# RadCom

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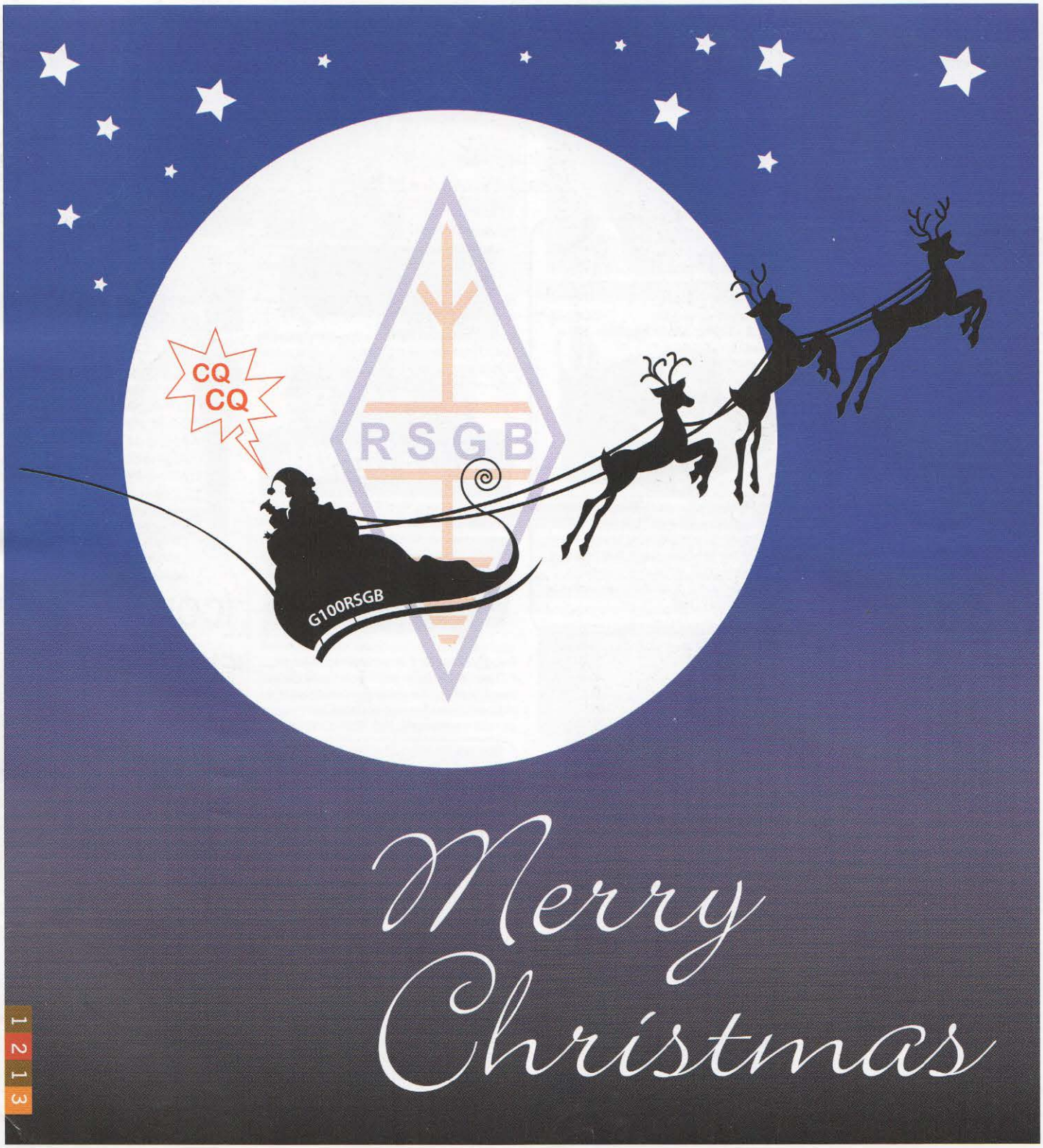
Radio Society of Great Britain
100 YEARS 1913 - 2013

DECEMBER 2013 ◆ VOLUME 89
NUMBER 12 ◆ £4.95

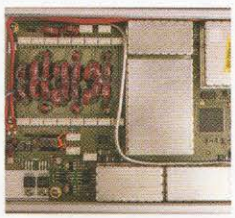



Merry Christmas

1213

## Software Defined Radio

Using a £10 DVB-T USB stick as a wide frequency range all mode receiver



## Zeus ZS-1

Fully digitised SDR transceiver with general coverage receiver


## Easter Island

All about the XRØYG CW DXpedition to this rather rare entity

WATERS & STANTON

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YAESU
Choice of the World's top DX'ers

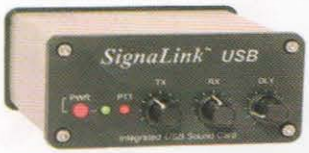
**PX Deals**

# The NEW FT-1200 Transceiver -- IN STOCK!

- 160 - 6m
- 5 - 100W
- Colour TFT Screen
- Auto ATU
- SpectrumScope
- 3 x Roofing Filters

**£1399**
**FREE DELIVERY**
**24 Month Wtty.**

## SignalLink USB




*Built-in Low-noise Sound Card*
*Simple Installation and Setup*
*Complete Radio Isolation*
*USB Port Powered*
*Works with virtually ALL Radios*
*Uses Mic, Data, or Accy Port*
*Supports virtually All Sound Card Digital and Voice Modes*

**£99.95b**

It's our most popular Digital interface with USB cable of your choice to connect to your radio. If you have not yet tried the digital nodes, this could be the perfect introduction.

**FT-60E + FREE ACCESSORIES!**
2m/70cm Dualband 5W Handie

Choose either a QS-112Y4 Speaker Mic or WEP-501Y4 Earpiece/Boom Mic.
+ THESE GOODIES
1x WCN-3 Adaptor (worth £4.95)
1x LBMP-BK Log Book (worth £5.95)
1x WSC-3 Soft Case (worth £12.95)
1x Exclusive Yaesu Cap (worth £19.95)

**£129.95b** Plus £50 Worth of FREE Extras

## OM Power

**NEW**

Two high quality amplifiers that will provide you with superb performance and signal gain. If you were at the Newark Hamfest you will know that the engineering is superb.

### 144MHz 1KW Solid State Amplifier

The OM-2001 144MHz all mode amp. with 17dB gain. Drive levels are 7 - 14W for 1kW output.. LCD data panel for and well protected against VSWR and overload etc. Three quiet cooling fans. Case is 270mm x 190mm x 340mm (width x height x depth). Weight is 12kg. **£2295**

### 1.8 - 52MHz 1.5kW Amplifier

The OM-1500. A single air cooled GS23B Ceramic tetrode provides 14dB of gain and delivers 1.5KW for SSB and CW (1KW data), reducing to 1kW on 50MHz. It typically requires around 60W drive for full power output. There is extensive protection against VSWR, High anode or screen current, Mis-tuning, Temperature to high, and features Soft start for protecting your fuses. **£2895**

### FT950
### HF & 6m 100W

**Save £195**

30kHz - 56MHz Rx, Auto ATU, triple conversion Rx with 3 roofing filters, 32 bit floating point DSP, Tx variable bandwidth and Mic EQ adjust, and much more! A really great transceiver for base station use. One of our most popular radios. **£1099.95c**

### FTDX-3000HF & 6m Transceiver

## Price Down!

**SAVE £150 - While Stocks Last!**

Dual roofing filters, DSP IF filtering, large colour LCD screen, RTTY and PSK31 mode. Spectrum scope, bandscope and data. Super front end combined with down conversion to 9MHz . IF output and USB interface comes as standard. And of course you get a built-in automatic ATU. IN STOCK - **£2399d**

## Heil Winner

### The HM-12 Can Change Your Signal

Just £69.95

It all starts at the microphone and if your audio does not have good articulation, then your signal will not be as distinctive, clear or as punchy as it could be. The HM-12 has been designed to work with all the modern HF transceivers. It can transform your audio. Ready made lead terminated with mic plug of your choice **CC-1 £35.95**

## WATSON

All models fitted with "NF" Noise Remove Function

**Power Mite-NF**

**£79.95c**

- Output Voltage Variable: 4.0V - 16V
- Output Current: 22A Continuous, 25A Peak
- Output Voltage Regulation: Less than 1%
- Red Trip Warning LED, Green Power LED

**Power Max-45 NF**

**£129.95c**

- Output Voltage Variable: 4.0V - 16V
- Output Current: 40A Continuous, 45A Peak
- Output Voltage Regulation: Less than 1%

**Power Max-65 NF**

**£239.95d**

- Output Voltage Variable: 4.0V - 16V
- Output Current: 60A Continuous, 65A Peak
- Output Voltage Regulation: Less than 1%

## ICOM Exclusive Deals!

### IC-7000

**SAVE £100**

HF-70cms up to 100W All Modes **£1099.95d**

**PLUS £60 of FREE Accessories**

Base or mobile, this is a great all-band and all-mode radio. Full colour screen, DSP selectivity and noise reduction and a great reputation.

| | |
|---|---|
| ICOM Cap | worth £19.95 |
| ICOM Mug | worth £7.95 |
| ICOM Document case | worth £19.95 |
| A4 Log Book | worth £4.95 |
| World Prefix Map | worth £4.95 |

## Win Free Radio

### FT1DE 2m/70cms Handheld

We are offering this brand new transceiver as a prize for all Yaesu customers. Just buy any Yaesu radio from us and send the warranty card back to us. The offer applies to purchases from 1st October until 31st December.

**WORTH £429 Don't Miss Out!**

The FT1DE is a rugged dual band transceiver with two independent receivers built in. It has four power levels and can produce a maximum of five watts RF output. It has both FM and the new Yesu digital mode. It has wide receive coverage and dual AF so you can monitor two stations at once.

### IC-R6

**Free Extras**

**This scanner covers 100kHz-1309MHz. Receives FM WFM & AM and comes with AC charge and NiMH batteries £179.95c**

**PLUS £50 of FREE Accssories**

| | |
|---|---|
| ICOM Cap | worth £19.95 |
| ICOM Mug | worth £7.95 |
| WAT-999 Earpiece | worth £9.95 |
| WSC-3 Belt case | worth £12.95 |

### TOKYO HY-POWER HL-100BDX

100W All Mode Amplifier 3.5 -50MHz

A very compact 100W amplifier that is ideal for low power transceivers such as the FT-817. It requires 6W or 12W input for full output (Switch selected) and PTT can be via RF sensing. The amplifier uses switched band pass filters. **£599.95 c**

### AMERITRON Value Amplifier

AL-811XCE 600W SSB CW

This popular amplifier will give your signal a real boost. 160m to 10m with low cost 811 tubes means easy maintenance. Has built in PSU. Just connect and talk! **£949.95**

### bhi Noise reduction products

**NEW**

**DeskTop**

- High Quality Desk Speaker
- 4" Bass & 1" Tweeter
- 10W output
- bhi DSP Noise cancelling unit
- Side DSP controls
- Accepts stereo or mono input
- Feed with line or speaker levels
- Requires 12v - lead included
- Hear the difference

Maybe you are not realising the full potential of your receiver? This DeskTop unit is a great station addition. **£179.95**

**NEX-10-2 mk II**

- Noise Cancelling speaker
- 9 - 35dB reduction
- 8 levels of processing
- Bypass switch
- Easy connects to any receiver
- No need to open up receiver
- 12v DC operation

A great asset to any receiver or transceiver. Hear the signal and not the noise! Makes copy so much easier. **£99.95b**

### Ultra Fast AA Battery Charger


**V-1000**

If you use AA cells, then this unit will charge 2Ah cells in around 2 hours. It comes supplied with AC mains adaptor and 12v car adaptor. So no matter where you are, you

**£11.95 a**

### VX-8GE
2m/70cm Handy

**Save £60**

The VX-8GE APRS/GPS provides an economical opportunity to obtain a handheld dedicated to APRS on 144 & 430 MHz. This model allows users to acquire a VX-8 series radio without having to pay for many of the VX-8DE features that may not be of value for their active APRS operation

**Was £349.95 Now £289.95c**

Carriage Charges: A=£4, B=£5, C=£8.50, D=£11

Fast Same Day Despatch! Orders Received Before 3pm

Buy Now Pay Later Available!

Main Sponsors of the RSGB National Club of the Year

WATERS & STANTON

# ICOM IC-7100 HF - 70cms inc 4M!

**Available NOW £1249.95c**

- HF, 6m, 2m, 70cm Multi-band, All-mode
- DSTAR DV Mode • Intuitive Touch Screen Display
- Easy-to-see, Easy-to-use Slant Top Controller
- Built-In SD Card Slot & USB • Built-In Speaker
- Dual DSP deliver great processing performance
- Built-in RTTY demodulator and decoder
- Voice recording and playback functions
- Optional RS-BA1 IP remote control software

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Multi Currency
Multi Language

CLICK!

# KENWOOD TS-990S 160m - 6m 200W In Stock

RadCom: "Performance Second to None" - "performed impeccably on strong and

PART EXCHANGE WELCOME

PHONE OR EMAIL US FOR A REALLY GREAT DEAL.

**£5999.95d**

The TS-990s 160-6m 200W transceiver is the product of many months of work carried our by the Kenwood engineers, and has resulted in a radio that is surely right at the top of current radio technology. Its comprehensive colour display forms the centre of the design. The large heavy flywheel drive is a joy to use and underlines the mechanical superiority of the TS-990s.

# Compact HF Antenna

# See Review

**DESPole Dualbander & Tribander**

No Trap No Compromise 5kW - Immediate Delivery!

The Despole has no lossy traps and coils, which means over 98.5% of power is radiated. It employs a single element feed and use proximity coupling of the remaining elements. A DESpole installed typically 10m above ground produces a significant gain over a 1/4 wave vertical and the folded ends both help with impedance matching and reduce the turning radius.

| Bands | Long / High | Weight | Price inc VAT |
|---|---|---|---|
| 15-10-6m | 5.5 / 1.5m | 4.48kg | £199.95d |
| 20-15m | 6.3 / 1.3m | 6.7kg | £259.95 |
| 20-17m | 6.3 / 1.9m | 8kg | £279.95 |
| 20-15-10m | 6.2 / 2.6m | 7.5kg | £299.95 |

## Handheld Transceivers

**IC-E92D**

Dual band 2m/70cm waterproof fitted D-Star. Rugged radio. The IC-E92D is a waterproof dual band transceiver. The IC-E92D is ideal for D-STAR enthusiasts, active amateurs who are fans of outdoor pursuits or organisations that are looking for a simple GPS position reporting system.
**£387.95d**

| | | |
|---|---|---|
| VX-3E | 2m / 70cm Handy Wideband receive | **£129.95c** |
| **VX-6E** | 2m/70cms handy, Wideband Receive | **£179.95c** |
| **VX-7R** | Triple band handy silver/black | ***£299.95c*** |
| ***VX-8DE*** | 6/2m/70cm Upgraded APRS | **£369.95c** |
| **IC-E80D** | 2m/70cm D-Star GPS ready | £329.95c |
| **TH-F7E** | 2m/70cm + wide receive inc. SSB | **£236.95c** |
| TH-D72E | 2m/70cm GPS & TNC + SiRF | **£426.95c** |
| **TG-UV2** | 2m/70cm with CTCSS DCS | **£84.95d** |
| **KG-UV6D** | 2m/ 70cm 5W/4W SMA | **£94.95d** |

# YAESU

**FT-252 2m Handy £79.95**

144-146MHz
Rx 139-174MHz
Loud 800mW Audio
Tx 5W, 2W and 500mW
CTCSS & DCS Tx & Rx
9 DTMF Auto Dial Memories
1Ah Li-ion Battery & Charger

**FT-450D HF-6m 100W**

Price Down!

One of the most popular HF transceivers with built in ATU at a new incredible price. Don't miss out! **£719.95**

NEW

# ICOM ID-51E 2m/70cm

- Dual Bander
- Rx. two simultaneously
- D-STAR DV
- Integrated PS
- AM/FM Broadcast Rx.
- Submersible Construction
- Voice Memory recorder
- MicroSD Card Slot
- 1304 Memory Channels
- Rapid Charge DC Power Jack

# TS-590s 160-6m Transceiver

Kenwood has won the admiration of the radio press and hams all over the world. It is probably one of the best transceivers that Kenwood have ever produced. The best dynamic range in its class, digital IF, narrow roofing filters and auto ATU. Also FREE PC control program that can be downloaded. Exceptional value.

**IN STOCK £PHONE FOR DEAL**

# IC-9100 HF - UHF Transceiver

The Icom IC-9100 is ideal for the operator who is looking for a complete high performance radio that covers HF - UHF in one box. It offers 100 Watts output on all bands up to 2m, whilst on 70cms you get a healthy 75 Watts. An internal auto ATU is included which covers HF plus 50MHz. IN STOCK . **£2899.95 D**

# KNENWOOD TS-2000 160-23cm *

A base station that does every thing. All modes, 160-2m 100W, 70cms 50W and 23cm (option) 10W. This fine radio has stood the test of time. **£1549.95c**

# ICOM ICOM IC-9100 160m - 23cm*

The latest all mode DC to light radio from ICOM. 160-2m 100W, 70cms 75W and 23cm (ption) 10W. It is one of the very best all mode and all band transceivers available. High performance receiver and large easy to read display.
**£2899.95c**

# IC-7600 HF Transceiver

HF - 6m 100W
Dual DSP and three roofing filters. 3 - 6 & 15kHz
Double conversion superhet - super image rejection
Display 5.8" with ultra wide viewing angle.
Real time specrum scope - USB for flash card or keyboard
PSK and RTTY Operation with external keyboard.
104dB dynamic range for great receiver performance
**IN STOCK £3299.95 D**

# AR-8600MKII Base/Portable

This base or portable station receiver covers 530kHz - 3GHz. All modes AM FM FMW & SSB with standard rotary tuning. The ideal general coverage station receiver. Every Ham radio station needs a means of monitoring the signal that is being transmitted. We think that this is the one. **£699.95**

NEW

# FG-01 MkII Antenna Analyser

The new FG-101 antenna analyser that covers up to 72MHz with larger screen and will include a matching AC charger and PSU. This highly portable unit features dual impedance and VSWR traces with colour screen. **£239b**

**Fast Antenna Adjustments**

**CHECK OUT OUR NEW WEB SITE**

## Mobiles

**TM-281E**

Latest 2m FM 65W mobile. Superbly built **£169.95 D**

**FT-8800E**

**FT-2900E**

75 Watt 2m 3W Audio, CTCSS, DTMF mic & "WIRES" internet. **£142.95 D**

**FT-7900E**

**FT-8900R**

Quad band 10/6/2m/70cm FM 50W (70cm 35W) **£329.95 D**

**FTM-10E**

**ID-E880**

**TM-D710E**

50 Watt Dual band 2m/70cm with D-Star and airband receive. **£439.95 D**

Dualband Mobile 50W / 30W Great Value **£284.95 D**

**FTM-350AE**

2m/70cm Mobile Bluetooth GPS APRS **£399.95 D**

2m/70cms mobile 50/40W CTCSS, DTMF, internet, wide Rx **£219.95 D**

**TM-V71E**

2m/70cm Mobile with Echo Link **£299.95 £259 D**

2m/70cms Blue Tooth & built-in mic. **£324.95 D**

**Add A Quality Dash-Board Speaker!**

**SP-160**

* 8 Ohms * Power rating 1.5W * 3m of lead with 3.5mm jack * Size 97 x 67 x 27mm * Weight **£9.95b**

50 Watts 2m/70cms with APRS **£445.95 D**

**SP-180A**

6W Ampified Speaker 6W * Gain and on/off control * 12V DC cigar plug, bracket, audio lead with3.5mm plug. **£20.95b**

## HF - UHF Compacts - One Box! GREAT PRICES

YAESU

FT-897D base or portable. This 1.8 - 440MHz transceiver is great value. 1.8 - 50MHz 100W 2m 50W 70cm 20W. **£749.95d**

**FT-857D** The great value mobile or base HF-6m 100W, 2m 50W 70cm 20W. **£679.95d**

WATSON **HF-VHF Mobile Whips**

**MultiRanger 9 £49.95c**

- 80 - 2m non WARC
- Impedance: 50 Ohms
- Power Capacity: 120 Watts
- Connector: (PL-259)
- Length: 1.9m Max

**MultiRanger 2000 £69.95c**

This antenna is the same as the MultiRanger 9 but adds the WARC bands of 30m, 17m and 12m, 200Watts

## HF on a BUDGET!

YAESU

**FT-450D**

Has extra IF filter & an Auto ATU built in. 100W 160m - 6m with 3 IF filters 300Hz, 500Hz & 2.4kHz. **£789.95d**

IC-718 SSB CW 100W from 160m-10m. You won't find a more cost effective HF radio! **£594.95d**

ICOM

ICOM

IC-7200 this 100 Watt radio covers 160m-6m and includes digital IF filters. **£839.95d**

KENWOOD

TS-480SAT A very HF transceiver giving 100 Watts from 160 - 6m and includes auto ATU. **£779.95d**

Carriage Charges: A-£4, B-£5, C-£8.50, D-£11

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# MFJ

World's Largest MFJ Distributor

### MFJ-266 HF-UHF Antenna Analyser

Covers HF, VHF, plus UHF amateur & commercial frequencies with digital precision. Also displays SWR, Complex Impedance, & Impedance magnitude simultaneously - all on the same easy-to-read LCD screen. Use it to measure Capacitance, Inductance, Field Strength, Frequency & generate test signals. Fine tune stubs, analyse coax, test baluns & RF transformers, and perform many other important RF-related tasks around the shack **£329.95 c**

### MFJ-269 HF-UHF Antenna Analyser

* Freq Coverage 1.8-170, 415-450MHz
* Frequency Counter * LCD readout
* SWR & impedance or SWR Bargraph
* Coaxial loss meter * VSWR Meter
* Signal Generator * Freq Counter) **£389.95c**

### MFJ-259B HF-VHF Antenna Analyser

* Frequency Coverage 1.8-170MHz
* Frequency Counter * LCD readout
* SWR & impedance or SWR Bargraph
* VSWR Meter * Signal Generator
* Frequency Counter

**£289.95 £249.95c C**

### MFJ-912 4:1 Balanced Line Balun

The famous W9INN 4:1 1.5kW balun is for feeding ladder line via coax cable. Two large insulators for ladder line and SO-239 for coax. loss. **£76.95c**

### MFJ-945E 300W 1.8-50MHz Coax ATU

The small 8W x 2H x 6D inch black aluminum cabinet uses little room. The Cross-Needle meter shows SWR, forward and reflected power -- at a glance £134.95c

### MFJ-971 1.8-30MHz Portable ATU

The MFJ-971 is ideal for portable work and as well as dual ranges of 30W and 300W, it is possible by changing an internal jumper to convert to QRP 6W or 30W FSD. Wire, coax or balanced. **£119.95c**

### MFJ-941E 1.8-30MHz 300W ATU

Here is amazing value. A cross needle meter, antenna selector switch, and the ability to match wire, coax and balanced feed. This makes a great base station tuner capable of up to 300W and has internal 4:1 balun. 12v illumination **£119.95c**

### MFJ-949E 300W 1.8-30MHz ATU + Load

More Hams use the MFJ-949E ATU than any other model. Match any antenna. Wires, coax, balanced, plus 8-way antenna switch Large 3" cross needle and internal dummy load. **£199.95 £179.95c**

### MFJ-974HB 1.8-30MHZ BALANCED

A fully balanced line antenna tuner. Gives you superb current balance throughout a wide matching and frequency range. Handles 300 Watts SSB PEP and 150 Watts CW. A simple doublet covers all bands. **£199.95 c**

### MFJ-267 1.5kW Power Meter & Load

1.5 kW Dry Dummy Load has built-in precision, true peak-reading SWR/Wattmeter switchable to external antenna! Up to 650MHz **£169.95c**

### MFJ-250X 2kW Dummy Load

The MFJ-250X VersaLoad KW Wet Dummy Load lets you tune up fast! You can run 1KW CW or 2 KW PEP for 10 minutes. Or run ½ KW CW or 1 KW PEP for 20 minutes. Requires oil **£59.95c**

### MFJ-260C 300W Dummy Load

Every station should have a dummy load for testing and adjustment purposes. This one is our top seller and is available with SO-239 (C) or N (N) type sockets. It will handle up to 300W of power. **£45.95c**

### MFJ-16010 200W Wire Tuner

The MFJ-16010 is a variable L-network random wire antenna tuner designed to match the low output impedance of your transmitter to the high impedance of a random wire. Covers 3.5 - 30MHz. **£65.95c**

### MFJ-901B

The MFJ-901B is MFJs small and most affordable 200 Watt PEP Versa Tuner. Its designed to match virtually any transmitter (up to 200 Watts and can match coax and end fed antennas. **£104.95c**

### MFJ-986 1.5kW 1.8-30MHz ATU

Differential-T Tuner uses a differential capacitor making tuning easier. Broadband coverage ends constant re-tuning. A rugged roller inductor atu that handles 1500 Watts PEP SSB power and covers 1.8 - 30 MHz continuously. **£359.95c**

### MFJ-989D 1.5kW ATU

New and improved! The world's most popular legal limit antenna tuner just got better -- with no increase in price! You get better efficiency, lower losses, and a new true peak-reading meter. Easily handles full 1500 Watts SSB/CW, 1.8 to 30 MHz. **£399.95c**

### MFJ-962D 1.6kW ATU

The compact MFJ-962D handles 1500 Watts PEP SSB amplifier input power (800 Watts PEP SSB amplifier output power). Its perfect for Ameritrons best selling 800 Watt AL-811H or 600 Watt AL-811 amplifiers! **£399c**

### Tiny Tuner MFJ-902B

Tiny 4 1/2 x 2 1/4 x 3 inch tuner handles full 150 Watts! Covers 80-6 Meters, has tuner bypass switch, tunes nearly anything! Wire or coax. **£104.95c**

### Tiny Tuner MFJ-902H

Featured! Versatile Tiny ATU

Rea View

This tuner is a compact little design that can match just about anything and makes it ideal for use either portable or fixed station use. It features inductor switch, antena and transmitter matching controls. On the rear are connectors for coax, end fed wire and balanced line. There is also a bypass switch. Its tiny size makes it very atractive for many applications, yet it will handle up to 150W. As part of an all band antenna system, just add balanced line and a doublet! **£127.95c**

### MFJ-993B Auto ATU 300W 1.8-30MHz

From the the worlds top maker of ATUs

Tunes unbalanced/balanced antennas *Ultra fast . . . New 20,000 memories *Antenna Switch *Efficient L-network .*Select 300 Watts (6-1600 Ohms) or 150 Watts (6-3200 Ohms) 4:1 current balun * Digital SWR/Wattmeter *Audio SWR meter *Backlit LCD *Remote control port *Radio interface. £279.95

### MFJ-929 Fast Compact Auro ATU

200W handling matches any antenna with near perfect VSWR. Get the best from your antenna! **£214.95c**

### MFJ-998 1.5kW Auto ATU

*Full 1500 watts SSB/CW *Digital & Analog SWR/WattMeter *Ultra-fast, Safe Automatic Tuning *Wide Tuning Range (12-1600 Ohms from 1.8 to 30 MHz ) *Built-in Antenna Switch for two coax/long wire *Automatic Bypass protects your amplifier *Field Upgradeable Software *Very Compact! **£659.95d**

### MFJ-925 for IC-7000 & FT-857

MFJ-925 IntelliTuner™ specifically complements todays compact HF transceivers, such as the IC-706MKIIG, IC-7000, FT-857D, DX-70TH and TS-50S. Operates from 2 - 200W **£174.95c**

### MFJ-991B 300W Auto ATU

First dual power level Tuner -- Select 300 Watt SSB/CW and match 6-1600 Ohm antennas Or select 150 Watt SSB/CW and match extra wide-range 6-3200 Ohms. New 10,000 VirtualAntennaTM Memories. Like MFJ-993B, less digital SWR/Wattmeter/ LCD display, audio SWR meter/audio feedback, antenna switch or 4:1 current balun. **£214.95c**

### MFJ-998RT 1.5kW 1.8 - 30MHz

Weather-tight ABS plastic cabinet top with a stainless steel bottom. Send DC/RF down the coaxial line. Has MFJ's InstantRecall to see if that requency has been used before. If so, tuning is instantaneous. Measures 13 3/4W x 6 3/4H x 17 1/2D inches. It's the true fit and forget Auto ATU for those using linear amplifiers. **£779.95d**

### MFJ-994BRT 600W Remote ATY

As you're ragchewing, contesting or DXing, your MFJ IntelliTuner is learning! to operate in milliseconds! We've made this tuner to suit the UK market, so that those with linear amplifiers can enjoy the benefit of auto ATU. Includes coax DC feed. **£449.95d**

### MFJ-926B 200W Remote ATY

MFJ-926B Automatic Antenna Tuner covers the entire HF band and will match a random wire or coax-fed antenna 1.8 - 30 MHz at a full 200 Watts SSB/CW. Matches impedances 6-1600 Ohms (SWR up to 32:1). **£299.95d**

### MFJ-993RT 300W Remote ATU

The Remote IntelliTuner is mounted in a durable hard plastic case. Covers 1.8 to 30 MHz, has heavy duty 16 Amp / 1000 Volt relays and a highly efficient L-network. It also includes the MFJ-4117 BiasTee Power Injector to send DC/RF down your coax. **£329.95d**

### MFJ-927 200WRemote Auto ATU

Weather protected remote auto tuner for coax/ wire ant., includes MFJ-4116 Power Injector. Most MFJ-929 features, no LCD/buttons. This is a low cost ATU that will get you on all HF bands using just a single wire. **£259.95d**

### AR-303X VHF Rotator

This is a low cost answer to those who have been looking for an effective VHF rotator that does not cost a huge amount or is too large for the job. If you have a medium size VHF or UHF antenna, this may well be the answer. The rotator will fit masts up to 1.5" It comes with the 230v AC controller that steps down to 12v. It only needs low cost cable to connect to the rotator. One of our most popular rotators. **£109.95c**

## WATsON End Fed Half Waves

NEW

We are pleased to introdu the new Watson range of End Fed Half-Wave Antennas. An easy way, a most convenient antenna system for both home and portable application. The are purpose built single band resonant antennas f optimum performance.

An end fed half wave antenna has a few advantages apart from the convenience of end feeding. It acts just like a dipole and has a predic radiation pattern. It can be erected as a sloper which gives it some directional gain. It can also be run up the side of fibre glass mast to a as a vertical dipole. Used as a vertical, the ground connection no lon becomes a major issue and the angle of radiation is lower than for a quarter wave, making it ideal for DX performance.

Each antenna is individually tuned and fed with a weather sealed pre-adjusted matching unit. Termination is via an SO-239 socket and the wire element is PVC covered and virtually unbreakable with no

| | | |
|---|---|---|
| **WREF-10** | 10m (5m long) halfwave SO-239 | £62. |
| **WRED-12** | 12m (6m long) halfwave SO-239 | £64. |
| **WREF-15** | 15M (7m long) halfwave SO-239 | £66. |
| **WREF-17** | 17M (8m long) halfwave SO-239 | £66. |
| **WREF-20** | 20M (10m long) halfwave SO-239 | £69. |
| **WREF-30** | 30M (15m long) halfwave SO-239 | £73. |
| **WREF-40** | 40M (20m long) halfwave SO-239 | £86. |
| **WREF-60*** | 60M (30m long) halfwave S)239 | £13 |
| **WREF-80*** | 80M (40m long) halfwave SO-239 | £15 |

*These antennas are suppled with coax choke for optimum matching.

## WATsON Get Mobile - Have Fun

W-3HM W-3CK WM-14B

| | | |
|---|---|---|
| W-3HM | Hatch mount - universal adjust | £14.95b |
| W-3CK | Cable kit - 5m - matches W-3HM | £19.95c |
| WM-14B | Magnetic mount - PL-259 cable | £16.95b |
| W-627 | 6m - 2m - 70cms mobile whip 1.6m | £39.95c |
| W-770HB | 2m / 70cm 1.1m whip | £19.95c |
| W-285 | 2m whip 1.34m long | £19.95c |

The Watson mobile whips are well made antennas with PL-259 bases to fit into the standard SO-239. Above we show all the items you need to provide an efficient and reliable mobile antenna system.

W-6

## WATSON Base Antennas

**W-30** 2m/70cm, Gain 3/6dB, Power 150W, Length 1.15m, Weight 0.885 SO-239. Features fibre glass case with stainless steel radials. **£49.95 D**

**W-50** 2m/70cm, Gain 5/7.2dB, Power 200W, Length 1.8m, Weight 1 SO-239. Features fibre glass case with stainless steel radials. **£59.95 D**

**W-2000** 6m/2m/70cm, Gain 2/6.2/8.4dB, Power 100W, Length 2.5m Weight 1.2 kg, SO-239. Features fibre glass case with stainless steel r **£99.95 D**

## YouKits 3 Band HF Transceiver Ki

3 Bands
4 Watts
14-18-21MHz
**£179.95**

Here is a great new kit that builds into a very useful three band QRP transceiver. It covers three of the most popular DX bands. The kit req about 2 - 3 hours to build, Almost all of the components are pre mounted and so there is not too much soldering. Three toroids nee be wound and the rest is mechanical. The radio has a digital displa a built in keyer. Audio output is via headphones and the power req is external 9 - 15v DC. DIY radio at a great price.

## INNOV CP4 YAGI BEAM

### We are Exclusive Resellers


This antenna covers 20-15-10-6m and can handle up to 2 No traps, coils or discreet matching units. It has a single fe point to one driven element. Other drivers are close coupl boom length is just 3.7m long and element spacing is opt for each band. Thick wall large diameter full sized elemen used which results in almost no element sag and an excep ally clean sky line. Rated up to 100mph wind speed.

**Available for immediate shipment £999.**

**ORDER NOW!**
**01702 206835**
01702 206835
01702 203353

PayPal VISA

Carriage Charges: A-£4, B-£5, C-£8.50, D-£11

# RadCom

THE RADIO SOCIETY OF GREAT BRITAIN'S MEMBERS' MAGAZINE

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The online *RadCom* is at www.rsgb.org/news/radcom/


## News and Reports



## Members' Special Offer

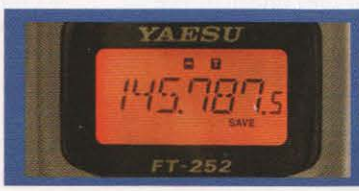


## Features

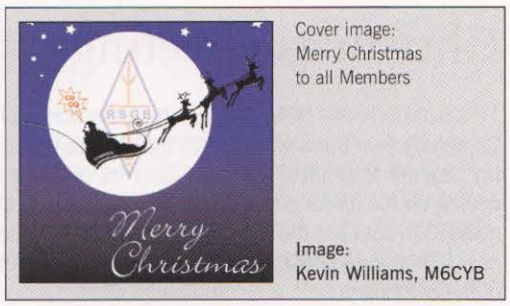


## Reviews






Yaesu's new low cost 2m handheld – P14




Cover image: Merry Christmas to all Members

Image: Kevin Williams, M6CYB

## Technical Features



Low pass filtering – P18

## Regulars

# Christmas Greetings

**TRY SOMETHING NEW.** With all the ceremonial of the RSGB Centenary year there was always the chance that it would crowd out my 'real' amateur radio activities, such as building something or even getting on the air for a few casual QSOs and a bit of contesting. I decided in January that I would make some time to enjoy trying some new things in amateur radio and that would be part of my celebration of the centenary.

**NEW BAND, NEW MODE.** For a start I decided to try and get on 472kHz, after all its just like Top Band but longer. Well, not quite! A transverter from 10.1MHz was haywired up from the junk pile and surprise, surprise I could even hear a few stations. So encouraged by this I tried *WSPR* and a few folks could even hear me. General transmitting was much more of a challenge though and I only managed two CW contacts – there is evidently much for me to learn about antennas for LF. Still that was a new band and a new mode.

**RECYCLING.** Fortified by this and as a result of a clear out of the garage, I found my old Meon 6m transverter (remember those) that I had built way back when we first got general access to 6m. I thought I would try and make it work on 4m. I have to say it was in a very sorry state but after a wash in alcohol and a careful dry out I was able to see some life in the devices. A new crystal and a bit of realignment and it worked! So with a simple amplifier and a 5-ele Yagi I was active on 4 and managed to put in a little operating in one of the 4m contests. Mind you I haven't got used to giving real signal reports and a great long locator, which to my HF mind gives me no clue as to where stations are actually located. Much frantic beam turning was the result.

**RADIO HOLIDAYS.** As far as radio holidays were concerned I had two. The first was a couple of weeks as J34G for the BERU contest in March. I only came 10th, so evidently not concentrating hard enough this year. Or was it that the antennas didn't seem to work like they should have, propagation was certainly very good indeed. Later in the summer I had a stay on The Lizard at the National Trust cottage next to the old Marconi station. A real trip back over 100 years to the start of radio when the world distance record was 186 miles. A great atmospheric experience to operate CW late in the evening with the Marconi OTs looking over my shoulder and no doubt tutting on the quality of my fist.


**A YEAR OF CELEBRATION.** Recently, I even managed to complete my STAR transceiver (PIC-A-STAR) to my satisfaction. Nothing can beat building your own high class radio and I am planning to build another in 2014 – very addictive this home construction.

Finally, I have used the GB4RS and G100RSGB calls to speak to many of you. I had asked for a SPAR (Special Presidential Autonomous Region) for G100RSGB but the powers that be were having none of such nonsense. It would have spiced things up a bit don't you think.

So I hope you all have enjoyed this year of centenary celebration and it only is left for me to wish you a Happy Christmas and my best wishes for 2014.

**Bob Whelan, G3PJT**
**RSGB President**

# Emergency Comms

A new single organisation to provide a unified emergency communications service has been approved by the RSGB Board. The Emergency Communications Committee will help bind the various affiliate RAYNET Groups within the RSGB and provide a more focused approach to managing and promoting RAYNET. It will meet twice a year jointly with RAEN at the Norbreck Rally in Blackpool and at the National Hamfest at Newark.

# PSC Vacancy

The Propagation Studies Committee (PSC) has a vacancy for a full member. It is looking for someone with an interest in HF who may be actively conducting their own research. The research might lead to a better understanding of HF propagation and/or would make for interesting features in *RadCom*. The commitment is for the member to join the PSC Yahoo Group, attend two six-monthly meetings in Leicester (spring and autumn) and perhaps help out on the PSC stand at the Newark Hamfest. You can find out more about the PSC at www.rsgb.org. Enquiries and applications should be sent to PSC Chairman Steve, G0KYA, via infotechcomms@googlemail.com.

## CONGRATULATIONS

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

| | |
|---|---|
| **70 Years** | |
| Mr J W Emmott | G3ANG |
| **60 Years** | |
| Mr A J Kightley | RS20103 |
| **50 Years** | |
| Mr I Beltrami | DX0130 |
| Mr C Garland | G3RJT |
| Mr J C Burbanks | G3SJJ |
| Mr R F C Alban | GW3SPA |
| Mr M J Bues | G8AAI |
| Mr J D Bosworth | G8BAV |
| Mr D Dunn | VK3DBD |

# Centenary Lectures

On 5 December, the RSGB is running a joint meeting with the IET at Imperial College, London (Room 308, Huxley Building) from 6.30pm to 9pm. This is the concluding, national, Centenary event. The meeting is open to all and attendance is free, including light refreshments. To assist us in organising the event, we ask that you indicate your intention to attend, online, as soon as possible (http://rsgb.org/main/about-us/rsgb-centenary-2013).

The meeting will comprise two lectures. Peter Chadwick, G3RZP, will talk on amateur radio technology and its application over the past 100 years and Lee Hudson, M0LMH will take a look to see how amateur radio may develop in the first decade, or so, of our next 100 years.

Details of the location of the Huxley Building can be found on Imperial College's website (www3.imperial.ac.uk/computing/about/gettinghere). It is very close to some of the most famous London museums – not to mention the Christmas market and ice rink outside the Natural History Museum.

It could be an ideal day trip to London rounded off with the RSGB Centenary meeting with the IET.

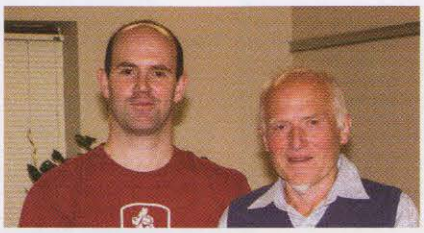
# Centenary Construction Competition

Congratulations to the following who won prizes in the RSGB Centenary Construction Competition. Prizes were presented at the RSGB Convention by Eben Upton, the designer of the Raspberry Pi. Some of the prize winning projects will be appearing in *RadCom* in 2014.

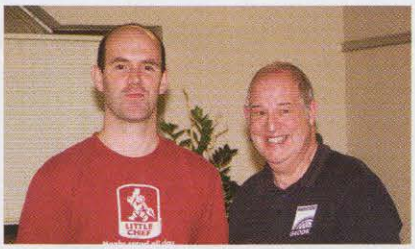
**Builder Category:**
Winner: Dr Guy Moore, G3RVU, The Continental TRF Crystal Set

**Designer Category:**
Winner: Giles Read, G1MFG, Beginners' AM Receiver with Printed Coil
Highly Commended:
Michael Castle, G1ZVN, EZE–PSK31
Sam Jewell, G4DDK, A Modern 4m Transverter Design
Michael Scott, G3LYP, A Personal Beacon for 9cm

**Pi-users Category**
Thomas Herbison, MI0IOU, RPi Wobbulator



Dr Guy Moore, G3RVU



Sam Jewell, G4DDK

Thomas Herbison, MI0IOU

# New IT System

During the coming days, the new IT system at HQ will be commissioned. This will improve the processing of membership applications and shop orders. Whilst no disruption is anticipated, Members are kindly requested to bear with us in the case of any short term difficulty.

# Video Competition

Have you – or your radio club – recorded any interesting amateur radio events, lectures or activities that could be used as part of RSGB promotional or teaching videos? If so, send a link to your amateur radio video to graham.coomber@rsgb.org.uk. RSGB book vouchers will be awarded to the best videos.

# Valuing Volunteers

The RSGB Board has adopted a policy that will recognise and encourage volunteers who give their time and expertise to support the development of the Society. A number of initiatives will be introduced during 2014.

# IOTA's 50th Anniversary Convention

2014 is the 50th Anniversary of the IOTA Programme and the Society will celebrate the event at Beaumont House, Windsor over the weekend of 4 to 6 July 2014. The Beaumont has undergone major refurbishment and is now one of the most popular conference centres/hotels in the area. It is set in 40 acres of countryside just by the River Thames with Magna Carta Island nearby where the famous charter of civil rights was sealed, as well as Windsor and its attractions just up the road

This will be a truly international celebration of IOTA. Well-known island enthusiasts both from the UK and overseas have promised to come. The occasion is not just for returning visitors but for new ones who want to enjoy the camaraderie of IOTA island chasers and activators mingling together and discussing their experiences on near and remote islands. The dates were chosen to encourage overseas visitors intending to attend Friedrichshafen 2014 (27-29 June) to make it a summer holiday by travelling across to Britain afterwards. You will find the warmest of welcomes here in 2014. We intend it to be truly a convention to remember.

Package bookings can be made shortly via a bookings module on the RSGB website. Day visitors will be very welcome and can also book attendance. In the meantime, mark the dates in your diary.

This is a one-off event to celebrate IOTA's 50th Anniversary and will not replace the October RSGB Convention. Do come and help make this happen.

**Roger Balister, G3KMA**

# M0 in a weekend!

Trainers are often asked about a fast track to a Full UK licence for competent candidates. Well, two Japanese visitors to the RSGB Convention did just that, completing all practical assessments and the three UK exams in a single weekend. Both Nozomu Takahashi and Masahiro Kitagawa already held Japanese callsigns and had good knowledge of radio and electronics so they breezed through the assessments and exams. The visitors gained the callsigns M0ITU and M0KKX just ten days after starting the process – and doing it in a second language is no mean feat!

Our thanks go to Olof Lundberg, G0CKV, who registered as an assessor and prepared the gentlemen for the exams, and to Carol Meredith, M6MUP, in the RSGB exam office for some DX admin in advance of the Convention. A great team effort showing that it is possible to fast track to M0, if you know your stuff.

It is possible for any candidate to sit more than one exam on a single occasion as long as the practical assessment(s) for those examinations have been completed. Your tutor will have all the details of this process: please check with them for more information.

The photograph shows the 15 candidates who sat the Advanced exam on the Sunday of the Convention with Lewis Thomas, G4YTN, and Steve Hartley, G0FUW, invigilating.

# QSL Matters

**QSL MANAGER UPDATES.** A new sub manager has now been appointed for the G7 Series. Experienced and former M1E sub manager, Chris Flanagan, G7NRO took early retirement from the Post Office some time ago and is making a welcome return to our volunteer team. It has not yet been possible to transfer Members' envelopes to him and all G7 members are asked to provide a small supply of new envelopes to Chris ASAP to help clear the backlog. Full details are on the RSGB website; click 'Operating' and follow the links.

G3A-D and G0N members are also requested to send a supply of new envelopes to the following sub-managers: G0s to Nigel Roberts, G4KZZ and G3A-D to Paul Pasquet, G4RRA. These groups were formally handled by our longest serving and well known sub manager, Ted Allen, G3DRN. Unfortunately, Ted has spent some time in hospital following an accident at home and is now recovering at a care home in Surbiton. The RSGB Board would like to wish Ted a speedy recovery and thank him for his service thus far. Until such time as we are able to transfer his stock of envelopes and cards will all G3A-D and G0N calls members please send new envelopes to Nigel and Paul.

The RSGB Board would like to send thanks to G0A sub manager, Keith Plumridge, G4BYY who made his last despatch of G0A cards this month after 40 years of RSGB volunteering. Keith is the longest serving G0 sub Manager and has been with us since the first G0A calls were issued, quite an achievement. He hopes to be back on the air soon and will no doubt be keen to contact old friends. This group is now part of the combined G0 series, all cards and envelopes having been transferred.

**IRC.** Last month's *Getting Started* article on QSLing (p31) gave rise to several positive comments from both new and experienced Members. Now that Royal Mail no longer offers International Rely Coupons (IRCs), you can obtain them from many independent, international QSL managers who act on behalf of DXpeditions and amateurs in rare locations. They continue to receive incoming IRCs from across the world and are happy to pass them on to UK amateurs at near face value.

## 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.**

Mr J Cook, 2E0JKC
Mr B Chalmers, 2E0NBA
Mr R Rogerson, 2M0RDG
Mr C J Wren, G0KLD
Mr C Carter, G1PCR
Mr K Bareham, G1RRR
Mr D Bailey, G3WNW
Mr S D Sharred, G4JGV
Mr B Walker, G4PCL
Mr R Bush, G6PKY
Mr D C Welch, G7IXU
Mr N Kingsley-Lewis, G7PSK
Mr P Whitehead, G8HEU
Mr C Wearing, GM8GIQ
Dr L Mag Fhogartaigh, GW0HGP
Mr L Kemp, KA7QLF
Mr S Waite, KB1YOQ
Mr S Marrano, KC2VNI
Mr C Wangen, LX1WC
Mr J Moch, M0HMN
S K Ramakrishnan, M0KRI
Mr P Howell, M3EYG
Mr G Wren, M3GVZ
Mr J Ball, M3VJM
Mr C Bassett, M6COE
Mr D L Reader, M6DJL
Mr A Ashton, M6EJA
Mr N Bookham, M6IVS
Mr J Saunders, M6JEO
Mr A Hoyte, M6LLH
Mr J Bookham, M6OBJ
Mr R Chappell, M6RCU
Mr R De Vries, M6RDV
Mr M Nutt, M6RNU
Mrs K Woodhams, M6RRL
Mr P Horrox, M6UMC
Mr WJ Alexander, M6WBI
Mr J Clark, M6YAL
Mr A Fell, M6ZZO
Mr A Morrow, MI6MFR
Mr D Waller, N1BBR
Mr R Wrede, PU2RKW
Mr J Secall, PY2MX
Mr S Watson, R214759
Mr A A H Williamson, RS211076
Mr H Newman, RS214440
Mr D Budden, RS214672
Mr D Whitehead, RS214683
Mr J Earye, RS214697
Mr M Bawden, RS214703
Mr A Stopford, RS214710
Mr B Bull, RS214711
Mr P Hodson, RS214715
Mr L Knapman, RS214718
Mr M Tointon, RS214771
Mr B A Lewis, RS214810
Mr M Hughes, RS214813
Mr M Woodruff, RS214822
Mr D C Frost, VE7FJE
Mr I M Palmer, VK3IN
Mr T Desiato, WA8LHB
Mr C Farnham, WD6CHC
Mr T M Samulenas, WO1X
Mr A Cranna-Powell, ZL1UJO
A M Lombard, ZS6WG

**The RSGB would like to welcome back the following Members who have rejoined the Society.**

Mr M Atherton, 2E0CKL
Mr A M Webb, 2E0DBT
Mr L S Bolton, 2E0NVK
Mr A Barron, 2E0TAZ
Mr R Goswami, 9Z4RG
Mr Mohamed Marhoon, A41KF
Mr J Holmes, G0BNF
Mr R F Jefferies, G0BQG
Mr R R Hoffman, G0CBO
Mr D Griffiths, G0CEQ
Mr J F Williams, G0KZI
Mr A W Glen, G0OQR
Mr R W Ravenscroft, G0RAV
Mr E K Lycett, G0SQZ
Mr J D Rushton, G0WZL
Mr B J Austin, G1IKV
Mr G T Senior, G3HRU
Mr G D Lawrance, G4EOB
Mr D J Rainer, G4VTQ
Mr J A Gagg, G4XRB
Mr G D Leggett, G7JYD
Mr M J Penn, G7JYY
Mr B Dorey, G7OYX
Mr C J Payne, G8AJM
Mr R Zielinski, GM0ELG
Mr S B Hayes, M0CNY
Dr R M Gooch, M0DWG
Mr G Asher, M3DTD
Mr M Turner, M6PLF
Mr R S Ewing, MM6SOR
Mr R T Tremelling, MW1FGB
Mr T I Rowlands, MW3RAU
Mr J N Liter, N2JL
Mr B P Dunn, ZS5XT


E&OE **All prices shown plus p&p**
**P+P From Free** See p80 for details

## Morse Code for Radio Amateurs

*11th Edition*

By Roger Cooke, G3LDI

*Morse Code for Radio Amateurs* is the latest, updated and expanded 11th edition of the RSGB's book designed to show how to learn Morse code and get the maximum enjoyment from using it.

*Morse Code for Radio Amateurs* has always set the standard for books covering Morse code and this edition is no exception. Morse enthusiast Roger Cooke, G3LDI has expanded this edition to be 50% bigger than its predecessor. As you would expect this book covers the history of Morse but there is much more besides. There are sections that guide you through abbreviations and prosigns, getting started, using computers and how to increase your speed. There is even a chapter on keys that discusses the way to use a straight 'pump' as well as modern keys and paddles. The book also describes the latest learning techniques involving computers and provides a guide to operating in contests.

**FREE CD:**
Included with this book is a free dual mode audio/ computer CD. There is nearly an hour of Morse code audio recordings, providing the opportunity to learn Morse code in the car or at leisure by playing it in any regular CD player. The computer readable section also contains these audio files as MP3 files and a whole host of Morse software from learning to contesting, along with lots of bonus material.

*Morse Code for Radio Amateurs* is the essential guide to Morse Code and there is no better start for anyone wanting to add "code" to their skills.

Size 210x297mm, 208pages,
ISBN: 9781 9050 8692 4
**Non Members' Price: £8.99**
**RSGB Members' Price: £7.64**

**£7.64 RSGB Members**

## Six & Four

*The Complete Guide to 50 & 70MHz Amateur Radio*

By Don Field, G3XTT

Six Metres (50MHz) – the 'Magic Band' – has always been 'different'. It sometimes behaves as an HF band, with world-wide propagation, but at other times acts more like a VHF band, enjoying the benefits of Sporadic - E, meteor scatter and other occasional propagation modes. Because it has so many facets, 6m is both a challenge and an enigma and it draws amateurs from both the VHF and HF worlds. Six & Four is the complete guide to this fascinating band and the similar Four Metre (70MHz) band.

Six & Four is based on the hugely popular 6 Metre Handbook, which is credited by some with doing much to popularise the 50MHz band. This book has moved on and is intended as a handbook for both the 6m and 4m bands. It includes a host of new material on the 4m band and the 6m material has been extensively rewritten to bring it fully up to date. There are details of the new equipment that has become available, especially by way of software-defined radios. There have also been some significant advances made in antenna design and EME ('moonbounce') activity has increased. There are new challenges, made possible by technological developments such as the WSJT and capabilities for remote operation have come on apace. And there are many ways to stay abreast of band openings and activity, through smart phones and other technologies. Six & Four covers all this and a lot besides.

Six & Four is essential, especially those who want to try something new and different. There's something for everyone, from the beginner who has never been on 6m or 4m, to those who might already have 200+ countries confirmed on 6m!

Size 210x297mm, 288pages,
ISBN: 9781 9050 8690 0
**Non Members' Price: £13.99**
**RSGB Members' Price: £11.89**

**£11.89 RSGB Members**

**Radio Society of Great Britain** **www.rsgbshop.org**
3 Abbey Court, Priory Business Park, Bedford, MK44 3WH. Tel: 01234 832 700 Fax: 01234 831 496

# Amateur Radio Licence Review

Ofcom have signalled that they intend to consult all UK amateurs sometime next year on their proposed Licence Review. Ofcom's Paul Jarvis has said that this is "not intended to be a radical change, but to be more explicit with regard to some of the existing clauses, operational practices and to help extend the services available to Amateur Radio to encourage development of modern technologies". The RSGB, working in consultation with Ofcom, is running a series of discussions on the RSGB website where any amateur can contribute feedback for Ofcom.

Three new discussion topics have just been launched, looking at Airborne Use, Remote Operation and Embedding the Progressive Licence Culture; others may follow in the next few weeks. Brief details are given here with much more information available on the RSGB website.

**AIRBORNE USE.** Ofcom has had a number of enquiries from non-amateurs regarding the use of the amateur spectrum for telecommand, telemetry and/or remote sensing downlinks from unmanned platforms, such as balloons, model helicopters, etc. Over the years the RSGB has questioned Ofcom as to allowing some relaxation to allow some airborne use to facilitate amateur experimentation. The current arrangements are seen to be unsatisfactory whereby licence exempt equipment is used within some amateur bands.

**REMOTE OPERATING.** The Society believes that the amateur radio community is interested in making more use of remote operation of stations, but the currently arrangements are slightly unclear and perhaps should be extended. The benefit would be for students, the elderly or disabled amateurs or others, who for a variety of reasons such as local noise or lack of space for aerials, cannot set up an effective station at their home.

**PROGRESSIVE LICENCE CUTURE.** Ofcom is keen to see how changes to the Licence conditions might best achieve this objective, and is therefore considering incentivising progression from one level to the next. In this pre-consultation period Ofcom have asked the following questions:

Should this concept apply to change the system for existing licensees?

Are there some groups that don't need to progress?

Should the mentoring concept be used more to encourage progression?

We need your views so please access the forum at www.rsgb.org/licencereview.

# Calling Notice

Notice is hereby given that vacancies exist for the following positions in 2014:

- President (two year term)
- 1 Elected Director (three year term)
- Regional Manager for Regions 1 (Scotland South and Western Isles), 2 (Scotland North and Northern Isles), 4 (North East), 5 (West Midlands), 6 (North Wales), 10 (South and South East) & 12 (East and East Anglia) (three year term). Regional Managers are able to seek re-election and any Members wishing to be elected must reside in the Region concerned.

Candidates for the role of President will require the supporting signatures of 25 RSGB Corporate Members – see Candidate Pack for details – to support the nomination. Candidates for the Elected Director will require the supporting signatures of 10 RSGB Corporate Members – see Candidate Pack for details – to support the nomination. Please note that Members cannot support a nomination for both President and Elected Director. See 4.1, 4.2 and 4.3 of the RSGB Byelaws.

Regional vacancies will exist in the seven Regions detailed previously. Candidates for the Regional vacancies must obtain the supporting signatures of 10 Corporate members residing in the Region and Members may only support one candidate.

All candidates who wish to seek nomination for any post should download the nomination papers from the RSGB website (www.rsgb.org.uk/candiddatepack) or obtain them by post from RSGB Headquarters at 3 Abbey Court, Priory Business Park, Fraser Road, Bedford MK44 3WH. Completed nomination papers, with the supporting signatures, must reach the RSGB Headquarters by noon on 1 February 2014. A list of candidates seeking nomination will be published in the April 2014 *RadCom* and a ballot will be held before the 2014 AGM.

If you would like to discuss what is involved in any role, you can write to the RSGB President, Bob Whelan, G3PJT, either by e-mail to g3pjt@rsgb.org.uk or in writing to RSGB HQ.

**Rupert Thorogood. G3KKT, Company Secretary**

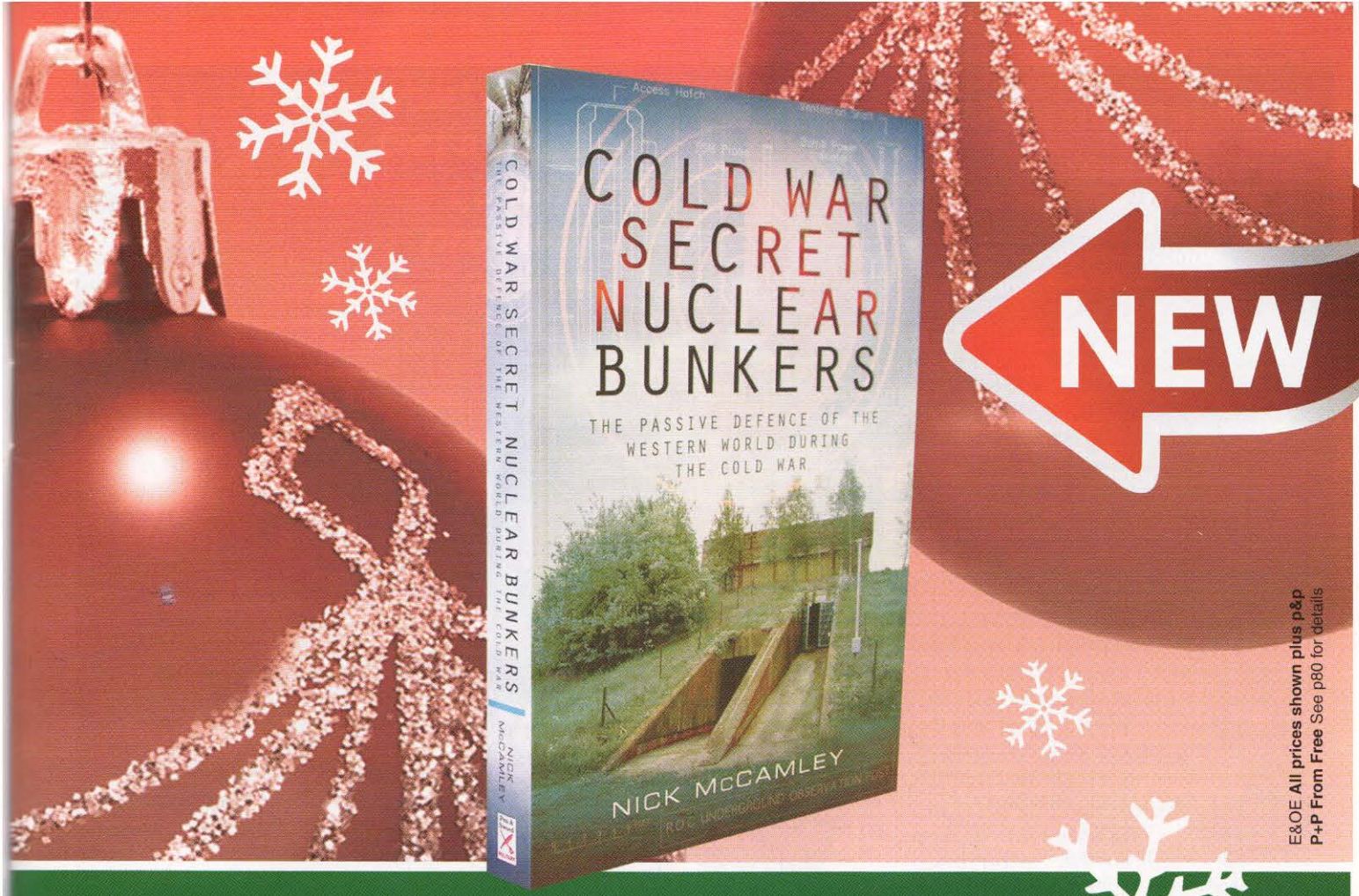
# Eric Neal, G8GP, SK, 2 May 2013

Eric Neal, G8GP passed away on 2 May 2013 just a few weeks before his 101st birthday.

