cluster Access 144.9000MHz - AX25 DX Cluster Access 144.9250MHz - TCP/IP User Access 144.9500MHz - AX25 BBS User Access 144.9750MHz - High Speed 25kHz Channel
144.990-145.1935	12kHz	FM/DV RV48 - RV63 Repeater Input Exclusive (Note 2) (Note 5)
145.200	12kHz	FM/DV Space Communications (eg ISS) - Earth-to-Space 145.2000MHz (Note 4) - Can be used by RAYNET
145.200-145.5935	12kHz	FM/DV V16-V48 FM/DV Simplex (Note 3) (Note 5) (Note 6) 145.2125MHz - Internet Voice Gateway 145.2250MHz - Can be used by RAYNET 145.2375MHz - FM Internet Voice Gateway (IARU common channel) 145.2500MHz - Used for Slow Morse Transmissions 145.2875MHz - FM Internet Voice Gateway (IARU common channel) 145.3000MHz - RTTY Local 145.3375MHz - FM Internet Voice Gateway (IARU common channel) 145.5000MHz - Mobile Calling 145.5250MHz - Used for GB2RS News Broadcast 145.5500MHz - Used for Rally/Exhibition Talk-in
145.5935-145.7935	12kHz	FM/DV RV48 - RV63 Repeater Output (Note 2)
145.800	12kHz	FM/DV Space Communications (eg ISS) - Space-Earth
145.806-146.000	12kHz	All Modes - Satellite Exclusive

Note 1: Meteor scatter operation can take place up to 26kHz higher than the reference frequency.
Note 2: 12.5kHz channels numbered RV48-RV63.RV48 input = 145.000MHz, output=145.600MHz.
Note 3: 12.5kHz Simplex channels numbered V16-V46. V16=145.200MHz.
Note 4: Emergency Communications Groups utilising this frequency should take steps to avoid interference to ISS operations in non-emergency situations.
Note 5: Embedded data traffic is allowed with digital voice (DV).
Note 6: Simplex use only - no DV gateways.
Note 7: EME activity using MGM is commonly practiced between 144.110-144.160MHz.
Note 8: The use of Amplitude Modulation (AM) is acceptable within the All Modes segment. AM usage may often be found on 144.550MHz although this frequency is not officially recognised within the 2m Band Plan. AM users are asked to consider adjacent channel activity when selecting operating frequencies.
Note 9: In other countries IARU Region 1 recommend 145.375MHz.
Licence Notes: Amateur Service and Amateur Satellite Service – Primary User. Beacons may be established for DF competitions except within 50km of TA 012869 (Scarborough).
Notes to the Band Plan: As on page 27.

430MHz (70cm) IARU RECOMMENDATION	NECESSARY BANDWIDTH	UK USAGE
430.0000 -431.9810MHz All Modes	20kHz	430.0125-430.0750MHz - Internet Voice Gateways (Notes 7, 8) (12.5kHz channels) 430.1625-430.1875MHz - Experimental MPT1327 Base TX Ch. 1-3 (12.5kHz channels)
430.4000-430.5750 430.6000-430.9250 Digital Repeaters		Digital Links 430.8000MHz - RAYNET 7.6MHz Talkthrough - Mobile TX 430.8250-430.9750MHz - RU66-RU78 7.6MHz Split Repeaters – Outputs **See licence exclusion note; 431-432MHz** 430.9900-431.9000MHz - Digital Communications 431.0750-431.1750MHz - Internet Voice Gateway (6dBW max) (12.5kHz channels)
432.0000-432.1000 Telegraphy MGM	500Hz	432.0000-432.0250MHz - Moonbounce (EME) 432.0500MHz - Telegraphy Centre of Activity 432.0880MHz - PSK31 Centre of Activity
432.1000-432.4000 SSB, Telegraphy MGM	2700Hz	432.2000MHz - SSB Centre of Activity 432.3500MHz - Microwave Talkback Calling Frequency (Europe) 432.3700MHz - FSK441 Calling Frequency

432.4000-432.5000	500Hz	Propagation Beacons Only (Note 9)
Beacons Exclusive		
432.5000-432.9940	25kHz	432.5000MHz - Narrow Band SSTV Centre of Activity
All modes	(Note 11)	432.5000-432.6000MHz - IARU Region Linear Transponder Inputs
Non-channelised		432.6000MHz - RTTY (ASK/PSK) Centre of Activity
		432.6000-432.8000MHz - IARU Region 1 Linear Transponder Outputs
		432.6250-432.6750MHz - Digital Communications (25kHz channels)
		432.7000MHz - FAX Centre of Activity
		432.7750MHz - RAYNET 1.6MHz Talkthrough - Base TX
		432.8000-432.9900MHz - UK Beacons (Note 9)
432.9940-433.3810	25kHz	433.0000-433.3750MHz (RB0-RB15) RU240-RU270
FM repeater outputs	(Note 11)	FM/DV Repeater Outputs (25kHz channels) in UK Only
in UK only (Note 1)		
433.3940-433.5810	25kHz	433.4000MHz - U272; IARU Region 1 SSTV (FM/AFSK)
	(Note 11)	433.4250MHz - U274
FM/DV	(Notes 12, 13)	433.4500MHz - U276 (Note 5)
Simplex		433.4750MHz - U278
Channels		433.5000MHz - U280 FM Calling Channel
		433.5250MHz - U282
		433.5500MHz - U284 Used for Rally/Exhibition Talk-in
		433.5750MHz - U286
433.6000-434.0000	25kHz	433.6000MHz - U288 RTTY AFSK
All Modes	(Note 11)	433.6250-6750MHz - Digital Communications (25kHz channels)
433.800MHz for		433.7000MHz (Note 3) - Can be used by RAYNET
APRS where 144.800MHz		433.7250-433.7750MHz - Can be used by RAYNET
cannot be used.		433.8000-434.2500MHz - Digital Communications
434.000-434.5940	25kHz	433.9500-434.0500MHz - 25kHz Internet Voice Gateway Channels
	(Note 11)	434.0625-434.0875MHz - Experimental MPT1327 Mobile TX Ch 1-3 (12.5kHz channels)
		434.3750MHz - RAYNET 1.6MHz Talkthrough - Mobile TX
		434.4750-434.5250MHz - Internet Voice Gateway (25kHz channels)
434.5940-434.9810	25kHz	434.6000-434.9750MHz (RB0-RB15) RU240-RU270
FM repeater inputs in	(Note 11)	FM/DV repeater inputs (25kHz channels) in UK Only
UK only and ATV (Note 4)	(Note 12)	
435.0000-438.0000		Satellites and Fast Scan TV (Note 4)
438.0000-440.0000	25kHz	438.0250-438.1750MHz IARU Region 1 Digital Communications
All modes	(Note 11)	438.2000-439.4250MHz (Note 1)
		438.4000MHz - RAYNET 7.6MHz Talkthrough - Base TX
		438.4250-438.5750MHz - RU66-RU78 7.6MHz Split Repeaters – Inputs
		438.6125MHz - UK Digital Voice (DV) Calling (Note 12) (Note 13)
439.9875 POCSAG		439.6000-440.0000MHz - Digital Communications Centre

Note 1: In Switzerland, Germany and Austria, repeater inputs are 431.050-431.825MHz with 25kHz spacing and outputs.
438.650-439.425MHz. In Belgium, France and the Netherlands repeater outputs are 430.025-430.375MHz with 12.5kHz spacing and inputs at 431.625-431.975MHz. In other European countries repeater inputs are 433.000-433.375MHz with 25kHz spacing and outputs at 434.600-434.975MHz, ie the reverse of the UK allocation.
Note 3: IARU Region 1 FAX/AFSK.
Note 4: ATV carrier frequencies shall be chosen to avoid interference to other users, in particular the satellite service and repeater inputs.
Note 5: In other countries IARU Region 1 recommend 433.450MHz for DV calling.
Note 7: Users must accept interference from repeater output channels in France and the Netherlands at 430.025-430.575MHz.
Users with sites that allow propagation to other countries (notably France and the Netherlands) must survey the proposed frequency before use to ensure that they will not cause interference to users in those countries.
Note 8: Internet voice gateway channels: maximum deviation ±2.4kHz, maximum effective radiated power 10W (10dBW).
Note 9: The beacon band in the UK is scheduled to change to 432.400-432.500MHz when agreed by the Primary User.
Note 10: No longer used.
Note 11: IARU Region 1 recommended maximum bandwidths are 12.5 or 20kHz.
Note 12: Embedded data traffic is allowed with digital voice (DV).
Note 13: Simplex use only - no DV gateways.
Licence Notes: Amateur Service – Secondary User. Amateur Satellite Service 435-438MHz – Secondary User. Exclusion: 431-432MHz not available within 100km radius of Charing Cross, London.
Notes to the Band Plan: As on page 27.

1.3GHz (23cm) IARU RECOMMENDATION	NECESSARY BANDWIDTH	UK USAGE
1240.000-1243.250MHz	150kHz	Note 7 1240.00-1240.750MHz
All Modes		Note 8 - See below prior to ANY application or assignment in 1240-1325MHz
1240.000-1240.750		
Alternative Centre	(Note 3)	1240.150MHz - Packet Radio
1242.025-1242.250		1240.300MHz - Packet Radio
1242.275-1242.700		1240.450MHz - Packet Radio
Repeater outputs		1240.600MHz - Packet Radio
1242.725-1243.250		1240.750MHz - Packet Radio
Packet Radio		
1243.250-1260.000		1248.000MHz - ATV Repeater Input
ATV		1249.000MHz - ATV Repeater Input
1258.150-1259.350		
Repeater Outputs		
1260.000-1270.000		Amateur Satellite Service - Earth to Space only
Satellites		
1270.000-1272.000	20kHz	
All Modes		
1270.025-1270.700		
Repeater Inputs		
1270.725-1271.250		
Packet Radio		
1272.000-1290.994		
ATV/DATV		1280.000MHz - ATV Repeater Input
1290.994-1291.481	25kHz (Note 4)	FM/DV Repeater Inputs (Note 5) 1291.000-1291.375MHz (RM0-RM15) 25kHz spacing
1291.494-1296.000		All Modes
All Modes		
1293.150-1294.350		
Repeater Inputs		
1296.000-1296.150	500Hz	1296.000-1296.025MHz - Moonbounce
Telegraphy, MGM		1296.138MHz - PSK31 Centre of Activity
1296.150-1296.800	2.7kHz	1296.200MHz - Narrow Band Centre of Activity
Telegraphy, SSB and MGM		1296.370MHz - FSK441 MS calling
(Note 1)		1296.400-1296.600MHz - Linear Transponder Input
		1296.500MHz - Image Mode Centre of Activity (SSTV, FAX, etc)
		1296.600MHz - Narrowband Data Centre of Activity (MGM, RTTY, etc)
		1296.600-1296.700MHz - Linear Transponder Output
		1296.750-1296.800MHz Local Beacons, 10W ERP Max
1296.800-1296.994		**1296.800-1296.990MHz Propagation Beacons Only**
Beacons Exclusive		
1296.994-1297.481	25kHz (Note 4)	FM/DV Repeater Outputs (Note 5) 1297.000-1297.375MHz (RM0-RM15)
1297.494-1297.981	25kHz (Note 4)	FM/DV Simplex (Note 5) (Note 6) 25kHz spacing 1297.500-1297.750MHz (SM20-SM30)
FM/DV Simplex		1297.725MHz - Digital Voice (DV) Calling (IARU recommended)
(Notes 2, 5, 6)		1297.900-1297.975MHz - FM Internet Voice Gateways (IARU common channels, 25kHz)
1298.000-1300.000	20kHz	All modes. See Note 8
All Modes		Unattended Remote Control, Beacons and Digital Communications
1298.025-1298.500		
Repeater Outputs		
1298.500-1300.000	25kHz	1299.000MHz - Packet Radio
Digital Comms	150kHz	1299.425MHz - Packet Radio
1298.725-1299.000	150kHz	1299.575MHz - Packet Radio
Duplex Packet Radio	150kHz	1299.725MHz - Packet Radio
1300.000-1325.000		TV Repeater Outputs (UK only)
		1308.000MHz - ATV Repeater Output
		1310.000MHz - ATV Repeater Output
		1311.500MHz - ATV Repeater Output
		1312.000MHz - ATV Repeater Output
		1316.000MHz - ATV Repeater Output
		1318.500MHz - ATV Repeater Output

Note 1: Local traffic using narrow band modes should operate between 1296.500-1296.800MHz during contests and band openings.
Note 2: Stations in countries that do not have access to 1298-1300MHz may also use the FM Simplex segment for digital communications.
Note 3: IARU Region 1 recommended maximum bandwidth is 20kHz. See also Note 7.
Note 4: IARU recommended maximum bandwidth is 12kHz.
Note 5: Embedded data traffic is allowed with digital voice (DV).
Note 6: Simplex use only - no DV gateways.
Note 7: 1240.000-1240.750 is designated by IARU as an alternative centre for narrowband activity and beacons. Operations in this range should be on a flexible basis to enable activation of this alternate usage.
Note 8: The band 1240-1300MHz is subject to major replanning. Contact the Microwave Manager for further information.
Licence Notes: Amateur Service – Secondary User. Amateur Satellite Service 1260-1270MHz – Secondary User. *Earth to Space only.* In the sub-band 1298-1300MHz unattended operation is not allowed within 50km of SS206127 (Bude), SE202577 (Harrogate), or in Northern Ireland.
Notes to the Band Plan: As on page 27.

2.3GHz (13cm) IARU RECOMMENDATION	NECESSARY BANDWIDTH	UK USAGE
2310.000-2320.000MHz		2310.000-2310.500MHz - Repeater links
Sub-regional	200kHz	2310.100MHz - Packet Radio
(National Band Plans)	200kHz	2310.300MHz - Packet Radio
		2310.000-2310.500MHz - *Remote Control
		2311.000-2315.000MHz - High Speed Data
2320.000-2320.150		2320.000-2320.025MHz - Moonbounce
CW Exclusive		
2320.150-2320.800		2320.200MHz - SSB Centre of Activity
CW and SSB		
		2320.750-2320.800MHz Local Beacons, 10W ERP Max
2320.800-2321.000		**2320.800-2320.990MHz Propagation Beacons Only**
Beacons Exclusive		
2321.000-2322.000		
Simplex and Repeaters		
(Note 1)		
2322.000-2400.000		2322.000-2355.000MHz - ATV and ATV Repeaters
		2355.100-2364.000MHz - Repeater Links
	200kHz	2355.100MHz - Packet Radio
	200kHz	2355.300MHz - Packet Radio
		2356.000-2360.000MHz - *High Speed Data
	1000kHz	2364.000MHz - *Packet Radio
		2365.000-2370.000MHz - Repeaters
		2370.000-2390.000MHz - ATV and ATV Repeaters
		2390.000-2392.000MHz - Moonbounce
2400.000-2450.000		2435.000MHz - ATV Repeater Outputs
Satellites		2440.000MHz - ATV Repeater Outputs

Note 1: Stations in countries that do not have access to the all modes section 2322-2390MHz, use the Simplex and repeater segment 2320-2322MHz for data transmission.
Note 2: Stations in countries that do not have access to the narrow band segment 2320-2322MHz, use the alternative narrow band segment 2304-2306MHz and 2308-2310MHz.
Note 3: The segment 2433-2443MHz may be used for ATV if no satellite is using the segment.
Licence Notes: Amateur Service – Secondary User. *Users must accept interference from ISM users.* Amateur Satellite Service 2400-2450MHz – Secondary User. *Users must accept interference from ISM users.*
*In the sub-bands 2310.000-2310.4125; 2355-2365 and 2392-2450MHz unattended operation is not allowed within 50km of SS206127 (Bude) or SE202577 (Harrogate).
ISM = Industrial, scientific and medical.
Notes to the Band Plan: As on page 27.

3.4GHz (9cm) IARU RECOMMENDATION	UK USAGE
3400.000-3402.000MHz Narrow band CW/EME/SSB	3400.100MHz - Centre of Activity (Note 1) 3400.750-3400.800MHz Local Beacons, 10W ERP Max
3400.800-3400.995	3400.800-3400.995MHz Propagation Beacons Only
Propagation Beacons	
3402.000-3410.000 All Modes (Notes 2, 3)	3401.000-3402.000MHz - Remote control
3410.000-3475.000 All Modes. See Note 4	3456.000MHz (Note 1)

Note 1: EME has migrated from 3456MHz to 3400MHz to promote harmonised usage and activity.
Note 2: Stations in many European countries have access to 3400-3410MHz as permitted by ECA Table Footnote EU17.
Note 3: Amateur Satellite down-links planned.
Note 4: Parts of this range are subject to regulatory change. Contact the Microwave Manager for further information
Licence Notes: Amateur Service – Secondary User.
Unattended operation is permitted for remote control, digital modes and beacons, except in the sub-bands 3,420-3,430MHz and 3,450-3,455MHz within 50km of SO916223 (Cheltenham), SS206127 (Bude) and SE202577 (Harrogate).
ISM = Industrial, scientific and medical.
Notes to the Band Plan: As on page 27.

5.7GHz (6cm) IARU RECOMMENDATION	UK USAGE
5650.000-5668.000MHz Satellite Up-links	Amateur Satellite Service - Earth to Space Only
5650.000-5670.000 Narrow Band CW/EME/SSB	5668.200MHz - Alternative Centre of Activity 5668.8MHz - Beacons
5670.000-5680.000 All Modes	
5755.000-5760.000 All Modes	
5760.000-5762.000 Narrow Band CW/EME/SSB	5760.100MHz - Current Centre of Activity 5760.750-5760.800MHz Local Beacons, 10W ERP Max
5760.800-5760.995	5760.800-5760.995MHz Propagation Beacons Only
Propagation Beacons	
5762.000-5765.000 All Modes	
5820.000-5830.000 All Modes	
5830.000-5850.000 Satellite Down-links	Amateur Satellite Service - Space to Earth Only

Licence Notes: Amateur Service 5650-5680MHz – Secondary User. 5755-5765 and 5820-5850MHz – Secondary User. *Users must accept interference from ISM users.*
Amateur Satellite Service 5650-5670MHz and 5830-5850MHz – Secondary User.
Users must accept interference from ISM users.
Unattended operation is permitted for remote control, digital modes and beacons, except in the sub-bands 5670-5680MHz within 50km of SS206127 (Bude) and SE202577 (Harrogate).
ISM = Industrial, scientific and medical.
Notes to the Band Plan: As on page 27.

10GHz (3cm) IARU RECOMMENDATION	UK USAGE
10,000.000-10,125.000MHz Digital Modes	10,002.5-10,027.5MHz - Wideband Transponders - 015 OUT 10,027.5-10,052.5MHz - Wideband Transponders - 040 OUT 10,052.5-10,077.5MHz - Wideband Transponders - 065 OUT 10,080-10,090MHz - Packet Links 10,090-10,110MHz - Wideband Beacons and Operating (Note 1) 10,110-10,120MHz - Voice Repeaters OUT
10,225.000-10,250.000 All Modes	10,227.5-10,252.5MHz - Wideband Transponders - 425 OUT 10,252.5-10,227.5MHz - Wideband Simplex
10,250.000-10,350.000 Digital Modes	10,277.5-10,302.5MHz - Wideband Transponders - 015 IN 10,302.5-10,327.5MHz - Wideband Transponders - 040 IN
10,350.000-10,368.000 All Modes	10,327.5-10,352.5MHz - Wideband Transponders - 065 IN 10,352.5-10,368MHz - Wideband Modes
10,368.000-10,370.000 Narrowband Telegraphy EME/SSB	10,368-10,370MHz - Narrowband Modes (Note 3) 10,368.1MHz - Centre of Activity 10,368.750-10,368.800MHz - Local Beacons, 10W ERP Max
10,368.800-10,368.995	10,368.800-10,368.995MHz - Propagation Beacons Only
Propagation Beacons	
10,370.000-10,450.000 All Modes	10,370-10,390MHz - Wideband Modes (Note 2) 10,390-10,410MHz - Wideband Beacons and Operating (Note 1) 10,412.5-10,437.5MHz - Wideband Transponders - 425 IN 10,440-10,450MHz - Voice Repeaters RX
10,450.000-10,475.000	10,400-10,475MHz - Unattended Operation 10,450-10,452MHz - Alternative Narrowband CW/EME/SSB (Note 3)
10,475.000-10,500.000 All Modes and Satellites	Amateur Satellite Service ONLY

Note 1: 10,400MHz is the preferred frequency for wideband beacons but 10,100MHz is still used.
Note 2: Wideband FM is preferred between 10,350-10,400MHz to encourage compatibility between narrowband systems, however there is still activity between 10,050-10,125MHz.
Note 3: The current Narrow Band sub-band is at 10,368MHz; however, 10,450MHz is being considered as a possible future alternative.
Note 4: Simplex TV operations should take place on wideband transponder inputs that are not being used by local transponders.
Note 5: Wideband transponder pairs are designated by input/output frequencies. The pairings shown are recommended but occasionally variants may be needed to suit local circumstances.
Note 6: 10,475-10,500MHz is allocated ONLY to the Amateur Satellite Service and NOT to the Amateur Service.
Licence Notes: Amateur Service – Secondary User.
Amateur Satellite Service 10,450-10,500MHz – Secondary User.
Unattended operation is permitted for remote control, digital modes and beacons except in the sub-bands 10,000-10,125MHz within 50km of SO916223 (Cheltenham), SS206127 (Bude), SK985640 (Waddington) and SE202577 (Harrogate).
Notes to the Band Plan: As on page 27.

24GHz (12mm) IARU RECOMMENDATION	UK USAGE
24,000.000-24,050.000MHz Satellites	24,025MHz - Preferred Operating Frequency Wideband Equipment 24,048.2MHz - Narrow Band Centre of Activity 24,048.750-24,048.800MHz Local Beacons, 10W ERP Max
24,048.800-24,048.995	24,048.800-24,048.995MHz Propagation Beacons Only
Propagation Beacons 24,050.000-24,250.000 All Modes	

Licence Notes: Amateur Service 24,000-24,050MHz – Primary User. *Users must accept interference from ISM users.*
24,050-24,150MHz – Secondary User. *May only be used with the written permission of Ofcom. Users must accept interference from ISM users.* Secondary User: 24,150-24,250MHz. *Users must accept interference from ISM users.*
Amateur Satellite Service 24,000-24,050MHz – Primary User. *Users must accept interference from ISM users.*
Unattended operation is permitted for remote control, digital modes and beacons, except in the sub-bands 24,000-24,050MHz within 50km of SK985640 (Waddington) and SE202577 (Harrogate).
ISM = Industrial, scientific and medical.
Notes to the Band Plan: As on page 27.

47GHz (6mm) IARU RECOMMENDATION	UK USAGE
47,000.000-47,200.000MHz	47,088.2MHz - Narrowband Centre of Activity
47,088.000-47,090.000 Narrow Band Segment	47,088.8-47,089.0MHz Propagation Beacons Only

Licence Notes: Amateur Service and Amateur Satellite Service – Primary User.
Unattended operation is permitted for remote control, digital modes and beacons, except within 50km of SK985640 (Waddington) and SE202577 (Harrogate).
Notes to the Band Plan: As on page 27.

76GHz (4mm) IARU RECOMMENDATION	UK USAGE
75,500-76,000MHz All Modes (preferred)	75,976.200MHz - IARU Region 1 Preferred Centre of Activity
76,000.000-77,500.000 All Modes	
77,500-78,000 All Modes (preferred)	77,500.200MHz - Alternative IARU Recommended Narrowband Segment
78,000-81,000 All Modes	

Licence Notes:
75,500-75,875MHz Amateur Service and Amateur Satellite Service – Secondary User.
75,875-76,000MHz Amateur Service and Amateur Satellite Service – Primary User.
76,000-77,500MHz Amateur Service and Amateur Satellite Service – Secondary User.
77,500-78,000MHz Amateur Service and Amateur Satellite Service – Primary User.
78,000-81,000MHz Amateur Service and Amateur Satellite Service – Secondary User.
Unattended operation is permitted for remote control, digital modes and beacons, except within 50km of SK985640 (Waddington) and SE202577 (Harrogate).

THE FOLLOWING BANDS ARE ALSO ALLOCATED TO THE AMATEUR SERVICE AND THE AMATEUR SATELLITE SERVICE:

122,250-123,000MHz – Amateur Service only, Secondary User
134,000-136,000MHz – Primary User
136,000-141,000MHz – Secondary User
241,000-248,000MHz – Secondary User
248,000-250,000MHz – Primary User

NOTES TO THE BAND PLAN

ITU-R Recommendation SM.328 (extract)

Necessary bandwidth: For a given class of emission, the width of the frequency band that is just sufficient to ensure the transmission of information at the rate and with the quality required under specified conditions.
The use of Amplitude Modulation (AM) is acceptable in the all modes segments but users are asked to consider adjacent channel activity when selecting operating frequencies.
Foundation and Intermediate Licence holders are advised to check their licences for the permitted power limits and conditions applicable to their class of licence.

All Modes: CW, SSB and those modes listed as Centres of Activity, plus AM (consideration should be given to adjacent channel users).

Image Modes: Any analogue or digital image modes within the appropriate bandwidth, for example SSTV and FAX.

Narrow band modes: All modes using up to 500Hz bandwidth, including CW, RTTY, PSK, etc.

Digimodes: Any digital mode used within the appropriate bandwidth, for example RTTY, PSK, MT63, etc.

Sideband usage: Below 10MHz use lower sideband (LSB), above 10MHz use upper sideband (USB). Note the lowest dial settings for LSB Voice modes are 1843, 3603 and 7043kHz on 160, 80 and 40m.
Beacons: Propagation Beacon Sub-bands are highlighted - Please avoid transmitting in them!
Amplitude modulation (AM) may be used in the telephony sub-bands providing consideration is given to adjacent channel users (NRRL Davos 05)
CW QSOs are accepted across all bands, except within beacon segments (Recommendation DV05_C4_Rec_13).
Contest activity shall not take place on 10, 18 and 24MHz bands.
Non-contesting radio amateurs are recommended to use the contest-free HF bands (30, 17 and 12m) during the largest international contests (DV05_C4_Rev_07).
Users of Digital Voice (DV) should check that the channel is not in use by other modes (CT08_C5_Rec20).
The term "automatically controlled data stations" include Store and Forward stations.

TRANSMITTING FREQUENCIES

The announced frequencies in the Band Plan are understood as "transmitted frequencies" (not those of the suppressed carrier).

Unmanned transmitting stations

IARU member societies are requested to limit this activity on the HF bands. It is recommended that any unmanned transmitting stations on HF shall only be activated under operator control except for beacons agreed with the IARU Region 1 Beacon Coordinator, or specially licensed experimental stations.

1.8MHz

Radio Amateurs in countries that have a SSB allocation ONLY below 1840kHz, may continue to use it, but the National Societies in those countries are requested to take all necessary steps with their licence administrations to adjust phone allocations in accordance with the Region 1 Band Plan (UBA - Davos 2005).

3.5MHz

Intercontinental operations should be given priority in the segments 3500 - 3510kHz and 3775 - 3800kHz.
Where no DX traffic is involved, the contest segments should not include 3500 - 3510kHz or 3775 - 3800kHz.
Member societies will be permitted to set other (lower) limits for national contests (within these limits).
3510 - 3600kHz may be used for unmanned ARDF beacons (CW, A1A) (Recommendation DV05_C4_Rec_12).
Member societies should approach their national telecommunication authorities and ask them not to allocate frequencies other than amateur stations in the band segment that IARU has assigned to intercontinental long distance traffic.

7MHz

The band segment 7035 - 7043kHz may be used for automatic controlled data stations (unattended) traffic in the areas of Africa south from the equator during local daylight hours.
Where no DX traffic is involved, the contest segment should not include 7175 - 7200kHz.

10MHz

SSB may be used during emergencies involving the immediate safety of life and property and only by stations actually involved in the handling of emergency traffic.
The band segment 10,120kHz to 10,140kHz may be used for SSB transmissions in the area of Africa south of the equator during local daylight hours.
News bulletins on any mode should not be transmitted on the 10MHz band.

28MHz

Member societies should advise operators not to transmit on frequencies between 29.3 and 29.51MHz to avoid interference to amateur satellite downlinks.
Experimentation with NBFM Packet Radio on 29MHz band: Preferred operating frequencies on each 10kHz from 20.210 to 29.290MHz included should be used.
A deviation of ±2.5kHz should be used with 2.5kHz as maximum modulation frequency.

1.3GHz

The band is subject to National and IARU-R1 replanning. It is also shared with air traffic radar.

Changes to the Band Plan since Yearbook 2010 Edition 6m: addition of the 51.510MHz FM calling frequency. 70cm: 432.4000-432.5000MHz Propagation Beacons Only (Note 9) added. 23cm: amended notes 3 (recommended maximum bandwidth) & 8 (re-planning in 1240-1300MHz). 3cm: addition of a note 4 (warning that parts of the range 3,410.000-3,475.000MHz are subject to regulatory change).
Notes: Correction to the BW for narrowband definition (500Hz). Sidebands heading changed to Beacons. New 1.3GHz statement added to Notes.

Data

More on block error-correcting codes

RECAP. Earlier this year we looked at error correction techniques. Peter Martinez, G3PLX kindly wrote this description of block coding and how it can be applied to non-binary transmission. The first part of his description refers to the 7 bit parity code described in August's edition and illustrated by the parity matrix here. We continue from that point:

```
x x . x x . .
. x x x . x .
x . x . . . x
```

The 4 + 3 code is probably the simplest error-correcting code in the book, but it's not often realised that it isn't restricted to transmitting blocks of binary bits. Suppose we replace the two bit-values '0' and '1' by the ten decimal values '0' to '9'. Instead of the parity function described above, we use the decimal equivalent. To encode 4 decimal digits, we add a 5th digit so that the sum of the 1st, 2nd, 4th, and 5th digits is a multiple of ten rather than a multiple of two, and so on. For example, the 4-digit number 2357 encodes to the block 2357853. Now when we repeat the parity calculations at the receiver, instead of getting a pattern of three parity failures we get a pattern of three decimal digits. For example, if the 2357853 block was received as 2377863, we see a 2 in the 2nd and 3rd parity calculations which, like the binary code, 'points to' the error being in the 3rd position in the block. We then subtract 2 from the wrongly-received digit to correct it.

We can extend this further, for example to hexadecimal digits (each of which can itself represent 4 bits), thus giving us a binary code that can correct groups of 4 bits at a time.

Going back to the 7-bit binary block code (with 4 data bits and 3 parity bits), you may recall that it can correct no more than a single error per block, simply because there are only 7 different possible parity-failure patterns. That's one for each combination of the 3 parity bits (the all-zero combination is reserved for the no-error condition). One could ask the question, "If we added more parity bits, and hence more combinations, could there be enough patterns to uniquely identify double errors in a block"? The answer is that we can, but not for all block sizes, and not always as efficiently as in the 7-bit-block case. For example, the following matrix can be used to construct a code that will correct 1 or 2 errors in a 15-bit block in which 7 of the bits are data and the remaining 8 are parity:

```
x x . x . . . x . . . . . . .
. x x . x . . . x . . . . . .
. . x x . x . . . x . . . . .
. . . x x . x . . . x . . . .
x x . x x x . . . . . x . . .
. x x . x x x . . . . . x . .
x x x . . x x . . . . . . x .
x . x . . . x . . . . . . . x
```

The encoding process is the same as for the 7-bit example and the decoding process is similar, only more complicated because there are now not just 7 possible error-patterns: there are 120. These are made up of the 15 possible single errors and the 105 possible double errors. This code can also be extended from binary to decimal or larger symbols.

We can go to more powerful block codes, but not without delving deeply into some very complex mathematics. The Bose-Chaudhuri-Hocquenghem (BCH) and the Reed-Solomon (RS) codes are particularly powerful but it would not be possible to describe how these work in this article. However they are, like the two example codes above, still limited by the fact that the decoder must be able to extract information about (a) the location of the errors and (b) the correction to be applied to each one. Even a 'perfect' error-correcting code could not achieve this unless it transmitted, along with the original data, at least this amount of information. For example, the 7-bit block code above, which is one of the few 'perfect' codes, needs 3 bits to correct one error in any of its 7 bits. Many of the useful codes are not 'perfect' in this sense. The RS code, which has become popular in several amateur radio applications including WSPR and digital SSTV, can be used with symbols having M values, where M can be in the series 2, 4, 8, .., in blocks of up to M-1 symbols, in which there can be up to M-1-2*t data symbols, the remaining 2*t symbols being parity symbols, where t is the maximum number of errors which the code can correct. For example, an RS code exists in which the symbols are bytes (M=256) that can be transmitted in blocks of up to 255 symbols. However, not all useful values of M are available and not all of these can correct as many errors as we might wish.

Error correcting theory relies heavily on the numbers involved having special properties similar to those of prime numbers, and as mathematicians down the ages have found, prime numbers are particularly difficult to tame. This does mean that we often have to use some strange numbers when choosing which codes to use for a given application.

MORE ON WSJT. In December we saw how important it is to get the sampling rate correct in WSJT. **Figure 1** shows where the self-measured values can be found, and which have to be entered manually into the Setup-Options window. The indicated figures in red appear when the WSJT software detects the rate has been set incorrectly.

FIGURE 1: Manually setting sampling rates in WSJT.

FEEDBACK. The request for some feedback on your datacomms experiences prompted Jeremy Adams, G4JZL, to write in. He says:

"Regarding data operating, I do enjoy this mode. It's silent and if my wife goes to bed early, I can operate in complete silence, save for the click of the mouse; the volume turned down and just relying on the waterfall to view the incoming signals. I used to find it hard to identify the mode of the various signals but I have got used the sound of them now. I use Ham Radio Deluxe (HRD) [1], and if I take a guess at the mode and select it, then firstly the waterfall cursor length adjusts itself and should fit the incoming waterfall trace if the guess was correct. Secondly if your rig has a monitor feature, turn the transmitter power down to zero or preferably switch to dummy load, transmit a short message, you will soon be able to tell if the outgoing tones are similar to those being received off-air. Do be aware of which sideband your are on though: most data signals seem to be on LSB but if you simple can't get a decode then try going over to USB.

"I started out using an Icom IC-7400 and RigBlaster interface into the Mic socket (the mic socket also has Rx audio wired out for this purpose). However this way of connecting is a pain as the audio levels are affected by the AF and mic gain controls. I soon made up a lead and connected to the Aux socket in the back of the rig. Here the audio levels are already attenuated and have their own gain controls; PTT also goes via the aux socket. The IC7400 has a dedicated data selection on SSB which cuts the mic out. The C/IV remote control feature is well worth getting going with HRD, you need a separate interface box to give voltage level conversion and USB to serial conversion if your PC doesn't have a hardware serial port.

"I recently upgraded to an IC-7600 and the data interface on this couldn't be easier! The USB socket on the rig connects to the USB socket on the PC and that's it! No wires, no audio interface box, no C/IV interface box, just a USB cable. You download a small driver program from the Icom site (the instructions are there), run it and plug in the cable. If you look on the device manager page on the PC an additional sound card has appeared, plus a new serial port.

"The rig looks to the PC like a sound card plus a serial link. The sound card deals with the TX and RX audio of course, and the seria l link is for the C/IV remote control. You have to go into HRD and alter the sound card settings for to new card, and also set up the com port number, speed, and address to match the new one. For the PTT control, you select this to work over the remote link over the C/IV.

"It all takes a while to play about and configure HRD so everything works but that's part of the fun. I have read two reviews of the IC-7600 and also its own handbook, and all mention the USB feature but without explaining what it can do or how to do it. One word of warning, though, I did find that a few of my unrelated PC applications that use a sound card defaulted to the new card and needed to be put back onto the PC's own original one. So if you get no sound where you expect it, just go into the applications setup, or the PC control panel, and tweak it.

"Of course if you have an IC-7600 you can just plug a keyboard into it and operate on PSK31 or RTTY directly with no external PC involved, but that's another story."

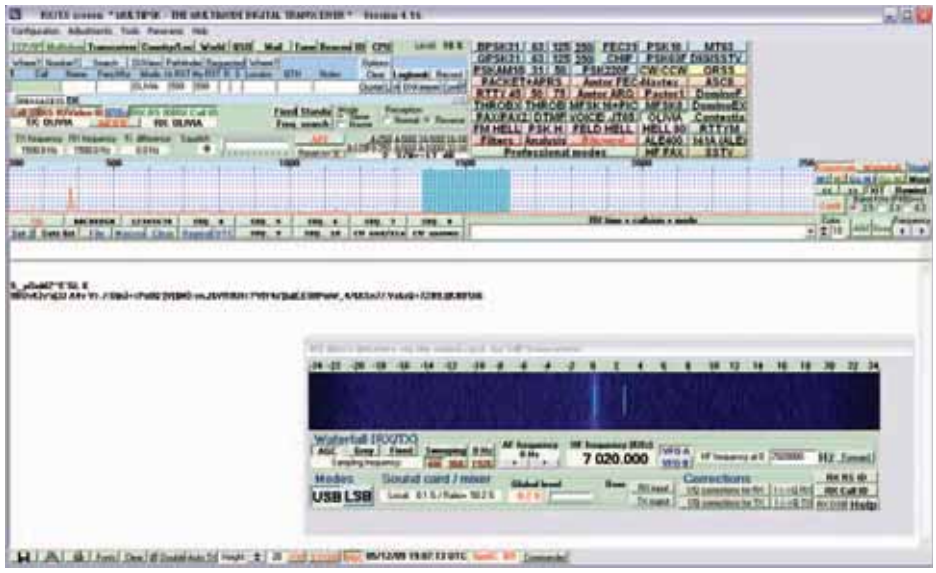

FIGURE 2: The new MultiPSK416 main screen.


The rear panel of the IC-7600 includes an USB socket.

NEW VERSION OF *MULTIPSK* RELEASED. A new version has been released [2] of this popular software package, which copes with just about every amateur datamode there is!

The main modifications of *MULTIPSK* 4.16 are as follows:

1) Decoding of the STANAG 4285 mode. This mode is used in HF for professional transmissions. Unfortunately, almost all transmissions are encrypted, which limits the interest of this mode
2) RS ID, Call ID (Message ID)
3) New macros:
   - "<LAST QSO>"
   - <SELF REPEATING
   -<EXEC:command>
4) Improvements of the ARQ FAE mode (in ALE or ALE400) with, mainly, an automatic re-synchronization using the RS ID, the Packet 1200 baud decoding, the sound card management, the 110A decoding, APRS (Packet, 1 41A and ALE400).
5) JT65: JT65 beacon transmitting at each minute.

NEW ARRL EMERCOMMS DIGIMODES COURSE. With digital technology becoming an integral part of amateur radio, the ARRL has released a new course to help amateurs take advantage of emerging modes. Aspects covered include packet radio, APRS, Winlink, IRLP, EchoLink, WIRES-II, D-STAR, APCO25, HF sound card modes and ALE. The course illustrates ways that amateur radio operators are using digital technologies as valuable emergency communications tools.

Written by ARRL Publications Manager (and QST Editor) Steve Ford, WB8IMY, this self-study CD-ROM also describes operating practices such as how to transfer supply lists or personnel assignments between emergency operations sites, how to get e-mails to the internet if a connection goes down, relaying digital images of damage at specific locations and tracking the locations of emergency personnel. Whilst understandably America-centric, this course looks to be a useful starting point for anyone interested in the public service applications of digital communications technologies. Full details are online at www.arrl.org/catalog/?item=1247.

REFERENCES

[1] Ham Radio Deluxe - www.ham-radio-deluxe.com. HRD also includes mapping, satellite tracking and the digital mode program Digital Master 780 (DM780).
[2] MultiPSK download - http://f6cte.free.fr/index_anglais.htm

ALINCO

Hand-helds

Alinco DJ-G7 Triband 2/70/23cm **£359.00**
Alinco DJ-V5 Dual band 2/70cm **£199.00**
Alinco DJ-596 Dual band 2/70cm ..... ~~£189.00~~ **Special Offer £149.00**
Alinco DJ-C7 Dual band 2/70cm **£149.00**
Alinco DJ-175E Single band 2m ..... ~~£149.00~~ **Special Offer £89.00**
Alinco V17E Single band 2m ..... ~~£149.00~~ **Special Offer £99.00**
Alinco DJ-195 Single band 2m **£139.00**

Mobiles

Alinco DR-635E Dual band 2/70cm with wideband RX 50 Watts **£299.00**
Alinco DR-135E Single band 2m with optional RX 118-173.995MHz 50 Watts **£199.00**

Base/Portable

Alinco DX-70TH 100W 1.8-50MHz All modes **£599.00**
NEW Alinco DX-SR8
All mode 100W HF Transceiver with QRP **£499.95**

KENWOOD

Hand-helds

Kenwood TH-F7E Dual band 2/70cm RX 0.1-1300MHz **£229.95**
Kenwood TH-K2ET Single band 2m with 16 button keypad **£165.95**
Kenwood TH-K2E Single band 2m **£159.95**
Kenwood TH-K4E Single band 70cm **£159.95**

Mobiles

Kenwood TM-D710E Dual band 2/70cm with APRS RX 118-524MHz & 800-1300MHz, 50 Watts **£429.95**
Kenwood TM-V71E Dual band 2/70cm with EchoLink RX 118-524MHz & 800-1300MHz, 50 Watts **£289.95**
Kenwood TM-271E Single band 2m, 60 Watts **£165.95**

Base

Kenwood TS-2000X All mode transceiver HF/50/144/430/1200MHz 100 Watts All mode transceiver **£1,745.95**
Kenwood TS-2000E All mode transceiver HF/50/144/430MHz 100 Watts All mode transceiver **£1,479.95**
Kenwood TS-480HX HF/6m 200 Watts Transceiver **£849.95**
Kenwood TS-480SAT HF/6m 100 Watts Transceiver **£749.95**

ICOM

Hand-helds

ICOM IC-E92D Dual band 2/70cm RX 0.495-999.9MHz with built in DSTAR **£369.95**
ICOM IC-E91 Dual band 2/70cm RX ~~0.495-999~~.9MHz DSTAR ready £269.95 **Special Offer £199.95**
ICOM IC-E90 Tri band 6/2/70cm RX 0.495-999.9MHz **£232.95**
ICOM IC-V82 Single band 2m digital with 7 Watts output **£172.95**
ICOM IC-U82 Single band 70cm digital with 5 Watts output **£172.95**
ICOM IC-T3H Single band 2m, 5.5 Watts output **£144.95**

Mobiles

ICOM IC-7000 All mode HF/VHF/UHF 1.8-50MHz, 100 Watts output **£939.95**
ICOM 706MKIIGDSP HF/VHF/UHF 1.8-70cm, 100 Watts output **£739.95**
ICOM ID-1 Single band 23cm 1240-1300MHz digital and analogue DSTAR transceiver **£689.95**
ICOM IC-703DSP All mode HF/VHF 1.8-50MHz, 10 Watts output **£524.95**
ICOM IC-E2820 + UT123 Dual band 2/70cm with DSTAR fitted, 50 Watts output **£539.95**
ICOM IC-E2820 Dual band 2/70cm DSTAR compatable, 50 Watts output **£384.95**
ICOM IC-2725E Dual band 2/70cm with detachable head, 50 Watts output **£319.95**
ICOM IC-E208 Dual band 2/70cm RX 118-173, 230-549, 810-999MHz 55 Watts output **£254.95**
ICOM IC-2200H Single band 2m digital compatable, 65 Watts output **£199.95**

Base

"NEW" ICOM IC-9100 HF/VHF/UHF/23cm All mode 100 Watts ..... **£TBA**
ICOM IC-7800 HF/6m All mode 200 Watts Icom flagship radio **£6,599.95**
ICOM IC-7700 HF/6m 200 Watts with auto ATU transceiver **£4,999.95**
ICOM IC-7600 HF/6m 100 Watts successor to the IC-756 ..... **£3,365.95**
ICOM IC-7400 HF/6/2m 100 Watts with auto ATU transceiver **£1,329.95**
ICOM IC-7200 HF/VHF 1.8-50MHz RX 0.030-60MHz, 100 Watts output (40w AM) **£759.95**
ICOM IC-718 HF 1.8-30MHz RX 300kHz - 29.999MHz, 100 Watt output (40w AM) **£449.95**

YAESU

Hand-helds

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Yaesu VX-7R Tri band 50/144/430MHz RX 0.5- 900MHz, 5 Watts outut **£259.95**
Yaesu VX-6E Dual band 2/70cm RX 1.8-222/420-998MHz, 5 Watts output **£199.95**
Yaesu FT-60E Dual band 2/70cm RX 108-520/700-999.99MHz, 5 Watts output **£142.95**
Yaesu VX-3E Dual band 2/70cm RX 0.5-999MHz, 3 Watts output **£139.95**
Yaesu VX-170E Single band 2m, 16 digit keypad, 5 Watts output **£95.95**

Mobiles

Yaesu FT-857D All mode HF/VHF/UHF 1.8-430MHz, 100 Watts output **£549.95**
Yaesu FT-8900R Quad band 10/6/2/70cm 28-430MHz, 50 Watts output **£334.95**
Yaesu FT-8800E Dual band 2/70cm RX 10-999MHz, 50 Watts output **£289.95**
Yaesu FTM-10E Dual band 2/70cm, 50 Watts output **£269.95**
Yaesu FT-7800E Dual band 2/70cm RX 108-520/700-999MHz, 50 Watts output **£199.95**
Yaesu FT-2800M Single band 2m, 65 Watts output **£124.95**
Yaesu FT-1802E Single band 2m, 50 Watts output **£119.95**

Portable

Yaesu FT-897D HF/VHF/UHF Base/Portable transceiver 1.8-430MHz 100 Watts HF+6, 50 Watts 2M, 20 Watts 70cm **£629.95**
Yaesu FT-817ND HF/VHF/UHF Backpack Transceiver RX 100kHz – 56MHz 76-154MHz 420-470MHz 5 Watts .. **£439.95**

Base

Yaesu FT-2000D HF/6m All mode 200 Watts transceiver RX: 30kHz – 60MHz **£2,399.95**
Yaesu FT-2000 HF/6m All mode 100 Watts transceiver RX: 30kHz – 60MHz **£1,899.95**
Yaesu FT-950 HF/6m 100 watt transceiver with DSP & ATU RX 30kHz – 56MHz **£1,099.95**
Yaesu FT-450AT Compact transceiver with IF DSP and built in ATU, HF+6m 1.8-54MHz, 100 Watts output **£679.95**
Yaesu FT-450 Compact transceiver with IF DSP, HF+6m 1.8-54MHz, 100 Watts output **£589.95**

eton

Eton Globe Traveller G3 AM/FM/Shortwave Digital Radio with SSB, RDS and Synchronous detector RX:150-30000kHz 118-137 MHz **£99.95**
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£489.95 + £7.99 P&P

● Watch all the action from home ● Real-Time radar Mode-S and ADS-B decoder ● Zoom worldwide to runway level ● Network your station with others ● Self powered from your computer or laptop USB port ● Centre map on your home – Direct reception

This new 3D version of the ever popular AirNav Radar Box adds Google Earth as a map overlay. In addition, the new 3D picture library displays the selected aircraft, enables you to zoom down and see the airport runway, or zoom out and see the aircraft fly over towns, sea and mountains. Never before has such detail and excitement been available.

AirNav RadarBox 2009. £389.95 The original box with everything you need including RadarBox, antenna and easy to install software.

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Manufacturers of radio communication antennas and associated products

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Heavy duty design HF verticals, with high power preparation, all with great performance

VR3000	3 Band 10-15-20M, Length 3.8M, Power 2000 Watts (without radials)	~~£149.95~~ **now £99.95**
EVX4000	4 Band 10-15-20-40M, Length 6.5M, Power 2000 Watts (without radials)	~~£159.95~~ **now £119.95**
EVX5000	5 Band 10-15-20-40-80M, Length 7.3M, Power 2000 Watts (without radials)	~~£199.95~~ **now £150.00**
EVX6000	6 Band 10-15-20-30-40-80M, Length 5.0M, Power 2000 Watts (including radials)	~~£349.95~~ **now £275.00**
EVX8000	8 Band 10-12-15-17-20-30-40 (80M Optional), Length 4.9M, Power 2000 Watts (including radials)	~~£349.95~~ **now £275.00**
EVXKIT-80	Radial kit for above to add 80M includes radial plus extension top section	**£129.95**

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GF151	Glass Mount 2/70cm, Gain 2.9/4.3dBd, Length 78cm complete with 4m cable and PL259	**£29.95**
MRM-100	MICRO MAG 2/70cm, Gain 0.5/3.0dBd, Length 55cm, 1" magnetic base with 4m coax and BNC	**£19.95**
MR700	2/70cm, Gain 0/3.0dBd, Length 50cm, 3/8 fitting	**£9.95**
MR777	2/70cm, Gain 2.8/4.8dBd, Length 150cm, 3/8 fitting	**£17.95**
MRQ525	2/70cm, Gain 0.5/3.2dBd, Length 43cm, PL259 fitting (high quality)	**£19.95**
MRQ500	2/70cm, Gain 3.2/5.8dBd, Length 95cm, PL259 fitting (high quality)	**£24.95**
MRQ750	2/70cm, Gain 5.5/8.0dBd, Length 150cm, PL259 fitting (high quality)	**£34.95**
MR2 POWER ROD	2/70cm, Gain 3.5/6.5dBd, Length 50cm, PL259 fitting (fibreglass collinear)	**£24.95**
MR3 POWER ROD	2/70cm, Gain 2.0/3.5dBd, Length 50cm, PL259 fitting (fibreglass collinear)	**£29.95**
MRQ800	6/2/70cm Gain 3.0dBi/5.0/7.5dBdBd, Length 150cm, PL259 fitting (high quality)	**£39.95**
MRQ273	2/70/23cm Gain 3.5/5.5/7.5dBdBd, Length 85cm, PL259 fitting (high quality)	**£49.95**

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Great single band antennas at great prices!

HV-2	2m ½ wave, Gain 2.5dBd, Length 130cm, SO239	**£29.95**
HV-4	4m ½ wave, Gain 2.5dBd, Length 200cm, SO239	**£44.95**
HV-6	6m ½ wave, Gain 2.5dBd, Length 300cm, SO239	**£49.95**
HV-658	6m 5/8 wave, Gain 2.5dBd, Length 375cm, SO239	**£59.95**

MOONRAKER Mono Band Collinear Verticals

Totally encapsulated GRP fibreglass antennas which require no tuning!

BM33	70cm 2 X 5/8, Gain 7.0dBd, Length 100cm, N-Type	**£44.95**
BM45	70cm 3 X 5/8, Gain 8.5dBd, Length 155cm, N-Type	**£54.95**
BM55	70cm 4 X 5/8, Gain 10dBd, Length 250cm, N-Type	**£74.95**
BM60	2m 5/8, Gain 5.5dBd, Length 155cm, N-Type	**£54.95**
BM65	2m 2 X 5/8, Gain 8.0dBd, Length 250cm, N-Type	**£79.95**
BM75	2m 3 X 5/8, Gain 8.0dBd, Length 430cm, N-Type	**£99.95**
BM140	4m 1/2, Gain 2.75dBd, Length 230cm, N-Type	**£69.95**
BM260	6m 1/2, Gain 2.75dBd, Length 285cm, N-Type	**£89.95**

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Get great results with the Moonraker range of HF mobiles !
... from as little as £17.95!

AMPRO-10	28MHz, Length 220cm, 38th fitting (slimline design)	**£17.95**
AMPRO-12	24MHz, Length 220cm, 38th fitting (slimline design)	**£17.95**
AMPRO-15	21MHz, Length 220cm, 38th fitting (slimline design)	**£17.95**
AMPRO-17	18MHz, Length 220cm, 38th fitting (slimline design)	**£17.95**
AMPRO-20	14MHz, Length 220cm, 38th fitting (slimline design)	**£17.95**
AMPRO-30	10MHz, Length 220cm, 38th fitting (slimline design)	**£17.95**
AMPRO-40	7.0MHz, Length 220cm, 38th fitting (slimline design)	**£17.95**
AMPRO-80	3.5MHz, Length 220cm, 38th fitting (slimline design)	**£19.95**
AMPRO-160	28MHz, Length 220cm, 38th fitting (heavy duty design)	**£17.95**
ATOM-20S	14MHz, Length 130cm, PL259 fitting (compact design)	**£24.95**
ATOM-40S	7.0MHz, Length 165cm, PL259 fitting (compact design)	**£26.95**
ATOM-80S	14MHz, Length 165cm, PL259 fitting (compact design)	**£29.95**

TA Tarheel Motorised Mobile

The best USA motorised antennas available here from Moonraker the European distributor – All models in stock now!

Little Tarheel II 3.5-54MHz 200W max length 48"	**£349.95**
Tarheel 40A HP 7-34MHz 1.5Kw max length 8ft	**£429.95**
Tarheel 75A 7-34MHz 250W max length 8ft	**£429.95**
Tarheel 100A 3.4-30MHz 1.5Kw max length 10.4ft	**£449.95**
Tarheel 200A HP 3.4-28MHz 1.5Kw max length12ft	**£479.95**
Tarheel 300A 1.7-30MHz 250W max length 11.4ft	**£449.95**
Tarheel 400A 1.7-30MHz 250W max length 12ft	**£479.95**

MOONRAKER GP2500

All Band HF Vertical

This is the perfect answer for anyone with limited space and requires no radials. Covering 80 through to 6M with a VSWR below 1.5:1 !!

Frequency 3.5-57MHz without tuner, Power 250 Watts, Length 7.13M

All at an amazing £199.95 !

MOONRAKER Dual and Triband Collinear Verticals

Diamond quality – Moonraker prices ! These high gain antennas have been pre-tuned for your convenience, easy to use, easy to install, and a choice of connection ... look no further

SQBM105P	2/70cm, Gain 2/4.5dBd, RX 25-2000MHz, Length 70cm, SO239 (Radial Free)	**£39.95**
SQBM105N	2/70cm, Gain 2/4.5dBd, RX 25-2000MHz, Length 70cm, N-type (Radial Free)	**£44.95**
SQBM110P	2/70cm, Gain 3/6dBd, RX 25-2000MHz, Length 100cm, SO239 (Radial Free)	**£54.95**
SQBM110N	2/70cm, Gain 3/6dBd, RX 25-2000MHz, Length 100cm, N-Type (Radial Free)	**£59.95**
SQBM200P	2/70cm, Gain 4.5/7.5dBd, RX 25-2000MHz, Length 155cm, SO239	**£54.95**
SQBM200N	2/70cm, Gain 4.5/7.5dBd, RX 25-2000MHz, Length 155cm, N-Type	**£59.95**
SQBM500P	2/70cm, Gain 6.8/9.2dBd, RX 25-2000MHz, Length 250cm, SO239	**£64.95**
SQBM500N	2/70cm, Gain 6.8/9.2dBd, RX 25-2000MHz, Length 250cm, N-Type	**£69.95**
SQBM800N	2/70cm, Gain 8.5/12.5dBd, RX 25-2000MHz, Length 520cm, N-Type	**£129.95**
SQBM1000P	6/2/70cm, Gain 3.0/6.2/8.4dBd, RX 25-2000MHz, Length 250cm, SO239	**£79.95**
SQBM1000N	6/2/70cm, Gain 3.0/6.2/8.4dBd, RX 25-2000MHz, Length 250cm, N-Type	**£84.95**
SQBM223N	2/70/23cm, Gain 4.5/7.5/12.5dBd, RX 25-2000MHz, Length 155cm, N-Type	**£69.95**

MOONRAKER Multiband Mobile

Why buy loads of different antennas when Moonraker has one to cover all! SPX series has a unique fly lead and socket for quick band changing

SPX-100	9 Band plug n' go portable, 6/10/12/15/17/20/30/40/80m, Length 165cm retracted just 0.5m, Power 50W complete with 38th PL259 or BNC fitting to suit all applications, mobile portable or base ... brilliant!	**£44.95**
SPX-200	6 Band plug n' go mobile, 6/10/15/20/40/80m, Length 130cm, Power 120W, 3/8th fitting	**£39.95**
SPX-200S	6 Band plug n' go mobile, 6/10/15/20/40/80m, Length 130cm, Power 120W, PL259 fitting	**£44.95**
SPX-300	9 Band plug n' go mobile, 6/10/12/15/17/20/30/40/80m, Length 165cm, High Power 200W, 3/8th fitting	**£54.95**
SPX-300S	9 Band plug n' go mobile, 6/10/12/15/17/20/30/40/80m, Length 165cm, High Power 200W,PL259 fitting	**£59.95**
AMPRO-MB6	6 Band mobile 6/10/15/20/40/80m, length 220cm, 200W, 3/8th fitting, (great for static use or even home base – can tune on four bands at once)	**£69.95**
ATOM-AT4	10/6/2/70cm Gain 2m 2.8dBd 70cm 5.5dBd, Length 132cm, PL259 fitting (perfect for FT-8900R)	**£59.95**
ATOM-AT5	5 Band mobile 40/15/6/2/70cm, Length just 130cm, 200W (2/70) 120W (40-6M) PL259 fitting, (great antenna, great price and no band changing, one antenna, five bands)	**£69.95**
ATOM-AT7	7 Band mobile 40/20/15/10/6/2/70cm, Length just 200cm, 200W (2/70) 120W (40-6M) PL259 fitting, (great antenna, great price and no band changing, one antenna, five bands)	**£79.95**





If we advertise it – we stock it!

MOONRAKER Yagi Antennas

All Yagis have high quality gamma match fittings with stainless steel fixings! (excluding YG4-2C)

YG27-4	Dual band 2/70 4 Element (Boom 42") (Gain 6.0dBd)	**£49.95**
YG4-2C	2 metre 4 Element (Boom 48") (Gain 7dBd)	**£29.95**
YG5-2	2 metre 5 Element (Boom 63") (Gain 10dBd)	**£49.95**
YG8-2	2 metre 8 Element (Boom 125") (Gain 12dBd)	**£69.95**
YG11-2	2 metre 11 Element (Boom 185") (Gain 13dBd)	**£99.95**
YG3-4	4 metre 3 Element (Boom 45") (Gain 8dBd)	**£59.95**
YG5-4	4 metre 5 Element (Boom 104") (Gain 10dBd)	**£69.95**
YG3-6	6 metre 3 Element (Boom 72") (Gain 7.5dBd)	**£64.95**
YG5-6	6 metre 5 Element (Boom 142") (Gain 9.5dBd)	**£84.95**
YG13-70	70 cm 13 Element (Boom 76") (Gain 12.5dBd)	**£49.95**

MOONRAKER ZL Special Yagi Antennas

The ZL special gives you a massive gain for the smallest boom length ... no wonder they are our best selling yagi's!

ZL5-2	2 Metre 5 Ele, Boom 95cm, Gain 9.5dBd	**£49.95**
ZL7-2	2 Metre 7 Ele, Boom 150cm, Gain 12dBd	**£59.95**
ZL12-2	2 Metre 12 Ele, Boom 315cm, Gain 9.5dBd	**£99.95**
ZL7-70	70cm 7 Ele, Boom 70cm, Gain 11.5dBd	**£39.95**
ZL12-70	70cm 12 Ele, Boom 120cm, Gain 14dBd	**£49.95**

MOONRAKER HB9CV

Brilliant 2 element beams ... ideal for portable use

HB9-70	70cm (Boom 12")	**£24.95**
HB9-2	2 metre (Boom 20")	**£29.95**
HB9-4	4 metre (Boom 23")	**£39.95**
HB9-6	6 metre (Boom 33")	**£49.95**
HB9-10	10 metre (Boom 52")	**£69.95**
HB9-627	6/2/70 Triband (Boom 45")	**£69.95**

MOONRAKER Halo Loops

Our most popular compact antennas, great base, mobile, portable, or wherever!

HLP-2	2 metre (size approx 300mm square)	**£19.95**
HLP-4	4 metre (size approx 600mm square)	**£29.95**
HLP-6	6 metre (size approx 800mm square)	**£39.95**

MOONRAKER G5RV Wire Antennas

The most popular wire antenna available in different grades to suit every amateur .... All from just £19.95!

G5RV-HSS	Standard Half Size Enamelled Version, 51ft Long, 10-40 Metres	**£19.95**
G5RV-FSS	Standard Full Size Enamelled Version, 102ft Long, 10-80 Metres	**£24.95**
G5RV-DSS	Standard Double Size Enamelled Version, 204ft Long, 10-160 Metres	**£49.95**
G5RV-HSH	Half Size Hard Drawn Version, pre-stretched, 51ft Long, 10-40 Metres	**£24.95**
G5RV-FSH	Full Size Hard Drawn Version, pre-stretched, 102ft Long, 10-80 Metres	**£29.95**
G5RV-HSF	Half Size Original High Quality Flexweave Version, 51ft Long, 10-40 Metres	**£29.95**
G5RV-FSF	Full Size Original High Quality Flexweave Version, 102ft Long, 10-80 Metres	**£34.95**
G5RV-HSP	Half Size Original PVC Coated Flexweave Version, 51ft Long, 10-40 Metres	**£34.95**
G5RV-FSP	Full Size Original PVC Coated Flexweave Version, 102ft Long, 10-80 Metres	**£39.95**
G5RV-HSX	Half Size Deluxe Version with 450 Ohm ladder, 51ft Long, 10-40 Metres	**£44.95**
G5RV-FSX	Full Size Deluxe Version with 450 Ohm ladder, 102ft Long, 10-80 Metres	**£49.95**

Accessories

G5RV-IND	Convert any half size G5RV to full with these great inductors, adds 8ft on each leg	**£24.95**
G5RV-CHOKE	inline balun to reduce RF feedback	**£39.95**
TSS-1	Pair of stainless steel springs to take the tension out of a G5RV or similar	**£19.95**

MOONRAKER Trapped Wire Dipole Antennas

Commercial quality trapped wire dipoles that resonate, so require no ATU!

MDT-6 FREQ:40 & 160m LENGTH: 28m POWER: 1000 Watts **£79.95**

MTD-1 (3 BAND) FREQ:10-15-20 Mtrs LENGTH:7.40 Mtrs POWER:1000 Watts **£69.95**

MTD-2 (2 BAND) FREQ:40-80 Mtrs LENGTH: 20Mtrs POWER:1000 Watts **£79.95**

MTD-3 (3 BAND) FREQ:40-80-160 Mtrs LENGTH: 32.5m POWER: 1000 Watts **£129.95**

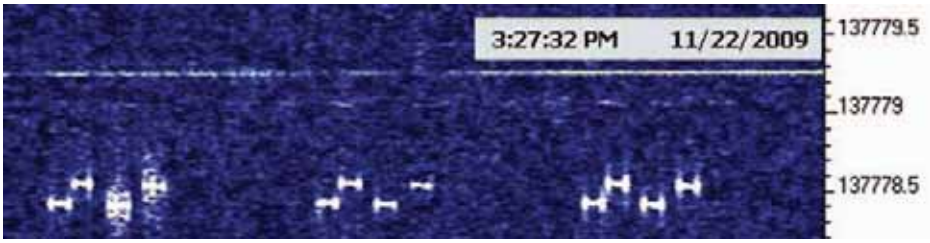
MTD-4 (3 BAND) FREQ: 12-17-30 Mtrs LENGTH: 10.5m POWER: 1000 Watts **£69.95**

MTD-5 (5 BAND) FREQ: 10-15-20-40-80 Mtrs LENGTH: 20m POWER:1000 Watts **£119.95**

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

LF

More amateurs gain access to 500kHz



One of Laurence's last China captures, a clear DFCW 'AET' from UA0AET.

LICENCE UPDATES. As one of a raft of licence updates, all Norwegian full licensees have access to 493 – 510kHz with 100W of CW. This is probably the most liberal deregulation of the 500kHz spectrum as no 'notice of variation' or other conditions of access apply. It wasn't long after the announcement that the first LA station appeared on the band. LA3EQ made the first LA/G contact on 500kHz on 8 December when he worked G3KEV.

From 1 January 2010, full licence holders in the Netherlands can apply for permission to conduct experiments in the 501 to 504kHz band with a maximum power of 5W EIRP and a maximum bandwidth of 100Hz.

Here in the UK the NOV system is set to continue for another two years. The current authorisations expire in February but these should automatically be renewed until 2012 with the same conditions.

It is heartening to see that there have been no reports of interference from NOV holders so far. Applications for new permits will be accepted as before, using form OfW306, which can be downloaded from Ofcom's website, or applied for by post from Ofcom, at Ofcom Licensing Centre, Amateur Radio, Riverside House, 2a Southwark Bridge Road, London SE1 9HA, telephone 020 7981 3131.

After months of negotiation with the Canadian amateur radio society, RAC, Industry Canada finally issued the first 'developmental' licences for operation in the 500kHz region at the end of October. The first two permits went to VE1ZZ and VO1NA.

VX9MRC is the callsign allocated to Joe, VO1NA and his signal has since reached across the Atlantic into the UK and near continent. CW signals were exchanged with EI0CF on a few occasions and QRS signals with G3LDO, OR7T and others.

Whether these exchanges count as QSOs is a moot point as the research callsign is not strictly an amateur call and the developmental permit does not cover QSOs with amateur stations. Clarification is being sought.

136kHz NEWS. Following on from the news in the last column of JH1GVY appearing on 136kHz, another Japanese operator, Rick Wakatori, 7L1RLL, tells us he is also testing on the band. He hasn't had any DX reports yet but has worked JH1GVY and is experimenting hard. It seems from his web pages that he is now using a Japanese-made 100W commercial transmitter – the Thamway TX-2200, which is available in the UK from Waters and Stanton. I have had the opportunity to try out one of these transmitters and a review appears elsewhere in this issue of *RadCom*.

Claude, F8BOJ has been quite active recently and after many improvements his signal is now very strong. He has worked OE5ODL and many others and is quickly becoming one of the top French stations on 136kHz.

OH1TN has returned to LF after a long absence. Reino uses a full quarter-wave of wire on 136kHz and has been heard by many stations around Europe under his own call and that of the club OH5UFO, but the last news I heard was that snow had brought down the aerial. I guess we'll have to wait until spring before he can get it working again.

UA0AET has reported that one of his beacon transmissions was picked up on the KL1X BY3A Chinese receiver recently. More news of Laurence's receivers in the 500k news.

If you can't hear anything on 136 or want to check whether you are getting out, a facility allowing you to tune across the 136kHz band and listen to the audio from a software defined receiver has been set up by the University of Twente in the Netherlands.

This remarkable receiver has multi-band coverage, not just LF. There are several examples of this technology listed at www.websdr.org but Twente is the only one I've found that covers an LF/MF amateur band.

NEW ON THE BANDS. Gunnar, SM6BGP is putting out a fine signal on 500kHz with initial reports from F4DTL, SQ2BXI, RW3ADB, DK6NI and OK2BVG. Pretty good coverage!

EI6IZ has been heard on 500kHz around the UK on CW. Brendan joins Finbar, EI0CF in the very small and select band of EI 500kHz operators.

I2PHD reports that he heard IK1HSS calling CQ on 136kHz QRS3 recently. IK1HSS has also been using WSPR and been copied in France and Germany. As this station is located near Turin in the north of Italy we may have a chance of seeing his signals in the UK.

ON THE 500kHz BAND. The WSPR experiments have continued and a few new participants have joined the fun on 500k. One interesting one is Vernon, VE1VDM in Nova Scotia who received Rik, OR7T and got a whopping signal from Jim, M0BMU.

WE2XGR/2 is the 600m call held by Jay, W1VD. His QRS signals have been seen around the globe this winter with reception reports coming in from the UK, Europe Russia and China. The very variable nature of long-distance propagation on 500kHz was illustrated by these tests with Jay's QRS3 signals easily reaching Russia one night and very little trace being seen the following night.

Also on 500kHz recently: WE2XGR/6 has been logged by several listeners including G4WGT, F4DTL on QRS and OH1LSQ on CW, and WD2XSH/17 on WSPR by DL4RAJ.

At the Chinese end of the link was, of course, Laurence, KL1X who has been based near Shanghai for the last year. At the end of November he packed up all the receiving gear and headed off to pastures new. His home-base north of Anchorage in Alaska will be activated soon as Laurence holds the experimental call WE2XPQ for 136 and 505 – 510kHz, in the meantime there is a receiving station set up there, which is posting grabs of the LF bands to the internet at KL1X.com. His regular reports from Shanghai have been very interesting.

I would like to thank him for his efforts. I don't suppose we'll have the opportunity to try for a Chinese report on LF/MF for a long time to come.

TO ALL THE CLUBS AND INDIVIDUALS WHO TOOK PART ON SEPT 19-20 2009

THANK YOU FOR MAKING OUR

15th ANNIVERSARY 1994 – 2009

TRANSMISSION

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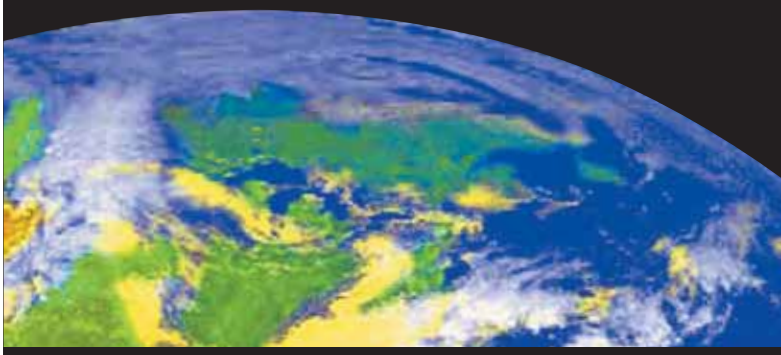

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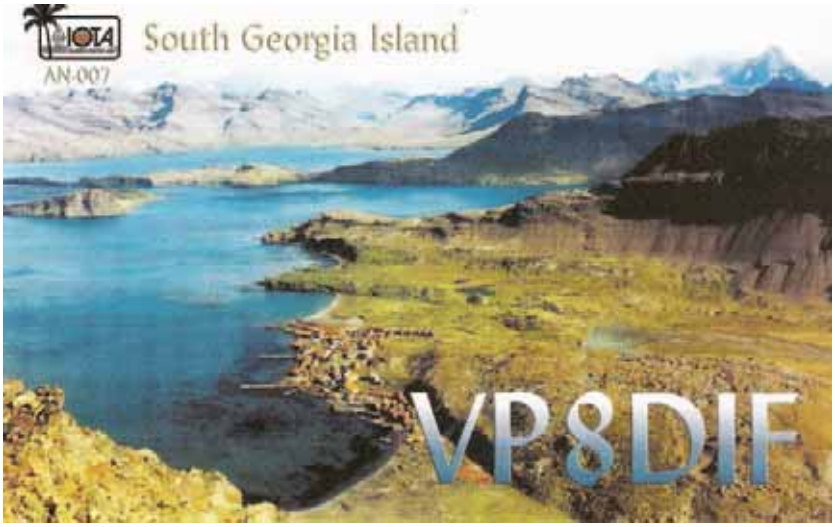
HF

As we settle into a new year, DXpeditions are on the increase.

SUNSPOTS! December saw the arrival of some of the most significant sunspots to appear so far in the new cycle, one apparently having a diameter some nine times that of the earth, which rather puts the size of these things – and of the sun itself – into perspective. Even so, there was very little obvious enhancement in HF propagation, but at least this is an encouraging sign.

Meanwhile, low band conditions remained good to excellent, with several folk mentioning regular long-path openings to Japan on 80m at our sunrise, though with signals appearing to arrive on a skewed path rather than on the great-circle route. Top Band saw frequent openings to the US West Coast, again at our sunrise.

Propagation and its vagaries are, when it comes down to it, very much what HF operation is about, and which can never truly be replicated by the internet or the various QSO simulators. I am completing this column after taking part in the first 80m Club Championship contest of 2010 and it was fascinating to follow the change of skip even in the 90 minutes of the contest and that pattern was quite different from the corresponding event of last year. While the vagaries of propagation can be deeply frustrating at times, they really are what make the HF bands so endlessly compelling.



The attractive QSL card of VP8DIF, one of the rare stations active in 2009.

DX NEWS. Three Bangladeshi operators, S21RC, S21S and S21D, will operate as (probably) S21DX from St. Martin's Island, AS-127, from 21 to 25 February. Although primarily intended as an IOTA operation, this could well be a good opportunity for country chasers to catch what has once again become quite a rare DXCC entity. The publicity says there will be a website so I have included the URL, but at the time of writing it doesn't appear to be operational.

The 'Caribbean Buddies 2010 team' go to St. Lucia, J6, 2 to 10 February, with nine operators. Their QTH is a cliff-top villa and they will operate portable from various spots on the island too, on CW, SSB and digital. They are still working on their licensing but each operator expects to end up with his own call. QSLing will be by LoTW, eQSL or direct to the individual operators, with SASE required.

Mike, W1USN, will sign VP2MPR from Montserrat from 28 February until 13 March. He will work mostly SSB and PSK31. Bob, AA1M, will operate mostly CW as VP2MPL from 3 to 11 March. QSL both via their home calls.

Nigel, G3TXF will join FO8RZ (F5PHW), F6BEE and VE2TZT for an all-band effort from French Polynesia from 9 to 25 February. There will be a particular focus on 160 and 80m. They will also participate in the CQ World Wide WPX RTTY Contest and the ARRL CW DX Contest. Plans are to have two complete stations QRV simultaneously. They will be using a 160m inverted-L in the ocean or on the beach, a pair of quarter wave verticals on 80m, verticals on 40, 30, 17 and 12m as well as a 5 band Spiderbeam. The team will also be using a Beverage or K9AY receiving antenna. No word yet on the callsign(s) but QSLs will go via G3TXF. Further information from the FO 2010 website.

G3SWH and G3RTE will be active as VK9X/G6AY from Christmas Island from 20 to 27 February. It's OC-002 for IOTA and is #66 on the DX Magazine's 2008 most wanted survey, worldwide. Phil and Jim will be CW only, all bands 80-10, going with the best propagation with two stations on the air as many hours a day as possible. QSL via G3SWH, direct with SAE and return postage or via Phil's website, for a bureau reply, or the regular way with a bureau card. More information via Phil's website.

Gerd, DJ4KW, and YL Gisela, DK9GG/V31GW, will once again operate as V31YN from Belize, this time from 21 January to 28 February. They plan to be in the CQ 160 CW Contest in January. Gerd will then operate as V31YN/P from IOTA NA-180 at the Blue Marlin Lodge, 2 to 7 February. He will also be operating in the CQWW RTTY WPX and ARRL DX CW Contests. A week later he'll be in the CQ 160 SSB.

LF enthusiast Ulf, DL5AXX will sign J38XX from Grenada between 10 and 24 February, including the ARRL CW DX Contest. He will be concentrating on the low bands. QSL via DL5AXX.

Bill, N7OU, and Bob, W7YAQ, are heading to Tokelau (ZK3) from 17 February to 10 March, which includes a multi-single effort in the ARRL DX CW Contest. "Tokelau is only accessible by boat and the exact dates may change a little", says Bill. The two will be in Samoa from 10 to 16 February before sailing to ZK3 and again afterwards from 11 to 15 March. 5W activity is expected during those periods. This will be a mostly CW effort with a little RTTY and SSB thrown in. They will be running 100 watts into verticals on all bands. Callsigns are yet to be announced. QSL cards will go via their home calls.

In addition to the two efforts reported above, there will as always be plenty of expeditions in February and March focused on the ARRL DX Contests, particularly to the Caribbean. The contest rules don't allow non-North America to non-NA contacts, but most groups make a point of working other areas before and/or after the contests (the CW leg is on 20/21 February and the Phone leg on 6/7 March).

NIGERIA UPDATE. I have in the past mentioned Nick 5N/LZ1QK who has been very active from Nigeria, an operation which has not been accepted for DXCC credit. Nick now reports that he has been issued with not one but four callsigns (5N3LQK, 5N3WQK, 5N4LQK and 5N4WQK) to be used from four different locations within Nigeria. 5N has 10 different call areas as follows:

5N1 = Ogun, Oyo, Ondo
5N2 = Kwara, Kogi, Niger, Osun
5N3 = Edo, Delta, Anambra
5N4 = Enugu, Rivers, Abia
5N5 = Cross Rivers, Akwa-Ibom, Imo, Benue
5N6 = Plateau, Taraba, Bauchi
5N7 = Adamawa, Yobe, Borno

5N8 = Kano, Jigawa
5N9 = Kaduna, Sokoto, Kebbi, Katsina
5N0 = Lagos State and Abuja, F.C.T.

Nick was back in Bulgaria over the Christmas/New Year period and planned to submit paperwork to ARRL. By now he should be back in Nigeria where he will remain through 2010 and operate as 5N50K in celebration of 50 years of Nigerian independence. QSL cards for all of Nick's calls go via LZ1CL, Vassil Shatarov, PO Box 185, Plovdiv 4000, Bulgaria. Ivan, OM3CGN, who I mentioned last month, has replaced his 5N7MGI callsign with 5N7M which, he says, is much nicer to use, especially on 160. He has made arrangements to use a 3-element 4-band Yagi for 40-10 and a vertical for the lower bands.

60m REPORT (From G4TRA). Last November from Barbados (8P9SS) Brian, ND3F reports that he worked a 'few' Europeans including a couple of G stations, but it was rough going. I was lucky enough to make it on the first night and Brian had a reasonable signal here, but the US competition was heavy. Also YS1/LA2FKA worked a few from El Salvador, but he was very weak for most of us. If you did manage to catch him, then QSL to LA2FKA.

Now some legislation. Tom, LA4LN reports in December that "It will become official within a few days that NRRL has sent a proposal to the IARU Region 1 Interim meeting in Vienna, to be held in February 2010, about a proposed band plan for 60m, based on the preliminary Norwegian band plan. In this NRRL proposal, we are proposing 5403.5kHz to be used as an international calling channel." For all of us channelised countries I am not too sure a band plan should be adopted, especially based on the one country alone that is allowed to use a 150kHz slot on 60m. We wait and see.

For the future, both V31YN (mentioned above) and J38SW/J38CW (more details next moth) are planning to include 60m in their activities, licences permitting. Finally don't forget that Bill, K7MT should be in Antarctica until 20 February.

My thanks to Steve for his regular 60m updates during 2009 – G3XTT.

CORRESPONDENCE AND TABLES. I find that several readers have sent end-of-year updates, but others have yet to do so, so I will hold over a year-end report until next month, when I will also run the final table for 2009. Just a reminder that the 2010 Annual Table will be rather different. It will still have four columns, but this time they will be band totals for 160, 80, 12 and 10, which hopefully will give some indication of what the two ends of the short wave spectrum are doing as the sunspots return. If this works out, I might stick with the format for a few years, which would then give an interesting slant on how the bands change as the cycle progresses.

So, this month, just a few reports, mainly those who raise other matters. Mike, GM3PPE, for example, writes, "I read your comments on 30m with interest, as I have also found 30m the most consistent band for working the various DXpeditions. I only use a Hustler 6BTV vertical but have had great success. The K4M DXpedition was my 300th country on the band. Your simple dipole is an indication of how easy it is to put out a good signal at minimum cost!" On a completely different subject, Mike says, "A subject in the amateur news a lot these days is the DX Cluster. I make a point NEVER to spot any DX. I cannot stand the sudden pile ups that arise when a new DX station is spotted. Many of those in the pile up have not the slightest clue as to how to work the station and end up causing either accidental or deliberate QRM. Last night I was doing the old fashioned tuning around 30m and heard first R1AND and then OR4TN calling CQ. It was great to have two QSOs with Antarctica without the screaming mass of Europe causing QRM! I feel that the Clusters have pretty much outlived their usefulness as there are other ways for 'DX pals' to alert each other on new stuff to work. In any case most of the spots tend to be self congratulatory rather than informational."

Nigel, G0RPM used CW to work KP2M on 20 plus 9H3HH, 8P9SS and HK1A on 40, while RTTY produced WP2B and VP2MNK on 20 plus VP2V/DL7VOG, 9K2YM, YB0AI, JS3CTQ and VK3TDX on 40. SSB accounted for V48M on 20 and VP5T on 40. Terry, G1UGH reports working CO6LC on 20, plus 9G5TT, YV5JBI, VP2V/W4DXX and VK6WC on 17, along with lots of North American stations, all SSB. Graeme, G6CSY used QRP on 160 and a temporary wire to work some new band-slots in the CQWW CW contest at the end of November. He mentions GJ2A, TF4X, YT3A, YL/4L3A and SK3W as being new for him on the band. Many of us will have forgotten the pleasure of trying out a new band, where almost everything is new, but his report did get me reminiscing a little about my early days on Top Band, which has always been my favourite band. Apropos of which, last month I mentioned Mike, G3SED's Top Band contact with 3D2KJ – he and Clive, GM3POI were the only UK stations to catch this one. Mike wrote again, with a scan of the QSL card for the contact and says this one QSO has done a lot to reinvigorate his interest in DX chasing that had waned somewhat as a result of the dreadful deliberate interference that accompanied some recent DXpedition operations.

Peter, G3HQT comments on two of the topics I have just mentioned, that is to say the 3D2KJ contact and DX Clusters. "I was interested to read Mike, G3SED, comment on 3D2KJ. Mike lives about 2 miles north of me, on somewhat higher, more level, ground.

The two sides of 3D2KJ's QSL card, confirming G3SED's remarkable 160m QSO (see text).

I often hear him giving good reports on LF to stations I can't hear a whisper of! Having recently installed broadband I can now take advantage of the Clusters. The PC I have broadband on is in another room to the PC in use for rig control. My wife feels I shall wear out the carpet between the two!"

SILENT KEY. Roy, ZL4BO passed away on 1 December. 'Blue Ocean', as many will remember him, was New Zealand's top DXer with 335/375 (current/total) countries confirmed at the ARRL DXCC Desk and he also had 5BWAZ. Roy had not been active for the past four years, but did manage to get on the air from his "holiday home in Alexandra" to work VP6DIA for his last new one, remembers Duncan, ZL3JT.

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 **April** issue by **Friday 19 February**.

WEBSEARCH
FO: www.fo2010.org.
G3SWH: www.g3swh.org.uk
S2 IOTA expedition: http://iota.s2dx.org

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IC-E90 6m / 2m / 70cm Handheld £169.00
Alinco DJ-V17E £105.00
IC-W2IET FM transceiver £99.00
Yaesu FT-40R 70cm Transceivers £69.00
HF Transceivers
Yaesu FT-920AF HF / 6M Base £899.00
Icom IC-706MkIIG DSP £549.00
Yaesu FT-1000MP MKV 200w HF DSP Base £1,399.00
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Icom BC-156 Desktop Charger for IC-R20 £45.00
Kenwood YK-88SN-1 SSB Filter £49.00
Yaesu FV-901DM VFO £175.00
CX-201 Diecast Coax Switch £10.00
Microset SR-200 2m 200w £319.00
AOR ARD9000 Digital Voice Interface. £129.00
Yaesu SC-1 Station Console
MFJ-1817 2m/70cm Telescopic Rubber Duck 36.8cm long £22.00
KSC-14 Fast Charger for TH-22E £70.00
MB-62 Mobile Mounting Bracket (Main) for IC-706, IC- £14.74
EM-8200 External Memory Card for AR-8200-8200-S2 £40.00
Kenwood YG-455CN-1 - CW Crystal filter £100.00
Kenwood / Trio BPF-2A HF filter £25.00
Icom LC-158 Carrying Case for IC-R20 £12.00
ICOM LC-168 Soft Case for IC-E92D £10.00
FL-101 9MHz Filter CW narrow 250Hz £60.00
SC-45 Soft Case for TH-G71E £10.00
CASE FOR KENWOOD TH-47 £10.00
LC-146 Leatherette Case for IC-R2 £8.00
ALINCO ESC-28 £10.00
010-10117-02 Garmin GPS New Carry Case £5.00
HS-800/PRO High Sierra Standard Control Box for 180 £75.00
BP-206 Lithium Ion Battery Pack for IC-R-20 & IC-R3 £30.00
HPS-900 934-935mhz POWER-SWR Meter £40.00
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Maplin XM-21 - power supply 7-9A £20.00
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1090 Radiomate Keypad	£91.95

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VHF/UHF

Disappointing tropo conditions but there was some winter Sporadic-E on 4m and 6m and plenty to work on meteor scatter and moonbounce

Screen capture of an SSTV QSO between G4MBN and G6TGO.