He was licensed in 1934 and was an avid constructor making his own equipment for all bands from 1.8 to 1296MHz. He was a superb CW operator who got great enjoyment from DXing, contesting with the Crystal Palace club and also from his membership of FOC. In later years he became interested in working through AMSAT and in VHF DXing. He particularly relished the challenges associated with making his own equipment for 23cm and this was an inspiration to me while I was struggling with similar issues. Towards the end of his life Eric moved to a care home where it was not possible to install amateur radio equipment but he maintained his interest via *RadCom*, talking about amateur radio to his visitors and making occasional visits to local clubs. His last amateur radio visit was to Cray Valley's 2012L Olympic station at Avery Hill in September 2012, where our DVD of the event shows him taking a keen interest in the proceedings, especially the CW QSOs.

**Colin Wooff, G3SPJ**
**Treasurer, Cray Valley Radio Society**

G8GP with his niece, Maureen, at 2012L. Photo CVRS.

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RSGB shop

## Cold War Secret Nuclear Bunkers

*The Passive Defence of the Western World during the Cold War*

By: Nick McCamley

Britain is littered with a huge number of "Nuclear Bunkers" many of which are left over from the "Cold War". These relics represent the elaborate precautions that governments took to protect themselves in the event of nuclear war. However, for good reasons the precise nature of these arrangements has, until now, remained a closed book. *Cold War Secret Nuclear Bunkers* reveals for the first time the true extent of the preparations made.

*Cold War Secret Nuclear Bunkers* both surprises and fascinates with the scale and thoroughness of the installations. In the UK there were the London bunkers and the Regional War rooms built in the 50s to protect against the Soviet threat, and their replacement in 1958 by much more hardened, underground Regional Seats of Government and the unique Central Government War Headquarters at Corsham. The book also describes a vast umbrella of radar stations that spanned from the Aleutian Islands through Canada to the North Yorkshire moors, all centred upon an enormous secret control centre buried below Cheyenne Mountain in Colorado. This is complemented in the United Kingdom with a chain of secret radars codenamed 'Rotor' built in the early 1950s, and eight huge, inland sector control centres, built over 100' underground at enormous cost.

Readers will find that *Cold War Secret Nuclear Bunkers* provides coverage of the UK Warning and Monitoring Organisation with its underground bunkers and observation posts, as well as the little known bunkers built by the various local authorities and public utilities. You will also find details of the various bunkers built for the US Administration, and developments in Canada. The book even examines the lack of provision for the general population, comparing the situation in the USA and the UK with the Soviet Union.

A fascinating read that details a huge array of bunkers in the UK and further afield. Recommended reading for anyone interested in Cold War history or just the details of these largely 'off limits' structures.

156x232mm, 288 pages, ISBN: 9781783030101

Non Members' Price: £14.99
**RSGB Members' Price: £11.24 (25% off)**

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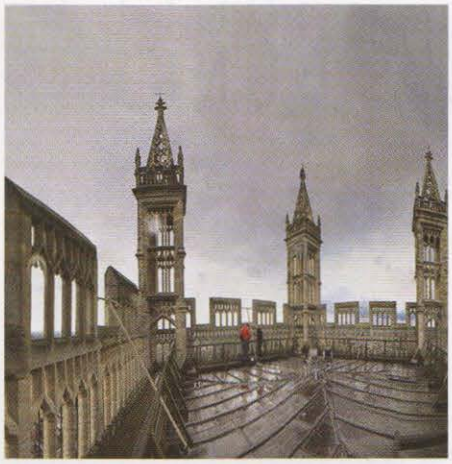
# Latest news of continuing RSGB Centenary celebrations

**CENTENARY STATION.** As I finalise this column, at the beginning of November, the total number of contacts is approaching 110k and so, with two Regions to go, the overall total for the year will be quite impressive. There has been a real following throughout the year to work the station as it moves between the RSGB Regions. Apart from the chasers there has also been a huge involvement by those organising and operating the stations. By the time this edition of *RadCom* is delivered we will be well within the final GM100RSGB schedule, with a full month's operation from Northern Ireland to take us up to the end of the year. I'd like to take this opportunity to thank the Regional Teams for organising the schedules, Joy and Rob at HQ for issuing the licence variations and the 'Alert' system credentials, the clubs and individuals who organised and operated the stations, John, G3LZQ for managing the online log & Log Book of the World uploads, and to Rob, M0VFC and the RSGB QSL Bureau for dealing with the Online QSL Request System and any incoming bureau cards (a responsibility that will continue for some time into the future). Michael, G7VJR and his team need a huge thank you for use of their *Club Log* system, and for creating the Leaderboard to track individual's Region / Band achievements. Finally, we should all thank Ofcom for providing us with the Special Special Event Station licence variation that made all the fun possible!

**CENTENARY VIDEO MOMENTS.** In addition to the longer accounts to be found on p72, I received an excellent video link of the Hallam DX Group's operation, which



G3VHI's 2m WSJT screen capture.

netted 3,393 QSOs in the day, including an 80m contact with ZM90DX, a station celebrating the first UK to New Zealand contact made in 1924. Other reports came in from Pete, G0WXJ of the Worcester Radio Amateurs Association, and Reg, G8VHI of the North Warwickshire Radio Group. The Worcester group had some logistics problems that delayed their start and after a huge pile up on 40m found that a solar event had curtailed matters on the HF bands. Reg reported an interesting 2m *WSJT* contact with OK1TEH, as well as a contact on 70cm with *RadCom* VHF Columnist Richard, G4HGI. Whilst this was ongoing Jim, G4AEH was having a 'busman's holiday' (from reading the BBC News) running pile ups on 40m and other bands.

**ENTHUSIASTIC SUPPORT.** I met a number of people involved in the Centenary station during the RSGB Convention, but my conversation with Afonwen, M6VAJ, wife of Graham, G0NBI our General Manager sticks in my mind. This conversation was memorable on account of her delight as a newly licensed amateur in taking on a 3 hour spell of operating with her local club, the Bromsgrove & DARC. I guess that she was one of those who could not be prised out of the operating chair. Getting newly licensed amateurs to experience the thrill of operating well designed and capable stations has been a regular feature of the correspondence that I have been receiving during the year about the Centenary station. I suspect, too, that the recent efforts by the sun in the current solar cycle have given many their first real experience of 10m at full stretch!

**JOINT MEETING WITH THE IET.** The final event of our Centenary Year is the joint IET/RSGB meeting on Thursday 5 December at Imperial College (Room 308, Huxley), between 6.30pm and 9pm. It is open to all, and attendance is free including the tea a biscuits! Following a suggestion from one of our overseas members we are discussing with the British Amateur Television Club the video streaming of the two lectures on the internet, and having the video available for later viewing. This, we believe, will be a fitting way to share in this final celebration of our Centenary year, and probably one that Rene Klein and the other Founders would never have envisaged in 1913!

For those planning to attend, we ask that you register your intent in advance at www.rsgb.org/ietrsgbmeeting – this will ensure that places in the lecture theatre are not over-booked. There are also links on our website with instructions on how to find the lecture theatre and, once finalised, links for the video stream and later viewing arrangements.

We are delighted to have both a well known presenter and some of our younger Members presenting. Peter Chadwick, G3RZP, will give the first lecture, entitled Amateur Radio: A Hundred Years of Introducing Technology. This will be followed by a short break for tea and biscuits, before Lee Hudson, M0LMH, presents the second of the two lectures, Amateur Radio: Looking to the Future.

**CLUB TALKS.** The Dip into the Archives series of talks have, so far, been downloaded by almost 40 radio clubs both in the UK and abroad. With wide ranging subject matter – highlights from the archives, wartime service, aerials and transatlantic tests – these talks last around 30 to 40 minutes each and can be a useful way of filling a gap in the programme. They can be downloaded from http://rsgb.org/main/about-us/rsgb-centenary-2013/convention-on-the-road/.

WEBSEARCH

Hallam DX Group G100RSGB video: http://rsgb.org/main/about-us/rsgb-centenary-2013/centenary-videos/
Joint IET/RSGB Meeting: www.rsgb.org/ietrsgbmeeting
ITP Journal article: follow link on www.rsgb.org/main/about-us/rsgb-centenary-2013/
Club Log: www.clublog.org

## STATION CALENDAR FOR OCTOBER

**Region 1: Scotland West and Western Isles, GM100RSGB**

| | |
|---|---|
| 1 -2 Dec | Ayr ARG |

**Region 8: Northern Ireland, GI100RSGB**

| | |
|---|---|
| 3 – 4 Dec | Orchard County DX Group |
| 5 Dec | Ballymena ARC |
| 6 – 8 Dec | Mid Ulster ARC |
| 9 Dec | The City of Belfast ARS |
| 10 – 11 Dec | West Tyrone ARC |
| 12 - 13 Dec | Foyle & DARC |
| 14 – 16 Dec | Greenisland Electronics & ARS |
| 17 – 18 Dec | Lagan Valley ARS |
| 19 Dec | Marconi Radio Group |
| 20 Dec | Lagan Valley ARS |
| 21 – 22 Dec | MI0MSR |
| 23 – 24 Dec | Hilltop RG |
| 25 – 26 Dec | MI0WJC |
| 27 – 29 Dec | Grey Point Fort ARS |
| 30 Dec | CASHOTA |
| 31 Dec | GI0AZB |

# Yaesu FT-252E

## The answer to cheap Chinese imports?

**INTRODUCTION.** In recent times there has been a flood of inexpensive 2m and dual band handhelds from the Far East, often purchased via eBay. Whilst they generally do a workmanlike job, support and backup is often at best a lottery; if you're lucky, the eBaye seller will replace a defective product provided you can work out a way of couriering the offending item to their PO Box in China – usually for a transport cost that substantially exceeds the value of the offending device. So you're snookered.

Enter Yaesu with their new FT-252E. It's a low cost yet remarkably high specification 2m handheld that competes with the Chinese imports on their own ground. But what's it like in practice?


The Yaesu FT-252E comes with the usual array of accessories – antenna, charger, belt clip and battery.

**WHAT'S IN THE BOX?** I was very pleasantly surprised when I opened the sturdy cardboard packaging: the first thing I saw was a slip of paper entitled 'FT-252E Quick Manual'. It's less than 8¼ by 3½ inches, yet on just one side it told me everything I needed to know to get the radio up and running. Full marks, Yaesu. The other side of the Quick Manual contained information about scanning, the Automatic Transponder System and how to reset the radio – all good stuff but, from an amateur radio perspective, I'd have found it much more useful to be told how to set up CTCSS so that I could access my local repeater straight away.

The radio arrives with a battery pack – of which more later – plus a 145mm long flexible antenna, a very light mains charger, belt clip, Quick Manual, 64-page Operating Manual and a warranty registration card. The charger is a switch mode design that I think owes its heritage to mobile phones rather than the heavy, clunky transformers that used to accompany amateur handhelds.

**DESCRIPTION.** The FT-252E is a fairly standard-size radio that feels very nice in the hand. It has a slightly sculpted feel and I found it very pleasant to hold, even for long periods. Everyone I handed it to remarked on its nice feel and also that it seems quite light weight, even though at 280g it isn't particularly anorexic.

The battery is quite different from any other handheld I've used: it's a small square package that lives under a removable hatch on the back of the radio and the electrical connections are made via a 3-wire lead that terminates in a plug that mates with a socket inside the radio (see photo). It was quite easy to install the battery, although I found it best to use something non-conductive such as a lolly stick to make sure that the plug went fully home. The battery is rated at 7.4V, 1030mAh (7.7WH) and uses lithium-ion technology.

Yaesu claim that the FT-252E is waterproof to IPX5. When I first encountered it (at Hamfest) I was told that it is based on a professional marine radio and this certainly looks to be the case: it has a feeling of quality and toughness that you just don't seem to get on lesser radios. The battery hatch has a rubber O-ring to keep moisture out and the DC charger socket has a tight-fitting 'bung' for the same purpose. I don't know how they keep the loudspeaker and microphone dry but I have no reason to think they haven't solved the issues there.

The receive audio sounds nice and solid, with no trace of the tininess that is sometimes the hallmark of an inexpensive radio. Transmit audio was reported as fine and "sounded surprisingly like me". There is no provision for an external microphone or earpiece/speaker.

**IN USE.** When you switch the radio on you're greeted with a gentle set of three rising tones whilst the orange backlit LCD shows the battery voltage for a couple of seconds (typically 8.4V when fully charged). Then the display switches to frequency (or memory channel – see later), whereupon it's ready for use.

Volume and squelch are adjusted by pressing the VOL SQL button and then using the knurled control knob on the top panel or the prominent up/down arrow buttons on the front.

Basic frequency selection is either via the control knob or arrows. I was pleased to note that right out of the box the FT-252E was set for 12.5kHz steps and repeater shift was automatically engaged between 145.600 and 145.800MHz. A quick delve into the manual found menu item 40 to turn on the CTCSS encoder then 42 to set the tone frequency, whereupon I was ready to use my local repeater. It was nice to note that even with the limited number of keys on the front panel, one (REV) was dedicated to listening on the repeater input.

At this point I got called away so thought I'd simply leave the radio on to listen in for a while. It was more than 24 hours later that I returned, and discovered that the handheld was still dutifully monitoring the repeater. The battery held out for several more hours, which I thought was impressive. Yaesu's figures suggest that the battery will keep the radio in standby on a silent channel for


The well-formed characters are easy to read on the backlit LCD.

more than 40 hours with a freshly charged battery, but – like a mobile phone – I'd probably charge it every day it was in use. I didn't get a chance to check the transmit battery life but it should be adequate. Transmit power is switchable between 5W, 2W and 0.5W using a dedicated front panel button and I'd be inclined to keep mine on the middle setting, as a balance between output and battery life.

Comprehensive memory facilities are provided. There are 200 memories (that's quite a lot more than the total number of 2m simplex & repeater channels!) plus 10 programmable scan edge memories and a 'home' (calling) frequency. Memories can be alphanumerically tagged with up to 6 characters so it's easy to set up things like GB3BF, RAYNET, S20 or whatever.

CONCLUSION. Overall I'm very impressed with this rugged little radio. It does what it says on the tin, feels solid without being clunky, is easy to use (even for a menu-hater like me) and has decent battery life. It is very good value indeed from a major manufacturer, giving Yaesu's well-known customer service backup at a bargain price.

My thanks for Waters and Stanton for the loan of the review radio.


The lithium ion battery pack is different from many handhelds and connects via a flying lead and plug.

# Moving On

## Loading of aerials

**INTRODUCTION.** This article makes use of some of the reasoning and facts established in my recent articles. These are fairly obvious and intuitive:

1) All wires carrying an RF current radiate (unless they are enclosed, eg by a coax shield), or are adjacent to another wire carrying an equal and opposite current (eg a twin wire feeder).
2) The amplitude of the electric waves and the magnetic waves radiated by a wire are each proportional to the current in the wire.
3) The current in a wire can be increased many fold for the same available RF power by making the wire part of a resonant system. Resonance implies storage of energy, usually with continuing exchange between potential and kinetic energy, with only a fraction of the total energy being dissipated during each cycle. In the case of a radiating aerial, the storage fields inherent in resonance (resulting from electric charge constrained in the radiating system) ensure that any energy stored on the first pass of the current is radiated subsequently.

**WHY DIPOLES RESONATE AND RADIATE.** Consider a wire with RF energy fed into it symmetrically about its centre, as shown in **Figure 1**. Each arm has self inductance, which increases as the arms are made longer and the dipole has capacitance between the arms, which also increases with their length. Although in reality these are both distributed along the arms, the centre fed wire aerial (that we will still call a dipole although not a half wave dipole) can still be represented by the equivalent circuit shown in **Figure 2**.

As explained in 3) earlier, for maximum radiation the wire should be made part of a resonant system and one way of doing this is by choosing the 'right' length. The reason that there is a right length is because inductive reactance increases with increasing inductance, but capacitive reactance decreases with increasing capacitance. So, at any particular frequency, as a wire is lengthened there comes a point where the rising inductive reactance and the falling capacitive reactance become equal. Now inductive reactance is positive but capacitive reactance is negative and they are effectively in series at the input of our short aerial, so their effective reactance becomes zero at this particular frequency. This is called the 'resonant frequency'.

In addition to rising inductance and capacitance as the wire length is increased, there is also a small series resistance due to the radiation from the wire. This is shown by the rectangular boxes in the upper arms of Figure 2. This 'radiation resistance' is very small indeed for a wire that is much shorter than a half wavelength, but it rises roughly as the square of the overall length to about 72Ω as the overall wire length reaches half a wavelength. A wire length equal to half a wavelength will not be considered further since no additional loading is required to bring the antenna system into resonance. The first overall length at which the inductance and capacitance become equal (and opposite in sign), is about 5% shorter than half a wavelength [1]. Nevertheless, such an aerial is still called a 'half wave dipole'.

**LOADING.** A centre fed dipole shorter than half a wavelength is thus deficient in both inductance and capacitance for achieving self resonance. This can be remedied by adding additional 'lumped' inductance or capacitance or both, or 'distributed' inductance and capacitance in the form of additional line length to the non radiating parts of the system. The latter is probably the simplest to explain.

Consider the aerial system shown in **Figure 3** in which the inner parts of the arms are brought together at right angles to the radiating part of the antenna.

This will still be self resonant if the total length of each arm is approximately one quarter wavelength long, although the feed point impedance will be rather less than 72Ω. This form of loading (for aerials that would normally be too big for your garden) is exemplified by the G5RV and others. In principle, the parallel feeder portion could have any spacing and impedance, but as there will be standing waves on it, it is better to avoid low impedance coax (which tends to be lossy at high VSWR).

A viable alternative is to introduce 'lumped' inductance into the system as shown in **Figure 4**, which makes use of the existing capacitance of the wire but adds inductance in series with it to achieve resonance.

Another alternative is to add lumped capacitance, usually applied to the ends of the dipole, which makes use of the existing inductance of the wires to achieve resonance, as shown in **Figure 5.**

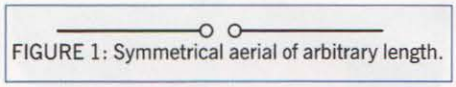


FIGURE 1: Symmetrical aerial of arbitrary length.

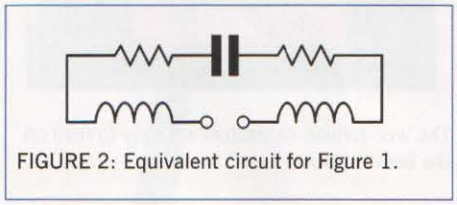


FIGURE 2: Equivalent circuit for Figure 1.

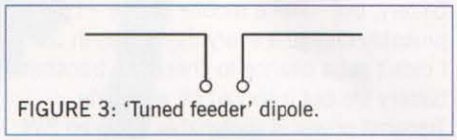


FIGURE 3: 'Tuned feeder' dipole.

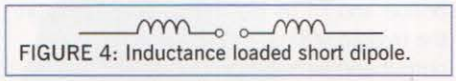


FIGURE 4: Inductance loaded short dipole.

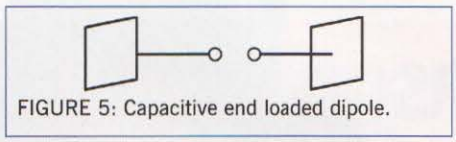


FIGURE 5: Capacitive end loaded dipole.

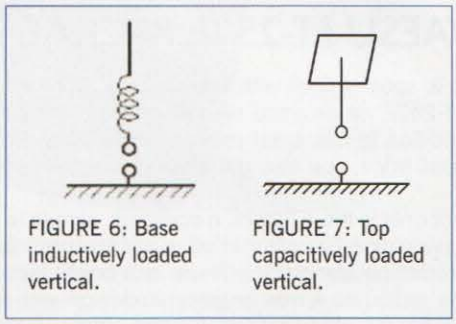


FIGURE 6: Base inductively loaded vertical.

FIGURE 7: Top capacitively loaded vertical.

**QUARTER WAVE VERTICALS.** All the systems discussed so far have been ideal 'balanced systems', clear of the ground. However, the principles are equally applicable to aerials tuned against ground, where, for 'perfect ground' (like a large copper plate or lots of radials) you only need, in theory, half of any of the above systems, as indicated in **Figure 6** and **Figure 7**. The ground, by the 'mirror image effect', provides the other half of the system.

The plate at the top of the capacitively loaded antenna is sometimes known as a 'capacitive (or capacity) hat'. In principle, loading may be applied to other parts of the antenna and, in particular, there is some merit in applying inductive loading part way up a vertical antenna, but discussion of this is beyond the scope of this simple explanation of loading. When tuned against ground, a full quarter wavelength antenna is self resonant, and has an input impedance of about 36Ω (half that of a dipole); rather less if it is shorter and loaded to achieve resonance.

**REFERENCE**

[1] This is discussed in more detail in the article on page 42.

# Homebrew

## Transverter LPF, Rx/Tx switching and a new LF/MF transceiver.

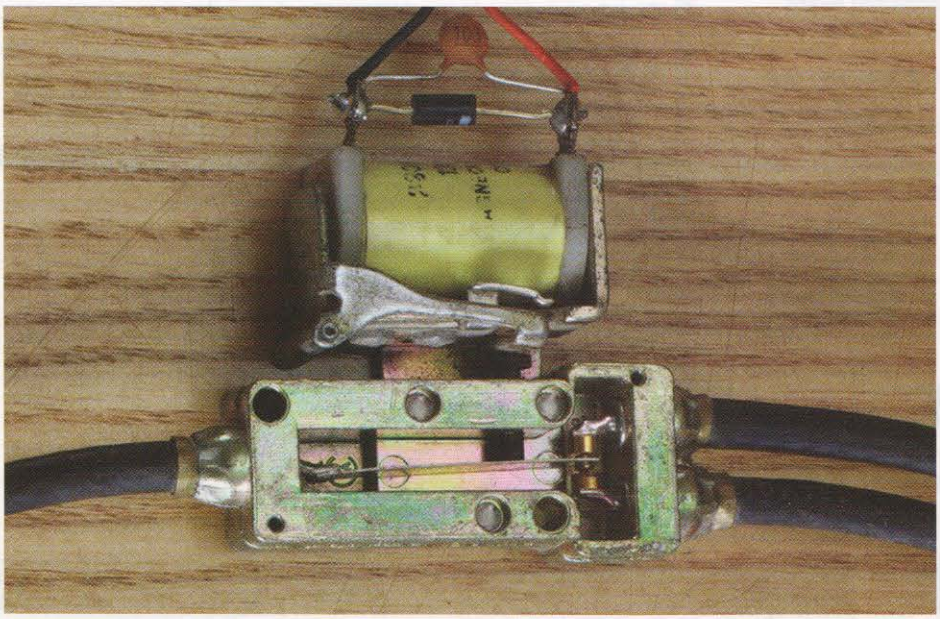


PHOTO 1: Close-up of a 50Ω coax relay.

LOOSE ENDS. Before we put the lid on the UHF transverter project, there are still a couple of loose ends to be tied up. The missing items are receive/transmit switching and the transmit LPF.

**Figure 1** shows simplified RF switching for a typical transverter. This exact arrangement was used in our previous 2m and 4m transverter projects. In most cases, the switches are electromechanical relays. It would also be possible to use solid state switching based on PIN diodes or other semiconductor switches (*by coincidence this approach is discussed in Design Notes on page 60 – Ed*).

Standard general-purpose relays are suitable for RF switching at HF and even into the low VHF region. Low profile, PCB mounting miniature relays with physically small contacts are useful up to 2m. Such relays are not suitable for use at UHF and above. Last month, we saw that even a short length of straight wire will have significant inductance at UHF. The contacts of a typical plug-in relay will look something like a single turn coil at UHF and an open or short circuit stub at microwave frequencies, depending on whether the relay contacts are open or closed. For UHF applications, a proper coaxial relay will be required. **Figure 2** shows the arrangement of a typical coax relay. In a typical device, the moving contact will be mounted on a flat metal strip that is placed in a metal channel. The dimensions of the moving strip and its enclosure are carefully chosen to form a transmission line of the specified characteristic impedance. Most coax relays are designed to interface with either 50Ω or 75Ω lines. The relay is operated by an insulated pin through a small hole in the body of the relay. This arrangement gives excellent isolation between the relay RF contacts and external circuits like the power supply for the solenoid coil. **Photo 1** shows a close-up of a 50Ω coax relay. Unfortunately, new coaxial relays are very expensive. In most amateur projects, these tend to be junkbox or surplus items. This can lead to a few problems, such as:

- inconvenient operating voltage for the DC coil, 24-27V instead of 12V
- non-standard size or PCB footprint
- non-standard I/O coaxial connectors.

In recent years, the standard relay for amateur high-power VHF/UHF operation has been the Russian REW 14 and 15 types **[1]**. These are military surplus relays with a DC operating voltage of 27V, although they will work reliably at 24V. RF connections are via special Russian coax connectors, rather than the more common N or BNC types.

I was fortunate to obtain a few Magnetcraft 12V coax relays at zero cost. These were pulled from old Storno VHF radio equipment (thanks Alex). These are well behaved at all frequencies from DC to more than 500MHz. I have been using a pair of these relays for RF switching in my 2m PA for more than 10 years without any failures.

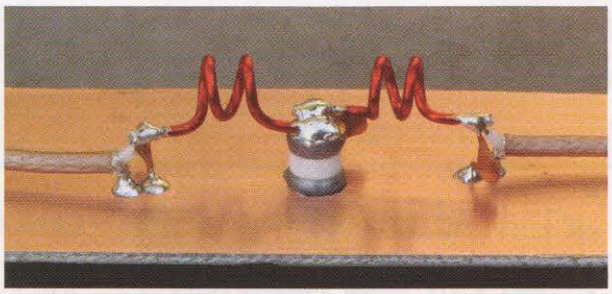


PHOTO 2: Assembled 460MHz low pass filter.

LPF. The built-in output matching network and LPF of a typical UHF power module will give harmonic attenuation of 25–60dB, depending on the chosen module and the DC bias conditions. The worst case scenario is when the device is biased for Class C non-linear operation and the output termination is not close to 50Ω. In a more usual configuration where the device is biased for Class AB linear operation and correctly terminated by a 50Ω load, PA modules like the Mitsubishi RA30H4047M will have 2nd harmonic attenuation of around 50dB and even better suppression of higher harmonics. Although this is an impressive performance given the small size of the

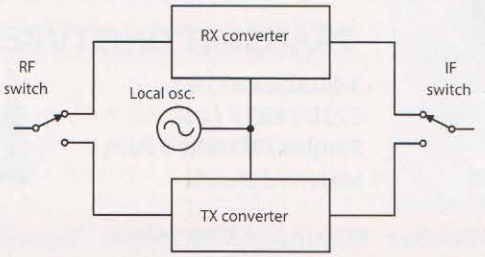



FIGURE 1: Simplified RF switching for a typical transverter.

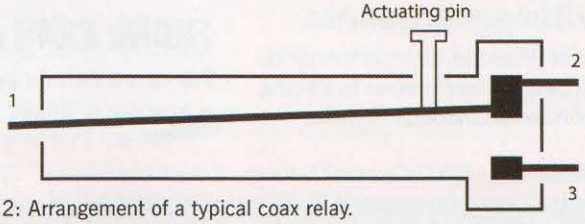



FIGURE 2: Arrangement of a typical coax relay.

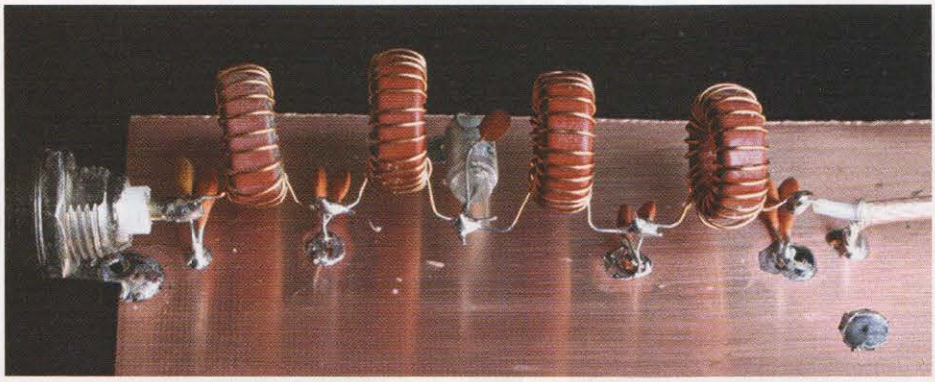


PHOTO 3: Prototype 4.2MHz low pass filter.

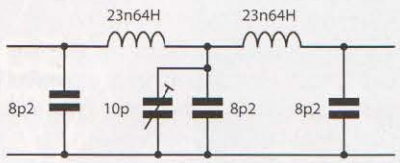



FIGURE 3: Simple 5th order low pass filter for 460MHz.

module, it is not quite sufficient to satisfy the requirements of the EI licence conditions. A further 20–30dB of harmonic suppression would be enough to guarantee compliance under all conditions. As a basic rule of thumb, simple LC low pass filters will give at least 6dB of 2nd harmonic suppression for each reactive element (L or C). Better performance is possible if a higher level of passband ripple can be tolerated.

A simple 5th order LPF will easily satisfy our requirements. There are several possible circuit configurations and filter types that would be suitable for this application. For transmit low pass filters, I usually use a PI network with component values calculated from handbook tables for a Chebyshev filter with negligible passband ripple of 0.1dB. On this occasion, I have taken the easy option and used the filter synthesis tool in *QUCS* [2]. One advantage of using *QUCS* is that you can easily tweak some of the filter parameters so that standard component values can be used. As an example, a 5th order Chebyshev PI LPF with a cutoff frequency of 460MHz and ripple of 0.1dB will require C1/C3 values of 7.93pF. This is not too far away from the nearest standard value of 8.2pF. We don't have the option of tweaking the design I/O impedance

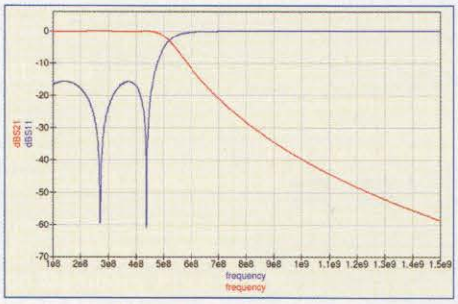



FIGURE 5: Expected performance of the 5th order low pass filter.

and there isn't much scope for decreasing the LP cutoff frequency.

We can however tweak the passband ripple by a small amount to achieve our goal. A couple of minutes spent tweaking the design resulted in a filter with 0.1166dB of passband ripple and C1/C3 values of exactly 8.2pF. The filter schematic is shown in **Figure 3.** The correct value for C2 is just over 13.9pF. One easy way to achieve this value is to use a parallel combination of 10pF and 3.9pF. The filter could then be fine tuned by adjusting the turn spacing of the two inductors. As I had a spare 10pF piston trimmer to hand, I used this in parallel with another 8.2pF disc capacitor to achieve the required value. **Photo 2** shows the assembled filter. Note the extremely short lead length used for the capacitors. The two inductors are each two turns of 1.25mm enamelled copper wire (Maplin YN81C) wound on a 5mm former.

Most of the standard textbook formulas show coil inductance as being proportional to $N^2$ (number of turns squared). This approach is usually quite accurate for a typical single layer, air cored solenoid with a relatively large number of turns and close turn spacing. At UHF where the number of turns can be very small, inductance may be more difficult to predict. Where coils only have 2-3 turns or where the turn spacing is very large, the usual coil inductance formulas tend to be unreliable. The straight connecting 'tails' at the ends of a UHF coil may also have significant inductance. For such coils, I usually reference the coil inductance charts in the old *VHF/UHF Manual* [3]. It is also possible to measure the inductance of small coils using an inductance meter or by forming a resonant circuit using the unknown inductor and a capacitor of known value. My standard test rig is shown in **Figure 4**. Series resonance is indicated by a sharp dip in measured output. $L = 25330/(f^2*C)$. However, for inductance values in the low tens of nH, it becomes almost impossible to determine whether you are measuring the inductance of the coil, your test rig, or the lead inductance of the reference capacitor.

The expected performance of the 5th order filter is shown in **Figure 5**. For the initial

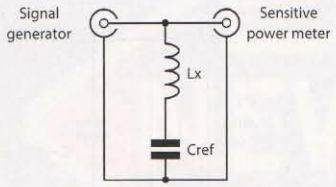



FIGURE 4: My standard test rig for measuring the inductance of small coils.

measurements, I used two turns of 1.25mm wire as described earlier and using a turn spacing of one wire diameter. This resulted in a cutoff frequency of around 400MHz, which is too low for our purposes. Spreading the coil spacing to just under 2 wire diameters resulted in a perfect filter response with the cutoff at 460MHz. Measured loss through the filter is less than 0.2dB. The wire at the end of the coils is 8mm long on each side. Use Photo 2 as a reference for making the coils. This filter is just about ideal for my application. If you will be using a Class C PA or if you just want to take a belt and braces approach to harmonic suppression, **Figure 6** shows a 7th order version of the LPF. All three coils are 2 turns as in the previous design, except that L2 uses a slightly closer turn spacing.

I had intended to build a high power PA for 70cm, but winter conditions and very low UHF activity in this part of the world make it hard to justify the effort at the moment. Perhaps I will take a look at UHF power amplifiers next spring when tropospheric conditions are more favourable. That wraps up the 70cm project for now. **Figure 7** shows the configuration of my transverter. A coaxial relay is used for RF switching. One pole of a standard DPDT relay is used for IF switching at 28MHz. The second pole is used for DC switching.

**LF/MF TRANSCEIVER.** Now we move to the other end of the spectrum and start work on an LF band transceiver.

My old 1992 vintage HF transceiver has finally reached end-of-life. I don't intend to repair it because it is mainly suffering from mechanical issues like worn switches, relays and a very worn VFO reduction drive. This leaves me in the slightly uncomfortable position of only having one working HF transceiver. The current HF transceiver was built between December 2010 and January 2012 and each of the modular stages was described in Homebrew during that period. So far, it has proved very reliable, but if it does develop a fault, I would be off the air until it is fixed.

A scan of the most recent pages of my logbook shows that almost all of my activity is on the 160m band. I am also interested in taking another look at the LF/VLF end of the spectrum this winter. I think a rig covering the range from VLF up to about 4MHz would be a useful addition to the

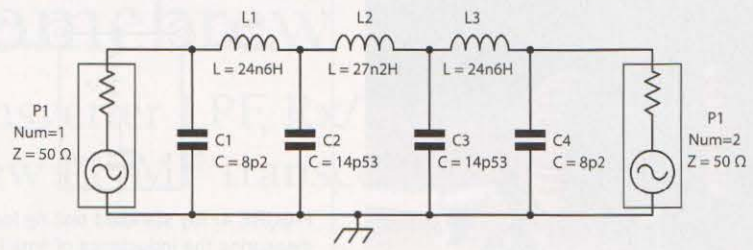



FIGURE 6: 7th order version of the low pass filter.

shack. This would serve as a backup rig for my 160 and 80m activities and also allow me to explore the VLF region.

My plan is to build a transceiver with continuous coverage from VLF to 4MHz. I'm not absolutely committed to any particular architecture yet, but my initial plan is to build an up-conversion superhet transceiver with an IF of 10MHz, RF tuning range from 4MHz down to as close as I can get to DC and local oscillator running on the high side of the IF from just over 10MHz up to 14MHz. As the IF and LO frequencies are well above 4MHz, there should be no need for switchable RF band pass filters. A single 4.2MHz LPF should meet all RF filtering requirements. Some aspects of the design may require a slightly different approach from what we have used in previous projects. For example: the transmit PA will need to work over a wide bandwidth, but at much lower frequencies than we have used in the past. Narrow bandwidth modes at VLF call for good frequency stability and small tuning steps. A DDS seems like the obvious choice for the local oscillator, although there are PLL based alternatives that we could explore. The receiver will be quite conventional apart from the VLF requirement. I will use home made crystal filters to provide the main IF selectivity. This will allow greater flexibility in the choice of IF bandwidth.

As we already have the necessary tools dusted off for the UHF LPF, we may as well start with the RF LPF section. The required frequency range is DC to 4MHz. As we will be depending on the LPF to reject the IF image and any direct IF breakthrough at 10MHz, the ideal filter would have around 100dB rejection of signals in the 10-14MHz range and at all frequencies above 14MHz. This can be achieved by a 9th order Chebyshev LPF designed for 0.1dB passband ripple. Once again, the *QUCS* filter synthesis tool was used to design the filter and to tweak the design to accommodate standard component values. The filter schematic is shown in **Figure 8.** To allow some margin between the top of the 80m band and the filter cutoff frequency, a cutoff of 4.2MHz was used for the LPF design.

The LPF was built on a strip of PCB laminate. Each of the inductors is wound from 0.375mm enamelled copper (Maplin YN86T) wound on a T50-2 (red) powdered iron toroid. The turns should be evenly spaced around the toroid. L1/L4 are 23 turns, L2/L3 are 25 turns. The five capacitors are made up from a parallel pair of standard value capacitors. The individual component values are shown in the schematic. The completed filter is shown in **Photo 3**. The measured performance of the filter is virtually identical to the *QUCS* model with negligible loss from DC to just over 4MHz and 'brick wall' rejection of all signals above the filter passband.

**WEBSEARCH**

[1] www.ur4ll.net/rew15.html
[2] http://qucs.sourceforge.net/
[3] *VHF/UHF Manual*, Fourth edition, 1985, G R Jessop, G6JP, RSGB.

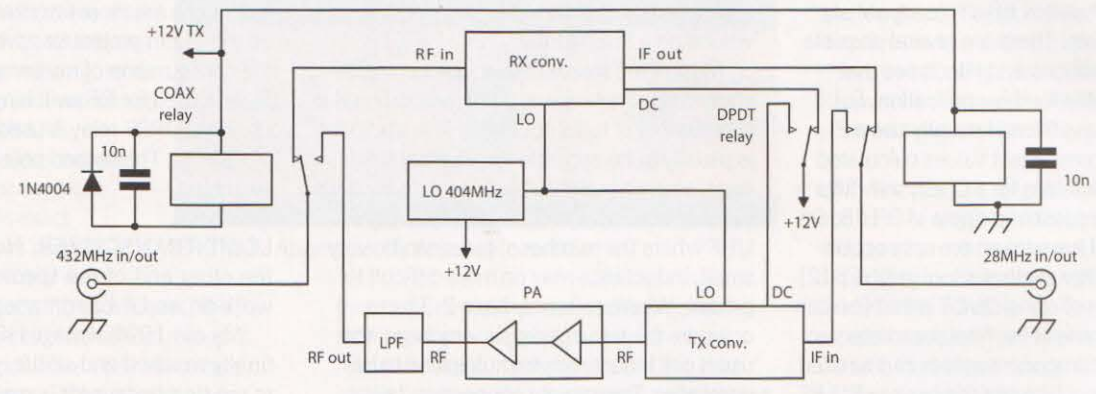



FIGURE 7: General configuration of my 70cm transverter.

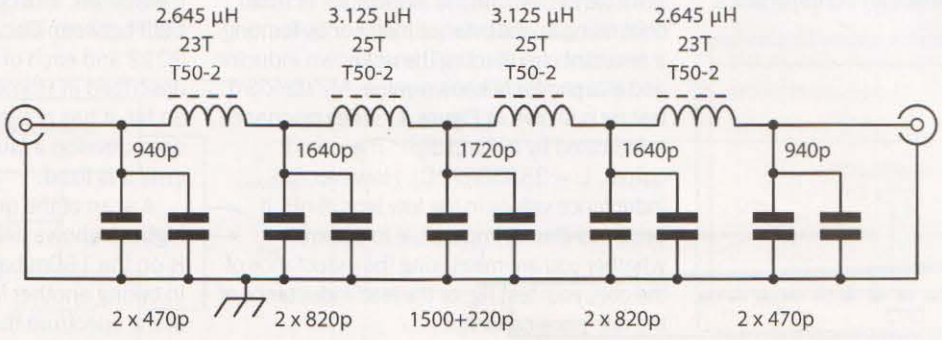



FIGURE 8: 4.2MHz 9th order low pass filter for the new LF/MF transceiver project.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# Zeus ZS-1 HF transceiver

## A fully digitised SDR transceiver with general coverage reception

The new Zeus ZS-1 HF transceiver is a fully digitised design featuring continuous general coverage reception from 300kHz through to 30MHz plus up to 15 watts transmit on the classic bands plus WARC bands. Being a fully digitised SDR transceiver, the hardware is virtually a 'black box' (silver in this case!) that carries all the interconnections with the transceiver's controls created through the PC software. The original hardware design and software development was by PARS LLC in Saint-Petersburg, Russia with Alexandr Gromov (UB1AGD) responsible for the hardware and Yan Alekseenko the software. The model reviewed here was built under licence by SSB-Electronic in Lippstadt, Germany.

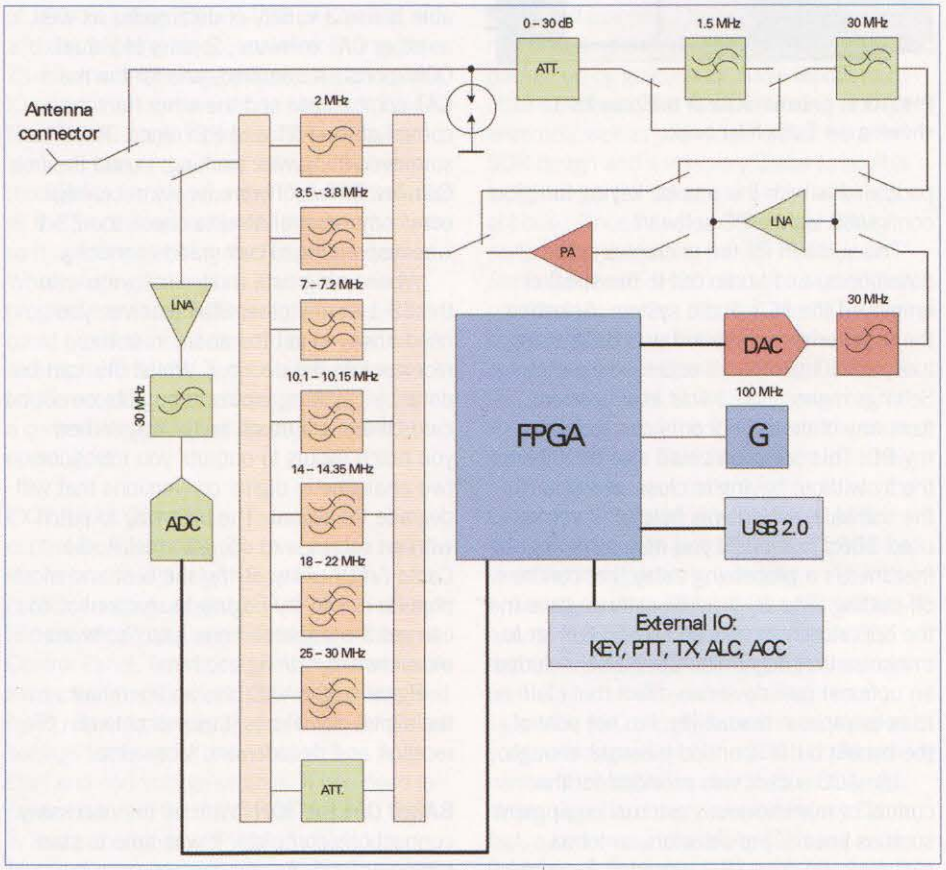


FIGURE 1: Simplified block schematic of the Zeus ZS-1 digital transceiver.

**HOW IT WORKS.** You can see a simplified block diagram of the Zeus ZS-1 in **Figure 1**. Following the surge protection, the antenna is fed to a software controlled 0 – 30dB attenuator (10dB steps) that is used to manage the input level to avoid overloading the Analogue to Digital Converter (ADC). The output of the attenuator passes via a 1.5MHz high pass filter for frequencies above 1.5MHz thus reducing the risk of overload from powerful medium wave broadcast stations. This is followed by a 30MHz low pass filter to eliminate signals outside the receiver's high frequency range. Before being applied to the main pre-selector filters, the ZS-1 has a switchable Low Noise Amplifier (LNA) that can be used to provide 14dB of additional gain. The main pre-selector filter bank comprises a set of 7 filters to cover the amateur bands. This same bank of filters is used for the transmit signal so large toroids were employed as you can see in **Photo 1**).

For use outside the amateur bands, the pre-selector can be bypassed in software by routing the signal via an attenuator that's set to match the loss of pre-selector filters. Following the pre-selector the signal is further amplified using a (LNA) and applied to the ADC via another 30MHz low pass filter. The ADC employed in this design is the Linear LTC2217, which provides 16-bit digitisation and is set to sample at a rate of 100 million samples per second (MSPS). The resulting output is a stream of16-bit parallel words arriving at a rate of 100 million per second! That's a lot of data to process and way too much to try and send to a PC. This is where the Field Programmable Gate Array (FPGA) comes into its own. These devices contain a wide range of high speed processing blocks that can be configured in software to create complex digital signal processing systems. The Zeus ZS-1 employs an Altera Cyclone III FPGA to do all the high power processing as well as providing the general control of the transceiver's functions. In the receive mode the main role of the FPGA is to provide a more manageable slice of digitised bandwidth that can be passed to the PC for processing and demodulation. This process is known as decimation and the output is a stream of IQ data that can be set to one of 9 pre-set bandwidths between 10kHz and 4MHz.

The transmit path is relatively simple as the modulated transmit signal is generated entirely in the digital domain by utilising a combination of the PC control software and the FPGA. The 14-bit output from the FPGA is applied to a Digital to Analogue Converter (DAC) running at 100MSPS where the output is a low-level, modulated, analogue signal at the chosen frequency. This signal passes via a 30MHz low-pass filter to the same LNA as used on receive. When the ZS-1 is used in its low power mode, this amplifier can provide up to 40mW of RF output. In normal use, the output of the LNA feeds a Class AB power amplifier using a pair of RD16HHF power MOSFETs that delivers up to 15 watts RF output. The PA or LNA output is then applied to the main pre-selector bank for final filtering before passing to the antenna.

**CONNECTING UP.** The ZS-1 is supplied with a CD-ROM containing the operating software along with the operating manual in PDF format and a USB lead for connection to the PC. **Photo 2** shows the rear panel of the Zeus ZS-1 where all the connections are made. The power requirement is 12 – 15V DC at 4A using a standard coaxial power connector. The antenna connector is a SO-239 50Ω device and the USB link is via a mini-USB connector. A wing nut terminal was also provided for the station earth. For Press-To-Talk (PTT) control there was a 6.3mm stereo jack where grounding of the tip put the ZS-1 into transmit. This connection could also be used to transmit an unmodulated carried by grounding the ring of the jack. The key connection also used a stereo jack and could handle straight or

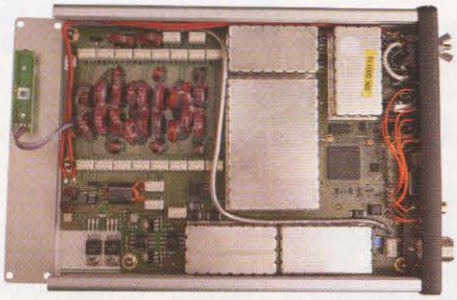

PHOTO 1: I nternal view of the Zeus ZS-1 showing the Tx/Rx filter bank.

paddle keys with the precise keying function configured via the PC software.

The audio in for the microphone (or datamodes) and audio out to the speaker employed the PC's audio system. Selecting the appropriate soundcard was done using a separate audio panel accessed via the Settings menu. Here I was able to select from any of the soundcards connected to my PC. This selection could also be done on the fly without having to close and restart the software, which was helpful. If you've used SDRs previously you may have noticed that there's a processing delay that can be off-putting. The ZS-1 audio settings gave me the opportunity to choose an ASIO driver to minimise that delay. The ZS-1 also included an optional pseudo stereo effect that claimed to help improve readability. I'm not sure of the benefit but it sounded pleasant enough.

The ACC socket was provided for the control of miscellaneous external equipment such as linears, pre-selectors, antenna switches, etc. The ZS-1 provided 8 control channels each of which had an open collector output that could source up to 150mA at 24V. The action of each channel was programmable in the PC control software. The Tx jack provided another 150mA/24V open collector output that was activated on transmit. Finally, the ALC jack was for the power amplifier ALC connection and could accept a negative going voltage ranging from 0 to -10V DC. When choosing a shack location for the ZS-1 I had to bear in mind that the top panel is used as the heat sink so needs a free flow of air. During the review the case ran gently warm to the touch during receive but became quite hot during prolonged data modes usage. However, there was a temperature monitor visible at the top of the display that provided software protection against overheating.

**RIG CONTROL.** Whilst the ZS-1 doesn't have a conventional CAT connector on the rear panel, it can still be controlled by third party software using what are known as virtual COM ports. To support computer control, the ZS-1 emulates the Kenwood TS-590 command set and the COM port and baud rate can be set up using the Server tab in the Settings menu. Because the control program and the transceiver are all created in software, there is no need to use real hardware COM ports. The solution is to use a software utility to create a pair of connected virtual COM ports. The ZS-1 manual suggests using *com0com* (http://sourceforge.net/projects/com0com/) so that's what I used for the review. In order to be able to use a variety of datamodes as well as other CAT software, 2 pairs of virtual COM ports are required, one for the main CAT control data and the other for simple control of the PTT and KEY lines. To make sure everything was working, I used the free *ComTestSerial* software (www.microridge.com/comtestserial.htm) to check the ZS-1 was responding to commands correctly.

When using data modes software with the ZS-1 or any other SDR receiver, you need a way to get the audio from the receiver into the decoder. Whilst this can be done by patching inputs to outputs on sound cards there is a much better way. When you patch inputs to outputs you introduce two analogue to digital conversions that will degrade the signal. The best way to patch without cables is to use a Virtual Audio Cable (VAC) utility. By far the best and most popular is *VAC* by Eugine Muzychenko. You can get the software here: http://software.muzychenko.net/eng/vac.htm.

By using the VAC, the audio remains in the digital domain as it moves between the receiver and decoder and vice-versa.

**BASIC OPERATION.** With all the necessary connections complete, it was time to start tuning around. As you can see from the screen shots, the ZS-1 uses a conventional SDR layout with spectrum and waterfall displays dominating the main display. With this type of display the primary tuning method is point and click and this was very well implemented in the ZS-1 software. A single left-click anywhere on the display and the receiver immediately re-tuned to that frequency. I could also tune around by dragging the frequency ribbon in the centre of the display. For more precise tuning with the ZS-1, I could place the cursor over any digit on the main frequency display and left-click at the top of the number to increase or the bottom to decrease the frequency. Fine tuning could also be carried-out by rotating the mouse wheel and I found this excellent for fine tuning SSB signals. The frequency step for each rotational click of the mouse wheel could be set to one of eight settings between 10Hz and 10000Hz. Getting around the amateur bands and mode selection was particularly easy thanks to the pre-set buttons at the top of the display. The Zeus ZS-1 also features two VFOs and I was able to quickly move between the two VFOs and swap values.

As mentioned earlier, the frequency span of the display could be altered and this was done by right-clicking anywhere on the display area. The nine options provided ranging from 10kHz to 4MHz wide, which should easily cover most requirements.

The ZS-1 includes multiple controls for managing the Automatic Gain Control (AGC). First up is the HF-AGC that controls the 0 – 30dB attenuator and the 14dB gain LNA ahead of the main ADC. This could be manually controlled or set to HF AGC Min to provide the best signal to noise ratio or HF AGC Max to simply avoid ADC overload. The second AGC controls dealt with the audio AGC and here you could adjust the speed and threshold values.

One of the strengths of most SDR systems is the excellent software filters and the ZS-1 does well in this area. By using a couple of sliders, the LF and HF cut-off points could be adjusted between 0Hz and 20kHz. I could also drag the bandwidth using the mouse pointer on the main display. Noise reduction filters were also provided with simple but adjustable broadband noise and automatic notch filters.

**TIME MACHINE.** One feature I particularly liked was the time slip control on the waterfall display. This appeared as a red arrow on the right hand side of the display that was normally aligned with the top of the waterfall. However, you could drag this down the display and it would play back a signal that had already passed down the waterfall. The maximum slip available was 2.5 minutes. But, in most cases, just being able to step back a few seconds was enough to recover a missed name or callsign.

**TRANSMIT AUDIO.** The ZS-1 included an excellent system for adjusting the transmit audio quality. With many rigs we have to rely on others comments to fine tune speech processors for the best communications audio but the ZS-1 has a better way. Using the TX Signal Settings panel, you first make a recording of your voice with your chosen microphone. Next you play back the recording and adjust the speech processor settings until you have your ideal audio. The voice recording plays back in a continuous loop so you can take as long as you like to get the sound just the way you want. To help get this right, the panel includes a spectrum display so you can see the spectral shape of your audio plus there is a 13-band


PHOTO 2: Zeus ZS-1 interconnections on the rear panel.

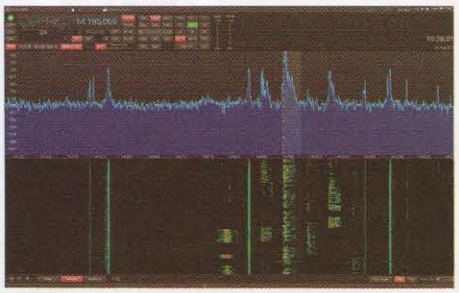

FIGURE 2: Zeus ZS-1 main screen.

graphic equaliser as well as adjustable dynamic and $\mu$-Law compressors and an AGC system. I tried this system with lots of different microphones and managed to get a decent sound out of all of them. The panel includes the facility to save two pre-set processor settings though I would have liked to be able to save more than that.

Completing the transmit audio, the ZS-1 included the facility to transmit a pre-recorded audio file. This could be useful for CQ calls amongst other things. The file just needed to be in 16-bit wav format with a maximum length of 5 minutes. The only feature missing was VOX facilities.

**CW PANEL.** For the CW operator, the ZS-1 is very well equipped with plenty of configuration options. The key is connected via the stereo jack on the rear panel and the ZS-1 can be configured to handle straight, single lever paddles and iambic keys. The CW tone could also be adjusted in 100Hz steps from 300Hz to 1kHz. Speed adjustment was also provided in characters per minute along with a spacing adjustment. The ZS-1 supports semi break-in with adjustable fall-back time and the ability to extend the first character to account for TX switching delays. The CW Panel was supplemented with a text entry box for typed QSOs along with a capacity for 12 pre-recorded macros that could be used for common exchanges.

**IQ VERSATILITY.** The In-phase and Quadrature IQ signals are the life blood of all SDR systems and it is these signals that are streamed to the PC for filtering and demodulation. However, with disk space being so cheap these days, it is perfectly feasible to record the IQ stream to disk for playback at a later time. The amount of disk space used by the ZS-1 depended on the bandwidth setting with a 10kHz bandwidth using 6MB per minute and the maximum recordable spectrum of 100kHz using about 44MB per minute. In addition to being able to make recordings, the ZS-1 software package includes a stand-alone IQ player that can be used to playback Zeus IQ files. The IQ player appeared to be a stand-alone version of the main software that was modified to handle recorded files. This included all the processing controls of the main software so it was like receiving the files all over again! When playing a recording, there is a handy progress bar at the bottom of the screen that could be used to fast-forward or re-wind to a section of interest. There are lots of uses for IQ recording, eg recording activity during a contest, recording activity during a band opening, etc.

FIGURE 4: The ZS-1 transmit audio processing panel.

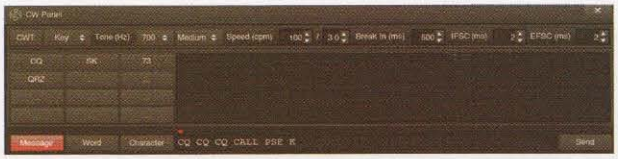

FIGURE 3: The ZS-1 CW settings panel.

**EXTERNAL CONTROL.** The external control facilities of the ZS-1 were very well implemented with eight separate open collector outputs available. The action of each line could be programmed using the External Control Panel. Activation points were available for each of the 9 amateur bands and triggered by Tx, Rx or both conditions. There were also settings for Tx on/off delays as well as ALC start and end voltage settings. If you need to control external fans or similar devices, there is also a configurable PWM (Pulse Width Modulation) output.

**SERVER MODE.** To support remote operation of the receiver, the ZS-1 software includes a server where its web address and communication port could be defined and the server activated. The server provides remote operation using *SDR-Console V1.5* or *SDRMAXIII* software. It should also be possible to provide fully remote LAN operation using one of the Silex USB-LAN servers but I didn't have the opportunity to try this.

**ON THE AIR.** I had the ZS-1 on review for several weeks so had the opportunity try it on lots of different bands and operating modes. The low power was no problem for me as I prefer to operate QRP and in most cases I used the ZS-1 running about 10 watts or less directly into my Butternut HF9V vertical antenna.