REPORTS AND TABLES. As this is being compiled at the beginning of a new year and for the benefit of any new contributors here are a few explanatory notes which, hopefully, will be helpful. Unless otherwise stated all times are in UTC (or GMT, if you prefer). Where known and relevant, CW QSOs are denoted by an asterisk (*) after the callsign. In the moonbounce section stations worked for the first time, known as 'initials', are identified by a hash (#) symbol. In your reports it would be appreciated if you would indicate the mode used, eg FSK441, JT65b or c, PSK31and so on. If possible the propagation mode used would be helpful especially on 4m and 6m where sometimes a meteor scatter (MS) QSO might also be enhanced by Sporadic-E (Es), unexpected tropospheric (tropo) or even ionoscatter.

Regarding the tables, the All-time Squares one has a starting date of 1 January 1979 because that was the start date of the Society's original 4-2-70 Squares Award. This table now includes 6m and 23cm in the five bands covered in this column. Anyone can submit an entry even though they may only operate on one of the bands. The only rule is that if scores are not updated for a year they will be deleted, it being assumed you are no longer interested, but entries can always be reinstated at any time.

The Annual Table obviously runs for the year in question and is for working squares, or more accurately grids, and the DXCC entities plus Sicily (IT9). All modes such as CW, FM, AM, SSB and digital are permissible but only station-to-station contacts, so repeater and packet radio QSOs should not be included, nor contacts through artificial satellites. Moonbounce (EME) QSOs are quite valid. When submitting reports please make it clear to which band they refer. It would be appreciated if you would add your locator.

SOLAR AND GEOMAGNETIC DATA. The solar data in the 30 days between 29 November and 28 December reveals that for the first ten days the sunspot number was zero. Thereafter, except for Christmas Day, numbers were recorded every day, reaching a maximum of 43 on 19 December, the highest for quite a while. The 10.7cm radio flux varied from a low of 71 to a high of 87 on 17 December making the average for the period 76.5 units, slightly up on last month. Six new regions were observed. By contrast the geomagnetic activity was very low and the maximum A-index at Fredericksburg was just four on 14 December so once again there were no reports of any auroral activity.

METEOR SCATTER. Brian Oughton, G4AEZ, operator of club station G8VYK (JO01), used FSK441 mode on 4m to add two new grids thanks to ON4PS (JO20) and LA/OZ2M (JP40). Using the same mode on 2m he completed contacts with IK0SMG (JN61), I3YXQ (JN55), F6BEG (JN25), OM3CWY (KN08), LA/PA5DD (JP40#) and S51AT (JN76). Ken Punshon, G4APJ (IO83), worked SM7GVF (JO77) and SP4MPB (KO03) with his QRP station in the Geminids. Colin Roberts, G4ZFJ (JO01), found increased activity in the 'extremely good' Geminids shower in December thanks to the annual BCC-MS contest. On 2m on the 12th and 13th he completed with LA/PA5DD#, SM2CEW (KP15#), LA4YGA (JO39#), EA1RJ (IN71#), EA1AFQ (IN71), RU1A (KO48#), LZ2FO/2 (KN14#), UT5ST (KN28#) and UT2UB (KO40).

Bryn Llewellyn, G4DEZ (JO03), was quite active on 6m in December and on the 2nd he completed with OZ3ZW (JO54). The 10th was a busy day with the NAC contest resulting in QSOs up to 2200. Stations listed are 9A5CW (JN65), SM3BEI (JP81), SM5CUI (JO89), OZ3TT (JO66), SK2AT (KP03), OZ2LD (JO54), OH6KTL (KP02), OZ8ZS (JO55), SM7UFR (JO87), OZ6OM (JO55), OZ3ZW, OE5MPL (JN78), OH6MIK (KP13), OH4MS (KP31), OH4AB (KP32), EB1EHO (IN73), LA4LN (JP50), OH3D (KP10), SK6HD (JO68), OZ6EI (JO45), and SP9HWY (JO90). On the 11th he completed with SO5AS (KO02) and LA8AJA (JP50) and next day with LA/OZ1BNN (JP40), SQ2LYF (JO93), EA2LU (IN92) and OH7TE (KP20). Off the back of the beam on the 13th he worked GW3LEW (IO71). The last ones in the 6m log were CT1FJC (IM57) on the 14th, OH7TE again and OH3SR (KP21) on the 15th and SM2CKR (KP03) on the 16th.

Back in November on 4m Bryn lists QSOs with DL3YEE (JO42), S51DI (JN76), 9A1Z (JN86) and the first G/OH contact with OH3UW (KP21) which took two hours to complete. On the 22nd a combination of MS and ionoscatter brought QSOs with OZ1DJJ (JO65) and OZ3ZW. On the 30th he completed with LA4YGA (JO48) and EI2GLB (IO63). Coming to December, on the 1st there was another QSO with OZ3ZW, on the 3rd OZ2OE (JO45). On the 10th OH5LID (KP30) was a new grid and next day he was in KP32 for another new one and on the 12th he operated in KP31. Other contacts were with LA/OZ2M (JP40#), LA6MV (JO59), OY3JE (IP62) and on the 15th, OH2BGN (KP20) in a purely random contact before the radiant of the Geminids had risen. He made a few contacts on 2m: on 24 November with SM5HUA (JP80), on the 29th with IZ5ILX (JN54), on 2 December with DL8NP (JN58), on the 7th with F6BEG (JN25) and DJ9EV (JN49), SM5HUA, IK0BZY (JN61) and SP1JPQ (JO73).

MOONBOUNCE. The dates for the European EME Contest sponsored by DUBUS Magazine and the French national society, the REF, have been published. There are five weekends for this CW/SSB only competition only three of which are relevant to this column. For 2m the dates are 27-28 March for the 48 hours starting at 00UTC on the Saturday morning. 24-25 April is for 70cm operators and 22-23 May for the 23cm enthusiasts. The full rules are on pages 109 and 110 in issue 4/2009 of DUBUS and can be downloaded as a .pdf file from the EME pages on the website.

This year's International EME Conference, the 14th, will be held at the Weston Hotel near the Dallas Fort Worth airport in Irving, Texas on 12-14 August. In a posting on

the Moon-net website on 11 December, Al Ward, W5LUA, wrote, "In keeping with tradition, the conference will primarily concentrate on EME on the 432MHz and above bands. At this point, I have several speakers already signed up but we are still actively pursuing talks and papers on various aspects of EME communication. This includes topics such as dish design and feed systems, Yagi antenna design, low noise receiving techniques, higher power solid state and tube amplifier design, TWTs, EME expeditions, tracking the Moon, evaluating system performance and EME QSO procedures just to name a few. We are also interested in articles for the proceedings even if you are not going to present it at the conference. The ARRL will be publishing the proceedings." Al's e-mail address is w5lua@sbcglobal.net and further information will be available on the North Texas Microwave Society's website.

Howard Ling, G4CCH (IO93), has listed his 23cm activity for the period from 29 November through 6 December on his website (Websearch). In total he completed 46 QSOs, three on JT65c digital mode, the rest on CW. In the final leg of the 2009 ARRL International EME Competition on 5 December UT2EG (KN67) and SM6CSO (JO57) were new initials bringing his analogue total to 303. Australians worked were VK2JDS on JT65c and VK3NX, VK3UM and VK5MC.

G4ZFJ was QRV on 2m and on 25 November Colin completed with WD4JHD (EM55#) and in the ARRL contest the pick of the bunch were VE7DXG (CN88#), K6HLH (DM14), N1DPM (FN32#), JR7ICP (QN01#) and UN9L (MO13#) on 5 December. He reports that the event brought out a few stations that are not normally active on EME. He is still persevering on 70cm with his 180W and a single 28-ele Yagi with which he completed with LZ1DX (KP22#) and a new DXCC for initial #10 on 5 December. On 2m at G8VYK Brian lists QSOs with SM5HUA (JP80), DK2PH (JO41), UN9L# for a new DXCC and SP4MPB (KO03).

DL7APV's 2010 *Lunar Weekend Calendar* was published in the *January 432 and above EME News* edited by Al Katz, K2UYH. In weekend 23-24 January there are two 70cm CW ATPs (Activity Time Periods), 2000-2200 on the Saturday and 1200-1400 on the Sunday. The following weekend 30-31 January is an activity one (AW) and there are a couple of 70cm CW ATPs in February at 2000-2200 on the 20th and 1000-1200 on the 21st. The next AW is on 27-28 February which also sees the 23cm SSB contest.

The January *432 and above EME News* includes reports from Peter Blair, G3LTF, and Dave Dibley, G4RGK. Peter was QRV in the December ARRL event and his overall total of completions on 70cm was 44 and on 23cm 87. He writes, "At the start of the contest, the 432 conditions were as good as I have ever heard in many, many years on EME. I really thought someone was trying to fool me with the strength and steadiness of the echoes." Dave was also QRV on 70cm and 23cm in the contest in limited operating times due to the bad weather. On 70cm he completed with seven stations and on 23cm he made 19 QSOs.

LOCATOR SQUARES TABLE

Starting date: 01-01-1979

Callsign	50MHz	70MHz	144MHz	430MHz	1296MHz	Total
G4DEZ	833	151	423	146	59	1612
G4VPD	522	34	244	18	-	818
G4OBK	519	64	96	17	-	696
G4ZFJ	476	85	531	93	51	1236
GM4VVX	449	62	316	2	-	829
G8TOK	446	84	146	58	37	771
G6TTL	428	-	-	-	-	428
G8HGN	423	26	242	102	-	796
GM8IEM	375	-	45	5	-	425
M0XLT	358	-	39	2	-	399
G4APJ	275	-	93	44	-	412
G0ISW	267	7	108	22	-	404
GM4JR	264	56	51	16	-	387
G8VYK	256	42	395	50	-	743
G0LGS	238	10	97	41	11	417
G4YTL	12	93	668	160	20	953

No satellite, repeater or packet radio QSOs. Band of the month 50MHz.
If no updates received for a year entries will be deleted.
Next deadline is 19 February.

BAND REPORTS

50MHz. There has been some winter Es on the magic band and on 13 December G4DEZ made contacts with EA7HG (IN89), EA4EOZ (IN80), CT1FOP (IN60), CT2 JNM (IN50), EA7EU (IM88), EA4FFM (IM89), EA1NL (IN52), CT1FJC (IM57), EB9CH (IM75), EA7DLD (IM77) and OH6MIK (KP02) which Bryn describes as "WSJT contact but pure Es." He reports another good Es opening on New Year's Day that began with lots of in-band line timebase TV noise from 1200. During an MS QSO with IZ0GYP there was weak Es present but the real opening occurred around 1700 when he worked 15 Italian stations in JN45, 53, 61, 64, 70 and 80.

John Tonks, G4MBN (IO93), also caught the 13 December event, which started around 1100 with strong video from the northeast on 49.760MHz, probably from the Kuldiga transmitter in Latvia. He called CQ for 20 minutes with no result although he copied many meteor pings. He made QSOs with ten G stations during the month and is active on SSTV one of his regular contacts being with Ian, G6TGO. Jim Davidson, GM3UAG (IO87), writes, "On 13 December at 1640 I was monitoring GB3LER on 50.064MHz which I can normally receive at about S1 and gives very good meteor pings. In the mid-Geminids it was performing well. Suddenly, I copied the callsign EA4TD, co-channel, sending location as IN80 about 539 with quite deep QSB. Tuning around the beacon section, I logged EA4Q at 539 QSB, EA4UW at 529 QSB and CS5BA at 519 QSB. Tuning around the band produced noises reminiscent of Sporadic-E and EA4TD on about 50.140 SSB and some other stations not logged. My 5W to a doubtful 3-ele did not raise EA4TD! I had to switch off at about 1730."

FINAL MISCELLANY. There is little to report on 4m, 2m and 70cm this month even though G4DEZ writes, "Quite a few new grids worked on 4m and a few on 6m as well. Who says bands are dead? Even had Sporadic-E on 4m a couple of times and lots more Es on 6m." Andy Anderson, GM4JR (IO85), is QRV on 6m, 4m, 2m and 70cm but wasn't out /portable much last year due to atrocious weather but plans to operate from the hills in 2m UKACs this year. He has spent a lot of time improving his 70cm station. He writes, "Christmas Cummulatives Contest was different this year! Apart from the generally poor conditions I still managed to work the South Coast on most bands most days… not as many people on as I'd hoped, but the awful weather would have ruined many attempts! Simply getting on air here was a joy – if only to get warmed up after having to spend approximately 90 minutes each day using a heat gun to thaw out the pneumatics on the SCAM mast despite its insulation."

DEADLINES. That's it from a frozen Riddlesdown with no end of this exceptionally cold spell in prospect. Thanks to *Dubus* for the 4/2009 issue of the magazine, to the UK Six Metre Group for the November edition of *Six News* and to *VHF Communications* for the Winter 2009-Q4 issue. The deadline for your reports for the April issue is 19 February and for May it is 19 March. My AOL ID is g3fpk.

WEBSEARCH
G4CCH: www.g4cch.com/

GHz Bands

Extend your range by troposcatter

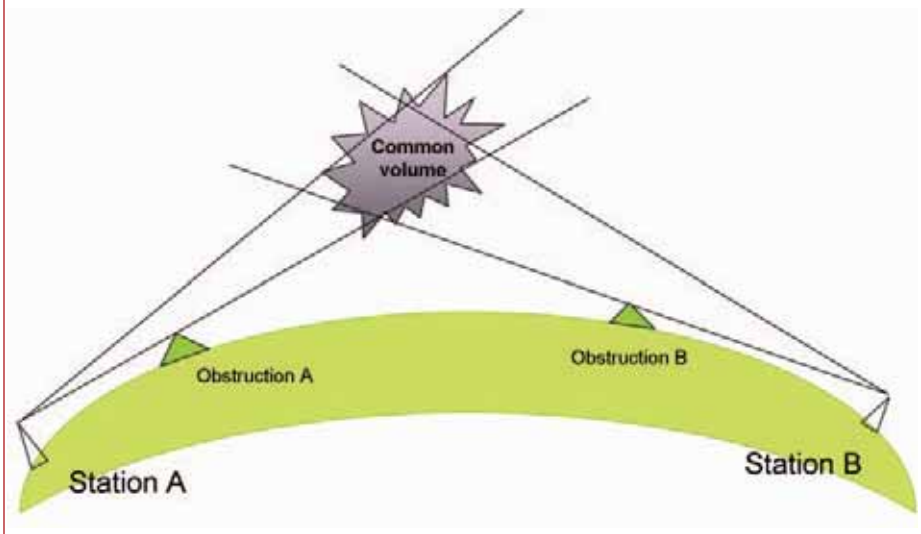


FIGURE 1: Geometry of the troposcatter path. Obstruction A and obstruction B determine the minimum horizon angle for each station. The vertical and horizontal beamwidths of the antennas at each end of the path determine the size of the common volume that is illuminated by the transmitting station and from which the receiving station is able to receive a scattered signal.

TROPOSCATTER, ANYONE? When conditions on the GHz bands are very good, even small amateur radio stations are able to work long distances. An output power of less that 10W, together with a single, short Yagi or a small dish can be enough to work more than 1000km on any band between 1.3GHz and 10GHz. Indeed, many of us got our first taste of DX on the higher bands as a result of operating in a 'bit of a lift'. As the number of 'lifts' (anomalous propagation events) has diminished over the last few years, working DX with such a small system has become much harder. This has caused frustration for some operators. The solution is to improve the station's capability, in terms of antenna gain and power output.

Our main mode of long distance propagation is tropospheric scatter (troposcatter). Troposcatter requires both stations to beam towards each other along the great circle path, with a very low angle of beam elevation. The two beams intersect in a common volume of the atmosphere near the centre of the path. A small proportion of the transmitted power is then scattered in all directions by the irregularities in the atmosphere in the common volume. A small fraction of this will be scattered in the direction of the receiver, by line of sight, allowing a contact to take place, since this is a reciprocal process. The geometry of the troposcatter path is shown in **Figure 1**.

The range obtainable by troposcatter signal propagation depends on several factors. The height of the bottom of the scatter volume that can be seen from each station depends on how low the local horizon is at each end of the path, as well as the distance to the scatter volume. The angle through which the signal is scattered is also very important, since the loss increases with angle. This means beaming at, or close to, the horizon. Together these factors lead to a path loss that increases by about 10dB for every degree of horizon angle increase at each end of the path and by about 9dB for each extra 100km of path length after the initial 100km path length **[1] [2]**.

Figure 2 shows troposcatter loss at 1.3GHz at distances up to 500km.

At 1.3GHz, the basic troposcatter path loss is 236dB for a 500km path under optimum conditions. The loss at 2.3GHz will show an additional 7dB and at 10GHz it will be 27dB higher.

As an example take two stations, A and B, 500km apart. Station A transmits with 100W into a 23dBi gain antenna. The horizon angle at station A is 0°. Station B receives with a 1dB NF system connected to a 23dBi gain antenna. The horizon angle at station B is +1°.

Over a path of 500km the basic troposcatter signal path loss is 236dB.

Transmit capability is transmitter power 'gain'+ antenna gain – horizon angle loss, (50 + 23dB – 0 = 73dB).

Receive capability is receiver sensitivity (for 0dB SNR in 2.5kHz, assuming a 1dB system noise figure) + antenna gain – horizon angle loss (–140dBm + 23dBi – 10dB = 153dB).

Adding these two numbers together gives the path loss capability between station A and station B, 226dB. This is 10dB less than is actually required to overcome the basic troposcatter path loss. On SSB no readable signal would be detected. However, using CW, the receiver sensitivity would be -150dBm when using a 250Hz IF filter. With the further improvement of the natural human ear-brain filter, a weak CW signal would definitely be copiable over this 500km path using the troposcatter propagation mode.

It follows that tropo is a weak signal propagation mode and to exploit it requires fairly large effective isotropic radiated power (EIRP). EIRP is calculated by multiplying the isotropic antenna gain by the power output delivered to the antenna feed point, eg

Antenna gain = 200 (23dBi)

Power into the antenna = 100W (20dBW)

EIRP = 200 x 100W = 20kW (43dBW).

By 2010 standards, this would be considered a medium size station on 1.3GHz. A big amateur tropospheric scatter station would be closer to 50 – 80kW EIRP.

Many amateurs will be reluctant to increase the station antenna gain in order to make better use of troposcatter propagation, if it means having to remove existing antennas from the mast that are used on other bands. The alternative is to increase transmitter output power, but this is often not economically viable or legally permissible. Perhaps, though, it should be the starting point. Hopefully, more microwave enthusiasts will start to consider improving their station capability in order to make better use of the troposcatter mode.

GETTING STARTED IN EME. Part 6 - Radio Equipment. The equipment needed for successful moon bounce (EME) depends on several factors. The first of these is obviously the band on which you intend to operate. The next is how big an antenna you intend to use. In the case of a very large dish antenna (reflector) it is possible to use relatively low transmitter power and possibly a not-so-low noise figure preamplifier. For most UK amateurs looking to get started on EME, the choice of antenna is probably determined by the size of their back garden. In other words, not too large!

In order to make successful contacts on the 1.3GHz band using a dish of 3m diameter, you will need a preamplifier with a noise figure of better than 0.3dB and 100 – 250W RF output on transmit. With the same size dish on 10GHz the choice is likely to be

FORTHCOMING MICROWAVE EVENTS - 2010

Rutherford Appleton Laboratories Microwave Round Table, April 17-18. Details: Brian, G4NNS, brian-coleman@tiscali.co.uk.

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

Crawley Microwave Round Table: no date available yet. Possibly September.

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

EME Conference, Dallas, Texas: 12-14 August 2010. Details: www.ntms.org.

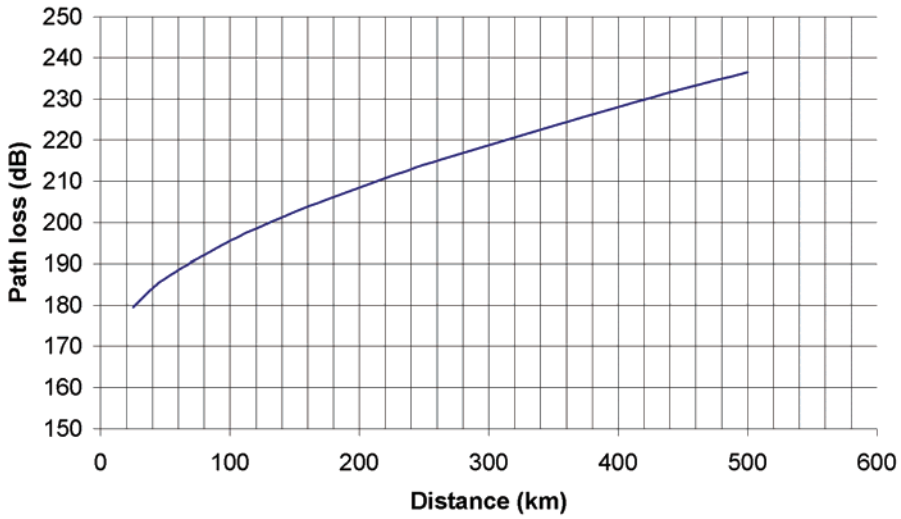


FIGURE 2: The basic troposcatter path loss at 1.3GHz. This is the loss over a smooth earth and does not take account of additional loss due to horizon angle at either end of the path or atmospheric conditions. This graph was re-drawn for 1.3GHz from Figure 3.9 in reference [2].

limited to a noise figure of 0.6 – 0.8dB and less than 100W RF output. For the bands in between the preamplifier and power amplifier parameters will probably fall between these limits.

THE PREAMPLIFIER OR LOW NOISE AMPLIFIER (LNA). Why is the LNA so important for EME? Back in my March 2006 *GHz Bands* column I explained how antenna noise temperature affected receiver sensitivity. Ian White also looked at this in the November 2009 In Practice. In amateur microwave (1.3 to 10GHz) terrestrial operation the antenna will always see some 'warm' earth within its beam width when directed to the horizon. This places a lower bound on the antenna noise temperature of around 170 kelvin (K). Since the noise output of the receiver is the addition of the antenna noise temperature and the receiver noise temperature (set by the preamplifier), a preamplifier with a very low noise temperature may be of limited use because of the relatively high antenna noise temperature. In practice a preamplifier noise temperature of about 70K (1dB noise figure) is usually adequate for terrestrial use since this will be added to the 170K antenna noise temperature for an overall system noise temperature of about 240K. Lower is always better, but not if it compromises system strong signal performance. That is another subject, for another column.

THE COLD SKY. A good, low noise EME dish antenna and feed looking towards a cold part of the sky will 'see' a sky noise temperature of between 3 and 10K. Clearly, when adding this antenna noise temperature to a 70K LNA noise temperature, the LNA noise dominates. The total system noise temperature can be reduced significantly if the LNA has a much lower noise temperature. On the 1.3GHz band it is now possible to build or buy an amateur LNA with a noise temperature below 20K.

It is vitally important to keep the total system noise temperature as low as possible as this represents noise power that will mask any weak EME signals. Noise power, in a given bandwidth, is defined as kTB, where k is Boltzmann's constant (1.38 x 10–23 joules/K), T is absolute temperature (kelvin) and B is the system pre-demodulator bandwidth (Hz).

In practice, dish reflectors and their feeds will often have noise temperatures of more than 20K (and occasionally as high as 50K). This is caused by the small – but often significant – contribution from ground noise due to spill-over and dish feed-through (mainly with mesh dishes). There may also be an effect due to ground reflection from obstructions, such as mounting tripods, between the feed and the dish surface.

With a system noise temperature of maybe 30 – 40K, very weak signals will be heard reflected from the moon on 1.3GHz and above, even with a dish of down to 2m diameter.

LNA ACTIVE DEVICES. We are fortunate to have access to some remarkably low noise devices for use on the microwave bands due to both satellite TV and cellular radio developments. The devices are not only cheap but are readily available from many suppliers.

The devices that give the lowest noise figures are now High Electron Mobility Transistors (HEMT). Devices in common use are the NEC NE325, Avago ATF360, Fujitsu FHX06 and the Mitsubishi MGF4919 series. Some of these are now obsolete, but can still be obtained as surplus stock from a number of dealers. Later devices have smaller geometries and, in some amateur designs for the lower bands, do not provide the very low noise figures of these earlier HEMTs. On the higher bands, such as 10GHz, they are usually better performers.

Suitable designs for LNAs have regularly appeared in the amateur radio press including *RadCom, VHF Communications, DUBUS,* the ARRL *MUD* and *VHF Proceedings* as well as on a number of web pages. There are, of course, several ready-built and kit LNAs available from various suppliers.

In general you are looking for not only low noise figure but also stability and enough gain to overcome the loss of any cable between the LNA and the transverter, radio or shack-mounted second LNA stage. Although there are a number of single stage LNA designs available, in general these do not have enough gain to overcome the 'second stage contribution' and it is recommended that you look for at least a two-stage design otherwise you will probably need to build or purchase a second LNA anyway.

You should use some form of noise indicator with your system to optimise performance. The recommendation is that the noise from the LNA should increase the noise displayed by at least 10dB. If this is not the case, then the 'second stage contribution' is still significant. An SDR receiver is perfect for displaying the system noise output, especially if the associated display application, such as *Spectravue*, has a continuum mode.

Next month I will be looking at EME noise measurement techniques.

INPUT TO GHz BANDS. Input for the column is welcome at all times. However, band activity reports should be sent as soon after the event as possible. I generally start to compile the column around the end of each month. My contact details are at the top of the page.

REFERENCES

[1] Tropospheric Scatter propagation, J Gannaway, G3YGF. *RadCom*, Vol. 57, 1981, pp 710 – 717

[2] System analysis and propagation. B Chambers, G8AGN. *Microwave Handbook*, Volume 1, RSGB. Edited by M Dixon, G3PFR

A homebrew D-Star repeater

Developing a Linux-based, G2-connected D-Star repeater on a shoestring budget

St Leonard's Church, Turners Hill, West Sussex. The flagpole atop the tower conceals the antenna for GB7MH.

IN THE BEGINNING. I became interested in D-Star during 2007/8 whilst on one of my regular visits to the USA. I'd been listening to the linked repeater networks on FM such as the excellent Winsystem, and was simply amazed by the level of traffic and the quality of coverage compared to the rather under-used repeater systems in the UK, at least round where I live.

During one of my visits, I was persuaded to pay a visit to the local Emporium and part with hard-earned money for an IC-91AD. There was a gateway-connected D-Star repeater within hitting distance of my hotel and, from that point, the benefits of linked repeaters coupled with digital audio won me over. Not having a D-Star repeater within range of my home QTH was a problem that I intended to solve; ideally without spending significant amounts of money.

As a network engineer involved in the design and deployment of voice over IP, I have many years of experience of digital voice systems. I decided, as you do, that it 'Couldn't Be That Difficult' to roll my own D-Star repeater. After all, this is just IP packets – and things don't get much simpler than IP packets do they? How wrong I was...

THE D-STAR SYSTEM. D-Star is a digital voice system that uses the AMBE-2020 codec over a GMSK carrier. There is also a low-rate user data stream carried alongside the voice signal. D-Star specifies the OTA (over-the-air) protocol, defining the all-important radio header and the format of the synchronisation carried in the data stream. A brief article like this is not the place to describe the OTA protocol in detail; the specification is open and published jointly by JARL and Icom. The AMBE-2020 codec is proprietary, owned and licensed by DVSI Inc, but this is only required if you wish to decode the voice data to baseband audio. Simply relaying the data does not require you to pull open the voice payload.

The first challenge I had was to be able to receive the RF stream carrying the D-Star signal and decode it. After many, many hours of trawling through the internet, I came across the Node Adapter project by Satoshi Yasuda, 7M3TJZ/AD6GZ.

Satoshi's board takes a GMSK input from a receiver and decodes it according to the D-Star specification. It let me see the header and the data stream through a USB interface. In transmit mode, I could send information to it and have it formatted as GMSK. Any FM rig should be able to transmit and receive the GMSK stream from the board to a commercial D-Star radio, provided the rig can modulate and demodulate down to very low frequencies.

Armed with my board from Satoshi, I went about trying to purchase the other various bits I'd need. Most were no problem – Mouser very helpfully ships to the UK, but finding the all-important CMX589 GMSK modem chip proved much harder. In the end, CML Microcircuits kindly sent me several sample chips without charge – had they not, I'd have been forced to buy from a US broker who had a minimum order charge of several hundred dollars.

I hooked the board up to a Yaesu FT-7800, plugged the USB cable into a PC and used some of the trial software provided by Satoshi. A few tweaks of audio levels later and I was sending and receiving audio! I was nearly there – or so I thought. That was July 2008.

TURNING IT INTO A REPEATER. The next step was to take the board and plug it into a system suitable for installation at a repeater site. My preference for systems such as this is to keep it simple. In a lab, a Windows system with a nice GUI is probably not going to go wrong. Translate that to the bell-tower of a church in a conservation area of southern England (the site chosen by the Ashdown Forest Repeater Group for our repeater systems), and things are going to break. It's a given. Therefore, I wanted to build the 'guts' of the system on the cheapest, least power-hungry and simplest system I could. The answer was Linux, and what I had to hand was a VIA EPIA 800 system board with 512MB of memory and a 4GB Compact Flash card – in fact identical to the system in use for my IRLP node, GB3MH. I even decided to run the same Linux operating system as GB3MH, CentOS 4.7.

So, at this point I had an RF 'hook' to the D-Star signal, a board capable of decoding it, and a system capable of 'crunching' the packets. What now?

Next came a period of understanding and learning the how D-Star systems actually work, down to bit level. As with every engineering endeavour, what I learnt was that the technical part is in fact less than 20% of the project: whilst it's a hackneyed phrase, working with other stakeholders in the various networks and solutions required diplomacy skills and collaborative working. This accounts for the other 80% of the job.

I had to learn how the current 'D-Star' network was built and identify the main characters in the system design and operation. I then had to build my relationship with them to the point where a renegade amateur (me!) could start connecting my home-brewed code into what is essentially a commercial, production-grade network.

The homebrew D-Star node lives in a professional-looking rack enclosure in the tower of St. Leonard's Church, Turners Hill.

The antenna GB7MH for is cunningly disguised as a flagpole.

SYSTEM ARCHITECTURE CONSIDERATIONS. What is thought of as 'the D-Star Network' is in fact two separate, but inter-linked systems:

- G2. Icom's network, which provides registration of users by callsign and allows callsign-to-callsign routing. Stations update their location in real time to a central Trust Server. The Trust Server is administrated by the K5TIT (Texas Interconnect Team) group, who work tirelessly to keep the network running. As a result of this effort, users can route directly to each other without having to know which system their correspondent station is on.
- D-Plus. Written and owned by Robin Cutshaw, AA4RC, this system provides hard links (much like IRLP) between repeaters and between repeaters and reflectors. Whilst it does not use G2 to route traffic, it does use the G2 database to authenticate users. It is via the D-Plus system that PC-based users can connect to repeaters and reflectors through the DV-Dongle. There is an important difference, though: while an RF user can use both G2 and D-Plus, a DV-Dongle user can only use D-Plus, ie they are not callsign routable when on their dongle.

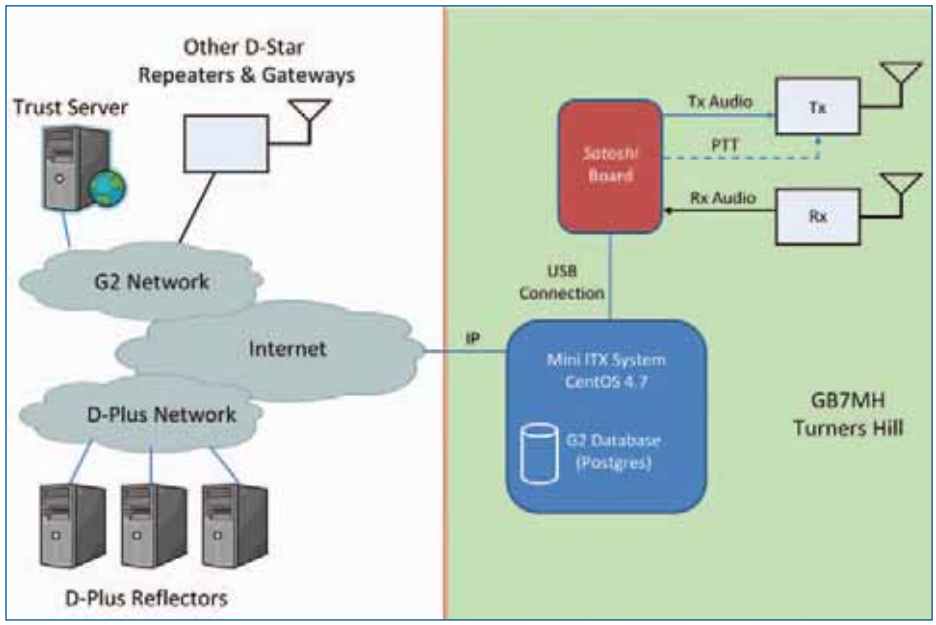
In addition, there are several other applications that run on-top of the D-Star network such as D-Star Monitor that reports last-heard information to the www.dstarusers.org page, DPRS that takes the GPS information embedded in the D-Star OTA protocol and sends it to APRS gates, etc. I had to keep all these uses in mind and make my code as transparent as possible to a D-Star user.

At roughly the same time that I started building my solution, Mark McGregor, KB9KHM, started work on his Hotspot solution. This was very useful, as we were trying to achieve similar – but subtly different – goals. Mark's goal was to build a Hotspot that provided local simplex coverage for D-Plus where there was no repeater, or where a user simply wanted their own system. His software is not linked to the G2 database, and therefore looks like a DV-Dongle. My goal was to build a replacement G2 repeater with support for the existing applications such as D-Plus. Mark and I were able to exchange ideas, which proved very useful. Before long we both had similar solutions running – Mark's on Windows, mine on Linux.

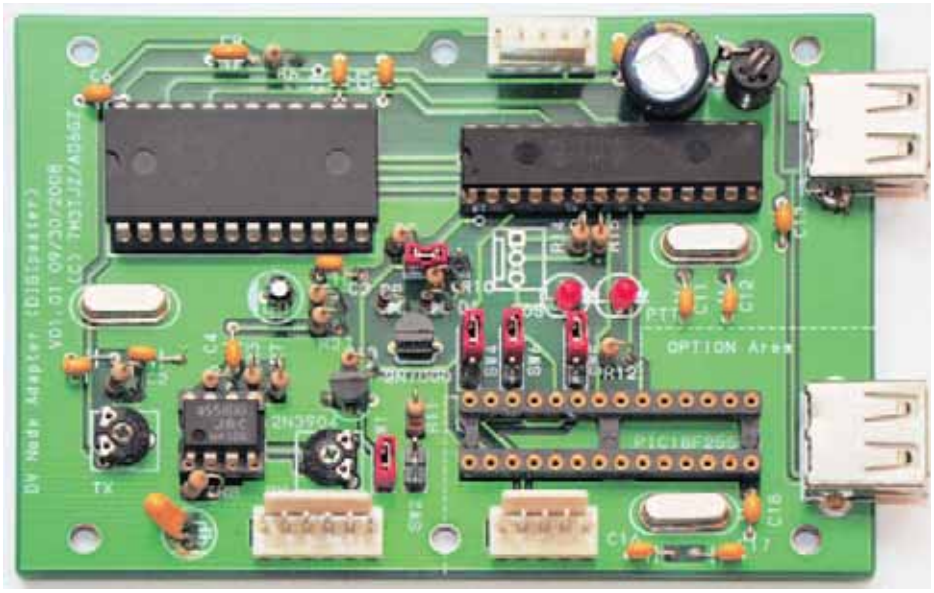
By February 2009, the first 'cut' of my repeater was running, providing local repeating services for D-Star users, and emulating a DV-Dongle to the D-Plus network. But I was not happy – this was NOT a true D-Star repeater: this was a DV-Dongle with RF. Users on my system were not G2 routable from Icom D-Star repeaters, so work carried on.

G2 COMPATIBILITY. The next stage was to start looking at the G2 gateway protocol. This is not documented, however runs unencrypted between Icom G2 systems and the Trust Server. Under the guidance of the ETCC in the UK, specifically Darren Storer, G7LWT and with immeasurable help from Jim McClellan, N5MIJ, I started to build an emulation of the Icom Gateway protocol on my system. By May 2009 I had successfully connected to the test Trust Server. With Jim's help and a test repeater system in Texas connected to the test Trust Server, we were able to hold a G2 routed QSO between Jim, mobile in Texas on his repeater, and me at home on mine!

Tentatively, my system was moved to the Production Trust Server, and GB7MH



Block diagram of major elements of the GB7MH D-Star repeater (green section) and external D-Star infrastructure.



The heart of the D-Star repeater is the Node Adapter board by Satoshi Yasuda, 7M3TJZ/AD6GZ.

In the absence of a phone line, internet connectivity was provided via a 3G internet dongle & Wi-Fi router from 3.

appeared in the live G2 database for the first time.

Now I had to work out how to support the existing gateway applications without having to change them. I wanted to be able to take packages such as D-Plus and D-Star Monitor and load them onto my system as if they were being loaded on a real Icom G2 gateway. The answer lay in re-creating the packets that are seen in a normal Icom system.

Icom D-Star repeaters consist of an RP2C controller connecting to the radios, and a separate Linux system running the G2 Gateway code. By spoofing the packets generated by the RP2C, the D-Plus and D-Star Monitor applications on my unit thought that they could see a real RP2C and, lo and behold, they worked just as if they were on a real Icom gateway system.

I was finally there. I had a D-Star repeater that as far as users were concerned was the same as any other Icom repeater with G2 and D-Plus on a single-board PC.

NEXT, A SITE. Meanwhile, through the sheer perseverance of Malcolm, G3NZP, we had a repeater site; St Leonard's Church, Turners Hill, West Sussex. At 174m (~600') above sea level, it is the highest point around for miles. Malcolm had persuaded the church to accept our offer of a new fibre-glass flag-pole, inside of which was concealed a radial-less 2m/70cm collinear. This was installed on the top of the bell tower, and coverage tests had proved this to be an excellent site. The NoV for GB7MH was issued, a duplexer and a Tait T800 were found and tuned for 439.6375/430.6375MHz. What could go wrong?

Well, let's start with no Internet connection, an antenna that decided to blow itself apart once installed and software that worked perfectly in a lab environment but couldn't cope with weak signals.

Getting an Internet connection to the top of a bell tower is tricky – especially one that is in a conversation area. In much of the village, no external antennas are allowed without planning permission and despite 802.11 WiFi antennas being small and discrete, none of the adjacent houses were willing to put one up to help us out. Eventually Malcolm, using his well-honed persuasive skills, convinced the church council that they'd really like a telephone in the Church Hall, and that we would pay for it. Whilst we wait for that to happen (it takes about 8 weeks for planning permission for an overhead telephone cable in a conversation area), I am using a 3G router to provide the Internet connection. It works, most of the time….

On the morning that Malcolm and I decided to install the repeater, Malcolm made one final, timely check of the VSWR of the Flagtenna. As I headed to site in the car at 08.30, I received a phone call: "I think we have a problem – the antenna is reading high VSWR across the board." Four hours later and we'd managed to wrench the antenna out of the flagpole, only to discover that the loading coil had detached itself from the radiator. Frantic repairs and another 4 hours later, the repeater was on air.

UNFORESEEN PROBLEMS. In my haste to build a system, I hadn't considered what would happen under marginal, lossy local RF conditions. D-Star uses a repeated frame structure – sync, 20 frames, sync, 20 frames, repeated. If you lose frames on receive you have to in-fill during transmit, or else the receiver will start to assume the transmission has finished. Of course, in the lab, I never lost a frame – but that's not what happens when your mobile station is driving around leafy Sussex. This necessitated a major change to the software and the repeater was in a very bad way for a week whilst I worked on the problem. Eventually though, the system was fixed and has been providing very good service ever since.

My background in VoIP and Unix certainly helped – most of the coding is in C++, but aspects such as the SQL database (I use Postgresql for the G2 routing) and USB interactions (I use libusb1 and libusb-compat to access the Satoshi board) were new to me, and required many hours of testing and investigation.

IT REALLY WAS CHEAP. Compared to purchasing an Icom system for GB7MH, the hardware cost has been miniscule: about £50 for the Satoshi board and parts, less than £30 for the Mini ITX Linux system, plus a fortuitously free Tait T800 repeater and duplexer. And I've certainly learnt a lot more about how D-Star really works than had I just bought an Icom box…

After the success of GB7MH, GB7BM was created the same way and is now on-air and providing good service. GB7NE will hopefully follow soon. So the basic goal of providing a cheap but fully-compliant alternative to an Icom D-Star repeater is complete. I'm now turning my attention to improving aspects of the current D-Star network such as the extended database synchronisation times, the use of more robust VoIP protocols and new features such as Simplex G2/D-Plus nodes.

THANKS TO… And finally, none of this would have been possible without the considerable help and support of the following people: Prof Satoshi Yasuda, 7M3TJZ/AD6GZ, Darren Storer, G7LWT, Iain Philipps, G0RDI, Jim McClellan, N5MIJ, Robin Cutshaw, AA4RC, Mark McGregor, KB9KHM, John Baxter, G8VIQ, Ashdown Forest Repeater Group, Malcolm Harman, G3NZP, Richard Hadfield, G4ANN, Stewart Bryant, G3YSX and Paul Philips, G7KBR. The home page of the repeater development is http://g4ulf.blogspot.com.

WEBSEARCH

Winsystem - www.winsystm.org
Detailed D-Star protocol - www.jarl.com/d-star/shogen.pdf
DVSI (AMBE codec) www.dvsinc.com
7M3TJZ/AD6GZ node adapter project - http://d-star.dyndns.org/node_adapter.html.en
Mouser Electronics (USA) - www.mouser.com
CML Microcircuits - www.cmlmicro.com
Ashdown Forest Repeater Group - www.afrg.org.uk
K5TIT Texas Interconnect Team - www.k5tit.org
DV-Dongle - www.dvdongle.com
D-Star Users - www.dstarusers.org

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ATU-450 Optional internal ATU	£163.43
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MD-200A8X Super Deluxe Desk Mic	£199.95
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Yaesu BU-1 Internal Bluetooth Unit £82.71
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Yaesu CD-41 Rapid Charger Requires NC-86U £17.32
Yaesu CN-3 SMA to BNC Adaptor £8.12
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Yaesu CT-134 Cloning Cable £36.74
Yaesu CT-136 GPS Antenna adapter for FGPS-2 ..... £27.54
Yaesu E-DC-5B DC Cable with Cigarette Plug £29.58
Yaesu E-DC-6 DC Cable for Handhelds £7.10
Yaesu FBA-39 Dry Cell Battery Case £22.44
Yaesu FEP-4 Earpiece for BH-1 Bluetooth Headset £16.30
Yaesu FGPS-2 GPS Unit Requires CT-136 or MH-74A7A £71.48
Yaesu FNB-101LI 7.4V 1100mAh Lithium Ion Battery £45.94
Yaesu FNB-102LI 7.4V 1800mAh Lithium Ion Battery £61.26
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Yaesu VX-3E. ML&S £138.95
Micro Handie 2/70 with scanner. Complete with Li-ion battery, charger & antenna.