I found the tuning system of the ZS-1 to be particularly good and seemed to combine the best features of the SDR designs that are around at the moment. I found the time machine option particularly helpful for recovering a missed name or QTH. As I mentioned earlier, adjusting the speech processing using a voice recording worked extremely well as I was able spend time getting the sound just how I like it. Even a webcam mic ended-up sounding pretty good! This was backed up by good on-air audio reports from other amateurs. The variable filtering worked extremely well as you would expect from an SDR design and it was very useful to be able to tighten up the selectivity when the bands got busy. Once I'd set-up the virtual COM ports I tried controlling the ZS-1 with *Ham Radio Deluxe* v5 (*HRD*) and this worked fine, provided you un-tick the RTS and DTR boxes on the *HRD* connection panel. Next up was some data modes operation using FLDIGI. For this operation I set FLDIGI to manage the Tx/Rx switching using the PTT line via the second virtual COM port. This also worked extremely well and I was soon making contacts into the Caribbean and South America on 21MHz using PSK-31 with just 10 watts. I found the variable filters particularly helpful on PSK as I normally operate PSK with the filter set at around 2.8kHz so I can see the whole PSK segment. However, if a strong signal appears on the band whilst you're working a weak signal the AGC usually kicks in and wipes out your weak signal! With the ZS-1 I could quickly narrow the receive bandwidth to exclude the strong signal and carry on working my DX. In fact, a better way of working DX is to narrow the bandwidth once you've established contact. Having spent some time with the transceiver I think the interface could be improved with the addition of tooltips. These are the small text boxes that appear when you hover over a button. Without tooltips to remind me, I found myself having to refer back to the manual to check the function of infrequently used controls.

**SUMMARY.** The Zeus ZS-1 is an excellent digital transceiver with a particularly good user interface that made it a pleasure to use. The range of control provided was excellent and I was particularly impressed with the clever speech processing adjustment system. On air, the transceiver had many good reports and worked effortlessly across a wide range of operating modes. Full details and the specification can be found at the SSB Electronic website at: www.ssb.de/product_info.php?language=en&info=p3407_Zeus-ZS-1-Transceiver.html

The Zeus ZS-1 is available from SSB-Electronic GmbH and costs €1,499. My thanks to SSB-Electronic for the loan of the review model and to Willi Passmann, DJ6JZ and Alexandr Gromov, UB1AGD for their generous technical support in writing this review.

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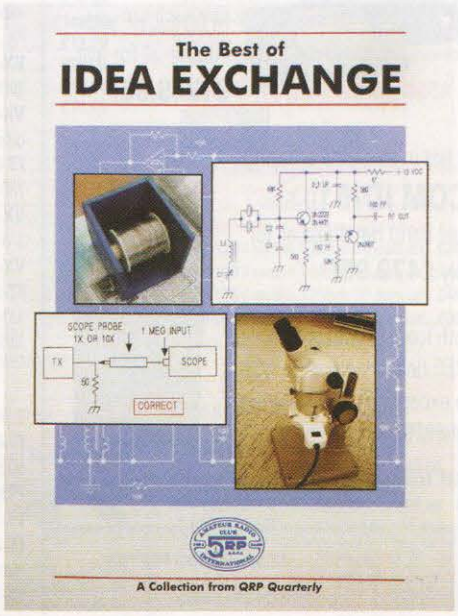
# QRP

## The best of idea exchange

**IDEA EXCHANGE.** There are some regular columns in amateur radio magazines that become compelling reading; they are the 'turn to them first' items. For many years I never received a copy of *RadCom* that did not have me turning first to Technical Topics by Pat Hawker, G3VA and, over the years, I have bought the *Technical Topic Scrapbook* collections. A very similar column is the 'Idea Exchange' in the American *QRP Quarterly*. Describing itself as "your construction and operating QRP sourcebook", *QRP Quarterly* is the journal of the QRP Amateur Radio Club International (QRP ARCI). Published for over 50 years, *QRP Quarterly* is sent free, four times a year, to all members of the QRP ARCI. It is fondly known as *QQ*.

When I receive my copy of *QQ*, I turn first to 'Idea Exchange', a regular column compiled by Mike Czuhajewsi, WA8MCQ, for more than two decades. Subtitled 'Technical Tidbits for the QRPer' it covers an amazing range of practical and technical ideas for the amateur radio homebuilder. The format is a cross between Technical Topics in *RadCom* and Hints and Kinks in *QST*. In the latest *QRP Quarterly*, at the time of writing this column (volume 54, number 3), the Idea Exchange occupies 16 pages and covers topics as diverse as improving eBay automatic electronic component testers, SMD test adapters, bench notes, a PCB shear, 40m AM broadcast interference filters, a DC power distribution system, parts storage, and laser printers and laminators for PCBs. It also included a contribution from Joe Everhart, N2CX, from a long standing series of ideas called Joe's technical quickies. The latest offering was number 87 in the series.

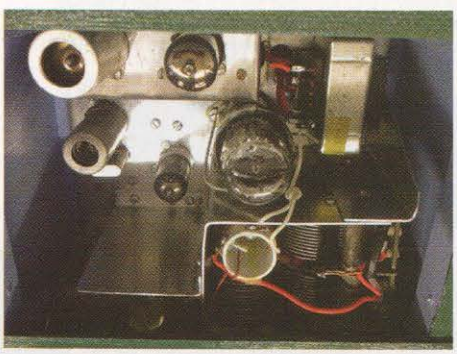
Idea Exchange is an excellent resource for the QRPer and any practical radio amateur, so I was pleased to read that the QRP ARCI has published a collection of the best items in book format. The book was announced by Ken Evans, W4DU, President of the QRP ARCI. Ken writes, "QRP ARCI announces the publication of a new book – *The Best of Idea Exchange*. This will quickly become a needed information source for your work bench. The content is drawn from 20 years of the Idea Exchange in past *QRP Quarterly* magazines. Items were selected by the editors for greatest value to active homebrew designers and builders.




Idea Exchange is an excellent resource for the QRPer.

"There are 138 pages of useful information divided into seven sections: Components, Circuit Design, Test & Measurement, Tools & Techniques, Repairs & Modifications, Antennas and Miscellaneous Ideas. This is an excellent resource full of useful data. We hope you enjoy it."

There has been a large demand for the book but online ordering is possible through the QRP ARCI. QRP ARCI is currently making changes in their club sales arrangements although these should be sorted out by the time this column appears. The expected cost, including shipping from the US is US$36 (Canada US$28, USA $25). PayPal will be available soon. Please check the latest arrangements and prices on the QRP ARCI website at www.qrparci.org/.



The PP3er Top Band AM transceiver designed and built by Alan Robinson, G3TPV.

**UNUSUAL TRANSCEIVER.** Tony Butler, G6MNL sent me an e-mail report about an unusual Top Band transceiver, the PP3er Top Band AM transceiver designed and built by Alan Robinson, G3TPV. Alan has produced a fully portable, 160m AM-only hybrid transceiver, enclosed in a wooden cabinet. The device is intended to be used for local AM nets on Sunday mornings. Alan has called it the PP3er. The transmitter design is a well-tested valve unit, using a 6BW6 PA with 5W of output, with a 6BW6 Class A modulator, using a crystal mic insert. A six foot centre-loaded whip aerial is mounted on the radio using a length of wooden dowelling and tuned against a throw-out 125 foot length of wire.

The receiver is a simple transistor superhet. For portable use, a clip-on power supply unit is provided, consisting of 10 rechargeable AA batteries for the valve heaters with thirty PP3 series wired batteries for the HT supply. For home-base use, there is a plug in mains PSU. Alan has had very good results on the local AM net and excellent results when testing in the field between his station and another portable station a few miles distant, with 59+ results in both directions. The main drawback, he says, is of course, the life-span of PP3 batteries; nevertheless several short QSOs have proved possible, with good stability, and much fun!

**WINTER SPORTS.** The G QRP Club Winter Sports is one of the most popular QRP operating events. Each year between Boxing Day (26 December) and New Year's Day (1 January) the club invites any operators to join in a QRP QSO Party using 5 watts of RF output or less. The event is so popular that other band users have complained about QRP stations taking over some CW designated parts of bands! The operating takes place on and around the International QRP Calling Frequencies. These are:

- CW: 1843, 3560, 7030, 10106, 14060, 21060, 28060kHz
  SSB: 3690, 7090, 14285, 21285, 28360kHz

The Winter Sports is not a contest, although the G4DQP Trophy is awarded to the operator thought to have made the best overall contribution to the event. So "5NN BK" exchanges are not heard and participants often linger over interesting QSOs. It is usual for operators to exchange their G QRP Club membership number, if they have one. The event does provide an opportunity for operators who do not usually use low power to turn down their power to 5 watts or less and see what can be done. Those taking part are invited to submit logs and comments to the G QRP Club Communications Manager, Dominic Baines, M1KTA, 34 Bury Road, Stapleford, Cambridge CB2 5BP, e-mail m1kta@gqrp.co.uk.

A very Merry Christmas and a Happy New Year 2014 from all the team at...

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# Operating on the 472kHz band

## Explore the delights of our newest allocation

**NEW THIS YEAR.** On 1 January 2013, Full licensees in the UK acquired a new band at 472 – 479kHz. This was the result of a decision at the World Radio Conference in 2012 to make this a worldwide amateur allocation on a Secondary basis. Previously, the UK and a few other countries had issued a small number of Notices of Variation (NoVs) for experiments in the region of 500kHz. Although a Full licence and an NoV is still required before transmitting on 472kHz, the process is now much easier, involving a simple registration form on the RSGB website [1].

The UK power limit on this new band is 5W (7dBW) EIRP – this is discussed in the tinted box below.

Although 472kHz is a global allocation and many countries have incorporated it, there are some notable exceptions: Russia, Canada and the USA, though a few USA stations have experimental licences. It is to be hoped that it is only a matter of time before these countries adopt the band.

472kHz is not a plug and play band. There are no transceivers currently covering it, though a dedicated transmitter is available in kit form. There are no ready-built transmit antennas or ATUs. Most operators build every part of their station with the exception of the receiver, and even that is often enhanced. Despite this – or perhaps because of this – there is a great sense of achievement to be had in making contacts on this sub-medium-wave band.

This article provides an overview, but it is not a blow by blow detailed recipe for success on the band. Some experimentation and ingenuity is needed.

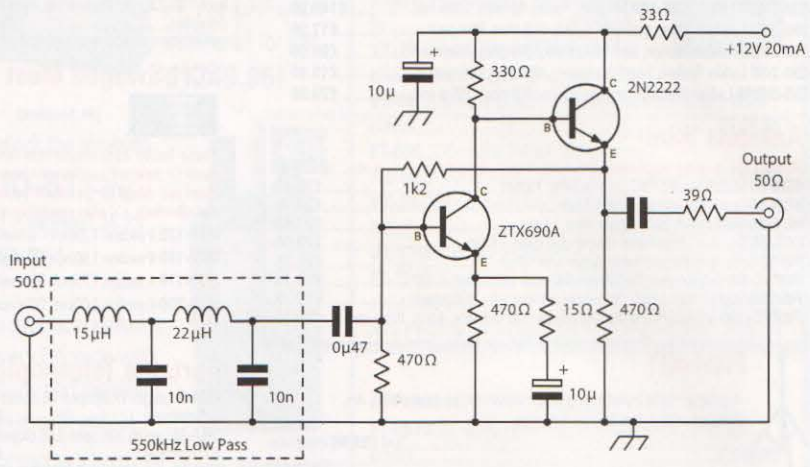


FIGURE 1: 20dB receiver preamplifier.

For most operators, this is all part of the fun.

### WHAT CAN YOU HEAR ON 472kHz?

This part of the spectrum is allocated to aeronautical beacons known as NDBs; a few, mostly in central Europe, can be heard within the new amateur band. They typically run 100 watts to a short monopole, sending a Morse callsign repeatedly, tone modulated on an AM transmitter. On an amateur receiver this appears as a central carrier with the Morse code heard as weaker sidebands about 1kHz either of it. The most prominent within the band is 'BIA' in Poland, which can be heard during the evenings (carrier frequency 474.0kHz), though it is not always active. Note that our use of the amateur band is conditional on not causing interference to other users, including NDBs.

Modes predominately in use by amateurs are CW, *Opera4*, QRSS3 and *WSPR2*. The first is popular for ragchewing and the last for propagation testing, especially with low power stations. CW contacts can be heard during evenings and at weekends; there is *WSPR* activity most of the time. No formal band plan exists, but the centres of activity are shown in **Table 1**.

As with Top Band, 472kHz is often used for local contacts during the day and for DX at night. This is a function of the propagation pattern, where ground waves dominate when it is light and sky waves during darkness hours. There is more activity in the winter than summer, partly because there is more darkness and partly because static levels are much lower. A unique feature of this band is the very deep fading that can reduce a strong station to nothing and back again in a few minutes. This limits the use of the very slow modes prevalent on the 136kHz band.

Daytime ranges are typically a few hundred kilometres (more over a sea path). Night-time skywave will support Europe-wide contacts and potentially worldwide DX. To date, American experimenters using *WSPR2* have been received in Europe at good strength and an Australian station (also using *WSPR*) has been logged in France.

**RECEIVERS.** Most amateur transceivers will receive on 472kHz, though some may have reduced sensitivity. Dedicated receivers, such as the AOR7030, are suitable, as are

### What is EIRP?

On most amateur bands, we are permitted a maximum RF power, which we can then use with any antenna no matter how much gain it has. However, on the 136kHz band, the power limit is 1W ERP, the ERP indicating the power radiated from the antenna relative to a dipole in free space. Thus if the antenna has one hundredth of the gain of a dipole (-20dBd), the maximum power permitted from the transmitter is 1 x 100 = 100W.

This same idea applies on the 472kHz band, but instead of the radiated power being compared to a dipole, it relates to an entirely theoretical 'isotropic antenna' (the 'I' in EIRP) that radiates equally in every direction. A dipole has a directional gain of 2.1dB compared to an isotropic antenna. This is the first time that EIRP has been used in the UK licence.

The result of this is that we need to factor in the gain of our antenna compared to an isotropic radiator in any calculation of the actual radiated power.

Using radiated power as the limit provides a certain equality, whereby someone with a small antenna can (theoretically at least) increase his transmitter power until he radiates the same power as a person with a much larger antenna.

software defined receivers (SDRs) such as the SDR-IQ and the Perseus.

With a tuned antenna (discussed later) the band noise – crackling from distant static – should be audible. If more sensitivity is required, the circuit in **Figure 1** will provide around 20dB gain. The low pass filter at the input is essential to reduce the level of adjacent medium wave broadcast signals.

**ANTENNAS AND TUNING.** For receiving, a wire at least 10m long is often adequate, provided your receiver is sensitive enough, but it helps considerably to tune it to resonance (**Figure 2**) with a series inductor such as the multi-tapped one described below. The inductance should be somewhere between 300μH and 1mH depending on how large your antenna is. For receive-only, the inductor construction does not need to be very substantial. Winding several tens of turns, liberally tapped, on a piece of drainpipe or similar will suffice. Alternative receive antennas are multiturn loops and ferrite rods, tuned to resonance with capacitors. The antenna should be out of doors to minimise noise pickup.

Any wire antenna will be short relative to the wavelength and so will work as a Marconi. Because of this there should be a proper RF earth return. This can be as simple as an earth stake in the ground beneath the feedpoint, or as complex as a radial system for Top Band. An RF earth is essential for transmitting, but it is also important for receiving (even if a loop or ferrite rod is used) to reduce the level of interference from local electrical devices, such as plasma TVs and fluorescent lights.

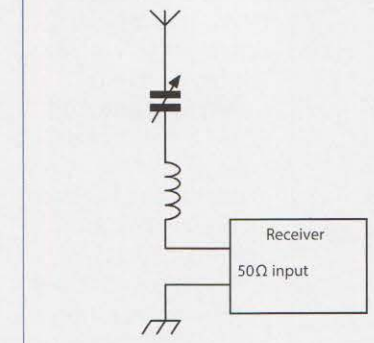


FIGURE 2: Resonating the antenna for receiving. Instead of the variable capacitor of about 500-1000pF, a piece of ferrite can be inserted into the inductor to tune it.

If you want to transmit at any time, you will need a properly designed and constructed antenna. Most people opt for a Marconi-style 'vertical'. A full size (quarter-wave) vertical would be around 150m high, which is of course impractical. However, as on Top Band, it is possible to shorten the vertical section by adding a 'capacity hat', usually comprising horizontal wires running from the top of the antenna to other supports. The classic shapes are 'inverted-L' or 'T' but in fact the shape is not critical (see **Figure 3**). What *is* important is to cover as much ground as possible.

Another vital factor is the 'effective height' of the antenna. Effective height is somewhere between 50% and 100% of the actual height and, in short, is the product of the average actual height and a factor relating to the length of the top loading wires. The calculation of this is dealt with next month in the section on estimating EIRP. Radiated power is the product of RF power and antenna gain, whilst antenna gain is proportional to the square of the effective height. Thus, doubling effective height, either by doubling the actual height, or by increasing the top capacitance (in practice, you should maximise both), will quadruple the radiated power.

Unlike an antenna intended solely for receiving, a transmit antenna must be properly insulated – a very short Marconi may have 1kV or more on it when running higher transmitter power. It should be kept as far away as possible from trees, buildings etc which will absorb some of the RF. It must also be tuned to resonance and properly matched to your transmitter.

If you already have a dipole for 160, 80 or even 40 metres, you have the basis of a Marconi for 472kHz. Simply strap the inner and outer of the coax feeder together to make a single vertical wire and the dipole will act as the capacity hat. **Figure 4** shows a simple way to achieve this. Again, take care to insulate all parts of the antenna, *including the coax*. Alternatively, a dedicated 472kHz antenna can be constructed.

Some operators have used conventional ATU circuits to tune and/or match their 472kHz stations, but above a watt or two of RF the voltages across switches and capacitors become excessive and the components become prohibitively expensive.

Two recommended methods of tuning and matching are shown in **Figure 5**. An electrically short Marconi antenna has considerable series capacitive reactance, so series inductance – a loading coil – must be added to resonate it. The inductor will carry an amp or so and several hundred volts, so care must be taken in its construction. Because each antenna is different it is impossible to predict the exact inductance required with any accuracy. Also, there are as many coil formers as there are operators, so the number of turns required will differ from station to station.

For typical antennas, the inductance is likely to be somewhere between 300μH and 1mH. With a former made from plastic drain pipe around 70mm in diameter, coil of between 100 and 200 turns of plastic covered wire is required. With a larger former, say 150mm diameter, the coil would need between 70 and 100 turns. For setting up purposes, therefore, the loading coil should comprise the higher number of turns, with the lower 50% tapped every five turns. A useful

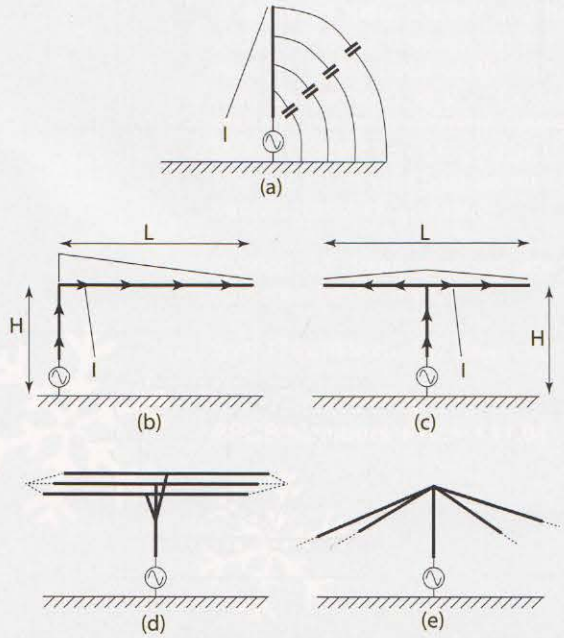


FIGURE 3: Marconi antenna configurations.

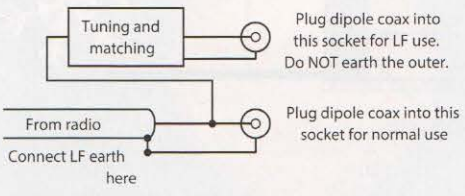


FIGURE 4: Simple method of switching a dipole for 160, 80 or 40m between use as a dipole and use as a Marconi for 472kHz, by using coax sockets.

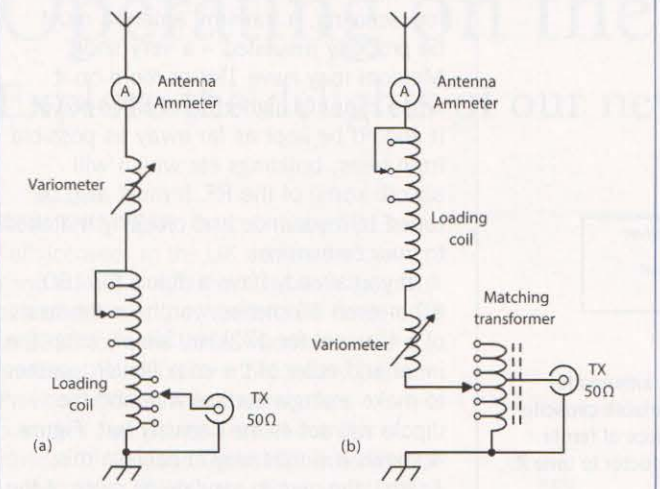


FIGURE 5: Two alternative antenna tuning circuits.

program for calculating the number of turns for your particular former can be found at [2].

For low power use, fine tuning can be achieved by taping a piece of ferrite to a plastic rod (**Figure 6(a)**). The plastic is used as a handle so that you can avoid touching the coil, which may have very high voltages on it when transmitting. Insert it into the coil until resonance is achieved.

At higher power levels, the ferrite is likely to become hot so a variometer will be needed instead. Two examples are shown in **Figure 6(b) and (c)**. Once again, it is important to avoid touching the coil when making adjustments.

Approximate resonance can be achieved by listening for a strong NDB close to the band [3], or asking a local station to make a test transmission. Fine tuning can be achieved by listening to band noise, amateur stations or an inband NDB.

If you are lucky, the antenna impedance will not be far from 50Ω but may still need closer matching to avoid damage to your transmitter. The simplest matching system to engineer is shown in **Figure 5(a)**. The transmitter is connected to taps at the 'cold' end of the loading coil. In practice this is difficult to get right because the antenna's tuning and matching will interact. A more reliable system is shown in **Figure 5(b)**, where a transformer takes care of the matching and is almost independent of the antenna tuning.

A suitable matching transformer is a Fair-Rite 35mm diameter, 43 material toroid core wound with 25 turns of 1.5mm wire, with taps every two turns. The 50Ω transmitter output is connected at the 16 turn tapping point and the 'cold' end of the loading coil connected to the tap that gives optimum matching. For higher transmitter powers, a larger core may be required.

Unless you have enormous amounts of real estate, typical antenna efficiency will be about 1%. The rest of the transmitter power is dissipated in losses, which include the resistance of the coil and earth system and also environmental effects such as absorption by trees and buildings (**Figure 7**). To achieve the maximum licensed power with that 'typical' antenna, a transmitter power in well in excess of 100 watts would be required. As on the HF bands, most operators manage to achieve success with far less than the maximum licensed power.

**NEXT MONTH.** We will conclude our look at 472kHz with some practical transmitter, power amplifier and other circuits.

WEBSEARCH

[1] www.rsgb.org/operating/novapp/nov-472-479-khz.php

[2] *SOLNOID3.EXE* written by the late G4FGQ can be used to design various size loading coils. See G3YXM's website www.wireless.org.uk/g4fgq/page3.html.

[3] NDB list: http://navaids.nowindows.net/ndblist.htm

**TABLE 1: Centres of activity on the 472kHz band (subject to change).**

| | |
|---|---|
| CW | Often around 472.5kHz, though can be heard all over the lower half of the band. |
| *WSPR* | Set dial to 474.2kHz USB (for signals between 475.6 and 475.8kHz). |
| QRSS | Around 476.175kHz. Also around 478.900kHz. |
| *Opera* | Set dial to 477.0 kHz USB (for signals between 478.5 and 478.8kHz). |

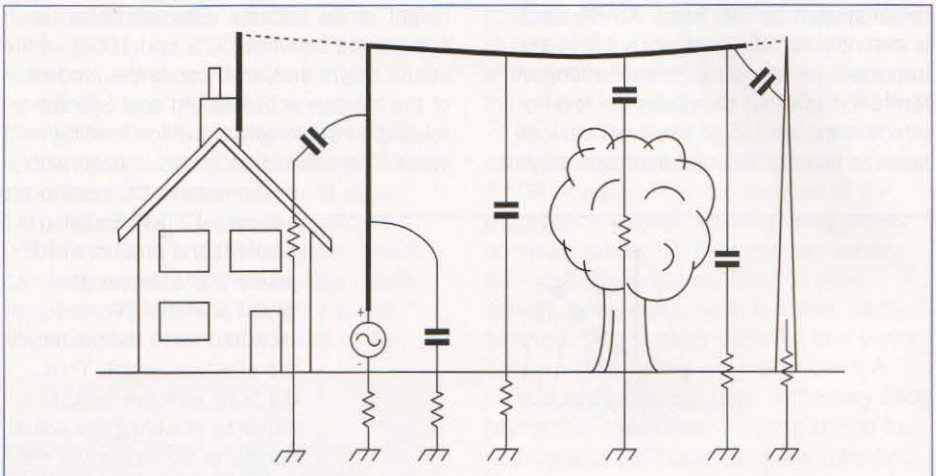

FIGURE 7: Loss in the environment around an antenna.

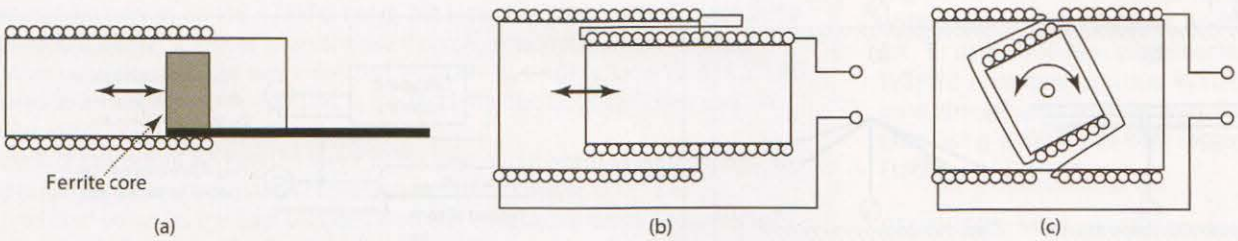


FIGURE 6: Three methods of fine tuning a loading coil: (a) For low power or receive use, a piece of ferrite can be slid into the coil; (b) telescoping two coils to vary inductance and (c) a variometer where part of the coil is rotated inside the main coil to add or subtract inductance.


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## LF Today

*A guide to success on the bands below 1MHz*

By: Mike Dennision, G3XDV

Low frequency operating has never been more popular, and the introduction of a new international amateur allocation at 472kHz means that, with 136kHz, there are now two bands below 1MHz. Written by a leading authority on LF, Mike Dennison, G3XDV this book distils nearly twenty years experience of the low frequencies and aims to help the beginner who wants to try out this fascinating amateur allocation, but it is also of great value to anyone already active on the band who wants to expand their knowledge of the bands.

This third edition of *LF Today* aims to provide the reader with a firm knowledge of the frequencies below 1MHz and has been expanded to include the many revisions and updates. New to this edition are many projects for the 472kHz band, an analysis of the various modes used on the low frequencies, and how to receive and transmit on even lower frequencies at VLF. Covering everything LF the book covers topics from getting started through equipment, operating, modes and much more. A guest chapter by Alan Melia, G3NYK, on LF propagation explains how to predict LF ionospheric conditions. There is much else besides including lots of practical information on antennas, receivers, transmitters and operating.

In short, *LF Today* is a one-stop shop for anyone seeking information on amateur radio operation below 1MHz.

Size 174x240mm, 192 pages, ISBN: 9781 9050 8693 1

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# Antennas

## More about quarter wavelengths of coax plus HF wire antennas in a suburban plot

**COAX RESONANT LENGTHS.** In last month's Antennas I noted reasons why it is useful to measure the electrical length of coax cable. In many cases resonant lengths are required to make up phasing units. On the other hand resonant lengths can be susceptible to common mode currents. These currents can cause unpredictable results to measurements when using some SWR analysers.

**DO IT IN SOFTWARE.** I thought you might be interested in a software product called *TLW*, Transmission Lines for Windows. It comes bundled with other software on the CD located on the rear inside cover of the *ARRL Antenna Handbook* and, when loaded, it presents the display shown in **Figure 1**.

The *TLW* program comes with a library of transmission line types and in Figure 1 you can see that I have selected RG-213. Rather than entering a physical length for the transmission line you can enter a quarter wavelength as 0.25w in the length box and the program will calculate the length from the frequency and the selected transmission line type.

The reflected impedance presented at one end of the coax is shown on the 'Input' line at the bottom of the display. This is the transform of whatever impedance is connected to the other end. For example in Figure 1 an impedance of 10000±j0 is reflected as 0.77 +j0 and an electrical quarter wavelength of RG-213 is 3.484m.

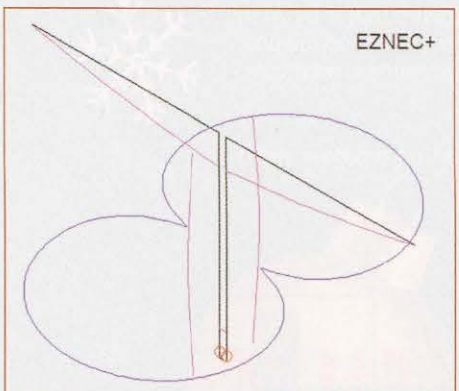


FIGURE 2: An idealised free-space doublet antenna, with equal antenna currents on each leg of the doublet and that the currents in the feeder are equal and opposite. Red lines = current distribution, blue lines = two dimensional signal distribution.

You can find the electrical quarter or half wavelength of coax for any given frequency without the need of test equipment or computer programs. To find a free space wavelength in metres L, divide c (speed of light in m/s, 300 x $10^6$) by frequency in Hz x $10^6$. This can be simplified to L = 300/f (MHz) A full wavelength of 14.2MHz is 300/14.2 = 21.126m For a quarter wavelength, it is 21.126/4 = 5.28m.

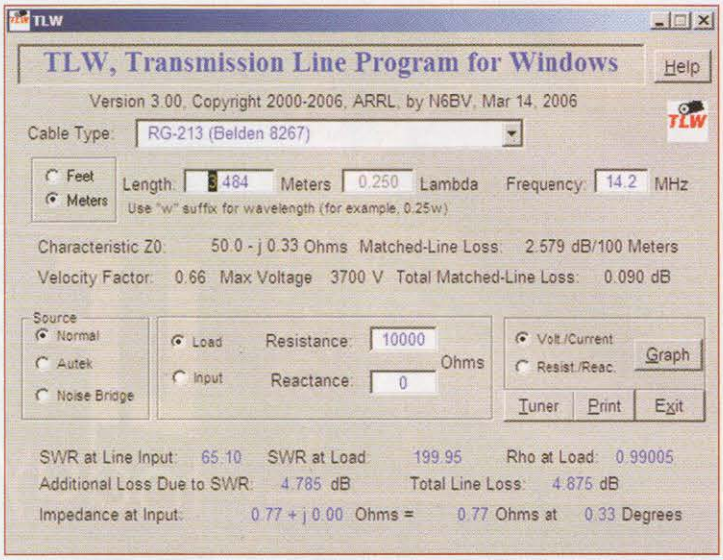


FIGURE 1: *TLW*, Transmission line program for windows showing the characteristics of a quarter wavelength of RG-213 terminated with a very high impedance (open circuit).

If we assume the coax to be RG-213 with a velocity factor of 0.66 then 5.28 x 0.66 = 3.483m, not very different from the length derived by *TLW*.

**THE BEST HF ANTENNA.** At times I am asked which is the best antenna for general HF operating in the normal restricted suburban environment. This can be a difficult question to answer because most of the time it is the antenna location that can be the main controlling factor. As I have said many times before, it is more important as to where the antenna is (located) than what it is.

So it is with interest that I heard from Roy Horton, G4GRM, who had been using a low profile 26m long, 8m high inverted-L antenna. This antenna had been in use for about 5 years now and gave a 'satisfactory' performance. He then erected a resonant (14.150MHz) delta loop for 20m, with an apex of 10m This loop was resonant in 14.15MHz orientated to at right angles to the inverted-L in an effort to try to work some east and west DX. The loop was fed at a lower corner nearest the shack via 50Ω coax and a 10 bifilar turn insulated 16SWG 1:4 balun wound on a piece of 35mm diameter plastic pipe. This loop was a disappointment with about 3-4 S-points of noise above that of the inverted-L and one S point down on signal strength compared with the inverted L (in all directions).

G4GRM tried various other antenna and configurations and finally settled on the simple arrangement described by G3GKG [1] and repeated in [2]. This antenna is a simple doublet fed with a slotted line feeder. Instead of using baluns a link coupled balanced tuner was constructed using parts available to hand.

Roy notes, "This antenna is a noticeable improvement in signal strength over the inverted-L regarding 14MHz DX stations. Not only that but the doublet is much quieter and also does not pick up bursts of static type QRN, which the inverted-L does. For 7MHz I had to insert an additional eighth wave of feeder to get the SWR down from 2:1 to 1:1. This is coiled up above the tuner in the shack so I can insert it as required".

**BALANCED ANTENNAS.** Some antenna articles and books describe a doublet as a balanced antenna. By 'balanced' I mean that the antenna currents on each leg of the doublet are equal and that the currents in the feeder are equal and opposite, as depicted in **Figure 2**. The currents in a balanced transmission line are equal and opposite and there is no radiation from the line on transmit; neither does the line pick up signals when the antenna is used for receive.

In the earlier days of amateur radio twin wire feeder was the only practical feeder

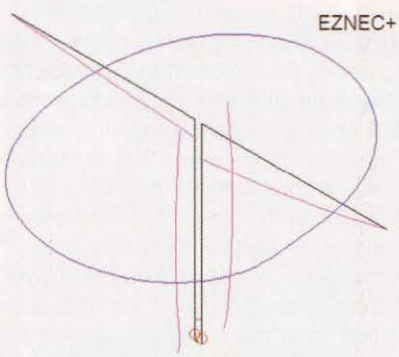


FIGURE 3: Model of a 7MHz half wavelength high dipole fed with twin-wire feeder with the unequal currents in each conductor of the feeder.

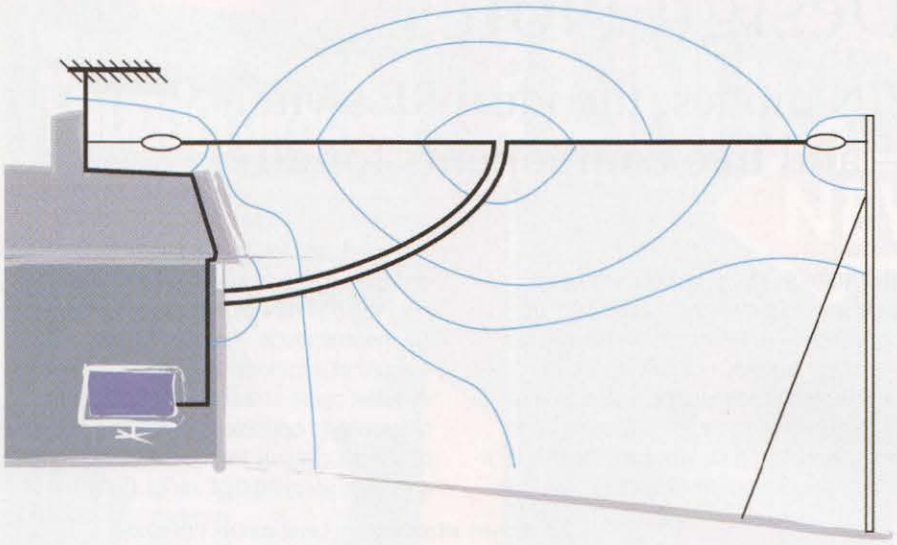

FIGURE 4: The real world situation of most of our antenna arrangements showing vulnerability to electrical interference on receive and TVI on transmit.

available and the design of the feed methods was influenced by commercial radio practice. The radio station at Rugby, for example, had a huge antenna farm of broadside arrays (later replaced by rhombics) on a several hundred acre site. Some of these lines had to be as long as 1.5km so they had to be efficient in transferring power without loss. Each twin wire line consisted of copper conductors, with one conductor placed 23cm from the other and supported 5m above ground.

With some 60 or 70 antennas the feedline system was somewhat complicated. On the main routes the feeders were arranged fairly close together. It can be appreciated that such an arrangement required that the feed lines should be well balanced (equal RF current in each conductor) to prevent radiation loss and crosstalk (mutual interference between sets of lines).

Unlike the idealised situation shown in Figure 2, in the real world the antenna is affected by ground reflection and interaction with nearby structures. Furthermore most ATUs use a balun to provide the balanced feed with no provision for adjusting the current in each conductor of the feeder for balance. In general the current distribution will be similar to that seen in **Figure 3**.

If the currents are not balanced then the feeders act as vertical antenna with consequent vertical antenna transmit and receive characteristics. Whether this is a good or a bad thing depends on the location of the antenna. For example if the antenna is located on an open space clear of electromagnetic obstructions then is might make a good DX antenna.

If, on the other hand, this antenna with its vertical characteristics is located close to the house then there are numerous possibilities of electrical interference, as shown in **Figure 4**. This is the situation in which most of our antennas are to be found. If you are using an antenna fed with ladder line or similar twin feeder and you have serious electrical interference then it might be a good idea to try a balanced feed ATU, as did G4GRM.

A very comprehensive balanced homebrew ATU by G0LMJ **[3] [4]** has provision for adjusting the currents in each conductor of the feeder. It uses plug-in coils rather than coil switching. It also incorporates a metering system for measuring these currents. This item could be built separately and used with any balance feed ATU to check just how balanced your antenna system is and whether balancing the transmission line reduced noise on receive.

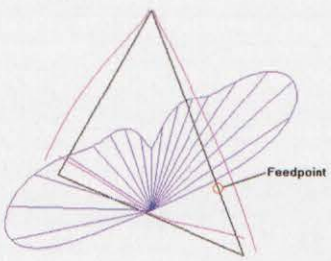


FIGURE 5: Computer model of a 14MHz resonant delta loop with a 10m high apex. The model implies that it can be a good DX antenna provided it is fed one third of the way up one of the vertical sections.

**COAX CABLE.** The same problem can also occur on coax fed antennas. In this case any difference between the current on the inner conductor and the inside if the braid will result in current flowing on the outside of the braid. Provided the conductor currents inside the coax are equal and opposite there will be no radiation from the line on transmit; neither does the coax pick up signals when the antenna is used for receive.

In the case of coax the solution is to suppress this outer braid current with a current choke. You may recall April edition of Antennas I tested a centre fed wire antenna that used a coax feed. There was no problem in transmitting but the noise level on receive was so high (S8.6 on 7MHz and S6.2 on 18MHz) that it only allowed contacts with very strong stations. This noise level seems to come from the telephone drop wire at this location, so I tried a couple of high impedance current chokes at each end of the coax section of the feeder. This reduced the noise to S6.5 on 7MHz and S4 on 18MHz, which allowed me to test the antenna with DX stations. If you have a receive noise problem at your QTH with a coax fed antenna then common mode chokes may be the answer.

**LARGE LOOP ANTENNAS.** Some further notes on the large loop antenna described by G4GRM earlier. I constructed a similar antenna for 7MHz some years ago and found it very good as a DX antenna for transmitting but it was very noisy receiving antenna – probably because it was located close to the house. Furthermore, no attempt was made to use balanced feeders. The large loop would appear to be reasonable DX antenna, see **Figure 5**, provided it is fed one third of the way up one of the vertical sections and that it is located some distance from the house.

**FINALLY.** I wish you all a pleasant Christmas and happy hours constructing antennas during the coming New Year.

REFERENCES

[1] 'The Doublet De-mystified', Brian Horsfall, G3GKG, *RadCom* January 2004

[2] 'The Doublet De-mystified', Brian Horsfall, G3GKG, *Antenna File* RSGB Books

[3] 'Balanced Line ASTU & Current Indicator, Ted Garrott, G0LMJ, *RadCom* July/August 1998

[4] *Backyard Antennas*, P54 – P63, RSGB Books

# Design Notes

## PIN diodes: the ideal RF switch – and free components for all?

**PIN DIODES.** Many readers will have heard about PIN diodes, particularly in connection with RF stages and antenna switching, but may not fully appreciate the difference between these and 'normal' diodes when used for RF switching and attenuation. But first, what are they? The 'I' in the name comes from Intrinsic, an extra undoped or pure layer of silicon between the P-type and N-type regions making up any normal diode. The I layer adds a small amount of additional resistance in series with the diode junction but makes little difference to operation at DC. The PIN diode still conducts only in one direction, with a voltage across it that varies (roughly) in proportion to the logarithm of the forward current. It will typically drop around 0.7V at 1mA; sometimes a slightly higher voltage drop due to the additional series resistance.

The main difference in operation comes about when RF current is superimposed on the DC forward current. The time taken for the electrons to transit the I layer, the lifetime of the carriers ($T_L$) can easily be several hundreds of nanoseconds to microseconds . While transiting the I layer there are no semiconductor junctions acting in a non linear way on the RF, so there are no non linear effects such as distortion and intermodulation. The PIN diode acts as a near perfect resistor at frequencies where the period of one cycle is significantly lower than $T_L$. For the majority of PIN diodes this will result in a minimum usable frequency in the region of 1 to 10MHz. The width of the I layer varies due to charge distribution within the diode junction, which in turn is proportional to the voltage across the junction. The width of the I layer determines the RF resistance, so we now have a near perfect resistor at RF, whose value is proportional to the voltage across the

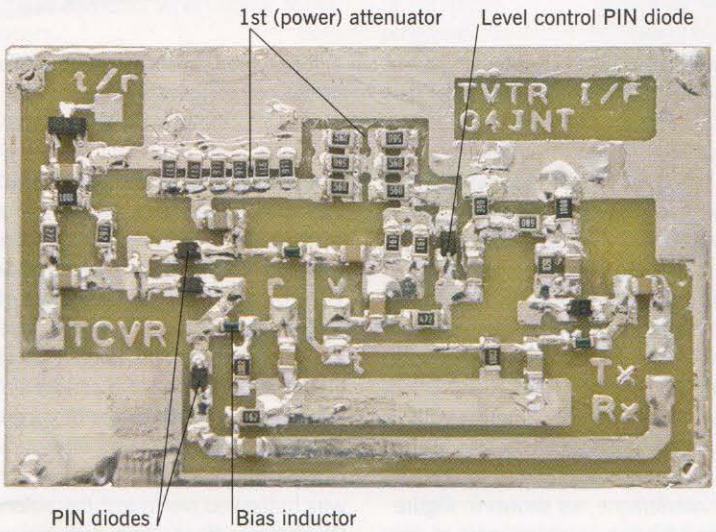


PHOTO 1: The finished transverter interface. The underside of the PCB is a continuous groundplane, connected through to the top at several places.

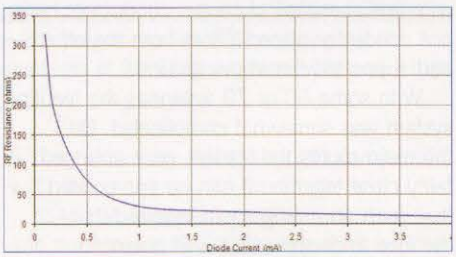


FIGURE 1: Resistance versus forward current for the BAP70-03 PIN diode.

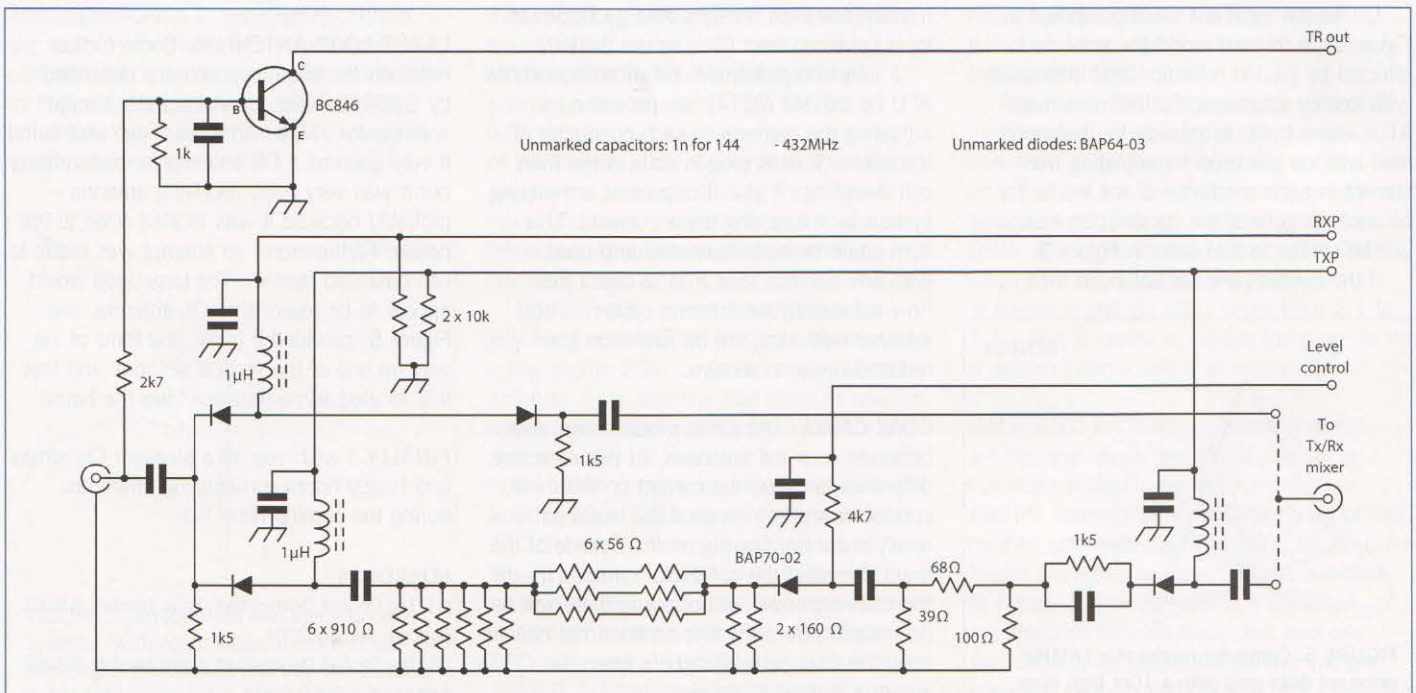


FIGURE 2: Interface for using a low power V/UHF Transceiver in conjunction with a transverter using a common Tx/Rx mixer. The NPN transistor shown top left has nothing to do with RF operation. It allows Tx/Rx switching via the coax when used in conjunction with a simple modification to the transceiver to place DC on the antenna socket during transmit.


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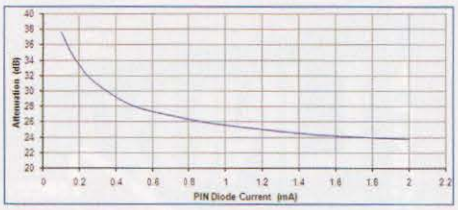



**FIGURE 3: Transmit path level control.**

diode. Forward voltage is proportional to the logarithm of forward current, so we now have an RF variable resistor whose value is roughly proportional to $\log(I_{FWD})$ where $I_{FWD}$ is the DC current superimposed on the RF flowing through the device. A typical curve of R vs $I_{FWD}$ for the BAP70-03 is shown in **Figure 1**. This particular device is designed primarily for use in attenuators and you can see the useful range of forward resistance is from around 30 to 300 ohms, corresponding to a forward current variation from 1mA to 100μA. $T_L$ for this device is specified as 1.25μs (one cycle of 800kHz). In practice this means the diode is useful at frequencies of a few MHz upwards.

When reverse biassed, current drops to zero and the I layer widens to give a lower reverse capacitance than the equivalent normal PN junction would – which in turn means greater isolation of the RF. For the BAP70 this reverse capacitance is specified as 270fF (or 0.27pF) with 5V reverse bias. A pretty low residual capacitance!

The characteristics of the semiconductor junction can be made to be almost anything the manufacturer wants and PINs can be optimised to have different resistances over the operating current; they can also be optimised for high or low frequency use. PIN diodes for power switching, for example, are designed to have a low series resistance at moderate forward current. The BAP64-03 is specified for 2Ω at 10mA with a $T_L$ of 1.55μs.

**A PRACTICAL APPLICATION.** Figure 2 shows the circuit diagram of a transverter interface designed for use with a low power transceiver such as the FT-817. Transverters are often used to mix the output from an HF or VHF transmitter as an intermediate frequency (IF) driver up to a UHF or microwave band. A corresponding downconversion using the same local oscillator operates on receive. The transmit upconverter mixer usually only wants a few milliwatts of drive, and a typical transceiver puts out an awful lot more than this. Inserting a fixed attenuator in the Tx path to reduce the drive power is straightforward, but this attenuator has to be removed on receive to avoid losing the downconverted IF signal. Furthermore, a common mixer and associated filter for the microwave band is quite frequently seen, with the same hardware in use for both Tx and Rx paths. So the IF path from transceiver to mixer has to have attenuation switched in during transmit and this has to be removed during Rx. PIN diodes are perfect for the job.

The FT-817 is run at its low power setting, delivering 0.5W (+27dBm) of IF drive at 144 or 432MHz. Most mixers need a drive of no more than around 0 to +2dBm, and sometimes lower if good linearity is essential, so the attenuation needed on Tx has to be adjustable over the range 25 to 30dB. It also has to be able to dissipate the half watt generated by the transmitter.

The two PIN diodes on the left side of the diagram are the primary RF switches. A voltage of around 8 to 12V is applied to one of the TXP or RXP lines for Tx or Rx operation respectively. 1μH chokes are used to decouple the RF and pass this voltage to one of two PINs in the Tx or Rx path. The common point of the two diodes is connected at RF to the transceiver input via a DC blocking capacitor. A resistor to ground here has the drive voltage (minus

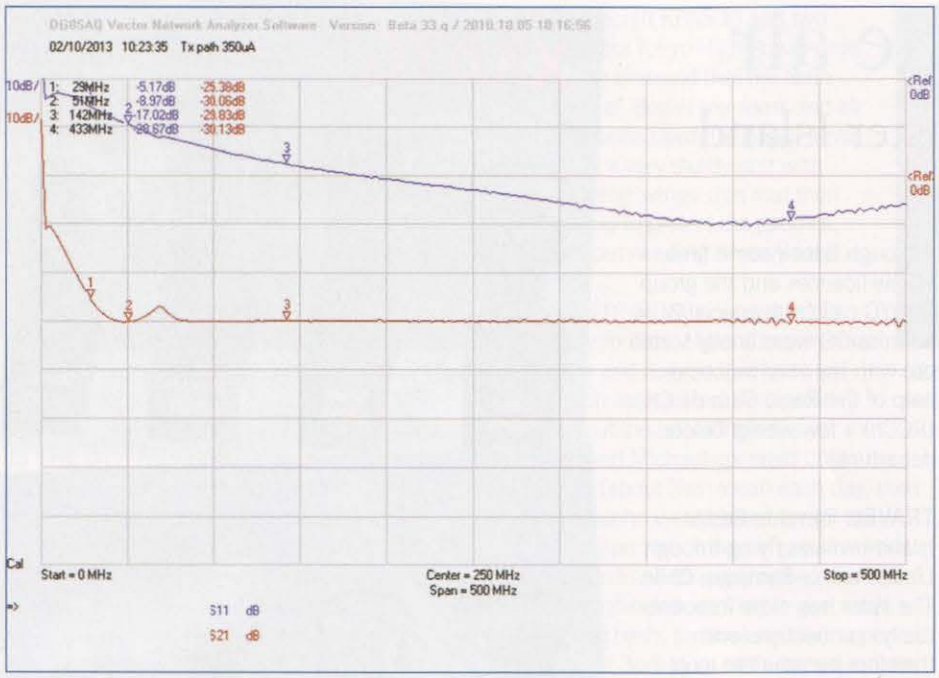



FIGURE 4: Network analyser plot of the transverter interface path on transmit (the red S21 plot). Note the broad constant attenuation above 100MHz. This can be varied by adjusting the diode forward current. S11 shows the return loss at the transmitter input. A value here of 17dB corresponds to a VSWR of about 1.3:1.

the diode drop) superimposed across it and defines the current that passes though the forward conducting diode. With the values given this is around 7mA and results in a diode resistance of around 3Ω for the BAP64 devices used. The unpowered line (RXP when in transmit) is maintained at zero volts with a pull-down resistor and, since the common of the diodes is at +V, means the one in the RF path not in use is reverse biassed to minimise junction capacitance and give the best possible isolation.

On transmit the RF passes first into a 6dB attenuator stage to dissipate most of the power. I build everything using SMT components, so several 0805 sized 0.1W resistors were used in parallel-series combinations to give the required attenuator values and stay within their rating. A BAP70-03 attenuator diode follows, the 4k7 resistor feeding this allowing a control voltage of 1 to 5V to give a resistance variation of around 200Ω to 30Ω This results in additional attenuation that can be varied over approximately 5 to 16dB. Intermediate resistors either side of this were selected to give an acceptable match on the Tx input for all diode current settings and to supply the attenuation range needed. A final fixed attenuator of 10dB completes the chain to make up the total attenuation for the path. Another switching diode transfers the attenuated RF signal to the mixer port. On receive, the other pair of PIN diodes conduct, generating an almost lossless path from mixer to transceiver Rx input. Note that in neither case is the second PIN diode, on the right hand side of the diagram, run with reverse bias. In practice there is sufficient isolation from the first one to make this unnecessary.

**MEASURED RESULTS.** A DG8SAQ network analyser was used to measure performance at 144 and 432MHz. The important parameters are the loss in the receive chain due to non-zero ON resistance of the switching diodes, the leakage of Tx power into the Rx path to the mixer that would interfere with the adjustable attenuation (Rx and Tx mixer ports were separated for the measurement), and the variable attenuation range.

**Figure 3** shows a plot of transmit attenuation versus control current and **Figure 4** shows a network analyser plot of the Tx path for 350μA over the frequency range 0 to 500MHz. Performance drops off below 144MHz due to the value of coupling capacitors and bias inductors chosen. Operation at 50 or 28MHz would be possible while still using the same choice of PIN diode by increasing these components to 10nF and 10μH respectively.

**Photo 1** shows the complete transverter interface module built on a 53 x 35mm PCB with a ground plane on the underside. The two PIN diode types used in this project are available from RS Components [1] for a few pence each (subject to buying a minimum quantity of 20).

TABLE 1: Measured results of the transverter interface.

| | | 144MHz | 432MHz |
|---|---|---|---|
| Rx path loss | | 1.7dB | 1.8dB |
| Rx path isolation on Tx | | 67dB | 48dB |
| Tx attenuation | $I_{FWD}$ = 100μA (~1.3V) | 37.8dB | 38.5dB |
| Tx attenuation | $I_{FWD}$ = 350μA | 29.8dB | 30.1dB |
| Tx attenuation | $I_{FWD}$ = 1mA (5V) | 25.4dB | 25.6dB |

## GETTING HOLD OF SMT COMPONENTS.

For years I have always built everything using surface mount components, as I find them very much easier and convenient to work with than wire ended ones, allow simpler and better PCB layouts and behave better at high frequencies. They are also easier to get hold of than wire ended components and generally cheaper. You do often have to buy a seemingly large number at a time – but the ridiculously low price of most routine items ends up still reasonable.

However, not everyone has access to the suppliers of these and for a useful selection of SMT resistors, capacitors inductors and several semiconductor types there is an (almost) free alternative for supplies of small quantities of anything on offer.

The UK Microwave Group (UKuG) has over the years been the recipient of several gifts of surplus stock and has built up quite a collection of SMT components – the Chip Bank [2]. These are available *completely free* to any member of the UKuWG who needs a supply of SMT bits, and UKuWG will even pay the postage as a benefit to members. (Apparently, it is simpler that way). The only proviso is that you do have to actually be a member of the Group and anyone requesting unnaturally large quantities to subsequently sell on eBay will be spotted and "dealt with"! UKuG represents those amateurs who are into higher frequency operation where homebrewing and construction is the norm. Membership costs £6 per annum, and for that you get an electronic newsletter delivered about 10 times per year that covers microwave activity and operation and construction and design techniques for the bands. Considering the £6 annual membership is less than most manufacturers' delivery charge for non account holders, membership for the Chip Bank alone is worth it.

Browse the catalogue on the UKuWG website to see the range of devices available. The 1μH inductors shown in Photo 1 came from here. The list gets added to regularly as new donations of stuff come in – SMT components are just so cheap now when supplied in bulk that manufacturers usually just throw their surplus stocks away.

WEBSEARCH

[1] RS Components: http://uk.rs-online.com/web/ (type 'PIN Diodes' into the search box)

[2] UK Microwave Group: www.microwavers.org/

# XR0YG on the air

## CW DXpedition to Easter Island


XR0YG QSL card.

Easter Island is part of Chile (though this is disputed by some of the indigenous Polynesian inhabitants) but a separate DXCC entity due to its enormous distance – over 2000 miles – from the mainland. It is also quite rare on the bands as there hasn't been an active resident amateur for many years. It is famous for its enigmatic statues or 'moai' and has become a major tourist destination throughout the year. In some ways it is almost a Scottish island as the Williamson-Balfour company held a management contract and ran it as a sheep farm for about half the 20th century. Many of the 'locals' proudly display pictures of their Scottish grandfathers!

**PLANNING.** The DXpedition was originally planned by team leader Michael, G7VJR to happen in January or February 2013. However, Michael didn't realise at the time that the UK winter is peak holiday season on Easter Island and not only was accommodation rather expensive but it was impossible to get anyway!

Finding a suitable place to operate from is a serious problem. Current DXpedition thinking is to find a beach-side location and deploy vertical antennas to take advantage of a low-angle salt water takeoff. For the short path to Europe and North America from Easter Island this would have meant the north coast – but unfortunately this is a national park zone and there are no buildings or power networks there. The XR0Y trip led by Bob Schmieder in 1995 erected a tent village and deployed multiple generators but we had neither the official contacts nor the money for this approach.

A re-think on both timing and QTH was required. Late March became the new target since accommodation for four team members plus shack was a little easier to find – but not much easier. Some places wanted to charge a ridiculously high fee to put antennas in the gardens. Fortunately Michael managed to find a booking agent in Chile, who armed with some photos of antennas on a 'field day style DXpedition' was able to find a hotel for us. But it was a risk – the QTH was an unknown quantity; we kept our fingers crossed!

The original team consisted of Michael, G7VJR, Nigel, G3TXF, Martin, G3ZAY and Bob, MDOCCE. The change of travel date didn't suit Bob so John, G4IRN, who coincidentally had been making plans to go to Easter Island at around the same time, was invited to join the team in his place.

Although it took some time, all the licences and the group XR0YG call (with special 30m permission) were finally sorted out with the very welcome help of the Radio Club de Chile (RCCh) a few weeks before departure.

**TRAVEL.** Travel to Easter Island involves flying through Lima, Peru or Santiago, Chile. The latter has more frequent (daily) connections and therefore became the route of choice, via Madrid from London LHR. Twice in the months prior to departure LAN Chile Airlines made changes to the flight times and the team had no option but to move the first two outward flights 24 hours earlier. Since the Madrid to Santiago flight is nearly 14 hours, this gave a very welcome opportunity for an overnight rest in Santiago before the onward flight and we were able to make some new friends while there.

**SANTIAGO, CHILE.** Ready to meet the team at their Santiago Airport hotel was local contester and DXer, Pedro, CE3FZ. Pedro very kindly took some time out of his working day to do so. The first stop was a local restaurant for lunch and to meet Dale, CE2/VE7SV (now CE2AWW) and Roberto, CE3CT, both keen contesters. After an hour or so of fine South American food, beer and lots of chatter we departed for a look at Roberto's station at his house a couple of miles away. His Multi/2 station was going through a renovation but one radio was hooked up and it gave us all an opportunity to get on the air for a few CW QSOs as CE3/home callsign. The only problem was that Roberto is an SSB op and didn't have a key wired up! This led to laughter and amusement as we all made a few QSOs with dodgy typing through the logging software. Come late afternoon and before he settled us back into our hotel, Pedro took us on a whistle-stop drive through Santiago and a walk around the new town during which we picked up some of the Chilean mains plugs that we would need on our DXpedition. With only 3 hours time difference from London, our body clocks didn't feel like we'd travelled so far; indeed Santiago reminded us being very much like a southern European city, we could easily have been in Montpellier or suchlike had we not known better!

**TO EASTER ISLAND.** A night in a proper bed was very welcome after the very uncomfortable Iberia flight. The hotel was about 50 metres from the airport terminal building so pushing the trolleys, piled with two ski bags and all the suitcases, across the road was easy enough. We were relieved to once again get rid of them as we checked in for the final part of the journey, mainly because we'd had to queue up for an hour and a half at check-in. Not good. We now had just a relatively short five and a half hour flight to our final destination.

Coming into land at Easter Island's tiny airport, it immediately struck us how green and lush the place is. Nigel remarked that it looked much like Devon. Once the packed Boeing 767 was unloaded, we were extremely pleased to see all the gear had arrived. Fresh in our minds was the bad luck of the GM guys who had travelled to Tuvalu a couple of weeks before us. Unfortunately, no one had told our hotel proprietor about the change of flight times (about a month beforehand!) and so we had to hang around a while for his wife to turn up, then when she saw all the gear we had, she had to muster her husband with another car. Fortunately, the hotel was only about a mile from the airport.

G7VJR showing some of the verticals. Photo: Nigel, G3TXF.

CE2AWW (CE3/VE7SV), G7VJR, CE3CT, CE3FZ, G4IRN and G3ZAY. Photo: Nigel, G3TXF.

**IS THE QTH ANY GOOD?** On arrival at the hotel in the early afternoon we were very pleased to find that we were at the top of a small hill with sloping ground from around south-west through to north north-east. The take-off to Japan was fabulous and the take-off to EU was pretty good, albeit with a few trees in the way. The piece of land making up the garden wasn't too large so we knew we would have to be creative about placing the antennas. Not wishing to delay operating we pitched the antennas for the first night's operation: a vertical dipole for 20m and ground planes for 30m and 40m. Getting on the air would be the litmus test for the antennas and QTH.

**SETTLING IN.** Fortunately there was no local noise on those bands and we realised fairly quickly that we were hearing well and getting out well. The next morning we put up a few more antennas – we decided that there probably wasn't enough room for the two 18m Spiderpoles (160m and 80m) together so opted to put up only one big pole, initially to be used on 160m but with the option of switching it to 80m a few days later. The 40m antenna was also used on 15m and we added vertical dipoles for 12m and 17m. We were going to add a 10m vertical dipole but then we had our first problem... but to be fair, it was probably our only problem all trip.

**FIRST (AND ONLY) PROBLEM.** The owner of the hotel we'd booked had been warned of our intent to establish antennas but although we paid 'for use of the garden' he had severe reservations about the visual impact and the possibility of a pole falling over and damaging his property. He was also unhappy about the amount of electricity he thought we were using, though this might not have been an issue but for the lights that were dimming up and down with our transmitted CW! Fortunately, his unhappiness was nipped in the bud when Michael had a little chat with him and gave him an extra tip. After that everything was OK!

**EQUIPMENT.** The team members were all Elecraft enthusiasts so there were three K3 transceivers and a K2. Linear amplifiers were an Elecraft KPA500 and two different Tokyo High Power units. It also emerged that the team were all Begali key users and all 4 stations used the Begali travel key – a very sturdy unit with cunning 'wings' that that then fold up to protect the paddles, without needing a heavy base.

**ROUTINE.** We soon got into a daily routine. Nigel was our 30m man and flogged that band as much as possible. We agreed to split the operating rotas so that Nigel and Michael operated until after EU sunrise (about 3am local) each day, then Martin and John would take over for the JA and NA/SA sunrises. It was impossible with a small team to be on every open band at the same time; however we tried to give each band a good bash, particularly when open to Europe. At 3pm local each day we retired to one of the local restaurants for our main meal of the day – the food and drink (and ice cream!) were always very good and it offered a good chance to relax, share experiences and a few jokes before getting back to the pile-ups.

Even though Easter Island's longitude suggests it should have -7 hours time differential from the UK, it has only -2 hours difference from Chile, making it -5 hours from the UK. We surmised that this is probably an attempt to keep the island's time as close to the mainland as possible for social and economic reasons; however it meant sunrise wasn't until around 8:30am every morning (1330UTC).

**CONDITIONS.** Good results were had on all bands. Michael was able to pull some QSOs through very heavy noise on 160m openings to the UK and Europe, and John couldn't believe the size of the JA pile-ups on 80m at XR0YG sunrise (the huge pile-ups on HF were expected!). For the European stations on 80m, propagation tracked the grey-line almost as closely as it did on 160m. Meanwhile the bulk of UK stations were worked on 40m to 15m; 12m and 10m had UK openings but rapid QSB and spotlight propagation often caused signals to drop out very quickly, particularly on 10m.

Of course, Easter Island has clear sea paths to both Asia and North America and there were times on HF when stations from both continents were simultaneously calling with 20dB over 9 signals. It's always fascinating (at least for the lesser travelled members of the team!) to experience propagation from a different part of the globe.

**RESULTS**

- Total QSOs: 23,979.
- Percentage unique calls worked: 39%
- NA: 44%, EU: 32%, AS: 20%, Other: 4%
- Percentage logged CW QSOs: 100%

**WEATHER.** Temperatures on Easter Island were hot, around 25°C, with high humidity. It rained most days for anything up to a couple of hours and although we got wet whilst erecting antennas on the first day, generally we managed to avoid it. The verdant landscape that we'd noticed when we arrived was testament to the amount of rain they must get.

**THE ISLAND.** We earmarked the Monday morning for a tour of the island, so armed with a map (though there's only one main 'road' around the island) and some good advice from a fellow hotel guest, we set off in our hire car to see some of the famous stone heads – the Moai.

These monolithic rock carvings of human faces were built between 1250 and 1500AD. There are 887 of them in total and about half of them are still at the quarry where they originated, to which we paid a visit. Hundreds of others were transported around the island and set on stone platforms; we made sure to see a couple of the major sites. The Moai represent the 'living' faces of deified ancestors, though many of them are faced downwards as a result of old conflicts and possibly tsunamis too. Four Moai can even be seen on the XR0YG QSL!

**TIME TO QRT.** We had a great time together as a team on Easter Island and were blessed with some excellent propagation. But the week flew by too fast! The antennas were ripped down immediately after breakfast on Wednesday 27 March and packed ready for the flight home. After doing that, we then found there was a 4 hour delay, so maybe we should have stayed on the air longer! We made good use of the time and headed for a super lunch at a restaurant by the local fishing harbour, overlooking the Pacific Ocean: next stop Pitcairn. Pity, Nigel's already done that one!

More pictures of this trip are available at www.g3txf.com/dxtrip/XR0YG/XR0YG.html http://g4irn.com/easter-island-2013-2/ and http://xr0yg.com/photographs/.

# Shortening, shortening

## Or why the 'ideal' dipole length isn't really right

**BUILD YOUR OWN.** Imagine you take a fancy to working on the 10m band. Your transceiver probably covers the frequency range but you need an antenna. You perhaps remember some of those antennas introduced on the licensing course – a dipole is one of the simplest and so perhaps the most suitable (see **Figure 1**). You might recall that it's a half-wave dipole, one that is half a wavelength long overall comprising equal sized arms. Let's suppose you have a couple of 2.5m bamboo gardening supports in the shed, and some handy iron-clad wire you picked up at a rally. Cobble it all together into a dipole and fix it to a corner of the roof.

You eye it warily, and decide to take some advice. One of the grey-beards from the club volunteers to come along with an antenna analyser. It's too long, he reckons; the antenna analyser says your dipole is inductive. Don't you remember? A dipole needs an end-correction, typically around 3-5%. Oh, right, you say, I'll get it down, chop a bit off and we'll see how we are doing next weekend.

"And you'll need a balun, 75Ω to 50Ω", he throws in as he departs.

So you get it down, trim 3% off each arm, and then have second thoughts about the wire you are using. It's rather stiff and it is exposed to the weather so, while you are fiddling with it, you change it for some nice flexible speaker wire you have spare. The insulation will protect the elements and the flexible wire will accommodate the vile winter weather rather better.

Next weekend, grey-beard comes back, connects up his analyser and says: it's too long, it's inductive. Aha, you have changed to insulated wire – that calls for another shortening. You are downcast, but while he's around, you get him to check a quarter wavelength of RG58 you have cut as part of your balun plans. Yes, it's too long, he says, have you corrected for velocity factor? You vow to do a bit more reading and to cut everything a bit shorter.

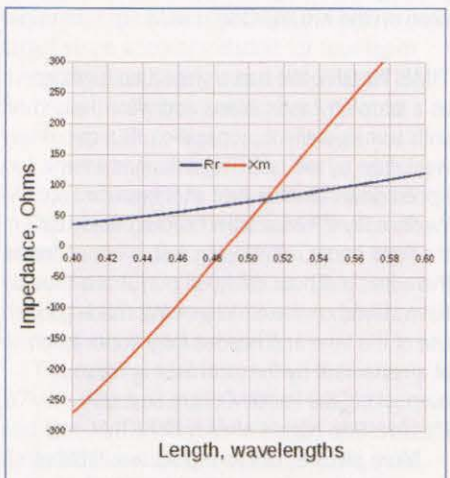



FIGURE 2: Dipole impedance variation around λ/2.

Three times you have had to shorten your work, and for three quite different reasons, often misunderstood, which we examine in turn.

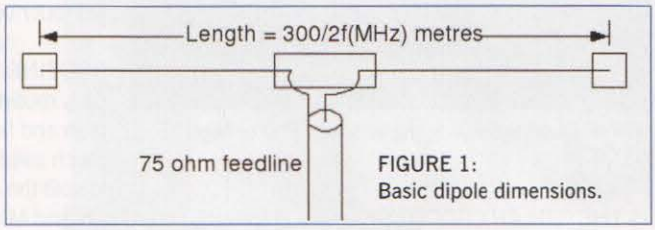



FIGURE 1: Basic dipole dimensions.

**DIPOLE END CORRECTION.** It's a satisfying theory that a half-wave dipole antenna will resonate at a wavelength corresponding to twice its overall length. Pythagoras would have loved it. Alas, it's not true. The dipole is not a stretched string: it has an essential gap in the middle where it is driven, which changes the boundary conditions and the impedance at the centre. On the simplest model of a dipole, where we assume a sinusoidal current profile along the antenna, we can calculate the real and imaginary parts of the antenna impedance in analytic form in terms of functions called sine and cosine integrals [1]. The result is that a half wave dipole for a given frequency presents an antenna impedance of around 73Ω real part and +42.5Ω imaginary part. Shorten the antenna and the imaginary part reduces before passing through zero and becoming negative, as shown in **Figure 2**. Resonance occurs when the imaginary part is zero and, depending on the thickness of the elements, this is around 95-98% of the original length. This result follows from calculation of the electric and magnetic fields in the near-field of the antenna based on the current in the antenna. This new length might or might not give you the best radiation pattern, but resonance is the easiest parameter to measure with an antenna analyser and is the common standard for setting up such an antenna.

Actually, the current profile on the antenna is not purely sinusoidal and there is a dynamic interaction between the fields around the antenna and the current flowing in it. A program like *NEC2*, best in one of its palatable guises such as *EZNEC* or *4NEC2*, calculates a better approximation to this dynamic interchange using the method of moments. The results are much the same in this case. **Figure 3** shows a *NEC2* analysis of a dipole cut for 29MHz. On the left, the overall length is 299.8/(2*29)=5.17m, ie no end correction, and on the right, an end correction factor of 0.967 has been used to shorten the antenna and bring it back to resonance at 29MHz.

Note that this length correction has nothing to do with travelling waves on the antenna wire. The antenna supports a standing wave with current nodes at each end but there is no travelling wave. Equally, it has nothing to do with capacitive effects between your antenna and its surroundings (these may well have a further impact of some sort), it's just what happens for any dipole, in outer space or here on Earth, and is fully described by Maxwell's equations for the system of wires.

**DIELECTRIC-COATED WIRE ANTENNAS.** What's happening with the insulated wires? Is there an easy rule of thumb for correcting the element length?

What is happening is a feature of the fundamental properties of the dielectric. In the simplest atomic model of a dielectric, the electric field of the antenna polarises the atoms in the material, separating by very small amounts the positive and negative charges on those atoms. This in turn creates a host of tiny electric dipoles that change the electric field of the antenna. In any analysis of antennas, we take as read that the applied currents vary in time like $\cos(2\pi ft)$ so the charges in the dielectric move to this same rhythm and, of course, moving charges constitute currents. These are the polarisation currents, and they influence the fields developed by the antenna which in turn influence them. Of course air is a dielectric too, but its dielectric constant ($\varepsilon = 1.0006$) is so close to that of a vacuum that polarisation currents in air can be ignored.

Unfortunately there is no simple rule of thumb that we can apply. The calculation is complicated and depends on the precise properties of the dielectric coating and on its thickness. Some antenna analysis programs, such as *NEC4* and *FEKO*, can model the effect of a dielectric sheath and in general it is agreed that theory suggests the dielectric lowers the resonant frequency of the antenna [3] – so you need to cut it shorter to move it

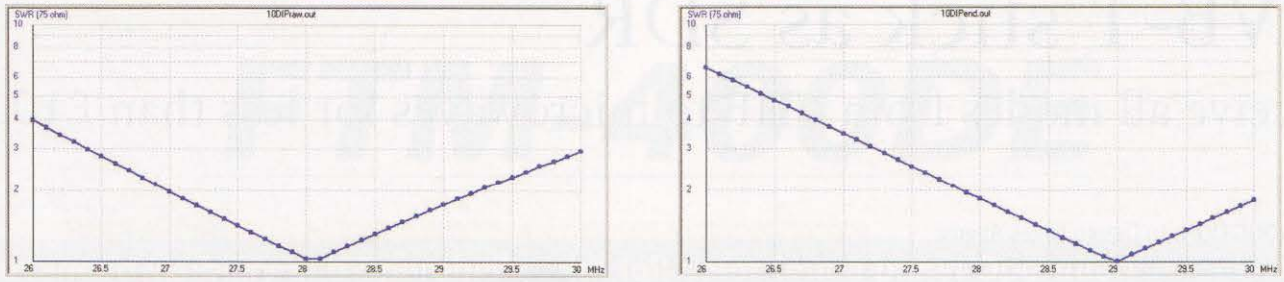



FIGURE 3: Left, 29MHz dipole cut to the dimensions of Figure 1. Right, 3.3% end correction [2].

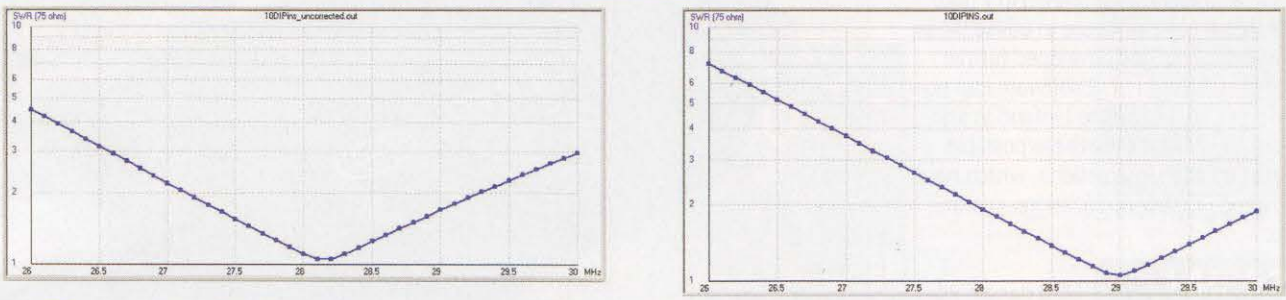



FIGURE 4: Left, insulation model added to end-corrected dipole. Right, re-tuning to 29MHz by cutting ~3% more.

back to resonance on your centre frequency, but with a bit of trial and error, ideally using an antenna analyser.

L Cebik, W4RNL (SK), on the Antennex website [4], presents a phenomenological model for use in *NEC2* where he adds distributed inductance along the wires to represent the insulation. This inductance isn't 'real', it is just that the effect of the insulation is to electrically lengthen the antenna and distributed inductance has the same effect in *NEC2*. He compared the results with full *NEC4* calculations to obtain rule of thumb tables and equations for the size of this inductance. For example, taking his data for an insulation layer 1mm thick on a wire of 1mm radius and with a dielectric constant $\varepsilon = 2.25$, the equivalent inductance is 86.7nH/metre.

**Figure 4** gives the *NEC2* results for our dipole using this model: on the left, the effect of adding the insulating layer model to the dipole cut to include end effect, and on the right, the new correction in length to restore resonance at 29MHz.

The effect of the insulation calls for a further 2.8% reduction in length in this case, so that the combined correction comprising both the dipole end correction and the insulation polarisation current correction is close to 94% of the length from **Figure 1**.

Bear in mind, the insulation correction is not a velocity factor correction; there are still no travelling waves on the antenna. It's simply a correction due to the additional polarisation currents arising in the dielectric acting in concert with the currents in the antenna wires.

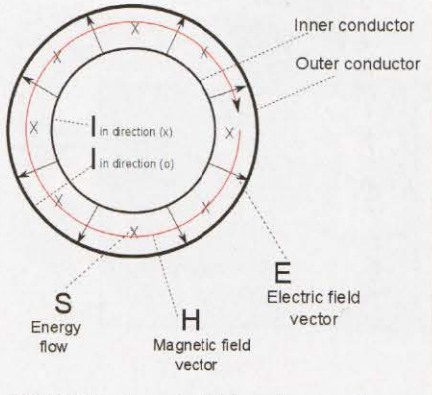



FIGURE 5: Current, fields and energy flow in a coaxial cable.

## VELOCITY FACTOR OF A COAXIAL CABLE.

Finally, the problem of calculating the correct length for a piece of coaxial cable. This is an easy and familiar calculation. Energy travels down a coaxial cable in the form of a transverse electromagnetic wave. In **Figure 5**, current on the inner conductor goes into the page, current on the outer comes out of the page. Energy flows into the page. To account for the dielectric, with its contribution of polarisation current, we can usually assume it is uniform and lossless and then the equations of energy flow in the line take the free-air form with a velocity less than the free-space speed of light, c. The velocity of energy flow, v, is modified by the dielectric constant $\varepsilon$ in the form $v^2 = c^2/\varepsilon$ or $v = c/\sqrt{\varepsilon}$. The ratio v / c is known as the velocity factor. The velocity factor is generally published data for good quality coaxial cables and commonly varies from 85% down to 67% for different cable constructions and dielectric materials.

**CONCLUSIONS.** Three distinct factors call for the reduction in length of the wires and cables associated with antenna installations. First, a dipole needs an end correction because it is not like a plucked violin string but instead it is a pair of wires driven at the gap between them. The laws of electromagnetism go on to tell us that an 'ideal' half-wave dipole is inductive at the design frequency. The effect is around 3-5%.

Second, polarisation currents flow in insulation on antenna wires and this affects antenna behaviour. The effect can be modelled in the more expensive antenna modelling software, or a simple model applied such as that proposed by Cebik. In an example, the effect was around an additional 3%.

Finally, coaxial cables carry energy as an electromagnetic wave and here it is proper to talk of a velocity factor correction since the wave travels in the dielectric medium within the cable. The velocity factor is usually in the range 67-80% and is well documented by cable manufacturers.

**ACKNOWLEDGEMENTS.** I'd like to thank Kate, G7DOF and Richard, G0REL for reading early versions of this material and helping me make it a bit more intelligible.

### REFERENCES

[1] See, for example, *Antenna Theory*, 2nd edition, p408ff, by C Balanis (John Wiley, publisher)

[2] VSWR referred to 75Ω; what you might see on the rig's VSWR meter using a 75Ω-50Ω balun

[3] On the Problem of Dielectric Coated Thin Wire Antenna, A Adekola, A I Mowete and A Ogunsola, published in *Progress In Electromagnetics Research Symposium Proceedings*, Moscow, Russia, August 18–21, 2009 (and available at http://piers.org/piersprceedings/piers2k9MoscowProc.php?searchname=adekola).

[4] See www.antennex.com/w4rnl/col0105/amod83.html.

# DVB-T stick as SDR

## Receive all modes from VHF to microwaves for less than £10...?

**INTRODUCTION.** In Design Notes August 2012 (and occasionally since) Andy Talbot described using a DVB-T (Digital Video Broadcasting – Terrestrial) USB adapter, also called a dongle or stick, as a software defined radio. A typical example is shown in **Photo 1**. Since that article, software to utilise these remarkable devices has developed further and some established SDR software can now support them. In this article I intend to just give a flavour of what's available/possible rather than detailed instructions, which have been covered in other publications and on the web.


**PHOTO 1: A common DVB-T USB dongle, usually available for about £10 on eBay.**

**TECHNOLOGY.** The DVB-T USB dongle uses a VHF to SHF tuner chip to downconvert a band of frequencies, typically a two to three megahertz segment, to baseband I & Q signals. These pass to a pair of 8 bit analogue to digital converters in a second chip, usually a Realtek RTL2832u. This chip outputs these I and Q samples over USB to a computer, where software can then take these data and demodulate almost any known mode. **Figure 1** shows the basic architecture. For its original intended use, the various broadcast digital TV and radio modes would be demodulated. But with suitable software anything from 'traditional' voice modes such as AM, FM, SSB through CW and digital modes, weather satellites, pagers, aircraft virtual radar and even GPS can be demodulated / decoded.

While DVB-T USB dongles are quite widely available and eBay is a popular source, only those based on the RTL2832u are of use to us. Any that don't make it clear that they have this chip are best avoided. Within the range of RTL2832u based sticks there are several tuner chip variants that offer different frequency ranges. One of the seemingly most sought after is the Elonics E4000 as, at the time of writing, this has one of the widest tuning ranges around: at least 64MHz to often over 2GHz. There is a gap of approximately 150MHz around the 1175MHz region. Unfortunately the future availability of this chip is in doubt as Elonics went into receivership last year. Unless you're interested in the top end of the range, any difficulty getting the E4000 is probably of little concern as one of the other tuner chips (such as the Rafael Micro R820T that covers 24 – 1766MHz) will probably suffice.

The wide bandwidth of these can also be their Achilles heel. A strong signal not too far away from what you're trying to listen to could cause de-sense or at least cause the AGC to make the gain jump up and down. I first noticed the latter when trying to receive weather satellites as there are pagers nearby in frequency. Within the software careful choice of sampling rate to reduce the bandwidth and/or adjustment of gain and AGC can make quite a difference. Beyond that, 'normal' radio techniques such as filtering before the dongle can be employed, particularly if it is being used for dedicated signal monitoring.

**WHAT'S IN THE BOX?** What you'll generally get in the pack is the stick itself, maybe a remote control, a small aerial and a CD of software for receiving broadcast TV. The

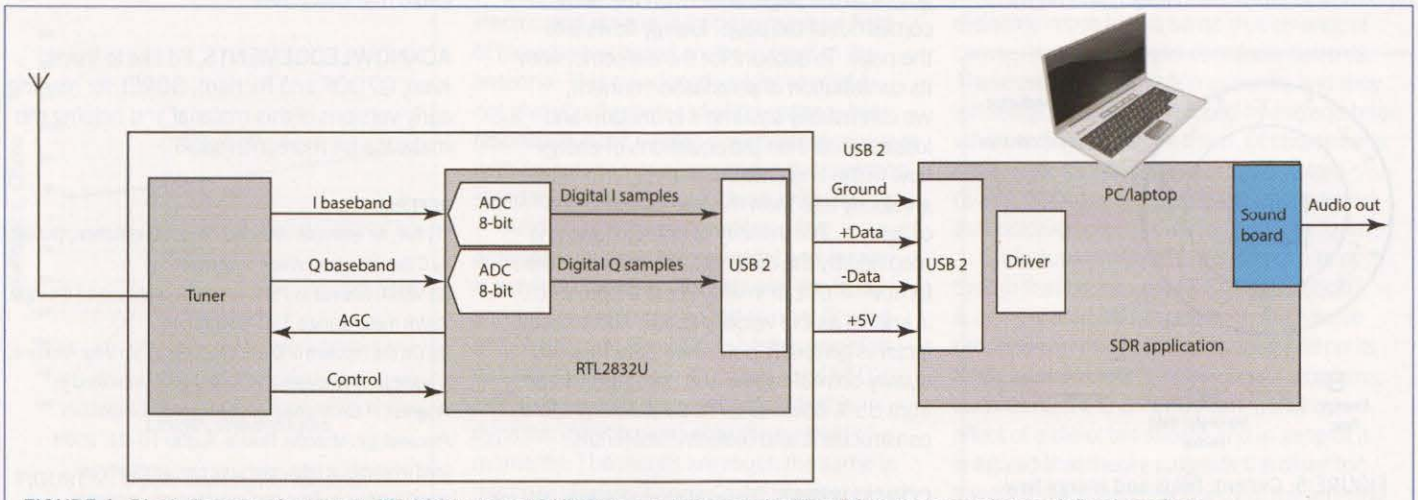



**FIGURE 1: Block diagram of a typical RTL2832u based DVB-T dongle being used with a PC to make a software defined receiver.**

# Exciting New C4FM/FM Digital Mobile Transceiver

## C4FM 144/430 MHz DUAL BAND 50 W DIGITAL/FM TRANSCEIVER

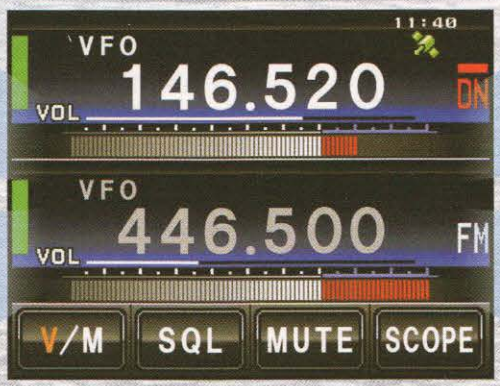
# FTM-400DE

## Advanced visibility and operability with full color touch panel Operation

Band Scope Screen

Altitude Screen

3.5-inch full color touch panel operation



The icon symbols, multi-function key display and pop-up messages are all displayed in high-resolution color thanks to the full-color, high luminance TFT liquid crystal screen.

Smart Navigation Screen

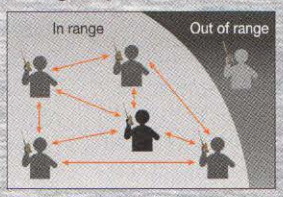
Frequency Direct Input Screen

## Smart Navigation Screen

- Real-time navigation function enables Location checking at any time.
- Backtrack function that starts navigation facing a registered point.


## Digital Group Monitor (GM) Function

- Automatically checks whether members registered to a group are within the communication range.

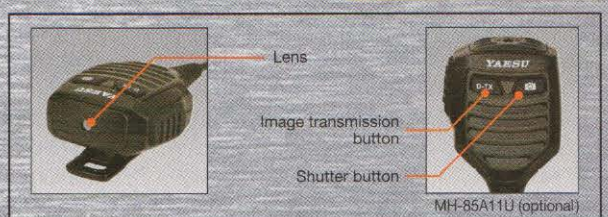


Group Monitor Function


C4FM Digital Clear Voice
Clear and Crisp Voice Technology


## Snapshot Function (Image Data Transmission)

- Image data can be displayed on the screen.
- Image data can be sent easily to other C4FM FDMA digital transceivers.

MH-85A11U (optional)

YAESU The radio

YAESU UK Ltd
Unit 12 Sun Valley Business Park, Winnall Close
Winchester, Hampshire SO23 0LB

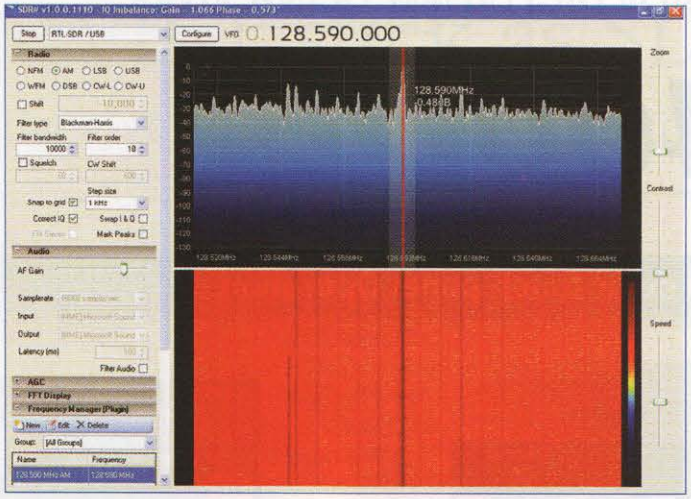



FIGURE 2: *SDRSHARP* receiving Volmet South.

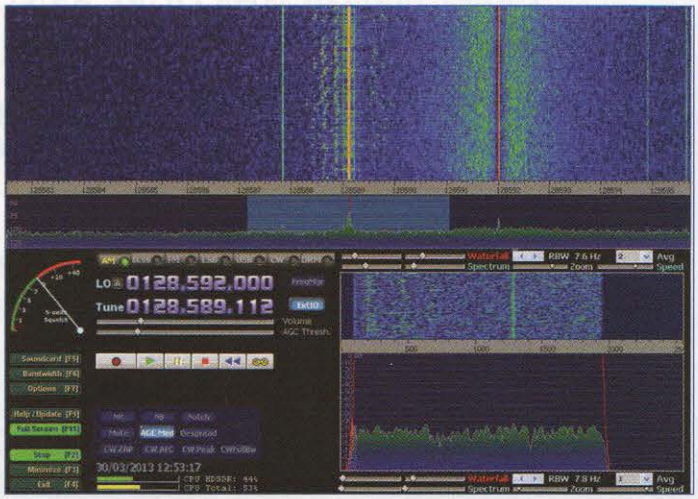



FIGURE 3: *HDSDR* receiving Volmet South.

remote and CD are of no use to us and the aerial is questionable, although one has successfully been used for a virtual radar demo. The aerial connection is usually either a Belling Lee or MCX, so an adapter will normally be needed to connect to an existing aerial. Of course if a dedicated aerial was being used the appropriate connector could be permanently wired.

**PROS AND CONS.** The advantages of SDR have been publicised before but I would sum them up as 'flexibility'. Depending on the hardware and/or level of ability, pretty much any mode can used and many of the radio parameters such as gain, filter width and shape can be adjusted. Adding new features or modes may be as simple as downloading new software.

**SOFTWARE.** Software for SDR seems to fall into one of three categories;

- Write it yourself in whatever programming language you choose. This is sort of equivalent of building your radio from scratch with discrete components. This could be quite time consuming and of course if you can't already program the learning curve is quite steep.

- Use software such as *GNUradio*, which provides a framework in which you build your system from (software) building blocks. A great many such blocks are available and if so inclined you can even write your own. There's no easy analogy here; it's maybe akin to using integrated circuits if you could plug them in and wire them together without having to bother with all the additional external circuitry needed.

- Software written by someone else. This is more like getting a traditional radio from a dealer and is probably the most common approach (and that the one that will be considered here). The big difference is you're not stuck with the user interface or functionality that came with the radio when you took it out of the box. If you don't like one program you can often easily change to another (although some allow some interface customisation). In fact you can easily have more than one installed on your PC and change the one you use depending on what you're doing at the time.

There is quite a lot of software freely available on the web for Linux, Windows (XP through to 8), MAC OSX and even Android. I guess that Windows is probably the most prevalent operating system amongst radio enthusiasts and I will mention three that I have tried for this operating system. These programs are not specifically written for DVB-T dongles but support them through a specific driver.

All support the normal voices modes – AM, FM, SSB – plus CW; I would encourage people to try all of them to see which suits them best.

***SDRSharp (SDR#)*** is a popular program by Youssef Touil. This supports 'plug-ins', add on applications to extend functionality, through an open interface. There are already some useful extras such as scanner, frequency manager and an interface to a satellite tracking program allowing automatic Doppler correction.

Of the three I've used this is probably the simplest program to use and is what I started with. When running, the largest part of the window features a single VFO (adjusted by clicking/scrolling), a spectrum display (bandscope) with a waterfall below. The relative size of these latter two can be adjusted. There are also buttons and panes on the left-hand side where various parameters can be adjusted. This is also where some of the plug-ins will appear when installed. The screenshot in **Figure 2** shows London Volmet South being received. I'm not sure of the significance of the signal level but the frequency displayed shows this particular DVB-T dongle's local oscillator to be about 10kHz high compared to what the software is setting it to, hence having to tune low. In this as in the other two programs this is fairly easily solved by adding or subtracting a correction factor, often in parts per million (ppm).

The filter bandwidth has a default depending on mode but can be easily changed by 'grabbing' the edge of the displayed grey bandwidth and widening or narrowing it as desired.

I can't put my finger on why but I find the waterfall not as helpful as in some other programs – but maybe I've not found the optimum adjustment. The waterfall is quite an important feature and can often give you a clue as to the type of modulation being used by unknown signals. Also if you suffer from various external sprogs the waterfall can help you identify real signals from interfering signals.

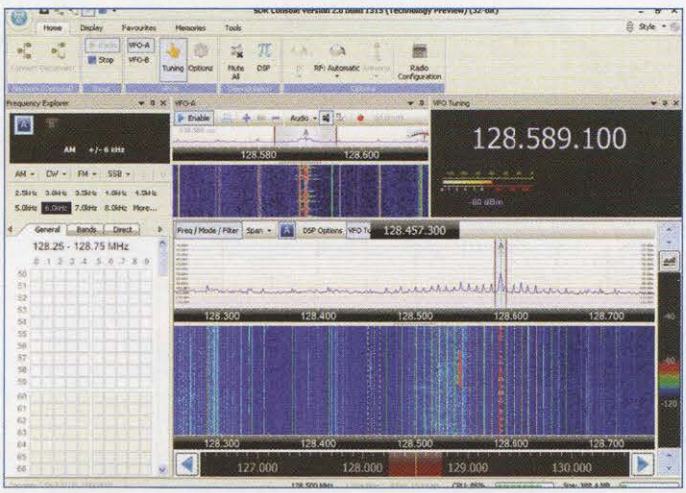



FIGURE 4: *SDR Console 2* receiving Volmet South.

***HDSDR (High Definition SDR)*** by Mario Taeube (**Figure 3**). The layout is somewhat different from *SDRSharp* (being based on *Winrad*) and I think the controls area in the bottom left hand quarter is meant to mimic a real radio. This software has a dual VFO but I find the LO/VFO combination clumsy, although there is an option to tie them together so they track each other with a fixed offset. The button marked 'bandwidth' is slightly misleading as it's actually for selecting the sampling rate, with the bandwidth being adjusted in the area on the bottom right hand quarter of the display. Bandwidth is limited to a maximum of half the sampling rate. On FM an additional bandwidth slider is available. Filter shape doesn't seem selectable but maybe I've just not found it yet! Also on my XP machine I found this program to be the most demanding of the PC's resources.

***SDR Console 2.0 beta*** by Simon Brown of *Ham Radio Deluxe* fame (**Figure 4**). Like *HDSDR* this is much more orientated towards the radio enthusiast. A feature I've not personally tried is the inclusion of a network server. This allows the SDR hardware to be installed on one PC, possibly in a position better suited for connecting to the antenna. The operating can then take place on a second PC networked to the first, potentially in a remote location. There is a promise of extras coming later such as integrated digital modes and satellite tracking.

Other software can be used to receive other modes. I would think almost any soundcard program could be used; all that is needed is to feed the audio output of the SDR software into the audio input of some suitable decoding software. In many Windows PCs this can be achieved using the audio mixer often included although you may have to dig into the Control Panel to use it. If your computer is lacking a useable mixer feature there are add on programs such as 'Virtual Audio Cable' that could be used.

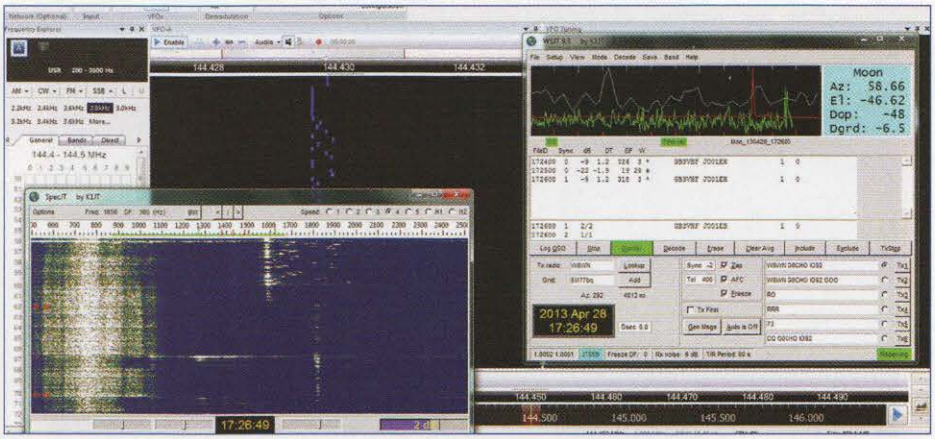



FIGURE 5: The GB3VHF 2m beacon being received using *SDR Console 2* then decoded with *WSJT*.

**2m BEACON MONITORING.** Using my 9 element Yagi I tried to listen for GB3VHF. Initially due to the dongle being a few kHz off I thought it wasn't sensitive enough to hear the beacon. After carefully looking at the waterfall and tuning around a bit I was pleasantly surprised to find it. I noticed that apart from carrier and the Morse ident there was also a series of tones so I looked up the website for the beacon. I discovered that the beacon also sends in JT65B mode, often used for EME (moonbounce). I downloaded the *WSJT* software and set up and after quite a bit of experimentation I got decoded reception of the beacon, as shown in **Figure 5**.

**WEATHER SATELLITES.** For these I tried a program called *ADPDecoder*, shown in **Figure 6**. A feature of this software I like is its built in pass prediction system, which can automatically start recording when a satellite is within range. Another handy feature is an audio signal level meter (seen at the top of Figure 6), allowing you to set the optimum level. Although the program supports automatically tuning some radios to correct for Doppler shift, no SDR software is yet supported so you have to manually set the frequency. Some internet searching shows that there are other weather satellite programs that can do this via a DDE method supported by *HDSDR* and by an *SDRSharp* plugin.

**PAGERS.** From the earlier mentioned issue I was quite aware of pagers. In the era of texting and smartphones I was a little surprised at how much apparent pager traffic there was and wondered if there was any software for their decoding. Thanks to Google it wasn't long before I found a program called *PDW*. It has the ability to decode a variety of pager formats but as these didn't mean much to me I left the defaults set. I found this program was very particular about the audio level before it would decode. I must say having proved it was possible I didn't find the pager traffic very interesting and haven't bothered much with it.

**PACKET/APRS.** For experimenting with this I just used *MultiPSK*. I do find the user interface of this somewhat 'busy' but it's handy for a quick try of various digimodes. I had it decoding packet and also APRS fairly easily but for more serious work or maybe running an APRS receive only iGate a combination of *AGWPE* and *APRSIS-32* could be used.

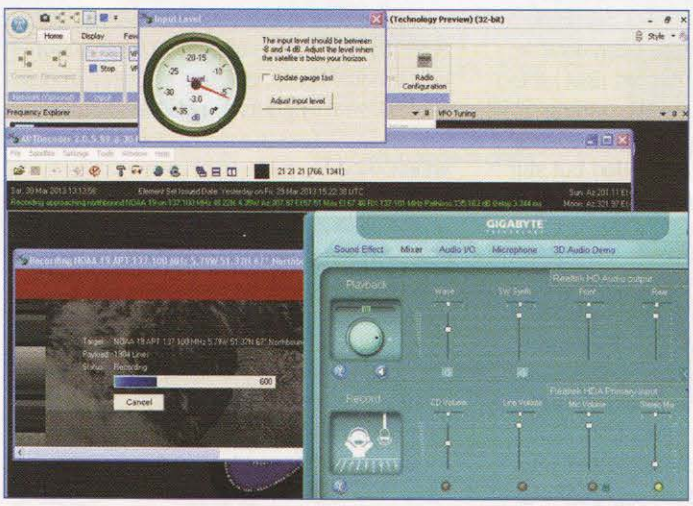



FIGURE 6: NOAA19 weather satellite received using *SDR Console 2* and decoded using *APTDecoder*.

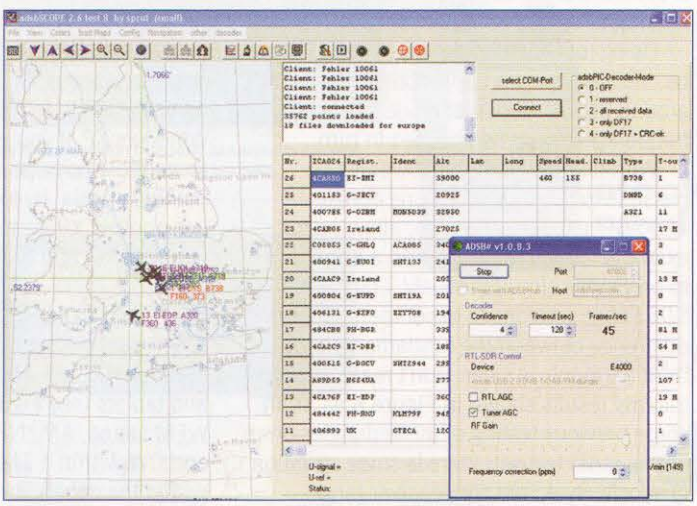


FIGURE 7: Aircraft ADS-B data being received / decoded with *ADSBSharp* and displayed with *ADSBScope*.

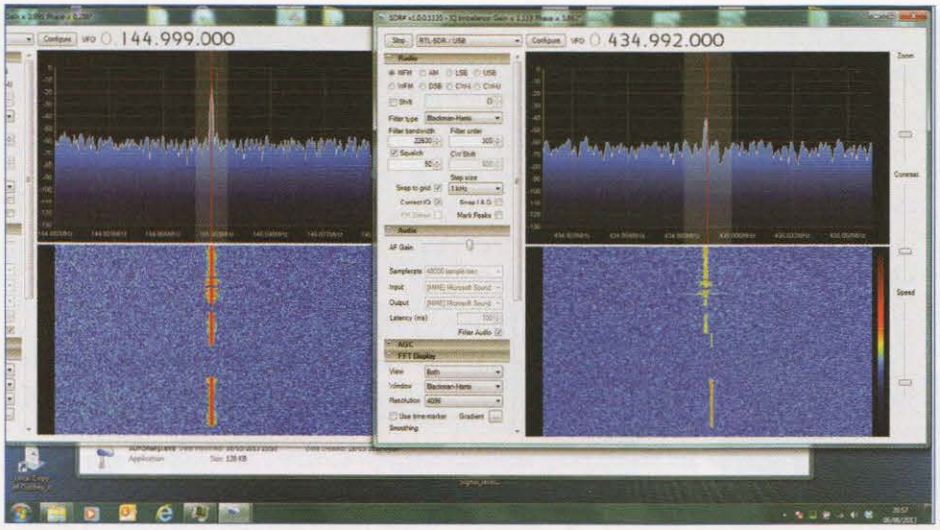



FIGURE 8: Two sessions of *SDRSharp* being used to monitor fundamental and third harmonic of an old 2m rig.

**VIRTUAL AIRCRAFT RADAR.** While investigating *SDRSharp* I saw mention of using it as a 'virtual radar' for aircraft tracking. Many commercial aircraft and some private transmit their location data along with some other info such as speed, heading and callsign on 1090MHz using a system called Automatic Dependent Surveillance-Broadcast, ADS-B. *ADSB#* is a version of *SDR#* dedicated to receiving these transmissions and decoding them into a data stream suitable for feeding plane tracking software such as *ADSBScope*. This displays the data and plots the planes' positions on a map (**Figure 7**). Given that the path from overhead planes is line of sight, even the supplied small whip antenna will pick up some – as long as it can see some of the sky. I have made use of this with the antenna propped up in the window to give demos to people at work, etc.

**SPECTRUM ANALYSER.** A DVB-T dongle can even be used as a crude spectrum analyser. Plenty of attenuation should be used; it's been suggested that the front end is sensitive to damage from strong local RF although I've had no issues so far.

Using just one dongle, close in spurii can be checked using an appropriate bandwidth around the fundamental while harmonic frequencies could be checked in turn.

With enough PC horsepower it's possible to run more than one dongle and SDR software at a time, allowing for example the fundamental and a harmonic to be viewed simultaneously. I ran two *SDRSharp* sessions to experiment and the difference between the fundamental and third harmonic is clear. Don't read too much into my results shown in **Figure 8** as, from some previous testing of these dongles done with a radio test set, there is some variation of sensitivity across the receiver range (and probably dongle to dongle). Ideally you would characterise this beforehand:

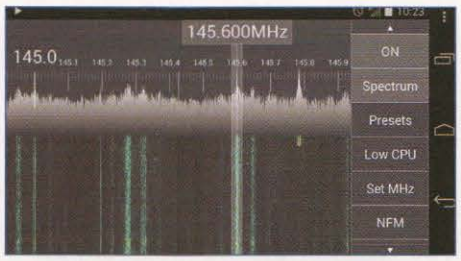



FIGURE 9: *SDR Touch* running on an Android phone with the DVB-T dongle shown in Photo 1, monitoring the 2m band.

maybe a local radio club has test equipment evenings if you don't have calibration equipment of your own. Once characterised, you can allow for any variations when taking measurements. That said, depending on what you're trying to achieve, the absolute values may be of less concern. For example if tuning a transmitter, minimising the harmonics can be done without knowing the precise values.

**PC CONSIDERATIONS.** You may think that you need a super powerful computer for SDR use but this isn't the case. If all you want to do is listen, ie no extra decoding, then something quite modest can do, I've successfully used a 10 year old IBM laptop (1.4GHz CPU, 1.25GB RAM) running Windows XP. If you want to add decoding some more horsepower is needed but still nothing special by today's standards, I often use another XP system with a 2GHz CPU (single core) and 2GB RAM.

**OTHER PLATFORMS.** Android was mentioned earlier: *SDR Touch* by Martin Marinov runs on Android mobile phones and tablets (see **Figure 9**) and demodulates WFM stereo, AM, NFM, USB, LSB, DSB and CW within a 1MHz band anywhere within the capability of your DVB-T dongle. You'll need a USB OTG (on-the-go) cable to connect the dongle to the device. If your phone/tablet doesn't output power on its USB port (many don't), a cheap powered USB hub should solve this.

Although it's sometimes said the simplest way to get a SDR stick running on a Mac is to install Windows, a native driver for the RTL2832U is available for Macs so that it can be used with programs like *HDSDR*.

**ANTENNAS.** The use of a software defined receiver doesn't invalidate what you already know about antennas. Apart from the usual types for whatever amateur bands you wish for general scanning type operation or use on a variety of very different frequencies a wideband antenna may be best, I have a discone in my loft which I have connected to an unused TV point in the spare room where my main PC lives. As mentioned previously the wide open front end of the RTL type dongles means some extra care may be required to prevent de-sense.

**CONCLUSION.** These 'dongles' provide a very low cost entry into the world of software defined receivers and can be a good way of learning about the subject – as well as being fun. In theory their front end performance could be improved for more serious work or simply be regarded as a stepping stone before getting something more purpose designed such as the FUNcube Dongle, which has *much* better performance.

For HF, modifications for these dongles have been suggested although I can't comment on how effective this may be having not tried myself or know anyone else who has. A more certain method would be to make or buy an upconverter. Much SDR software allows a frequency offset to be added so that you can tune with the correct frequency displayed.

Again you may wish to progress to more advanced hardware maybe including transmit capability. There is quite a lot of SDR hardware available, particularly for HF, from kits through quite sophisticated systems comparable in performance with the higher end of dedicated amateur equipment. If your pockets are deep enough professional systems are also available.

**WEBSEARCH**

*SDRSharp* site: http://sdrsharp.com/
*HDSDR* site: www.hdsdr.de/
*SDR Console 2*: http://v2.sdr-radio.com/
This website helped me get started: www.m9t.co.uk/
Reddit RTL SDR forum: www.reddit.com/r/RTLSDR/
Mainly *GNUradio* but with useful summary list of RTL2832u dongles: http://sdr.osmocom.org/trac/wiki/rtl-sdr
*SDR Touch*: http://sdr.martinmarinov.info/
RTL2832U on Mac: www.hamradioscience.com/using-the-rtl2832u-on-the-macintosh/
www.google.com: to find the other software mentioned plus a host of other RTL / SDR related stuff!

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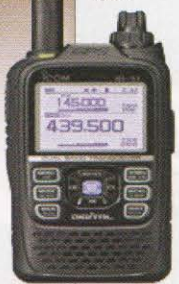


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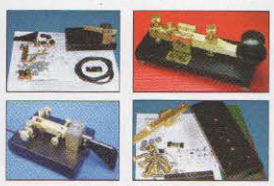

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HF Linear Amplifier 2kW PEP Output from 2 x 4CX800A's.

## Ameritron Amplifiers

See web for full range and specifications.

**Only available from ML&S, each and every AL-811HXCE is modified and checked in our workshops to improve reliability & performance. A very cost effective way of getting up to 800W PEP from a neat compact mains powered HF Linear Amplifier.**

**Ameritron AL-811HXCE + ML&S Price: £1099.95**

## LDG Auto Tuner Range

NEW! RT-100 100W

Factory appointed distributor with the largest stock of LDG outside the US.

| | | |
|---|---|---|
| NEW! RT-100 100W | **Weather proof remote Auto ATU** | £189.95 |
| NEW! RC-100 | **Remote control for RC-100, + DC power over coax** | £46.95 |
| AT-1000pro11 | 1kw Flagship Auto ATU. Separate external head-up large format meter | £494.95 |
| M-1000 | Large Analogue meter for the new AT-1000Pro11 | £124.95 |
| M-600 | Optional 4.5" meter for the AT-600Pro11 | £104.95 |
| YT-450 | Auto Tuner for the FT-450 & FT-950 | £234.95 |
| YT-847 | Want a really good Auto ATU for your FT-847? Here it is! | £234.95 |
| AT-600pro11 | NEW MODEL 600W pep, Optional external 4.5" Meter | £304.95 |
| AT-200pro11 | Designed for new generation of rigs | £219.95 |
| AT-1000Pro | 1kw 160m-6m (1.8-54MHz) High speed Auto ATU, tuning range 6-1000Ω | £499.95 |
| AT-897Plus | Bolt-on Alternative Auto Tuner for the FT-897. Wider tuning range and cheaper too! | £179.95 |
| IT-100 | New version of the AT-7000 | £167.95 |
| YT-100 | NEW AUTO ATU for FT-897/857 or FT-100 with additional Cat Port Control | £186.95 |
| Z-817 | Ultimate autotuner for QRP radios, including the Yaesu FT-817D | £124.95 |
| Z-100Plus | Ultimate autotuner for Yaesu FT-817D | £141.95 |
| Z-11ProII | Portable compact & tunes 100mW to 125W | £167.95 |
| RCA-14 | 4-way DC Breakout Box | £52.12 |
| KT-100 | Dedicated tuner for Kenwood radios | £182.95 |
| RBA-1:1 | Probably the best 1:1balun out there | £37.95 |
| RBA 4:1 | Probably the best 4:1 balun out there | £37.95 |
| FT-Meter | Neat Analogue back-lit Meter for FT-897/857. S-meter, TX Pwr, ALC Etc | £46.95 |
| FTL- Meter | Jumbo version of the famous FT-Meter | £79.95 |

## MyDEL

The neatest smartest looking desk top power supplies that money can buy. Ideal for powering any main rig or accessory requiring 13.8 Volts at up to 120 Amps.

### NEW MyDEL MP-23SW1

The latest in a long range of quiet compact switch mode power supplies. This new model can supply up to 23 Amps – more than enough for most modern (and old) HF transceivers. Unlike other PSUs on the market, the MP-23SW1 is crow bar protected ensuring the output voltage can never rise above 14V. Set at 13.8V, the PSU has a cigar lighter outlet on the front panel for any accessory items you may wish to use (ideal for handies etc.) a LED indicator for output Voltage and a lit power on/off switch. To the rear there are two large binding posts for the main 23Amp output, small cooling fan vent and mains input with fuse.

**£69.95**

**Specification**
Input Voltage: 234V 50Hz
Output: 13.8V DC +/- .5V. 10-15V internally adjustable
Output Voltage regulation: Less than 2%
Protection: Overload, Over temperature, Short Circuit by constant Current circuit and Over Voltage.
Output Current: 23Amps max
Ripple & noise: < 100mV p-p
Fused: 5Amp
Dimensions: 181x63x190mm
Weight: 1.6kg

### MyDEL MP-304Mk11

**New addition to the MyDEL range of PSU's. Heavy Duty LINEAR 30Amp**

For those of you that prefer old style non-switching technology in your power supply we think this new 30 Amper from MyDEL is the one. Switchable Volts/Amps with large precise metering (analogue of course!) variable Voltage, Cigar socket output for all your accessories, twin front panel outlets for up to 6Amps and two large binding post terminals for up to 30Amps. Remember, all MyDEL PSU's come with a two year no quibble guarantee.
**£99.95**

**Two-year warranty on all MyDEL PSUs**

### MyDEL MP-50SW111

50Amp DC power supply.
**£149.94**

Probably one of the lightest 50Amp DC power supplies available today, the new MP-50SW111 weighs in at only 2.2Kilos (4.85lbs). Unbelievably compact measuring a mere 195mm wide including chunky rear terminals and front panel knobs and only 85mm wide.

### Yaesu FP-1030A

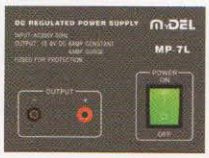
25-30Amp 13.8V fixed DC PSU, Twin meters, near silent running.
**£189.95**

### MyDEL MP-9626

120A, 13.8V DC power supply, switch mode.

~~£399.95~~
**Now £369.95**

### NEW MP-7L




Small & compact, this new Linear 6-7Amp PSU is ideal for running ancillary items in the shack. Due December 2013

**ML&S Price: £29.95**

## MFJ Products

Lots more MFJ stocked! See web for details

| | | |
|---|---|---|
| MFJ-266 | V/U Portable Antenna Analyser 1.5-185MHz + 300-490MHz | £339.95 |
| | | Free UK carriage |
| MFJ-974HB | Manual ATU for balanced line antennas, 160-10m | £199.96 |
| MFJ-974 | as above but without 160m | Special! £179.95 |
| MFJ-16010 | Random Wire ATU 160-10M | £71.95 |
| MFJ-949E | Manual ATU metered, Dummy Load, 1.8-30MHz, 300W | £199.95 |
| MFJ-901B | Manual Mini ATU 1.8-30MHz, 200W | £111.95 |
| MFJ-971 | Manual ATU metered, 1.8-30MHz, 200W | £119.95 |
| MFJ-904H | Manual ATU, metered, inc balanced, 1.8-30MHz 150W | £139.94 |
| MFJ-969 | Manual Roller ATU Metered 1.8-54MHz, 300W | £199.94 |
| MFJ-993B | Auto ATU Metered 1.8-30MHz, 300W | £279.95 |
| MFJ-1786X | Magnetic Loop 10-30MHz, 150W | £439.95 |
| MFJ-1788X | Magnetic Loop 7-22MHz, 150W **re-built & re-aligned by ML&S** | £489.95 |
| MFJ-259B | Antenna Analyser 1.8-170MHz | £289.95 |
| MFJ-269B | Antenna Analyser 1.8-450MHz | £389.94 |
| MFJ-260C | Dummy Load 300W SO-239 | £45.95 |

## BlueCAT Repeater Controller

Now available for Yaesu & Icom Transceivers. Using your Android phone you can instantly touch a repeater and see your rig jump to the frequency, CTCSS & offset. Designed & built in the UK by ZB2M, exclusive to ML&S and appointed dealers.

**Only £59.99**

## Palstar

**AT-2K**
2.5kW PEP Antenna Tuner. Price: **£499.95**

| | | |
|---|---|---|
| HF-Auto | 1.5kW PEP fully automatic ATU for QRO | £1399.95 |
| AT-500 | 600W PEP Antenna Tuner | £409.95 |
| AT-2K | 2000W PEP Antenna Tuner | £499.95 |
| AT-2KD | Differential 2kW PEP Antenna Tuner | £479.95 |
| AT-4K | 2.5kW PEP Antenna Tuner | £789.95 |
| AT-5K | 3.5kW PEP Antenna Tuner | £999.95 |
| BT-1500A | Balanced Antenna Tuner | £639.95 |
| PM-2000AM | Power/SWR Meter | £159.95 |
| R-30A | Superb HF Communications Receiver. 100kHz - 30MHz AM, SSB, 20Hz/100Hz Tuning Steps | £699.95 |

**Palstar Dummy Loads** DL-1500 (1.5KW) £189.95 DL-2K (2kW) £339.95 DL-5K (5kW) £429.95

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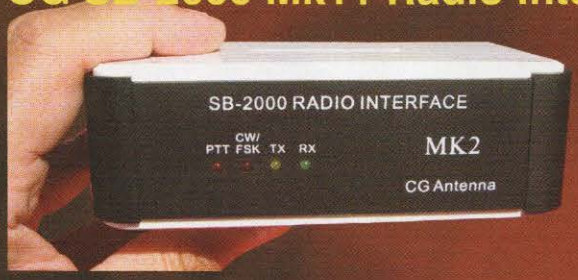
# CG SB-2000 Mk11 Radio Interface




**New from CG, the SB-2000Mk11 is an updated version of the original. The unit now supports 2 serial ports allowing you to have one reserved for CAT/CI-V rig control, the other for data operation. It also supports faster speed rate for CAT & CI-V, up to 19200bps.**

- **Connect your computer with USB port.**
- **USB to UART bridge by FT232 single chip. USB 2.0 compliant. Full speed.**
- **CAT, CI/V controller and audio transformer are combined together.**
- **Complete isolation between computer and radio station.**
- **Optical isolation used for digital signal.**
- **Audio signal isolated 1:1 transformer. It has internal static isolation.**
- **Excellent EMC(Electromagnetic compatibility)**
- **Powered via your USB port.**
- **Dimensions 135 x 76 x 48mm.**
- **Weight less than 400 grams.**

## Only £89.99

**Complete set of interface cables for your radio £19.95.**

**For more info see:**
**www.hamradio.co.uk/cg2000**

Tigertronics
Grants Pass, Oregon

**Call to discuss your rig-to-cable requirements.**

## Tigertronics SL-USB

ALL sound card Digital and voice modes are supported by the SignaLinkTM USB. This includes traditional modes such as RTTY, SSTV and CW (to name a few), as well as today's hottest new modes like PSK31, MT-63 and EchoLink.