Yaesu FT-60R. ML&S £145.95
Latest twin band handie complete and ready to go.

Yaesu VX-6R. ML&S £199.95
Yet another 2/70 handie from Yaesu.

Yaesu VX-7R. ML&S £259.95
The UKs best selling Triple Band Handie.

Yaesu FT-7800E. NOW ONLY £199.95
Bar make the tea it'll give you 2m/70cm @50W/40W. FREE YSK-7800 Remote Kit!

Yaesu FTM-10R. ML&S £269.95 A small compact dual band 2m/70cm transceiver with high power output of 50W on 2m and 40W on 70cm, (adjustable power levels of 50/40W, 20/20W, 5/5W). Receive range from 0.5–1.8MHz, 76–108MHz, 137–222MHz and 300–999MHz.

Yaesu FT-8800. ML&S £295.95
Similar to the FT-7800 but can receive on 2 & 70 simultaneously.

Yaesu FT-8900. ML&S £329.95
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
Bundle Price: £CALL (Rig only: £554.95)

Yaesu FT-817ND
The world's only all-band portable transceiver.

Only £449.95 with FREE CSC-83 Carry Case worth £19.95

All ML&S FT-817NDs include; 2 Years warranty, metal hydride batteries, charger, mic, etc.

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

Open six days a week. Mon - Fri: 9.30am - 5.30pm Sat: 9.00am - 5.00pm

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E-mail: sales@hamradio.co.uk

FT-817ND

YAESU

After almost 9 years you would think there would be competition for the FT-817. Still the ONLY truly hand-portable 160m-70cm all mode transceiver available today.

£449.95 with Free CSC-83 Carry Case worth over £20.

FT-857D & ATAS-120A Package

Still our best selling HF Mobile Radio.

By adding the remarkable ATAS-120A Auto Antenna you have 40-10M at the press of a button without getting out of your car! No other manufacturer has been able to offer this unique feature together with their mobile radio. Having used the ATAS on 40m I was amazed how a mobile antenna so small performs so effectively. My single band whips have been consigned to the garage ever since!

FT-857D only £554.95
or with ATAS-120A £759.95

NEW! FT-dx5000MP

HF/6M Transceiver with 112dB Dynamic Range & IP3 of +40dBm

Can they be SERIOUS??!!

Once again Yaesu engineers have listened to requests from all over the world and responded by offering what is probably the highest performing receiver contained within a full size basestation. They have achieved 112 dB dynamic range and an IP3 [3rd Order Intercept Point] of +40 dBm (CW, 500 Hz BW). Newly designed, extra sharp roofing filters for VFOA/Main receiver are selectable between 300 Hz (optional on some versions), 600 Hz, 3 kHz, 6 kHz and 15 kHz. Yaesu incorporates two of their famous custom designed 32 bit floating point DSP chips based on the TI TMS320C6727B running at 300 MHz ... one for VFO A and one for VFO B. Enjoy state of the art on the transmit side with a pair of reliable VRF150 FETS in a push-pull configuration yielding 200 watts (75 watts class A operation). Three electro-luminescent subdisplays indicate sub frequency, graphical wave and menu functions. The rear panel features a 9 MHz IF out from VFO Main receiver. Other enhancements include: large multi-function meter and variable CW audio peak filter.

Three models will be available later this year and prices are to be announced. See web for further details.

ICOM

IC-7000

Icom HF products

IC-718	Basic HF Radio, 12V, 100W output	£459.74
IC-706mk11G	100W HF/6m + 2/70 Multimode Mobile	£735.95
IC-7200	Mr T's choice for tough HF/6M Operation	£775.95
IC-7000	Full DSP, TFT Screen, 100W HF/6m + 2/70	£939.95

IC-7400
100W HF/6M/2M Base, full DSP, Auto ATU **£1199.95**

IC-7600	100W, Twin RX, Huge Display. No psu	£Call!!
IC-7700	Superb 200W HF/6M Base, PSU/ATU	£Call!!
IC-7800	Icom's Flagship radio has gone up again	£Call!!
IC-PW1Euro	1kW Fully automatic HF/6m Linear Amp	£Call!!

Icom V/U Products

IC-E92ED	As above c/w D-Star fitted & splash–proof	£379.95
IC-E2820	Proper dual band, dual display, remote etc	£395.95
IC-E2820+D	Supplied with UT-123 D-Star board	£549.95
IC-910H	Multimode 2/70 Base Station	£1269.95
IC-910X	As above but with optional 23cm UX-910	£1469.95

Icom Receivers

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

ICOM PC Controlled Receivers

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
IC-PCR2500	Twin Receiver version of PCR-1500	£499.95
IC-R2500	As above but with remote head	£559.95

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

Click on our website to see a video from Tokyo Hamfair August 2009!

V/UHF Satellite + HF/50MHz bands + D-STAR DV mode

- HF/50MHz 144/430(440)MHz & 1200MHz coverage
- SSB, CW, RTTY, AM, FM & DV modes
- 100W on HF/50/144MHz, 75W on 430(440)MHz. 10W on 1200MHz
- 32-bit floating point DSP & 24-bit AD/DA converter
- Double superheterodyne with image rejection mixer
- Optional 3kHz/6kHz 1st IF (roofing) filters (for HF/50MHz bands)
- Satellite mode operation
- Optional D-STAR DV mode operation

Price: TBA

Icom IC-7600

See our website for first full detailed review by Adam Farson VA70J

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.

KENWOOD

TS-2000E

Kenwood HF Products

TS-480SAT	Remote head HF/6m 100W inc ATU Transceiver	£749.95
TS-480HX	200Watt version of above, no auto-ATU	£849.95
TS-2000E	100Watt all mode HF/2/6M with auto-ATU etc	£1499.95
TS-2000X	As above but fitted with 10Watts on 23cm (all mode)	£1799.95

Kenwood V/U Products

TH-F7E	The only 2/70 FM Handie with SSB/CW WB Receiver	£229.95
TM-V71E	First Class 2/70 FM Mobile with remote head	£289.95
TM-D710E	The only 2/70 FM Mobile/Base with APRS/TNC etc	£429.95
TM-D710E+AvMap Bundle. Personal Navigator for GPS located APRS		£Call!!

New! Alinco DJ-G7E

"As used by Howard, G6LVB"
Unique 2/70/23cm Handie.
Ideal for hand-held Satellite operation.

Brand new model from Alinco, the DJ G7 looks sure to be a winner, at last we have a handheld transceiver with a great new choice of bands, it has always been hard and very expensive to try and find a 23cms handheld, but the Alinco G7 operates on 23cms along with 70cms, and also 2m band, so it is great value for money, I can remember many moons ago nearly paying this price for a 23cms only handheld !!! Full duplex operation, and a host of features are going to make the G7 the big hit of 2009, we have limited stocks and many advance orders to process, so don't miss out on this great new radio and order yours now.

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

The Official SBS Open Day, in store at our Chertsey HQ.

Saturday 13th February 2010.

Come and meet the TEAM behind the creation of the famous SBS-1 series. Full demonstrations all day with lectures on how to get the most of the best selling Virtual Radar in the world and the only unit to offer built in high performance Air Band receive & Ethernet connectivity.

MyDEL 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.

Price £249.95. Call or see website for further details.

NOW IN STOCK - very limited quantity.

- 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.

MyDEL CG-3000

Aerial Tuning Units

ML&S: £289.95

With 200W and 200 memory channels.

CG-3000 shown with optional remote switch.

CG-5000MkII

At last! 600W PEP High Speed Remote Tuner from MyDEL

ML&S: £559.95

NEW! Remote control for the CG-3000 and CG-5000. £39.95

See web for full specifications

DV-Dongle

NEW

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

Yaesu Rotators

The best available at very special prices.

Only £299.95

G-450C The most popular medium duty rotator available today. ML&S always guarantee to have the largest stocks in the UK and of course the best prices.
With 25m of cable

G-250 Ideal simple to use remote control Antenna rotator for light weight antenna installations. Ideal use for turning 4/6/9 element Tonna 2m antennas, 9/19/21 element 70 cm antennas. Also V/U Log periodic (i.e. Maldol LP-1300) and small single and HF dipoles.....Only £109.95

G-550 Elevation rotator for satellite operation.....Only £259.95

G-5500 Heavy-Duty PC Controlled Vertical rotator for satellite and EME applications. .....Only £469.95

G-650 Medium duty with higher brake torque than the G-450. Supplied with 25m control cable £339.95

G-1000DXC This new, high-performance rotator is ideal for heavy-duty applications. Its slim-line constructions is ideal for many crank-up tower installations. Rotation range: 450°, with presets.....£399.95

G-2800DXC Yaesu's top-of-the-line rotator is for extra-heavy-duty antenna installations. It includes Auto Slow Start and Auto Slow Stop features to avoid sharp jolts to the antenna array and tower. The G-2800A includes a mast clamp and 40 metres of control cable, to simplify installation. Total rotation range: 450°, with presets.....£769.95

FACT not FICTION: Did you know that ML&S sell MORE of the excellent LDG Auto Tuners than any other dealer outside the U.S.A.?

LDG Auto Tuner Range

AT-100pro	Desktop tuner covering all frequencies from 1.8-54 MHz	£194.95
AT-200pro	Designed for new generation of rigs	£214.95
AT-1000Pro	1kw 160m-6m (1.8-54MHz) High speed Auto ATU, tuning range 6-1000Ohms	£510.95
AT-897	Bolt-on Alternative Auto Tuner for the FT-897. Wider tuning range and cheaper too!	£183.95
IT-100	New version of the AT-7000	£153.95
YT-100	NEW AUTO ATU for FT-897/857 or FT-100 with additional Cat Port Control	£173.95
Z-817	Ultimate autotuner for QRP radios, including the Yaesu FT-817D	£122.95
Z-100Plus	Ultimate autotuner for Yaesu FT-817D	£143.95
Z-11Pro	Portable compact & tunes 100mW to 125W	£158.95
RCA-14	4-way DC Breakout Box	£49.95
KT-100	Dedicated tuner for Kenwood radios	£173.95
RBA-1:1	Probably the best 1:1balun out there	£35.71
RBA 4:1	Probably the best 4:1 balun out there	£35.71
DTS-6 + 6R	Remote Antenna Switchers. 1.5kW 1-54MHz.	£43.95

NEW FTL- Meter

Jumbo size meter for your FT-857/FT-897. LDG's new version of the its popular Yaesu meter is the FTL-Meter. It's a highly readable 4.5 inch meter face with calibrated scales for signal strength or disc on receive; power out, SWR, Mod, ALC or supply voltage on transmit. Each function is selected from the radio's meter menus. RRP: 79.95 INTRO PRICE: £67.95

The SR2000A Frequency Monitor

ML&S: £1999.95

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.

DX Engineering Products stocked at ML&S!

New! DXE-UT-8213 Coax Cable Stripper

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).

Only £45.99

Nye-Viking "Telegraphic Morse Keys"

We have just received a small quantity of these excellent USA manufactured Classic Oval Speed-X key, model 310-003. Back Oval Base Key with Nickel Plated Hardware with silver plated contacts and shorting bar (for tune -up). Very limited stocks at a big saving over the usual RRP.

ONLY £49.94

Morse Keys

Begali

For the entire range with choice of bases and contacts and prices please see our website.

The finest range of keys available today.

Begali Sculpture

Begali Signature

Begali Camel Back

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.

VAT may have increased but many of our prices haven't!

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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
AD-ATT3G50/HP	0MHz to 3GHz (2kW) surge protector. N-Female Connector.	£48.89
AD-ATT3G50U	0MHz to 500MHz (200W) surge protector. SO-239 Connector	£39.95
AD-ATT3G50U/HP	0MHz to 500MHz (2kW) surge protector. SO-239 Connector	£44.95
End Insulators	Dog Bones. They are extremely rugged, UV and RF resistant	£1.53
Delta-DX-A	160m, 80m and 40m 1/4 twin slope trap antenna. This antenna combines the tremendous DX firepower of the 1/4-wave slope with the wide bandwidth of the 1/2-wave dipole. One leg is 67ft long and the other is 55ft long	£79.95
Delta-DX-B	160m, 80m, 40m and 30m single slope trapped antenna. This antenna is designed for limited space installations, were room does not allow for large wire antennas; it only requires 60ft of space providing amazing DX performance at installation heights of 35ft	£84.96
Delta-DX-CC	80m, 40m, 20m, 15m and 10m dipole. This antenna is parallel length dipole with no traps; overall length is 82ft	£136.90
Delta-DX-DD	80m and 40m dipole. This antenna is parallel length dipole with no traps; overall length is 82ft	£89.95
Delta-DX-EE	40m, 20m, 15m, 10m dipole, it can be used on 30m, 17m, 12m with an ATU. This antenna is not trapped, and has an overall length of 40ft	£119.95
Delta-DX-LB	160m - 80m, and 40m Low Band dipole. This antenna performance and 2:1 VSWR bandwidth depends on the height and surrounding objects; overall length is 100ft.	£119.96
DX-LB-PLUS	160m, 80m, 40m and 20m - 10m Low Band dipole. This antenna performance and 2:1 VSWR bandwidth depends on the height and surrounding objects; overall length is 100ft.	£162.45
DX-Series	Full-size utilized monoband dipole. These dipoles are using the Delta-C Centre Insulator with built-in Arc-Purge Surge Suppressor. **DX-20:** 20m Monoband Dipole at 33ft long **DX-40:** 40m Monoband Dipole at 66ft long **DX-80:** 80m Monoband Dipole at 133ft long	£44.95
DX-Ultra	Medium wave to 30MHz 80ft AM Broadcast Dipole. Efficient, low-noise dipole for military, government, etc., use.	£119.95
Hardware Kit	contains the following: 1x Dipole Centre 2x Dog Bones 1x Surge Protection Block	£27.95
Delta-SEP	Replacement/spare Arc-Plug™ Static Electricity Protector. This unit is usually attached to the back of the Alpha Delta Centre T Balun	£12.95

Super Antennas USA

Super Antenna ChapStick
MP-1 80m-10M Portable Antenna supplied complete with tripod & 80m coil.Only £159.955

Super Antenna MP-1 Rotary Dipole
10-80M with (Incl. 80m Coils) Collapses into a small carry bag. .....Only £299.95
Or Deluxe version with Tripod. £389.95

Super Antenna YP-3 "Beam in a Bag" 80-10M (inc WARC) 3 ele portable beam supplied with carry bag £399.95

The complete range of Super Antenna products and accessories can be found on our web site

Hustler Antennas

Base Station Range
Free standing, max 7.3m tall, 1kW

4-BTV	40/20/15/10m	£178.95
5-BTV	80/40/20/15/10m	£218.95
6-BTV	80/40/30/20/15/10m	£245.95

17-BTV-S 17m add on for 5-BTV or 6-BTV **£53.95**

Mobile Range
200W or 1kW, both stocked. RM10 to RM-80
10M to 80m single-band whips.. **£24.95** to **£56.95**

The full mobile and base range and accessories available from stock, including the high power 1kW mobile range.

Mini VNA PC Controlled Antenna Analyser

ML&S: £259.95

The mRS miniVNA is a compact 100kHz to 180MHz antenna analyser interface that is operated via a PC powered by a single USB connection. You can see at a glance where the antenna is resonant, what the SWR and the return loss is. The best (minimal) SWR frequency is automatically found and displayed. An optional internal RS232 connection is also available.

Full range of Palstar now in stock

HF-2500 Commander 1.5kW Amplifier **£3595.95**

AT-500 ..600W PEP Antenna Tuner.... **Special Price £349.95**

AT-Auto Automatic 1500 Watt ATU **£1099.95**

AT-1500DT 1500W Differential Antenna Tuner ..**£449.95**
NEW AT-2KD The AT-1500DT and the AT-1KP have been combined into a new 2Kw Tuner **£419.95**
AT-4K (2.5kW) Antenna Tuner **£759.94**
AT-5K (3.5kW) Antenna Tuner **£999.95**
BT-1500A Balanced Antenna Tuner.....**£599.95**
PM-2000AM Power/SWR Meter.....**£149.95**

Palstar Dummy Loads
DL-1500 (1.5KW) **£109.95**
DL-2K (2kW) **£229.95**
DL-5K (5kW) **£349.95**

Palstar R30A Receiver

Palstar R30A, fitted Collins filters for SSB & AM.....**£549.95**

MW550P Active preselector & ATU for AM & 160M reception **£259.95**
SP30 Matching Desk Speaker.....**£69.95**
AA30 Active Antenna Matcher 300kHz-30MHz ...**£99.95**

See www.hamradio.co.uk

ML&S are the SOLE Authorised Distributor of Palstar for UK & Ireland & stock their FULL RANGE of products.

COMET

Comet SWR/Power Meter
CMX 2300 2 separate SWR/Power Meters in one box! .£153.21

Comet Antenna Tuner
CAT-300 300W Antenna Tuner £194.08

Comet Wide-Band Vertical
CHA 250B 80m to 6m with no ATU and no gaps £306.48

Comet Rotary Dipole
H-422 4 Band trapped dipole £275.82

Comet HF/VHF/UHF Base Antennas

CWA1000	80,40,20,15,10 trapped dipole	£99.95
GP1	144/430 MHz 3.0 / 6.0dbi 1.25m	£59.95
GP3	144/430 MHz 4.5 / 7.2dbi 1.78m	£69.95
GP6	144/430 MHz 6.5 / 9.0dbi 3.07m	£99.95
GP9	144/430 MHz 8.5 / 11.9dbi 5.15m	£139.95
GP15N	50/144/430 MHz 3/6.2/8.6dbi 2.42m	£99.95
GP98	144/430/1200 MHz 2.94m long	£139.01

Comet Handy Antennas

BNC-750	BNC HF whip 7-50MHz TX/RX	£81.69
CH32	BNC 144/433/900Mhz 45mm	£20.39
CH-99	BNC Tel Whip 70-1000MHz 195-1135mm L	£20.38
CHF816	16 3.5/28/50MHz 74cmL 10W/Yaesu FT817	£51.03
RX5	144/430/900MHz 44cm L 8W SMA	£30.60
RX7	144/430/900MHz 44cm L 8W BNC	£30.60
SH95	144/430/1200MHz 37cm L 10W BNC	£30.60
SMA3	144/430/900MHz 25cm L 10W SMA	£25.50
SMA99	70-1000MHz 1.1mm max L Tele SMA	£17.32

Comet Duplexers

CF360A	28/50MHz w/leads SO239 - PL259/PL259	£40.82
CF416A	44/430MHz w/leads SO239 PL259/PL259	£35.71
CF416B	144/430MHz w/leads SO239 PL259/N male	£35.71
CF503C	50/144MHz Sockets SO239 - PL259/PL259	£45.93
CF530C	50/144MHz w/leads SO239 - PL259/PL259	£45.93
CF530A	50/430MHz w/lead PL259 SO239/SO239	£40.825
CF4160B	144/430MHz Sockets SO239 PL259/PL259	£33.66

Comet Triplexers

CFX431A	144/430/1200MHz N socket/PL259/N/N	£51.03
CFX514N	50/144/430/MHz SO239/PL259/PL259/N	£51.03

DIAMOND

Base Antennas

X-30	2/70, 3/5.5dB, 1.3m Long	£51.04
X-50N	2/70, 4.5/7.2dB, 1.7m Long	£66.37
X-300	2/70, 6.5/9dB, 3.1m Long	£102.12
X-7000	2/70/23, 8.3/11.7/13.7dB 5m Long	£204.30
V-2000	6/2/70, 2.15/6.2/8.4dB, 2.5m Long	£127.67

Mobile Antennas

NR-770R	100W, 2/70, 3/5.5dB, .98m Long	£35.71
NR-770RSP	As above but spring loaded	£40.82
NR-7900	2/70, 3.2/6.4dB, 1.46m Long	£51.04

Duplexers/Triplexers

MX-72N	1.6-150/400-460MHz Duplexer	£45.94
MX-62M	1.6-56/140-470MHz Duplexer	£69.44
MX-610	HF/6+2+70 (for FT-8900)	£73.52
MX-2000	6/2/70 Triplexer	£85.78
MX-3000N	2/70/23 Triplexer	£82.71

Switches

CX-210A	2-way, SO-239 Die Cast	£47.98
CX-210N	2-way, N-Type, Die Cast	£74.54
CX-310A	3-way, SO-239, Die Cast	£83.74
CX-310N	3-way, N-Type, Die Cast	£109.28

SWR/PWR Meters

SX-100	1.6-60 MHz, 30W-300W-3KW	£132.78
SX-200	1.8-200 MHz, 5-20-200 Watts	£91.91
SX-1000	1.8-1300 MHz, 5-20-200 Watts	£230.87
SX-40C	144-470MHz X needle Mobile Meter	£88.85
SX-20C	3.5-150MHz X needle Mobile Meter	£88.85
SX-27P	COMPACT 144/430, 60W Portable Meter	£45.93

Power Supply
GSV-3000 25Amp 5-15V Variable Metered £224.74

Huge selection of Diamond products always available ex-stock.

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Great British designed and built products

DSPKR Price £149.95
New Desk Top "Noise Away" Price £149.95
NES10-2MKII DSP Noise cancelling speaker Price £97.95
NEIM1031MKII Price £136.95
ANEM "Noise Away" MKII Price £122.95
NEDSP1061-KBD Price £97.95
NEDSP1062-KBD Price £102.95
Radio Mate Compact Keypad Price £87.95
CAT-MATE Electronic "Y" splitter for Yaesu FT-817 FT-857 & FT-897 Price £48.95

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

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Used equipment sitting at home gathering dust?
MAXIMUM PRICES PAID
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Antennas

More on baluns

PHOTO 1: Balun types. Top: 8 turns of RG58 on a section of 70mm plastic pipe. Middle: 8 turns of RG58 through 6 ferrite rings. Bottom: 6 ferrite beads threaded on a length of Mini8 coax.

CURRENT CHOKES AND BALUNS. I have previously made reference to current chokes that can be used to reduce or eliminate RF common mode currents (currents on the outside of coax transmission line). The way that this is done is to introduce impedance on the outside of the outer braiding of the coax to oppose these currents while at the same time leaving the inner side of the braid unaffected. The subject was discussed in detail by Ian White, GM3SEK **[1]** so I don't propose to repeat it here. What I will do is discuss some of the practical aspects of constructing a current choke and my attempts at measuring balun performance.

Before I start I will clear up some points of terminology. A balun (balanced to unbalanced network) is a device that allows you to connect an unbalanced transmission line (coax) to an unbalanced line (twin line feeder or a balanced antenna such as a dipole). It has been common practice to use a 4:1 transformer in this application. This is probably because coax has an impedance of 50Ω and twin line feeder is normally 300 or 450Ω, although these impedances are unlikely to be encountered in a multiband antenna system. As GM3SEK pointed out, a transformer does little to reduce common-mode currents. A current choke is much more effective in this application.

TYPES OF CURRENT CHOKE. What is required is a high impedance on the outside of the coax braiding that does not affect the normal transmission line characteristics. This impedance should be high over the whole desired frequency range. The only practical component that can be used for the job is an RF choke. As you are aware, the characteristics of an RF choke in normal RF circuits is large inductance with a very small self-capacitance. Because this capacitance is low, the off-resonant reactance is high, giving the component a broadband characteristic.

COILED COAX. The simplest method of introducing inductance on the outside of the coax is simply to make part of the coax feedline into a coil, with just a few turns of coax in a loop of diameter 150 to 300mm (6in to 12in). The coils of coax make up the inductance of the choke so not any old roll of coax will do. See **Table 1** for the number of turns required for various antenna applications. At higher frequencies the coil choke should be wound on a former, as shown at the top of **Photo 1**.

I made some measurements of various baluns using the AIM-4170. Using this method, the characteristics of the coil balun were measured. The results are shown in **Figure 1**. This and most of the following measurements using the AIM-4170 show the magnitude of impedance only; for clarity, I have turned off the other parameters. In some cases a second scan was done, with the balun placed or connected differently. These results are overlaid. The measurements in Figure 1 show an initial scan (in red) where the balun is placed on a table covered with an earthed conductive anti-static mat. The second scan (blue) shows the balun placed 6in clear of the table on a cardboard box, which indicates that care is needed when performing these measurements. The colours for these parameters have been modified in the AIM-4170 configuration file for improved print reproduction. Note that characteristics are not measured above 2000Ω; this scale was chosen as being the most appropriate for balun characteristic measurements.

COAX WOUND ON FERRITE. The characteristics of a balun can be improved considerably by using ferrite material. The coax feeder can be wound round a large ferrite ring as described and illustrated by GM3SEK **[1]** or wound through a small number of ferrite rings as shown in the middle of Photo 1. The advantage of this illustrated arrangement is that a larger diameter coax such as RG-213 can be used to make a QRO balun. The characteristics of this balun are shown in **Figure 2**. The inductance of this arrangement is rather large for HF general coverage but is excellent for the lower frequency LF bands.

FERRITE BEADS ON COAX. Yet another alternative, popularised by W2DU, is to feed the coax feeder through ferrite tubes or beads to form a sleeve. An experimental arrangement, using FairRite 43540001 (or equivalent, obtainable from JAB **[2]**) is shown at the bottom of Photo 1. This ferrite material fits nicely on Mini8 coax cable. For this type of balun to be effective the ferrite beads should be a reasonably snug fit on to the coax.

This arrangement was tested and the results are shown in **Figure 3**. A balun with reasonable characteristics is achievable with just four beads (shown in red). An improved performance, shown in blue, is achieved with six beads. This implies that eight or ten beads are required for a balun to cover the HF bands. I wasn't able to test this assumption because I had run out of ferrite beads!

I tested a commercial version of the W2DU coax current choke of the type I have just described. I cut a hole in it to see how it was constructed and found it comprised around 30 ferrite beads, each 10mm OD and 7mm long. I was unable to see clearly the size of coax that the beads were threaded on but it looked like RG58. The characteristics of this balun are shown in **Figure 4**. I have included an additional Theta (angle of impedance) graph to show that this type of balun also has resonance (just the same as a coil of coax), in this case just over 7MHz.

BALUN CHARACTERISTICS AND FERRITES. An important characteristic of a balun is that it should have a reasonable impedance to prevent common mode currents in the frequency range for which it was designed. The coil of coax balun at the top of Photo 1 appears to have an impedance greater than 1000Ω (Figure 1) in the range 17 to 40MHz and has a peak at 28MHz greater than 13kΩ.

The balun made with coax and ferrite rings in the middle of Photo 1 appears to have an impedance greater than 1000Ω Figure 2 in the range 1 to 15MHz and has a peak at 3.5MHz greater than 57kΩ.

On the other hand, the W2DU balun has a much flatter response of impedance relative to frequency as shown in Figures 3 and 4. It should be noted that baluns so far described

TABLE 1: Coiled-coax feeding chokes for HF. Wind the indicated length of coaxial cable into a flat coil and tape it together. Source: W7EL, ARRL Antenna Handbook.

Frequency	feet RG213/UR67 cable	turns RG213/UR67 cable	feet RG58/UR76 cable	turns RG58/UR76 cable
Single band (very effective)				
3.5MHz	22	8	20	6-8
7MHz	22	10	15	6
10MHz	12	10	10	7
14MHz	10	4	8	8
21MHz	8	6-8	6	8
28MHz	6	6-8	4	6-8
Multi band (good compromise)				
3.5-30MHz	10	7	10	7
3.5-10MHz	18	9-10	18	9-10
14-30MHz	8	6-7	8	6-7

FIGURE 1: Characteristics of the top balun in Photo 1.

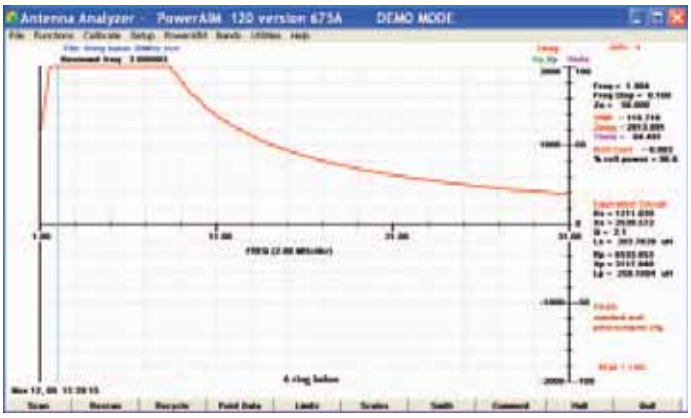

FIGURE 2: Characteristics of the middle balun in Photo 1.

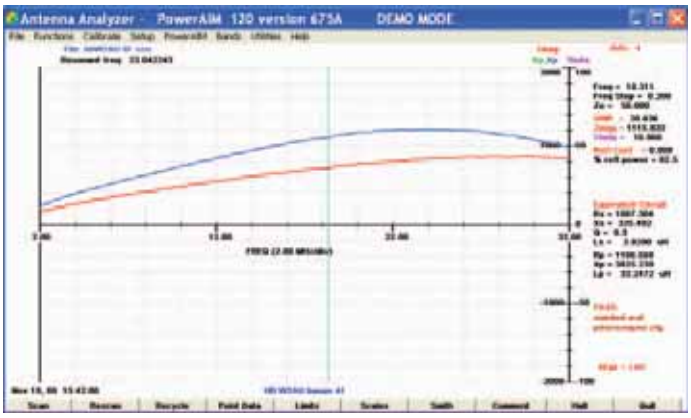

FIGURE 3: Characteristics of a home made W2DU type balun with four ferrite beads (red) and six beads (blue).

FIGURE 4: Characteristics of a commercial W2DU coax current choke with magnitude of impedance (red) and Theta (purple).

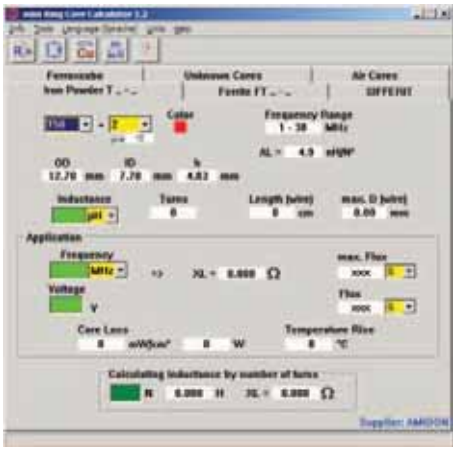

FIGURE 5: Main window of *Mini Ring Calculator.*

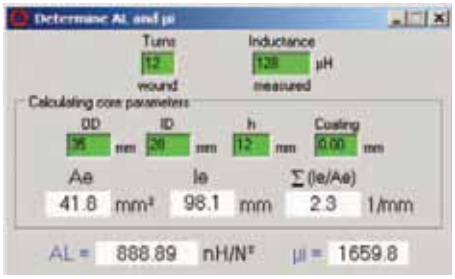

FIGURE 6: Sub window of *Mini Ring Calculator* (see text).

PHOTO 2: Measuring the inductance of a coil wound on ferrite.

do not represent any sort of 'design'. All I have done is made up baluns with odd lengths of coax and items of ferrite, mostly from the junk box, just to examine the characteristics of these constructions.

The classification and characteristics of ferrite material with various manufacturers using different units can be confusing. What follows is a method for determining if the ferrite rings you have in your junk box are suitable for making a current choke balun.

Wind 10 turns of wire around your mystery ferrite ring or bead and measure the inductance as shown in **Photo 2**. I use an Atlas LCR40 for this job, one of the best and most-used instruments in my shack apart from the multimeter.

Use *Mini Ring Calculator* by DL5SWB, a program that can be downloaded for free **[3]**. I am indebted to DJ4RAJ for bringing this to my attention. The main page of *Mini Ring Calculator* is shown in **Figure 5**, which shows many measurement options outside the scope of this discussion. The help file in particularly informative.

Click on the $R_L?\mu_i$ button in the top left hand corner and the program will display the part we are really interested in, see **Figure 6**. Enter the measured inductance and the dimensions of the ferrite into the appropriate boxes and it will come up with the permeability value μ_i of your ferrite ring. This core should have a permeability of at least 1500 if it is to be any use as a current choke.

FINALLY. The impedance presented to common mode currents should be well above 500Ω. If you are running a QRO transmitter, low choke impedances can allow enough current to flow that the ferrites will overheat. Theoretically, these baluns should have no loss to differential mode currents (normal coax RF current). This is supported by the fact that no measurable power loss could be detected with the baluns described above when I made this test. Next month, I will describe some practical designs for current balun chokes.

REFERENCES

[1] In Practice, Ian White, GM3SEK, *RadCom* November, 2009
[2] JAB Electronic Components www.jabdog.com.
[3] www.dl5swb.de

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IOTA

G3ZAY discusses forthcoming DXpeditions

Hugh, K7A on the beach at Wosnesenski Island NA-222.

RECENT ACTIVITY. The recent P29 DXpedition to Papua New Guinea was a great success despite bad sea conditions. The team of five operators led by G3KHZ made a combined total of 20,000 QSOs from the Tanga, Green and Woodlark IOTA groups. Distribution of QSL cards began on 11 December. A separate *RadCom* feature article will cover this trip in more detail.

Hugh, K7A reports the following QSO stats for his Alaskan trip this summer: NA-236 (a new one) 1,237 QSOs, NA-222 407 QSOs, NA-087 563 QSOs. HF conditions were poor throughout and he spent many hours CQing on a dead band.

NEW AND RARE ONES. Looking forwards, the next new one is likely to be a three-day activation of East Pen Island (NA-231) in the Canadian Arctic by Cezar, VE3LYC, operating as VY0V. The time slot for this trip is approximately 26 to 31 March. The island is only a kilometre or so off the Ontario coast of Hudson Bay but is many hours travelling time by snowmobile from the nearest settlement with an airstrip. At least the sea will still be frozen at the end of March so dangerous boat trips won't be involved. Cezar attempted to activate this one with Ken, G3OCA in 2007 but some of the local Cree First Nation elders had concerns about letting the operation proceed. Let's hope that things have now been sorted out and they understand a bit more about IOTA. Needless to say this will be an expensive trip, requiring the employment of several local guides. Cezar would be pleased to receive donations – contact him at tiberius.trifu@gmail.com if you would like to support the trip.

Another island group that almost counts as a new one since the only previous operation made very few QSOs with Europe is the Vietnamese island of Con Co (AS-185). A major DXpedition there is now being organised by HB9BXE for 10 to 18 April. The call will be 3W6C and the team will include a number of local operators. See the website at: www.3w6c.qrv.ch.

Apart from Rockall, one of the rarest UK groups is the Flannan Islands (EU-118) about 20 miles west of the island of Lewis in the Outer Hebrides. MS0INT is the callsign issued to the expedition, which expects to be QRV around 18-21 June. This will definitely be weather-dependent as landing is very difficult on these exposed Atlantic islands and the jetties and steps installed for the lighthouse have not been maintained for many decades, now that the light is automatic. Operators include MM0NDX, EA1DR, EC2ADN, EA3NT and SM0MDG. QSL via M0URX.

ANTARCTICA. One of the toughest parts of qualifying for the basic IOTA-100 certificate is working Antarctica. It isn't a particularly difficult path but there aren't many stations on from there and the pile-ups can be hard to crack with modest power and antennas. So it is good to hear about a number of new stations that will be looking for QSOs.

Sang Hoon Lee, DS4NMJ will be active as DT8A from the Korean Antarctic base on King George Island in the South Shetlands (AN-010) for 14 months until 31 January 2011. He plans to operate all bands mainly CW, with some SSB and RTTY. This is a relatively easy path from the UK as it avoids the auroral zone. QSL via HL2FDW.

The South Shetland Islands are in one of the most accessible parts of Antarctica and are home to well over a dozen bases. A group of Chilean amateurs from the Radio Club de Concepcion were QRV from the Arturo Prat base during January to celebrate the 200th anniversary of the independence of Chile. Operators included CE5COX, CE6UFF, XQ5CIE and F6DXE. See www.ce5ja.cl.

Bill, K7MT should be at the US McMurdo Station (KC4USV) on Ross Island (AN-011) until 20 February. This is on the other side of the continent from us so signals must traverse at least one auroral zone. He expects to be QRV for Europe at 1800UTC on Saturdays; he also plans to be on 14243kHz on Sundays at 0000Z and to operate PSK-31 (14070kHz) and CW (14043kHz) as well, if time permits. QSL via K1IED.

VP8DMH is the callsign issued to Mike, M0PRL, who is currently stationed at Rothera Base on Adelaide Island (AN-001) Antarctica.

Mike, RW1AI, should have arrived at Progress Station in Antarctica around 16 December and will be active from the R1ANP club station throughout 2010.

OCEANIA. David VK9WBM will be assigned to the weather station on Willis Island (OC-007) for the next six months and plans to be active in his spare time. QSL via VK4DMC.

A group of six operators plan to activate Broughton Island (OC-212) off the coast of New South Wales for three days from 5 February. See www.vi2bi.blogspot.com for more information and a log search.

Siegfried, DK9FN will be active again as H40FN from the Reef Islands (OC-065), Temotu Province on 6 to 19 February. He will operate CW only, with a strong emphasis on 160 and 80m, while Bernhard, DL2GAC will operate SSB using his H40MS call and Hans-Peter, DG1FK will operate mainly PSK31 as H40FK. Further information can be found at http://hari-ham.com/h40fn.

OTHER ACTIVITIES. One of my favourite islands off California, Santa Catalina, is due to be activated from 25 to 28 February on the usual IOTA frequencies – but mainly 20m SSB – by the Palos Verdes Amateur Radio Club using the call K6PV. The island is probably visible from many of their members' homes as it lies about 25 miles out in the Pacific from the Palos Verdes peninsula. I strongly recommend a visit to this beautiful island if any *RadCom* readers are visiting Los Angeles. There are regular ferries from San Pedro and Long Beach – both about a 30 minute drive from Los Angeles airport, LAX.

S21RC, S21AM, S21S and S21D will return to St Martin's Island (AS-127), Bangladesh, from 21 to 25 February. They plan to operate as S21DX with two stations. QSL via EB7DX. Further information can be found at http://iota.s2dx.org.

Oleg, UA0ZAL is a resident of Bering Island (AS-039) and has been active mainly on 40 metres. QSL via RV1CC, direct or bureau.

Vasily, RA9LI will soon be moving to Troynoy Island (AS-086), where he expects to operate in his spare time as RA9LI/0 for one year. QSL via UA9LP.

Phil, G3SWH and Jim, G3RTE will be active from Christmas Island (OC-002) on 20-27 February as VK9X/G6AY – a call that will doubtless give logging software and the IOTA website some problems. See www.g3swh.org.uk/christmas-island.html.

DK9FN on his 2009 Pacific trip.

Thamway TX-2200A 136kHz Tx

The first Japanese transmitter for the new LF band

The TX2200A is well built, quite compact and attractively workmanlike in its appearance.

NOT YAE-KEN-COM! Japanese amateurs were allocated the 135.7 – 137.8kHz band in 2009 and the first Japanese company to produce a rig for the band is not one of the 'big three' but the Thamway company of Fuji. They manufacture commercial RF equipment so they have the expertise, but they don't make much amateur equipment.

It isn't the first commercial rig for the band; the Dutch 'Ropex' TX appeared in 1998 and in many ways the Thamway TX2200A is similar. Like the Ropex, it runs 100W from a 13.8V supply and is designed as a CW-only transmitter, but whereas the Ropex was crystal controlled, the Thamway is synthesised and covers the whole band.

DESCRIPTION. It's about the same size as any small transceiver, being 200mm wide, 100mm high and around 260mm deep including the knobs and heatsink. It feels quite light and, apart from the slightly wobbly tuning knob, pretty solidly built. The supplied documentation is rather basic but adequate. It doesn't include any circuits.

On the front panel there is a clear backlit meter that can measure voltage, current, forward and reverse power. There is a two line LCD dot matrix display, Tx and on-off switches. All nice and simple.

At the rear is the large heatsink, a PL259 RF output socket, two phono sockets for receiver aerial and remote TX, a standard jack socket for the key, a DC power input socket and fuse, plus the receiver mute control.

I can never resist taking the lid off a new radio so I had a peek inside and was impressed by the neat and tidy construction. There are four glassfibre circuit boards; the DDS and control board with the filter and aerial switching board underneath it, the PA board (fixed to the heatsink) and the display board behind the front panel.

OPERATION. Lid back on and the Thamway was connected into the system in place of my normal, much more powerful, 136kHz transmitter. The only adaptor required was for the phono receiver socket; I would prefer a BNC here but a 50p adaptor solved the problem.

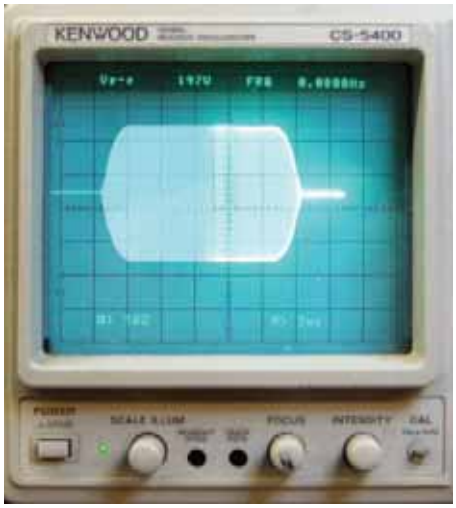
The dot matrix display indicates frequency, power and TX hang delay. The function to be controlled by the rotary encoder is selected by pressing the small button to the bottom left of the display and is indicated by a cursor that moves to underline the active digit. All the settings are remembered when the rig is powered off. In VFO mode the cursor stops under the 10Hz digit and the DDS moves in 10Hz steps; pressing the control knob once moves it to the 100Hz digit, making QSYing a bit faster.