**From only £99.95**

## New Model! FUNcube Dongle Pro+


**£149.95**

After the worldwide success of the FUNcube Dongle, many of you have noticed that we've been out of stock and waiting for new deliveries. Howard Long, the FUNcube inventor decided to take into account feedback by many FCD users with a redesign he is calling the FUNcube Dongle Pro+. Howard thinks that you will find that the results are very worthwhile (actually so do we!). There are many enhancements both in performance, extended range and features.

**INTRODUCING THE EXTENDED RANGE VERSION, the FUNcube Dongle Pro+.** Not only has it got a frequency range of **150kHz to 240MHz & 420MHz to1.9GHz** but this new design has on board filters for the lower frequencies.

- Coverage is from 150kHz (yes, that's kHz) to 1.9GHz.There is a gap between about 250MHz to 410MHz. There isn't a gap anywhere else.
- Eleven discrete front end filters, including some really, really serious SAW filters for 2m and 70cm
- 0.5ppm TCXO
- Much improved phase noise
- Better Dynamic Range by up to 7dB
- Tuner PLL Steps from memory
- All this plus more and still no drivers required!

## Perseus VLF-LF-HF Receiver

PERSEUS is a VLF-LF-HF receiver based on an outstanding direct sampling digital architecture Only **£699.95**


IN STOCK

## Perseus-FM+

High Performance FM 88-108MHz adapter for the Perseus SDR Receiver. Available now. **£299.95**

# A Real SDR Receiver That doesn't need a PC?

**The CR-1 SDR communications receiver** is independent of a PC or MAC, using embedded digital signal processing technology providing a degree of portability and performance previously unavailable to the radio enthusiast. **Enter the CommRadio CR-1.**


Star feature in RadioUser December Issue

Covering 500kHz-30MHz all mode, the CR-1 SDR is a small, low-power, ruggedly constructed radio receiver that is finding a niche in the world of short wave listeners and ham radio enthusiasts alike. Not only does it cover all the shortwave frequencies, but FM Broadcast*, AirBand* & VHF/UHF* too. It's even got a built-in Li-Ion battery pack allowing true portability for up to eight hours of use. (More using headphones). As one potential customer noted: "It's an SDR with knobs, keys, and a display!" **We think it's a modern day Lowe HF-150.**

* At reduced performance

# The New CommRadio CR-1.

**NOW IN STOCK**

For full specifications, video's and further details see www.hamradio.co.uk/cr1

ALPHA DELTA COMMUNICATIONS, INC.

## 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 ..... **£59.95** |
| **Delta-4B** | 4-way position SO-239 switch (2kW) for use up to 500MHz ..... **£79.95** |
| **Delta-4BN** | 4-way position N-type switch (1.5kW) for use up to 1.2GHz ..... **£89.95** |
| **AD-ATT3G50** | 0MHz to 3GHz (200W) surge protector. N-Female Connector ..... **£54.95** |
| **AD-ATT3G50/HP** | 0MHz to 3GHz (2kW) surge protector. N-Female Connector. ..... **£56.95** |
| **AD-ATT3G50U** | 0MHz to 500MHz (200W) surge protector. SO-239 Connector ..... **£49.95** |
| **AD-ATT3G50U/HP** | 0MHz to 500MHz (2kW) surge protector. SO-239 Connector ..... **£49.95** |
| **End Insulators** | Dog Bones. They are extremely rugged, UV and RF resistant ..... **£1.95** |
| **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 ..... **£89.95** |
| **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 ..... **£89.95** |
| **Delta-DX-CC** | 80m, 40m, 20m, 15m and 10m dipole. This antenna is parallel length dipole with no traps; overall length is 82ft ..... **£139.95** |
| **Delta-DX-DD** | 80m and 40m dipole. This antenna is parallel length dipole with no traps; overall length is 82ft ..... **£119.95** |
| **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 ..... **£129.95** |
| **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. ..... **£169.95** |
| **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 ..... **£49.95** |
| **DX-Ultra** | Medium wave to 30MHz 80ft AM Broadcast Dipole. Efficient, low-noise dipole for military, government, etc., use. ..... **£149.95** |
| **AD-Delta C** | Hardware Kit contains the following: 1 x Dipole Centre. 2 x Dog Bores. 1 x Surge Protection Block. ..... **£29.95** |
| **Delta-SEP** | Replacement/spare Arc-Plug™ Static Electricity Protector. This unit is usually attached to the back of the Alpha Delta Centre T Balun ..... **£14.95** |

## Nifty KX3 Stand

Made of heavy duty black acrylic with a beautiful high gloss finish especially designed to fit the Elecraft KX3.

**Only £29.95**

**A Date for your Diary! Don't Miss Our Famous Open Day on Saturday 30th November! Our Legend**

## New product from British manufacturer. WonderWand WonderLoop Antenna

**ML&S PRICE ONLY £91.95**

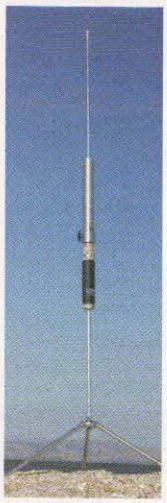
If you are an avid FT-817 or KX-3 operator and enjoy nothing more than heading for the hills on a weekend to active those rare WAB squares. Take a look at the all new WonderWand WonderLoop Antenna.

Incorporating their easy to use tuning circuit, which offers frequency coverage from 20m-6m and handling 10w of RF power, you can be on the air in seconds. The tuning unit is enclosed within a lightweight ABS case, no larger than a pack of cards. This means you will no longer need to carry around all those additional extras needed to string up a wire in the field. There is also no need to worry about running a counterpoise with this efficient loop design.

So how does it perform? As we had sunshine this afternoon, we popped out into the car park here at ML&S and attached the loop to our demo FT-817. Within minutes we had tuned to the 20m band worked into EA, I and 9A. Not bad for 5w and the 'shack' in our hand.

***For full info & video see: www.hamradio.co.uk/wonderloop***

## New Super Antenna MP1 SuperStick



**Covering a massive 80m right through to 450MHz*, this simple to erect compact vertical antenna weighs only 1kG, is only 2.1m tall when fully extended and collapses down to just 30.5cm (12")!**

*With optional 80 & 60m coils

**Product features:**

- Ham bands: 40m-30m-20m-17m-15m-12m-10m-6m-4m-2m-70cm
- Frequency Range: HF 7MHz~30MHz continuous
- Frequency Range: VHF 48 to 144MHz continuous
- SWR: 1.5 : 1 or better
- Rated Power: 500W SSB; 300W CW / DIGITAL
- Antenna Weight: < 2 pounds (1kg)
- Also configurable for up to 450MHz
- Standard 3/8"-24 male thread for mounting
- Low profile TM1 tripod included
- MC80 80m coil included for 80m band
- Optional MR series radial sets available
- Optional MC60 60m coil for 60m band

**Only £159.95 including the 80m Coil FREE!**

**For the complete range of Super Antenna products see www.HamRadio.co.uk/Superantenna**

## Miracle Antenna

**LAST FEW REMAINING MIRACLE STOCK!**

**MMD-17** 17M MIXED MODE DIPOLE,+ 5 BANDS with ATU ..... **£89.95**

**MMD-30** 30M MIXED MODE DIPOLE ..... **£99.95**

## DIAMOND

Huge selection of Diamond products always available

**Base Antennas**

**NEW!** CP-VU8 80m-70cm 200W Compact HF Base, only 2.7m Long! ..... **£469.95**

X-30 2/70, 3/5.5dB, 1.3m Long .. RRP £79.95 **SPECIAL £59.95**

X-50N 2/70, 4.5/7.2dB, 1.7m Long RRP £72.95 **SPECIAL £64.95**

X-300N 2/70, 6.5/9dB, 3.1m Long RRP £146.95 **SPECIAL £109.95**

VX-1000 6/2/70 2.15/6.2/8.4DB 1.42M Long ..... RRP £149.95 **SPECIAL £99.95**

X-510N 2/70 Fibre glass 8.3/11.7dB gain. 5.2m long "N" ..... RRP £154.95 **SPECIAL £129.95**

V-2000 6/2/70, 2.15/6.2/8.4dB, 2.5m Long ..... RRP £149.95 **SPECIAL £109.95**

**Mobile Antennas**

NR-770R 100W, 2/70, 3/5.5dB, .98m Long ..... RRP £34.95

NR-770RSP as NR-770 but spring loaded ..... RRP £39.95

NR-770RSP As above but spring loaded ..... RRP £37.95

NR-7900 2/70, 3.2/6.4dB, 1.46m Long ..... RRP £54.95

**Duplexers/Triplexers**

MX-72N 1.6-150/400-460MHz Duplexer ..... RRP £44.95

MX-62M1.6-56/140-470MHz Duplexer ..... RRP £69.95

MX-610 HF/6+2+70 (for FT-8900) ..... RRP £59.95

MX-2000 6/2/70 Triplexer ..... RRP £91.95

MX-3000N 2/70/23 Triplexer ..... RRP £86.95

**Switches**

CX-210A 2-way, SO-239 Die Cast ..... RRP £53.95

CX-210N 2-way, N-Type, Die Cast ..... RRP £82.95

CX-310A 3-way, SO-239, Die Cast ..... RRP £89.95

CX-310N 3-way, N-Type, Die Cast ..... RRP £114.95

## mRS MiniVNA Series of Antenna Analysers

Perfect for checking antennas and RF circuits for hams and commercial users.

**MiniVNA Pro with Bluetooth**
100kHz-200MHz **£379.94**

**MiniVNA Extender**
For Pro only, extends range to 1500MHz
**£299.94**

## The UK's favourite rig-mounted antenna system!

Wonder Wand Antennas U.K.

**NEW! WonderWand Widebander**
1.8-460MHz with 1.3M Whip! ..... £129.95

**NEW! WonderWand Mk4**
7-432MHz antenna with 1.8m Whip ..... £89.95

**Wonder-TCP**
40-10m Tuneable Counterpoise ..... £59.95

## Looking for a wire antenna that will operate from 160m – 10m with no ATU, right out of the box?

**You've just found it. The Yaesu YA-30.**

**FREE Carriage UK Mainland**

This design was originally manufactured for military use and thousands have been deployed around the world. Take the assembled antenna out of the package, snap in the included spreaders, string it up preferably no lower than 15' off the ground and you have an antenna system that needs NO ATU and offers continuous coverage from 1.8-30MHz.

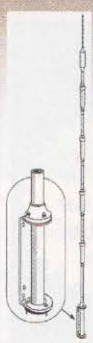
**The RRP is £309.95 ML&S: £199.99. See web!**

## MyDEL CG-3000

Weather proof remote Auto-ATU. 160m-10m 200W PEP.
**ONLY £229.95**
Remote Control for CG-3000.
**£39.95**

## HUSTLER

**See web for full listing!**



**Hustler are one of America's oldest manufacturers of Ham Radio antennas. The famous "White Whips" have been seen on many cars operating HF mobile. Their HF base range of 4 5 or 6-BTV antennas are probably the easiest to assemble and get going and of course are ground mounted, operating with just an earth spike mounted close to the base.**

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

4-BTV 40/20/15/10m ..... £189.95

5-BTV 80/40/20/15/10m ..... £229.95

6-BTV 80/40/30/20/15/10m ..... £269.95

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

## EAntenna

## New Product Range

**ML&S are pleased to announce sole distribution for EAntennas for the UK.**

**The entire range of HF & VHF antennas is now available to order. See web for more details.**

## MyDEL Surmen Antenna

SU/Z300S
VHF/UHF antenna Gain: 2.15/3.8dB 150w H:0.32m ..... £16.95

SU/Z209A
VHF/UHF antenna Gain:3/5.5dB H:1.07m - fibre glass ..... £26.95

SU/Z207B
VHF/UHF Mob. Antenna 4/6dB- 100w 1.23m with Radial ..... £29.95

SU/UT106-SMA-MALE
VHF/UHF MINI MAG MOUNT - 35CM 4M CABLE Male SMA ..... £12.95

SU/UT106-SMA-FEMALE
VHF/UHF MINI MAG -35CM 4M CABLE SMA (Ideal Wouxun) ..... £12.95

SU/SC-ECH 5m cable for mobile mounts - rg58 ..... £14.95

SU/SC-5MS 5m cable for mobile mounts with35cm pig tail SO/PL ..... £19.95

SU/SBB4 VHF/UHF antenna- Gain: 3/5.5dB - 60Wmax - H: 0.92m .. £29.95

SU/NL-770R VHF/UHF antenna- Gain: 3/5.5dB - 150W - H:0.99m ..... £19.95

SU/K808 Ultra thin mag mount - 120mm base - 4m of rg188 ..... £29.95

SU/K706 Mag Mount 120mm base - 4m RG316 (THIN CABLE) to PL £24.95

SU/K505 STRONG MAG MOUNT - 120MM WITH 4M OF RG58 ..... £24.95

SU/K303B ANGLED MAG MOUNT WITH 4M OF RG-188 THIN CABLE PL ... £24.95

SU/UT106-SMA-female 2/70 MiniMag
2m/70cm V+U Mini-Mag with replaceable whip, 35cm with 4m cable terminated with reverse SMA female plug. Ideal for Wouxun range of handies ..... £12.95

SU/UT106-SMA-male 2/70 MiniMag
2m/70cm V+U Mini-Mag with replaceable whip, 35cm with 4m cable terminated with reverse SMA female plug. Ideal for Wouxun range of handies ..... £12.95

**Looking for the best USED EQUIPMENT? See www.HamRadio.co.uk/used**

# Index 2013

## Antenna Features



## Construction



## Getting Started In...



## Features

## Reviews



## Technical Features



## Book & RSGB Shop Reviews



## Editorial



## Obituary



## Regulars



## Special Offers

# EMC

## ADSL/VDSL EMC

**HISTORY.** In late 1994, RSGB EMC Committee Chairman Robin Page-Jones, G3JWI wrote to BT expressing concern about the EMC implications of the planned use of ADSL (Asymmetric Digital Subscriber Line) to deliver Video on Demand (VoD) via existing copper telephony pairs. The higher speed VDSL concept had not been developed at that time but subsequent work by BT on VDSL included studies and practical tests on the immunity of VDSL to amateur HF transmissions and the possible effects of VDSL emissions on amateur reception. In June 1996, BT invited the RSGB to send its technical experts to a meeting at BT Labs to discuss the results of the tests. This meeting was attended by Robin, G3JWI and the current EMC columnist Dave, G0SNO. Further information was reported in the EMC Column in *RadCom* October 1996.

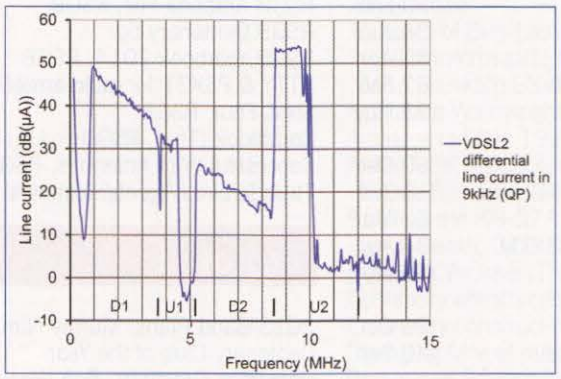



**FIGURE 1: Measured frequency spectrum of line current on a VDSL2 line.**

In April 1998, the Radiocommunications Agency (RA, which became part of Ofcom) held the first PLT/DSL meeting. Radio users were asked to advise on the level of interference that can be tolerated for each service. The RSGB advised the RA that the maximum level of specifically generated, continuous, broadband interference for the HF amateur bands should not exceed 0dBμV/m (in 9kHz bandwidth at 10m distance).

In March 2001, the RA established a Technical Working Group (TWG) to determine the potential for interference to UK radio services from emerging DSL technologies (specifically Very High Bit Rate DSL, or VDSL) and PLT operating in the frequency range 1.6MHz to 30MHz. TWG membership included representatives of HF users such as RSGB and HF broadcast services plus government sponsored HF radio services, including military, public safety aeronautical and maritime radio. Manufacturers and telecommunications operators were also represented. In October 2002, the TWG issued a comprehensive 427 page Final Report, which is still available online as of October 2013 (see Websearch).

In 2010, EMC Committee member Robin, G3JWI had BT Infinity Broadband (VDSL2) installed. In November 2012, BT advised him that the service would be improved, mainly with increased upload speeds. It seems that this involved the implementation of an 8.5MHz to 12MHz upstream band that had not been used previously.

Early in 2013, Robin noticed an increased noise floor on the 10.1MHz amateur band. The noise appeared to be 'white' and was constant 24/7 at about 10dB above ambient, measured on an inverted V dipole in the back garden at least 30m from the nearest telephone pole. The noise was not related to Robin's own BT Infinity line. When his own line is unplugged from the VDSL modem the VDSL signal will go off the local line but doing this makes no difference to the level of radiated noise emissions measured at 10.1MHz on the inverted V.

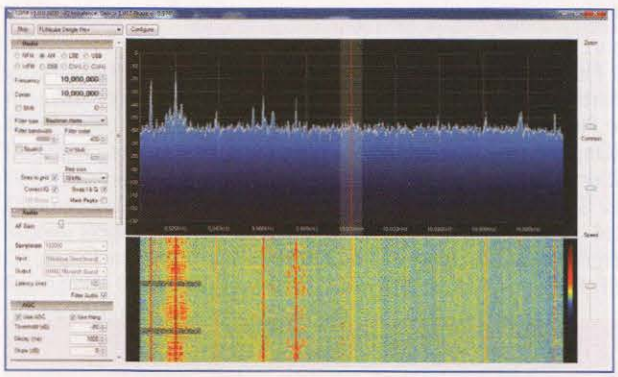


**FIGURE 2: SDR plot showing VDSL2 noise and wanted HF radio signals around 10.0MHz.**

**MEASURING VDSL2 SIGNALS.** G3JWI and G0SNO made some measurements of the VDSL2 line current indoors using a clip-on RF current probe on one wire of the line. The results are shown in **Figure 1**. The resolution bandwidth is 9kHz and the detector is Quasi-Peak (QP). Bands D1 and D2 are 'downstream' bands (to the customer) and U1 and U2 are upstream bands (from the customer). This is one of the variants of Bandplan 998 that is specified in the ITU-T standard G.993.2 for VDSL2 broadband systems such as BT Infinity. It can be seen that the two upstream bands U1 (3.75 – 5.2MHz) and U2 (8.5 – 12MHz) are not fully utilised on this particular line although the radiated noise spectra suggest that they are fully utilised on some other lines in the local area.

G3JWI and G0SNO also made some spectrum measurements using software defined radio (SDR). We used a FUNcube Dongle Pro+ USB SDR receiver on a laptop PC with *SDRSharp* software, although any SDR with HF coverage should be suitable for such measurements.

Since the noise is 'white' and is present all the time, it is not possible to make a direct measurement of the increased noise level on the 10.1MHz band using a fixed wire antenna. Nevertheless, it is possible to detect the change of noise at the edges of the U2 upstream band – nominally 8.5 and 12.0MHz. Robin found that in his case, the actual frequencies are a few tens of kilohertz inside the U2 band. It is also possible to use SDR to identify spectral characteristics of noise that indicate whether the source is likely to be VDSL2 or some other source. **Figure 2** shows an SDR plot centred on 10.0MHz. This and the other plots include some wanted HF signals that are mostly bright red.

ADSL, VDSL and VDSL2, collectively known as xDSL, use multi-carrier modulation that sounds just like 'white' noise on a receiver. However, it looks different on an SDR. Truly random thermal noise looks like a random speckled pattern on an SDR waterfall display whereas with xDSL, it is possible to resolve individual sub-carriers or 'tones' by carefully adjusting the contrast in the SDR software. This may not be easy to see unless the xDSL signal is significantly higher than the background natural noise. In Figure 2, a structure of spectral lines can be seen as vertical yellow and blue stripes. This line structure can also be seen more clearly in **Figure 3**. If there are 10 pairs of darker and lighter spectral lines in a bandwidth of 43.125kHz, this indicates a subcarrier spacing of 4.3125kHz, which is characteristic of VDSL (and ADSL).

Further investigation produced even more surprising results. The other upstream band U1 is nominally 3.75MHz to 5.2MHz and listening at the band edge frequencies (3.795 and 5.174MHz at this QTH) showed a noise 'step'. Noise increases by about 6dB above 3.795MHz and also increases by about 15dB below 5.174MHz (again 30m from the nearest telephone pole). This U1 band is mostly in between the 80m and 60m amateur bands although it does overlap the top end of 80m.

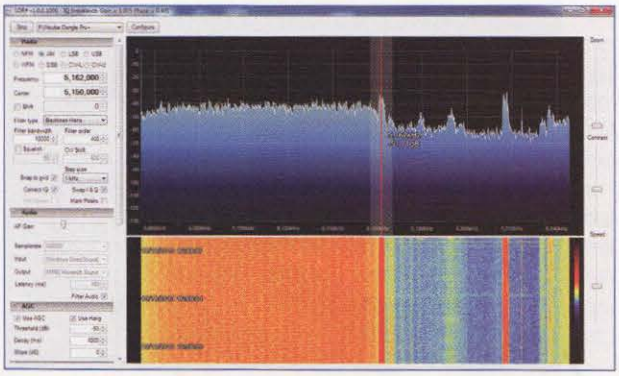


FIGURE 3: SDR plot showing a 'noise step' and wanted HF radio signals around 5.160MHz.

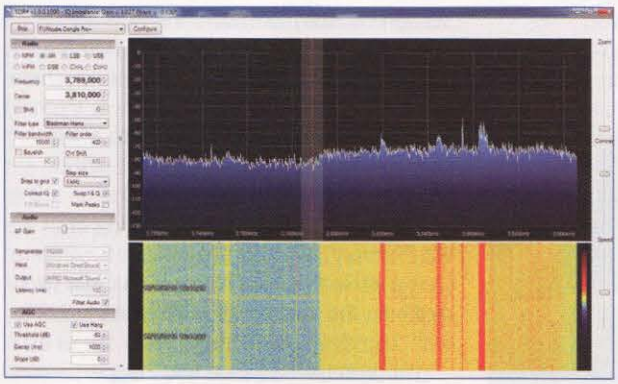


FIGURE 4: SDR plot showing a 'noise step' and wanted HF radio signals around 3.780MHz.

**CONTACT WITH BT.** The question that the EMC Committee is asking is, "could this happen elsewhere?" It would be an odd coincidence if a strange one-off fault just happened to occur at a location where the EMC Committee has been keeping an eye on HF noise levels for a number of years.

In the present case the only amateur band where the whole band is affected is the 10.1 – 10.15MHz band but the EMC Committee's concern is not so much this specific case but the need to determine the fundamental cause and how it relates to similar systems. The EMC Committee is in contact with BT who made a preliminary investigation and reported that they had identified an installation problem in the local area.

In mid October, Openreach went to look at a VDSL2 installation nearby and they took the opportunity to do some checks. Engineers from BT and Openreach did a repair and temporarily disconnected a couple of nearby lines that were suspected of having poor balance at RF. Meanwhile Robin monitored the noise on 10MHz. None of the actions made any difference to the emissions. It is understood that at the time of writing, the BT engineers are planning to make a report and take things from there.

This particular location appears to have is a relatively high take-up of BT Infinity because the location is some distance from the local telephone exchange and this limits the speed of the slower ADSL2 broadband service.

For VDSL2, the upstream bands are more likely to radiate from overhead wires as these signals are sent from the customer premises equipment whereas the downstream bands are sent from the street cabinet and are generally weaker by the time they reach the customer premises. The upstream bands have been planned so that they avoid amateur radio bands except 10MHz and the top part of 3.5 – 3.8MHz. Nevertheless, we have also received a report from another member at a different location where the noise 'step' at around 3.7MHz goes down instead of up. This would indicate that the downstream D1 signal is radiating more than the upstream D2.

The ITU-T G.993.2 standard for VDSL2 requires that the system shall have the capability to 'notch' the amateur bands or any other frequencies, should the need arise. It is sometimes claimed that notching should not be necessary in normal installations and it is there as a safeguard. We understand that at present the BT VDSL2 hardware is capable of 'notching' amateur bands but the software infrastructure to support this capability is not currently available.

The EMC Committee is continuing a useful technical dialogue with BT EMC specialists about VDSL2 leakage. Any further developments will be reported in a future EMC column.

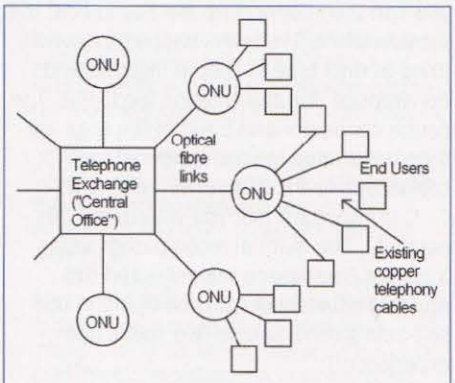



FIGURE 5: Outline of Fibre to the Node/Fibre to the Distribution Point.

**G.FAST – BEYOND VDSL2.** UK trials of new broadband internet service using G.fast have been announced recently (see Websearch). G.fast is a further development of VDSL2 and it uses the same basic architecture, as shown in **Figure 5**.

Unlike ADSL, which uses existing copper telephony cables all the way from the telephone exchange to the customer, VDSL2 uses a Fibre To The Cabinet (FTTC) architecture and G.fast uses Fibre To The Distribution Point (FTTdp). In both systems, optical fibres link the telephone exchange to Optical Networks Units (ONUs). For FTTC, these are located in street cabinets that serve multiple customers via existing unshielded copper telephony pairs up to 1km long. For FTTdp, the ONUs are smaller micro-nodes that could be in underground distribution points or on telephone poles. The length of the copper pair to the end-user's premises is up to 250m. Both FTTC and FTTdp are intermediate steps towards the ultimate goal of Fibre To The Home/Premises (FTTH/FTTP).

G.fast is the working title for ITU-T Recommendation G.9700. This aims to provide data rates that compete with FTTH but without the expense of installing optical fibre all the way to the home. Applications of FTTH and G.fast include downloading and uploading HD and Ultra-HDTV video content, HD video conferencing and cloud-based storage. Data rates of up to 500Mbps are claimed for cable lengths up to 250m or 1Gbps for up to 100m.

Although the current UK trials of G.fast are using underground distribution points, overhead distribution could potentially be used in future. G.fast has some potentially more significant EMC implications than VDSL2 because G.fast uses 106MHz of RF bandwidth with a later phase using 212MHz. G.fast has the ability to 'notch' certain ranges of frequencies to avoid interference to radio services.

ITU-T Recommendation G.9700 specifies methods to minimise the risk that G.fast equipment will interfere with broadcast services such as 88-108MHz FM broadcast and DAB (174 – 240MHz). At the time of writing G.fast has not yet been ratified and the RSGB EMC Committee has not seen details of proposals for possible 'notching' of VHF amateur bands. Nevertheless, members can rest assured that we are keeping a close watch on this matter.

**WEBSEARCH**

Radiocommunications Agency, *Compatibility of VDSL & PLT With Radio Services in the Range 1.6MHz to 30MHz*, TWG(07)09rev4, Final Report of the Technical Working Group, October 2002 – www.ofcom.org.uk/static/archive/ra/topics/interference/documents/twg-finalreport.pdf

*Lightwave* magazine – BT to field trial G.fast fiber to the distribution point technology from Huawei –www.lightwaveonline.com/articles/2013/10/bt-to-field-trial-g-fast-fiber-to-the-distribution-point-technology-from-huawei.html

Telecoms.com – BT Adastral Park plays host to UK G.fast tech trial – www.telecoms.com/189272/bt-adastral-park-plays-host-to-uk-g-fast-tech-trial/

# InnovAntennas 20/15/10 DESpole

## A three-band rotatable dipole

**MORE ANTENNAS.** Justin, G0KSC has been busy designing more antennas. His company, InnovAntennas on Canvey Island now has quite a range and so far at *RadCom* we have tested a 9-element 2m Yagi and a 5-element monoband 15m Yagi.

This latest 3-band rotatable dipole borrows much of its design from the company's 15m Yagi. This include the use of the Opposing Phase Driven Element System (OP-DES) and Stauff connectors with Allen key-driven fastenings. The OP-DES is patented technology that Justin claims offers maximum performance and a wide-bandwidth.

**NEW DESIGN.** In basic terms, the antenna features three half-wave dipoles for the 20, 15 and 10m bands. While the 10m element is straight, the 15 and 20m elements are 'kinked'. That is after going out horizontally for about three metres, the elements drop vertically.

The net result is a better match to 50 ohm coax, wider bandwidth and, more importantly, the overall turning radius or width is reduced substantially without resorting to loading coils or traps. For example, a full-size 20m dipole would be approximately 10.6 metres wide. But the DESpole manages to fit the band in with just 6.2m.

In terms of the physics of doing this, it is the current flowing in an antenna that does the radiating. And with the maximum current flow occurring at the feedpoint and zero current at the ends (which are high voltage points) you can see that the vast majority of the radiation comes from the centre horizontal section of the antenna.

The DESpole manages to fit 14MHz into just 6.2m.

The dropped vertical sections are really there for matching purposes. Of course, on 10m the entire element is horizontal for maximum efficiency.

Justin says that doing away with traps and loading coils means the antenna is very efficient. The InnovAntennas' website quotes gain figures at various angles, compared with an isotropic source, which you can peruse.

Another feature of the 3-band design is that only the centre 20m element is actually driven. The other two elements are electrically isolated and work by parasitic coupling (open-sleeve technology). If this idea is new to you, don't worry. It works perfectly and as long as the coupling distance is small enough has little effect on the overall performance. It does, however, simplify the feed design.

The antenna is specified as being able to handle 5kW+ and survive 165kph/102mph winds. If you think this isn't enough talk to Justin who can build a beefier version.

The antenna comes packed in a single long cardboard tube.

**CONSTRUCTION.** The antenna arrived in a single long cardboard tube that could be carried by one person. The overall antenna weight is around 7.5kg / 16.5lb. Emptying the contents onto Chris, G0DWV's (extremely cold) lawn in February was a little daunting, but it is fairly straightforward to build.

First up was to assemble the centre plates that hold the elements. The two plates bolt together and then the elements are mounted with the Stauff connectors. You then build outwards, adding the elements one by one. These are fixed with a mixture of Allen bolts and stainless steel worm-drive clips. Take care to carefully measure each section carefully to ensure that it is the correct length. If you don't, you'll find the antenna's resonant points may not be where you want them.

The 20m element is made with a six section taper starting at 32mm (1.25") and finishing at 9.525mm (3/8"). The 15m section has five tapers starting at 22.25mm (7/8") and finishing at 9.525mm (3/8") while the 10m element has just two sections, the centre being 19.05mm (3/4") with 15.88mm (5/8") tips.

You also have to slide two Perspex spacers onto the 20m element, which can be used as guy supports. There is nothing technical about this, but make sure you slide them on at the appropriate point in the build, otherwise you will have to undo all your handiwork later (we put both ours on upside down, which altered the spacing and therefore the tuning, albeit very slightly!).

I would suggest leaving the final drooping elements until you have mounted the antenna on your luffed-over mast. This makes the antenna easier to manhandle and also prevents damage to the elements.

Once bolted on, using three large U-bolts, you can then add the final four drooping sections, which exert some leverage until the whole thing is mounted upright.

You will also need to create a choke balun for the feedpoint. This is easy and involves winding around 15 turns of RG213 coax or similar around a large spray can. By laying cable ties on the can before you start you can then connect up the ties to hold the turns in place. We then wrapped the whole thing in duct tape to keep it together and tie-wrapped it to the antenna feedpoint. The centre conductor and braid of the coax are then terminated in small soldered tags for connection to the 20m driven element.

It is important that you waterproof this carefully. The manual recommends using a rubber / aerospace sealant – and this appears infinitely better than trying to use self-amalgamating tape (we speak from experience!).

So, did we encounter any problems with the build? Only a couple – the diagram supplied showed one of the measurements

First job is to assemble the centre plates that hold the elements.

Only the centre element is actually driven.

as 835mm when it was clear that it should have been about 335mm. We had one worm-drive clamp that was too big for the element it was to be used on. We also felt that there wasn't really enough space to fit the washers that hold the U-bolts and plate to the mast – apparently smaller washers are now provided.

IN PLACE. Having assembled everything on to a three section Versatower we cranked it up to see how it performed. First tests showed a 1:1 SWR on 15m (21MHz) and 10m (28MHz), slap bang in the middle of the band. On 14MHz the 1:1 point was at around 14.350MHz, all measured at the end of 100ft of RG213 coax. Obviously, the 20m elements were too short, but this is easily remedied with a screwdriver on the worm-drive clips to extend the telescoping sections. We were pretty sure we measured everything correctly in the first place, so this might be something for InnovAntennas to take a look at.

InnovAntennas says that the antenna should offer an SWR below 1.5:1 from 14.00MHz to 14.35MHz, below 1.7:1 from 21.00MHz to 21.45MHz and below 1.9:1 from 28.00MHz to 28.60MHz and our figures backed this up once tuned correctly.

IN USE. We even managed to get the Icom IC-756 Pro 3's internal ATU to tune it on 17m with reasonable performance. It is a 'get you going' antenna on the 17 and 12m WARC bands and don't expect all internal ATUs to be able to match the antenna on these frequencies – the 'raw' SWR on 17m was 3.5:1 and on 12m it was 5:1 at the end of the coax.

While we worked stations on 17m (including K6YRA) signals on 12m were down about 3-4 S-points on a half-wave sloper at about 55ft (please see the sidebar comment).

In terms of the antenna's performance on the bands it is designed for, it worked very well indeed. This is essentially a unity gain antenna, so don't expect it to outperform a Yagi. In comparing it with Chris's Force 12 beam at about 65ft the InnovAntennas' dipole was usually down by about 2-4 S-points. This is not surprising as the Force 12 C31XR offers 6dBd gain on 20m (and costs substantially more). Often there was little difference in signal strengths between the two antennas.

We worked or heard stations in Hong Kong, India, Canada (Niagara Falls) and Senegal, with 15m being the 'money band' at the time of operating.

As always, you need to get the antenna as high and in the clear as possible to get it to work at its best. You could theoretically mount this without a rotator, but that would be a shame as you would miss out on signals arriving end on to elements, which could be up to 2-3 S-points down.

SUMMARY. Overall then, the 20/15/10 DESpole rotating dipole offers three-band performance in a reasonably lightweight package. I say reasonably lightweight as you need a fairly sturdy mast or aluminium pole to support the weight – this isn't for mounting on a one-inch pole or fibreglass fishing rod. The maximum turning circle was only 6.2m, which means it is more likely to fit into narrow spaces.

InnovAntennas also produce versions that cover 15, 10 and 6m; 20, 17 and 12m and 30, 20 and 15m. This means that you could mount the 20, 17 and 12m variant underneath a tri-band Yagi, giving you access to the 17 and 12m WARC bands and perhaps bi-directional performance on 20m, which can often be helpful in contests and the like.

The 20/15/10 three band DESpole rotating dipole costs £299.95 (including 20% VAT) plus £10 P&P. Our thanks go to InnovAntennas for the loan of the antenna – see www.innovantennas.com or call 0800 0124 205.

Fitting the coax choke balun.

You will need a fairly sturdy mast or heavy pole.

## PROBLEMS WITH USING AN ANTENNA FOR A BAND IT ISN'T DESIGNED FOR.

It is common for amateurs to think they are tuning an antenna with an ATU. When an ATU is connected to an antenna with coax in between, any mismatch is still on the antenna side of the ATU.

The ATU merely provides an acceptable impedance for the transceiver to 'see' in order that it will not be damaged. Usually this means that maximum power will leave the antenna too.

The impedance at the output of the ATU will be usually be a long way from 50Ω (unless the rig's ATU is used for its intended purpose, which is to present a more manageable impedance on an antenna for a given band that is perhaps in need of a 'tweak').

And therefore the coax, along with the antenna at the end of the run, are now radiating. Unless an excellent earth system is installed, all manner of issues will result from RF feedback to RFI, but certainly the antenna will not be working as it should or as it is intended to.

Coax losses will be higher too, due to the high SWR on the feedline.

For clarity, an ATU should be used:

- to fine-tune an antenna for a given band, where final tweaking is not possible or practical
- at the end of a balanced feed line
- at the base of an antenna (long wire or long vertical).

# LF

## More countries join us on MF

**NEW COUNTRIES ON 472kHz.** The 630m band continues to be introduced in more countries across the world. I've heard from RW3ADB that Georgia is now on and OH1LSQ tells me that Swedish licensees have full access to the band with 1W ERP from 1 October. As for the long awaited appearance of France, it seems that so far only one station, F6CIU, has a permit. At least it's a start!

In Canada, the consultation process on the proposed allocation of 472kHz is continuing and Industry Canada has published the comments it has received. Most are favourable except for one from a company citing possible problems with power-line signalling systems. This is the old chestnut that has so far scuppered the US allocations in LF and MF, despite no problems having come to light from all the experimental stations operating under Part 5 permits.

**73kHz CROSSES THE POND.** The US 73kHz experiments are progressing well with several stations being received on this side of the Atlantic. This is the first transatlantic success on this band since G3AQC's tests 10 years ago.
The most regularly seen QRSS signals come from Bob, W2ZM who holds the special callsign WG2XRS/4, and Dex, W4DEX who has WG2XRS/5. During October, SWL Hartmut Wolf, Henny, PA3CPM and Mike, G3XDV made determined efforts to capture these signals and got some particularly clear ones later in the month.

A new 70kHz class 5 licence has been allocated to experimenter Pat Bunn under the callsign WG2XLP. Pat hopes to have a 1kW transmitter ready soon and is building a suitably large variometer.

***OPERA* 'DEEP SEARCH'.** The *Opera* mode, invented by Jose, EA5HVK, has been in use on LF and MF for some time now. It is proving effective as a beacon mode over long distance paths. It's easy to use because it is an on-off keying mode using a single frequency carrier; the standard software decodes in real time. For transatlantic tests on 136kHz (and recently 73kHz) *Opera 32* is often used. Markus, DF6NM has written an add-on to *Spectrum Laboratory* called '*Opera Deep Search*' that detects and identifies *Opera* transmissions as much as 10dB below the level that the standard *Opera* software is capable of. It attempts to do a correlation between received signals and templates from a predefined search list of callsigns. *OPDS* works in conjunction with *Spectrum Laboratory* by DL4YHF, and processes exported FFT data files. This takes a little longer than the standard decode process but, as the mode is generally left running overnight and the results viewed the morning after, that is of no consequence. Unfortunately, it doesn't work on 64-bit versions of Windows 7 or 8.

**MORE MODES THAN EVER.** *Opera* is only one of many modes being used regularly on LF and/or MF. Others recently reported have been *Wolf* and *JT9* in addition to the multitude of *WSPR* and *QRSS* signals. *JT9* is a QSO mode similar to *JT65* but optimised for LF work. Joe Taylor, K1JT claims that it is about 2dB more sensitive than *JT65A* while using less than 10% of the bandwidth. The new package allows use of slower versions of *JT9*, which can increase the weak signal performance by up to 15dB if you are prepared to spend 3 hours on a QSO! *JT9* and *JT65* come as part of the *WSJT-X* package as a free download.


Very clear 'XRS4' as received by PA3CPM.


The top trace is 'XRS4' and the bottom 'XRS5' received by G3XDV.

Rik, ON7YD decided to have a try on 472kHz using *JT9-2*, the second fastest version, which should allow a QSO time of about 12 minutes. He arranged a sked with Tobias, DG3LV and made a good QSO quite easily. Tobias then had contacts with IW4DXW, OR7T and DF2FF and was heard by F4DTL, F5WK and G6AVK. The 'dial' frequency in use was 474.200kHz USB, as for *WSPR*, but with 1380Hz audio tone so that the actual frequency was 475.580kHz, just below the *WSPR* activity.

*WSPR* is still very popular on 472kHz but Spain has been under represented. That situation seems to be improving slightly as EA1FBU on the west coast of Spain recently appeared on wspr.net with reception of G8HUH, G3XIZ, M0PPP, EI0CF and many other European stations.

**136kHz DX.** Laurence, KL7L has been waiting for the autumn and winter conditions to help signals reach his northerly location. Recently patience has been rewarded on 137kHz with a nice clear copy of JA1CGM in QRSS and a spot of UA0AET on *WSPR* – the first good DX of the season.

From the Japanese end of the path JA7NI has been receiving R7NT, UW8SM and, most remarkably, SV8CS. Also JA8SCD/1 copied the Volga State University club station RC4HAA so it seems that the Japanese interest in 136kHz DX is high.

Alex, R7NT has been logging 136kHz *WSPR* DX spots and has singled out the best DX reports. The headliners were UA4WPF to JA5FP at 6576km, DF6NM to W1VD at 6258km and DK7FC to W1VD at 6099km. Best distance from a UK station was G8HUH to W1VD at 5255km.

There are still records to be broken at lesser distances. Alex, R7NT decided to try for a 'classic' QRSS QSO and his CQ call resulted in QSOs with RX3QFM and UW8SM. The contact with UW8SM was the first two way between Russia and Ukraine on 136kHz.

**ANTIPODEAN 472kHz TESTS.** In September several ZL and VK stations took part in a WSPR activity weekend in the hope of getting some DX reports. Although no record-breaking reports were received the weekend was deemed to be a success because of the amount of interest it generated. They will try again soon.

**NEW RIG FOR LF/MF.** The Chinese X1M QRP transceiver costs about £200 and works on SSB and CW between 100kHz and 30MHz. This makes it an interesting prospect as a drive source for an LF or MF transmitter – and you get a receiver too! Initial tests by DD7PC indicate that it will deliver 5W on 472kHz and something on 136kHz. I'm sure we'll be hearing more about this interesting little radio.

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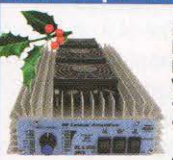

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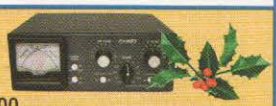

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# HF

## Sunspots Return for the CQWW SSB Contest

There were around 10 sunspot groups on the Earth-facing side of the sun by mid October and conditions responded as you would expect with many loud Pacific and North American stations on the higher bands. I didn't think it would last until the CQWW SSB contest but conditions actually got better with a solar flux index of 167 at the end of the month. 10 and 15m were alive with DX for the contest and there was a surprise appearance by 7O2A on the island of Soqotra (Yemen), operated by RA9USU. The last full weekend of November sees the CQWW CW event so let's hope the sunspots hold up until then.

**NEW ZEALAND.** As I mentioned last month, the special call GB2NZ was used by a number of operators during October, to commemorate the first radio communication between Great Britain and New Zealand on 18th October 1924. The main objective was to make as many contacts as possible on 80m – the band nearest to that used in the original QSO which was 90m. Conditions were mixed on 80, but on the actual anniversary on 18th October, twelve ZL stations made it into the GB2NZ log. Other bands were used and other countries worked. The final ZL tally was 47 QSOs on 80m, and 139 QSOs over 6 bands. 781 QSOs were made in total. It is hoped that for the 90th anniversary in 2014, extensive advance publicity and continuing collaboration between teams in the UK and New Zealand will result in a special series of events to commemorate that first QSO. More information at GB2NZ.com.

**TABLE 1: Main operations this month.**

| | |
|---|---|
| Until 20 Nov | XR0ZR Juan Fernandez |
| Until 20 Nov | YE5R (OC-108) |
| Until 24 Nov | W8A N8A Am. Samoa |
| Until 24 Nov | DV1/KJ6YAP (OC-244) |
| Until end Dec | T6JR |
| Until end Jan | IA0MZ |
| 14-28 Nov | Z81X |
| 16 Nov – 15 Dec | 5R8IC (AF-090) |
| 17-26 Nov | S21ZBB/S21ZBC |
| 17-30 Nov | TU5XV etc |
| 17-26 Nov | XT26DJ XT2FCJ |
| From 18 Nov | 5V and TY by ON6DX |
| From 20 Nov | V47NT and V47T |
| 22-29 Nov | 3D2R |
| 22-30 Nov | V63DX V63ZF |
| 26 Nov – 2 Dec | 5W8A |
| 1-6 Dec | P29VNX (OC-008) |
| 4-11 Dec | T32RC |
| ?? | 4M5DX |

TX5D operators N7QT and K2IW.

**DXPEDITION ACTIVITY.** XR0ZR should be QRV from the Juan Fernandez Islands (#37 on the EU wanted list according to Club Log) on 1.8-50MHz for a few more days until 20 November. The islands are famous for being the temporary home of the Scottish seaman Alexander Selkirk who may have inspired the story of Robinson Crusoe. Selkirk was marooned there from 1704-1709 when he asked to be put ashore rather than continue in what he deemed to be an unseaworthy vessel.

The XR0ZR group will doubtless have been hoping for good flying weather for their travels as the airstrip is notoriously dangerous in windy conditions. After landing the team would still have had an interesting journey as they had to descend a steep hillside and board a boat to take them around the island to the only settlement at St Juan Bautista. It will be interesting to hear how well the place has recovered from the 2010 tsunami that totally destroyed the settlement. See www.juanfernandez2013.com for more information about the operation.

The Mediterraneo DX Club operation from Bangladesh (#87 in EU) is set for 17-26 November. Apparently they plan to use the call S21ZBC from 17-22 November and then switch to S21ZBB for the CQWW CW contest and the rest of their stay. They have a huge group of around 22 operators and are teaming up with a number of local amateurs so look for lots of activity on all the bands. Their official website is www.mdxc.org/bangladesh2013

The 4M5DXgroup is planning a DXpedition to the DXCC entity of Aves Island (NA-020) at some time between November and February – depending on when the Venezuelan navy can take them. The island currently ranks number 35 on the *Club Log* most wanted list. It is more of a tiny sandbar than an island and frequently disappears during (and for a while after) major storms! The group plans to use the special call YW0A for at least 10 days, depending on the schedule of the navy. The team have a website at www.avesisland.info and are on Facebook. The last DXpedition to Aves Island was YW0DX in 2007. Note that it is not to be confused with another YV island called Aves which is much nearer the mainland – this one is much nearer Dominica than Venezuela.

A multinational team will be in Juba, South Sudan on 14-28 November. They will be QRV as Z81X with an emphasis on 160 and 80 metres. The plan is to have three stations with amplifiers, low band verticals and beverage antennas. Two different radio locations may be used. The period includes the CQ WW DX CW Contest and there will be some single band entries combined with LF SSB during the weekend. Information and updates will be posted at www.qrz.com/db/Z81X. The DXpedition is combined with an IARU Region 1 mission led by Hans, PB2T to conduct a series of administrative workshops on radio licensing for government officials and to introduce amateur radio to the Ministry of Education.

V63DX and V63ZF will be operated by JA7HMZ, Sho, and JA7ZF, Masa, from Pohnpei (OC-010), Federal States of Micronesia from November 22 to 30. QSL via their home calls.

YT1AD, YU1AKV, RW4NW, RZ3FW and WD5COV will visit Hawaii (13-15 Nov), Samoa (16-17 Nov), American Samoa (18-19 Nov), Fiji (20-22 Nov and 29 Nov-4 Dec) and Rotuma (22-29 Nov) as a reconnaissance trip for a future DXpedition. They have a wide variety of calls from most locations but will use 3D2R from Rotuma. The positions of these spots on the EU most wanted list are: Samoa #75, American Samoa #38, Fiji #78. Rotuma #56.

9M6XRO, W6SZN, ZL1GO and ZL3CW also plan to be QRV this month from the Samoan DXCC entities. They will be using W8A from American Samoa until 22 Nov and will switch to N8A during the CQWW CW contest on 23-24 November. They will be stopping in Western Samoa on their way back and will be QRV as 5W8A until about 2 December.

ON4JM will be QRV as T6JR from Northern Afghanistan until the end of December.

From 4-11 December, N7RO, AH6HY, NX1P, and KW7XX will join up with NL8F to operate as T32RC from Christmas Island to mark the 20th anniversary of the Russian Robinson Club. NL8F may be QRV a few days earlier as T32TM. The group has antennas for 40 through 10 metres and is

trying to find some for 80 and 160 metres. Their website is at www.t32-2013.com. QSL T32RC via N7RO and T32TM via K8NA.

IW0HEU, Massimo, is heading to the Mario Zucchelli Station at Terra Nova Bay, Antarctica where he will be working until the end of January 2014. He is planning to operate as IA0MZ in his spare time. He'll be using a commercial transceiver running 500 watts into a rhombic. Listen for him on his suggested frequencies of 14.333, 18.125, 21.230 and 24.940MHz, between 1700-1900Z and 0900-1030Z. More details can be found at http://www.qrz.com/db/IA0MZ.

N7QT and W4VAB, Rob and Hugh, will be in Saba and Sint Maarten in November. They will be PJ6/homecall until 17 November and then PJ7/homecall from 17-24 November.

Two old friends of mine – Paul, F6EXV, and Jan, DJ8NK, are off to the Ivory Coast from 17-30 November and will be joined by Chris, F4WBN. They will be QRV as TU5XV, TU5NK and TU5AX respectively on 160-6m. They will be working with the local club station TU2CI to train some more operators and will leave some radios and antennas behind for local use.

Nearby in Togo, ON6DX, plans to be active on CW, SSB and RTTY as 5V7TH on 40 and 30 metres from 18 November. He also plans to visit Benin, which is only a taxi ride from his Togo QTH so he could well be active with a TY1 callsign. See http://dxpedition.be/5V7TH or http://dxpedition.be/Benin.

Andy, N2NT/V47NT says he is planning to resurrect his station on St Kitts for the CQWW CW contest. He claims his station is currently a shambles and he will only be able to manage a field day operation but goes on to say that he will have a linear, monobanders on 7-28MHz, a delta loop on 3.5MHz and a vertical on 1.8MHz.


TX5D DXpedition QSl card

**TABLE 2: Worked DXCC Entities.**

| Call | CW | SSB | Data | All |
|---|---|---|---|---|
| M0BKV | 121 | 108 | 22 | 164 |
| M0BVE | 164 | 0 | 0 | 164 |
| G4XEX | 0 | 141 | 92 | 159 |
| G3HQT | 118 | 0 | 114 | 142 |
| G4FVK | 47 | 57 | 0 | 85 |

K6RB and WF4W operaing C82DX.

That's quite some field day setup! He will be on from about 20 November and will use V47T in the contest.

A large Indian team is heading for the Laccadive (Lakhadweep) Islands from 20 November to 10 December. For more information see www.vu7ag.info.

David, OK6DJ and Petr, OK1FCJ will be active as XT26DJ and XT2FCJ from Burkina Faso on 17-26 November. They will be QRV on 160-10 metres. XT2FCJ will participate in the CQ WW DX CW Contest. For more information see www.qrz.com/db/XT26DJ.

**IOTA.** Eric, F6ICX will be active as 5R8IC from Sainte-Marie Island (AF-090) from 16 November to 15 December. He will operate mainly CW, with some RTTY, BPSK and SSB, on 40-10 metres.

JA1NLX, Aki, will be QRV from Lissenung Island (OC-008) in Papua New Guinea as P29VNX from 1-6 December. Activity will be mostly on CW with some SSB and RTTY on 10MHz - 28MHz. QSL via JA1NLX.

The YE5R expedition to the Anambas Islands (OC-108) was delayed and should be on the air until about 20 November. A large team of operators should be making their presence felt on the bands.

James, KJ6YAP will be active as DV1/KJ6YAP from Masbate Island (OC-244) until 24 November.

**CORRESPONDENCE.** Steve Telenius-Lowe, 9M6DXX, has written to say that he is leaving Borneo (East Malaysia) after eight and a half years and moving to Bonaire (SA-006) in the Caribbean. He hopes to be QRV with a PJ4 callsign by the end of the year.

There were some remarkable openings on 24/28MHz over the pole into the Pacific during October. Hawaii and the Cook Islands were not unexpected around 1700z but Clive, GM3POI worked Fiji and the Austral Islands on 24MHz around midnight. As expected, Hawaii was worked on 10m long path throughout the month around 0900z but more surprisingly Tim, M0URX, worked Chile and Uruguay on 10m long path via the North Pole at about the same time. A few stations also reported morning short path openings to Hawaii on 10m – a sign of the high solar flux.

Richard, G3ZGC, uses a half-size G5RV


The C82DX team.

on 10-40m and on 80 he has about 130 feet of wire wrapped around his 55ft garden. This makes DXing a bit of a struggle but he still worked quite a lot on CW. The 80m wire produced three ZL and four Caribbean QSOs, while on 10m he netted over 30 DX QSOs from Chile, the Caribbean, Mali, Mayotte, Oman, China and Australia.

Peter, G3HQT, had a good month and noted a lot of DX on 10 metres. His CW DX haul included Sable Island and Sierra Leone on 30, Philippines on 17, Rodrigues and Mayotte on 15, Kuwait, Congo and Mozambique on 12, and Bolivia and Peru on 10. He also netted Oman and Afghanistan on PSK31 on 12, and Guantanamo Bay on RTTY on 10.

Fred, G3SVK, erected dipoles for 40 and 30 metres and was rewarded with a wide range of DX. On 40 he found plenty to work including New Zealand, the Austral Islands in Polynesia, west coast USA, Ascension Island, Mayotte, Mozambique and Uganda, Thailand, Sri Lanka, China, and much of south and central America. On 30 he found Japan, Australia, New Zealand, Fiji, Thailand, Philippines, and Malaysia. HF highlights included Sable Island (20 & 17), Japan and Korea (20), Australia (17), and Indonesia (12).

Nobby, G0VJG, uses an MA5B mini-beam supplemented with a homebrew 2 element quad for 24/28MHz about 20ft above ground. On 10m he worked Bhutan, Sable I, Sth Shetlands, Macao, Thailand, Congo and Australia. On 12m the highlights included Sable, Nicaragua, Mozambique and the Congo; and on 20m Uganda, Nicaragua, Sable and the rare IOTA VK5CE/4 on OC-255.

Peter, G4XEX, says October was a stunning month and he was kept busy mainly on 10 and 12 metres, rarely venturing below 15. It was "almost like the sunspot maximums of old" he says. Highlights included Guantanamo, Reunion, Malaysia, China, Taiwan, Hong Kong, Indonesia and Mayotte on 10; Australia and Mayotte on 12; and Taiwan, Sable, Korea, Mayotte and VK5CE/4 on 15.

Dave, M0BVE, found Libya and Ivory Coast on 12, Surinam on 15, Fiji Jordan and Uganda on 17, Panama on 30, and Belize and Guatemala on 40.

My *RadCom* deadline is around the 4th Monday of each month so reports and comments would be appreciated around the 3rd Monday of the month please.

**THANKS.** As always, thanks to DX-World.net, 425 DX News and Daily DX for information.

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(next day delivery available £12.50 mainland)

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Merry Christmas.
Free gift wrap on request!

**Wanted: Secondhand for cash or p/x**

## VHF/UHF TX

### YAESU FT-252

2m waterproof handie. Includes batt/ chrg.
SALE **£69.99**

### YAESU VX-3

Micro 2/70cm + wide Rx. Incl's battery/charger.
SALE
**£129.99**

### YAESU FT-60

2m/70cm + Rx: 108-999MHz (AM/ FM) incls battery/ charger.
New low price
**£109.99**

### YAESU VX-6E

144/430MHz Tx 5W. Rx 500kHz-1GHz (AM, FM, FMN). Includes battery/charger.
**£179.99**

### ICOM ID-51E

Dualband D-Star incl's: Dual Watch Function Built in GPS receiver 5W output + Analogue FM with CTCSS Compact fully featured.
**£409.99**

### YAESU VX-8DE

6m+ 2m + 70cm APRS.
SALE
**£359.00**
Add extra batt'y.... £379.00

### WOUXUN KG-UV920R

NEW 2m/ 70cm. Dual receive + wideband Rx.
INCLUDES 5m DETATCH CABLE
**£199.95**

### YAESU FT-7900 R/E

2m + 70cm + wide Rx. Optional in-car kit £39.99.
Incls: Wide Rx + DTMF mic
SALE PRICE **£199.99**

### KENWOOD TMV-71E

50W, 2m, 70cm dual Rx. Built-in "Echolink" facility & more.
Includes wideband receive
**£295.00**

### YAESU FT-8900 R

10/6/2/70. Incls DTMF remote mic.
Incl's wideband receive
**£325.00**

### YAESU FTM-350 E

2m/70cm + APRS. Inc's wideband Rx.
ONE ONLY £349.99
FTM-350AR/AE NEW MODEL £399.99

### KENWOOD TM-D710

2m, 70cm + APRS/ TNC True dual bander. Wideband receive available
**£439.99**

## HF AND MORE

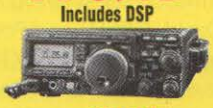
### FT-817 ND

HF + 6m + 2m + 70cms. Incl's battery/charger + antennas.
OUR PRICE **£525.00**
Optional case £22.00
Extra spare battery..... £49.99
FT-817ND + extra battery + case £569.99

### FT-857D DSP

HF + 6m + 2m + 70cm.
SALE **£649.99**

### ATAS-120A
Military spec mobile antenna – superbly made. Covers HF + 6m + 2m + 70cm. *Fully automatic. (*certain Yaesu radios).
OUR PRICE
**£299.99**

### FT-897D
Includes DSP

SALE **£725**

### NEW FT-450D

This is the latest IF DSP marvel from Yaesu. HF + 6m (500/300 CW filters as standard). New design + ATU.
SALE PRICE
**£729.99**
FT-450D + MD-100 £875.00

### FT-950
HF + 6m (100 Watts)

LAST FEW £1119.99
DMU-2000 MANAGEMENT UNIT £999.99

### NEW FT-DX1200

HF + 6m + colour display.
£1349.99

### YAESU FT-DX3000

New 100 watt HF + 6m.
SALE £2199.99

### FT-DX5000

THE ULTIMATE HF+6M FLAG SHIP RADIO
£4099.99
FT-DX5000D £4399 FT-DX5000MP £4699

### LDG ANTENNA TUNERS

| | |
|---|---|
| IC-100 ATU for Icom rigs | £177.99 |
| YT-450 ATU for FT-450/FT-950 | £225.00 |
| AT-100 PRO II 1.8-54MHz/125W | £209.99 |
| AT-200 PRO II 1.8-54MHz/250W/10W | £219.99 |
| AT-1000 PRO (1.8-54MHz) 1Kw | £499.99 |
| AT-897 plus bolt-on ATU-897 | £185.95 |
| YT-100 ATU for 857/897 | £177.95 |
| Z-817 ATU for FT-817 | £119.95 |
| Z-100 plus ATU FT-817 | £134.95 |
| Z-11 PRO II (1.8-54MHz) 125W | £165.95 |
| FT-Meter for 897/857 | £46.95 |
| FTL-Meter Large meter/above | £85.00 |

### HEIL MICS

Proset 6 inc HC-6 insert
**£149.00**

| | |
|---|---|
| ProSet Elite 6 | £179.99 |
| ProSet Icom | £179.99 |
| Heil Radio Adaptor (specify-model) | £20 |

### MD-200

Top of the range desk mic
**£219.00**

### SP-2000

Superb extension speaker
**£179.99**

### IC-7100

HF + 6M +4M + 2M/70cms +D star
**£1245.00** inc. del

| | |
|---|---|
| IC-9100 + 23cms | £3419.00 |
| IC-7410 | SALE £1549.00 |
| IC-9100 HF-70CM | £2849.00 |

### TS-590S

HF + 6m. Superb DSP Rx
**£1199.99**

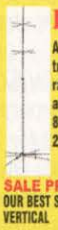
| | |
|---|---|
| New TS-990S | £Phone for deal |
| TS-2000e | £1469 |
| TS-2000X | £1699 |
| TS-480SAT | £765 |
| TS-480HX | £865 |

## ANTENNAS

### RIG EXPERT ANALYSERS

AA-170 LABORATORY QUALITY ANALYSER (100kHz-170MHz). IDEAL FOR tuning antennas, checking coax/losses/SWR etc. Superb graphic display.
**£449.99**

| | |
|---|---|
| AA-30 HF ANALYSER (0.1-30MHz) | £194.99 |
| AA-54 HF ANALYSER (0.1-54MHz) | £249.99 |
| AA-600 (0.1-600MHz) | £649.99 |
| AA-1000 (0.1-1000MHz) | £749.00 |

### DIAMOND CP-6

A superb (diamond quality) 6 band trap vertical antenna with trap radials – "rotary" trap system allows "flat wall" mounting. 80m/40m/20m/15m/10m/6m. 200W SSB, HT 4.6m (15ft tall).
SALE PRICE **£299.99**
OUR BEST SELLING VERTICAL
SEND SAE FOR DATA SHEET

### INTRUDER II

11 band (80-10 6/2/70cm). PL-259 fitting. Collapses to 95cm. **£39.99**
(2 for £70.00)
INTRUDER III: 12 band version inc. WARC bands **£59.99**

### BUTTERNUT VERTICALS

| | |
|---|---|
| HF-2V (80/40m) | £279.99 |
| HF-6V (80/40/30/20/15 /10m) | £375.00 |
| HF-9V (as HF-6V + 17/12 & 6m) | £425.00 |

### Standard & Deluxe G5RV

| | |
|---|---|
| Half size 40-10m | £32.99 |
| Full size 80-10m | £36.99 |
| Half size Deluxe | £44.99 |
| Full size Deluxe | £59.99 |
| In-line choke balun for G5RV, etc | £39.99 |
| Replacement dipole centres (80-239) | £9.99 |
| Replacement dipole centres (open wire) | £9.99 |

### TONNA YAGIS

| | |
|---|---|
| 22089 9ele 2m | £79.99 |
| 220811 11ele 2m | £109.99 |
| 220817 17 ele 2m | £139.95 |
| 220818 9ele 2m XD | £129.95 |
| 220921 21ele 70cm | £109.00 |

### CUSHCRAFT BARGAINS

| | |
|---|---|
| MA5B Mini beam 10/12/15/17/20m | £519.99 |
| A3S 3 ele yagi (10-20m) | £599.99 |
| A4S 4 ele yagi (10 - 20m) | £675.00 |
| R-8E 40 - 6m verticle | £525.00 |

### WONDER WAND

1.8-450MHz BNC. Whip supplied. Ideal for FT-817. Optional desk stand + 5m patch £29.99
**£129.99**

## ACCS

### MFJ-259B ANALYSER

1.8-170MHz
SALE **£249.99**
Case 259B £29.99 Dip Coils 259/269£29.99

### MFJ-269 ANALYSER

1.8-170MHz + 70cm
SALE **£369.99**
Case 269B £29.99

| | |
|---|---|
| MFJ-993B 30W AUTO ATU | £249.99 |
| MFJ-969 HF+6M Rollercoaster ATU | £209.99 |
| MFJ-994B (600W Inteli tuner) | £289.99 |
| MFJ-901B ATU | £109.99 |
| MFJ-949 300 watt ATU | Sale £174.99 |
| MFJ-962D 1.5kW (metered) antenna tuner | Sale £289.99 |

### MFJ-993B

Fully auto (1.8-30MHz) **£249.99**

### MFJ-969

1.6-60MHz (rollercoaster) **£209.99**

### SGC MAC 200

Superb auto ATU with 5-way electronic coax switch.
(1.6-60MHz /200W) ..... £249.99
SGC-239 (1.8-30MHz AUTO)..... £199.99
SGC-230 (1.6-30MHz waterproof). £449.99
SGC-Smart lock for above ..... £69.99

### FG-01 MKII

Antenna analyser (1MHz-72MHz) with colour graphic display.
SALE £239.99
inc's battery plus 12V charging lead.

### LDG FT METER

External analogue meter for Yaesu FT-857/FT-897.
**£44.99** (Post £5)
FTL GIANT VERSION OF ABOVE £79.99

## PSUs

### DIAMOND GSV-3000

TRUE LINEAR POWER SUPLY
Superb 30A supply with meters (1-15V). AMAZING USUAL DIAMOND BUILD QUALITY. OUR BEST SELLING DIAMOND POWER UNIT.
**Bargain £159.99**

### DIAMOND GZV-4000

40AMP/13.8V P.S.U.
SALE PRICE
**£159.99**
Both include built-in extension speaker

### DIAMOND GZV-2500

25AMP/12V P.S.U.
SALE PRICE
**£99.99**

### ALINCO DM-330MV

SPECIAL PURCHASE!!! 30amp POWER UNIT WITH NOISE OFFSET CONTROL
RRP: £129.99 **OUR PRICE £99.99**

### MP-50SW1

Latest 50A heavy duty switch mode power unit (9-15V fully metered) multiple outlets.
**£149.99**

### MS-1228

28A at 13.8V yet under 2kgs. (H 57mm, W 174mm, D 200mm approx). Fully voltage protected. Cigar socket & extra sockets at front/rear. Ultra slim.
Professional build quality **£89.99**

### NISSEI PS-300

Features: ★ Over voltage protection ★ Short circuit current limited ★ Twin illuminated meters ★ Variable voltage (3-15V) latches 13.8V ★ Additional "push clip" DC power sockets at rear. Dim'ns: 256(W) x 135(H) x 280(D)mm.
30 AMP/12 VOLT PSU
OUR PRICE **£199.99**
A truly professionally made unit built to outlast most PSUs.
THE ULTIMATE TRUE 'LINEAR' PSU

## GIZMOS

### NEW SANGEAN ATS-909X

The ultimate all-mode portable shortwave + FM (76-108). Fully loaded portable with improved Rx thanks to a "dsp" tuner. Includes PSU, antenna, case, etc.
**£249.99** Del £10

### AOR AR-5001D

I.F. D.S.P RECEIVER WITH SIMULTANEOUS DUAL RECEIVE
40kHz-3.15GHz.
OUR PRICE
**£2950**

### EXPLORER 3G

Superb hand-held spectrum analyser with graphic display
15MHz-2.7GHz.
**£225.00**

### EXPLORER

Superb hand-held spectrum analyser with graphic display
240-960MHz.
**£129.99**

### WOUXUN

UV6D 2 & 70..... £89.99
UVD1P 2/4M..... £94.99
PC LEAD +SW ...£16.99

### SIGNALINK

Includes rig lead; specify!
**£99.99**

### AR-301

Quality rotator for VHF/UHF. Superb for most VHF-UHF Yagis, 3-core cable required. 3-core cable £1 per mtr. GS-050 stay bearing £39.99.

| | |
|---|---|
| 2" to 1.5" pole convertor | £26.99 |
| 2" to 1.25" pole convertor | £26.99 |

AR-301 **£109.99**

## NEW NOISE FILTER!

A superb TDK 'snap fix' ferrite clamp for use in Radio/TV/ Mains/PC/ Phone etc.

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

**2 for £16.99 / 5 for £36.99 (P&P £5.00)**

**6mm SNAP FERRITES NOW IN STOCK. 2 for £14.99, 5 for £30. P&P £5.00**

## COAX BARGAINS

True military spec real UK coax

RG-58 Military spec x 100m. £49.99 *or 2 for £90.00*
Coax stripping tool (for RG-58).....£8.99

RG-213 Military spec x 100m (10mm dia).
£149.99/100m *or 2 for £260.00*

SALE

OUR MIL RG-213 IS GENUINE UK 10mm MIL SPEC COAX!

## D-308B DELUXE DESK MIC

(with up/down). Many amateurs (over 4000) have been pleased with its performance. Includes 8-pin round Yaesu mic lead. Icom/Kenwood & other leads available. Phone (£24.99 each). Replacement foam windshield £3.00 + P&P.

8-pin modular plug converting to 8-pin round Yaesu adapter £24.99

**£99.99**

## NEW DIAMOND WD-330


Amazing performance. Twin folded dipole. 2-30MHz – and it really works. No ATU required (25mts long). Supplied with 30 mtr PL-259 feeder – ready to go. If you want great transmission, look no where else. Japaness quality made product

OUR PRICE **£249.99**

## NEW DIAMOND BB6W

2-30MHz (250W) 6.4m long. End-fed wire antenna. Includes matching balun. Sling up & away you go.

OUR PRICE **£199.99**

## W-8010 DIAMOND SHORTENED DIPOLE

80-10m & only 19.2m long! (Up to 1.2kW) Includes 1:1 Balun. Bargain. Superb Japanese quality antenna system.

SALE **£139.99**

## Q-TEK PENETRATOR

"We've sold 100s all over Europe"

★ 1.8 - 60MHz HF vertical ★ 15 foot high ★ No ATU or ground radials required ★ (200W PEP).

SEND SAE FOR LEAFLET

**£219.99**

NEW Wire Penetrator 50ft long (1.8-70MHz).....£189.99

## CAROLINA WINDOM

| | | |
|---|---|---|
| CW-160S | (160-10m) 40m long | £175.99 P&P £10.00 |
| CW-160 | (160-10m) 80m long | £175.99 P&P £10.00 |
| CW-80 | (80-10m) 40m long | £150.99 P&P £10.00 |
| CW-80S | (80-10m) 20m long | £150.99 P&P £10.00 |
| CW-40 | (40-10m) 20m long | £139.95 P&P £10.00 |

## NEW DIAMOND HEAVY DUTY TRAPS (1.2kW)

SUPERB QUALITY ENCAPSULATED TRAPS (P&P £5)
80m (pair) Inductors/Traps..... £59.99
40m (pair) Inductors/Traps..... £54.99
20m (pair) Inductors/Traps..... £49.99

## Q-TEK BALUNS & TRAPS

Baluns 1:1 or 4:1 or 6:1.....£39.99 each P&P £5
Traps 80m or 40m or 20m or 15m.....£39.99 pair P&P £5

## NISSEI PWR/SWR METERS

RS-502 1.8-525MHz (200W) ..... £79.95 P&P £6.50
RS-102 1.8-150MHz (200W) ..... £59.95 P&P £6.50
RS-402 125-525MHz (200W) ..... £59.95 P&P £6.50
TM-3000 1.8-60MHz (3kW) Incls mod meter ..... £69.95 P&P £6.50
RS-40 144/430MHz Pocket PWR/SWR..... £34.99 P&P £5
DL-30 diamond dummy load (100W max)..... £29.99 P&P £5

## GENUINE COAX SWITCHES (P&P £6.00)

2 way CX-201 (0-1GHz) SO239.....£29.99
2 way CX-201 'N' (0-1GHz) 'N' .....£34.99
4 way CX-401 (0-500MHz) SO239.....£89.99
4 way CX-401 'N' (0-500MHz) 'N' .....£94.99

## YAESU REPLACEMENT MICS

MH-IC8 8 pin Yaesu mic (8-pin round).....£44.99 P&P £5
MH-57A8J 8-PIN modular .....£35.00 P&P £5
MH-31A8J 8 pin modular .....£39.99 P&P £5
MH-48 A6J 8-pin modular (DTMF) .....£59.99 P&P £5

## REPLACEMENT POWER LEADS

DC-1 Standard 6-pin/20A fits most HF .....£22.00 P&P £4
DC-2 Standard 2-pin/15A fits most VHF/UHF .... £10.00 P&P £4
DC-3 Fits Yaesu FT-7800/8800/8900, etc ..... £17.50 P&P £4
DC-4 Fits new Yaesu FT-950/450, etc ..... £22.99 P&P £4

## NEW POLE CONVERTERS

2 inch to 1.5 inch .....£26.99
2 inch to 1.25 inch .....£26.99
1.5 inch to 1.25 inch .....£26.99

**RH-999** (new)
Tx: 50/144/430/1200MHz. BNC (plus SMA adapter). 51cm long. Rx: 40-1200MHz.
NEW **£89.99** post £5

**RH-770H** (BNC)
2m/70cm Tx + wide Rx. High gain up to 5.5dB.
**£59.99**
P&P £5.00

## DIAMOND YAGIS

No tuning required

| | | | |
|---|---|---|---|
| 2m/5 element | No tuning required | SO-239 feed | £47.99 |
| 2m/10 element | No tuning required | SO-239 feed | £82.99 |
| 70cms/10 element | No tuning required | SO-239 feed | £52.99 |
| 70cms/15 element | No tuning required | SO-239 feed | £69.99 |
| 6m/2 element | No tuning required | SO-239 feed | £94.99 |

## DIAMOND COLLINEARS

### DIAMOND V-2000

6m + 2m + 70cm. 2 section (2.5m long) PL-259 fitting. Superb quality.

SALE **£109.99**

| | |
|---|---|
| CP-22 2M (2.7M/6.5db) | £54.99 |
| X-30 2M/70cm (1.3M-3.5/5.5db) | £52.99 |
| X-30N "N"-Type version of above | £54.99 |
| X-50 2M/70cms (4.5/7.2db-1.7M) | £64.99 |
| X-50N "N" Type version of above | £69.99 |
| X-200N 2M/70cms..(6/8db-) 2.5M -N type | £89.99 |
| X-300N 2M/70cms (6.5/9db) 3.1M N type | £94.99 |
| X-510N 2M/70cms (8.3/11.7db) 5.2M-N-type..SALE | £125.00 |
| X-700H 2M/70cms (9.3/13db) 7.2M | £259.99 |
| x-5000 2m/70CMS/23CMS (4.5/8.3/11.7DB) 1.8m... | £129.99 |
| X-6000 2M/70cms/23cms (6.5/9/13db) 3M | £179.99 |
| VX-1000 6M/2M/70cm (1.4M) | SALE £99.99 |

## DIAMOND VSWR METER:

| | |
|---|---|
| SX-100..(1.6-60MHz)3KW | £84.99 |
| SX-200..(1.8-200MHz)) 200W | £89.99 |
| SX-400...(140-525MHz)200W | £89.99 |
| SX-400N..."N" Type version of above | £92.99 |
| SX-600.. (1.8-525MHz) 200W | £154.99 |
| SX-600N.."N" Type version of above | £169.99 |
| SX-1100.. (1.8-1300MHz-with gaps) 200W | £219.99 |

### DUPLEXERS & TRIPLEXERS

| | |
|---|---|
| MX-2000 50/144/430MHz Triplexer | £84.99 |
| TSA-6011 144/430/1200MHz Triplexer | £84.99 |
| MX-72 144/430MHz | £39.99 |
| MX-72 "N" 144/430 | £42.99 |
| MX-62M (1.8-56MHz + 76-470MHz) | £79.99 |
| MX-610 1.8-30MHz + 49-470MHz (S-239 conn's) | £99.99 |

## Q-TEK COLLINEARS (VHF/UHF)

Del £10.00

| | |
|---|---|
| X-30 GF 144/430MHz, 3/6dB (1.1m) | £49.99 |
| X-50 GF 144/430MHz, 4.5/7.2dB (1.7m) | £64.99 |
| X-300 GF 144/430MHz, 6.5/9dB (3m) | £89.99 |
| X-510H GF 144/430MHz, 8.5/11dB (5.4m) | £119.99 |

## MOBILE ANTENNAS

Del £10.00

| | |
|---|---|
| DB-7900 2m/70cm (5.5/7.2dB) 1.6m (PL-259) | £44.99 |
| DB-770M 2m/70cm (3.5/5.5dB) 1m (PL-259) | £29.99 |
| Diamond CR-8900 10/6/2m/70cm (1.26m) | £99.99 |
| Diamond 770H (1m) mobile 2.70 | £34.99 |

## COPPER ANTENNA WIRE ETC

| | |
|---|---|
| Hard drawn (50m roll) | £29.99 P&P £7.50 |
| Enamelled copper wire (50m x 16 guage) | £24.99 P&P £7.50 |
| Flexweave (H/duty 50m) | £44.99 P&P £7.50 |
| Flexweave (H/duty 18m) | £21.99 P&P £7.50 |
| Flexweave (PVC coated 18m) | £24.99 P&P £7.50 |
| Flexweave (PVC coated 50m) | £59.99 P&P £7.50 |

## METALWORK & BITS (Del Phone)

| | |
|---|---|
| 2 inch to1½" or 1¼" pole convertor (specify) | £26.99 |
| 2" mast-floor base plate | £19.99 |
| 6" stand off brackets (no U-bolts) | £8.99 |
| 9" stand off brackets (no U-bolts) | £10.99 |
| 12" T & K brackets (pair) | £24.99 |
| 18" T & K brackets (pair) | £28.99 |
| 24" T & K brackets (pair) | £32.99 |
| 36" T & K bracked (pair) galvanised | £46.99 |
| U-bolts (1.5" or 2") each | £2.00 |
| 8mm screw bolt wall fixings | £1.70 |
| 8-nut universal clamp (2" to 2") | £9.99 |
| 2" extra long U-bolt/clamp | £7.49 |
| 2" crossover plate with U-bolts | £18.99 |
| 15" long (2") sleeve joiner (1.5" also available) | £19.99 |
| 3-way guy ring | £9.99 |
| 4-way guy ring | £12.99 |
| Heavy duty guy kit (wire clamp, etc.) | £49.99 |
| Set of 3 heavy duty fixing spikes (~0.7m long) | £29.99 |
| 30m pack (4.4m) 480kg B/F nylon guy | £15.00 |
| Roll of self-amalgamating tape 25mm x 10mtr | £8.99 |

All our brackets are of high quality, British made and galvanised.

## DOUBLE THICK FERRITE RINGS

A superb quality ferrite ring with incredible properties. Ideal for "R.F.I". Width 12mm/ OD35mm. 6 for £16.99 P&P £5.00
12 for £26.99 P&P £5.00
20 for £40.00 P&P £10.50

## KEVLAR 3.5mm BRAID NOW IN STOCK!

Xtra H-Duty (600Kg BK) Kevlar braid £1 per Mtr.

**New 30 Foot 2 inch mast set- 6 x 5 foot -2 inch sections £74.99**

## NEW 20 FOOT SWAGED MAST SETS

4 x 5 foot £54.99 — 5 x 4 foot £54.99

Any two sets £90.00

## CALLING ALL DIY ENTHUSIASTS

10 x 13mm diameter, 6 foot long aluminium tubes swaged at one end. (Slot together – ideal for antenna construction/ repair). 13mm diameter

**£30.00** FOR 10

## HEAVY DUTY 30ft SWAGED MAST SET

5 sections, 2 inch x 6 foot long. Very heavy duty.

★ STAR BUY ★ **£84.99 PER SET** (delivery £12.50)
TWO SETS FOR £150.00 SALE: THREE SETS FOR £199.00

## HEAVY DUTY 24ft SWAGED MAST SET

New extra heavy duty 2" mast set. 4 sections x 6 foot that slot together. **£79.99 PER SET** (delivery £12.50)
TWO SETS FOR £140.00 SALE: THREE SETS FOR £169.99

## NEW SWAGED MAST SETS

24 foot mast. 1½" – 4 sections (6ft long). **£49.99** OR 2 SETS £84.99
SALE:- 3 SETS £109.99

24 foot mast. 1¼" – 4 sections (6ft long). **£46.99** OR 2 SETS £78.99
SALE:- 3 SETS £99.99

## H/DUTY CAR BOOT MAST SETS

| 15 foot (2 inch) ( 5 x 3 foot) | 18 foot (1.5 inch) (6x 3 foot) | 18 foot (1.25 inch) (6 x 3 foot) |
|---|---|---|
| £39.99 | £39.99 | £36.99 |

Any two sets £65.00

### TWIN FEEDER/ LADDER LINE

300Ω Twin Feeder
£1/mtr £70/roll
450Ω Ladder
£1/mtr £70/roll (100m)

### ALUMINIUM POLES (2")

| | |
|---|---|
| 20ft (collection only) | £45.00 |
| 10ft (collection only) | £25.00 |
| 2.4m | £29.99 |
| 5ft | £14.99 |

## MAST HEAD PULLEY

A simple to fit but very handy mast pulley with rope guides to avoid tangling.
(Fits up to 2" mast) **£14.99** + P&P £5.00
30m pack (4.4mm) nylon guy rope £15.00
Special: 50m pack (4.4mm) nylon guy £25.00

## NEW EASY FIT WALL PULLEY

Pulley will hang freely and take most rope up to 6mm. (Wall bracket not supplied).

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30m pack (4.4mm) nylon guy (480kg) .....£15.00
132m (4.4mm) nylon guy (480Kg).....£45.00
Special: 50m pack (4.4mm) nylon guy £25.00

## BARGAIN WINCH

500kg brake winch. BARGAIN PRICE
**£94.99** Del £10.00
(Now includes cable grip)
Winch wall bracket..... £22.99

## LOW LOSS PATCH LEADS

£4.50 P&P

| Connectors | Length | Price |
|---|---|---|
| PL-259 - PL-259 | 0.6m | £13.99 |
| PL-259 - PL-259 | 1m | £16.99 |
| PL-259 - PL-259 | 4m | £24.99 |
| PL-259 - PL-259 | 20m | £49.99 |
| BNC - BNC | 1m | £16.99 |

## NEW GALVANISED STEEL TELESCOPIC MASTS

Delivery £30

| | |
|---|---|
| 9m (closed HT-2.8m) | £150.00 |
| 12m (closed HT-2.8m) | £199.99 |
| 15m (closed HT-3.35m) | £239.99 |
| WITH TRIPOD STAND | |
| 9m (closed HT-2.6m) | £299.99 |
| 12m (closed HT-2.6m) | £399.99 |
| 15m (closed HT-2.6m) | £449.99 |

# VHF/UHF

## RSGB Convention provided some great VHF/UHF Talking points

Peter, DK1CL post QSO with G3RIR.

**PRESENTATION.** I had the opportunity to deliver a talk at the RSGB Convention on encouraging 70cm activity outside of contests. The talk was designed to create reaction from the audience with an emphasis on trying to generate activity on 70cm. This goal was achieved with excellent feedback from some 'learned' 70cm operators who attended. It was agreed by all that activity on 70cm across the UK is poor outside of the 2nd Tuesday night of the month contests. An average 70cm UK Activity Contest night will see approximately 115 *fixed* stations active. Add to this other stations who don't like contests or the structure of the UK Activity Contest system, this gives an idea of how many stations could be active on the band.

Since 2009, when the 'club' element came into being, the number of clubs participating has more than doubled to over 70. This is due to individual club members taking an interest. Whether they belong to a small or medium set up, or can come on the band only for an hour, their score contributes to the overall club tally. This then breeds friendly internal club rivalry and so on. 25 different locator squares on average are active on a Tuesday night stretching from Channel Islands to GD, GI and GM. I highlighted the DX potential of the band when tropo conditions are favourable and confirmed the excellent recent QSO between GD8EXI and EA8CTK as a new tropo DX record for 70cm. Clearly for most, the band does not benefit from what you would consider to be normal VHF propagation ie Sporadic-E, aurora and meteor scatter. However, the emergence of the aircraft scatter technique is generating keen interest. John, G3XDY gave an excellent talk on that subject at the RSGB Convention. With 10MHz of bandwidth to play with, there are so many different ways of using this amateur service allocation. Basically there is something for everyone, so with all this positivity how do we get more activity on the band. I presented three possible ways forward for discussion.

**IDEA ONE.** As a group of amateurs we always generally look to either collect or compete individually or as a team/club. DXCC, Maidenhead locators, QSL cards and contesting all seem to be part of the hobby where there is a competitive edge involved. Going back in time when Norman, G3FPK used to write the column he produced a monthly activity table. Bryn, G4DEZ used to be at the top most of the time but there were always challengers. The tables consisted of County, Country and Locator squares worked on different bands. It was a relaxed affair with no prize as such as it was self administered however there was indeed a keen interest.

**IDEA TWO.** A 70MHz initiative back in the 80s was established using the callsign GB4MTR. The basis was that a volunteer station would take the callsign for a month and operate as much possible, thereby giving other operators and other volunteers a target or goal to work to. This was a resounding success.

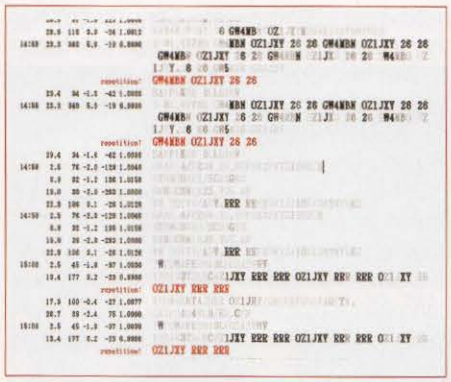
**IDEA THREE.** The G100RSGB scheme has also been a success this year and has appeared on many VHF and UHF bands including 70cm. This brings the 'club' element into the equation. A potential way forward would be for a club to sign up for a monthly special 70cm callsign or use their club callsign. Operating periods could be coordinated so everyone would know the times and days the station would be operational. Interestingly, Reg, G8VHI was going to activate the G100RSGB callsign on the day after the Convention. Reg worked a number of stations on 70cm directly on a CQ or QSY from 2m. The key point here is a special call, plus a notified period, generated activity.

**DISCUSSION.** The Emley Moor and Sutton Coldfield beacons are long gone, so there are no central UK beacons on 70cm, meaning that continental stations don't beam this way to check as there is no point. Stations set up for 70cm not interested in contests tend to drift away because there is no activity and use their tower/rig resource for something more productive. There was also a view that perhaps there is a lack of VHF/UHF emphasis in the training of new licensees. There was considerable interest in the 'activity period' and 'special callsign' idea. If a special call is not available, each volunteer club could use their own club callsign, getting club members involved as well. If there were to be a re-introduction of the Table idea the governing factor should be the number QSOs made on any mode rather than just big DX on SSB. This could bring TV, satellite, PSK operation into the mix, which is the main goal of the project.

**CONCLUSIONS.** To sum up, all attending agreed that 70cm needs a stimulus and a summary of possible actions follows.

- Try to find a site for a 70cm central UK beacon – the kit is available.
- Establish an activity period either per day, weekend or both but *outside* of contests (possibly an hour before during the week on a UK Activity Contest night).
- Look at a potential special callsign to be run by club or individual.
- Introduce a yearly Table including the 6, 4, 2 and 70cm bands based on the number of QSOs but emphasising the multi mode nature of the project.
- Make trainers of Foundation and Intermediate candidates more aware of the interesting and rewarding possibilities of VHF/UHF operating.

Martin, G4GFI posted a message via the RSGB 'Have Your Say' web page on 14 October. His subject was Low Level Of Activity On V/UHF Bands, highlighting his concerns that although the Tuesday UK Activity Contests have certainly increased contest activity and the opportunity to work new locator squares, they have not provided the opportunity for longer QSOs to discuss operating conditions, equipment etc. He comments further, "Would it be possible for the RSGB to suggest and advertise a convenient time to encourage this type of general QSO? An hour or so before each of the UKACs might be a suitable time for this



GW4MBN MSRX decode screen.

purpose". This is not dissimilar from our proposals going forward so thanks Martin for the comments – we are working on it.

**BAND REPORTS.** Neil, G3RIR (IO92) sent in a report on an excellent 'unusual' QSO during the last tropo opening in September. Neil exchanged 5/8 reports with Peter, DK1CL/P who was operating from his motorbike close to the Swiss border in JN48. Peter was using a simple HB9CV antenna only a few feet from the ground bolted to his bike. As Neil says, admittedly he was a few thousand feet up a mountain!

Brian, GW0GHF (IC81) has recently set up on 2m running digimodes. He can work all modes that are in the DM780 *DigiMaster* program with some good successes using his homebrew interface. He is now QRV on 2m PSK31 mainly monitoring the centre of activity on 144.138MHz. Unfortunately, Brian reports little activity around this frequency in the past six months. Brian's excellent setup consists of an Icom 7400, 100W and 3-ele quad with either horizontal or vertical polarisation and he is in an excellent VHF QTH in Penarth near Cardiff.

David, G4TUP (IO83) advises that after a long period of QRT, the Southport Repeater, GB3OA, is back on the air after a relocation to a new site. Although located close to Southport's railway station, GB3OA appears to like the new location with less interference on the input frequency, which caused problems in the past. At present neither the IRLP nor Echolink nodes are activated as the running of the bare repeater for now is being focussed upon. The output/input frequencies are 145.6125/145.0125MHz (600kHz shift) and 82.5Hz CTCSS. Output power is 5 watts to an omnidirectional vertical antenna and the locator is IO83LP. For those in the North West of England, David and the group are looking for reception reports, especially from the M6, M56 area from Lancaster to Warrington and North Wales. They also look forward to any DX reports from GI, GD, EI and southern GM – please send them to David's e-mail address, david@norris.org.

Reg, G8VHI (IO92) activated the G100RSGB callsign from his home QTH on 14 October. He used ON4KST Chat and the DX Cluster to announce the activity and with his excellent station worked many stations particularly on 432MHz.

Peter, G3UBX (IO82) writes in with two main points of frustration. First, he couldn't get to the RSGB Convention due to family commitments and secondly, while listening on 432.200 (which he often does) there was a CQ call from a G7 station. He was about S5/S6 and slightly off frequency according to Peter's rig. He only gave his call three times, never to be heard again. The moral is if you call CQ consider the possibilities that (1) somebody will hear you but be slightly off tune (it ***matters*** on SSB) and (2) somebody will hear you but very weakly and want to adjust their beam (this can take up to a minute, so make a reasonably long call) and (3) somebody will hear you but needs to put the soldering iron down in a safe place before calling. Furthermore, if you want to stir up some activity make several calls on different beam headings.

Thanks to Dave, G4RQI (IO93) for sending in his report from his 432MHz operations that missed last month's edition. On 23 September, David could hear the beacon DB0MMO/B (JN49) that only runs 6 watts ERP. As the band began to open up he worked DL3YEE, DL6NAA, DJ5NQ, DF0HF (JO50), PA2V (JO22) and, his best DX, DG0VOG (JO70) at 1045km. The opening on 28 September brought DL2OM (JO30) and DL6NAA (JO50). David has developed his station from his FT-897 and 10 watts output to a new system that comprises a DB6NT transverter module, 50W PA and homebrew sequencer. Under construction is a 70cm mast head pre-amplifier by G0MRF. A sked made on 19 October with G7RAU (IO90) completed on a very flat band at 334km.

Regular contributor John, GW4MBN (IO71) has been QRV on 4m meteor scatter during the month with stations worked so far being DI2AX, DI2BK, OZ1JXY, PA5JS, IS0AWZ, LA4YGA, EA5/G3XGS, OZ3ZW and ON4GG. John has also been experimenting with other digital modes and worked PA5JS on 6m and 4m using PSK2k mode. PSK2k by DJ5HG uses strong error correction to produce clean decodes, free of 'garbage'. John also runs MSRX by DJ5HG [1] alongside WSJT9 to improve FSK decoding of very weak short pings. The decoded text is shown in black for high confidence, pale grey for garbage and red for repeated decodes. It is very easy to interpret. Mike, M5MUF (IO92) has been evaluating two different modes within the *WSJT* suite of software for meteor scatter QSOs on 4m. FSK441 and JTMS are slightly different in their makeup, where JTMS has better error correction. This is supposed to lessen the number of bad decodes and rubbish sometimes associated with low signal strength pings and bursts. However, Mike and his PC still seem to prefer FSK441. During October Mike worked IK0BZY (JN61), DI2AX (JO43), LA4LN (JP50), S52OR (JN76), LA4YGA (JO48), PA5JS (JO21) and OZ1JXY (JO46), completing in 19 minutes after he heard a 15s burst of Henning's CQ. OZ1JXY (JO46), OZ1DJJ (JO65), OH1UM (KP10), OZ3ZW (JO54) and SP3OCC in (JO92) were also logged. IK0BZY (JN61) was worked using JTMS and OZ1JXY (JO46) in FSK441 with both stations receiving full-period bursts. After hours of trying, Mike finally managed to work Greg, SP3RNZ/4 in KO13 on 4m FSK 441 thanks to a two minute trail that gave two full periods in each direction. This monster was all the more spectacular, coming in the last few minutes of Greg's time from that square. Conditions during the Orionids peak were very strange as few stations seemed to be working direct paths as predicted by Virgo. SP3RNZ/4 was worked again on 4m FSK from his next site in KO14AA. The 2m UKAC Contest produced 24 QSOs, including GD8EXI, G8PNN/P (IO95), G7RAU (IO90) and F8BRK (IN99), but not a single GM or GI. A 6m MS QSO with GM4VVX (IO78 – random) using FSK441, gave a new square on the band. Later in the evening the NAC 6m contest resulted in MS QSOs using JT6M. SC7C (JO86) was a colossal signal with 1kW to an 11-ele Yagi and LA4LN (JP50) and 5Q2M (JO65) were also worked successfully.

John, G4SWX (JO02) posed himself a question: "What can you do in a month on 144MHz when you have already worked 510 squares?" Answer: work another 25! John's locator square tally is now 535 squares in 25 months since coming back onto 2m. John gave an excellent 'standing room only' talk at the Convention on establishing a remote station for VHF and HF. This system has proven to be a powerful tool in working DX on 144MHz EME and has been very productive during October with the following highlight QSOs, VK5APN (PF85) a small portable/rover expedition and ZL2ADU (RF60) was worked with a very short 15 minute moon window. YJ0HP (RH42) brought John his 85th DXCC on 16 October, again with a very tight moon window and a huge pile up.

**FINALE.** Discussion points and ideas from the RSGB Convention are being worked on to try and encourage activity on VHF/UHF but particularly 70cm. Please look out for news in the January edition of *RadCom*, Yahoo Groups [2] and other message boards for more information. Thanks to all the contributors this month.

**WEBSEARCH**

1: www.dj5hg.de/dj5hg_download.html

2: VHFandUHF@yahoogroups.com

# GHz Bands

## Some musings on the use of preamps, rain scatter and how to increase activity

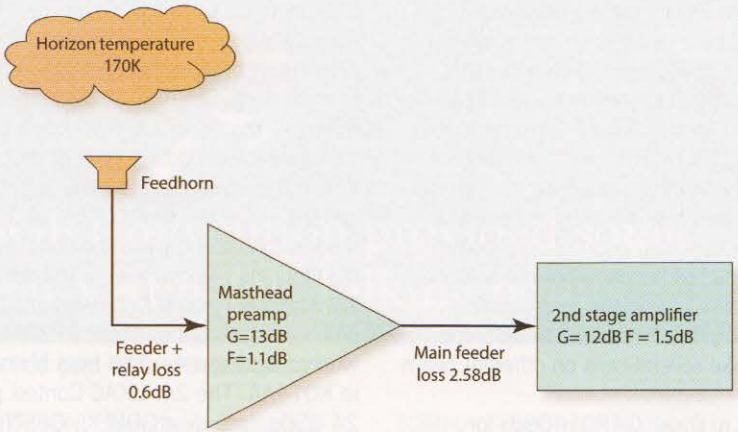



FIGURE 1: Example 10GHz system values.

**DEATH OF A PREAMP.** The consequences of a recent rebuild of my 10GHz system to accommodate a 15W SSPA in my loft got me thinking about masthead preamps. Due probably to a sequencing error, I managed to destroy my masthead 10GHz preamp (fortunately just a €3.50 'Franco' board) [1] and was left with 5 metres of FSJ2-50 coax giving 2-3dB of loss between my transverter's LNA and the dish feed. I'd had a QSO with G3XDY with the preamp working and all was well, then a day later it died during a test with Marcel, F5DQK. I have now left the transfer relay 'straight through' as I can't face taking the mast down again for a while until I get to the bottom of the failure mechanism for sure!

Surprisingly, my performance doesn't seem to have suffered too badly, as I copied the PI7RTD beacon on rain scatter later that same day. Operating successfully for a few weeks without a preamp got me even wondering if it's worth the extra hassle of having a masthead 10GHz preamp for terrestrial operation. The thought of just a straight coax feed with no relays or power at the masthead is very attractive with such a short run of feeder. I therefore decided to do some system calculations using the VK3UM *EMECalc* receiver performance calculator [2] to see what my theoretical loss of sensitivity would be.

Unlike EME or satellite systems where the antenna is looking at 'cold sky' at a temperature of around 4K at 10GHz, a terrestrial antenna pointed at the horizon looks at a considerable chunk of the noisy 'hot' ground at around 290K and consequently sees a temperature of around 170K. I used *EMECalc* to compare my 10GHz system's sensitivity with and without a preamp for a 170k antenna temperature in 2.5kHz bandwidth (see **Figure 1**). The system has a masthead preamp, 4 SMA connectors, a relay and a cable loss between the feed and preamp of 0.2dB, giving an overall loss of 0.4dB. The masthead preamp has a noise figure of 1.1dB and a gain of 13dB and the second stage, 1.5dB/12dB is preceded by a 2.58dB coax loss. This gives an overall receiver noise figure of 1.9dB and a sensitivity of -137.8dBm.

Removing the LNA would leave coax and 2 SMA connectors with a total loss of 2.58dB in front of the 1.5dB/12dB second stage, giving a receiver NF of 4.28dB and a sensitivity of -134.1dBm. Is it worth all the extra complication of a masthead preamp and relay for 3.7dB of extra sensitivity? You decide.

Returning to preamp failures, there has been discussion in the past as to whether it's better to power off a preamp on transmit or leave it powered. In my case it was permanently powered on in Tx mode, with a transfer relay round it. There should be plenty of isolation in the relay (>60dB) meaning just 100$\mu$W from the Tx at either end. I consulted Sam, G4DDK and Chris, GW4DGU and I got justifications for both leaving the preamp on or off. I'm not convinced by either argument. Chris can't ever remember losing a preamp due either to it being on or off and, although the devices were rather different back then, all of his high-end MuTek preamps operated with the preamp off in the transmit mode and they had very few failures. With his current 10GHz system, Chris doesn't turn the preamps off and the only time he's had failures has been attributable to T/R switching timing problems. It seems the answer is to be quite conservative with timing, with the Tx being enabled about 60ms after power to the antenna relay has been applied. One important point, though; don't forget that coax relay isolation measurements are made in a constant impedance system. It's entirely conceivable that the voltage coupled to the gate of a pHEMT could be much greater than you'd expect from the 50Ω measurements. Sam notes that when leaving a preamp powered up and using a transfer relay, the input and output are connected in a loop that forms a pretty efficient oscillator and is probably the reason mine failed. Not good practice. Sam prefers to turn preamps off during transmit as an oscillating preamp may just cause some unwanted radiation. With two cable systems you are also in danger of sending a high level signal down the receive coax and damaging a second stage. Again it seems it's a case of 'you decide'.

**HOW DO WE ENCOURAGE MORE ACTIVITY?** I got an e-mail from Phil, MOMBI in Diss, Norfolk (JO02MI) asking for advice on starting on 1.3GHz. I suggested that he get active in the Tuesday Night UKAC contests and sign up to the ON4KST reflector [3]. Phil's location is 40m ASL and he runs a TS-2000X, 15m of Ecoflex10 coax and either a home made bi-quad or a Sandpiper 19-ele Yagi on a 10m mast. Even with this relatively modest set up, in the UKAC, he heard stations from Kent to the Midlands, Lincolnshire and one or two weak signals from Wales. He had QSOs with a couple of the locals (G3PYE/P and G3XDY) but was a little reluctant about diving in to a contest situation. There is really no need to be reluctant. Most contesters are very happy to get the few extra points or a new square. Worryingly, Phil commented to me that he got the feeling that the band is really only for contests so wouldn't suit an "old rag chewer like him". Maybe we need to look very carefully at our activities in the light of this comment and try and get on the bands outside of contests and Tuesday nights. At the RSGB Convention in October I attended a talk from fellow columnist Richard, G4HGI about how to increase activity on 432MHz. Much of the discussion related just as much to the GHz bands, and two suggestions seemed to have particular merit. The first one was from Jim, G3YLA who suggested the idea of a 'happy hour' at some mutually convenient hour during each day where everyone made the effort, got on the bands and called CQ. The idea being, "if you plan to go in the shack, do it at this time!" Secondly, what do you think about reintroducing the monthly band 'league tables' in the GHz bands and VHF/UHF columns? This would solely rely on

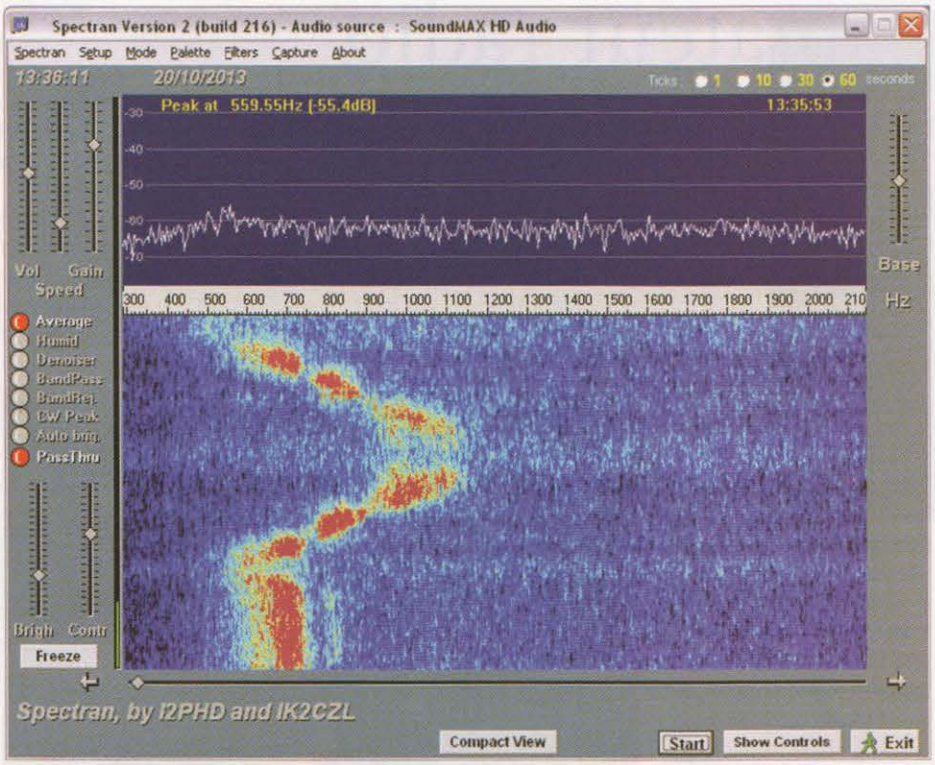



FIGURE 2: Frequency variation seen by G4JNT when turning the antenna through a rain scatter signal.

you sending us monthly updates of squares, maybe counties and DXCCs worked by band. Would that encourage you to actually operate rather than just listen or watch internet reflectors? Both Richard and I would be interested to get suggestions and comments on both these ideas, so e-mail us and tell us what you think.

**ACTIVITY REPORTS.** Late September brought a good tropo opening with many reports of QSOs over 1000km on 1.3GHz including on the 22nd, a 1384km QSO between DB6NT (JO50VJ) and EA2TO (IN83MB). EA2TO worked a number of other German stations all over 1000km. On the 23rd, G3YPQ went up to a nearby hilltop near Bude, Cornwall taking a simple 23cm setup of an FT-817, a transverter and small 25W linear plus a 44-ele Wimo strapped to his car. He had a tropo duct to Germany and, with IO70 much sought after, he was swamped! Stations worked included DH2SAV, (JN48) 5/9+, DB6NT (JO50) at 1032km and, ODX, OE5VRL (JN78) at 1372km. Five new Squares in 1 hour! Slightly further East in Devon, on the same day at 2208 Ralph G4ALY, worked DB6NT on 5.7GHz for his first DL on that band and new ODX of 1123km. Ralph notes that it 'only' took about 9-10 years to break the 1000km barrier on 5.7GHz and that he is still to do it on 3.4 and 10GHz. On the same day on 10GHz, Nick, G4KUX (IO94BP) worked DL7QY (JN59BD) at 1023km. He was the German station's first G station on 10GHz.

On 1.3GHz Dave, G4RGK (IO91ON) worked DH2SAV (JN48), DL7QY (JN59), OE5XBL (JN68), F6AFC (JN38), DJ5NQ (JO50) plus, on 2.3GHz, DB6NT (JO50) and DJ5NQ (JO50). On 10GHz, Dave had duct in to JO50 and nowhere else, and worked DL6NAA ODX at 894km. DB6NT and DJ5NQ. The good 1.3GHz conditions extended in to early October with G3XDY (JO02OB) working SP5QAT (KO02IB ) at 1350km and SP4MPB at 1308km and G4EAT (JO01HR) working SP4MPB at 1387km, all on the 7th.

**RAIN SCATTER.** Early October brought some heavy rain to Southern England. On the 16th there were QSOs reported in Germany and France and I copied GB3XGH IO82WO) on 10368.810 at 52S and GW3TKH (IO81JM) reported GB3CCX (IO81JM) at 51S. These conditions persisted for the next 3 days with beacon spots from stations in Wales and Cornwall through to East Anglia. The October SHF UKAC was also blessed with good rain scatter conditions on 10GHz. I worked 6 stations and finally managed a QSO on NBFM with Bob, G8DTF (IO83SM) at 227km after many failed attempts.

Rain scatter is one of those fascinating propagation mechanisms that is exclusive to the GHz bands and can have some interesting effects on the signal. As well as Doppler spreading making the signal sound auroral, Andy, G4JNT posted a plot of the GB3SCC 5.7GHz beacon showing the frequency change that you see as you rotate your antenna through a signal. The centre frequency of the Doppler spread changes as you rotate the antenna on and off bore sight (**Figure 2**). No retuning was done to produce the plot; the frequency shift was as Andy rotated his antenna over a 50° swath covering a huge rain cell travelling up from the south west. You can see 500Hz of mean Doppler shift on the plot and the change as the antenna rotates. My initial thought was that this was caused by the rain cell rotating (like a tornado) and as you move to one side of bore sight the scatterers are moving away from you and at the other they're moving towards you, but meteorologist Jim Bacon, G3YLA pointed out that you'd expect the plot to be sinusoidal, going high on one side and low on the other. Jim did confirm that such a cell could have rotation, sometime very marked, but also that the very strong rising updrafts and downdrafts within a storm cloud, whether rotating or not, are not actually vertical and in many cases will be tilted over and this may also impart a component of differential motion. I have seen a sinusoidal effect on other signals, but in this case the asymmetry of the trace implies some other factor than rotation such as two rain cells, one moving considerably faster than the other. I hope to investigate this further.

**EME.** Johan, PA3FPQ, Jurgen, PE1LWT and Rene, PE1L were active from Turkey for a few days in September as TA/PE1L. On 1296MHz they worked 22 stations with just 80W and a 67-ele Yagi. On the 24th in the first hour of one pass, they worked 10 stations and commented that it looked almost like a 2m pile-up! The second pass started with Bruce, PY2BS (GG66GJ) and this QSO was much easier than the attempt on 432MHz. For log and details see **[4]**. October saw the 2.3GHz And Up ARRL EME contest and this coincided with another DL1YMK 'mystery DXpedition'. This time it turned out to be Jersey. Michael made it even more difficult by signing MJ/SA6BUN, his Swedish callsign! Much to my annoyance, my dish rotator failed on the Friday night and I missed the whole event! Peter, G3LTF (IO91GG) spent the Saturday on 2.3GHz then about 90% of his available moon time on Sunday on 3.4 and 5.7GHz. He reckons he must have made at least 20 round trips of 100m from the shack to the dish and back to change feeds! Peter comments that activity was a bit up on last year and that he was pleased with his dish surface improvements. He worked 39 stations on 2.3GHz, 10 on 3.4GHz and 9 on 5.7GHz. Jac, PA3DZL reports that prior to the microwave contest he worked the DL1YMK DXpedition to Jersey on 4 different bands, giving him a new DXCC and 2 'firsts': PA to MJ on 2.3 and 3.4GHz EME.

WEBSEARCH

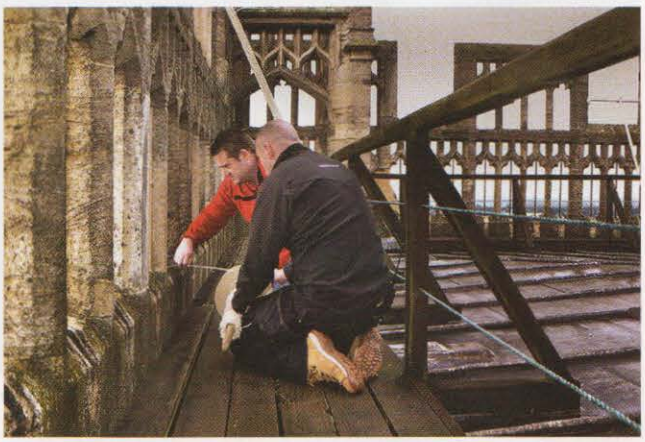
[1] "Franco" preamp boards: www.rf-microwave.com/eng/catalog_view_item/0/5-equipments-pc-boards/4-SU-02.html
[2] *EMECalc*: www.vk3um.com/eme%20calculator.html
[3] ON4KST Microwave Chat: www.on4kst.info
[4] TA/PE1L: www.emelogger.com/ta

# G100RSGB – amateur radio at its very best

## More stories from the clubs who have operated the RSGB's Centenary station

GLOUCESTER AR&ES. Gloucester Amateur Radio and Electronics Society needed somewhere for Churches and Chapels on the Air (GB4GC) and also G100RSGB that would be different – a bit special if we could manage it – and open to public view. Somewhere in the centre of Gloucester would be nice: the best of all sites would be the Cathedral but what would they say if we asked them? For those who don't know, Gloucester has the best Cathedral in the realm in the best county. There was only one way to find out, so back in May I approached the Cathedral office and introduced myself as a radio ham. Although they had not heard of it, they were welcoming and interested. A further meeting was arranged. It was the people's Cathedral and they wanted people to use it.

We hoped that we would be allowed to put up an unobtrusive antenna in the grounds but, to our delight, they offered what we didn't dare to ask, "You will want to hang it from the tower, won't you?" "Yes please". We had to plan and rehearse very carefully, taking care not to damage or 'modify' the masonry. One mistake and a spare nut would be back on the ground down several hundred dark and gruelling winding steps. We were able to put up a 132' dipole over the knave roof with the upper end suspended from the tower in just an hour – but you cannot hurry all those winding steps, especially with masonry polished like glass by hands over many centuries.



Lowering a bob weight on a wire from the roof of Glasgow Cathedral. Photo: www.chrisrennie.co.uk.

We operated from our new gazebo by the Cathedral main entrance, running 100 watts from a Kenwood TS-590 through an awful lot of 300 ohm twin feeder. We made many contacts on both days, mainly UK and into Ireland and Europe and there were, of course, interested enquires from the public, not to mention the local press and a party of visiting French schoolgirls. What was most remarkable was that we were able to operate from such a truly amazing place, where William the Conqueror had once held court in the chapter house and had ordered the Doomsday Book.

Both events went off better than we could possibly have expected and so it was well worth the effort to go and ask in the first place. The lessons are to be polite, know exactly what you want to do and have some answers ready for any question.

Our grateful thanks to the Dean and Chapter and all at the Cathedral who went out of their way to help us.

**Mike Rainbow, G6OTP**

Hicknall RRAC had plenty of volunteers to help with the antennas.

HUCKNALL ROLLS-ROYCE ARC. We started our participation many weeks before it was our turn to run the station. It was agreed that we would put as many stations on as possible for the whole 48 hours; we eventually arrived at the figure four. Whilst four doesn't appear many, especially when counting on your fingers, the logistics of putting on this many was going to be quite a challenge.

Immediately questions arose: "can we run three HF stations and VHF all at once?", "have we got enough aerials?", "how much feeder is required?" and so on. First, we had to decide how to divide off the four stations. Kevin rose to the challenge and he fabricated and fitted dividers between stations and a temporary partition to keep the radio area of the club room separate from the very essential kitchen/tea making area. Headphones and various splitter connectors were procured so that every operator and logger could hear the calls coming through without interference from other operators.

A request was then put out for volunteers to erect aerials, run feeders and solder various plugs for the quarter wave stubs, make band pass filters and load the logging software onto the computers, to name but a few tasks. It was really pleasing to see so many of our members turning up to provide the much needed help.

At midnight UTC on 5 October we started putting out the CQ calls: we had an 80m and 40m HF station on SSB. A 30m data station and a VHF/UHF station switching between SSB and FM. They were all running nicely at the same time and without any of the problems that we had envisaged.

During the weekend a steady stream of members arrived for their allocated time slots as others departed upon completion of theirs. Overall we had a really great weekend with no major catastrophes and everyone really enjoyed the experience. There were some members who have never been part of a special event station before this one.

I must mention the guys from the South Normanton, Alfreton & District Amateur Radio Club who stepped in to provide extra operators to take some of the strain off our members. They did themselves, their club and us proud.

At the end of the 48 hours we were pleased to have made over 1,200 contacts. We duly forwarded them on to John, G3LZQ who has had the mammoth task of collating all the G100RSGB entries from the beginning of this year.

It just remains for me to say a huge thank you to everyone who contributed to this event. HRRARC is only a relatively small club and I feel extremely proud of what we achieved over the forty eight hours. Is there anybody up for the G200RSGB event? If so please e-mail my great, great grandson circa 2112.

**Neil, MONJJ**

BROMSGROVE & DARC. When someone announced at a regular Bromsgrove and District ARC Friday evening shack meeting 9 months ago that they had booked G100RSGB for three days in October the proverbial pin could be heard to fall. I am not sure whose idea it was, but thoughts had been turned into action and we were committed. Robert Louis Stephenson said that "to travel hopefully is a better thing than to arrive", and thence began a hopeful journey that, looking back, was probably the best thing that the club has ever done in its 48 year history.

Bromsgrove is a small club having waxed and waned like so many over the years. There are 15 active members and, despite being in the middle of an urban conurbation, we are blessed with a dedicated, electrically quiet shack on the (open) site of a Crafts Centre built on top of old salt marshes.

As the months passed so the excitement built and a 'countdown' was commenced. To do justice to the callsign and give a good account of ourselves, we first had to do all those things that we should have done long ago but always managed to avoid. For example,

- A new (to us) Force 12 beam replaced the rather sad pieces of metal that masqueraded as a Yagi on top of the tower
- Dipoles were taken down and overhauled
- An 80m vertical was fashioned and erected in an accommodating tree.

Members turned out on weekdays and Sundays to help with these things and our signals were noticeably improved. Rallies were attended to sell the surplus stuff that seems to beat a relentless path to our door in order to fund another rig and other expenses. We may be over-endowed with enthusiasm, but that excess does not run to club funds. Even the walls outside the shack were stripped of years of overgrowing weeds and a vacuum cleaner and rubber gloves were in evidence – we had advertised our operation in the local paper and visitors were expected.

Imaginations began to run wild. Why not put on five stations, four HF (SSB, CW and two data) and one VHF? Well, the fact that we only normally have one station in the shack and that data was a dark art to all but a couple of members were two reasons, but we were not to be deterred.

Willia, MW6WOD visited G100RSGB and worked his first pile up.

But how do you operate multiple stations at once for 72 hours with just 15 potential operators, two of whom were one month old Foundation licence holders and many others who, by their own, admission were not seasoned long-distance runners?

In the event, it was a classic example of you don't know what you can do until you try.

The club chairman Barrie Palin, G4AHK's passion about the '5Ps' – proper planning prevents poor performance – ensured that, by the time 0000 on 11 October arrived, operating rotas were in place, the stations were up and running (and not interfering with each other) and all the vital details like who was going to feed us had been considered and resolved. We were ready and more than a little apprehensive.

Our nervousness was not helped by the early shift operator being taken unwell at the eleventh hour and, as it transpired, other medical emergencies conspired to reduce our operating team. When we finally had our first full shift of wannabe heroes in place at 0500 the bands were totally dead – as if someone had cut the coax. And then, gradually, the dream became reality and we never looked back.

The result was 2,243 QSOs from 153 DXCC entities– 5% data and the rest split equally between SSB and CW – despite some strange propagation and having to battle with contesters. For some reason our signals, which were universally reported as being "loud" or "very loud", refused to cross the equator except as a special favour on odd occasions.

The carefully planned rota was discarded both to recognise that we did not have the ham-power we had hoped for but also because certain Foundation licensees, freed from the shackles of 10W and sub-optimal antennas at home, revelled in the pile ups and had to prised out of the operating chair! We sometimes read and hear of Foundation licence holders being shunned and abused by others on the air but, throughout the weekend, the courtesy and patience shown to obviously new operators by all those wishing to work us was exemplary, even if it meant them waiting a while to make the contact. As I say – amateur radio at its very best.

2m proved a revelation in that it publicised in real time our operation to the local amateur community. As a result, colleagues including past members visited and operated. One such unexpected guest was William Davies, MW6WOD, a 10 year old RSGB member from Aberystwyth visiting the area with his parents. He, too, had never been at the right end of a pile up and his command of the operation was an inspiration to us all. He also came back the following day for more.

For those who still look forward to the privilege of putting G100RSGB on the air, a couple of learning points:

- *It's all about the antennas.* If you can get them right, the rest will follow.
- *Time spent familiarising operators with the equipment is never wasted.* The club rigs may be different and/or have more capability than your domestic gear and, when sorting out a pile up, knowledge of the rig can make all the difference.

Looking back with more than a little sense of anti-climax, not only did we meet the G100RSGB objectives of getting all our members on the air and having fun but we have a legacy for the future, ie

- We now have a dedicated data station available in the shack.
- We know we have shared in something special and are determined to build on this. You can expect to see Bromsgrove ARC entering and climbing the league table in RSGB club contests.

Finally, 2015 is our half-centenary and, needless to say, we can hardly wait to try and do justice to another important event. Our thanks go to the RSGB for an unparalleled opportunity that we will remember forever.