Power can be adjusted from 100W right down to 1W, which is a nice feature. The Tx hang delay varies between 1 and 9 where 1 is almost (but not quite) full break-in and 9 is about two seconds. I found 5 to be a good setting for my fairly slow CW. The automatic Tx facility only works when the BREAK-IN switch is in the up position, otherwise you need to flick the SEND switch up to enter the Tx mode. Flicking this switch down to CAL allows you to hear the DDS VFO and net onto another signal. If no key is plugged in, the rig will go straight into transmit as soon as the BREAK-IN or SEND switch is operated.

IN USE. If you aren't certain that the aerial is matched it's probably best to start at low power and check the reflected power first. All being well you can turn it up to 100W and do a final check. The transmitter will shut down if the reflected power exceeds an indicated 30W. The ID setting of the meter switch measures FET drain current and should show about 12A at full power. Pretty efficient, these Class D transmitters! I did accidentally transmit into an open circuit and nothing went pop so it seems that the TX is adequately protected against mismatch.

On the air the CW note sounds good. I had no reports of key clicks and the keying envelope looks well shaped and symmetrical on the 'scope. The transmitter doesn't have an electronic keyer built in.

There is no sidetone generator in the rig (although there seems to be provision on the circuit board) so you will need to listen on your receiver whilst transmitting. The RX-MUTE control on the back panel can be used to control the amount of signal getting to the receiver during transmission.



The CW keying waveform is quite acceptable, with rise and fall times of about 2ms.

The front panel of the transmitter is simple and uncluttered.

The internals are neatly laid out and sturdily constructed.

Simplicity is the keyword on the rear panel, dominated by a large heatsink.

ON THE AIR. Many QSOs on the 136kHz band are made using very slow CW, keyed by a computer, and the cool-running Thamway is well suited to this. Its automated switching means that you don't need to connect a Tx line, just the keying line. The keying current is only 9mA so an opto-coupler interface can be used. For DX work quite slow speeds are used, requiring very accurate frequency calibration and high stability. The Thamway I had on test was very well calibrated, being within 2Hz of the indicated frequency, but the 10Hz steps are a limitation at very slow speeds. 1Hz steps would enable one to avoid the Loran lines. Stabiltity was adequate for QRSS10 but not quite good enough for QRSS60, the rig staying within 0.1Hz over an hour of testing.

BENCH TESTS. The power output at various settings was tested with the Tx on a 13.8V supply. Current drain at full power was 11A, giving a total efficiency of 74%. This means that the Thamway runs cool, even after long periods of key-down abuse.

Setting	Measured output
100W	112W
50W	53W
10W	9.7W
2W	1.7W
1W	0.4W

Second and third harmonics were more than 50dB down and higher ones very much further down. The RF waveform looked nice and clean into a 50Ω resistive load. CW envelope rise and fall time was about 2ms.

CONCLUSION. This transmitter does exactly what it sets out to do and is a perfectly good starter rig for LF. Its limitations are the low power output (100W isn't going to get you very far with a poor aerial), the 10Hz minimum frequency steps and its CW-only mode. It is also quite expensive. On the other hand it's a pretty idiot-proof and well made piece of equipment, ideal for taking out portable, with an easy to use and accurate built-in DDS.

The Thamway TX2200A is available at £689.95 from Waters and Stanton, to whom I am grateful for the loan of the equipment.

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ALINCO
MORE for LESS!

Homebrew

We continue developing the LF/MF receiver, adding an audio amp and AGC.

WHERE ARE WE? At this stage in its development, our LF/MF receiver is working quite well, but there are a few important parts missing including an output stage and automatic gain control. The lack of a built-in audio power amplifier means that the receiver can only be used with an external amplifier or a PC sound system. So the first of this month's projects is a simple audio power amplifier.

Most of my previous receiver projects have used relatively low power audio amp ICs. The humble LM386 (500mW) and LM380N (2W) have both served me well in the past. This time, I have decided to use something a little more hi-fi and higher power. The TDA2003 is a 10W audio amplifier that works from a single-ended DC supply of around 12V. This makes it an ideal choice for use in mobile equipment.

The maximum power specification for most audio amplifier ICs assumes that the output load impedance is very low (often just 2Ω) and that a high distortion level of 10% is acceptable. At higher load impedances, such as 8Ω, the available power falls and the distortion improves significantly.

The maximum output of an audio amplifier is limited by the available output voltage and the impedance of the output load, which is usually a loudspeaker. To achieve reasonably low levels of distortion, audio amplifiers are usually run at a level well below their maximum output rating. A typical setup might have an 8Ω speaker and a 12V DC supply. With a single-ended supply, this would allow a maximum possible output voltage swing of ±6V. As most amplifier outputs cannot swing all the way from 0V to the positive supply rail voltage, a more practical maximum limit is probably around ±5V (10Vp-p). For a sine wave test signal, this is 3.535V RMS, which results in a power output of 1.56W. This might not seem like a lot, but you will find that it is more than enough to drive most loudspeakers to ear-splitting levels of sound.

The TDA2003 is very well protected against electrical and thermal overload. The specified maximum operating voltage is 18V, but the device can be run at 28V without suffering any damage and it can survive brief transients of up to 40V on the power supply pin. The IC has thermal shut-down that provides protection against overheating. It'll also survive reversal of the power supply polarity for long enough to blow a 1A protection fuse.

A SIMPLE AUDIO POWER AMPLIFIER. The circuit is based on the standard test circuit in the TDA2003 data sheet [1], shown in **Figure 1**. This amplifier has a voltage gain of 100 (40dB). The power gain is substantially more than this, because the output load resistance is much lower than the input resistance. The specified -3dB frequency response of the data sheet circuit is 40Hz to 15kHz. I have increased Cx from the data sheet value of 39nF to 100nF, which reduces the upper end of the frequency response to about 7kHz at the -3dB point. Specified total harmonic distortion (THD) is 0.15% at output levels from 0.05W to 4.5W into a 4Ω load.

CONSTRUCTION. The amplifier is built on a strip of copper clad PCB laminate. The TDA2003 is available in two different versions: the TDA2003V and TDA2003H, one for vertical mounting and the other for horizontal mounting. As we won't be using a PCB for this project, either version can be used. The 5 pin 'Pentawatt' package is not based on the usual 0.1in square matrix. For my usual method of point-to-point wiring, I used small pliers to straighten all five pins. The IC was then mounted horizontally on a strip of PCB. I used a small scrap of 1mm aluminium sheet bent into a U shape for additional heatsinking. Take care not to break off the IC pins while you are straightening them! A lost pin would make the IC useless, except in the case of pin 3 (ground) which is internally connected to the heatsink tab. **Photo 1** shows the finished amplifier. If you would prefer to use an etched PCB, the ST data sheet has a recommended PCB layout. Alternatively, you can buy a kit like the Velleman K4001 (Maplin VF55K) that comes with all components and a high quality PCB.

TESTING. The amplifier was tested using an 8Ω resistive load. As 8Ω is not a standard value, I used 15Ω in parallel with 18Ω. (R1*R2)/(R1+R2) = 8.18 ohms. Using a 13.8V DC supply the measured standing current was 45mA, which is in the expected range. The output voltage at pin 4 is exactly half the supply voltage, which indicates that the DC bias conditions are correct.

The AC performance of the amplifier was evaluated using one of the low distortion oscillators from the December 09 Homebrew as a signal generator, plus Baudline software for THD analysis. The gain of the amplifier is exactly as predicted, with the 3dB roll-off

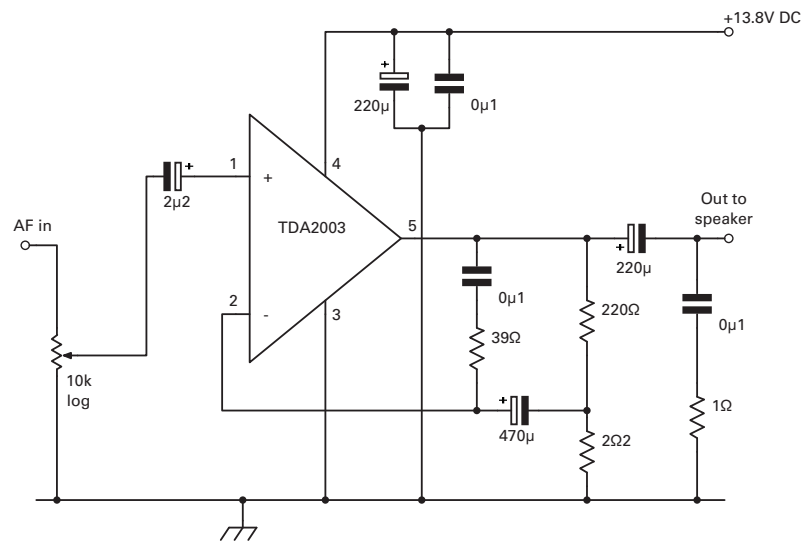


FIGURE 1: The TDA2003 amplifier circuit, based on the data sheet.

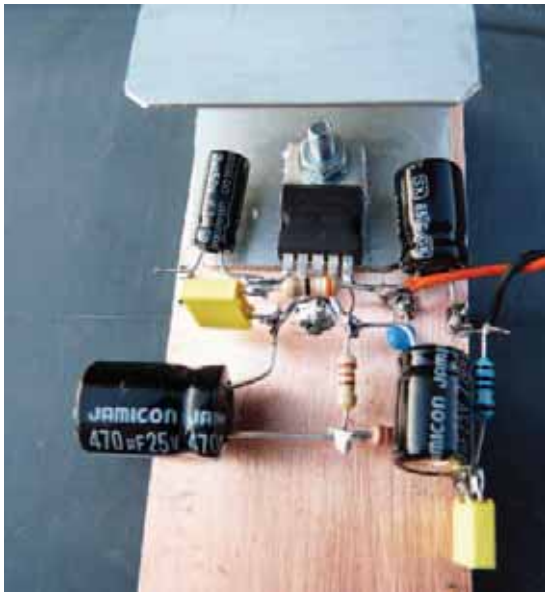


PHOTO 1: The prototype TDA2003 audio amplifier.

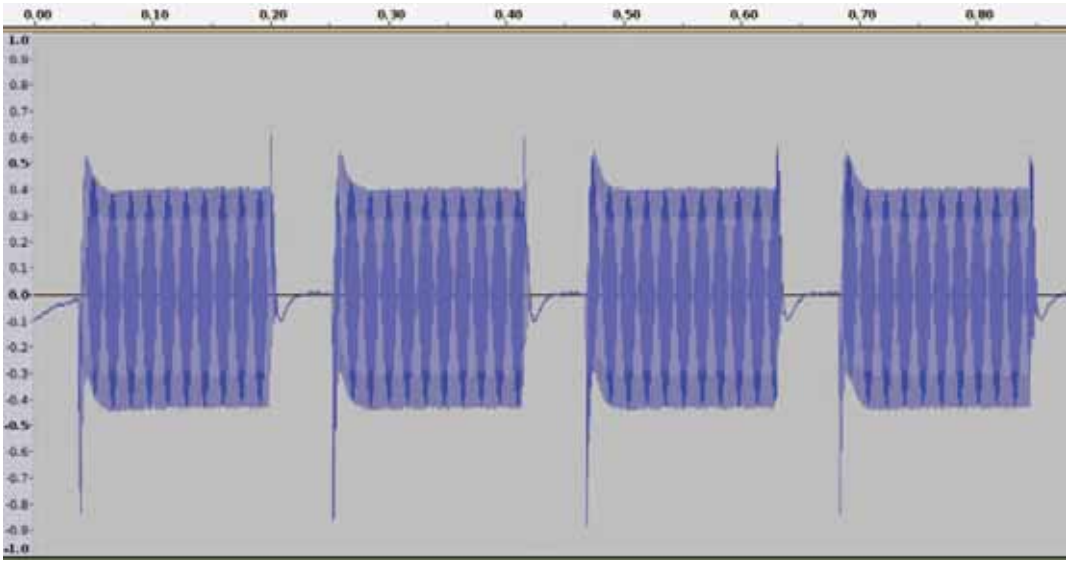


FIGURE 2: Received signal with slight delay on the attack and slight overshoot.

points at 40Hz and 7kHz. Measured THD is less than 0.1% at 1W output into 8Ω using a 1kHz test tone. When the 8Ω dummy load was replaced by a speaker, the first thing I noticed was a complete absence of noise while the amplifier is running. Apart from a slight click when power is applied and a soft thump when the power is turned off, there is no trace of any noise or any indication that the amplifier is powered up. Using a CD player as the input source produced a pleasing sound with no detectable distortion. When the amplifier was wired into the receiver, the result was very good audio quality, even a high output levels.

A word of warning is required at this point. **Audio power amplifiers can cause permanent hearing damage.** Commercial equipment makers take great care when designing equipment. They have to ensure that the equipment they sell meets all relevant standards and doesn't pose any unnecessary risk to the operator. The home constructor is not constrained in this way. We can and unfortunately sometimes do make equipment that is not entirely safe to use. A relatively high powered amplifier that can produce several watts of output should never be connected directly to a pair of headphones. While it is possible to reduce the AF gain to a safe level, you can be sure that sooner or later you will accidentally turn it up to maximum level or disable the AGC just as a strong local station is about to call. Always use an attenuator between the amplifier output and the headphone socket. This can be as simple as a single resistor in series with the phones. The required value will typically range from a few tens of ohms to a few hundred ohms. If the headphone impedance is known you can easily design a suitable PI or T attenuator. You should use a value of attenuation that produces an output level that is comfortable at the AF gain mid position and not excessively loud even at maximum gain.

I did encounter a few small problems while testing the amplifier. I did the initial tests without the Zobel network (1Ω resistor in series with a 100n capacitor) at the output because I couldn't find a 1Ω resistor at the time. Under some load conditions, the IC ran quite hot. Looking at the output on an oscilloscope revealed that it was producing several volts at 4.8MHz. Fitting the correct components completely cured this problem. Initial tests on the amplifier showed that it was very 'microphonic'. This effect was quite severe. Tapping the board even very lightly produced an audible sound in the speaker. Shouting directly at the board produced a reasonable reproduction of my voice! It turned out that I had made a reasonably efficient condenser microphone. The electrolytic capacitor at the amplifier input was mounted horizontally in very close proximity to the PCB ground. As I hadn't yet installed the AF gain pot, this unintentional capacitor was floating at one end while the other end was connected directly to the high impedance input of the amp. Repositioning the capacitor a few mm away from the board completely cured this problem.

RECEIVER AGC. The next important stage of the receiver is the automatic gain control (AGC). AGC is a form of negative feedback that samples the received signal and then adjusts the receiver gain to avoid overloading any of the receiver stages, or to maintain a desired audio output level over a wide range of received signal strength. The simple AGC systems in broadcast receivers respond relatively slowly to changes in the received signal because they only need to compensate for fading (QSB). They aren't expected to cope with sudden, dramatic changes in received signal strength as might be encountered when working both weak and strong stations at the same time. The rapidly changing nature

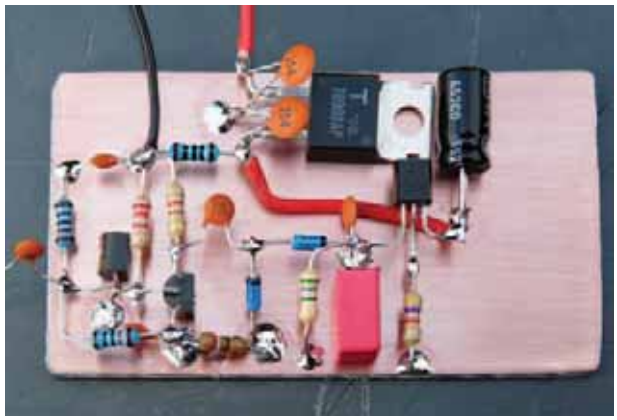
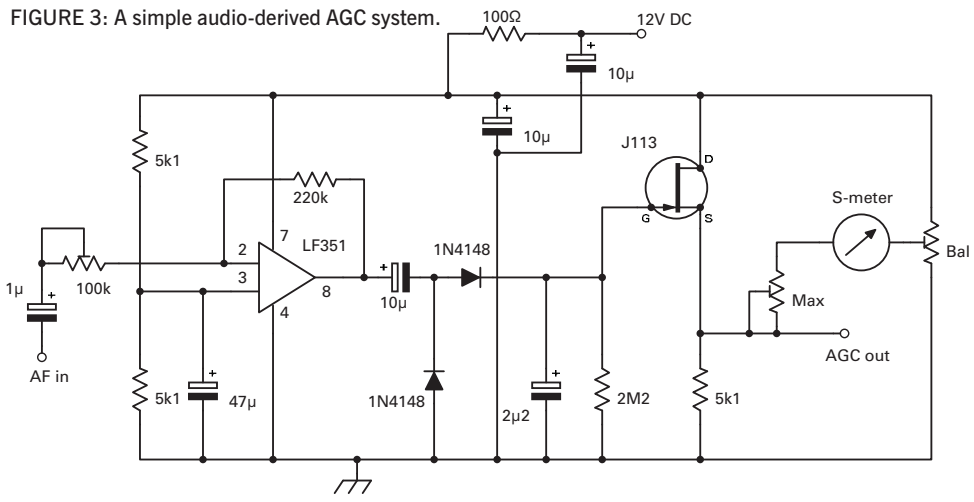


PHOTO 2: The finished AGC unit.

FIGURE 3: A simple audio-derived AGC system.



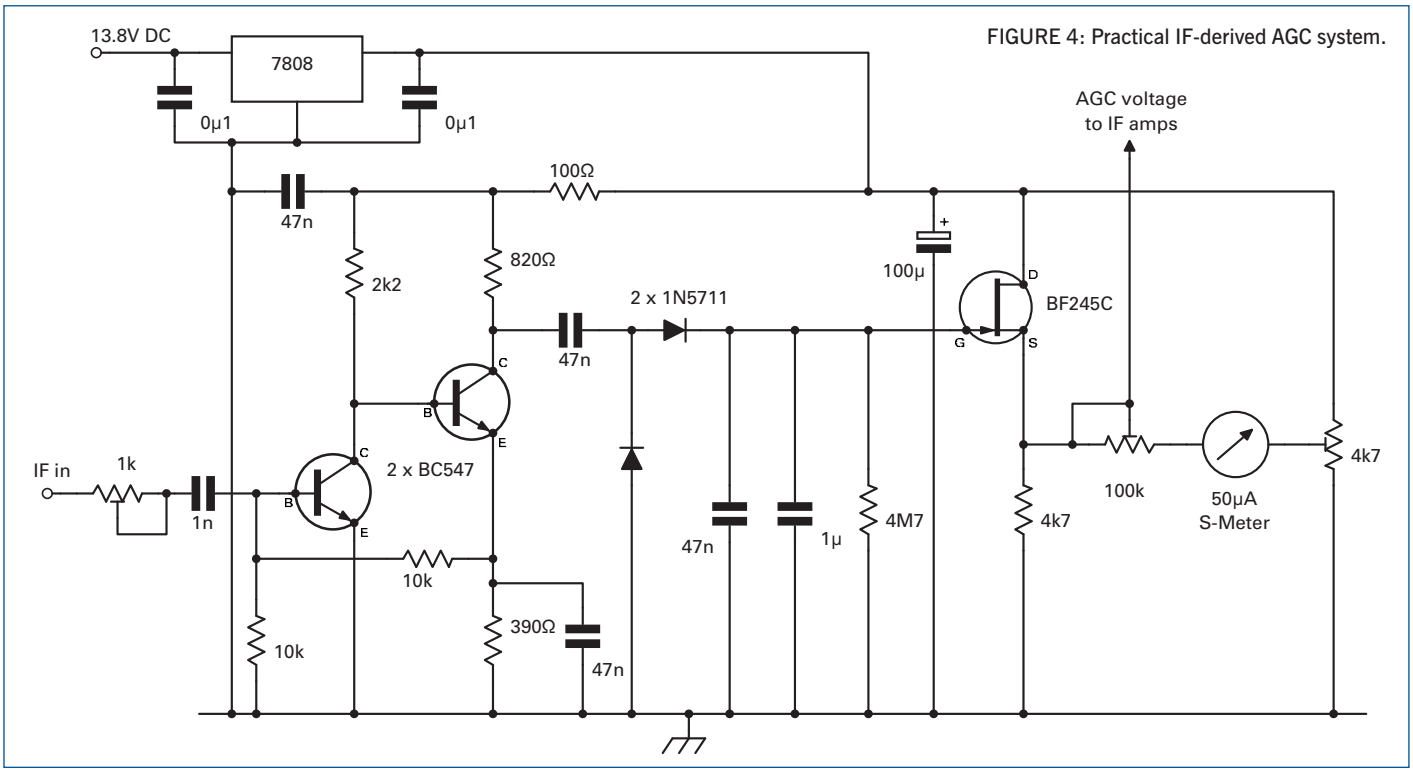


FIGURE 4: Practical IF-derived AGC system.

of SSB and CW signals is particularly challenging for the AGC system designer.

There are many different methods of applying AGC to a receiver. Audio-derived AGC samples the output from an AF amplifier in the receiver and adjusts the receiver gain to achieve the desired level. IF derived systems sample the output at one of the final IF amplifiers to determine received signal strength. In a digital (SDR) system, the AGC may be implemented entirely in software, although in some SDR systems, RF gain control is applied to the receiver front end to prevent overloading of the ADC at a later stage in the receiver.

Some direct conversion receivers use AGC that is entirely audio-derived. As there is no IF amplifier, it is not possible to apply gain reduction at an IF stage. As many direct conversion receivers don't have any RF amplifier either, the only place where AGC is easily applied is in the high gain audio amplifier chain. This is notoriously difficult to do without causing noticable noise and distortion.

Superhet SSB and CW receivers can sample the signal from an audio stage after the product detector and then use the level of this signal to apply AGC to the IF and/or RF amplifier. This arrangement can be made to work very well [2]. This system is much less prone to the various pops, clicks and distortion which often afflict the simple DC receiver with audio AGC.

IF-derived AGC systems usually offer better dynamic performance than AF-derived systems. Audio-derived systems have a limited 'attack' time, especially if the received signal produces a relatively low frequency audio signal at the product detector, as is often encountered with SSB or low-pitch CW signals. The AGC attack and decay times are critically important for SSB and CW reception. The attack time is the period between the arrival of a strong signal and the application of AGC. The receiver will operate at close to maximum gain while receiving a weak DX signal. If a very strong signal appears on the same frequency, it may be necessary to reduce the receiver by a very large amount in a short time period - perhaps as much as 40-50dB of gain reduction will be required, typically in less than a couple of ms. To prevent the gain control system from tracking the modulation envelope of the received signal, most AGC systems have a relatively slow decay time. The ratio of attack time to decay time is typically about 1000:1.

The gain reduction during the attack period must happen without causing any noticeable distortion of the received signal. Obviously the band noise will be greatly reduced by the heavy application of AGC. This tends to be masked by the strong received signal that caused the AGC action. There are a number of problems that affect the operation of analogue AGC systems. Slow attack will cause a loud surge or click on the leading edge of strong signals. This is

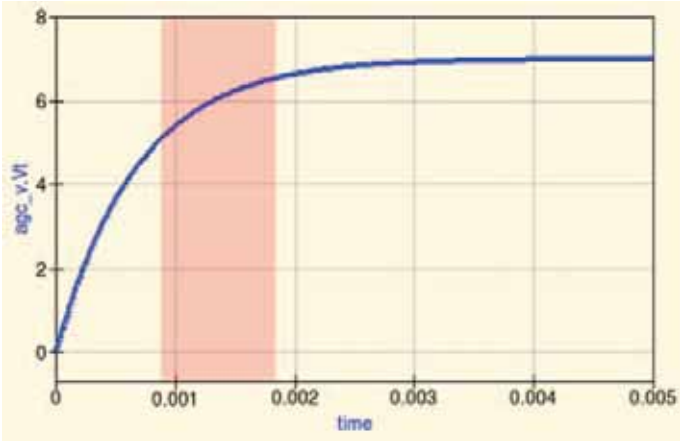


FIGURE 5: QUCS simulation of the AGC attack period, 1ms/div.

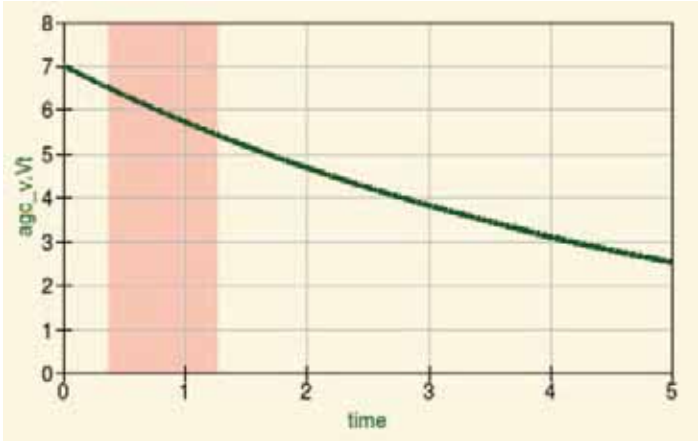


FIGURE 6: QUCS simulation of the AGC decay period, 1s/div.

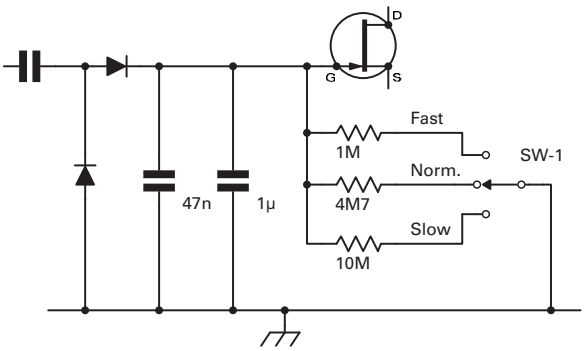


FIGURE 7: It's easy to add a switch for fast/normal/slow AGC.

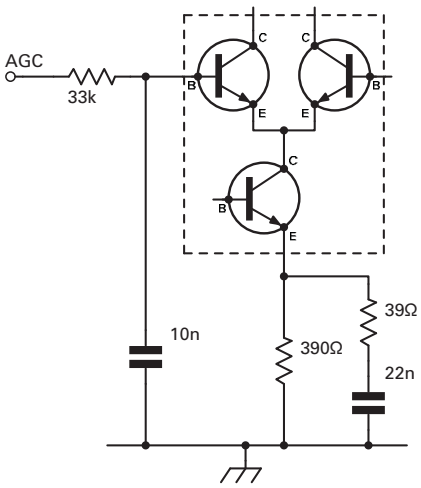


FIGURE 8: Modifications to the receiver IF stages to reduce the gain slightly.

particularly apparent on strong CW signals. Another common problem is AGC overshoot, where excessive gain reduction is applied. **Figure 2** shows a sample of a received signal with slight delay on the attack and some signs of overshoot. There is no perfect solution to these problems. Because of the time delay while the signal is propagating through the narrow IF or audio filter, it is not possible for the AGC to react to a strong signal until some time after it arrives at the receiver input. By this time, some of the later stages of the receiver may already have been driven into limiting. One partial solution is to use an entirely separate IF or AF amplifier for the AGC system – but this must have a greater bandwidth than the main IF or AF filters, so it will tend to respond to off-channel signals as well as the wanted signal. Most analogue receivers use just a single IF chain with carefully chosen time constants for the AGC attack and decay. **Figure 3** shows a simple audio-derived AGC system that I have used in several receiver projects. Receive audio is taken from the last audio stage before the AF gain control. The hot end of the AF gain pot is usually a convenient point from which to extract the audio signal. This signal is amplified by an opamp and then rectified to provide the DC signal used to generate the AGC control voltage. Because the opamp has a relatively low output impedance, the 2.2µF capacitor is charged very quickly when a strong signal is received. This provides the fast AGC attack time of a few ms. The FET is used as a DC buffer amplifier which has a very high input resistance. The RC network in the gate circuit of the FET has a time constant of several seconds. This provides a slow AGC decay time. The DC output at the source of the FET provides the AGC voltage and also drives the S-meter.

All of the superhet SSB/CW receivers that I have built in the past have used audio-derived AGC. I built several audio derived AGC systems for the LF/MF receiver. Most of them used FET-input opamps as precision rectifiers and DC buffers. All of them worked to some degree, one version worked very well, but not any better than the simple system described previously. You can find a sample of the audio derived system in operation here: http://tinyurl.com/y85kok4.

Just for a change, I decided to have a go at building an IF-derived AGC system. The new IF derived system consists of a two-stage 10.7MHz IF amplifier, which is followed by a voltage doubling rectifier and a FET DC buffer. The 10.7MHz amplifier input is connected to the 50Ω output of the receiver IF strip at the input to the product detector. The new 10.7MHz amplifier is a direct-coupled, two stage, common emitter type and in the presence of a strong received signal it produces several volts p-p of IF signal at the output. This amplifier is followed by a voltage doubling rectifier. The 1N5711 Schottky diodes have a lower forward voltage drop than the IN4148 diodes used in the earlier circuits. **Figure 4** shows the schematic of the AGC system. The RC network in the gate of the FET buffer has a time constant of just under five seconds. **Figure 5** shows a QUCS simulation of the attack period. The horizontal scale is 1ms/div. It takes less than 1ms to go from full gain to maximum attenuation. **Figure 6** shows the decay period. The horizontal scale of this plot is 1s/div. The transition from maximum attenuation to full gain takes about 1s.

AGC CIRCUIT CONSTRUCTION. The AGC unit is built on a strip of PCB. I used a pair of BC547 transistor in the 10.7MHz amplifier. The FET is a BF245C (Maplin N65AG). The 1µF capacitor is a Wimo plastic type. You can use a standard electrolytic instead provided that it has very low leakage. The S-meter is a 50µA SEW type. A 100µA or 200µA meter should also work in this circuit. **Photo 2** shows the finished AGC unit.

My own preference is for a very slow AGC decay. I don't like listening to rapid variations in background noise as the AGC operates. Other operators may prefer a faster AGC rate. **Figure 7** shows a simple way of providing a switchable fast/normal/slow AGC control.

TESTING. The AGC unit should be installed in a position that is not too close to the input of the main IF. Connect the AGC output to the receiver AGC line. Set the meter-zero adjustment to the mid position and the meter deflection adjustment pot to maximum resistance (minimum deflection). Once the unit is powered up, set the meter zero adjust with no aerial connected to the receiver.

The 1k pot at the AGC amplifier input should be set for best dynamic behaviour of the AGC system. I found a value of 100Ω was about optimum. I removed this pot from the finished circuit and replaced it with a fixed 100Ω resistor. The meter deflection pot should be set for almost full scale on a very strong broadcast station. There is some interaction between the zero and deflection adjustments, so you might have to repeat the meter adjustments several times. If you have a calibrated signal generator, you can use it to calibrate the meter scale. Otherwise, the best that you can do is to calibrate the meter for S9 on a moderately strong signal. A switchable step attenuator can be used for relative calibration, ie S9+10dB, +20dB, +30dB...

The AGC has performed very well in listening tests. Even very strong local signals are well controlled without any evidence of distortion, popping clicking etc. As mentioned last month, I found that the receiver had far too much gain for use at LF/MF. The total gain of the IF amplifiers is more than 100dB (20+40+40). The two audio stages have a combined gain of almost 80dB. Even when the losses of the various filters, passive mixers and attenuators are taken into account, the net receiver gain is around 150dB. This is enough gain to turn a sub-microvolt signal at the aerial into several volts at the speaker. I have made a couple of modifications to the IF amplifiers to reduce the gain to a more reasonable level. **Figure 8** shows the modifications to the IF stages. I have put a 39Ω resistor in series with the emitter bypass resistor of each IF amp. This reduces the gain of each stage to just under 30dB. I also increased the value of the resistors at the AGC input from 10k to 33k, which gives a slightly less sharp 'knee' in the AGC response curve.

Next month I'll take a closer look at the DDS local oscillator for the LF/MF receiver.

ERRATA: In the December 09 Homebrew, the electrolytic capacitors in the negative supply of the opamp in Figure 3 and Figure 5 are shown with the wrong polarity.

REFERENCES:

[1] TDA2003 10W car radio audio amplifier, ST 1998 - www.st.com
[2] Homebrew June 2006

Thinking Day on the Air

Join in the 2010 25th anniversary radio celebration with the special prefix GG100

Amy and Elizabeth, soon to be licensed. Photo courtesy Paul Lewis.

BACKGROUND. To celebrate 75 years of Guiding in 1985, some licensed Guiders from UK, Canada and Australia arranged a Thinking Day On The Air event to enable members speak to each other across the world. The event has continued through waxing and waning sunspot cycles and will celebrate 25 years of TDOTA during the centenary of Guiding in 2010.

Ofcom has granted Girlguiding UK stations the very special prefix of GG100, so listen out during 2010, and particularly during TDOTA weekend, 20/21 February. More information and a list of stations are on the website www.guides-on-the-air.co.uk. Also on the site are previous years' reports, an information pack, as well as a participation certificate and details of a badge to celebrate 25 years of TDOTA. Contact Liz, M0ACL, QTHR or e-mail liz@guides-on-the-air.co.uk if you need any further information.

TDOTA (Thinking Day on the Air) is an opportunity for the members of the Guide Association, from the youngest Rainbow to the oldest Trefoil Guild member, to talk to other members of the World Association of Girl Guides and Girl Scouts via amateur radio.

February 2009 was another very active TDOTA celebration; over thirty UK stations took to the air to give nearly one thousand members of Girlguiding UK an opportunity to use amateur radio. It was nice to have a number of stations on air for the first time this year, especially GB0SBG, St Brendan's Guides in Belfast, GS3BSQ for Aboyne Guides near Aberdeen and GB0GGR Girlguiding Renfrewshire, Greenock. All stations enjoyed the event so much that they plan to take part in 2010. The dates to look out for TDOTA stations are 20 and 21 February.

25 YEARS OF TDOTA. TDOTA began in 1985 to celebrate 75 years of Guiding in the UK, Canada, New Zealand and Australia, so next year the event will celebrate 25 years along with Guiding's centenary. During the past 25 years many stations have provided members with the opportunities to experience amateur radio as a form of communication for Thinking Day. GB0IHG, for example, has been providing First Highworth Guides with a station for at least 21 years, thanks to the organisational abilities of SWL Dick Humphries.

Here are extracts from some of this years station reports.

GB0GGR Girlguiding Renfrewshire. Eunice, MM3UVL enlisted the help of Greenock District Scout Amateur Radio club to organise the first TDOTA station for Girlguiding Greenock Division. Kathryn and Jenna, from 5th Gourock Guides helped with running the station as part of the training for their Foundation Licence. During the weekend the girls were taught the correct radio procedures and gained tips from operators in Australia and USA. Guides and Brownies sent Thinking Day greetings to other TDOTA stations across the UK and Canada. They contacted 20 countries across the world. Their most exciting contact was with Keith, VK2HBJ in Wagga Wagga, New South Wales, Australia.

Apart from sending greetings messages, the girls were offered Morse code, outdoor wide games using 2-way radios, learning the phonetic alphabet and then the Brownie Promise using the phonetic alphabet and sign language.

GS3BSQ/P Aboyne, Scotland. Thinking Day on the Air is a chance for girls to speak with people all over the world using amateur radio. For many it is their first experience of amateur radio and it is a great way to enthuse the next generation of licence holders! This year the Aboyne Guiders and Aberdeen Amateur Radio Society got together to take part in Thinking Day on the Air at the Scout/ Guide hut in Aboyne. About 10 members of the club turned out to help set up a G5RV antenna as an inverted V with a height of 21 feet dropping to 6 feet in a field adjacent to the hut. The station used a Kenwood TS2000 running 100 watts and a Yaesu VX-6 with 5 watts on 2m.

When the girls arrived, they had a go at writing their names in Morse Code and practised using a key attached to a Datong Morse Tutor. A lot of noise was made and some coped so well they quickly moved on to passing messages to each other. Everyone made a contact, illustrated a QSL card and many photos were taken of budding amateurs posing with the VX-6. The Guiders thanked the club for their time and expertise and the club thanked the Guiders for the lovely soup and sandwiches - a good day was had by all!

GB0IHG First Highworth Guides. This year they operated from the Church Room of St Michael's Church Highworth, Wiltshire, a 13th century, medieval church situated on a hill top blessed with a 24m (78ft 9in) high bell tower. The tower has a hole made by a cannon ball when it was used for target practice in the English Civil War. They suspended a sloping long wire antenna from the top of the tower, running over the churchyard and into the church room. The total length was 46m (150ft 11in).

They used an Icom IC756 PRO Mk1 transceiver and tuned the long wire via an old KW107 ATU. Plus they employed two 4ft earth stakes supplemented by quarter wave counterpoises for the 40 & 80 metre bands.

An old Heathkit SB610 monitor scope was included to make sure that the young ladies were generating a good RF output – some of them tend to speak very quietly. They employed the same audio system as last year with a separate amplifier and speaker, driven from the IC756 ACC I socket, to complete with the background noise. The IC756 audio amp was used separately to drive a pair of headphones for the operator. A Yaesu FT8900 was used to operate through the local UHF repeater, GB3TD, and they even had a try at using Echolink.

A simple wired intercom unit had been used prior to TDOTA, so that the girls could practice sending messages and the use of the phonetic alphabet. This equipment was home made to a design from an old JOTA publication.

Their logs show that they didn't work too many stations, but some of these were quite long contacts and all the young ladies passed their messages. Two of the contacts were made using CW (Morse code) to show how it is done. Everyone had a great time.

Liz and Fiona talking to Canada. Photo courtesy Paula Williams.

Kathryn and Jenna making a contact. Photo courtesy Eunice Lynch.

GX0CSR Caterham. After many years of JOTA and TDOTA, Caterham have developed a structured approach to their event. Brownies and Guides visiting for the first time work towards their Communication badges; second-time Guides assist the operators in running the station; third-time visitors starting to get the hang of amateur radio assist the other Brownies and Guides and they may then be interested enough to apply and join a amateur radio Foundation Course.

The morning was spent on 80m contacting TDOTA stations including GB0FHG Farnham Common, GB2FOX Lyndhurst New Forest, GB2SPX Norwich Norfolk, GB4SUN South Norwood South London, GB0HDG Horsham West Sussex and other stations in England.

At 1400 they moved to the 20m band and, after a contact with Helen, VA1YL and her Girl Guides in Nova Scotia, the HF station contacted other Guides on the Air Stations including CS0RCL 2/414 in South Portugal, VO1BZM Admiralty Museum Mount Pearl, Newfoundland, Canada. Other stations of note were W3CRA Collins Radio Association, Pennsylvania, HV0A Vatican City, and 8P9MD Barbados.

During their visit to the station Brownies and Guides also had to participate in one of the two discussion sessions covering propagation and radios, aerials, comparing different hand-held transceivers (including a very old 'brick' mobile phone) and a home made transmitter and receiver lead by John.

GB2FOX Foxlease, Hampshire. Brownies staying in the main house at Girlguiding UK's training centre in the New Forest had a fun-filled weekend and the chance to speak to Guides in Canada using the station arranged by Itchen Valley Amateur Radio Club. The Brownies and their leaders were able to learn the phonetic alphabet and use the knowledge to compose a message to pass onto others, and to complete a clause of their Communicator Badge. With their messages written they were then delighted to be able to pass them onto Helen, VA1YL and her Guides in Nova Scotia, Canada. During another session during the weekend, one Brownie had informed the instructor that they knew there were Brownies in other countries because 'she had spoken to Guides in Canada on the radio'. Brownies also produced their own QSL cards to send to the stations with whom they spoke – and have received some in return.

GUIDING CENTENARY GG100. From September 2009 to October 2010 Ofcom have agreed that stations celebrating the Guiding Centenary may apply for the very special prefix of GG100 for their station. Applications need to be accompanied by a letter of verification from an adult member of Girlguiding UK who will be part of the activity. TDOTA 2010 will be, as always, the third full weekend in February, which is 20th and 21st in 2010. So even if the solar conditions remain similar to this year with few sun spots, TDOTA stations should find lots of radio amateurs wanting to work our special calls.

If you or your club would like to offer to run a station for TDOTA 2010 on behalf of a Girlguiding UK group, contact Liz by e-mail at liz@guides-on-the-air.co.uk. Further information can be found of the website www.guides-on-the-air.co.uk.

Contesting at G6PZ

The G6PZ team for the CQWW SSB Contest: left to right front M0CLW, 2E0SQL, back M0DXR, G6PZ, G4DBL, G4MJS.

THE BEGINNING. The invitation to attend the Icom sponsored contest station at G6PZ was first extended during the May 2009 Dayton Hamfest. The idea was to visit the station during the IOTA contest weekend. Unfortunately, due to a variety of reasons, it wasn't practical to organise a visit. It was then decided to join the contest team for the CQWW SSB contest in late October to see what it is like when you have the equipment and operators to really take part.

ANTENNAS. The station is hosted at the QTH of Paul Beecham near Eastertown, Lympsham in Somerset. It is a great location, being only a mile or so from the Severn estuary on a plot that's over 3 acres. There are two 80ft towers with stacked SteppIR antennas for 20 through to 6m and a big MonstIR beam for 40 through to 6m. The third tower is a trailer tower and supports a 7-element Cushcraft X7 providing coverage for 20, 15 and 10m plus 40m with the add on. Following the CQWW SSB contest they now have a modified top-loaded Titanex V160 for Top Band with a DX Engineering receive 4-square. A 4 square is the main transmit aerial for 80m.

SHACK. The shack at G6PZ is a fantastic sight, all top line equipment, tuned to give maximum performance along with ease of use. Chris particularly noted the bandpass filtering arrangement. Because they operate two of the three radios simultaneously during the contests, interference could be a major problem for the group. So each radio has a bandpass filter that has been set up to automatically track the operating frequency of the radio as well as allowing for automatic selection of antennas, amplifiers etc. It's controlled by a TopTen Devices band decoder.

The rigs are two Icom IC-7700 radios that have been supplied by Icom as part of their sponsorship of the contest station. They join the IC-7800 that was already at the station. Each radio has an Acom 2000 auto-tune amplifier and uses the Win-Test logging software on all the Wi-Fi linked laptops. This means that each operator can see what the other station is doing at any particular moment, which can save any inadvertent rule infringements. Also an off-duty op can oversee the software on a separate laptop in partner mode and edit or adjust anything if necessary.

THE FIRST 24 HOURS. By Chris, G0DWV. When I arrived at about 3.30pm on the Friday afternoon I was greeted by Paul holding the four new phasing lines he had just made for the newly installed 80m 4 square. I thought that this was perhaps leaving it a little late in the day to be doing last minute tweaking – with only about eight hours to the contest – but that wasn't the half of it! We also had to crank up the main towers; luckily the stacked antenna tower had an electric winch and was up to height in just 5 minutes.