# Sport Radio

## A look back at the 2013 UKACs and a new event for 6m

YOUR RSGB THE BEST CONTESTS

**UKAC ROUNDUP.** The 2013 UK Activity Contest (UKAC) series is coming to a close and it seems inevitable that this year it will be won by the Travelling Wave CG, a relatively new group that has taken a huge lead in the results table. Their rise up the results tables has been meteoric (nowhere in 2010, 38th in 2011, 3rd in 2012), so I was keen to discover how they had gone about building a team that was capable of toppling Bolton Wireless Club from the top position they held for four years, which is every year since an overall table of all bands was produced. John Clifford, GW4BVE of the Group said; "The Travelling Wave Contest Group (TWCG) was originally formed by a small group of people with a common interest in mountain walking and radio, predominantly Summits on the Air (SOTA) enthusiasts, which explains the higher than average number of /P operations from the group in the UKACs. From the start the Group set out to be friendly and supportive and at that time there was no intention to develop into a winning team, although of course the members are competitive or they wouldn't be contesting. The Group have a set of principles that all members accept: not pressuring anyone to do something that they don't want to do, encourage participation in RSGB contests, improving equipment and skills of members by being supportive and – above all – to have fun! This approach attracted members who didn't have a local club, where the local club didn't have any interest in contesting or where the club meeting night was on a Tuesday and clashed with the UKACs. Within the Group all members are treated with equal respect, so operators with smaller stations or less experience are just as welcome as the 'big guns'. Many Group members are also members of other clubs and contest groups. Where there are clashes it is left totally to the individual member to decide which club or group to support in a particular contest. TWCG have also developed an alliance with the GM0B Contest Group, and as a result four TWCG members operated CQ WW SSB with that group in October 2013.

"As members of the group are located across the UK, the main method of communication is via the internet, with e-mail, Skype and a private Yahoo group being the main channels. Even committee meetings and the AGM are held via Skype. In addition there are occasional face to face meetings between groups of members at radio exhibitions/rallies, or at pub lunches. The Group has its own simple website (www.twcg.org.uk), which contains basic information about the Group and contact details.

"At first the focus was on the RSGB 80m Club Championship, but as the Group expanded, mainly through personal contacts of existing members, there was a move towards adding the UKACs to the portfolio, which Matt Porter, G8XYJ credits himself with leading. Members were enthusiastic and started to improve equipment and antennas, and add bands to their stations. As an example, the Group chairperson, Carolyn Williamson, G6WRW, started from scratch on 1.3GHz and, with the support of other group members, in 9 months developed a competitive /P station for the UKACs. The approach taken by the Group has been extremely successful. We also entered our first /P contest, VHF NFD, in 2013, winning the 144MHz restricted section and taking third place overall. Along this journey we have reactivated many operators' interest in contesting, encouraged many station and skill improvements, and certainly added to the activity in the UKACs."

So a mix of inclusivity, support, mutual respect and fun has served the TWCG well. But what John forgot – or was too modest – to mention was about the leadership of a group. It needs to be inspirational, because it's hard to be inspired by someone who's a bore. And it needs to set achievable goals – too easy and it's not worth doing, too difficult and some may give up.

Photo 1: Carolyn, G6WRW/P 6m UKAC station in Shropshire.

**SPECIAL CONTEST CALLSIGNS.** All currently issued Special Contest Callsigns (both individual and club) expire on 31 December 2013. All SCC holders need to re-apply if they wish to continue using their currently assigned callsigns after the expiry date. The good news is that as from 1 January 2014 Ofcom have relaxed the restrictions on the contests in which these callsigns may be used (where the use of such callsigns is permitted by the contest organisers).

The qualification standard to obtain a SCC will be the same as it is currently. Here is an extract from the new application form: "Individual licensees (or the licence-holder in the case of club licensees) must be able to supply evidence of having entered at least five contests from a list of qualification contests within the last three years and of having achieved at least one third of the number of contacts as the leader. If the licensee (or licence-holder) achieved more than one half of the number of contacts achieved by the leader, the contest will count as two contests towards this requirement." Please note that in this context, the 'leader' is the leading UK station in the appropriate section.

The new form has been published on the Ofcom website. To find it easily, type ofw268.pdf into a search engine. Applications can be made using the form that is part of the PDF on that web page. Applications made using this form will (if approved by Ofcom) qualify for the new SCC Notice of Variation, valid from the date of issue. All new SCCs will expire on 31 December 2016.

**A TALE OF WOE.** We often hear it said that if something can go wrong, it will, and usually at the most inconvenient time. That statement certainly holds true for the 2012 Low Power Field Day exploits of the Lowestoft District and Pye Amateur Radio Club. Mike Parker, M0SAZ picks up the story.

"John, G4RLS, Tony, M0TDK, Phil, G0JSG, Carl, G3XGK and I all contributed to a really amusing Low Power Field Day for the Lowestoft District and Pye Amateur Radio Club using callsign G3JRM. We had done all the planning, organised equipment

## RSGB VHF EVENTS

| Date | Event | Times (UTC) | Mode(s) | Band(s) | Exchange |
|---|---|---|---|---|---|
| Dec 3 | 144MHz UKAC | 2000-2230 | All | 144 | RS(T) + SN + Locator |
| Dec 8 | 144MHz AFS § | 1000-1600 | All | 144 | RS(T) + SN + Locator |
| Dec 10 | 432MHz UKAC | 2000-2230 | All | 432 | RS(T) + SN + Locator |
| Dec 17 | 1.3GHz UKAC | 2000-2230 | All | 1.3 | RS(T) + SN + Locator |
| Dec 26-29 | Christmas Cumulatives | 1400-1600 | All | 50-432 | RS(T) + SN + Locator |

## BEST OF THE REST EVENTS

| Date | Event | Times (UTC) | Mode(s) | Band(s) | Exchange/info |
|---|---|---|---|---|---|
| Dec 1-31 | UKSMG Winter Marathon | All | All | 50 | RS(T) + Locator |
| Dec 6-8 | ARRL 160m | 2200-1600 | CW | 1.8 | RST (Ws & VEs also send ARRL/RAC section) |
| Dec 14-15 | ARRL 10m | 0000-2359 | CW, phone | 28 | RS(T) + SN (Ws, VEs & XEs send State/Province code) |
| Dec 26 | DARC Christmas Contest | 0830-1100 | CW, SSB | 3.5-7 | RS(T) + SN (DLs send DOK or 'NM') |
| *Dec 28* | *RAC Canada Winter Contest* | *0000-2359* | *CW, phone* | *1.8-144* | *RS(T) + SN (VEs send Province code)* |

* HF Championship event; + VHF Championship event; § Super League event; Δ VHF CW Championship event. *Italics* indicate that only provisional information was available when going to press. For the latest RSGB contest info and results, visit www.rsgbcc.org.

and thought we would be running like clockwork for the contest. Alas that wasn't the case and in the end just about everything that could go wrong did!

First, I was supposed to bring a gazebo, so I bought one of these pop up ones from our local department store. A day before the contest I tried it out and it popped up no problem, but when it came to collapsing it, it did just that – rendering it completely useless. It would have been fine not using the gazebo except that contrary to the weather forecasts it was not as nice outside in the morning as expected – at least from Lowestoft beach, where we operated (see **Photo 2**). Add to this the fact we couldn't see the laptop screen for logging because of the light, we had to make a shelter from bits of the ex-gazebo. We got it up and although it was a little Heath Robinson it kept the wind and even a slight shower at bay.

"Then we broke one of our fibreglass poles that was to support our inverted L (bare counterpoise wire in the wet sand). Luckily I had some lengths of aluminium pole that I cable-tied to a nearby sign. Amazingly, even after all the issues getting the inverted L erected, the antenna had near perfect resonance on 40m and wasn't a million miles out on 80m – the Elecraft K3 ATU having no problems matching it. There was also some problem with the computer logging / *Winkey* combo that, in the middle of all the other commotion going on was decided we would straight key and paper log, through the whole contest. The paper log would then be typed up from the comfort of Tony's shack.

"Luckily the afternoon weather was a lot nicer and even though the conditions on the air were quiet and we kept finding the same contacts each time we went up and down the bands during the afternoon session (resulting in us packing up early), we still had a good time."

It all goes to prove that well before the event you need to check that all the equipment works when connected together and that accommodation is fit for purpose.

Photo 2: G3JRM/P on Lowestoft beach.

### THIS MONTH'S EVENTS.

With no RSGB HF events at all this month, we start with VHF. It's the final month of the UKACs; and we begin with 2m on Tuesday 3rd. The Super League series continues with 2m AFS on Sunday 8th. This year it is two hours shorter than last year, because a lot of people said that towards the end they had basically run out of stations to work. It would be good if there was a turnout comparable to a 2m UKAC event, where recently there have been 200+ entries a month and the SSB section of the band is absolutely packed. After that we return to the UKACs, with 70cm on the 10th and 23cm on the 17th. There are no UKACs on the 24th (Christmas Eve), but for those who need a contesting fix over the festive season the Christmas Cumulatives take place for two hours on Thursday-Sunday, 26-29th. All four bands are in use each day, so to do well you will need to keep band hopping and turning the beams. In 2011 there was a record entry, but it was a record that didn't stand for very long because it was promptly beaten last year. Although December is a five Tuesday month there is no UKAC on 4m on New Year's Eve.

To promote activity on 6m during the winter, the UK Six Metre Group has just introduced a new event to compliment their Summer E's Contest. Called the Winter Marathon, it will be held over a two-month period, commencing on 1 December 2013 and ending on 31 January 2014. It's a 100% Locator square chase, with no points for individual QSOs, but as well as normal QSOs you can claim the squares worked in other 6m contests over the period. Internationally there are two ARRL events to tell you about. The ARRL 160m Contest runs for 42 hours, starting at 10pm on Friday 6th. This is a CW-only event in which you work the USA, US Territories and Canada only. The wording of the rules suggests that good frequencies to work on are 1830-1835kHz, but you are not limited to this 5kHz window. Heading off to the opposite end of the HF spectrum, the ARRL 10m Contest runs for 48 hours on the 14–15th. In this event everyone can work everyone. Both of these events have too many sections to list in this column. Please visit the ARRL web site to see them all. The DARC Christmas Contest runs for 2½ hours on Boxing Day morning. At this time of day there isn't likely to be much propagation between the UK and Germany on 80m, so for UK stations 40m will carry most of the traffic. The RAC Canada Winter Contest takes place for the full 24 hours of Saturday 28th. There are numerous entry categories and everyone can work everyone. Concentrate on working Canadians, because Canadian Provinces and Territories are where the multipliers are. Certificates are on offer to the winner of each category in each DXCC entity. This event is well worthy of a festive Wallpaper Alert, because from the UK only six entries from England (ie no GW, GM etc logs) were submitted in 2012.

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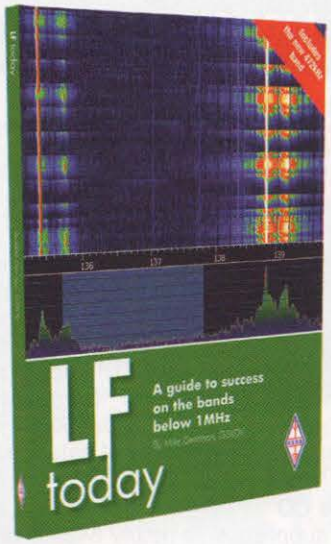
# Book Review

## Low bands and underground secrets

### LF Today, 3rd Edition
**by Mike Dennison, G3XDV**




With the existing 137kHz LF band and the advent of the new 472-479kHz MF band, more amateurs than ever before are now becoming active on these low frequency bands. There are even people operating between 5kHz and 9kHz. Whether you have existing experience below Top Band or are a relative newcomer, you're sure to find some fascinating material here.

I like the practical approach of this book. One of the early images is a graphic illustration of a full size vertical for 136kHz shown dwarfing the London BT Tower. That this book shows how you can put a useful transmitting antenna for this frequency in a suburban back garden is a testament to the ingenuity of radio amateurs. There certainly is some theory, where necessary, but the main thrust is good old-fashioned radio experimentation. In many parts of the LF spectrum the amateur work being pursued is breaking new ground.

The antenna is absolutely key to the performance of a low frequency station. Whilst you can work the world on a piece of damp string on HF, the same is not true at 472kHz and particularly at the lower frequencies. The size of any normal amateur's back garden is such a tiny fraction of a wavelength that heavily loaded antennas are required, and this brings its own issues. The loading coil for a LF transmitting antenna can easily have tens of kilovolts across it, so the construction techniques and requirements for insulation are essential.

But receive antennas are a different kettle of fish. A relatively tiny E-field probe can perform remarkably well at LF, with an active element of a metre or less. Loop antennas and other possibilities are also examined. But not all LF aerials even require metal in the air: some have experimented with 'earth mode' antennas consisting of earthing rods a few metres apart, achieving remarkable ranges.

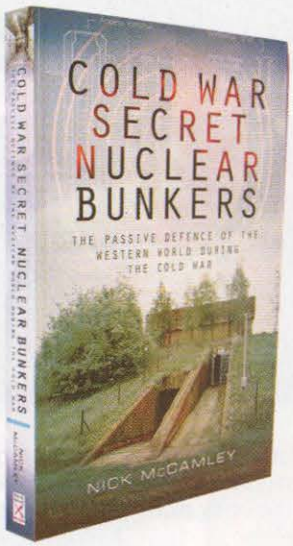
Much LF work takes place in eye-wateringly narrow bandwidths – sometimes just a few thousandths of 1Hz wide – meaning that frequency stability is a critical consideration at LF. There is an entire chapter devoted to generating LF signals, beginning with a discussion of the stability required for different modes and moving onto practical circuits for generating suitable signals.

In the Transmitters chapter there is the interesting prospect of modifying audio amplifiers to operate at 136kHz, plus there's a goodly amount of information to build your own transmitters.

By coincidence, this month we start a two-part article on LF by the same author, so you can get some feel for his writing style. Whether or not you plan to start operating on the low frequencies, this book makes fascinating reading and is well worth a place on your bookshelf. Highly recommended.

ISBN 9781 9050 8693 1
192 pages, 174 x 240mm
Non members' price £12.99
Members' price £11.04

### Cold War Secret Nuclear Bunkers
**by Nick McCamley**




Like many people I have a fascination with secret places such as abandoned Tube stations and old military bunkers. No-one publicly admits to where the *current* bunkers are, but facilities that have fallen into disuse or been superseded sometimes do get opened up to the public – many of us have seen brown signs on our roads that direct tourists to the local Secret Nuclear Bunker.

But there's a lot more around than we're allowed to see, as this book makes clear. You'll find details of assets ranging from four-man Royal Observer Corps bunkers sprinkled in their dozens around the country via complex radar installations to giant alternate seats of government that would sustain thousands of people for months at a time. The detailed descriptions of these sites are augmented by rare photographs and even floor plans in many instances.

Some sites, like the Royal Observer Corps Group Headquarters near Bedford, have been demolished. Others, for example at Bedminster, simply had the lights turned off and the doors locked for 40 years whilst the interior slowly mouldered. Some of the larger facilities are now privately owned and used as secure document storage facilities.

The book starts with a look at some of the 'big bunker' facilities in the USA, which are quite mind-blowing. The well-known secret installation at Cheyenne Mountain – the NORAD command center – is just one of many similar installations scattered throughout the States. But not all were manned command facilities: the Mount Pony Federal Reserve Bunker, for instance, used to house untold billions of dollars in banknotes, ready to replace all the currency in the states north of the Mississippi. (During the Second World War, similar country-size stocks of major European currencies were held in an old mine a hundred feet below Corsham in Wiltshire). We learn how these interacted with other sites such as Fylingdales in Yorkshire, specially-constructed offshore platforms and many more sites. But the majority of the text is concerned with facilities in Britain, starting with the ROTOR radar project.

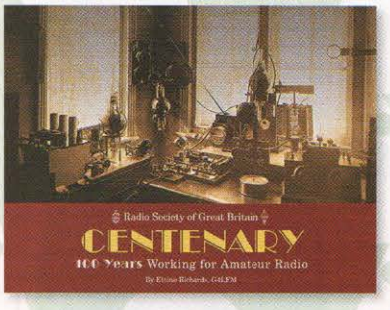
One thing becomes clear as you read through this book: little expense was spared during the Cold War when it came to providing secure accommodation for key people and facilities. Actual costs, which probably come from Treasury records referenced in the Foreword, show eye-watering amounts spent on capital projects (and, presumably, their long-term upkeep) which, in the end, were never used. The most amazing thing is that the author has only used open sources to compile the material. It makes one wonder what else might be there, skulking around beneath our feet...

ISBN 978 1783 030 101
304 pages, 156 x 233mm approx
Non members' price £14.99
Members' price £11.24 (25% off)

RSGB shop

MERRY CHRISTMAS

## Great titles of the Year




### Centenary

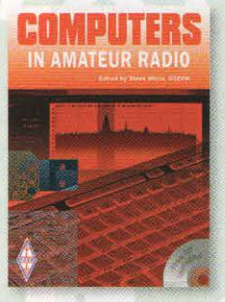
*100 Years Working for Amateur Radio*

By Elaine Richards, G4LFM

As part of the Centenary celebrations the RSGB commissioned and produced this hardback book looking at 100 years of RSGB History. In its first century, the RSGB has represented the interests of members at national and international level and provided the framework within which the early pioneers and experimenters thrived.

Hardback, Size: 300x225mm (landscape), 144 pages, ISBN: 9781 9050 8689 4
**Non Members' Price £19.99**
**RSGB Members' Price £16.99**

£16.99 RSGB Members




### Computers In Amateur Radio

Edited by Steve White, G3ZVW

When radio amateurs connect a personal computer to a radio, then it takes the potential of both to another level. *Computers in Amateur Radio* provides a practical guide to what is possible for radio amateurs who wish to combine these two technologies.

This thoroughly revised and updated edition of *Computers in Amateur Radio* has been expanded to include new material on Raspberry Pi and the wide variety of data modes now available.

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CD supplied, with nearly 640MB of software.

Size 174x240mm 256pages, ISBN: 9781 9050 8685 6
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### RTTY & PSK31 for Radio Amateurs

By: Roger Cooke G3LDI

A practical guide to the two most popular data modes, RTTY and PSK31.

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### RSGB Antenna File

The RSGB has been promoting antenna experimentation for 100 years and publishing much of the work in its monthly journal RadCom. This book is a compilation of some of the best articles about antennas.

The RSGB Antenna File covers all parts of the spectrum from HF to UHF - and even LF and microwave frequencies. From simple wire dipoles to more complex multi-band and multi-element arrays, RSGB Antenna File contains dozens of 'how to' constructional articles.


Size 210x297mm, 288pages, ISBN: 9781 9050 8687 0
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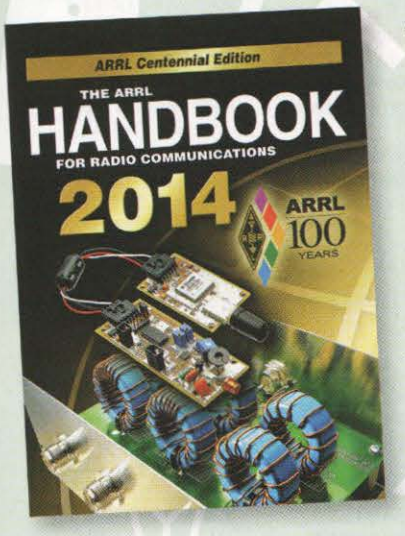
# 2013 Christmas Gifts

## Great titles from the Year




### ARRL Handbook 2014 (Centennial Edition)

*100 Years of Advancing the Art and Science of Radio*

For 100 years, ARRL has been at the forefront of promoting technical advancement and improvements in radio operating practices. Since 1926, The ARRL has published its Handbook that has defined the latest innovations in the field of applied electronics and communications. This 91st edition of The *ARRL Handbook for Radio Communications* marks a milestone: the 2014 ARRL Centennial.

This commemorative edition *ARRL Handbook* has been extensively updated and revised to include: New Projects such as, a one or two tube (valve) linear amp for beginning builders, VHF and UHF signal sources and QSK controllers for amplifiers (analog and digital). There is also new Information on MOSFET design for power amplifiers, telemetry and navigation data including GPS, oscillators and synthesizers, current battery technology, the new Codec2 software for HF digital voice, new material on microwave techniques and the Annual transceiver model reviews.

FREE CD-ROM
The book's accompanying CD-ROM includes all text and illustrations in the printed book.

Size 274x208mm, 1320 pages,
ISBN: 9780 6259 5001 7
**Non Members' Price £37.99**
**RSGB Members' Price £32.29**

£32.29 RSGB Members

### RSGB Deluxe Log Book & Diary 2014

With the same design style as the *RSGB Yearbook 2014*, the new *Deluxe Log Book & Diary 2014* is a suitable companion. Not only are the very latest UK band plans included but you will find a useful DXCC prefix list, RSGB QSL Bureau information, RSGB Contest Calendar and information, a locator map, repeaters - pretty much everything you need to know. There is a dia lists of operating abbreviations & codes of activity and, of course, a generous amateur radio station log section for you to record a whole year of your activity.

**Non Members' Price £4.99**
**RSGB Members' Price £4.24**

**The RSGB Deluxe Log Book & Diary 2014 includes:**

- Current UK band plans
- European locator map
- Prefix guide
- Repeater listings
- QSL bureau information
- RSGB Contest Calendar
- Generous Log section
- 2014 Diary
- Handy lists of abbreviations & codes

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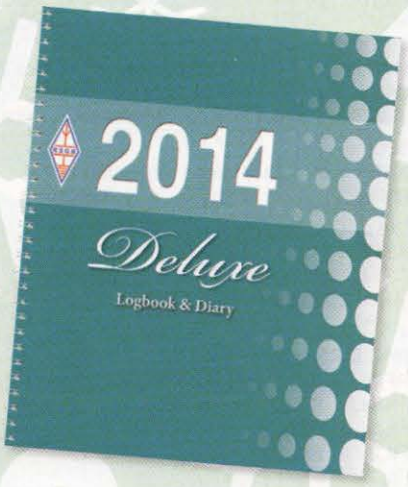
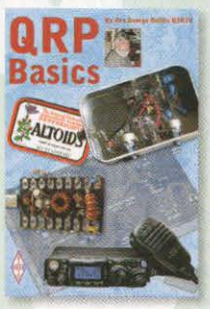



## More Great RSGB Books

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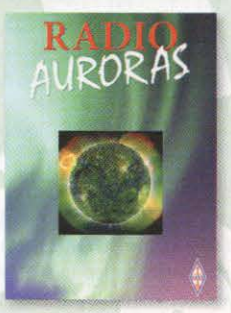
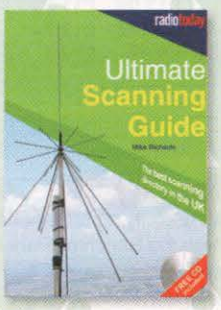
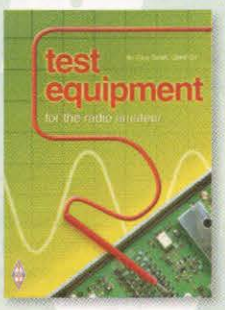



**Radio Auroras**
Non Members' Price £6.99
**RSGB Members' Price £5.94**




**Ultimate Scanning Guide**
Non Members' Price £19.99
**RSGB Members' Price £16.99**




**Test Equipment for the Radio Amateur**
Non Members' Price £14.99
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# The latest Amateur Radio titles

RSGB shop

## ANTENNA BOOKS

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| SUWA | Successful Wire Antennas | £13.99 | **£11.89** |
| AB22 | ARRL Antenna Book - 22nd Edition | £46.99 | **£39.94** |
| SASS | ARRL Small Antennas for Small Spaces | £17.99 | **£15.29** |
| STLH | Stealth Antennas | £13.99 | **£11.89** |
| HFAE | HF Antennas for Everyone | £14.99 | **£12.74** |
| AGAT | ARRL Guide to Antenna Tuners | £17.99 | **£15.29** |
| ACV8 | ARRL Antenna Compendium Vol. 8 | £18.99 | **£16.14** |
| ATRA | ARRL Antenna Towers for Radio Amateurs | £27.99 | **£23.79** |
| ADNB | ARRL Antenna Designer's Notebook | £27.99 | **£23.79** |
| AFVA | Antennas for VHF and above | £12.99 | **£11.04** |
| UBAN | ARRL Basic Antennas | £24.99 | **£21.24** |
| BSHA | Building Successful HF Antennas | £14.99 | **£12.74** |
| MVAC | ARRL More Vertical Antenna Classics | £13.99 | **£11.89** |
| PWA2 | Practical Wire Antennas 2 | £11.99 | **£10.19** |
| INAC | International Antenna Collection | £14.99 | **£12.74** |
| INA2 | International Antenna Collection 2 | £14.99 | **£12.74** |
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| BKYA | Backyard Antennas | £18.99 | **£16.14** |
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| HFAL | HF Antennas for all Locations | £19.99 | **£16.99** |
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| ACV1 | ARRL Antenna Compendium VOL 1 | £15.99 | **£13.59** |
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| MWAC | ARRL More Wire Antenna Classics VOL 2 | £12.99 | **£11.04** |
| VACS | ARRL Vertical Antenna Classics | £12.99 | **£11.04** |
| VUCS | ARRL VHF/UHF Antenna Classics | £12.99 | **£11.04** |

## BEGINNERS

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| AREX | Amateur Radio Explained | £5.79 | **£4.92** |
| PAFN | Practical Antennas for Novices | £7.99 | **£6.79** |

## CALLBOOKS

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|---|---|---|---|
| CB14 | RSGB Yearbook 2014 Edition | £19.99 | **£16.99** |
| CS14 | Callseeker Plus 2014 (CD) | £16.99 | **£14.44** |
| MS14 | Memory Stick 2014 | £16.99 | **£14.44** |

## EMC & RFI

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|---|---|---|---|
| RFI3 | ARRL RFI Book 3 | £23.99 | **£20.39** |
| FRIN | Single Ferrite Ring | £2.25 | **£1.91** |
| FIL3 | Filter 3 | £10.00 | **£8.50** |
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| SIX4 | Six and Four | £13.99 | **£11.89** |
| SMHB | 6m Handbook | £13.99 | **£11.89** |
| VHF2 | VHF/UHF Handbook | £14.99 | **£12.74** |
| YGVU | Guide to VHF/UHF | £8.99 | **£7.64** |

## SPACE & SATELLITES

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|---|---|---|---|
| ARA2 | Amateur Radio Astronomy - 2nd Edition | £16.99 | **£14.44** |
| SAT2 | ARRL Satellite Handbook | £19.99 | **£16.99** |

## TECHNICAL BOOKS

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|---|---|---|---|
| AH14 | ARRL Handbook 2014 | £37.99 | **£32.29** |
| HK18 | ARRL Hints & Kinks for the Radio Amateur | £18.99 | **£16.14** |
| RIG4 | The Rig Guide 5th Edition (including p&p) | | **£5.99** |
| EPR2 | ARRL Emergency Power for Radio Comms 2nd Ed. | £23.99 | **£20.39** |
| TEQP | Test Equipment for the Radio Amateur | £14.99 | **£12.74** |
| RH11 | RSGB Radio Communication Handbook | £32.99 | **£27.99** |
| VARV | Valves Revisited | £16.99 | **£14.44** |
| UNB2 | ARRL Understanding Basic Electronics | £26.99 | **£22.94** |
| HORE | ARRL Hands-On Radio Experiments | £14.99 | **£12.74** |
| WEEK | Weekend Projects | £13.99 | **£11.89** |
| RADN | Radio Nature | £16.99 | **£14.44** |
| HFA2 | HF Amateur Radio | £12.99 | **£11.04** |
| RFDB | RF Design Basics | £17.99 | **£15.29** |
| LPAR | ARRL Low Profile Amateur Radio | £14.99 | **£12.74** |
| PSHB | Power Supply Handbook | £15.99 | **£13.59** |
| PICB | Pic Basics | £16.99 | **£14.44** |
| CIRO | Circuit Overload | £14.99 | **£12.74** |
| ARES | Amateur Radio Essentials | £15.99 | **£13.59** |
| HART | 25 years of Hart Reviews | £14.99 | **£12.74** |
| RFAC | ARRL's RF Amplifier Classics | £14.99 | **£12.74** |
| DMFO | Digital Modes for all Occasions | £16.99 | **£14.44** |
| TT50 | Technical Topics Scrapbook - All 50 years | £14.99 | **£12.74** |
| TTSB3 | Technical Topics Scrapbook 1995-99 | £14.99 | **£12.74** |
| TTSB2 | Technical Topics Scrapbook 1990-94 | £13.99 | **£11.89** |
| EMRD | ARRL Experimental Methods in RF Design | £34.99 | **£29.74** |
| AICH | ARRL Image Communications Handbook | £19.99 | **£16.99** |
| DSPT | ARRL Digital Signal Processing Technology | £34.99 | **£29.74** |
| IRFD | Introduction to Radio Frequency Design | £29.99 | **£25.99** |

## OPERATING & DX

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| ARSH | ARRL Amateur Radio Public Service Hbk | £28.99 | **£26.64** |
| LDX5 | ARRL Low Band Dxing - 5th Edition | £34.99 | **£29.74** |
| OPM7 | RSGB Radio Amateur Operating Manual | £16.99 | **£14.44** |
| HBCB | Homebrew Cookbook | £12.99 | **£11.04** |
| ROAR | ARRL Remote Operating for Amateur Radio | £19.99 | **£16.99** |
| SSAR | Storm Spotting for Radio Amateurs | £19.99 | **£16.99** |
| WLOD | World Licensing and Operating Directory | £12.99 | **£11.04** |
| RADO | Radio Orienteering – ARDF Handbook | £9.99 | **£8.49** |
| MOVE | ARRL's Amateur Radio on the Move | £14.99 | **£12.74** |
| DOTE | ARRL DXing on the Edge | £18.99 | **£16.14** |
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## COMPUTING & RADIO

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| HLIN | Haynes Linux Manual | £19.95 | **£14.95** |
| HMAD | ARRL Ham Radio for Arduino and PICAXE | £27.99 | **£23.79** |
| RTT2 | RTTY/PSK31 for Radio Amateur - 2nd Edition | £7.99 | **£6.79** |
| CIA2 | Computers in Amateur Radio - 2nd Edition | £14.99 | **£12.74** |
| HFDG | ARRL Get on the Air with HF Digital | £21.99 | **£18.69** |
| PPFB | ARRL Pic Programming for Beginners | £32.99 | **£28.04** |
| VOIP | ARRL VoIP Internet Linking for Radio Amateurs | £15.99 | **£13.59** |
| RTTY | RTTY/PSK31 for Radio Amateurs | £7.99 | **£6.79** |
| VHDH | ARRL VHF Digital Handbook | £14.99 | **£12.74** |
| COMM | CoMmand | £16.99 | **£14.44** |

## MAPS

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|---|---|---|---|
| PR10 | RSGB Prefix Guide 10th Edition | £9.99 | **£8.49** |
| RAMW | Radio Amateur's Map of the World | £6.99 | **£5.94** |


## RSGB Centenary Day Cover

The RSGB has specially commissioned a special cover to celebrate our Centenary Day on the 5th July 2013. Produced in conjunction with the Bletchley Park Post Office, the cover is a limited edition of 250, each of which is hand numbered. The covers were franked on the 5th July to mark our special day. We have also agreed that the special Royal Mail "Station X" stamp commemorating the work of Bletchley Park during WWII is also used. The cover is a traditional postage size 220x110mm envelope and contains a card detailing a short history of the RSGB first 100 years.

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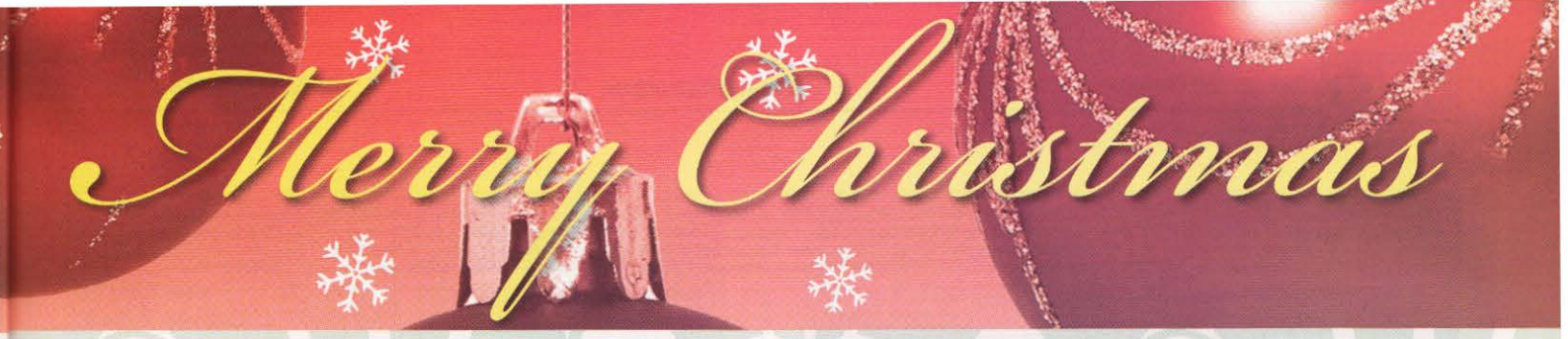
Order on the internet at **www.rsgbshop.org** or you can order by post making cheques and postal orders crossed and made payable to Radio Society of Great Britain or telephone your credit card order to **01234 832 700**. Open 8.30-4.30 (Mon-Fri). Send no cash. **Post & Packing:** Standard Delivery - 2nd Class Post (4-9 Days), For one item £1.95, For two or more items: £3.50, **For orders over £30.00 standard delivery is FREE.** Priority Delivery - 1st Class Post (2-4 Days), For one item £2.95, For two items: £4.95 , For three or more items: £5.95. **Overseas:** Worldwide Surface Delivery, For one item: £3.00, For two items: £5.00, Extra items: £1.00 per item. Worldwide Air Delivery: For one item: £9.00, For two items: £15.00, Extra items: £3.00 per item.

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|---|---|---|---|
| **RADCOM** | | | |
| 0RCB | RadCom Back Issues | | **£4.75** |
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| BV12 | RadCom Bound Volume 2012 | | **£49.99** |
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| RC8185 | RadCom 1981-85 | £29.99 | **£25.49** |
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| ID15 | IOTA Directory | £11.19 | **£10.19** |
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| QSTC | ARRL Subscription Digital only 1 Year | | **£26.00** |
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| SPTB | Low Power Spratbook | £14.99 | **£12.74** |
| QRP2 | QRP Basics (2nd edition) | £14.99 | **£12.74** |
| LPS4 | ARRL Low Power Communication | £22.99 | **£19.54** |
| INQC | International QRP Collection | £12.99 | **£11.04** |
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| **LOGGING** | | | |
| DL14 | Deluxe Log Book 2014 | £4.99 | **£4.24** |
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| MKHW | Microwave Know How | £12.99 | **£11.04** |
| IMH2 | International Microwave Handbook 2 | £16.99 | **£14.44** |
| MICP | Microwave Projects 1 | £16.99 | **£14.44** |
| MIP2 | Microwave Projects 2 | £16.99 | **£14.44** |
| **PROPAGATION** | | | |
| RDAU | Radio Auroras | £6.99 | **£5.94** |
| RPPP | Propagation - Principles & Practice | £14.99 | **£12.74** |
| **MORSE CODE** | | | |
| MC11 | Morse Code for Radio Amateurs 11th Edition | £8.99 | **£7.64** |
| INMC | Learning the Morse Code (CD) | £9.99 | **£8.49** |

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|---|---|---|---|
| **GENERAL BOOKS** | | | |
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| THDR | Haynes Thunderbirds Manual | £14.99 | **£9.99** |
| IFOP | Ian Fleming & SOE's Operation Postmaster | £19.99 | **£14.49** |
| CBL2 | The Cable - the wire that changed the world | £9.99 | **£7.49** |
| PGMS | Pigeon Guided Missiles | £12.99 | **£9.74** |
| TDLB | The Three Dimensions of John Logie Baird | £16.99 | **£14.99** |
| BWWW | Before We Went Wireless | £19.95 | **£16.96** |
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| IMAS | Images Across Space | £19.99 | **£14.99** |
| HSPT | Haynes Manual for Supermarine Spitfire | £19.99 | **£16.99** |
| H109 | Haynes Manual for Messerschmitt Bf109 | £17.99 | **£15.29** |
| WRST | What Really Sank the Titanic | £9.99 | **£7.49** |
| RENH | The Real Enigma Heroes | £19.99 | **£16.99** |
| FCIR | Full Circle: A Dream Denied, A Vision Fulfilled | £10.99 | **£9.34** |
| AVRO | Avro Vulcan: Britain's Cold War Warrior | £19.99 | **£11.99** |
| ENUB | Enigma U-Boats | £8.99 | **£6.74** |
| CAPE | Capturing Enigma | £8.99 | **£6.74** |
| HLAN | Haynes Manual for Avro Lancaster | £17.99 | **£15.29** |
| HAPO | Haynes Manual for Apollo 11 | £19.99 | **£16.99** |
| BSAC | Between Silk and Cyanide: A Code maker's War | £14.99 | **£12.74** |
| ABOC | A Bit of Controversy | £13.99 | **£11.89** |
| PTCG | Perera's Telegraph Collectors Guide | £9.99 | **£8.49** |
| CHJH | Captain Henry Jackson of HMS Defiance | £9.99 | **£8.49** |
| TSOE | The Story of Enigma (CD) | £9.99 | **£8.49** |
| TCCD | Perera's Telegraph Collectors CD | £9.99 | **£8.49** |
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| VREX | Virtual Radar Explained | £6.99 | **£5.94** |
| ABR7 | Air Band Radio Guide | £9.99 | **£7.49** |
| AT10 | Air Traffic Control | £9.99 | **£7.49** |
| **TRAINING** | | | |
| EXSE | Amateur Radio Exam Secrets | £12.99 | **£9.74** |
| FNOW | Foundation Licence - NOW! | £4.99 | **£3.74** |
| IMD5 | Intermediate Licence Book | £6.99 | **£5.24** |
| ADVA | Advance! The Full Licence Manual | £11.99 | **£8.99** |
| IEXM | International Amateur Radio Exam Manual | £14.99 | **£11.24** |
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Please send news reports to radcom@rsgb.org.uk. To get future events listed here and put on GB2RS, e-mail details of your meetings as early as possible to GB2RS@RSGB.org.uk and we'll do the rest. We need to know your club name, RSGB Region number, contact name & phone number, date of meeting and detail of meeting. Example: South Bristol ARS, Region 11, Len, G4RZY, 01275 834 282,29 October, On the Air. It's that simple. Please note that we don't normally print 'closed', 'TBA' or 'every Tuesday' type submissions. The deadline for the January *RadCom* is 21 November and for the February edition it's 19 December. For GB2RS, the deadline is 10am on the Thursday for the week of broadcast. If you need to amend your club details, please visit www.rsgb.org/clubupdates.

## INTERNATIONAL

**PAFOS RADIO CLUB, CYPRUS**
**Richard, 5B4AJG, 00357 97857891, 5B4AJG@cyprusliving.org**

## NATIONAL

**Civil Service Amateur Radio Society**
Weekly net every Tuesday, 8pm, 3.763MHz

## REGION 1: SCOTLAND SOUTH & WESTERN ISLES

REGIONAL MANAGER: JASON, O'NEILL, GM7VSB, RM1@RSGB.ORG.UK

**Ayr ARG**
**Ralph, GM4SQO, 01292 285 281, aargsecretary@sky.com**
11 Club meeting
11 Amateur radio question time
18 Christmas dinner
**Cockenzie & Port Seton ARC**
**Bob, GM4UYZ, 01875 811 723, www.cpsarc.com**
6 Normal club night
7 Christmas night
18 Winter Solstice activity night
**Kilmarnock & Loudoun ARC**
**Graham, MM3GDC, mm3gdc@btinternet.com**
10 Club night
**Livingston & DARS**
**Norman, GM1CNH, 07740 946 192, uk.groups.yahoo/group/ms0liv**
3 AGM
10 Operating evening
17 Club evening
**Lothians RS**
**Alan, GM3PSP, 0131 623 4580, alanjmasson@virginmedia.com**
11 Christmas curry at Himalaya Tandoori
**Stirling & DARS**
**John, gm0fsv@gm6nx.com**
1, 8, 15 Construction, training, projects and operating, 10.30am till late afternoon
5, 12, 19 Club meeting

## REGION 2: SCOTLAND NORTH & NORTHERN ISLES

REGIONAL MANAGER: DENNY MORRISON, GM1BAN, RM2@RSGB.ORG.UK

**Aberdeen ARS, Fred, MM0ODL, 01975 651 365**
5 Junk sale
12 Construction evening
19 Christmas party
26 Closed

On the weekend of 7 & 8 September, members of **Dundee Amateur Radio Club** operated the special callsign GB558VUL to celebrate the planned visit of the last flying Vulcan bomber, XH558, to the Leuchars Air Show. This was intended to be a farewell visit for two reasons: the Vulcan is going to be grounded permanently in the near future and this will be the last Air Show hosted by RAF Leuchars. Unfortunately, the Vulcan developed a fuel tank leak, leading to the cancellation of the flight to the disappointment of the 40,000 visitors. A mast with a tribander beam, plus an inverted L long wire supported by two 12m Spiderbeam poles, were erected on the Friday so that operation could start first thing on Saturday morning. Conditions were far from perfect owing to QRM from SSB Field Day plus numerous other, smaller contests, but a respectable total of contacts were made on the two days, mostly on HF SSB, followed by CW and a few 2m SSB contacts on the Sunday. Members of the team were Malcolm, 2MOINE, Paul, GM0BKC, Peter, GM1CMF, Colin, GM4JPZ, Ally, MM0DRA, Jim, MM0DXD, Mark, MM6BJJ and Denis, MM6GFG.

Saturday saw a contact between GB558VUL and the German Air Force Museum 10th Anniversary station DR10EDBG at General Steinhoff Kaserne in Berlin, formerly RAF Gatow. This was a particular honour for the DARC operator, GM4JPZ, who was stationed at RAF Gatow in the late sixties and had arranged the sked. DARC would like to thank all who worked us and expressed an interest in the maintenance

of Vulcan 558 as part of our heritage. The photo shows, left to right, Malcolm, 2MOIME; Ally, MM0DRA; Paul, GM0BKC; Mark, MM6BJJ; Jim, MM0DXD and Denis, MM6GFG.

## REGION 3: NORTH WEST

REGIONAL MANAGER: KATH WILSON, M1CNY, RM3@RSGB.ORG.UK

**Bolton Wireless Club**
**boltonwireless@gmail.com**
2 HF beach operations at Selsey Bill, Mark, M0UFC
16 Table top sale
**Chester & DRS**
**Bruce, M0CVP, 01244 343 825**
3 Wireless in the Boer War, Brian Austin, G0GSF
10 Committee meeting
17 Christmas Social with speaker Kath Wilson
24, 31 Closed
**Fleetwood Radio Enthusiasts Group**
**John, M0JFE, 07940 815 659, GB0FRG@hotmail.com**
3 Natter & discussion, Sharon, M6TKU
10 Antennas & fault finding
17 CB set up plus installation & SWR
24, 31 Closed
29 Christmas Net on 2m at 2pm
**Mid-Cheshire ARS**
**Peter, G8HAV, 01606 553 401**
4 On the air
11 What contributes to audio quality?
18 Beer & stew evening for members and families
25 Closed
**South Manchester R&CC**
**Ron, G3SVW, 01619 693 999**
5 DVD
12 Talk on 3D printing
19 Christmas party
26 Closed
**Stockport RS**
**Nigel Roscoe, 07973 312 699, info@g8srs.co.uk**
3 The history of DX and its personalities by Sarah, 2E0KUH
10 SRS on the air from Walthew House
17 AGM and Christmas social
29 Open Morning and SRS on the air from Walthew House
**Thornton Cleveleys ARS**
**John, G4FRK, 01253 86 2810**
2 Night on the air
9 Sounds Radio, G4EZM
16 Christmas party
23 2m FM net, 8pm
30 Closed
**Workington & D AR&IT Group**
**Barry, G0RZI, 01946 812 092, barrydrm31@hotmail.co.uk**
9 DXpedition presentation
23 Christmas dinner

## REGION 4: NORTH EAST

REGIONAL MANAGER: HAROLD SCRIVENS, GOUGE, RM4@RSGB.ORG.UK

**Denby Dale RC**
**Richard, M0RBG, 07976 220 126, m0rbg@talktalk.net**
4 Christmas party at Star Hotel
11 On the air ±145.575MHz, 7.30pm
18 50 years in TV repairs, Denis, G8BZY
**Halifax & DARS**
**Martin, M0GQB, 01422 341 317**
17 Pie and pea supper evening;

pre-booking essential
24, 31 Closed

**Hornsea ARC**
**Gordon, G3WOV,**
**01377 240 573,**
**gmacnaughtwov@yahoo.co.uk**
4 DF operating, MOCZR
11 Christmas party

**Sheffield ARC**
**Peter, G3PHO,**
**sarc@g3pho.org.uk**
2 Hearing problems & amateur radio
9 Propagation and how to best use it, Peter, G3PHO
16 Christmas dinner
23 Informal evening

Further to the article on GB7TD in the November issue, digital DMR mode has taken a further leap forward in Yorkshire. Previously a D-Star repeater, **GB7HX** has been converted to DMR by repeater keeper John, G0PRF. Located at an elevated site to the west of Huddersfield between the Colne and Calder valleys, GB7HX has excellent coverage in its own right. More importantly though, used in combination with GB7TD, extremely wide area UHF QSOs are now possible without the need to manually switch repeaters. The joint repeater groups will be publishing occasional newsletters under the banner 'Yorkshire DMR Group'. The October edition can be viewed at www.gb3yw.co.uk/news.

Geoff, M1EDF ended the special event station **GB5FE** with 400 QSOs. The station was to commemorate the 50th anniversary of RAF Fylingdales. It had a special meaning to Geoff as he was stationed at RAF Goldsborough north of Whitby during the build of Fylingdales and was with 5131 Bomb Disposal Sqn, then aged 20 and a Senior Aircraftman, and travelled daily to clear UXB ordinance to make it safe for the build.


The photo below shows, left to right; James Hogg, Adam Barker and Ewan McLaughlin, all Cadets in **110 City of York ATC Squadron** who have just passed their Foundation exam, coached by Tony Skaife, G4XIV.

This photo shows four of the candidates at **South Tyneside Amateur Radio Society** who sat their Intermediate exam in September. From left to right: Aiden, 2E0SDP, Ryan, 2E0RLM, John, G0ROK (instructor), George, 2E0GRI and Ray, 2E0ERD. Congratulations to all.

## REGION 5: WEST MIDLANDS

REGIONAL MANAGER: VAUGHAN RAVENSCROFT, M0VRR, RM5@RSGB.ORG.UK

**Aldridge & Barr Beacon ARC**
**Albert, G0KFS,**
**01922 614 169**
2 Christmas buffet
16 Closed

**Bromsgrove & DARC**
**Chris, M0BQE,**
**01905 776 869,**
**g3vgg@hotmail.com**
6 VHF night
13 Christmas dinner
20 Christmas raffle
27 Review of the year

**Central RAC**
**Martin, G1TYV,**
**07906 905 071,**
**radio-circle@live.co.uk**
5 Night on the air, 8pm
19 Christmas get together, Turf Tavern, 7.30pm

**Cheltenham ARA**
**Derek, G3NKS,**
**01242 241 099,**
**secretary@caranet.co.uk**
12 AGM

**Coventry ARS**
**John, G8SEQ,**
**07958 777 363**
2, 9, 16 Club net on 145.375MHz
6 Orkney saga part 1, G4GEE
13 Introduction to 2014 project

**Dudley & DARS**
**Carl, M0ZCR,**
**m0zcr@live.co.uk**
3 VHF 2m UKAC
4 Advanced training course
6 Advanced exam
10 On the air & natter night
17 SHF 23cm UKAC & Christmas celebrations

**Gloucester AR&ES**
**Anne, 2E1GKY,**
**01242 699 595, daytime,**
**www.g4aym.org.uk**
2 And I got paid for doing this!, Brian, G4CIB
9 Workshop / construction / operating in the shack
16 Annual buffet and grand draw
23, 30 Closed

**Midland ARS**
**Norman, G8BHE,**
**07808 078 003**
4 Open meeting, on the air and training classes
11 Christmas party, 7.30pm
18, 25 Closed

**Rugby ATS**
**Steve, G8LYB,**
**01788 578 940,**
**stephen@tompsett.net**
3 UKAC 144MHz, radio operation and projects
7 PIC/Arduino/PC problem solving, C Programming and general assistance, Steve, G8LYB
10 UKAC 432MHz, radio operation and projects
14 Committee meeting
17 UKAC 1296MHz, radio operation and projects
21 A video about vintage electronics and valves, Mike, G8CTJ
24 UKAC 50MHz, radio operation and projects
28 Come and show off your shiny new toys
31 UKAC 70MHz, radio operation and projects

**South Birmingham RS**
**Mick Cleary, G7RRP,**
**07595 696 359,**
**g7rrp@btinternet.com**
3, 10, 17 Coffee morning, 11am-1pm
5, 9, 12 Training classes with Dave, G8OWL
13 Christmas party
16 Ragchew and shack on the air
20 Work in the shack

**Sutton Coldfield ARS**
**Robert Bird,**
**spirit.guide@hotmail.co.uk**
2 Open net ±145.250MHz
9 Meeting and OTA at Warmley rugby club, 7.30pm
10, 16 Open net ± 70.475MHz, 7.30pm
23 Christmas party

**Telford & DARS**
**Mike, G3JKX,**
**01952 299 677,**
**mjstreetg3jkx@blueyonder.co.uk**
4 Committee meeting & GX3ZME OTA HF/VHF/UHF
11 Christmas dinner
18 Mince pie & mulled wine social
25 Closed

**Wythall Radio Club**
**Chris, G0EYO,**
**07710 412 819**
1, 8, 15, 22, 29 Club net on 145.225MHz, 8pm
1 RSGB 144MHz Affiliated Societies Contest 10am
2 Mock Advanced exam
3 Morse class, 7.54pm, free 'n' easy/144 MHz UKAC Contest, 8pm
6 Advanced exam, 8pm
10 Morse class, 7.54pm, committee meeting 8.30pm
13, 20, 27 Shack social, 7.30pm
14 Christmas social at Britannia Room, Wythall House
17 Morse class, 7.45pm, Christmas contest preparation evening, 8.30pm
23, 30 Curry night at the Monsoon, 6.30pm
24 Morse class, 7.45pm, Christmas contest starts 8pm
25-26, 28-31 Christmas contest
27 Christmas fox hunt, 10am

**Midland Amateur Radio Club** held a late summer BBQ. Despite the drizzle, the cook Paul Higginson, 2EOPRF did a sterling job and provided plenty of food for members.

This photo shows the auditors at **South Birmingham ARS** checking the accounts for the AGM on Wednesday 6 November. Left is Dennis Darwood, G3YKO and Ray Smith, G4TBJ.

At the **Midland Amateur Radio Society** AGM in October, President Julius Katz, 2E0BTU presented awards to Jackie, 2E0JRF and (shown), Ron, M0WSN.

## REGION 6: NORTH WALES

REGIONAL MANAGER: MARK HARPER, MW1MDH, RM6@RSGB.ORG.UK

**North Wales RS**
**Liz Cabban, lizcabban@vodafoneemail.co.uk**
5 General meeting
12 Technical topic
19 Christmas party
26 Closed
**Wrexham ARS, Frank, M1EYH, fcbailey20@btinternet.com**
3 Christmas meal

## REGION 7: SOUTH WALES

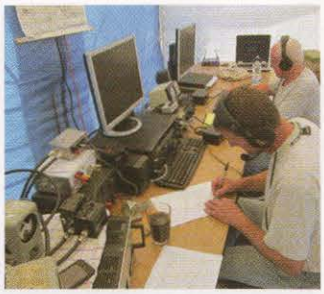
REGIONAL MANAGER: JIMMY SNEDDON, MW0EQL, RM7@RSGB.ORG.UK

**Llanelli ARS**
**Craig, MW0MXT, 01269 845 773, craig@mw0mxt.co.uk**
2 GC0EZQ on the air
9 Christmas raffle & social evening
16 Members' Christmas dinner
23, 30 Closed
**Marches ARS, marchesars@hotmail.co.uk, www.marchesradiosociety.org**
12 Quiz and Christmas raffle

The photo shows **Hoover Amateur Radio Club** members on the recent 4m contest. It was very cold but they did well, with the furthest contest from Merthyr being Stoke-on-Trent.

An amateur radio contest group has made history in the RSGB Centenary year. **Pembrokeshire Amateur Radio Contest Group** was formed just three years ago by a small group of local radio enthusiasts and achieved great success this summer by winning the prestigious VHF radio Field Day contest, operating from South Pembrokeshire using the callsign GW2OP. Their field operations were able to take place near Manorbier due to the generosity of a local farmer and other friends of the group who provided the contest site and secure storage for some equipment.

The Pembrokeshire group recently attended the RSGB Convention and where they were presented with their trophy by the President of the RSGB, Dr Bob Whelan, G3PJT. It is the first time in over 40 years that the winner of this contest has been based in Wales. The group welcomes enquiries from anyone with a keen interest in amateur radio and particularly if they would like to get involved with the contest radio station activities. They can be assured of an enjoyable learning experience in radio, electrical and mechanical engineering and even when the weather is inclement it's still great fun. The group will be holding its annual meeting soon and where it will discuss plans for 2014 and beyond.



## REGION 8: NORTHERN IRELAND

REGIONAL MANAGER: PHILIP HOSEY, MI0MSO, RM8@RSGB.ORG.UK

No Listings recieved

**Mid-Ulster Amateur Radio Club** continued its busy season of public events at the International Lighthouse Lightship Weekend by activating Haulbowline Lighthouse, which stands in the mouth of Carlingford Lough between Counties Down and Louth. The chosen location was Cranfield Bay, adjacent to a large caravan park. The club partnered with the local RNLI Lifeboat Station in Kilkeel, Cranfield Caravan Park and Newry & Mourne District Council to bring about a fun and informative weekend for all the family. Using their purpose-built demonstration trailer, a busy weekend was enjoyed by all with a lot of HF activity with other lighthouse activation callsigns and a lot of footfall from interested members of the public who came along to see the operation and also to see the Kilkeel RNLI Lifeboat. The club were able to help raise water safety awareness with the RNLI team, and also to raise much needed funds for the RNLI. All in all, a hugely successful weekend for amateur radio and the RNLI.


**CAUSEWAY & GLENS AMATEUR RADIO CLUB** had five successful candidates in the August Foundation exam. They are from left to right Albert Toner, Adam Morrow, Michael Ferguson, Stephen Horner and Trevor Ferguson. The club is pleased that some of the Foundation candidates have expressed the desire to continue with the intermediate course.

## REGION 9: LONDON & THAMES VALLEY

REGIONAL MANAGER: LARRY SMITH, G4OXY, RM9@RSGB.ORG.UK

**Burnham Beeches RC**
**Dave, G4XDU,**
**01628 625 720**
2 Christmas event
16 Video evening
**Edgware & DRS**
**Mike, G4RNW,**
02089 500 658,
michael.stewart5@ntlworld.com
12 Christmas social, Hasu, G4KEP with help from members
**Harwell ARS**
**Malcolm, G8NRP, 01235 524**

844, info@g3pia.org.uk
10 AGM
Newbury & DARS
Rob, G4LMW,
01635 862 737,
g4lmw@btconnect.com
4 Christmas dinner
Reading & DARC
Pete, G8FRC, 01189 695 697
6 Annual dinner, Vin, G4JTR
12 AGM then cheese & wine
Shefford & DARS
John, 2E0OAK,
07860 804 793
5 Operating software based radio part 2, Paul, G8IUG
12 Communications in WWI & WWII, Elaine, G4LFM, *RadCom* editor
19 Mince pie evening
Southgate ARC
Mr K Mendum, G8RPA,
g8rpa@arrl.net
11 AGM
Verulam ARC
Ralph, G1BSZ,
01923 265 572,
g1bsz@aol.com
10 Radio equipment on eBay, Tony, 2E0WAP, then festive food

## REGION 10: SOUTH & SOUTH EAST

REGIONAL MANAGER: MICHAEL SENIOR, G4EFO, RM10@RSGB.ORG.UK

Brede Steam ARS
Steve, 01424 720 815,
M0NUC@aol.com
3, 7, 10, 17, 31 At the shack
Bromley & DARS
Andy, G4WGZ,
01689 878 089
17 Mince pies and quiz
Coulsdon ATS
Steve, G3WZK,
secretary@catsradio.org
9 AGM
Cray Valley RS
Lawrie, G4FAA,
0208 300 1894 e/w,
secretary@cvrs.org
5 Video evening with Guy, G0UKN
19 Christmas social 8pm
Crystal Palace R&EC
Bob, G3OOU,
01737 552 170,
g3oou@aol.com
6 Computer construction, Alan, G8NKM
Hastings E&RC
Gordon, 01424 431 909,
gordon@gsweet.fsnet.co.uk
25 Closed
Horndean & DARC
Stuart, G0FYX,
02392 472 846,
www.hdarc.co.uk
5 Natter night/social evening + mince pies
19 Closed
Horsham ARC
Alister, G3ZBU,
01932 242 243,
www.harc.org.uk
5 AGM
19 Social, The Crown, Capel
Itchen Valley ARC
Quintin, M1ENU,
023 8078 7799
13 Christmas social
Southdown ARS
John, G3DQY,
01424 424 319
2 Christmas social at Chasely
4 Operating at Hailsham shack, G0DOF on 145.275MHz
Surrey Radio Contact Club
John, G3MCX,
020 8688 3322,
john.g3mcx@btinternet.com
2 A 4-square phase steerable beam antenna for 21MHz, Garth, G3NPC
16 Informal Chat, Move-it-on, Fix-It Christmas Social
Sutton & Cheam RS
John, G0BWV,
020 8644 9945,
info@scrs.org.uk
12 Christmas junk sale (note: 2nd Thursday, this month only)
Wimbledon & DARS
Andrew, G4ADM,
02083 353 434
13 Christmas social
27 Closed
Worthing & DARC
John, G8FMJ, 01273 593 232
1 Monthly breakfast meeting at the Goring café
4 Annual Christmas quiz, G8MSQ
11 100 degrees plus from Lancing, Paul, G3SXE
18 Christmas party (no meeting at the Parish Hall)
Worthing & DARC
John, G8FMJ, 01273 593 232
24 80m Santa Claus net
25 2m Christmas Day net

**Horndean & District ARC** ran their eleventh Foundation exam and twelfth Intermediate exam in September. Training was supported with equipment bought with the Awards For All Lottery grant. All seven Foundation and all three Intermediate candidates passed. Congratulations to all the successful candidates, and thanks to tutors John, M0HEX, Laurence, G8NJJ and Simon, G0IEY. The Foundation candidates included a father and two teenage sons.

(L to R): John Ash, M0HEX (tutor), Joe Sheath, Simon Bland, Mike Bookham, James Bookham, Nathan Bookham, Graham Brooks, (sitting) Molly Walden.