Paul went on to explain that he had used some 75Ω coax of unknown velocity factor and that it was affecting the performance of the new 4 square antenna. The vertical elements were also resonant a little too low in the 80m band for the SSB contest, so he was then about to change the lengths of each of the verticals too. As it was a cold dull afternoon we had little time to get this done before dark, let alone before the contest started.

Out in the paddock where the 4 square was positioned, the four 68ft verticals were in the laid 'over' position with the ground radial system (40 quarter-wave wires) laid on the grass at the base of each, each vertical being 66ft from the other. The first job was to raise each element vertically to check the resonant frequency on Paul's newly purchased RigExpert antenna analyser (bought the day before for this purpose, just don't tell his wife!).

Each vertical was raised in turn then lowered, adjusted, raised, checked, lowered, adjusted, raised, until all were at the same resonant frequency of 3.750MHz.

Each vertical was likely to interact with each other, so for checking, we had to leave them laid over after getting them adjusted. We probably raised and lowered each element three or four times before they were the same frequency. Two other members of the G6PZ team Peter, G4MJS and Simon, M0CLW arrived just as we had finished and raised each for the last time! So Peter and Simon were duly sent to raise the 40m MonstIR SteppIR on the manual winch tower as a punishment for being late. Raising that was really hard work.

The 4 square antenna elements are all connected in the centre to a clever hybrid switching and phasing box along with a dump dummy load. By switching the phasing of the elements, the array can be steered to give gain in four directions, greatly adding to the improvement of the wanted signals and the rejection of others. Everything at the centre was covered by an upturned plastic bin to keep out the rain that came down a little later.

FINAL TEAM TALK. The rest of team started to arrive and by 9.30pm all were chatting about recent changes to the equipment and giving lessons on how to drive it for the newcomers. At 10.30pm a team talk was needed to discuss and agree strategy for the forthcoming 48 hour event. Finally, the group held a minute silence in memory of the C6 contest team who died en route to the Bahamas for this contest. It wasn't only the G6PZ group that would notice them missing from the bands.

The format for the G6PZ entry is known as multisingle where one station (called the run) is on one band for a minimum of 10 minutes at a time, calling CQ, with the other (called the mult) station searches for multipliers on another band at the same time. The searching station must stay on a band for a minimum of 10 minutes too. This is where contest logging software comes into its own as it tracks how long the station has been on the band, again preventing rule violations as each ten minutes period only starts with the logging of a first QSO. Tactics depend on which band is open at which time, which operators are happiest in the thick of a pileup and which ones prefer the tactics of searching out multipliers. It's best to have a plan at the start, although the G6PZ team did admit that the plan is only good until the moment the contest starts and then things can change very quickly.

Peter, 2E0SQL at IC-7800 operating position.

Stacked 4 over 4 SteppIR's.

Paul, G6PZ at the IC-7800 operating position.

THE SECOND 24 HOURS. By Elaine, G4LFM. The contest station at G6PZ is always happy to welcome guest operators, especially new licensees who are keen on contesting. They are more than happy to help newcomers learn their way around the station by getting them on the air in the quieter moments to start with, building up to full contest operation as skill and confidence grows.

Chris, G0DWV has been taking part in contests for many years and was looking forward to joining the team for the first half of the event. On the other hand, it is a few years since I have taken part in contests – listening in and giving away a few points doesn't count – and I was interested to see how things have changed and what drives amateurs to want to take part.

Having joined the team on Saturday evening, the contest was in full swing. This was my first opportunity to see a state of the art station working in a contest. Each station ran very smoothly – which probably had a lot to do with the skill of the operators – with PTT floor switches, logging software and CQ loops on push buttons on the rigs. Antenna changeover was quick, as was tuning. Watching the stations change bands as conditions altered and change which station was calling CQ and working through the accumulated pile up was fascinating.

It's easy to see why contesting appeals to many younger amateurs coming into the hobby. It does seem to bring out the competitive spirit! But winning isn't the main goal – at least not with this group – they were more interested in challenging themselves to do better than last time, work more on a certain band than in a previous contest or increase the number of stations worked by an individual. The goals were as diverse as the operators. Sitting watching the operation showed me that different operators had different styles and that the skills needed for most efficient operation varied depending on conditions as well as whether the operating position was 'running' or 'search and pounce'.

Personally, I found the idea of 'running', especially when conditions were good, very daunting. Yet the 'search and pounce' technique had a lot that appealed. There is a challenge for every contact. Trying to make your signal heard through the masses requires stealth and cunning as well as listening to the DX station and determining whether they are working on a split frequency or working through the pile up by numbers. One of the biggest changes I noticed was the use of logging software. What a difference that has made to the speed and accuracy of contacts – although a knowledge of a computer keyboard is definitely an asset! Watching the cluster feed during the huge worldwide contest was also interesting. It gave the search and pounce station information about multipliers not yet worked and the difference when a DX station 'spotted' G6PZ was quite fascinating.

But the group are very keen to show that whilst they are efficient operators now, it wasn't always that way and they were encouraged to have a go and improve in the same way that they want to encourage other new contesters. They are happy to show other amateurs the ropes, help them learn about changing propagation, working pileups and exchanging contest details quickly and accurately.

For the G6PZ team, it isn't just taking part in the contest, they enjoy a social element too as only two operators are needed at any one time. Some members of the group were sleeping (a 48 hour contest takes its toll on the operators), others were catching up on news since the last contest and there were several debates about aspects of contesting and the hobby in general taking place at all hours of the day and night.

The CQWW contests, both SSB and CW, are huge undertakings by these big contest stations. They require a vast amount of work setting up whether that is antenna building or making sure all equipment is running smoothly; and requires a lot of man power to get through the 48 hours. For this contest, G6PZ had just six operators: Paul, G6PZ, Peter, 2E0SQL, Simon, M0CLW, Mark, M0DXR, Tim, G4DBL and Peter, G4MJS. I would like to thank them all for their company, they were very generous with their time despite being very busy with the contest and it shows how much they want to encourage other amateurs to have a go. Contesting will never be for everyone but if you do have an interest and would like to have the opportunity to operate a state of the art station, visit the G6PZ website (www.g6pz.com) and get in touch.

Paul, G6PZ raising the stacked 80ft tower.

One of the 80m 4 square elements showing the radial system and lowered element.

G6PZ and 2E0SQL working on the 4square hybrid coupler.

Sport Radio

Online submission of logs and winning ways in the CQ WW WPX RTTY contest.

The modest antennas that made G4DBW top G in one category of the 2009 CQ WW WPX RTTY contest.

BEHIND THE SCENES. RSGB contest participants already know that the system for submitting entries has changed dramatically in recent times. Here the man behind the software that the robot runs, Pete Lindsay, G4CLA, tells us about it.

"The number of entries for some of the RSGB contests was increasing, especially the contests made up of a series of events like the VHF UKACs and the 80m Club Championships. The Contest Committee was keen to try and maintain a fast turnaround for these events as it was felt that this was an important factor in their popularity. A lot of hard work had been done by Mike, G0GJV, to write some excellent software, which made the process of adjudication much faster and with much less effort. The problem was the amount of time taken up processing the incoming e-mails. The 80m CC contests alone required the adjudicator to send over 200 personal e-mail responses a week! For VHF the problem was even worse, as Roger, G4BVY, dealt with all incoming e-mails, which was turning into a full time job. Even after the e-mails had been read, sorted and filed it was found that a significant number of them had missing or incomplete information, many of them were for the wrong contest and others were formatted badly. Clearly a new entry system was needed and during 2008 the current entry robot was designed and implemented.

"A simple e-mail robot would have reduced the committee workload, but e-mails are notoriously unreliable. Not that many e-mails go missing on their way to the committee's server, but if the robot did find any problems and requested a re-send, the outgoing e-mails could easily get lost in SPAM bins, over-quota mailboxes, etc. Consequently the committee opted for a web-based system that would be able to give instant feedback to entrants about any problems found with a log and even be able to request missing information during the submission process. The system was then set up, using all the VHF contests as a trial. This involved creating a definition of each contest in a form that the robot could use to check the likes of multipliers, entry deadlines, contest specific rules, etc. The resultant XML contest definition file turned out to have some excellent other uses, including creating the contest calendar and is also now used by the adjudication software. Once the system was completed and the initial testing was done, Roger, G4BVY, performed the beta testing by using all the VHF logs received in the last two months of 2008. By January 2009 we were ready to go! Even though only a few weeks notice was given, almost all VHF entrants used the new robot and seemed to do so with no problems. With the VHF contests done, HF contests were then added, starting with the 80m CCs."

Next month, what the robot does when you submit a log.

WINNING WAYS. The 2010 running of the CQ WPX RTTY is this month, but you don't need a legal-limit station and beams at 100ft to come top in it. To demonstrate this, take the example of Bob Hammond, G4DBW, who was top G in the Single-Op Low-Power All-Band category of the 2009 CQ WW WPX RTTY Contest.

Bob described his first place in G in the Low Power Single Operator All bands section as "a very pleasant surprise" and adds "I hope my notes here might tempt others who want to try RTTY contesting to 'have a go' in a RTTY contest, where the rules give even modestly equipped UK stations a chance of a competitive score.

"I operate a station with limited space for antennas. I have a Comet H422 Vee dipole for 40-10m (see photo) and a 100ft bent doublet for 80m. Both are at only 25ft. The doublet causes TVI when I run 100W, so operation on 80m is limited to 10W maximum. My radio is the excellent Elecraft K3. On the computer side I use a 1.4GHz Pentium PC running the freely available N1MM logging software with MMTTY for the RTTY."

So how did Bob do it? "The first tip is to read the rules of the contest", he says. "The point scoring in this contest favours the low bands (80m and 40m). In fact, working a strange German prefix for a multiplier on 40m is worth more points than struggling in a pile up to work DX on 20m. Prefix multipliers count only once, irrespective of band slots worked.

"My strategy was to focus heavily on working 40m (where I have a reasonable antenna) and gather as many prefixes on this band as possible. I ventured up to 20m and 15m when conditions allowed and I could achieve a reasonable QSO rate. Operation on 80m with 10W was, frankly, limited to short periods calling S9+ EU and G stations.

"The next tip is to recognise your limitations and plan accordingly. With my set-up I was not going to be able to run stations on a busy band. I planned to tune up and down in 'search and pounce' mode for the vast majority of my QSOs.

"Third tip. The standard macros on N1MM need editing to achieve the best results. Short and repetitive calls giving your call, listening in between, seems to yield results. Long 'DE G4DBW G4DBW G4DBW' just slows things down and the big guns will often work other stations while you are still calling. The 'DE' I find just causes confusion. Short snappy reports such as 'DL4ABC TU 599 001 001 001 G4DBW' work best for me. The space

RSGB HF EVENTS

Date	Event	Times (UTC)	Mode(s)	Band(s)	Exchange
Feb 1	80m Club Championships	2000-2130	SSB	3.5	RS + SN
Feb 10	80m Club Championships	2000-2130	Data	3.5	RST + SN
Feb 13-14	1st 1.8MHz	2100-0100	CW	1.8	RST + SN + District
Feb 18	80m Club Championships	2000-2130	CW	3.5	RST + SN

RSGB VHF EVENTS

Date	Event	Times (UTC)	Mode(s)	Band(s)	Exchange
Feb 2	144MHz UKAC & Club Championship	2000-2230	All	144	RS(T) + SN + Locator
Feb 7	432MHz AFS	0900-1300	All	432	RS(T) + SN + Locator
Feb 9	432MHz UKAC	2000-2230	All	432	RS(T) + SN + Locator
Feb 16	UHF UKAC	2000-2230	All	1.3/2.3	RS(T) + SN + Locator
Feb 23	50MHz UKAC	2000-2230	All	50	RS(T) + SN + Locator
Feb 28	70MHz Cumulative #1	1000-1200	All	70	RS(T) + SN + Locator

BEST OF THE REST EVENTS

Date	Event	Times (UTC)	Mode(s)	Band(s)	Exchange (info)
Feb 13-14	CQ WW WPX RTTY	0000-2359	RTTY	3.5-28	RST + SN
Feb 13-14	PACC Contest	1200-1200	CW, SSB	1.8-28	RS(T) + SN (PAs send Province)
Feb 20-21	ARRL International DX	0000-2359	CW	1.8-28	RST + tx power (Ws send State, VEs Province)
Feb 26-28	CQ WW 160m SSB	2200-2200	SSB	1.8	RS +CQ Zone (Ws send State, VEs Province)
Feb 27-28	REF Contest	0600-1800	SSB	3.5-28	RS + SN (Fs send Dept number or o/seas prefix)

character between each serial number and callsign is important to correct corruption of characters on receive.

"My 670 QSOs with 355 multipliers gave me a total score of 834,605 points." The QSO distribution is shown in **Table 1**.

Of course there were other winners across the UK – G6PZ (operated by UT5UDX) in the Single-Op High-Power category (top in Europe), GW4SKA in the Single-Op High-Power Single-Band 7MHz category, G2YL in the Single-Op Low-Power Single-Band 14MHz category, MW0CRI in the Single-Op Low-Power All-Band category, GM5A in the Single-Op High-Power All-Band category, MI0M in the Single-Op Low-Power All-Band category and G6BOX in the Multi-Single category. Well done to all of them.

THIS MONTH'S EVENTS. HF-wise, February is mainly an 80m month. Contesting begins on Monday 1st with Club Championships. The sequence in which the modes are used is rotated every month, so this month its SSB first, Data second (on Wednesday 10th) and CW last (on Thursday 18th). This month it is often the case that the long skip propagation that gave stations in the far North an advantage in January is somewhat reduced. Sometimes this is only by a bit, sometimes a lot. The only other RSGB HF event is the First 1.8MHz Contest. This takes place on 13-14th. There should be plenty of UK and Continental European stations to work in this one, plus some longer DX if you have a sufficiently competitive station.

On VHF the 2010 UKACs continue, with 2m on the 2nd, 70cm on the 9th, 1.3/2.3GHz on the 16th and 6m on the 23rd. With only four Tuesdays in February, there's no 70MHz session this month.

On the morning of Sunday 7th February the 432MHz AFS contest takes place. This is a team event with a maximum of three members in each team, although clubs can enter more than one team. Clubs must be affiliated to RSGB to compete, but the members need not be RSGB members. However, if you want to submit an entry as a Single Operator, you do need to be an RSGB member. In 2007 and 2008 conditions for this event varied between disappointing and diabolical, but activity levels were similar to 2007. Fingers crossed! Although there is no 70MHz UKAC this month, February is not devoid of an RSGB 70MHz event because it ends with the first of this year's 70MHz Cumulatives on Sunday 28th. There will be four more Cumulatives in the series, the first next month. Last year the 70MHz Cumulatives all took place in January, February and March, so please note the change of dates.

Internationally, there are several major events this month. VERON (the Dutch National Society) PACC Contest takes place on 13-14 February. For non-Dutch entrants there are sections for various combinations of power level, mode and single- or multi-band. Send a report and serial number, but expect to receive a report and a 2-letter Province code. According to the rules, "…all (non-Dutch) participants who submit a valid log will receive a token of merit. First placed stations in each category per country or per call area… will receive a certificate."

The CQ WW WPX RTTY Contest takes place over the entire 48-hours of the weekend 13-14 February. This is one of the biggest RTTY events of the year. For single-op stations there are sections for low- and high-power (but not QRP), and single- and multi-band. For multi-op stations, its all-band and high-power only, with Multi-one for a single transmitter, Multi-two for two transmitters and Multi-multi for anything greater. Please bear in mind that Multi-multi stations send separate serial numbers per band, so you may receive a lower number when you work a multi-multi station on a second or subsequent band.

The CW leg of the ARRL International Contest takes place over the entire 48-hours of the weekend 20-21 February. There are sections for various power levels from QRP to QRO, single- and multi-op stations and single- and multi-band entries. Those outside of North America should work American and Canadian stations *only*. Send a signal report and your transmitter output power, but expect to receive a 2-letter State or 3-letter Province code.

The penultimate event of February is the CQ WW 160m SSB Contest on 26-28 February. The CW leg was held last month, so please refer to the January edition for further information.

The month ends with the SSB leg of the REF Contest on 27-28 February. Work French stations only. Unlike many international contests, there are only a few categories. Single-op stations can enter single- or multi-band, but for multi-op stations it's all-bands and a single-transmitter only. There are no separate categories for different power levels. Send a report and serial number, but expect to receive a report and a Department code (or prefix from French overseas territories).

TABLE 1: G4DBW's activity in CQ WW WPX RTTY 2009.

Band	QSOs	% time spent
80m	78	14
40m	379	52
20m	183	28
15m	48	6
10m	0	0

QRP

Catch up with the news from the Rishworth QRP Convention

Agnes, M3XYF building her Sudden receiver at the 2009 QRP Convention.

CONVENTION ROUND UP. The 2009 QRP Convention at Rishworth in West Yorkshire was declared a success by those who attended it last October. There was a fascinating range of stalls but with no commercial equipment. Where else could one buy a homemade Paraset, an Eddystone 358X or Litz wound plug-in coils? It was a Convention, not a rally, and as usual there was a fine line up of speakers: Rex Harper, W1REX, on his range of Picaxe kits, Ron Taylor, G4GXO, on the 70MHz SSB Eden Project transceiver, Ken Evans, W4DU, spoke on QRP in the USA and Hans Summers, G0UPL, introduced 'The Art of QRSS'. An Open Technical Forum with David Stockton, GM4ZNX, ran in one of the school laboratories. Steve Fletcher, G4GXL, webmaster of the American QRP ARCI, provided video streaming of the lectures. This was an experiment not announced in advance but gradually the word got around and by the end of the day about 200 people were watching the lectures online. It will be repeated next year with announcements before the day.

An exhibition of homemade QRP equipment, organised by Dom Baines, M1KTA, was impressive showing an amazing variety of projects from a rebuilt B2 Spy Set to a complete Pic-a-Star transceiver. Ian Keyser, G3ROO, operated his B2 from the physics lab. Also located in the physics lab was the convention's first attempt at a Buildathon. Twelve people, of all ages, built a Manhattan-style Sudden receiver under the guidance of a team of mentors led by the experienced Bath Buildathon team of Steve, G0FUW, Mike, G3VTO and Lewis, G4YTN. All 12 participants completed their Sudden and every Sudden received signals on 40 metres. The organisers are already talking about a possible Buildathon project for 2010 and another homemade equipment exhibition. The date for the convention in 2010 will be announced shortly.

THE 'SKY' 80m VALVE TRANSCEIVER. Of all the fine items of homemade equipment on display at the Rishworth QRP Convention one project that caught my eye was an 80 metre valve transceiver from Ian Keyser, G3ROO. Ian's description of the 'Sky Transceiver' reads:

"The whole idea started on the plane on the way back from the Friedrichshafen Ham Fair while talking to Alan, G3XAQ. I had, for some time, been thinking along the lines of rebuilding a valve transceiver that I built in the seventies but using 'battery' valves. Our discussions gave birth to a single band CW transceiver using 1970s technology. The IF and audio stages were constructed first to prove feasibility of using battery valves. The result was so successful I decided to launch into the rest of the project. It was to be experimental so there was no fancy layout; it was built ugly style and used printed circuit board as the chassis. The front end was built next. This is where the biggest surprise of the whole construction occurred: the stability of the VFO! Normal rugged construction was used but the big gain came in the lack of heat generated by the valve. The VFO is as good as any solid state VFO I have ever constructed.

"The whole receiver was finished within a week of the flight and the transmitter section was next. A mixer VFO was decided upon using a VFO at 450kHz and mixing with the receiver VFO. The output was fed to into a pass-band filter that had a trim control on the front panel. This fed a buffer amplifier and then into a 3D6 as the power amplifier valve. The valve I used from the junk box was from the first transmitter I ever built, a radio control transmitter in 1956! I got one watt of RF output, but the image was only 30dB down. A modification and inclusion of two relays brought the receiver RF stage into the transmitter path... now I had image a respectable 60dB down, providing the trim was accurately set. The 'Sky' has seen considerable use. During last year's G QRP Club Winter Sports several 80 metre QSOs were made with the USA."

THE MARCONI BASIC-7 TRANSCEIVER KIT. During the Dayton Hamvention in May of last year, I was approached by Seike Hidefumi (Hidy), a young Japanese man who had just produced his first QRP kit called The Marconi Basic-7 transceiver. Some time after my return home, Hidy sent me a kit to try. The Basic-7 is a no-frills direct conversion transceiver for 40 metres with the following specifications: RF power 1.5W (with 12 volts DC), variable crystal oscillator (VXO) tuned in the range 7.020 to 7.040MHz, RF attenuator, RIT, sidetone and full break-in. The kit comes with a good quality PCB and a pressed steel case (W:180 H:70 D:120mm). I found the kit was easy to build from a rather novel step by step pictorial manual. My finished Basic-7 put out a shade over 1.5W and did all one might expect from such a transceiver. The audio output was a little low for the built-in speaker but more than adequate for headphones. It would make a useful home built transceiver suitable for a less experienced constructor and an excellent introduction to QRP. Details can be had from www.marconi-japan.com (use the Google translator) or seike@marconi-japan.com.

ANTENTOP: A free antenna and amateur radio magazine. It is good to receive an unexpected gift. A the end of 2009 I received an envelope from Canada with Christmas and New Year greetings from Igor Grigorov, VA3ZNW, plus a CD about his e-magazine 'ANTENTOP'. Igor is a Russian born member of the G QRP Club now living in Canada; I remember Igor as RK3ZK. For some years Igor has run ANTENTOP as a free e-magazine devoted to amateur radio antennas with some radio construction items. Articles from all the issues of the magazine can be found in PDF format at www.antentop.org and in printed book form via www.lulu.com. ANTENTOP categories include an interesting variety of antennas and other sections including homebrew receivers and transmitters and QRP projects. All are downloadable free of charge, although there is an opportunity to make a donation to support the website. Whatever your amateur radio interest ANTENTOP is worth a visit and a browse.

The G3ROO Sky transceiver.

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bhi DSPKR

The DSPKR is the latest offering from the growing range of bhi noise reduction systems.

OVERVIEW. The DSPKR is a compact but very powerful noise reduction system and audio amplifier/speaker combination. Although principally designed for mobile environments, it can also be used very successfully in the shack.

IN THE BOX. No larger than a conventional external speaker box, the DSPKR is surprisingly compact for the range of included features. The box contained everything you need to get going, which is a pleasant change when ever more consumer products are being supplied without the vital connecting leads! The power connection uses a standard 2.1mm coaxial connector and a wire ended and fused lead was included in the pack. The audio connection to the rig was provided using a 2m lead terminated with a standard 3.5mm mono jack. The mounting arrangement was very substantial with a sturdy plastic bracket and a pair of knurled adjustment knobs.

In addition, the mounting bracket had substantial click stops so there was no chance that the unit's position would drift or slip in a high vibration mobile set-up. There was even a pair of screws included to complete the installation.

Also included was an 8-page printed manual. Although this was just stapled sheets of A4, it was good to have a printed manual to hand.

A PEEK INSIDE. A quick look inside the DSPKR reveals that it uses the bhi NEDSP1061 noise reduction module coupled to a powerful 10 watt amplifier and speaker. Noise reduction is achieved using a sophisticated surface mount digital signal processor (DSP) chip. This chip provides analogue to digital conversion and the FFT processing that's used to analyse the signal and reduce the noise. The DSP approach employed here analyses the signal to identify voice components. These are then allowed to pass unhindered whilst all other elements of the signal are suppressed. The process is fully adaptive, ie the DSP chip constantly monitors the incoming signal and automatically adjusts the noise reduction to match the prevailing conditions. From the operator's point of view, this is a real boon as once the desired level of reduction is selected, the DSP unit handles the rest.

INSTALLATION. The DSPKR's compact size and sturdy mount make installation straightforward and there was a wide range of adjustment from the mounting bracket.

The power requirement for the DSPKR was 10 to 16V DC at up to 2 amps so is ideal for mobile or fixed operation and can be taken from the same feed as that supplying the rig. If you want to use an external speaker or headset with the DSPKR there is a standard 3.5mm jack provided on the side panel. When you plug into this socket the internal speaker is automatically cut off.

OPERATION. Simplicity is the key with the DSPKR, which is great for its intended mobile environment where the last thing you would want is a bank of knobs/buttons to play with. Once connected up, all operations are controlled by a single push-button on the top panel. Despite its compact size, the DSPKR pumps out an incredible volume of punchy audio. This is helped by its small size as this naturally limits the low frequency response of the speaker.

Selection of the desired noise reduction setting is done using the single push-button on the top panel. On each press of the button the unit steps sequentially to the next highest noise reduction setting. Each press is accompanied by a beep from the speaker, which is useful to confirm the action. When you reach the highest setting the next press sounds two beeps and takes you back to the beginning, ie no noise reduction. You have a choice of either 4 or 7 step noise reduction settings and the switch between 4 or 7 is done by holding the function button pressed whilst powering up the unit. You can also set the unit to operate with just your preferred noise reduction setting. To do this you cycle through the noise reduction options as normal but then press and hold the function button when you reach the desired setting. The DSPKR emits a short beep to confirm selection and it's done. Now the function button operates as a simple toggle between your chosen setting and no noise reduction. This is particularly helpful for mobile operation.

The DSPKR is fitted with its own volume control on the top panel which saves having to alter the rig's main volume control. As with most accessories, getting the input level right is important and the DSPKR includes an audio level LED to aid this process. All you have to do is adjust the rig's volume so that the DSPKR's green LED is mainly on and you're done.

The DSPKR also has a handy power-saving sleep mode that kicks in if no audio is received after a pre-set period. In sleep mode the power consumption drops to mere microamps.

TABLE 1: Filter settings in 7-level mode

Noise Cancelling	Tone Reduction (dB)	White Noise Reduction (dB)
Off	none	none
1	4	9
2	5	11
3	6	13
4	8	15
5	16	17
6	21	20
7	25	24

TABLE 2: Filter settings in 4-level mode

Noise Cancelling	Tone Reduction (dB)	White Noise Reduction (dB)
Off	none	none
1	4	9
2	6	13
3	16	17
4	21	24

IN USE. First test was a look at the busy 80m band with the DSPKR set for the 8-step noise reduction mode. I could hear a difference for each step as I cycled through the range but settings 4 and 5 seemed to be best for this band. At the time of listening, the band was very noisy with signals piled on top of each other. The DSPKR did well to provide some improvement as much of the interference was from other speech-band signals so this is not the best way to see a benefit from this type of noise reduction unit. I then moved on to Top Band and here the situation was very different with an assortment of weak signals that were buried in general noise. In this situation the DSPKR did extremely well and the noise reduction was particularly noticeable and really helped to pull some signals out of the noise. The situation was very similar on the higher frequency bands and the DSPKR consistently did well when the desired signal was affected by general noise. In the vast majority of cases I found that settings between 4 and 6 gave the best results. The maximum noise reduction setting produced a quite different result to most of the others with more audible processing artefacts such as robotic sounding speech and a watery background noise – a bit like being in the bathroom with a leaky tap! However, even this setting could be useful at times but I found I needed to spend some time getting used to its 'sound'. I found the high setting useful when listening to a

reasonably strong QSO when the maximum setting could be used to eradicate virtually all the noise to give a particularly clean signal. This was helpful when listening for longer periods, eg an 80m ragchew! When you use the high setting with a strong signal, the watery artefacts disappear and you're left with clean audio with just a minor touch of robotic speech. The provision of a headphone/external speaker socket was useful but you do need to watch the volume levels when using headphones as there's a lot of power available from this socket, but no limiter. The socket was also wired as a 3.5mm mono so your stereo headphones will only reproduce through one earpiece.

SUMMARY. bhi have a proven pedigree in noise reduction and the DSPKR builds on this to deliver a particularly compact and powerful unit that works well in both mobile and base station applications. The very simple single button operation worked well and the facility to store your favourite setting helped make operation of the DSPKR a real breeze. Noise reduction performance was excellent with useful improvements available over a wide range of listening conditions. The noise reduction settings were particularly well chosen and all were usable under the appropriate conditions.

RRP is £154.95 including VAT and the unit is available from bhi Ltd on 01444 870333 or any of their authorised dealers.

EMC

Powerline Ethernet Adaptors - how well does 'notching' of amateur bands work in practice?

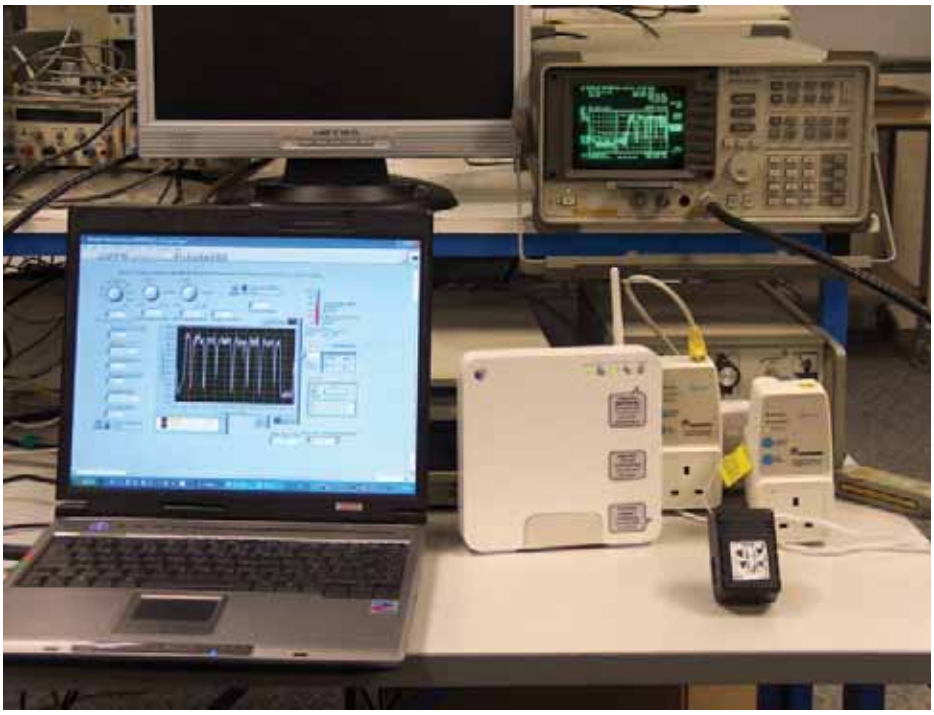

PHOTO 1: EMC Testing a pair of Comtrend PG902 Powerline Ethernet Adaptors (PLA) and a BT Home Hub power supply unit.

THE PLA THREAT. Much has been written about Powerline Ethernet Adaptors (PLAs) and in the January 2010 *RadCom*, the RSGB Spectrum Defence Fund was announced. Its purpose is to challenge Ofcom over its interpretation of the various Acts and Directives that cover PLA/PLT and the threat these pose to the HF radio spectrum.

Meanwhile, the RSGB EMC Committee has done further technical investigations into interference emissions from PLAs. As shown in the February 2009 EMC column, these inject RF signals into the mains supply, typically from 2 - 26.5MHz with 'notches' to reduce the emissions in international amateur radio bands, although not in the 5MHz experimental band. Over most of the HF spectrum outside the amateur band 'notches', the emission levels are far in excess of EN55022 Class B conducted emission limits. The potential for interference to HF broadcasting and other services has been widely reported. Inside the amateur band 'notches', the emission levels are reduced substantially, normally below the EN55022 Class B conducted emission limits. Nevertheless, the EMC Committee has been investigating reports of PLAs where the 'notching' appears to be less effective than expected, leading to increased levels of interference in amateur bands.

NOTCH FILLING. If PLAs have been CE marked by means of an EMC Assessment then it could be argued that this should take account of the actual operating environment of a PLA connected to a mains network rather than under laboratory conditions. In particular, non-linear loads connected to the mains close to a PLA could generate intermodulation products, leading to partial 'notch filling'. RSGB EMC Committee member Richard, G3SBA has been investigating this. Richard designed a representative rectifying load similar to **Figure 1**. It is simply a bridge rectifier with four fast recovery diodes, a small smoothing capacitor C1 and a resistive load R2. A 4.7Ω surge limiting resistor R1 has been added. The load current of 11mA RMS is typical of a small plug-in switch-mode power supply that consumes about 2.6W. Due to the relatively small capacitor, the diodes conduct for most of the mains cycle but relatively large conduction angles are not unusual in modern switch-mode power supplies that include so-called 'power factor correction'.

Photo 1 shows a pair of Comtrend PG902 PLAs on test. The PLA on the right is the local PLA connected directly to the Line Impedance Stabilisation Network (LISN) and the emission measurement is primarily from the right hand PLA. The PLA on the left is connected to the LISN via a mains network that introduces 20dB attenuation at RF to simulate a remote PLA in another room. Hence the remote PLA on the left only makes a small contribution to the measured emission. The local and remote PLAs are communicating but no data is being sent. Measurements were made at 400 spot frequencies with a 9kHz measurement bandwidth and a Quasi-Peak (QP) detector. The results are shown in **Figure 2**, with the EN55022 Class B QP limit shown for comparison. As this test uses pre-compliance test equipment, it should only be taken as an approximate indication of the conducted emission spectrum and its level.

The blue curve in Figure 2 is with no non-linear loads on the mains. Due to the frequency step size, the narrower notches such as 10MHz, 18MHz and 24MHz amateur bands may not be shown with their full depth but all are at least 30dB deep and some are over 40dB deep at the centre.

The red curve in Figure 2 shows the effect of connecting the rectifier shown in Figure 1 to an adjacent mains socket. It can be seen that the depth of the 3.5, 14, 18, 21, 24 and 28MHz notches is reduced to about 20dB. There is also a significant increase in out-of-band 'splatter' with a peak amplitude that is significantly higher than the QP level. The increase in emissions in the range 0.5 - 2MHz includes the 1.8MHz amateur band and the MF broadcast band. There are also increased emissions above 27MHz that could affect the 28MHz and 50MHz amateur bands, although the emissions above 30MHz are not shown in Figure 2. The rectifying mains load in Figure 1 may be near the 'worst case' for generating intermodulation products when plugged in near a PLA but it shows the effect that low power rectifying mains loads can cause.

A small plug-in switch-mode mains PSU for a BT Home Hub version 1.5 was also tested to see what happens if it is plugged in next to a Comtrend PG902 PLA. These devices are often used together in BT Vision installations. The PSU was later dismantled and it was found that the rectifier part was similar to Figure 1, apart from a larger smoothing capacitor and different diodes. The mains goes straight into the bridge rectifier via a 5.6Ω resistor and the RF interference filtering is after the rectifier. This means that RF signals from a nearby PLA can get straight into the bridge rectifier and any intermodulation products generated by the bridge rectifier can get straight out again, onto the mains.

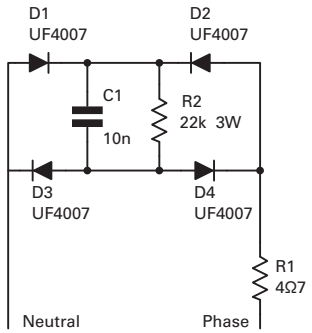

FIGURE 1: A representative low power rectifying mains load that causes partial 'notch filling' in nearby PLAs.

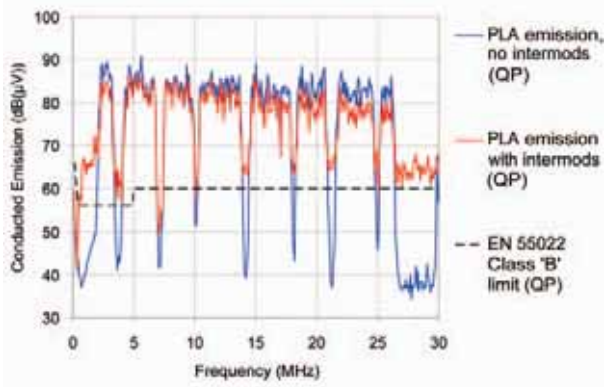

FIGURE 2: Conducted emission spectra from the PLAs shown in Photo 1. The blue curve is with no rectifying loads on the mains. The red curve is with the rectifier shown in Figure 1 connected across the mains.

Some tests were also performed with one Comtrend PG902 PLA on its own. This may be a 'worst case' situation where it is constantly 'calling CQ' and searching for another PLA but it may also be representative of the case where two PLAs are plugged in close together, as sometimes happens. In either case, the QP level of the intermodulation products is higher than the results shown in Figure 2 (where a local PLA is communicating with a remote PLA). At a spot frequency of 14.182MHz, inside the 14MHz 'notch', the QP emission levels for one PLA on its own were as follows:

No rectifying load, 44dB(μV)
With BT Home Hub PSU on load, 60dB(μV)
With BT Home Hub PSU off load, 65dB(μV)
With rectifier shown in Figure 1, 73dB(μV)

The 14MHz notch is quite deep and goes well below the EN55022 Class B limit of 60dB(μV) QP but in this situation, it was found that a BT Home Hub PSU on load can bring the level up to the limit. It was found that a BT Home Hub PSU that is disconnected from its Home Hub can generate intermods that are about 5dB over the limit. The BT Home Hub PSU on its own is relatively quiet in the HF bands so the above emissions appear to be caused by the rectifier of the PSU generating intermodulation products from the PLA signals.

A charger for a Blackberry® mobile phone was also tested and it also generated intermod products, particularly when off-load, although these were about 2dB less than the BT Home Hub PSU when off-load. Clearly there are many different types of switch-mode power supply that can be plugged in to the mains and some of these may cause significantly more intermodulation than the two types mentioned above.

It is therefore concluded that the amateur band 'notches' in PLA emission spectra are somewhat 'fragile' and are susceptible to partial 'filling in' due to nearby non-linear loads on the mains. These include bridge rectifiers in low power switch-mode power supplies such as BT Home Hub power supplies and mobile phone chargers, particularly if these devices are plugged into the mains with no load connected. This adds weight to the case against PLAs, as it shows that interference emissions in the 'notched' amateur bands in a real-world installation can be significantly higher than under laboratory test conditions.

I would be very interested to hear from any members who have suffered from interference from a BT Vision installation in amateur bands, particularly if the depth of the notches in the amateur bands appears to be less than expected.

GIGABIT POWERLINE NETWORKING. Powerline Ethernet Adaptors (PLAs) that claim 'raw' data rates of up to 1000Mb/s are now available. These are aimed at distributing high definition digital TV signals around the home and may use frequencies up into low VHF. The EMC Committee has a pair of these and is testing them. It is intended to publish results in a future EMC Column.

TV LICENCE CONDITIONS. There was an item in the December 2009 *EMC* on Ofcom's use (or non-use) of its powers under Section 366 of the Communications Act to enforce the TV Licence non-interference condition by acting (or not) against TV equipment that causes radio interference. Andrew, G4VFL sent a link to an item on the BBC News website (see Websearch). This is about a case in Bedfordshire where a TV aerial amplifier was oscillating and causing interference to VHF air traffic control radio communications for aircraft approaching Luton Airport. Ofcom engineers traced the source and asked the owner of the offending amplifier to dispose of it, which he did. Clearly this was interference to a 'safety of life' service that was given high priority and this case was settled by voluntary agreement but it raises the question of what powers Ofcom would use in cases where voluntary agreement fails. It seems that Ofcom is reluctant to admit to having any such powers.

In the case of interference to amateur radio reception caused by TV equipment such as plasma TV sets, if the case cannot be settled by voluntary agreement then Ofcom should have the same powers as for other radio services even if amateur radio cases are given a lower priority. The EMC Committee is continuing to seek clarification on this matter.

WIRELESS CHARGERS. The Wireless Power Consortium claims to be setting the standard for interoperable wireless charging (see Websearch). That means a standardised way of charging portable consumer products such as mobile phones or rechargeable torches. An item was included in a previous EMC column about wireless power transmission using radio frequencies but it seemed rather improbable that it would ever catch on due to low efficiency and high magnetic field strengths that would be significant compared to biological exposure limits.

Nevertheless, the Wireless Power Consortium has produced a draft specification but it seems that in order to obtain a copy, or submit a comment, it would be necessary to join WPC as an associate member. This costs €10,000 per year. If such products are to be marketed then WPC would need to show EMC compliance. In addition to radiated emissions, wireless chargers using RF are likely to produce conducted emissions via the mains supply. If this leads to a request for a relaxation in EMC conducted emission standards, the RSGB EMC Committee would be involved via the national and international EMC standards-making process.

LOW VOLTAGE LIGHTING. John, G3WTO found a source of interference installed in his flat. The bathroom was fitted with 12V 20W down lighters manufactured by RING in Leeds. These were powered by a switch mode power supply that was built in to the ceiling void. As the power supply was not obvious and only came on when these lights were switched on, it was a source of S9+ noise on the 3.5MHz band that was difficult to track down.

Some types of so-called 'electronic transformers' for 12 volt halogen spotlights are a known source radio interference. They power the lamps via unscreened cable with an AC waveform at typically 40kHz that may have harmonics to 3.5MHz and above. Clues to look out for are a source of interference that is only present when a light can be seen in a particular room, possibly in a neighbour's house.

WEBSEARCH

Wireless Power Consortium:
www.wirelesspowerconsortium.com

BBC News item on interference from TV to aircraft:
http://news.bbc.co.uk/1/hi/england/beds/bucks/herts/8327549.stm

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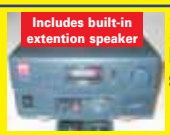

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Blue tooth adapter £79.99

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

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Japanees quality made product

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"We've sold 100s all over Europe"

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

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80-10m & only 19.2m long! (Up to 1.2kW) Includes 1:1 Balun. Bargain. Superb Japanese quality antenna system. **£159.99**

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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

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All bracket measurements are from wall to end of bracket

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Start Here

Working split and working by the numbers

YOU'RE NEVER ALONE. Sometimes when you tune across HF, bands you come across stations seemingly talking to themselves, occasionally saying "Up 5 to 10" or just "Up". Even more oddly, you may have come across stations that ask for "Number 1 only". In this article, we explore the ideas and practicalities behind working split frequency and working by numbers.

Before we begin, we should emphasise that working split frequency and working by numbers are mainly tools used by special event or rare stations in order to manage the hordes of eager amateurs waiting to contact them. For this reason, these techniques are primarily found on the HF bands and sometimes on 50MHz when conditions are really good. However, knowing how these techniques work is not just for those in rare locations. By understanding them, you can make your contacts with greater ease and less frustration.

WORKING SPLIT FREQUENCY. From time to time, a station may experience too many stations calling all at once. This makes it harder to pick out callsigns and lowers the number of contacts. By working split frequency, the station hopes to spread the number of callers over a slightly larger piece of the band and, at the same time, keep their own frequency clear for their transmissions only. This has the effect that the callers should all be able to hear the rare station (DX) and only transmit when asked. The DX station can then tune up and down across the crowd of callers, trying to pick out a clear callsign quickly and maintain a high rate of contacts.

Let's consider operation from the DX end first so that we understand the concept before looking at how to work a split frequency station. If you consider yourself to be sufficiently rare to use split frequency, take time in advance to find a clear space to call and listen. Please don't assume that other stations will move when you have a few callers or that you can steadily progress up the band as more and more stations call. If you find yourself needing to operate split frequency, take a quick, good listen across the range of frequencies you'll be using and be prepared to keep the callers well under control!

Ideally, you should aim to keep your callers only a few kilohertz away from you, using the smallest chunk of frequencies required to manage them. Normally, for voice, this means starting two or three kilohertz either up or down from your frequency (up is more common) and perhaps spreading out a further 5kHz (see **Figure 1**). Since Morse and data modes require less space, the split is often closer to your frequency and perhaps only one or two kilohertz wide, yet this fits in roughly the same number of stations.

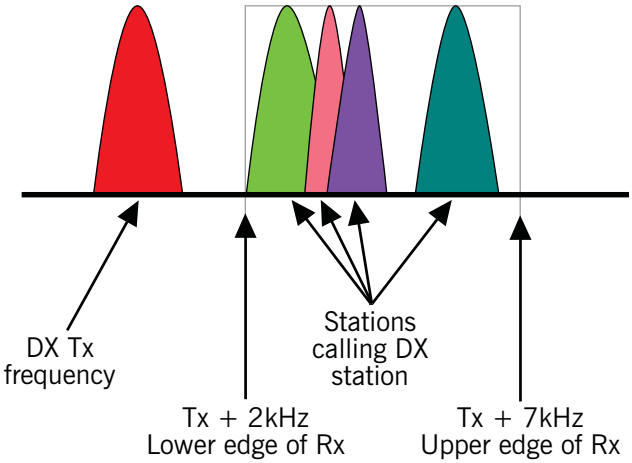

FIGURE 1: When working split, the DX station keeps to a single frequency while the 'herd' calls back over a defined, separate frequency range.

When working split, it is vital that you tell your callers who you are and where you are listening. Even more important is doing this regularly! Not everyone is following the DX cluster for information and having people ask for your callsign or transmitting on your frequency (since they didn't know you're working split) only serves to slow you down. A good operator will announce regularly, perhaps every two or three calls, something like "Mike five Fox Uniform November, up two to five kilohertz" or in Morse, "M5FUN UP 1". Here UP 1 generally means call across a small range of frequencies centred around one kilohertz up from the DX.

MANAGING THE PILE-UP. Once you've set your radio to receive on one frequency and transmit on another, you need to manage the callers. This involves making it easy for them to contact you by being somewhat predictable. If you sit on one frequency within the split range, within a short while this will be common knowledge among the callers and all you have done is shift the mass of callers a few kilohertz. However, if you steadily tune from top to bottom of the split, the callers spread out across the whole range and you can distinguish them a lot easier. This is just one way of finding callers in the range. It's up to the individual to find what works best for them.

FROM THE OTHER END. Now that we know how split works, how can we effectively work someone who's using split? This requires a bit of patience and listening. First, you must find out the callsign of the DX and where they're listening. Then, set your radio to transmit on a somewhat clear frequency where the DX is listening, while listening to the frequency the DX is transmitting. When the DX says "QRZ" or similar, give your full callsign once in phonetics. After a few calls (or a few hours for really rare DX!) you should hopefully make the contact.

It's important to keep in time with the DX. Dropping your callsign in once or twice when asked means that you shouldn't miss the DX coming back to you. A good DX station is able to work split fairly fast and will find stations in the clear quickly, so be prepared to listen on your transmit frequency and move it to somewhere clearer. Then, be ready for the DX to reply to you!

DOING IT BY NUMBERS. Having mastered split, let's consider working by numbers. This is perhaps more common for less rare stations. Generally, you transmit and receive on the same frequency. The idea consists of thinning out the callers by asking only for stations with a particular number in their callsign. Once you have worked a few stations with zero in the callsign, you go on to the next number and cycle round when needed. This can be effective but is often unfair if you take too long to go between numbers – waiting half an hour or more is not uncommon. For those of you lucky enough to have two numbers in your callsign, you get two goes at calling the station. For example, 2E0ATF can call on two and zero.

Working either split or by numbers requires discipline on both sides of the contact. Making an exception by working someone calling outside the split or out of turn for the number asked for will inevitably lead to chaos. There are advantages and disadvantages to both techniques and this article only scratches the surface. Many of the tricks can be picked up by being on the air and taking part or by asking at your local club. Hope to see you in the pileups!

RSGB shop

RSGB Yearbook 2010

Edited by Steve White, G3ZVW

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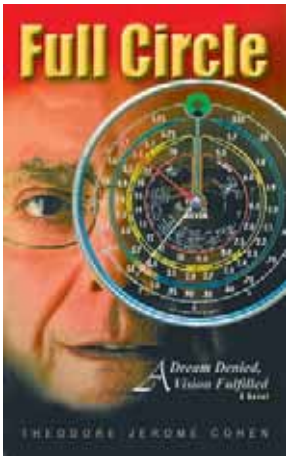
Book review

Two very different books: a charming novel and a fascinating historical work



Full Circle

Theodore Jerome Cohen

This is an unusual novel as it's based on real events in the author's life. The story probably starts in the 1940s and ends around 2006 or so. As a young man, Teddy became interested in amateur radio and goes through the same dilemmas that many people have – what interests to spend time on. He is a talented musician and has to decide between a future in music (the choice of his father) and a future in electronics. The story charts his life from his early music lessons through his choice of career to his retirement. It's a charming story that reflects things that happen to many people through their lives and many readers will identify with different parts of the story. His amateur radio interest brings him in touch with some very colourful people and the author goes to great lengths not to be too technical with his descriptions. You do learn some interesting facts about the equipment he built and some of the stations he contacted. Without giving too much away, the story does go 'full circle' and the main character, Teddy, does end up fulfilling part of his father's dream.

I finished the story wishing wholeheartedly that it had been an autobiography! But the author is careful to point out that although it depicts actual events and people in his life, some of the situations are fictional. So, as a novel, it is a very enjoyable read as you follow this young man through his two interests of music and electronics until he, finally, finds the time to fit both into his life.

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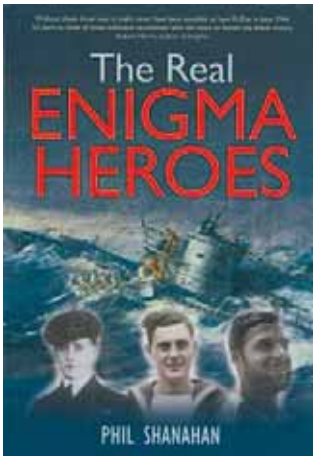

The Real ENIGMA Heroes

Phil Shanahan

Since first reading about the Enigma machine many years ago I have found all aspects of this period of history fascinating. But it is, perhaps, the people that make the Enigma story come alive. There are tales of genius from the codebreakers themselves, stories of stoicism from the Y station operators who often worked in very bleak places and great heroism from those that risked their lives obtaining information about the Enigma. This book concentrates on three of the latter heroes: Colin Crazier and Tony Fasson who died capturing code books from a U-boat and Tommy Brown who died two year later.

The author of the book is the deputy editor and first heard about Able Seaman Colin Crazier, a local man, in 1998. As he researched the story it became apparent that he was an uncelebrated hero – as were others on *HMS Petard*. This book follows the campaign to get these men recognised for their contribution to the outcome of the war. It tells the story of how having drawn alongside the sinking submarine, Colin and Tony Fasson swam across and climbed aboard. They passed the codebooks up to Tommy Brown, who had lied about his age to join the Navy and was just 16 years old. Tommy was also a canteen assistant and shouldn't have been involved with the German submarine either. Tragically, the two men died having handed the books over as the submarine sunk very rapidly. Tommy was rescued, with the code books, but died a couple of years later in a fire.

At the time, the men were awarded the George Cross, posthumously, or in Tommy's case the George Medal. But that was where the story ended until 1998 when it surfaced again.

The details of the research and what it uncovered is gripping reading as you study first hand reports of the event from those who served on *HMS Petard* at the time. The story of how Phil Shanahan campaigned for their recognition reveals a tireless effort and a passion for the subject that makes the book difficult to put down. There are wonderful photographs of the characters involved and of documents relating to the incident as well as anecdotal entries from family and friends.

If you have an interest in history, you'll find this book a welcome addition to your collection.

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In Practice

Turning our attention to supply rail decoupling

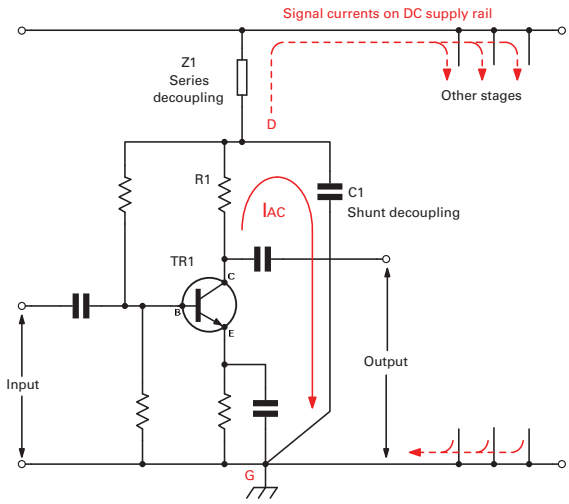

FIGURE 1: The decoupling components C1 and Z1 work together to return I_{AC} to the ground point G, and keep stray currents off the DC supply rail.

Q: In the October 2009 column you said, "Supply rail decoupling can be a tricky subject." Can you expand on that?

A: Figure 1 recalls Figure 1 from the October article, and shows a transistor AF amplifier that develops its output voltage across the collector load resistor R1. An essential feature of this circuit is the decoupling capacitor C1, connected between the DC supply end of the load (point D) and this stage's local 'ground' point G. In RF circuits the collector load would usually be a tuned circuit or some kind of RF transformer and, of course, the active device could also be a FET or a valve; but in every case, the circuit needs a decoupling capacitor from D to G.

The decoupling capacitor is often described as ensuring that the signal-frequency voltage at point D is zero. However, we can see much more by following the fate of the *currents* instead. The signal-frequency current I_{AC} flows from TR1, through the load resistor to point D. Then the function of C1 is to return I_{AC} directly to G, and back to TR1 in a tight loop. We don't want any signal current to escape onto the DC supply rail, for as shown in Figure 1, these currents will find their way back to G through the decoupling capacitors of other stages. In RF equipment, this unwanted coupling between stages can cause spurious transmitted signals and is a prolific source of spurious responses ('birdies') in receivers.

I_{AC} will divide itself between the wanted and unwanted pathways according to the dictates of Ohm's Law. The designer's job is to herd the current in the right direction by making the shunt impedance of C1 as low as possible and the series impedance Z1 as high as possible. That means there isn't just one decoupling component: there are always *two*, working together. The design rule is therefore to make the ratio of $(Z1/Z_{C1})$ much greater than 1, see **[2]**. In a transmitter or receiver it can be quite difficult to achieve good decoupling at all relevant frequencies. Digital circuits are worst of all, because variable pulse sequences with fast edges can contain energy at all frequencies from AF to UHF simultaneously.

The rest of this article will focus on the decoupling capacitors, but don't ever forget the series impedance Z1. In low-level stages, Z1 can often be a resistor of about 100Ω; at a DC current of typically 10mA, the drop in supply voltage through 100Ω will only be about 1V, which is usually acceptable. In higher-level RF stages, use an RF choke to reduce the voltage drop while still creating a high impedance at signal frequency. The March and July 2007 columns had more details about selecting RF chokes.

THE RIGHT CAPACITORS. One of the well-known pitfalls of RF decoupling is using the 'wrong' types of capacitors… but technologies change, so maybe it's time to revisit that topic with some measured data. Each performance plot includes a small photo of the capacitors in question, beginning with **Figure 2** which compares the performance of 10nF and 100nF multilayer ceramic capacitors. All of these graphs plot the measured values of series resistance Rs and series reactance Xs, from about 100kHz to 50MHz. Rs uses the left-hand Y axis and is always close to 0Ω at the bottom of the chart. Xs uses the right-hand Y axis, which has 0Ω half-way up the scale to allow plotting of either negative or positive values.

The 10nF ceramic capacitor (red traces with Xs above, Rs below) shows very typical behaviour. At very low frequencies Xs is always negative, as you'd expect from a capacitor by definition, and the value is close to what you'd calculate from $X_C = 1/(2\pi fC)$. At higher frequencies, that formula would predict that Xs would come closer and closer to the 0Ω line while always remaining negative because it's a capacitor. But in reality, Xs crosses through the zero line at 19.7MHz, becomes *positive* and then continues to rise. In other words, this 'capacitor' is now behaving as an inductor! Meanwhile Rs bumps along at a fairly consistent value of about 0.3Ω.

Figure 3a explains this behaviour: as well as the internal loss resistance Rs, this 10nF capacitor also has a small amount of series inductance Ls. At low frequencies the reactance of Ls is small, but at higher frequencies Ls becomes increasingly dominant. We can calculate Ls by plugging 10nF and 19.7MHz into the usual formula $f = 1/2\pi\sqrt{(LC)}$ and the answer is about 6.5nH. A few nanohenries of internal inductance is very typical of these small multilayer ceramic capacitors. Although Figure 3a is only an abstract circuit model, it can explain the capacitor's real-life performance with surprising accuracy **[3]**.

It's perfectly OK for a decoupling capacitor to have inductive reactance – what matters is that the overall series impedance Z_C remains *small* in magnitude. Around the series resonant frequency, Ls actually helps the capacitor to perform better because the two opposing

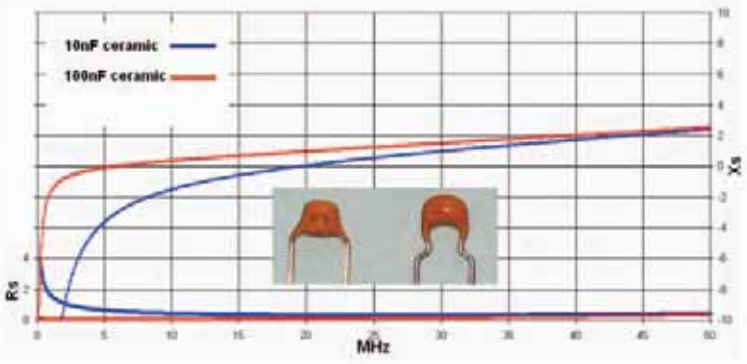

FIGURE 2: Measured performance of 10nF and 100nF ceramic capacitors.

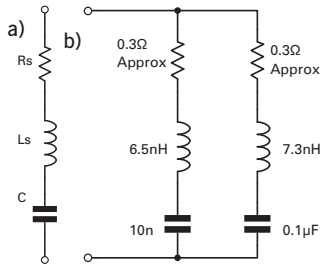

FIGURE 3: (a) Model of a 10nF capacitor with series inductance and loss resistance; (b) 10nF and 100nF capacitors in parallel.

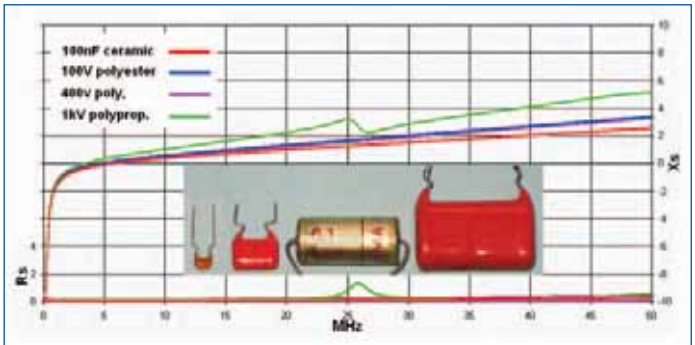

FIGURE 4: Four different 100nF capacitors compared.

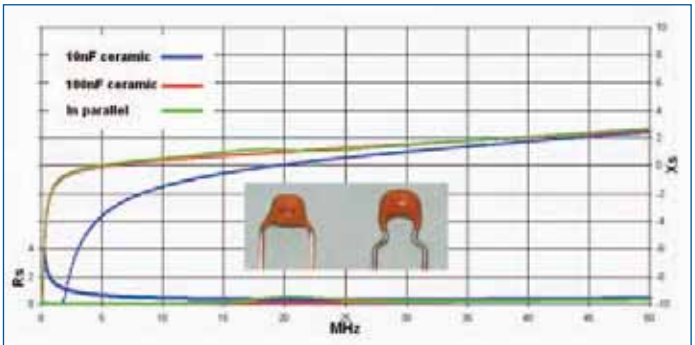

FIGURE 5: 10nF and 100nF ceramic capacitors, separately and in parallel.

reactances cancel; but above the series resonance, the net impedance Z_C will *increase* with frequency so the decoupling performance will get progressively *worse*. Higher-value capacitors have a lower impedance at lower frequencies; but the wrong types of capacitor can also have a high series inductance which makes them ineffective for decoupling at higher frequencies.

The blue traces in Figure 2 are for the 100nF ceramic capacitor. As we'd expect, the low-frequency capacitive reactance is about 10 times lower than that of the 10nF capacitor. The series resonance has moved down to 5.9MHz, so Ls for this capacitor is about 7.3nH. These small multilayer ceramic capacitors are almost always the best choice for general purpose HF decoupling and they can deal comfortably with harmonics into the VHF region. SMD chip capacitors have even lower values of Ls and for wide-range decoupling these are probably the best of all.

Working voltage is also important, of course. The ceramic capacitors have a maximum working voltage of about 50V so they are suitable for most low-level transistor circuits. Disc ceramics up to 10nF are also readily available with ratings up to 1kV DC. The picture changes at 100nF because high-voltage ceramic capacitors are hard to find, and we have to be quite careful about making substitutions. **Figure 4** compares the four different types of 100nF capacitors. The red traces in the foreground are the 100nF 50V multilayer ceramic, exactly the same as in Figure 2. The blue traces are for the small 100V polyester capacitor, which is made from extremely thin aluminised plastic film, rolled into a 'Swiss roll' and then flattened out. This construction creates a larger internal inductance than the ceramic types, so the series resonant frequency moves down a little and the inductive reactance becomes larger. The pink traces (almost hidden behind the blue) are for the 400V tubular polyester capacitor. This capacitor behaves quite predictably and would be suitable for RF bypassing in most low-level valve circuits, from below 1MHz to at least 50MHz.

But if you need a 1kV voltage rating, the dielectric has to be thicker and the whole capacitor becomes much more bulky, eg the large orange capacitor at the right in Figure 5. Then some odd effects may appear that can't be explained by the simple series-resonant model in Figure 3a. The green traces for this 100nF 1kV capacitor show that the series resonance has moved down to 4MHz, but there is also another resonance at 26MHz which produces a wobble in the Xs trace and an odd little peak in Rs. Even so, this particular capacitor would still be quite usable for RF decoupling in most situations.

The general message about high-value RF decoupling capacitors is that low-voltage ceramic types perform very well; but if you need to use larger aluminised plastic capacitors for their higher voltage ratings, watch out for internal inductance.

PICK AND MIX? High-value capacitors are good at low frequencies, while low-value capacitors have a smaller *inductive* reactance at frequencies above series resonance. So how about connecting one of each in parallel to give better decoupling across the entire frequency range? This pick-and-mix approach seems attractive but there are some pitfalls. However, there have also been some unduly pessimistic assessments of the problem, leading to inappropriate 'solutions' that may actually make things worse.

We've already seen how a capacitor can be represented at HF as a series-resonant circuit with some resistive losses, Figure 3a. The problem with simply connecting two different capacitors in parallel (**Figure 3b**) is that you don't simply get two series resonances: a new *parallel* resonance appears between them where the net impedance rises to a peak. There is nothing mysterious about this – it's a completely predictable property of the kind of network shown in Figure 3b – but oversimplified simulations have caused undue alarm by neglecting the beneficial damping effects of internal resistance in the two capacitors. **Figure 5** shows what is more likely to happen in real life, when the 10nF and 100nF multilayer ceramic capacitors from Figure 2 are connected in parallel.

The parallel resonance is there (green traces, 21MHz) but the peak in Rs is very small, so it didn't do any real harm to connect those two different capacitors in parallel. The circuit model in Figure 3b predicts the major features of Figure 5 quite accurately, and also shows that the 'peakiness' is very sensitive to the values of internal loss resistance in each capacitor [3].

Figure 6 shows what can happen when a 10μF electrolytic capacitor and a 10nF ceramic capacitor are connected in parallel, in an attempt to provide a low decoupling impedance all the way from AF to RF. Once again the real-life loss resistances come to our aid in damping the unwanted parallel resonance, so the simple way works after all. This month's In Practice web page [1] includes some additional plots of attempts to damp out any parallel resonance by inserting a resistor or a ferrite bead in series with the electrolytic capacitor. By trying to solve a problem that doesn't exist in this particular case, the additional components only make the decoupling performance worse! Either keep it simple and connect the capacitors directly in parallel, or else make detailed measurements with a network analyser; there really is no middle ground.

NOTES AND REFERENCES

[1] Please follow this month's links from the 'In Practice' website, http://tinyurl.com/inpractice. This includes a direct link to the October 2009 column on the RSGB Members-Only site.

[2, 3] Please see the 'In Practice' website.

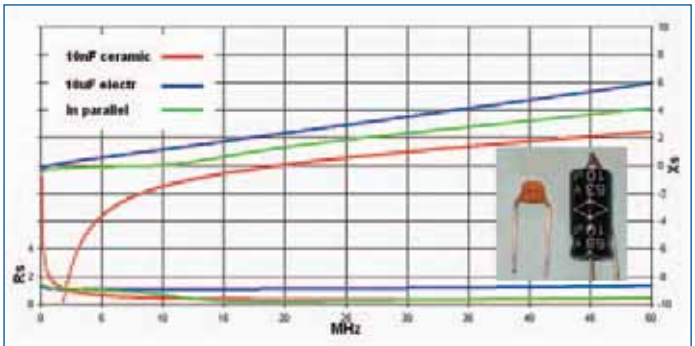

FIGURE 6: 10μF electrolytic and 10nF ceramic capacitors, separately and in parallel.

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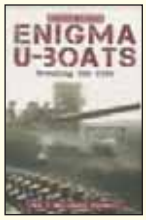

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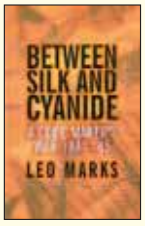

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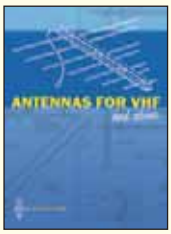

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25 Talk

PAISLEY (YMCA) ARC
Bill Anderson, 2M0BZZ, 01505 613633, bill@3bis.co.uk
3 TBA
10 Training
17 TBA
24 Training

2 SCOTLAND NORTH & NORTHERN ISLES

REGIONAL REP: DENNY MORRISON, GM1BAN, GM1BAN@RSGB.ORG.UK

ABERDEEN ARS
Lewis, GM4AJR, 01224 575 663, www.aars.freeserve.co.uk
4 Junk Sale
11 Construction / On the Air.
18 Talk by Graham, GM8FFX
21 TDOTA Aboyne Guides Communication Badges
25 Work Night

3 NORTH WEST

REGIONAL REP: KATH WILSON, M1CNY, M1CNY@RSGB.ORG.UK

BOLTON WIRELESS CLUB
boltonwireless@gmail.com
8 Digital Amateur Television by Darren, G7LWT
22 Tests and measurements activity night

CHESTER & DRS
Barbara Green on 07957 870770, www.chesterdars.org.uk
2 Surplus Sale
16 Bring & Tell
23 Radio Operating Evening & Video

SOUTH MANCHESTER R & CC
Ron, G3SVW, 0161 969 3999
4 The odd-shaped ball by Peter, G0BHP
11 Antarctica 40 years on by Ron, G3SVW/VP8LK
18 Volta's Piles by Ged, G8RSI
22 Monthly Technical Forum
25 MPT1327 trunking explained by Scott, 2E0JIR

4 NORTH EAST

REGIONAL REP: HAROLD SCRIVENS, GOUGE, GOUGE@RSGB.ORG.UK

ANGEL OF THE NORTH ARC
Nancy Bone, G7UUR, 0191 477 0036, nancybone2001@yahoo.co.uk
1 Take to the Air. Advanced course continues
2 Advance Licence exam
8, 15 OTA and natter night
22 Basics of electrical safety and EMC testing by Mike Taylor

HORNSEA ARC
Gordon MacNaught, G3WOV, 01377 240573, gmacnaughtwov@yahoo.co.uk
3 Activity Night, CW class and more
10 Activity Night, CW 80m CC Data
17 Military Radio WS19/62 by G3WOV
24 Committee Meeting

SHEFFIELD ARC
Trevor Wood, M0TWS, trevorwood6@yahoo.co.uk
1 social night & subscription renewals
8 Simple wire directional antennas for the suburban QTH by Peter, G3PHO
15 Limited space antennas by Trevor, M0TWS
22 Contest workshop 2 by Steve, M1ERS

5 WEST MIDLANDS

REGIONAL REP: TREVOR BAILEY, M0KMB, M0KMB@RSGB.ORG.UK

COVENTRY ARS
John, G8SEQ, 07958 777363
5 No meeting
12 Construction competition
19 Introduction to Project 2010
26 HF, VHF and UHF radio workshop

GLOUCESTER AR & ES
Anne, 2E1GKY, 01452 548478, daytime, www.g4aym.org.uk
1 Club construction project by Cliff
8 Operating Club Equipment
15 Talk by a Club Member
22 Informal Evening

MIDLAND ARS
Norman, G8BHE, QTHR, 01214 229 787
3 General meeting and training classes
10 Committee Meeting and training classes
17 Shack on the air, training classes
24 Laptop computer evening and training classes

MID-WARWICKSHIRE ARS
Bernard, M1AUK, 01926 420 913
9 Meet your fellow members night at Emscote HQ.
23 Homebrew and amateur construction projects

SOUTH BIRMINGHAM RADIO SOCIETY
Don, 0121 458 1603
1 Contest review meeting
3 Lecture in main hall
5, 12, 19, 26 Construction evening
8 Rally planning evening
15 Committee meeting
22 Aerial review and shack clearout
29 VHF field day planning

TELFORD & DARS
Mike, G3JKX, 01952 299 677, mjstreetg3jkx@blueyonder.co.uk
1 Open house/HF OTA
10 Under £5 construction competition
17 DF Antenna offset oscillator, with attenuator
24 Video evening

6 NORTH WALES

REGIONAL REP: MARK HARPER, MW1MDH, MW1MDH@RSGB.ORG.UK

DRAGON ARC
Stewart Rolfe, GW0ETF, 01248 362229
1 Discussion night and inventory of club equipment
15 PSK31 by Stan Hulme, GW3SRM

MEIRION ARS
John, MW0VTK, 07868 738016, meirionars.multiply.com
4 Surplus equipment sale

PORTHMADOG AND DISTRICT ARS
Glyn MW5CAD 01286 830078
18 Club Talk

7 SOUTH WALES

REGIONAL REP: JIMMY SNEDDON, MW0EQL, MW0EQL@RSGB.ORG.UK

No club events received this month.

8 NORTHERN IRELAND

REGIONAL REP: PETER LOWRIE, MI5JYK, MI5JYK@RSGB.ORG.UK

BANGOR & DARC
Mike, GI4XSF, 028 4277 2383
4 Software defined radio by Charlie, GI4FUE

9 LONDON & THAMES VALLEY

REGIONAL REP: ALISON JOHNSTON, G8ROG, G8ROG@RSGB.ORG.UK

AYLESBURY VALE RS
Roger, G3MEH, 01442 826 651
10 Discussion evening

BROMLEY & DARS
Andy, G4WGZ, 01689 878089
16 Programme planning

BURNHAM BEECHES RC
Dave, G4XDU, 01628 625 720
1 SDF by M1FHU
15 RAYNET by 2E0PTM
20 TDOTA GG100PGG (Saturday / Sunday)

COULSDON ATS
Andy, G8JAC, g8jac@btinternet.com
8 How to lose your SMD virginity by Terry, G4CDY

CRAY VALLEY RS
Bob, 2E0RCV, 020 8265 7735 after 8pm
18 Natter nite with a focus on CW

CRYSTAL PALACE R & EC
Bob, G3OOU, 01737 552 170
6 Annual General Meeting

DORKING & DRS
Garth, G3NPC, 01737 359472, garth@swansons.org.uk
23 Weak Signal Propagation Reporter (WSPR) by Walter, G3JKV

MILTON KEYNES ARS
www.mkars.org.uk
1, 15 Shack open night
8 4m band and conversion of ex-PMR radios
22 Bring & Buy Sale

NEWBURY & DARS
Richard, G3ZGC, 01635 46241, richard.jolliffe@vodafone.com
24 Repeaters by Andrew, G8DOR

READING & DARC
Pete, G8FRC, 01189 695 697
11 The Magic of Six Metres by Don, G3XTT
14 HV Power Distribution to Railways by Richard, G0FFL
25 Shifting London's Sewage! by Paul Fountain of Thames Water

SHEFFORD & DARS
David, G8UOD, 01234 742 757, www.sadars.co.uk
4 My best QSL Card
11 Construction Winner Talk
18 Club Project Testing
25 Making PCB's by Andy, G8ATD

SOUTHGATE ARC
David Sharp, M0XDS, david.sharp1@tesco.net.
14 Graeme Wilkes will bring four PCs and CDs of all the back issues of *RadCom*

SURREY RADIO CONTACT CLUB
Ray, G4FFY, 020 8644 7589
1 Sid Morley Memorial Lecture
15 Club Fixit and Natter Night

SUTTON & CHEAM RS
John, G0BWV, 020 8644 9945, info@scrs.org.uk
18 Introduction to Military Communications by Mike, G8MOB

WEY VALLEY ARG
www.weyvalleyarg.org.uk
5 A personal history of maritime radio by Olof, G0CKV
19 A record of sound recording by John, G0GNA

WIMBLEDON & DARS
Jim, M0CON, 020 8874 7456, www.gx3wim.org.uk
12 On the air and construction
26 Amateur TV: talk and demo by John, G8MNY

10 SOUTH & SOUTH EAST

REGIONAL REP: GAVIN KEEGAN, G6DGK, G6DGK@RSGB.ORG.UK

ANDOVER RAC
Martin, M0MWS, 07776181646, www.arac.co.uk
2 Demonstration of commercial SDR radios

BREDE STEAM ARS
Steve, 01424 720815, M0NUC@aol.com
2, 9, 16, 23 At the shack
6 AGM at the shack

CRAWLEY ARC
John, G3VLH, 01342 714 402
24 WSPR by Walter Blanchard, G3JKV

FARNBOROUGH & DRS
Derek, G3OFA, mail@farnboroughradio.org.uk, www.farnboroughradio.org.uk
10 Virtual Radar by Chris, G0WTZ
24 Computing Topics Gary of Surf IT

HARWELL ARS
Malcolm, G8NRP, 01235 524844, info@g3pia.org.uk
9 Construction Contest
23 Shack Activity Night

HASTINGS E & RC
Gordon, 01424 431 909, gordon@gsweet.fsnet.co.uk www.herc.uk.net
3 Hastings Repeater Group Auction
24 AGM

HORNDEAN & DARC
Stuart, G0FYX, 023 9247 2846, www.hdarc.co.uk
2 Natter night/social evening
23 YL's DXpedition to VP8 by Liz M0ACL

HORSHAM ARC
www.harc.org.uk
4 The History of Mr Polley (part 4) by Ron, G3PYC
26 Social, The Lintot, Southwater
28 Sunday Morning Fox Hunt

ITCHEN VALLEY ARC
Charlie, M0WYM, 02380 439560, secretary@ivarc.org.uk
12 Members Evening
26 Operating Portable by Colin, G4GBP

LYMINGTON ARS
Keith, M0LCC, m0lccandg8mzf@googlemail.com
5 Disguised Antennas

MID-SUSSEX ARS
Peter, G4AKG, 01444 239371
5, 12 Radio Night
19 Newhaven Fort Museum by Eddie Wilson
26 Radio Night and Table Top Sale

SOUTHDOWN ARS
John, G3DQY, 01424 424 319
1 Magnetism. Practical Demo by Steve M3EVM & Tony, G0EYE
3 Operating at Hailsham shack

SWINDON & DARC
Den, M0ACM, 07810 317750, www.sdarc.net
4 Members Equipment Sale
11, 25 Natter Night
18 Talk

WATERLOOVILLE ARC
Rich, G4IBW, 02392680852, g4ibw1@ntlworld.com
1, 7 Exam course
10 CW night
29 club chat

WORTHING & DARC
Roy, G4GPX, 01903 753 893
3 Vintage radio films from the BVWS
10 D-Star and its Operation by David, G4ULF
17 Meeting at Lancing Parish Hall
24 GX3WOR on the air and discussions

11 SOUTH WEST & CHANNEL ISLANDS

REGIONAL REP: PAM HELLIWELL, G7SME, G7SME@RSGB.ORG.UK

APPLEDORE & DARC
Brian Jewell, M0BRB, 01237 473251
15 Life Under The Waves Part 3 by Laurence, G4XHK

BLACKMORE VALE ARS
Tony G0GFL, 01258 860741
2 VHF on air & 4m Set Testing
9 Russian Alaskan Islands video
16 HF evening in the club shack
23 Radio Discussion

CORNISH RADIO AMATEUR CLUB
Steve, G7VOH, 01209 844939, G7VOH@btinternet.com
3 Lizard Wireless Station at Bass Point by Russell, M1AVW
8 Music and Computers Part 4 by Pete, G3WKP

POLDHU ARC
Keith Matthew, G0WYS, vickeith@globalnet.co.uk
9 Minnehaha, the Bishop and the Lizard by David, G3PLE

SOUTH BRISTOL ARC
Len, G4RZY, 01275 834 282
4 Club station operating on 2m & 70cm
11 Technical topics with Len, G4ZRY
18 Mid Winter table top sale
25 OTA

TAUNTON & DARC
William, G3WNI, 01823 666 234, g3wni@btinternet.com
3 Discussion on WSPR Mode
10, 24 Operating Club station & Morse Class
17 YouTube Video by Peter, G0EYR

THORNBURY & SOUTH GLOUCESTERSHIRE ARC
Tony, G0WMB, 01454 417048, tonytsgarc@sky.com
3 Underwater Experience by Peter G4OST
10, 24 On Air Night
17 Video Night

TORBAY ARS
Dave, G6FSP, g6fsp@tars.org.uk
5, 19 Operating Night
12 Natter night
26 AGM

WEST DEVON RADIO CLUB
Jules Cuddy, M1AGY, 01752291588
2 Bring and Buy sale
16 Antenna Construction Night. Wire antennas for beginners

YEOVIL ARC
Steve Crask, G7AHP, steve@g7ahp.co.uk
4 EGM
11 Construction Competition
18 G4DCH RADAR
25 Station on air

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
11 Informal
25 Planning for major events and training opportunies

BRAINTREE & DARS
John, M5AJB, 01787 460 947
1 Construction evening
15 Portable mini DX & back packing operating by Mark, M0MJH

CAMBRIDGE UNIVERSITY WIRELESS SOCIETY
MARTIN ATHERTON, g3zay@btinternet.com
4 Sunspots and Solar Physics by Dr Michael Proctor, visitors welcome
25 HF Direction Finding by Dr David Sadler, visitors welcome

CHELMSFORD ARS
Martyn, G1EFL, 01245 469 008, www.g0mwt.org.uk
2 Loop-fed-Array Yagi by Justin, G0KSC
7 Canvey Island Rally
9, 16, 23 Club net night
10 Committee Meeting - Danbury

DOVER RC
Brian, G4SAU, g4sau@darc.org.uk
3 Natter and Operating Night
10 100th Anniversary of first channel crossing by aircraft video with Brian, G8ZYZ
17 School Holiday Net on GB3KS
24 Amateur Television by Brian, G8ZYZ

FELIXSTOWE & DARS
Paul, G4YQC, pjw@btinternet.com
8 EME by Sam, G4DDK
22 Port of Felixstowe revisited by Brian, G7MHK

GORLESTON ARS
David, G3OEP, QTHR, 01493 662 323
27 Lunch time meeting at the Short Blue Hotel, Gorleston

KING'S LYNN ARC
Ray, G3RSV, ral-g3rsv@supanet.com, www.klarc.org.uk
4 AGM
11, 18, 25 Club night and 2m club net

NORFOLK ARC
Chris Danby, G0DWV, 01603 419204, cmdanby@btinternet.com
4 Codes and Ciphers by Ed Erves
10 Informal
17 D-Star presentation by Gavin, M1BXF
21 TDOTA weekend
24 Informal, construction, workshop and Bright Sparks evening

PETERBOROUGH & DARC
David Howlett, M0VTG, padarc@tesco.net
24 Bring and Buy / Junk Sale

SOUTH ESSEX ARS
Norman, M0FZW, 01268 692776, secretary@southessex-ars.co.uk
7 25th Canvey Radio & Electronics Rally
10 Talk by Peter, G4OAD

13 EAST MIDLANDS

REGIONAL REP: JIM STEVENSON, G0EJQ, G0EJQ@RSGB.ORG.UK

BOLSOVER ARS
postmaster@g4rsb.org.uk, www.g4rsb.org.uk
3 Shack Night
10 Natter Night
17 Power Supplies by Colin, G0RXT
24 Committee Meeting

EAGLE RG
Terry, G0SWS, 01507 478590
9 Planning Permission for Radio Amateurs by Jim, G0EJQ

HINKLEY ARS
John, M0JAV, m0jav@lowgables.co.uk, 07836 731544
3 Social Evening
10 Antenna Workshop DBJ1/2 portable VHF/UHF Antenna by John, M0JAV
17 Radar by Richard Neal-Gardner, M1EYA
24 Work for the RSGB by Jim, G0EJQ

LEICESTER RS
Duty committee member, 07804 595749, www.lrs.org.uk
1 Lecture
22 Committee Meeting

LINCOLN SHORT-WAVE CLUB
Pam Rose, G4STO, 01427 788356, pamelagrose@tiscali.co.uk
3, 17 Shack Activity and Natter Night
10 Your Ideas for the Club's future activities
24 G5FZ on air

LOUGHBOROUGH & DARC
Chris, G1ETZ, 01509 504 319
2 Morse keys bring something along
9 AirNav Radar Box by Brian, G8BUB
16 Open Forum on Wire aerials
23 Practical Evening

SOUTH NOTTS AMATEUR RADIO CLUB
Terry, M0RIA, www.radioclubs.net/snarc
2 2m Contest
3 Construction Project Receiver Calibration by G4EDX
10 On the Air and Morse
17 Blue Box Sort out
24 RSGB DRM Visit

WELLAND VALLEY AMATEUR RADIO SOCIETY
Peter D Rivers, G4XEX, QTHR, 01858 432105, g4xex@fsmail.net
15 Operating evening and Balun construction
20 TDOTA Station at Market Harborough Guide HQ

HELPLINES

IMPORTANT NOTICE

RESPONDENTS ARE ADVISED NOT TO SEND ORIGINAL DOCUMENTS, BUT TO COPY THEM AND SEND THE COPIES.

Helplines is a free service that can be used to ask other members for help on amateur radio related matters. Items for inclusion can be sent by post to RSGB HQ or preferably by e-mail to radcom@rsgb.org.uk.

• M5ALU is looking for any user information, circuits or maintenance details for a Dymar 1525 signal generator. If you can help please e-mail him at a_horsfield@hotmail.com.

• Tom Morgan, G0CAJ, ZS1AFS, ZT1T is trying to work the rest of the UK from ZS1. He needs to make skeds with GD, GJ, and GU. E-mail info@onboardpublications.co.za or he can be contacted on Skype at tom.zs1afs. He is also looking for information on how to get a D44 amateur radio operator's licence?

• Ian, GM3LGU has obtained a HB-1A Transceiver. The rig came direct from China but had no form of instruction enclosed. Is there a way of adjusting the speed of the built in keyer and how can he use a straight key (his preferred option). He loves the rig but not the keyer! Ian, GM3LGU, QTHR, 01620 825 639, e-mail gm3lgu@milnet.uk.net.

• Bruce, G3WCE, still looking for information to enable restoration of a TW Communicator (2m version). A circuit diagram would probably mean that he could get it working, anything else would be a bonus. Tel. 01692 538794 or e-mail g3wce@grimblepoos.co.uk.

• WANTED: THERMISTOR. Self-heating NTC such as R(A)53. Where can I buy one? Godfrey Manning, G4GLM. 63 The Drive, Edgware, Middx, HA8 8PS, 020 8958 5113, e-mail cgmm2@btinternet.com.

• Matt Cox, M3COX is seeking information about the life and radio activities of Norman Clark, G2BUC for Norman's family. Anyone who knew him please e-mail Matt at m3cox@live.co.uk.

HF F-Layer, Propagation Predictions for February 2010

Compiled by Gwyn Williams, G4FKH

Time	000011111220	000011111220	000011111220	000011111220	000011111220	000011111220	000011111220	000011111220
(UTC)	246802468020	246802468020	246802468020	246802468020	246802468020	246802468020	246802468020	246802468020
*** Europe								
Moscow	88.....47888	5.....478867	..3556786...	...78888....	...7999.....	....888.....	.....	.....
*** Asia								
Yakutsk	........454.	357766	...56...4...	...44.......	.....	.....	.....	.....
Tokyo	.......3222.	......57633.	.....	.....	.....	.....	.....	.....
Singapore	.......1211.	687554	......55....	......5.....	.....35.....	.....	.....	.....
Hyderabad	.....	24333	.......54...	......44....	......4.....	......4.....	.....	.....
Tel Aviv	99.....28999	968....99988	......388...	...65678....	...57776....	....555.....	.....	.....
*** Oceania								
Wellington	.....	....32352...	....5554....	.....4......	.....	.....	.....	.....
Well (ZL) (LP)	.....	.....	.33.....	43.......6..	.....	.....	.....	.....
Perth	.....	......37643.	......785...	......76....	.....	.....	.....	.....
Sydney	.....	......6742..	.....587....	....357.....	.....	.....	.....	.....
Melbourne (LP)	.....	..495.....	35.99.....	...794......	....8.....	.....	.....	.....
Honolulu	.....	...33.....	....33.3....	.....	.....	.....	.....	.....
Honolulu (LP)	.....	.....	.....	.....	.....	.....	.....	.....
W. Samoa	.....	...24223....	....677.....	.....66.....	.....64.....	.....	.....	.....
*** Africa								
Mauritius	2........111	6......26766	3......77534	.......74...	.......5....	.....	.....	.....
Johanesburg	.....	.2.......233	56.....38877	.......886..	.......4....	.....	.....	.....
Ibadan	23.......222	774.....6677	777.....7777	...4...587..	...765678...	...666775...	....6656....	.....
Nairobi	.....	52......5555	6......46656	.......66...	......56....	...54566....	.....	.....
Canary Isles	777.....4677	8884....8878	88372..68887	....65676...	....4545....	.....	.....	.....
*** S. America								
Buenos Aires	.....	22.5.....	33.8......3.	...4.....	.....	.....	.....	.....
Rio de Janeiro	.....	23.....22	45.6.....643	.....5..	.....	.....	.....	.....
Lima	.....	...2.....	...5.....	.....	.....	.....	.....	.....
Caracas	1.....	44.2......24	43.73....563	....7...47..	.....	.....	.....	.....
*** N. America								
Guatemala	.....	.....	...24.....	.....	.....	.....	.....	.....
New Orleans	444.....	66.6......26	...4.....	.....	.....	.....	.....	.....
Washington	455.....4	77.6......77	.....64.	.....64565..	......55....	......44....	.....	.....
Quebec	666.....66	3..5.....57.	.....57..	.....66774..	......66....	.....4....	.....	.....
Anchorage	.44.....	5.....3	.....63..	.....	.....	.....	.....	.....
Vancouver	.....	3.....	.....	.....	.....	.....	.....	.....
San Francisco	.....	.....	.....	.....	.....	.....	.....	.....
San Fran (LP)	.....	.....	.....	.....	.....5....	.....5....	.....	.....

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 February, March and April are respectively (SIDC classical method – Waldmeier's standard) 3, 3, 3 and (combined method) 21, 24, 25. The provisional mean sunspot number for December 2009 was 10.6. The daily maximum / minimum numbers were 30 on 20 and 0 on 1 – 9, 25 December 2009.

RadCom

Yaesu FT-950 Transceiver

Direct lineage from the legendary FT DX 9000 and FT-2000

HF/50 MHz 100 W Transceiver
FT-950

Recommended Retail Price
£1275.95 inc VAT

- Triple-conversion super-heterodyne receiver architecture, using 69.450 MHz 1st IF
- Eight narrow, band-pass filters in the RF stage eliminate out of band interference and protect the powerful 1st IF
- 1st IF 3 kHz Roofing filter included
- High-speed Direct Digital Synthesizer (DDS) and high-spec Digital PLL for outstanding Local Oscillator performance
- Original YAESU IF DSP advanced design, provides comfortable and effective reception. IF SHIFT / IF WIDTH / CONTOUR / NOTCH / DNR
- DSP enhancement of Transmit SSB/AM signal quality with Parametric Microphone Equalizer and Speech Processor
- Built-in high stability TCXO (0.5 ppm at room temperature)
- Built-in automatic antenna tuner ATU, with 100 memories
- Powerful CW operating capabilities for CW enthusiasts including CW Zero-in and CW Spot features
- Five Voice Message memories, with the optional DVS-6 unit
- Large Multi-colour VFD (Vacuum Fluorescent Display)
- Optional Data Management Unit (DMU-2000) permits display of various operating conditions, transceiver status and station logging.
- Optional RF µ-Tune Ultra Sharp Preselector System for 160 m, 80/40 m and 30/20 m Bands

Optional, YAESU Exclusive, Fully-Automatic -Tuning Preselector System!

Fully automatic, Ultra-sharp, External µ-Tuning Preselector (optional) features a 1.1" (28 mm) Coil for High Q

On the lower Amateur bands, strong signal voltages can impinge on a receiver and create noise and intermod that can cover up the weak signals you're trying to pull through. YAESU engineers developed the µ (Mu) Tuning system for the FT DX 9000/FT-2000, which is now available as an option for the FT-950. There are three modules available, the MTU-160, MTU-80/40, and MTU-30/20); these may be connected externally, using the optional base kit, with no internal modification required.

When the µ-Tuning module is engaged, the VRF system is bypassed, but the fixed Bandpass Filters are still in the received signal path.

Optional External Data Management Unit (DMU-2000) Provides Many Display Capabilities

Enjoy the ultimate in operating ease by adding the DMU-2000!

Enjoy the same displays that are available with the FT DX 9000 and FT-2000: Band Scope, Audio Scope, X-Y Oscilloscope, World Clock, Rotator Control, Extensive Transceiver Status Displays, and Station Logging Capability. These extensive functions are displayed on your user-supplied computer monitor.

Shown with after-market keyer paddle, keyboard, and monitor (not supplied).

DMU-2000
Data Management Unit (option)

For the latest Yaesu news, visit us on the Internet:
http://www.yaesu.co.uk

Specifications subject to change without notice. Some accessories and/or options may be standard in some areas. Frequency coverage may differ in some countries. Check with your local Yaesu dealer for specific details.

YAESU
Choice of the World's top DX'ers

IMPORTANT NOTE

From the March edition of *RadCom*, charges are being waived for Members' Ads submitted by e-mail to memads@RSGB.org.uk. Terms and conditions apply, which are listed in the grey box on page 89.

FOR SALE

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.

CYPRUS QTH for retirement, holidays, investment. Located 900ft ASL in Peyia. Large pool, full central heating & air conditioning. Details and photos on the web at www.imak.org.uk. Iain, 00357 266 22859, e-mail G3RSI@btinternet.com.

DECCA LW TX. Two Decca 5501 with driver, ATU and power supply. Also other items. G3MFW, 01726 73608, e-mail kelwood@talktalk.net.

ICOM 706 MK IIG boxed, manual. Very good condition. Just repaired by Barry Horning (GM4TOE), £500 plus postage. David, MW0DVM, 01443 686281 (Porth Rhondda, S Wales).

ICOM IC-756 PRO III. Excellent condx. Mine from new, original packing. Prefer buyer inspect and collect or carriage extra. G3WZT, QTHR, 01403 864222, e-mail G3WZT@dsl.pipex.com (Horsham).

KENWOOD TS450S with MC43S mic and manual, £275. Icom IC706 mk 1 HF +2m, headset & manual £195. Both sets in VGC. Maynard, M1EGX, QTHR. 0121 351 2827, e-mail mbeddard@hotmail.com.

YAESU MD200 A8X DESK MIC in original packing with instructions. Hardly used. Bought new £230 16/6/09, £99 + £10 P&P. 01652 632038 (Barton Upon Humber).

WANTED

COLLINS 30S-1 AMPLIFIER. Collins KWS-1 Tx. Drake L4B power supply. G3ZIG, QTHR. Roy, 01362 688430, e-mail roy@reedg3zig.plus.com (Dereham).

DISABLED FAN OF OLD DAYS seeks pre-1975 QSLs, magazines etc. Mike, 8 Windsor Road, Reydon, Southwold, Suffolk IP18 6PQ.

LDF 4-50 MALE/FEMALE CONNECTORS. G4RFC, QTHR, 0208 2934989, G4RFC@yahoo.co.uk (Blackheath).

MORSE KEYS WANTED PLEASE. Avid collector seeks straight keys, bug keys etc. In particular Marconi. Please ring or e-mail John, G0RDO, on 01626 206090, e-mail john@morsemad.co.uk (Newton Abbot).

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 (Leeds). E-mail: AQuest1263@btinternet.com.

TEN-TEC CORSAIR 2 in top order. No mods or faults. Alan, G0HKG, QTHR, 01787 223356 (Gt. Tey Colchester).

SILENT KEYS

We regret to record the passing of the following members:

Mr D I Coathup, G0HZZ	24/11/2009
Mr E M Vincent, 2I0EMO	22/11/2009
Mr A A Chilles, GM4OSQ	11/2009
Mr D W Wheeler, G0GMK	5/12/2009
Mr R B Herrick, G0SZY	24/11/2009
Mr R F Saunders, G3CVW	25/10/2009
Mr A E Pardy, G4DAU	12/11/2009
Lt Col W Weir, G4GJX	12/3/2009
Mr L J Kennard, G3ABA	18/11/2009
Mr F J Light, G1JOT	2/12/2009
Mr M Wiggins, G0KBF	
Mr W R Burns, G7SVP	8/12/2009
Mr B J Dobson, G3CQK	13/9/2009
Mr J R Corner, M0DPI	18/9/2009
Mr W N Craig, G6JJ	5/12/2009

RALLIES & EVENTS

Members of the RSGB Regional Teams will be at the rallies in February that are marked with a diamond.

7 FEBRUARY - 25TH 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].

14 FEBRUARY - HARWELL RADIO AND COMPUTING RALLY - Didcot Leisure Centre, Mereland Road, Didcot OX11 8AY. TI S22 (V44), free CP, £2 (u12 free), OT 10.15/10.30. TS, SIG, LB, C, DF. Details on 01235 816379, e-mail ann.stevens@btinternet.com [www.g3pia.org.uk].

14 FEBRUARY - NORTHERN CROSS RALLY - Ossett School, Storrs Hill Road, Ossett, West Yorkshire WF5 0DG. OT 10.15/10.30, £3, TI. [www.northerncrossrally.org].

21 FEBRUARY - RADIO-ACTIVE RALLY - Civic Hall, Nantwich, Cheshire CW5 5DG. CP, OT 10.30, TS, B&B, C. Simon Chettle G8ATB, 01270 841506, e-mail info@radioactiveshow.co.uk [www.midcars.org].

21 FEBRUARY - NEW VENUE - SWANSEA ARS RALLY - Following a major fire at the Afan Lido the show will now take place at the Court Herbert Sports Centre, Neath Abbey SA10 7BE, 2 miles from M4 J43 (via A465). OT 10.30, £2/50p, free CP, TS, B&B, SIG, LB, C. Details Roger, GW4HSH, 01792 404422 [www.radioclubs.net/swanseaars].

28 FEBRUARY - RAINHAM RADIO RALLY - Rainham School for Girls, Derwent Way, Rainham, Gillingham, Kent ME8 0BX. Trevor, G6YLW, 0771 7678 795.

7 MARCH - BOURNEMOUTH RADIO SOCIETY 21ST ANNUAL SALE - Kinson Community Centre, Pelhams Park, Millhams Road, Kinson, Bournemouth BH10 7LH. CP, OT 09.30, admission £1.50, TS, SIG, C, DF, Junk Sale. Contact John, G0HAT, 07719 700 771 [www.brswebsite.org.uk].

7 MARCH - EXETER RADIO & ELECTRONICS RALLY - America Hall, De la Rue Way, Pinhoe, Exeter, EX4 8PW. OT 10.30 (10.15), £2, TS, B&B, C, TI. Contact Pete, G3ZVI, 07714 198374, e-mail g3zvi@yahoo.co.uk.

7 MARCH - CAMBRIDGE & DISTRICT AMATEUR RADIO CLUB RALLY - Wood Green Animal Shelter, King's Bush Farm, A1198 London Road, Godmanchester, Cambs PE29 2NH. OT 10:00 (09:45), £3, TI, TS, B&B, LB, C ,DF, SIG, WIN, LEC, FAM, Contact David, M0GUM, 01954 203080, email rally2010@cdarc.co.uk, [www.cdarc.co.uk].

13 MARCH - DUTCH NATIONAL RADIO FLEA MARKET - "Autotron", Rosmalen ('s-Hertogenbosch, just off A59 motorway). OT 0900 to 1530. TS, FM, €6. TI PI4SHB, 145.250MHz. Details +31 6 1356 1325, e-mail info@radiovlooienmarkt.nl, [www.radiovlooienmarkt.nl].

20 MARCH - LAGAN VALLEY ARS RALLY - The Village Centre, 7 Ballynahinch Road, Hillsborough. OT 11.30, TS, CP, C. Contact Jim, GI0DVU, 02892 662270, e-mail jim.henry@ntlworld.com.

21 MARCH - 25TH WYTHALL RC RADIO AND COMPUTER RALLY - Woodrush Sports Centre, Shawhurst Lane, Hollywood, nr Birmingham B47 5JW on the A435, 2mi from J3 M42. OT 10-3, £1.50, TS, C, B&B, CP, TI S22 (V44). Contact Chris, G0EYO, 07710 412 819, e-mail g0eyo@blueyonder.co.uk. [www.wrcrally.co.uk].

21 MARCH - CALLINGTON AMATEUR RADIO SOCIETY RALLY - Callington Community College, Launceston Road, Callington, Cornwall PL17 7DR. TI, CP, OT 10am, £2.00, TS, B&B, C, DF, WIN. Contact Chris G7UDX, 07973418371, e-mail g7udz@mac.com.

28 MARCH - SOUTH GLOUCESTERSHIRE RALLY - Avon Scouts Activity Centre, Woodhouse Park, Almondsbury, S.Glos. BS32 4LX. I.5 mile from the M4/5 junction. Organised by Thornbury & S. Glos ARC with Avon Scouts ARC. OT 9.30/10.00. traders 7:30, £2, Tables & boots £5 (booking essential). No dogs (except assistance). TS, FM, TI, DF,CP, C, CBS. Contact Peter Cabban, G4OST 01454 612689 or peter.cabban@btinternet.com. [www.avonscouts.org.uk/woodhousepark/location.htm].

28 MARCH - SPRING MILITARIA & ELECTRONICS & RADIO AMATEUR HANGAR SALE - Hack Green secret Nuclear Bunker, Nantwich, Cheshire, CW58AP. 10am, £2.50. Contact Rod Siebert, 01270 623353 or e-mail coldwatr@hackgreen.co.uk. [www.hackgreen.co.uk].

11 APRIL - NORTHERN AMATEUR RADIO SOCIETIES ASSOCIATION EXHIBITION - Norbreck Castle Exhibition Centre, Blackpool. TI, CP, TS, B&B, SIG, MT, LB, C, DF, RSGB Book Stand. OT 10:45/11:00. Dave, M0OBW, 01270 761 608 or e-mail dwilson@btinternet.com [www.g1gyc.demon.co.uk/narsa].

11 APRIL - LOUGH ERNE AMATEUR RADIO CLUB ANNUAL RALLY - The Share Holiday Village, Lisnaskea, Co. Fermanagh BT92 0EQ N. Ireland. Access from Erne/Shannon Waterway. OT 12 noon, CP, B&B, TS, LB, C, DF. Details Iain 028 66326693, E-mail gibbjgbb@aol.com [www.loughernerradioclub.co.uk].

18 APRIL - WEST LONDON RADIO & ELECTRONICS SHOW [KEMPTON RALLY] - Kempton Park Racecourse, Staines Road East, Sunbury on Thames, Middlesex TW16 5AQ. TI, free CP, OT 9.50/10.00. TS, FM, B&B, SIG, C, DF, WIN, lecture stream. Details Paul, M0CJX, 0845 165 0351, info@radiofairs.co.uk [www.radiofairs.co.uk].

24 APRIL - NEW DATE - 4TH CHESTERFIELD AMATEUR RADIO RALLY - Hasland Village Hall, Eastwood Park, Hasland S41 0AY (M1 j29/30). TI S22 (V44) & GB3EE. OT 10am, TS, C. Details by e-mail to rally@chesterfieldrally.com [www.chesterfieldrally.com].

25 APRIL - ANDOVER RADIO AMATEUR CLUB BOOT SALE - Wildhern Village Hall and Playing field SP11 0JE (North of Andover) just off the A343. TI S22, CP, £1.50, C, DF. Vendors £6 per boot/table, £8 inside the hall. Details Martin, M0MWS, 01980-612070 [www.arac.org.uk].

25 APRIL - 26TH YEOVIL QRP CONVENTION - Digby Hall, Hound St, Sherborne, Dorset. Digby Hall adjoins the central shopping car parking. TI S22 (V44), CP, OT 09.30. LEC, TS, B&B, C, DF. Robert, 01935 706715, e-mail robert.farey@btinternet.com [www.yeovil-arc.com].

3 MAY - DARTMOOR RADIO RALLY - Tavistock College, Crowndale Rd, Tavistock, Devon, PL19 8DD. OT 1015/1030. TS, B&B, TI S22 (V44), CP, DF, C, FAM. Details Peter, M1AYI, 01822 860277.

14 - 16 MAY - DAYTON HAMVENTION® - Hara Arena, Dayton, Ohio, USA. 3 day pass $20/$25 on door. CP, TS, FM, SIG, DF, LEC, C, CBS, WIN [www.hamvention.org].

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].

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

This list shows all rallies and events we are aware of as at 7 January 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.

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].

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 petermail@peterg8frcmilton.plus.co [www.McMichaelRally.org.uk].

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 ARC17TH 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 1830 to 2130.

15 AUGUST - FRISKNEY & EAST LINCOLNSHIRE COMMUNICATIONS CLUB RALLY - The Frisknet Village Hall, Church Road, Friskney, Lincs. 6.5 miles south of Skegness. OT 1000 to 1430, £1.50, CP, C, WIN, TI S22, DIS. Details Bren, 2E0BDS, 01754 820204, e-mail felcc@btinternet.com [www.felcc.webs.com].

30 AUGUST - HUNTINGDONSHIRE ARS BANK HOLIDAY MONDAY RALLY - St Neots Community College, Barford Rd, St Neots, PE19 2SH. OT 10.00 (traders from 8am). 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 - 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].

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 JU Burke	G3HEA
Dorking & DRS	G3CZU
Mr F V Kershaw	G3GKI
Mr T I Lundegard	G3GJW
West Kent ARS	G3WKS

50 years

Mr R A Fuller	G8CEZ
Mr DAG Martin	G3ODC
Dr A J Masson	GM3PSP

19 SEPTEMBER - HORNSEA AMATEUR RADIO CLUB RALLY - Floral Hall, 7 The Esplanade, Hornsea, East Yorks HU18 1NQ. OT 10.30am, 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 at g3tli@hotmail.co.uk [www.hornseaarc.co.uk].

19 SEPTEMBER - NEW DATE - GREAT NORTHERN HAMFEST - Metrodome Leisure Complex, Barnsley S71 1AN. OT 11.00, DF, TS, SIG, B&B. Details Ernie, G4LUE, 01226 716339.

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. 10am, £2.50. Contact Rod Siebert, 01270 623353 or 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].

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].

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.

SPECIAL EVENT STATIONS FOR FEBRUARY 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 M0XLT?

Date	Callsign	Phonetics	Location	Bands	Keeper
01/02/2010	GB0RDF	Radio Direction Finding	Daventry	TLHV27	G1BHR
	GG100MHG	Market Harborough Guides	Market Harborough	LHV27	G4XEX
12/02/2010	GG100WGG	Wirral Girl Guides	Willaston	LH27	G6XHF
13/02/2010	GG100BG	Beaconsfield Guides	Beaconsfield	TLH27	G3OHX
15/02/2010	GB0ANT	Antartica	Barnsley, Sth Yorks	LH	M0OXO
19/02/2010	GG100GLE	Girlguiding Leicester East	Tilton, Leicestershire	LH27	M0DBG
	GG100PGG	Pinkneys Green Guides	Maidenhead	LH2	G4XDU
	GG100CGB	Chesham Guides & Brownies	Chesham	LH27	G3XZG
	GG100AG	Ackworth Guides	Pontefract	TLH2	G0BPK
	GG100FOX	Foxlease	Lynhurst, Hants	LHV2	M0ACL
	GG100S	Girl Guides Sheffield	Sheffield	LH27	G4FAL
	GG100CHA	Chatteris Girl Guides	Huntingdon, Cambs	TLHV27	G8AKL
	GG100IHG	First Highworth Guides	Swindon, Wilts	LH27	G4AJA
20/02/2010	GG100NG	Nottingham Guides	Nottingham	LHV27	G8OHC
23/02/2010	GB0TFL	Thanks For Life	Knaresborough	LH	G3XZV
24/02/2010	GB95STD	95th anniversary of St Dunstan's	Ovingdean, Sussex	LH27	G3STD

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. **As an interim concession, this charge is waived for any postal adverts received between 8 January & 1 March 2010.**

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) 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.
5) Recurring ads will not be accepted, but members may re-submit the same advert each month if they wish. Not more than one ad per month will be accepted from any member.
6) Adverts will be published at the first available opportunity but no guarantee can be given as to when a particular ad will appear.
7) The RSGB believes that it is inappropriate for members trading in radio equipment in any way to place members' ads. We therefore regret we are unable to accept such ads, although we do welcome these in the 'Classified' advertising section of *RadCom*.
8) The RSGB accepts no responsibility for errors or omissions, or for the quality of goods for sale or exchange.
9) Members' Ads are accepted and published in good faith.
10) Members' Ads are accepted at the sole discretion of the Editor, whose decision is final.

WARNING

Members are advised to ensure that the equipment they intend to purchase is not subject to a current hire purchase agreement. The 'purchase' of goods legally owned by a finance company could result in the 'purchaser' losing both the goods and the money paid.

Members' Ads also appear on the Members-Only website at www.rsgb.org/membersonly/membersads.

RADCOM MEMBERS' AD REQUEST FORM

Only use this form if you are unable to send your advert by e-mail. E-mailed adverts are free. A charge of £5 is made to cover administration costs for Members Ads submitted by post. Photocopies of this form are acceptable. Posted ads must not exceed 40 words. Please fill in all details, especially your name, callsign, phone number, town and your signature or your advert may not be accepted.

☐ I enclose a cheque for £5 payable to RSGB

☐ Please charge £5 to my credit card

Number

☐☐☐☐-☐☐☐☐-☐☐☐☐-☐☐☐☐

Expiry date MM-YYYY Issue number (Switch only) ☐☐

Name

Callsign

Phone

Town

Signed

Date

Section: ☐ FOR SALE ☐ WANTED

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, 299 Reepham Road, Hellesdon, Norwich, NR6 5AD Tel: 0870 904 7377 Fax: 0870 904 7378 E-mail: adsales@rsgb.org.uk

Payment to: RSGB, 3 Abbey Court, Priory Business Park, Bedford, MK44 3WH

FOR SALE

ISOLATED DATA INTERFACES for PSK31-SSTV-RTTY-CW-FSK-WSJT etc. ALL PREVIOUS MODELS STILL AVAILABLE, See RSGB Reviews SEPT 09 RADCOM. NEW ISOTERM TRAVELLER KIT AVAILABLE. PAYPAL REGISTERED. www.g3liv.co.uk johnny@melvin.com 0191 2843028

FIBREGLASS TUBE High strength tube, square box, rod, and other sections all from stock in 6m lengths. Engineered Compositions, Chester. Tel: 01244 676000 e. barbara@engineered-composites.co.uk www.engineered-composites.co.uk

PROGRAMMING CABLES for Icom, Motorola, Kenwood, Vertex, Yaesu, Alinco, HYT, Entel, Simoco, Tait, and many other brands at www.radioarena.co.uk Tel. 0845 0942245 info@radioarena.co.uk

DAB DIGITAL RADIO BARGAINS, left over from Xmas – www.nevadaradio.co.uk

WANTED

Unwanted valve amplifiers, working or not. Known makes only (Kenwood, Yaesu, Drake, Linear Amp, etc), not homebrew. Cash paid. Contact Peter G3ZRS on 01482 862323 or e-mail: g3zrs@hotmail.co.uk

CARDS & DESIGN

QSL FACTORY: top quality colour QSL cards. www.qslfactory.com

LOW COST AND HIGH QUALITY QSL cards by LZ1JZ QSL PRINT http://www.LZ1JZ.com

AERIALS

G4TPH PORTABLE MAGLOOPS QRP & QRO models available Full details at: www.g4tph.com

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M0CVO ANTENNAS HF, VHF and UHF Antennas, fixed or portable Full details at: http://www.m0cvoantennas.webs.com

YAGI ANTENNA INSULATORS - Insulators from £1.50 each. Free Yagi Designs and more insulator info at www.g0ksc.co.uk

LIQUID ELECTRICAL TAPE- waterproofing for outdoors. £9.50. Velcro straps - ideal for supporting temporary antennas. £5.99. Antenna poles. 7m fibreglass. £17.95 Prices include p&p. SOTAbeams, 89 Victoria Road, Macclesfield, SK10 3JA. 01625-425700 www.sotabeams.co.uk

YAGI ANTENNA INSULATORS - Insulators from £1.50 each. Free Yagi Designs and more insulator info at www.g0ksc.co.uk

COMET H-422 ROTARY DIPOLE – covers 40/20/15/10 we have several ex display units, as new with full one year warranty, for £199 (save over £70 !) first come first served. www.nevadaradio.co.uk

NEW COMET ANTENNAS – cover 144/430/1.2Ghz Base and Mobile, ideal for the new Alinco DJ-G7E Handheld. see the range at www.nevadaradio.co.uk

WIRELESS LAN ANTENNAS – 2.4GHz Corner Dipole were £44.95 now £14.95 each www.nevadaradio.co.uk

MISCELLANEOUS

CALL IN ON THE 'GOOD NEWS' - CHRISTIAN NETS! Every Sunday morning at 8am on 3747kHz and around 7047 and 144.205 at 3pm, sharing Christian fellowship over the air. For brochure on WACRAL write to 51 Alma Road, Brixham,South Devon, TQ5 8QR, Tel:01803 854504 or derekg3xnx@talktalk.net

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A SALUTARY TALE

Richard Strafford, G3MRT

Hey Diddle Diddle
The knobs need a twiddle
Though all was well with my rig.

But I've no power to resist
The temptation to twist
Every knob on the face of the set.

And it's not just the knobs,
It's all bits and bobs
That must be twiddled at will.

The position and pitch
Of each button and switch
Must be altered again and again and again.

But now they're all changed
I feel so deranged
'Cos not a thing can I hear on my rig.

Oh! If only I'd resisted
The urge to be ham-fisted
And left every knob well alone.

So take my advice
Don't succumb to my vice
Of fiddling with everything that moves.

If nothing is bust
It's possible, it's best
To leave well alone and don't fix!

Hey diddle diddle,
When left in the middle,
The knobs are perfectly set

ADVANCE TO THE FULL LICENCE

R D Bibby, G1PIX

The route into amateur radio is from the Foundation licence through the Intermediate and subsequently to the Full licence. Hobbyists progress through the system to the level they desire. There is no obligation to progress through the system, neither should there be. Each will make their own decision based on what they think their limit is. After almost 25 years of teaching first the RAE and then latterly the three tier system, I have experienced a lot of people who thought that the top level was beyond them, but very few who eventually did go for it, didn't get there.

Too many look at the manual and examples of questions for the Advanced level and then after about an hour's deliberation, decide they can't do it. To those I say, did you pass a driving test and if so, could you do everything required after the first lesson? Of course not, and the amateur radio advanced course is no different. Just like in the majority of cases, time spent with a driving instructor improves your performance to the point where you finally pass the driving test. So time spent with guys like me will get you to and through the Advanced examination and on to the Full licence.

As a group, we at the Widnes and Runcorn Amateur Radio Club (plug plug) take newcomers through the Foundation level over a weekend, with the examination (we call it a quiz so we don't scare people too much) on the Sunday afternoon. The Intermediate takes a little longer with up to four evenings and a weekend to cover all the syllabus and then the examination on the designated evening.

The top level can never be considered to be achievable in such short timescales. The scary bit is in thinking it can. Stop, take stock and slow down. I take about 20 weeks to cover the syllabus sufficiently for most to be able to sit and pass the examination. There is no practical requirement for the advanced level but I try to break the monotony of loads of theory by chucking in a couple of practical evenings. Design and build a PSU and design and build an antenna are my favourites – and are usually entertaining enough to alleviate the theory tension.

By the time we get to the exam night most candidates are sufficiently confident to go for it. For any who are still a bit insecure, I advise them to hang on a bit as there will be another in two months, not six months as it used to be. This gives us a bit of time to recap on their perceived weak points.

To all out there who have their Intermediate I say, why not give it a go? Take your time and don't expect to be ready for the top level exam in a fortnight. It takes time but it is there to be passed. If you convince yourself that you can't pass it then guys like me have a job and a half getting you through, but we do succeed more times that we fail. Give it a go, surprise yourself. You will feel so good afterwards.

AM I THE OLDEST?

William A Oliver, MW6KGB

I have recently passed my Foundation Exam (96 per cent) and obtained my callsign, MW6KGB, at the age of 74. Can you tell me please if this is a record?

I intend to go for the Intermediate in the spring and, hopefully, the Full licence in the summer.

As a matter of interest, my callsign becomes more amusing if I operate in Northern Ireland!

LF, MF OR HF?

Derek, G1ZJQ

Quite a while ago, school physics lessons taught me about an electromagnetic spectrum. This was carved up into fairly arbitrary regions and sub-regions based on wavelength or frequency. LF was 30kHz to 300kHz; MF, 300kHz to 3MHz and HF was 3MHz to 30MHz.

When did 500kHz, 1.8, 3.5, 5 and even 7MHz become LF?

This must be confusing for people coming from a scientific background… and school children.

MORSE CONTEST

Hilton, MW0OPS

Whilst looking at the rules for a contest in the USA, I saw what I feel may be a useful addition to some of the contests in the UK. The organisers had allocated a specific frequency for slow Morse and beginners. I would like to practice my very poor Morse and perhaps give away a few points in a contest but am reluctant to do so.

Usually in the heat of a contest I do not respond as I feel that I may be slowing the QSO down or making a complete hash of it. I would not want to penalise a participant due to my ineptitude. If, however, there was a specific frequency I could listen on and respond knowing that the operator was expecting a beginner I would be more confident in having a go. A contester could visit this frequency in quieter moments and maybe gain another point or two that would not otherwise been available. A rule of one QSO then QSY may prevent the hogging of the allocated frequency.

A REMINDER OF DAYS GONE BY

Bill Walker, MOWTW

As the RSGB DRM for Kent, Bill Walker, MOWTW, was requested to visit Eric, G2AZC, by his daughter who stated that Eric who was in his 90s and was now resident in a retirement home in Bearsted near Maidstone in Kent. Eric was very active in the amateur world in the 1930/50s and was interested in passing on some of his old QSL cards and personal stories.

Eric's QTH was in Exeter were he lived for many years and was a member of the Exeter & District Wireless Society in 1935. It is interesting to note that their President was Sir Ambrose Fleming, who knew a thing or two about radio valves.

Going though many of Eric's records, I noted that in 1938 he was active in developing equipment at 56MHz – they were really pushing technology. They also held a dinner in May 1967 at the Royal Garden Hotel in London, which was called The Third London Single Sideband Dinner. How times have changed; there are many other stories too many to record here.

When I visited Eric I thought it would be a good idea to get him on the air again so from his bedside I used a Yaesu handheld to get into the Maidstone Echolink repeater MB7IMS-L and as agreed contacted Alan, GOJUS and Robert, W4VFW in Tennessee. He called CQ G2AZC and when we eventually made contact it reminded him of days gone by. It was a great pleasure to meet Eric and to speak to one of our many radio pioneers who led a very interesting and active life.

Eric died on 2 December 2009.

OUR CROWDED BANDS

Phil Cross, G7MWH

In The Last Word in January's addition, there was a letter from G3MZV bemoaning the fact that he can't afford the extra power he obviously craves to compete in the various contests. What

ever happened to using just enough power to do the job? I was taught by a wise ham that it was good practice to use only enough power to make the contact and that metal in the air was what counted not watts out of the back of my rig. I was dismayed reading that letter, its no wonder we suffer so much QRM. Why worry about PLT, etc when we are making it impossible to make a decent contact through our own thoughtlessness. If we all backed off the RF power a little, the bands would be clearer then we could perhaps concentrate on curing PLT. Although I do agree with G3MZV, why sell equipment that is illegal to use.

WSPR

Julian, G4ILO

I write in response to GM3BST's letter about WSPR on 600 metres. John says that "amateur radio has always been about communications between individuals or groups." I don't think that's true. I seem to recall that amateur radio began with "artificial aerial" licences that allowed people to test transmitters without communicating at all.

Though two-way communication undoubtedly forms the majority of amateur activity these days there are still many for whom building and testing equipment or carrying out propagation experiments is the main interest. The medium is more important than the message, which these days can often be more effectively communicated via the internet.

Modes such as WSPR reveal a lot about propagation and their use probably contributes more to an individual's self-training than participation in the local club net. Transmitting a signal and seeing where it can be received is a tradition that goes right back to the first experiments by Marconi, and is therefore surely a part of our amateur radio heritage.

PRESERVED COMMUNICATION BAND

Ray J Howes, G4OWY

Now, that's a good idea – 'a preserved communication band' ("Letters", January, 2010), says GM3BST.

So, a 'vintage' band-plan for 'preserved' communications is what we need? Let me see, so presumably this will include AM and, of course, CW and perhaps, for those who really are suffering from the symptoms of nostalgic withdrawal, we can't possibly leave out spark. Then there is DSB and so on. I must say, it does sound a wonderful concept. All those 'past it', those of a reactionary bent, the old-codgers and all other persons who consider themselves to be just outside the normal operating envelope, can gather happily together in several spots at a frequency as yet undesignated, and once there, join the delirious throng of like-minded fellows and to their hearts content, wax lyrical as they propel RF up into the ionosphere the old-fashioned way.

I can see it all now in my mind's eye, '600 metres' chock full of spark communications. AM is once again thriving. BBC quality voice transmissions are all the rage. Morse Code and its dits and dahs are singing their songs of sixpence all over the preserved communications frequencies, RTTY is joining in on the chorus too. If only, eh?

Derek Stanners G3HEJ

My heartfelt applause for John Tuke's, GM3BST letter in January's *RadCom*.

As a relative OT with some 59+ years of CW enjoyment, as I sit in the shack during these longer winter evenings, looking for some new challenges, I find few background sounds more enjoyable than those emanating from my little Target HF3 receiver's loudspeaker, whilst tuned to the new 500kHz band (set to a 3kHz wide pass-band)!

Last evening, (15.12.09), between 2015Z and 2200Z here in Camberley. Surrey, I casually heard signals (at upto S9+) from SM6BHZ, G3LDO (in QSO with G3DXZ), G3KEV, DI2AM, OK0EMW, EI0CF (again in QSO with G3LDO), G4JNT and... then at 2152Z, (RST 449) the higher pitched 10wpm beacon from VX9MRC, the Marconi Memorial Station in Nova Scotia on 507.770kHz.

My antenna is just an Inverted Vee doublet, untuned and fed via a 4:1 balun/coaxial feed to the HF3. This location suffers from local neighbourhood buzzy noises that come and go, but generally abate by 2300Z; however they cause minimal reception enjoyment problems.

As a kid, I learned to copy and enjoy recognising the various 500kHz MCW callsigns of the British and European Coastal Shipping stations, (audible on our elderly family radio,) as they communicated with ships around these coasts. Needless to say, I'm now working hard to generate about 50 watts of RF on this new band. So, will any of you happy *RadCom* readers join me there?

CHANGES, CHANGES, CHANGES

Roger Lapthorn, G3XBM

Having read GM3BST's letter regarding 500kHz, WSPR and CW, please may I respond?

John's sentiment is understandable, but WSPR is a very narrow band mode taking just 6Hz bandwidth for a single transmission, which may be sent as infrequently as a few minutes in each hour. Surely there is space for both WSPR and CW? Incidentally I've had several attempts at CW QSOs with quite strong stations on the 500kHz band and, with a few exceptions, it has been hard to get contacts with my very low ERP (1mW). Not so with WSPR. I can get instant reports from other amateurs and SWLs, via the WSPRnet internet database, day and night in great detail: reports give the receiving station's callsign, S/N level, distance, QTH locator, direction. All this data confirms that the signal has propagated to the distant receiving station. It allows me to see in a few minutes the effect of a change of propagation, antenna, ground, power output etc. In just 3 months on 500kHz I have received WSPR reports, so far, from 49 different stations in 8 countries, with the best DX reports being from LA and SM (951kms), and all with just 1mW ERP or less.

Take another example on 40m this evening. Noise level here was running at S8-9 and it was a struggle to hear much on the band. I go on to WSPR running 5W to my 5m long vertical (incidentally the same antenna used on 500kHz) and get a report within a few minutes from VK4YEH who was 16451km away. On CW I would never have heard him and I doubt he would have heard me. With WSPR I immediately KNOW that my QRP signal reached Australia.

Like many, I enjoy much QRP CW but there is definitely a place for WSPR beaconing on ALL bands as a real means of experimentation with propagation, antennas and rigs.

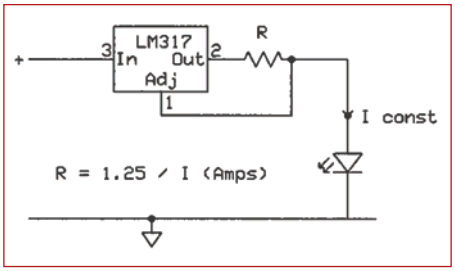
SHORT CIRCUITS

Geoff R Darby, G7RTC

It was good to see Andy Talbot's 'Short Circuits' feature detailing uses of the old but still infinitely useful LM317 variable voltage regulator. I'm sure it has served to introduce many amateurs to this versatile device, and remind many others who had forgotten about it.

I was, however, surprised to note that Andy had not made any reference to a well known (in professional circles) 'trick' mode of the LM317, in that with the addition of a single resistor, it can be used as a constant current source, capable of supplying at least 1 amp. This makes it an especially useful device for example, for driving LEDs, particularly high power types, of which there are now many on the market. Driving LEDs with a constant current has the advantage of prolonging their life. I have used several LM317s in this mode, at home in my kitchen, to drive series chains of white LEDs for plinth lighting.

The attached schematic shows how to connect an LM317 as a constant current source, and shows the formula for calculating the value of the single resistor used to set the output current.



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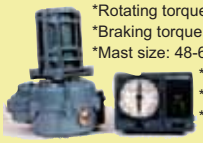

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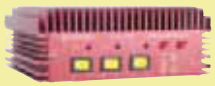

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DC - 800MHz 3-way coax switch 1.5kW 3x SO-239 Connectors.

2-Way Switches

CX-SW2N **£32.95 C**
DC - 3GHz 2-way coax switch 2kW 3x N-Type Connectors.

CX-SW2PL **£26.95 C**
DC - 1GHz 2-way coax switch 2kW 3x SO-239 Connectors.

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

VAT may have increased but many of our prices haven't!

MORE NEW PRODUCTS FROM ML&S!

ISOTRON!

The most compact 1kW HF Antenna ever!

After 30 years of manufacture and Hot from the USA, these very clever compact antennas are available for all the HF bands. They are easy, quick and simple to install. Tunes & performs without radials or antenna tuners.

Unlike other compact designs (that aren't actually that compact) Isotron even offer multi-band versions for 80/40 and 20/ 15/10m.

W8USR showing off the Isotron 40-80 Meter Combo Antennas

- Solve Virtually Any Restricted Space Problem - 40 Metre Isotron only 22 inches x 16 inches x 15 inches!
- Easy, Quick, and Simple Installation
- Tunes & Performs Without Radials or Antenna Tuners
- Handles Up to 1000 Watts PEP
- Durable Construction, Can be Used in Extreme Weather Conditions
- Excellent For Portable Operation - Emergencies, RV's, Field Day, Motels, Etc.
- Multi-Band Operation on One Feedline with Back-to-Back Mounting & NO Loss of Performance>
- Can be mounted in ANY Position Without Loss of Performance
- Maritime Operation - Uncluttered Setup, with Stainless-Steel Fasteners & Not Dependent Upon Grounding for Performance
- SO-239 Connector on All Models

The full range can be viewed on our web-site and prices start from only £100 through to £200 for the "Combo's".

G3TXQ HEX BEAM 5-BAND DXE-HEXX-5ATP

The G3TXQ 5-band HEXXAGONAL BEAM built by DX Engineering is a directional antenna kit made with fibreglass spreaders and wire elements for the 20, 17, 15, 12 and 10 meter bands. It looks like a very large inverted umbrella frame. Even at 22 feet wide and approximately 5 feet tall, it has a smaller turning radius than a two element 20 meter Yagi, and offers several enhanced operating characteristics.

The DX Engineering HEXX antenna can offer gain and front-to-back performance that exceeds your expectations for a 2 element beam, as its unique shape is much smaller, better balanced and has been reported to receive less noise than typical beams. This lighter, easier to handle antenna can be rotated with a light duty rotator, and it performs well, even when it is not mounted very high above the ground.

DX ENGINEERING

In stock, £599.95
more details see our website.

MICROBIT REMOTE RIG INTERFACE

A complete remote control system for Amateur radio

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.

For more info see our advert inside this magazine or visit **www.hamradio.co.uk/rrc-1258.shtml**

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.

An example: At the start of your walk, car or cycle ride turn on the G730 and when you finish your journey, turn it off. Once home plug the G730 into your PC, open the software, click on two icons and the route and pictures you have taken are viewed on Google earth/maps. The G730 records your speed, altitude, distance etc., even showing how long you have stopped for during your journey. You can even use your digital images taken on route for future reference. How good is that!

Accuracy is to within 5 metres and you get up to 18 hours continuous use after a 2 hour charge via your USB port on your PC. **Use the MyDEL VENTUS GPS-logger for cycling, rambling, jogging, skiing, trekking, sailing etc.**

VENTUS WX-831

Introducing the next level of professional weather stations

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

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.

Intro offer of only £199.95 - in stock now!

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.

Functions

PC-Software
Anemometer with solar charger
Meteotime 4 days forecast from satellite
Wind Speed
Wind Direction
Wind Chill
Rain Gauge
Barometric forecast
Pressure Read out
Bar charts
Trend indicators
Dew Point
Heat Index
Sunset and sunrise display
Moon phase
Critical weather alert
In/Out Temperature
In/Out Humidity
Memory of temperature, humidity and atmosphere pressure
Calendar
Alarm
Radio-controlled clock
Time-zone setting
Blue backlight

Open six days a week. Mon - Fri: 9.30am - 5.30pm Sat: 9.00am - 5.00pm

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