(L to R): Roger, 2E0KBK, Laurence, G8NJJ (tutor), John, 2E0CWJ, Simon Worger, Simon, G0IEY (tutor).

## REGION 11: SOUTH WEST & CHANNEL ISLANDS

REGIONAL MANAGER: PAM HELLIWELL, G7SME, RM11@RSGB.ORG.UK

Appledore & DARC
Brian, M0BRB,
01237 473 251
Zepp Net on Monday, Tuesday and Thursday from 4pm on 145.450MHz. GB3DN net on Wednesday at 4pm. HF net on 7.185MHz ± QRM on Friday at 4pm.
Bristol RSGB Group
Robin, G3TKF, 01225 420 442
30 On air meeting
Callington ARS
John, G4PBN,
01822 835 834,
lumley85-cars@yahoo.co.uk
4 Christmas meal at Rifle Volunteer
11 Making a balun
Cornish RAC
Steve, G7VOH,
01209 844 939,
G7VOH@btinternet.com
5 Main meeting
19 Christmas party
Exeter ARS
Nick, M0NRJ,
01363 775 756,
info@exeterars.co.uk
2, 16 HF net on 3.675MHz, 7.45pm
3, 10, 17, 24 2m net on 145.575MHz 7.45pm
11 Skittles Night 7pm
23 Bring in something interesting night 7pm
Flight Refuelling ARS
John, G4POF,
g4pof@hotmail.com
15 Cyber security, Paul, M0EYT
Mid Somerset ARC
Nick, 2E0FGQ,
01749 346 320,
nick.bennett@midsarc.org.uk
10 Club night, 7.30pm
Plymouth Radio Club
Robert, 01752 777 888,
robert.2e0itn@gmail.com
9 Christmas party
Riviera ARC
Alan, G2DXU,
rivieraarc@gmail.com
3, 10, 17 Club meeting and MX0RIV on the air
6, 13, 20, 27 2m net on 145.525MHz, 8pm
Saltash & DARC
Brian, M0BHG, 01752 844 321
6 Mince pies & sherry evening
Torbay ARS
Dave, G6FSP, g6fsp@tars.org.uk
6, 20 Natter night
13 Christmas party and inter club quiz
27 Closed
Yeovil ARC
Rodney, M0RGE,
01935 825 791,
rodney.edwards@uwclub.net
5 Mini talks
12 Aerial analysers, G3MYM
19 Mince pies

**Callington Amateur Radio Society** participated in the Callington Honey Fair in October. At 7am on the day, several members of the Society braved the rain and darkness to erect the event shelter, displays and antenna facilities. Relevant amateur radio literature was available for members of the public to read together with

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demonstrations of equipment using HF and VHF facilities. Despite the inclement weather, a high local noise floor and generator noise from an adjacent burger van, the stall attracted a number of interested members of the public. Some were intrigued by the equipment whilst others were keen to learn more about amateur radio and what it has to offer. The picture here shows Roger, 2E0RPH and Chris, G1VNA taking their turn to demonstrate the equipment. On the training side, a new Foundation course began in September run by the Society's trainers, Keith, G1FMU and Chris, G7UDX. An Intermediate course is scheduled to commence in January.

In October, operation started of what is believed to be the UK's first digital-only 23cm digital ATV repeater located to the east of Bournemouth. Input is on 1249MHz and the output is on 1304MHz. There are full details on the repeater website at www.gb3sq.com. It is run by the Bournemouth Amateur Television Group who hold their weekly net on Sunday evening at 8pm, which is also streamed on the BATC website.

**Weston Super Mare Radio Society** members took numerous movie clips over the weekend of the June CW Field Day. This was then edited by ex ITV cameraman John Bennett into a 10 minute video and he also gave the club an evening talk on how he used simple editing software to put everything together. The entertaining final result can now be seen on YouTube.

## REGION 12: EAST & EAST ANGLIA

REGIONAL MANAGER: MARK SANDERSON, M0IEO, RM12@RSGB.ORG.UK

**Braintree & DARS**
**John, M5AJB, 01787 460 947**
2 Natter night
16 Christmas social
**Cambridge & DARC**
**David, M0ZEB,**
**01353 778 093**
13 Christmas social with coffee and mince pies
27 Closed
**Chelmsford ARS**
**Martyn, G1EFL,**
**01245 469 008,**
**www.g0mwt.org.uk**
3 Circuit schematics, Peter, G3SUY
7 Christmas lunch in the Lodge Country Inn
**Colchester Radio Amateurs**
**Jeff, G7TAT, 07899 894 435,**
**g7tat@live.co.uk**
19 Christmas social
**Dover RC**
**Pete, M0PKH,**
**peter.halloway@sky.com**
4 The next step for the club antenna analyser, Pete, M0PKH
11 You got your licence, what next?
18 Christmas social at St Margarets
25 Closed
**East Kent RS**
**Karl, M1DFM,**
**01227 710 120,**
**karl.davies@talk21.com**
11 Christmas dinner
**Felixstowe & DARS**
**Paul, G4YQC,**
**pjw@btinternet.com**
9 Christmas noggin, video & mince pies
23 Natter night
**Harwich ARIG**
**Kevan, 2E0WMG,**
**07766 543 784**
**kevan2e0wmg@live.co.uk**
11 AGM and Christmas social
**Havering & DARC**
**John, M0UKD,**
**07890 222 111,**
**john@m0ukd.com**
4, 18 Informal evening
11 The 'G' in Electronic, Ollie, G3TPJ
25 Closed
**Hilderstone R&EC**
**Chrissie Turner,**
**hilderstoneclub@gmail.com**
5 Foundation exam
6 Advanced exam
12 Party!
**Loughton & Epping Forest ARS**
**Marc, G0TOC, 02085 021 645**
13 Christmas buffet and bring & buy sale
27 Closed
**Norfolk ARC**
**Chris, G0DWV, 01603 898**
**678, cmdanby@btinternet.com**
4 Informal meeting, Bright Sparks, Club shack open, workshop available
11 Christmas party
18 Quiz
25 Closed
**South Essex ARS**
**Dave, G4UVJ.**
**0126 8697 978,**
**g4uvj@btinternet.com**
10 Christmas social evening
**Thanet R&EC**
**Denis, M0ZDE,**
**contact@m0tfc.org**
8 On the air – data
22 Christmas construction party
**West Kent ARS**
**Keith G4JED,**
**info@wkars.org.uk**
9 Christmas social

October saw **Braintree & District ARS** once again involved in JOTA. This year they were asked to put on the station by two local scout troops, Steeple Bumpstead and Yeldham. They agreed and used the callsign GB0SYS. The event was held under canvas at a farm in the north of the district. They set up and operated radios on HF, VHF and UHF plus a satellite station and worked over 50 other stations, at least half of which were JOTA stations. There were over 60 Scouts, Cubs and Beavers from the two troops who all took part in message passing and learning Morse code etc. They all had a great time despite being bombarded with torrential rain storms, and have kindled an interest in amateur radio with several of the youngsters that will be followed up.

Later in October saw a presentation at the club meeting by Richard 2E0XRS entitled Air Nav dongle. The system only requires a TV dongle. A small aerial was purchased online and combined with some free downloadable software, which gets you watching aircraft movements real time, via the aircraft transponders. This may not new but it only cost £4.99. Combine this with your air band scanner, and you can watch what you listen to very cheaply.

Colchester Radio Amateurs would like to remind amateurs worldwide that 2013 is their 50th anniversary year. One of the activities is their 'anniversary challenge', open to all, and there is still time to take part. Simply dig out your logbook for contacts made during 2013 on FM, AM, SSB, CW, RTTY or PSK and then select the callsigns where the first or last letter of the suffix contributes to the phrase 'Colchester Radio Amateurs'. No dupes are allowed. Scoring is 1 point per callsign, with bonus points if you have worked the club callsign, G3CO (or one of its variants such as GX3CO/P), making a maximum possible score of 50. The latest entry date is 31 January 2014 and we expect to announce the results in Feb, emailing certificates soon afterwards. Full details, examples and the entry form can be found at www.g3co.org.uk/cra-50th-anniversary-challenge.

An enquiry about amateur radio from the Tinker Society at the University of Kent at Canterbury led to a fruitful visit from the Hilderstone Radio & Electronics Club. John, G7OHO expounded the varied aspects of amateur radio while Don, G4TKR explained the virtues of the Kent repeaters in which he is involved. They appreciated seeing some amazing Arduino projects which Matt, M0LMK had constructed, including his 'drifting buoy'. Sixteen students wanted to gain their Foundation licence so we started them off on their VHF QSO. On the following Sunday they joined the club for the Jamboree on the Air special event station using the callsign GB0BAS for the 1st Birchington Air Scouts. In the morning eight Beavers aged between 6 and 8 took part in various activities associated with radio communications. They learnt Morse code using a Morse key, made an LED electronic circuit to send Morse with light flashes, found the fox with a direction finder and spoke to other Scout groups on

the club radio. The lads had a great time and thoroughly deserved their activity badge. In the afternoon the university students split into two groups and erected antennas and made an HF QSO. Both succeeded and learnt a lot from it. They are looking forward to the Foundation exam in December and making their Intermediate project over the holiday period.

## REGION 13: EAST MIDLANDS

REGIONAL MANAGER: STEVE BODEN, G4XCK, RM13@RSGB.ORG.UK

**Derby & DARS**
**Richard Buckby, radio@dadars.org.uk**
3 Junk sale
10 Committee meeting
17 Fish and chip supper
24 Closed

**Hucknall Rolls Royce ARC**
**Dave, G1YAI, treasurer@hrrarc.com**
6 Exams – club not open to members until 9.30pm
13 Bring and buy sale
20 Christmas buffet
27 Club forum evening – what do members want?

**Leicester RS**
**Alex, G8FCQ, 07531 201 640, www.g3lrs.co.uk/**
16 Christmas bring and share + raffle

**Loughborough & DARC**
**Chris, G1ETZ, 01509 504 319**
3 Open forum on radio rallies
10 Arduino board, Andrew, G7SEG
17 Playing cards fun night
24 Closed

**RAF Waddington ARC**
**Bob, G3VCA, 0791 166 250**
12 Christmas dinner
19 Nibbles night

**South Kesteven Amateur Radio Society**
**Nigel, M0CVO, 01476 402 550**
11 Final meeting of 2013
14 Christmas buffet and raffle

**Welland Valley ARS**
**Peter, G4XEX, 01858 432 105, g4xex@fsmail.net**
2 Satellite working with Andy
9 Christmas dinner

60 years after the 1953 East Coast Floods, Lincolnshire continues to provide emergency support for the User Services. Following the very successful Exercise Watermark 2 years ago, when Sutton on Sea schools were evacuated in a flooding scenario, Lincolnshire RAYNET again assisted the Lincolnshire Joint Emergency Management Service in Exercise Georgiana. Members of Lincolnshire RAYNET were deployed for a major exercise organised by the County Emergency Planning authorities. The exercise was based on a rail crash, and was based at two areas within the county. Including RAYNET nearly 100 volunteers were involved, these were involved with the survivor evacuation phase of the exercise. The 'casualties' were logged by members of the Emergency Planning Staff, and RAYNET DGC. Gerald, G7HNM, passed the casualty details on to the reception at the Rest Centre. The Forward Control Station at the Rest Centre was operated by Jim, M0MHW and Billy, 2E1AXL who, upon receipt of transport details, passed them on to the Red Cross personnel who were conducting the Registration process. A link was provided back to the operations control room at Fire Brigade Headquarters in Lincoln to Gold Control staffed by Gordon, G4WEC and Barry, G4DBS.

In June they once again assisted with the Grantham Carnival procession, fielding around nine operators to cover the route, and provided cover for the Marie Curie 10km walk at Grimsthorpe Castle, at which Konrad, M6KVF located a missing walker.

The group were involved with the Emergency Services Events over the weekend in August, the Saturday being spent at the Sandtoft Trolleybus Museum, near Scunthorpe, and the Sunday at Thorpe Camp's 999 exhibition at the Southern end of the county near Woodhall Spa. These events are very useful in raising the profile of the organisation, and making ourselves known to potential user groups.

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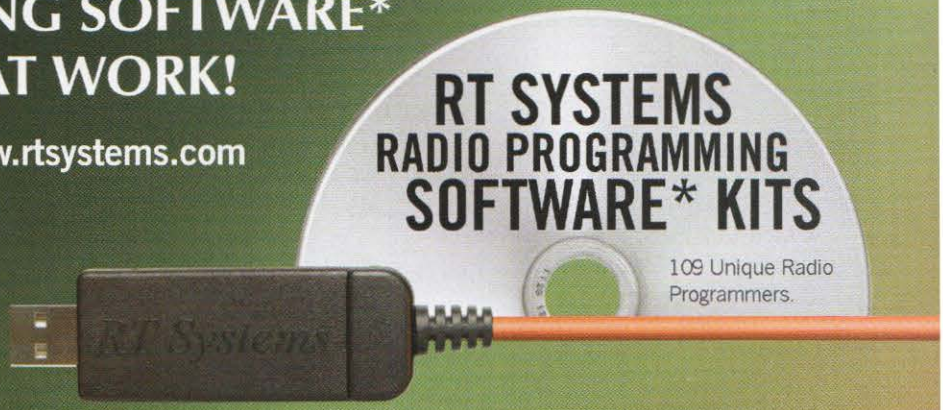


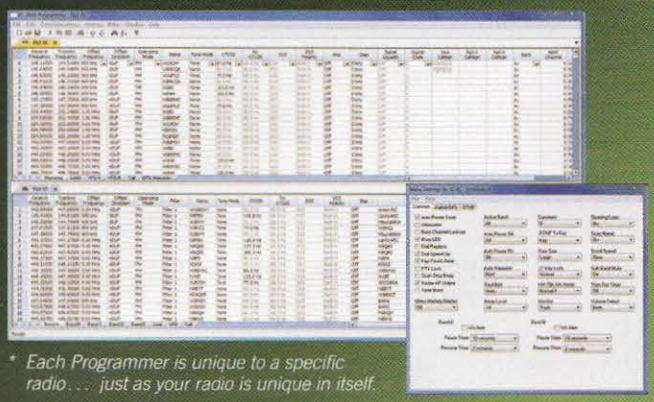

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## Business Cards



## Adertisers Index

# Data

## Reader feedback

**BUMPER POSTBAG.** I had quite a lot of response after my request for input, so here goes:

From Alex, G7KSE: "I don't get much time on the rig at the moment but operating data modes is an enjoyable distraction from busy work life. I have found that the Arduino is a great little device for data. Current projects are pretty simple like an MSF time signal decoder. Recently I bought the Argent data radio shield that allows me to decode APRS with a VHF handheld and also a QRP *WSPR* Tx from Hans Summers. All very simple to make and use. I find kits generally work first time but things like the Arduino need a bit of tinkering, with loads of support on forums. It would be great to build a PSK decoder or perhaps a PSK reporter / reader. A bit of fun, but maybe later.

"I have found that the number of new modes and software sources is getting a bit out of hand and can be a bit bewildering. Perhaps a comparison between common and uncommon modes would help us – eg wideband or narrowband, centres of activity, QSO technique and how to identity signals. All would help people get involved. Nothing new I'm afraid but we all need reminding every now and again." ‡

And from John, G4KLA after his report last time "In case there is a real G8KLA, I'm G**4**KLA". He adds that "there is now a lot of activity on 20, 17 and 15m with both JT65 and JT9 modes".

Dick Whittering, one of our overseas readers (SV0XBN / SW9FF, ex G3URA), is critical of recent coverage. He states "I can understand no feedback is very frustrating as you do not know if people actually read, or just skip over the Data page. As I see it, Data should be about things like RTTY and PSK QSOs – operating. Who is working whom, data DX, contest news and up-coming stuff. The HF news does not cover this and the Contesting section only ever mentions BARTG contests now and again.

"There is too much emphasis on using the internet with radio, which in my mind is becoming the norm. Not everyone has super efficient broadband or regular internet access – out here we can get it by using a dongle, if the wind is in the right direction. Look at the article recently by the two VKs on SDR radios – they even suggest that you should fit your SDR server up to the internet! This sort of thing is getting away from 'proper' amateur radio and 'proper' data communication.

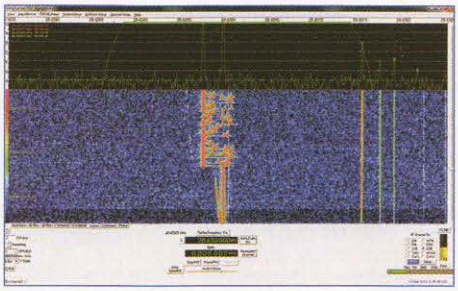

**FIGURE 1: Aircraft reflections on the 2m GB3VHF beacon received by G0API at a distance of 178km.**

"Those that use modes such as JT65 rely on the internet for computer timing [but see below – G4JNT] and once again this gets away from proper data operating. WSPR relies on exact computer timing. I can understand why it is done but amateur radio is about two-way communication; WSPR is only one way. Useful, yes, if you are testing, but it gets too much prominence.

"Items such as the 'balloons and radio links' are out of place, and do we need to know about wireless LANs and amateur radio? This sort of stuff is far too complicated for the average ham and if it needs to be reported maybe a separate, specialist article. I just think that the Data section should be about data operating and nothing else.

"I'm using RTTY in a few contests, working some PSK31/63/125 and MFSK, and having 'proper' two-way data QSOs. Sorry if this 'feedback' is not what you were expecting, but at least I got it off my chest!"

Well, it's one opinion. I can only write about what I receive, like any other columnist. Perhaps it is unfortunate Dick is out in the sticks! And he is wrong in stating *WSJT* modes needs internet connectivity for timing. Time only has to be set to within a few seconds accuracy for these. Setting manually from a time signal, a TV or anything is quite good enough. PCs or quartz clocks should then maintain sufficient accuracy for several days before having to be recalibrated.

Ken, G8NDL is an avid digi user. "I cannot remember the last time I had a non-digi QSO – maybe a year ago. They're ideal, as I occupy a spare room in the house next door to my daughter's bedroom. The volume control is turned down to a whisper; me talking on the radio at night would certainly annoy her, so this is perfect. Others are in the same situation.

"I've 2,600 digi QSOs logged on HF, 99% of which are macro-type. It amazes me how people rarely have the time to sit and chat for only maybe five minutes. I am aware that there are limitations with chatting internationally and I have little vocabulary of other languages. However there are a small bunch of people who enjoy a chat and on modes other than PSK. Even macro Olivia QSOs are hard to find. Considering the advantage of these other modes, I wonder why so few people are willing to use them. Maybe people have limited patience for a QSO and just want to clock up numbers. Pure QSOs may be one person's means of occupying their time, which is OK, but I would like to see the non PSK modes used on HF a little more. I still get a buzz out of using Hell, Olivia and others, so let's move away from the popular PSK modes once in a while.

"It amazes me often, where emphasis is made on the word 'digital', people think that digital comms is a new up and coming 'cool' subject, but when you consider that the most efficient means of communications is CW, and that CW as a digital means of communications has been around a very long time. Probably Morse code was the first digital means of communication."

I have to add, however, CW is NOT a digital mode. It was designed for human aural reception, and actually has three signal states, off, short and long. Machine reading of CW is more akin to machine decoding of human speech. My own opinion is that Morse is just another language to be learned.

***OPERA* AIRCRAFT REFLECTION.** Graham, G0NBD and Gary, G4WGT are dedicated *Opera* users. On 21 September they were conducting tests with *Opera* OP 0.05 on 144.180MHz. Both were beaming 150°. Gary states, "I noticed a strong second signal on the *Opera* waterfall but drifting LF, then had two decodes of Graham's beacon. We decided that it was a reflection from an aircraft on our beam heading. Then Graham had a similar reflection of my signal with the second trace moving HF but no decode. In view of this I set up a SpecLab screen running Fast Morse 'Tape reader' with captures at one minute intervals. Only one more signal was seen and recorded showing a reflection." See G4WGT's Photo Album on the *Opera* Yahoo group page **[1]** for both these captures.

‡ This was received before the November *RadCom* article 'Signals Viewed in the Waterfall Display' was published – Ed.

**WEBSEARCH**

[1] Opera User Group: http://groups.yahoo.com/group/O_P_E_R_A_/

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**BARLOW WADLEY** operating instructions manual for XCR-30. Original 2-colour version with specification, user tips and block diagram. Good used condition, £7 ono inc post. Richard Marshall, G3SBA, 01582 460 815, richard.marshall@iee.org (Harpenden).

**COLLECTORS ITEMS.** Valve signal generator- CT 212, 85kHz to 32MHz in 7 bands. CW/AM/FM, £40. Valve Voltmeter No 3, CT208 with probes, £30. Both items heavy, so cash on collection. Watson, G4EHT, 07754 082 404, bill.g4eht@yahoo.co.uk (Lichfield, Staffs).

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**DAIWA CN650** UHF SWR/pwr meter 1.2 – 2.5GHz, max 20W, with instructions, £50, postage £6. ICOM WR-2000 HF SWR/pwr meter 1.8 – 1300MHz, will take 3 ants inputs but only 2 couplers supplied, with instructions, a superb meter, £70, postage £6. Brian Atkinson, G3GSI, 01435 883 248 (Heathfield, East Sussex).

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**EX RAF HF** 'Amplifier radio frequency. Ref 110u/5821-00-845-899C' contains two 4CX250 valves and motors for remote tuning. PSU input is 27.5VDC. Also matching high voltage power supply, Ref 545 407100. Believed to be manufactured by Collins. £100 + p&p. M Wood, G8MTV, 01325 720 031 Darlington.

**EXPLORER 1200** linear amplifier, made by Linear Amp. Good condition but with some scratches on the side panels, front unmarked. Full output available, £550. Mick, GOIET, 01780 754 401 (Stamford, Lincs).

**FLEXRADIO FLEX-3000** SDR xcvr, HF+6m 100W, ATU, 6 months old and in great condition, original box + mic & all cables, excellent condition. Would prefer buyer to inspect and collect, but can post at cost. £995. James, 2E0JCQ, 07572 860 114, james_carpman@hotmail.com (Berkhamsted).

**FV901DM**, boxed since new, also matches FT-101ZD, £220.00. Sure 401B mic, boxed, £120. FT-290R (Mk 1), original, little use, £110. FT-790R (Mk 1), original, little use, whip antenna, £110. SL250DX HF amp, little use, £150. Plus carriage or collect. Kevin, G1REQ, 07522 029 542 (Stoke-on-Trent).

**ICOM IC-7000**, good condx, complete with all remote gear (bracket, extension lead etc). Barely used. £800, cash only. Buyer to test/collect. Norman, MW0HJG, 07725 347 712 (Rogit, Monmouthshire).

**ICOM IC-7000**, immaculate, with very little use, £800 ONO. John, G3WCO, 01279 876 607, g3wco@idnet.com (Dunmow, Essex).

**ICOM IC-718** ~3yo. Acquired 1 year ago from an elderly gent who seemed to have used it little; 12V cable was still sealed. Added £90 240V PSU, tested then put both away. £350 pair inc manuals & UK mainland delivery. Jonathon, RS 212611, lockhopper1@yahoo.co.uk (Ely).

**ICOM IC-T3H** with stand, manual, NiCad battery pack BP-222 (7.2V, 600mAh), BP-209 (7.2V, 1100mAh), 2 x battery cases BP-208, Watson speaker mic, charger, Revex W540 SWR/power meter. All in working condition. £80 postage free. James Dykes, G0NDU, 01242 692 667, gondurs@btinternet.com (Cheltenham).

**KENWOOD R5000** GC Rx, £300. Yaesu FT-790 + 10W linear, £125. Yaesu FT-690 Mk II + 10W linear, £150. Standard C5800 1W/25W 2m multimode, £175. Bound volumes *RadCom* 1969 – 2012, £350, no split. Buyers collect or carriage at cost. Dave, G4IDF, 01905 351 568 (Worcester).

**MANY VALVES** inc 4CX250B, 572B, 6146, QQVO320A. Also antennas and other misc items. E-mail for list. Terry, G3NPZ, 02392 550 733, terrygrif4@aol.com (Lee on Solent).

**MOTOROLA GM340** on 70cm same on VHF. variety of good PMR kit ideal for RAYNET or repeater projects. Also some hand portables. Willing to negotiate on price. Alan, G8SSL, 0797 664 632 alan.marwood@ntlworld.com (Nottinghamshire).

**NEW DIAMOND CR-8900** 4-band mobile whip, PL259/SO239 connector, £80. Saphir TSB-3301 2m & 70cm white stick, 6.5dB/9.0dB, 200W, 3.07m, never used outside, £80. Collection if possible. Alan, G3VLQ, 01935 422 973, merv.al@btinternet.com (Yeovil).

**PST61 PRO, SIS TEL ROTATOR** cost £900 new, offers. GW3NAS, 01545 581 108 (Dyfed).

**QTH, SE CORNWALL.** 1970 built 3 bed semi-det + garage. Ready made shack in bedroom 3. Antennas for 80m to 70cm. No onward chain, £170k. G4HOL, 01579 342 503 (Cornwall).

**THREE ANALOGUE TVs:** Ferguson 12" B&W portable, no SCART, Philips 16" colour, no SCART, Philips 21" colour TV-video combi with SCART. All working, complete with instructions and remotes. Offers please. Roger, GOCYC, 01707 324 958 (Welwyn Garden City).

**UNCOMMON OLD KEYER:**

Hi Mound Electro Co, Japan 'Electronic Keyer Model DA-1' in old 'JB Radio & Electronic Component Manufacturers' box. Good condition, but no idea if it works, and no instructions. Best donation to National Radio Centre secures. Kevin Jones, GW0KIR, kevinmjones@fastmail.fm (Knighton, Powys).

**YAESU FT-1000 MK V FIELD** 100W, VGC, Yaesu SP-8 external speaker, Yaesu MD-200A8X mic, all boxed. Collection only, £1000. Phil, 2W0PJM, 01824704761 (Ruthin).

**YAESU FT-857D,** YF-1225 Collins SSB filter fitted and FTL meter. Non-smoker. Shack use only and in excellent condition. £450. Can delivered within 50 miles, or you pay postage. Dave, GW3DRK, 01443 683 912 (Mid Glamorgan).

**YAESU FT-902DM** classic HF transceiver in immaculate condition and full working order, complete with mic, mains lead, DC lead and handbook. Offers. Collection preferred. Brian, G4SAU, 01304 823 702 (Dover).

## WANTED

**DISABLED FAN OF OLD DAYS** seeks, DX photo QSLs, Datong FL3 filter, Codar RQ10X and PR30X. Mike, 8 Windsor Road, Reydon, Southwold, Suffolk IP186PQ.

**FV-101DM AND FTV-901R** wanted, dead or alive, to complete station line up. As long as the units are complete there is a possibility they can be repaired. Thomas, GW8WEY, 02920 219 977, Thomas.jones80@ntlworld.com (Cardiff).

**HANSEN FS-500H** peak reading power meter 1.8-60MHz wanted in good working order. Has anyone got a circuit diagram for this meter, or know where to get one please? Alan H Brown, M1JAK, 07973 103 213, m1jak@talktalk.net (Warwickshire).

**SILENT KEY CLEAROUT** or not just wanted. I collect QSL cards for historic interest; any date but preferably before 1970. Can collect or arrange collection. Tony, G4UZN, 0113 269 3892, AQuest1263@btinternet.com (Leeds).

**TEKTRONIX 191** signal generator. Dennis Goacher, G3LLZ, 01793 828 188 (Swindon).

**TRIO VFO-230,** to allow split frequency operation with Trio TS-830S transceiver. Jerry, G4JQN, 01373 864 478 g4jqn@talktalk.net (Westbury, Wiltshire).

**YAESU FT-480R,** very good condition. Gordon, G4PDV, 01732 457 820.

## HELPLINES

I used a contaminated cloth to clean a small radio screen of 5x4 inches, with the result that it now has left a very small clear area on the dark antiglare screen. When the radio is on, it has perfect presentation. Spares are not available. Any ideas, please – touch up or spray? – what with? Maurice, G0AWA 01661 824 945 (Newcastle upon Tyne).

LOST – VFO associated with Tx by G3AAZ and SK G2QA featured in *RSGB Handbook* 1961 p199-203. 3.5-3.8MHz VFO housed in black crackle finish cabinet approx 18 x 15 x 10cm, backlit 180° dial. Any info? G Gibbs, G3AAZ, 01489 456 781 (Huntingdon).

RACAL – MESL receiver Band 1 Type 10033 / 020. Information sought about this microwave unit, or direction as to where any may be found. Is this an L Band module and can it be adapted for use in the 23cm band? Alan, G1EAB, g1eab@tiscali.co.uk (Nottingham).

## RALLIES & EVENTS

**1 DECEMBER - BISHOP AUCKLAND RADIO AMATEURS CLUB RALLY** – Spennymoor Leisure Centre, Co Durham DL16 6DB. CP, TI S22 (V44), OT 10.15 /10.30, £2 (U14 free). TS, B&B, C, LB, DF, FAM. Mark, G0GFG, 01388 747 497.

**7 DECEMBER - SOUTH LANCS WINTER RALLY** – Bickershaw Labour Club, Bickershaw Lane, Bickershaw, Wigan WN2 5TE. OT 10am, traders 8am. Tables £9 pre-booked, entry £2, TI, B&B, C, DIS, CP, SIG, DF, TS, LB. Jason 01942 735 828, rally@slarc.co.uk.

**12 JANUARY - RED ROSE WINTER RALLY** – The George H Carnall Leisure Centre, Kingsway Park, M41 7FJ; easily accessible from M60 J9 (opp. Trafford Centre). OT 11am. Free CP, TS, B&B, SIG, C, DF, DIS, RSGB book stall. John, 07840 389 427. [www.wmrc.org.uk]

**26 JANUARY - HORNCASTLE WINTER RALLY** – Horncastle Youth Centre, Lincolnshire LN9 6DZ. OT 10.00/10.30, £1.50, DF, C, free CP. Tables £5, free power. Tony, G3ZPU, 01507 527 835, tony.nightingale@yahoo.co.uk.

**2 FEBRUARY - 29th CANVEY RADIO & ELECTRONICS RALLY** – 'The Paddocks', Long Road, Canvey Island, Essex SS8 0JA (southern end of A130). Free CP, OT 10.30. C, DF, TS. Vic Rogers, G6BHE, 01702 308 562, nvr@blueyonder.co.uk. [www.southessex-ars.co.uk].

**16 FEBRUARY - RADIO-ACTIVE RALLY** – Civic Hall, Nantwich, Cheshire CW5 5DG. OT 10.30. TS, B&B, C, WIN. Tim, 01948 519 249, tm0sin@yahoo.com. [www.midcars.org].

**23 FEBRUARY - BRATS RAINHAM RADIO RALLY** – Rainham School for Girls, Derwent Way, Rainham, Gillingham, Kent ME8 0BX. TI, OT 10.00/9.30, TS, SIG, C Darley, 0798 2244 788, charlesdarley@hotmail.co.uk.

**1 MARCH - LAGEN VALLEY ARS ANNUAL RALLY** – the Village Centre, Ballynahinch Street, Hillsborough. OT 11.30am, CP, C, B&B, SIG, TS. Jim, GI0DVU, 02892 662 270.

**2 MARCH - EXETER RADIO & ELECTRONICS RALLY** – America Hall, De La Rue Way, Pinhoe Exeter EX4 8PW. OT 10.15/10.30, £2. TS, B&B, C. Pete, G3ZVI, 07714 198 374, g3zvi@yahoo.co.uk.

**9 MARCH - WYTHALL RC ANNUAL RADIO RALLY** – Woodrush Sports Centre, Shawhurst Lane, Hollywood, nr Birmingham B47 5JW on the A435, 2 mi from J3 M42. TI S22 (V44), CP, OT 10am, £3. TS, C. Chris, G0EYO, 07710 412 819, g0eyo@blueyonder.co.uk. [www.wrcrally.co.uk].

**25 MARCH - 39th DUTCH NATIONAL RADIO FLEA MARKET** – "Autotron", Rosmalen. TI, CP, OT 9am. TS, FM, C. Details: info@radiovlooienmarkt.nl. [www.radiovlooienmarkt.nl].

**6 APRIL - 51st NORTHERN AMATEUR RADIO SOCIETIES ASSOCIATION EXHIBITION (Blackpool rally)** – Norbreck Castle Exhibition Centre, Blackpool FY2 9AA. TI, CP, OT 10.15/10.30. TS, B&B, SIG, MT, LB, C, DF, RSGB book stall. Dave, M0OBW, 01270 761 608, dwilson@btinternet.com. [www.narsa.org.uk].

**13 APRIL - SOUTH GLOUCESTERSHIRE AMATEUR RADIO RALLY** – Scout Activity Centre, Woodhouse Park, Almondsbury, Bristol BS32 4LX. OT 10.00, B&B, CP, C, CBS, TI S22 (V44). Mike, M1DPB, 07806 310 095, southglosradiorallycoordinator@gmail.com. [southglosradiorally.org.uk].

**4 MAY - DAMBUSTERS HAMFEST** – Thorpe Camp Visitor Centre, Coningsby, Lincs LN4 4PE. TI S22, GB3FR, £3, B&B, C, OT 10am. Free CP, free pitches but size limited if not pre-booked. RAF heritage centre on site. Camping by appointment. Contact tcrm@hotmail.co.uk. [www.qsl.net/gb4tcm/dambusters.html].

**10 MAY - LOUGH ERNE AMATEUR RADIO CLUB ANNUAL RALLY** – Share Discovery Village, Lisnaskea, Co Fermanagh BT92 0EQ. OT 11.30 am CP, B&B, TS, LB, C, DF. Iain, 028 6632 6693, iain@learc.eu.

**8 JUNE - 13th JUNCTION 28 QRP RALLY** – South Normanton Alfreton and District Amateur Radio Club IAW G QRP Club. Alfreton Leisure Centre, Derbyshire DE55 7BD. TI, OT 10am. TS, SIG, C, LB. Anya Lawrence, 2E0BQS, 0115 930 7322, adylawri@btinternet.com. [www.snadarc.com].

**29 JUNE - WEST OF ENGLAND RADIO RALLY** – Cheese & Grain, Bridge Street, Frome, Somerset BA11 1BE. CP, OT 10am, £2.50. TS, RSGB book stall, C, DIS. Shaun, G8VPG, 01225 873 098, rallymanager@westrally.org.uk. [www.westrally.org.uk].

**5 JULY - BANGOR AND DISTRICT ARS RALLY** – Donaghadee Community Centre, Co Down BT21 0HB. OT 11.30, £3. TS, B&B, SIG. Peter, MI6NID, 0289 1889 018, petermi6nid@outlook.com. [www.bdars.com].

**27 JULY - HORNCASTLE SUMMER RALLY** – Horncastle Youth Centre, Lincolnshire LN9 6DZ. OT 10.00/10.30, £1.50, DF, C, free CP. Tables £5, free power. Tony, G3ZPU, 01507 527 835, tony.nightingale@yahoo.co.uk.

**31 AUGUST - TELFORD HAMFEST** – Enginuity Technology Centre, Coalbrookdale, Telford TF8 7DU. Martyn, G3UKV, 01952 255 416. [www.telfordhamfest.co.uk].

**26 OCTOBER - 24th GREAT NORTHERN HAMFEST** – Barnsley Premier Leisure Complex, Queens Road, Barnsley S71 1AN. GNHF IAW SYRG. OT 10.30, TS, SIG, C, FAM. Ernie, G4LUE, 07984 191 873. [www.gnhf.co.uk].

## SPECIAL EVENTS STATIONS

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.

| Date | Callsign | Phonetics | Location | Bands | Keeper |
|---|---|---|---|---|---|
| 11/12/2013 | GB1WH | Wakefield Hospice | Wakefield | TLHV27 | M0IAA |

This list shows all rallies and events we are aware of as of press deadline. 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. We also recommend you check the details are correct in *RadCom* and tell us if not.

## RSGB MEMBERS' ADVERTISEMENTS

RSGB Members wishing to place an advertisement may do so free of charge by e-mail.

**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. Ads may still be submitted by post but must be accompanied by a payment of £5 to cover administration costs.

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 maybe edited for readability at our sole discretion. Longer ads may be accepted if there is a good reason, eg a shack clearance on behalf of a SK Member; e-mail us and ask.

4) Not more than one ad per month will be accepted from any member. 'Recurring' ads will not be accepted, but Members may re-submit the same advert each month if they wish.

5) E-mailed adverts may optionally include one photograph of the item(s) being offered. Images must be attached as a jpg file, at least 800 pixels wide and of good quality. By submitting any image you warrant that you own the copyright and that you permit the RSGB to use it in anyway. We will endeavour to publish photographs with ads as space permits but cannot guarantee to publish any particular photograph.

6) Adverts will be published at the first available opportunity but no guarantee can be given as to when a particular ad will appear.

7) The RSGB believes that it is inappropriate for Members trading in radio equipment in any way to place Members' Ads. We therefore regret we are unable to accept such ads, although we do welcome these in the 'Classified' advertising section of *RadCom*.

8) The RSGB accepts no responsibility for errors or omissions, or for the quality of goods for sale or exchange.

9) Members' Ads are accepted and published in good faith.

10) Members' Ads are accepted at the sole discretion of the Editor, whose decision is final.

**WARNING**

**Members are advised to ensure that the equipment they intend to purchase is not subject to a current hire purchase agreement.**

**The 'purchase' of goods legally owned by a finance company could result in the 'purchaser' losing both the goods and the money paid.**

Members' Ads also appear on the Members Only website at www.rsgb.org/membersonly/membersads.

## SILENT KEYS

**We regret to record the passing of the following Members:**

| Name | Date |
|---|---|
| Mr P Cunningham, 2E0BMV | 7/2013 |
| Mr S R Walker, G3IYT | 16/10/2013 |
| Mr J McEachran, GM3XGX | |
| Mr W H Pearson, G4MWU | 20/9/2013 |
| Mrs C G Sheldon, G6CMP | 15/8/2013 |
| Mr P Turner, G6UOI | 23/7/2013 |
| Mr D J Hebden, G8BLC | 28/10/2013 |
| Sqn Ldr J P A Thomson, G8PJL | 22/2/2013 |
| Mr W L Sheppard, MW0LES | 1/10/2013 |
| Mr I K Brocklehurst, M3NBV | |

# HF F-Layer Propagation Predictions for Decmber 2013

## Compiled by Gwyn Williams, G4FKH

| | 3.5MHz | 7.0MHz | 10.1MHz | 14.0MHz | 18.1MHz | 21.0MHz | 24.9MHz | 28.0MHz |
|---|---|---|---|---|---|---|---|---|
| Time | 000011111220 | 000011111220 | 000011111220 | 000011111220 | 000011111220 | 000011111220 | 000011111220 | 000011111220 |
| (UTC) | 246802468020 | 246802468020 | 246802468020 | 246802468020 | 246802468020 | 246802468020 | 246802468020 | 246802468020 |
| *** Europe | | | | | | | | |
| Moscow | 886....67788 | 8672..288888 | ..3755784... | ...88898.... | ...9999..... | ...7999..... | ....998..... | ....88..... |
| *** Asia | | | | | | | | |
| Yakutsk | .......24433 | 7553..577767 | 4..77..763.. | ...65..... | ..... | ..... | ..... | ..... |
| Tokyo | .......3222. | ...67467656. | ....3..... | ..... | ..... | ..... | ..... | ..... |
| Singapore | .......2222. | ......787665 | ......66.... | .....263.... | .....77..... | .....66..... | .....55..... | ..... |
| Hyderabad | ..... | .......34333 | .......64... | ......55.... | ......64.... | ......5..... | .....45..... | ..... |
| Tel Aviv | 885....28888 | 979....99989 | .......85... | ...63367.... | ...78887.... | ...5889..... | ....888..... | ....88..... |
| *** Oceania | | | | | | | | |
| Wellington | ..... | ....5665.... | ....6775.... | ....677..... | .....64..... | ..... | .....5..... | ..... |
| Well (ZL) (LP) | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Perth | ..... | .......42... | ......884.. | ......87.... | ......5..... | ......4..... | ..... | ..... |
| Sydney | ..... | .....38742.. | ....2887.... | ....788..... | ....464..... | ....45..... | ..... | ..... |
| Melbourne (LP) | ..... | ...88..... | ..399..... | .4.89..... | ....96..... | ....97..... | ....8..... | ..... |
| Honolulu | ..... | .......3.... | ....3536.... | ..... | ..... | ..... | ..... | ..... |
| Honolulu (LP) | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| W. Samoa | ..... | ...27677.... | ....8898.... | ....6886.... | ....487..... | .....76..... | .....5..... | ..... |
| *** Africa | | | | | | | | |
| Mauritius | 2........112 | 7......57767 | 5......87635 | .......84... | ..... | ..... | ..... | ..... |
| Johanesburg | ..... | 4........233 | 73.....7766 | .......563.. | .......6.... | .......6.... | ..... | ..... |
| Ibadan | 11........11 | 676.....6667 | 777.....7777 | ...4...387.. | ...754578... | ...766674... | ...67777.... | ....7776.... |
| Nairobi | 2........222 | 87......8888 | 63.....36555 | .......66... | ......36.... | ...4..56.... | ...66675.... | ......7..... |
| Canary Isles | 666.....3566 | 7776....7878 | 88.7...58688 | ...4756768.. | ....8889.... | ....7887.... | ..... | ..... |
| *** S. America | | | | | | | | |
| Buenos Aires | ..... | 23.6........ | 45.8......22 | ...7........ | ..... | ..... | ..... | ..... |
| Rio de Janeiro | ..... | 23.6.......2 | 56.9.....343 | ...8........ | ...3........ | ....4....... | ..... | ..... |
| Lima | ..... | 23.4........ | 35.75....... | ....3....... | ..... | ..... | ..... | ..... |
| Caracas | ..... | 4434......23 | 68.85....364 | ....7...3... | ....46556... | .....7774... | .....777.... | .....877.... |
| *** N. America | | | | | | | | |
| Guatemala | ..... | 23.32....... | 36.66....... | .....5...... | .....4...... | ......5..... | ......5..... | ......5..... |
| New Orleans | 222........ | 6646.......6 | 35.76....... | .....5...... | ..... | ......4..... | ......55.... | ..... |
| Washington | 2332.......2 | 77773.....77 | 47.65....553 | .....6..6... | .....3.46... | .....56.... | ......67.... | ......74.... |
| Quebec | 4553.....254 | 67.6.....776 | ....6...74.. | ....66567... | .....566.... | ......66.... | ......77.... | ......7..... |
| Anchorage | ..... | 55.4...34333 | 5...66.47..3 | ........4... | ..... | ..... | ..... | ..... |
| Vancouver | ..... | 33.2........ | ..... | ..... | ..... | ..... | ..... | ..... |
| San Francisco | ..... | 22.2........ | ..... | ..... | .......4.... | ..... | ..... | ..... |
| San Fran (LP) | ..... | ..... | ..... | ..... | .......5.... | .......5.... | ........5.... | ..... |

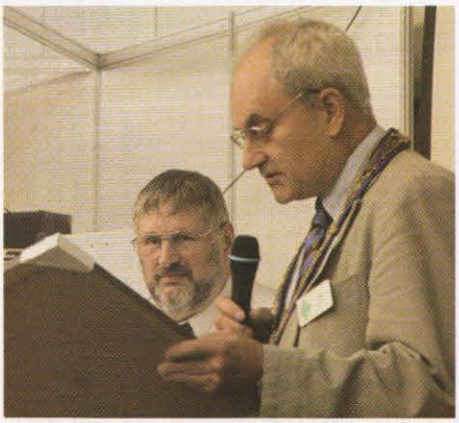
Key: Each number in the table represents the expected circuit reliability, eg '1' represents reliability between 1 and 19% of days, '2' between 20 and 30% of days, etc. No signal is expected when a '.' is shown. **Black** is shown when the signal strength is expected to be low to very low, blue when 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 December 2013, January and February 2014 are respectively (SIDC classical method – Waldmeier's standard) 57, 56 & 55 and (combined method) 75, 77 & 79. The provisional mean sunspot number for October was 85.6. The daily maximum / minimum numbers were 116 on 18 October and 35 on 6 October.

## PRESENTATION

**Rob Mannion, G3XFD/EI5IW**
**Retiring *PW* Editor**

I'm writing to express my grateful 'thank you' to the RSGB for the special presentations made to me at the 2013 National Hamfest at Newark. I felt honoured when I saw the RSGB President, Bob Whelan, G3PJT, sitting in the audience during my 'farewell' talk! I'm also grateful to the Lincoln Short Wave Club for the gift of lifetime Honorary Membership presented at the same time. I've developed a special relationship with the Lincoln Club and its members over the years – and I'm delighted by the wonderful gestures by the RSGB and the LSWC on my retirement as Editor. I really have enjoyed serving amateur radio via the pages of *Practical Wireless*.

Best wishes to everyone.



Bob Whelan (R) making the presentation to Rob Mannion at Hamfest (Photo: G4EAN).

## REAL ENGLISH

**David Oliver, G4HMC**

I wholeheartedly agree with Rob Macfie's comments in his letter to *RadCom* November 2013, regarding the use of plain English on the air and the misuse of the Q code. "The personal here would be" is another commonly-used phrase substituted for "My name is".

Sad, but true, this is part of a general decline of operating standards and behaviour on the bands. It has often been said in these pages that this is, in part, due to the watering-down of requirements for entry into the transmitting side of the hobby. Of course, there are exceptions to this, and the tiered route to the licence has resulted in some very good Foundation and Intermediate operators using not only 'phone but Morse too. Quite often, however, one finds that these people have had at least some experience as an SWL before obtaining the 'ticket'.

It is difficult to know where we go from here. Rob Macfie suggests that we point out examples of gobbledegook. I would add examples of poor operating practice.

This is by no means an easy option when faced with such a situation on the air. Although I certainly don't profess to be a perfect operator, I feel every right-minded amateur has at least some responsibility to politely draw attention to shortcomings when he or she hears them.

**Colin Topping, GM6HGW**

I agree in full with the comments of Rob Macfie, G4FAX concerning the incorrect use of English and CW abbreviations used by radio amateurs over the air. Sadly, it's not just radio amateurs; listen to the way English is used by BBC presenters and newscasters. The most common incorrect usage is often; "I was sat" instead of "I was sitting". Alarmingly, many primary and secondary school teachers fail to use grammatically correct English, therefore what hope for children under their care?

Another common misuse heard over the air – and in general conversation – is the interjection of the word 'like' several time in each sentence and those who can't finish a statement without adding; "know what I mean?" Know what I mean?

## DIPOLE FOR HANDHELD

**Bob Houlston, G4PVB**

I have been working the Verulam Amateur Radio Club 2pm Sunday 145.375MHz net with my tiny 1 watt handheld transceiver. Although I am moderately well received, my signal is usually too weak for reliable communication. Norman Fisher, G8ATO suggested I put up a 2m antenna so I investigated the internet and eventually decided to make a folded dipole as the one described by Dave Kimber, G8HQP on his web links below. I use a thin pigtail to protect the hand held antenna connector from damage by the thicker RG58C/U cable. It's an economy, lossy cable (best to keep the length less than 10m) for low power use and has a stranded centre conductor so less likely to break if the cable is bent. The conductors are tinned so easy to solder. My signal is now enhanced and I'm delighted. Thank you to Dave Kimber and the VARC net for your encouragement. See http://myweb.tiscali.co.uk/g8hqp/radio/projects/2mVertical.html

## ANTENNAS & LADDERS... OUCH!

**Bob Houlston, G4PVB**

At the tender age of sixteen I was fortunate to be a GPO apprentice telephone engineer. First lesson: Always obey the 1 in 4 rule. For every four units of measure up, measure one unit out. This ensures optimum friction of the ladder to prevent it slipping. Also, don't over reach. Ladder stays are relatively cheap so get one. I always remember the instructor saying at the conclusion of the lesson: "When you're at the very top of a ladder you only fall once".

The most dangerous place on a ladder is to be standing on the bottom rung to give it extra stability whilst someone is at the top working. If they drop a tool... get yourself eye protection and a hard hat. At nineteen I was a student nurse so I found out by caring for a scaffolder how a blow to the head, with no protection, can wreck someone's life and that of his new wife.

Stay well, stay safe.

## REMINISCENCES

**Tony Blythe, G3LOJ**

I am prompted to write by the photo of the QSL card from VS9ARC that adorns the centre of the clock picture submitted by Jud Connel, M6DBC, Last Word October 2013. I worked this station many times from Cyprus as ZC4AB. I still have the paper logs for these operations, through the original G3LOJ log pages are disintegrating.

## FRIEND REUNITED

**Victor Brand, G3JNB**

Twenty five years ago Julian, G3EHN and I were members of the old Thames Valley ARTS. So it was a real pleasure to get together again at the recent RSGB Convention at Horwood House. We spent most of Sunday swapping stories of the old days.

## WHAT KIND OF HOBBY?

**John Rowlands, MW1CFN**

One is always reluctant to add to moans in *RadCom* but, in a member-owned society, sometimes it's necessary.

Put simply: is amateur radio and those involved in various ways within it, trying to kill off the hobby? It does seem so.

Why? Well, it's a well-worn moan to say that the average age of ops seen within the pages of *RadCom*, as in the general Membership, is increasing step-in-step with time. This is not unique to amateur radio, but it is a huge problem. And when are we going to really see articles written – heaven forbid – for those who have passed some form of licence, still largely clueless about electronics, yet have a passion to learn?

I was happy to see the new GHz section announce in 2013 a new, democracy-led content. Yet, several issues later, I have yet

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to read a single thing that makes starting off in that band easier.

And to test the editor of *RadCom* further, I will ask: when will advertisers realise that, if they only push expensive, top-flight gear at the retired, the youngsters upon whose future their very business depends will simply not be there to buy anything?

Am I moaning from an armchair? Not a bit. I'm trying to get a club station set up at my local primary school. They are enthusiastic about it. With a bit of luck, it will materialise.

Come on, fellow hams – and the RSGB – it's time to stop being introspective and elitist, and time to really make a push for younger operators – and members!

## ENCOURAGING BEGINNERS AND YOUNG PEOPLE

**Ken Smith, G3JIX**

Over the last month or two, you have probably noticed the correspondence regarding some young beginners in amateur radio and the somewhat negative experiences they've suffered. This was triggered off by the letter in the June issue from Chris Whitelaw, MORKF about his daughter Kendra's feelings of alienation on the air.

From my earlier letter which you kindly published in 'The Last Word', September issue, a few old links once active years ago, reactivated somewhat.

One question an early enthusiast asked me was, "Whatever happened to QUA Associates?" Our little gang in a Northern Radio Club discussed and learned quite a lot from those articles. Another correspondent asked what had happened to the publication *DiY Radio*, once offered by RSGB, but which bit the dust years ago, leaving an empty hole. Finally, we had project YEAR, but that bit the dust too,

I recently spoke to a young teenager about his visit to a local radio society, but his answer did not inspire me. He said, "It was Okay, but everyone there had white or grey hair – they were so old!" (H'mm, I mumbled while trying to conceal my short white mop [G3... I thought, old timers now]) So, there is a generation gap obviously opening up, which as the old timers die off, will result in a rapidly shrinking amateur population. I thought amateur radio was one of the relatively few hobbies that were scientific interests. As one correspondent wrote in a letter to a magazine, also fairly recently, "No one has much interest in Ham Radio – why should they? They are all too busy on their cell phones and iPads and laptops – 'communicating'."

So are we on a losing wicket?

## MAST TRIUMPH

**David Lankshear, G3TJP**

There have been HF antennas on a fixed mast attached to the back of my house since the mid 70s, all without a word of complaint or criticism from any who could see it. Recently, I decided to move antennas to a telescopic tilting mast to facilitate easier adjustment and maintenance. It would also hide my antennas from view when not in use, so with the help of my good neighbour, Terry, a 30ft mast was installed. Before the antennas could be transferred, the Borough Council planners were involved through a complaint made by a different neighbour. Planning permission was refused on the grounds of its setting a precedent, but with the help and guidance of John, G4TEQ, of the RSGB's Planning Committee, an appeal was submitted and upheld, so my mast and antennas can stay. I am deeply grateful to John and the Committee as well as the Appeals Inspector, to whom I offer sincere thanks.

Subsequently, I decided to fit an electric winch to the mast and chose a Goodwinch, as they advertise in *RadCom*. Unfortunately my mast was slightly different from those that Goodwinch had encountered previously, requiring a modified backing plate and spacers to make it fit. David Bowyer and his staff supplied modified and new parts cheerfully, rapidly and free of charge for which I offer grateful thanks. It was a pleasure to have dealings with Goodwinch, who did more than it said on the tin, hence earning my unstinting commendation.

## CHARITY CAKES

**Peter, G4XEX**

Anyone who knows me will attest to my love of food, especially cakes and items of that nature. Without that simple fact the tale below makes much less sense.

A week or so ago my 8 year old daughter was playing quietly with her friend, drawing and colouring in pictures on my front lawn. In the past, if my boys had been playing so quietly, alarm bells would have sounded and I would have checked on them. But, being a girl, I left her to her own devices. Alas it was a mistake. For an hour or so later she came in and informed me that they had made posters and flyers advertising that they were having a cake sale for Macmillan's the following Sunday and had distributed them to all the houses on the street!

The next Saturday two dozen cupcakes were made and the following morning my daughter Charlotte set up her table outside. I was at the National Radio Centre that day and was looking forward to getting home, expecting there to be a pile of unsold cakes left for me to eat. How wrong I was. They all sold within an hour, raising £29.75.

This spurred me on to bring cupcakes to the NRC on the next Thursday to try and raise some monies for Macmillan's in memory of Vaughan Cherry, G3OFE, a regular volunteer who was taken by cancer earlier this year.

An e-mail was sent to Bletchley Park staff and volunteers inviting them to visit us in the National Radio Centre and join us for a coffee morning. I am happy to say that we had quite a few people pop in and managed to raise £36.50 for the Macmillan trust with our impromptu coffee morning.

I would like to thank all the staff and volunteers at Bletchley Park and the National Radio Centre for their generosity.

## CELEBRATING 50 YEARS

**A poem written by Clive Jones, 2W0CLJ to commemorate 50 years of Hoover Amateur Radio Club.**

**THE EVER PRESENT MEMBER**

He is a founder member of this radio club of ours,
He rules us all not by his voice,
but by his awful powers.

Some of us he has treated well,
and given us his airs and graces,
Others he has treated rough,
with lined and haggard faces.

He comes to every meeting,
ridiculous or sublime,
We do not know his callsign,
but he is known as Father Time.

He doesn't use the radio,
or send messages with Morse,
He hasn't got a callsign,
his voice is never hoarse,

If Father Time is good to us,
then worry we need not,
For future meetings of our club,
one regular we have got.

He'll be there sitting quietly,
a gentleman in his prime,
Who is that old, old member?
his name is Father Time.....

Keep calm and communicate!

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## *Available NOW*

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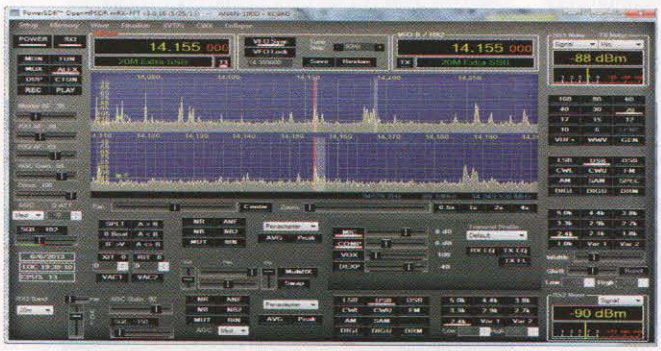
## ANAN-100E & ANAN-100DE 160-6m 100W


## It Not Only Looks Good!

Mac and Linux Coming Soon

**160m - 6m 100W Ethernet Connection** ANAN-100E £2229.95d ANAN-100DE £2999.95d inc. VAT



### The Apache-Labs Facts.

*The Price is Competitive. with 2 Year Warranty*
*The Connection is Ethernet*
*The Software is FREE*
*The Support is FREE*
*The Software is fully functional and Mature*
*Graphic Bandwidth is 1.5MHz (10kHz - 53MHz*)*
*All models are available immediately.*

** Requires FREE cuSDR Software*

### ANAN-100DE - Ethernet Linked

The ANAN-100DE is the top of the range SDR transceiver from Apache Labs. It has all the features of the ANA-100E but with the addition of an extra physical receiver. Its fourth generation design employs DDC/DUC AD conversion. All the CPU power required, is kept inside the PC for the fastest data processing. Used with a standard Windows PC the FREE Power SDR software, the ANAN-100D can provide a band display of just over 1.5MHz. That's pretty impressive. But if you switch to the new cuSDR, you can increase this bandwidth to over 50MHz! And you can have up to 7 slice receivers open with reception right down to 10kHz

## ANAN-10E
## QRP or VHF - UHF Driver

**Price £1559.95d inc. VAT**

Apache Labs are very mindful that to many, the attraction of SDR is clean high performance receivers and low distortion, low phase noise transmissions. Often this technology is used as the base driver for transverting up into the VHF and UHF regions. And of course not everyone wants high power anyway. The ANAN-10 is a great QrP transceiver with a performance and versatility that cannot be faulted. Indeed the ANAN-10 has the same performance as the higher powered 100W model. So whether you are looking for a clean transverting source, a radio to drive your linear or a QRP rig, the ANAN-10 has a lot to offer you.


### ANAN10 Brief Specification

160m - 6m 10W (Typically 15w)
3 ant. Sockets - 1 Transverter I/O - PTT out
10kHz - 55MHz Rx. Displays up to 384KHz
Software: PowerSDR mRX
Ethernet connection
13,8v DC - 165 x 63 x 140 (mm)

**STOP PRESS**
**ANAN-100DE**
**Can be switched to 1536KHz**
**Panoramic Display**

### ANAN-100E - A Serious 100W SDR Transceiver £2299

We have been very impressed by the performance of the ANAN-100E transceiver. It is a fully developed 100W transceiver that brings you top performance in both transmit and receive. It marks a dramatic improvement in SDR with a lot more promised for the future. That improvement is assured by keeping all the CPU power within the PC, by far the cheapest way of upgrading CPU performance. The rugged cabinet houses one of the most respected fourth generation designs coupled to a well proven 100W PA module. Three antenna sockets and dual transvert I/O ports make the radio ideal as a base transceiver or as a driver for a set of transverters for BHF and UHF,

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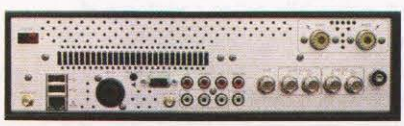
FlexRadio Systems®
Software Defined Radios

## We Specialise in SDR Transceivers

### Flex 6000 Series Arrives

From the USA, comes FlexRadio's latest design. A design that has been in the making for neaely two years, and is now available in the UK. We were the first dealer to bring commercial SDR transceivers to the UK.

### Flex-6500 £3499 Flex-6700 £5799



### The Flex 6000 series is Available from Stock

At the heart of the new Flex-6000 series is the new SmartSDR software that is a complete workover of the original open source program introduced by FlexRadio at the inception of their product range. The new software is closed source and has a brand new skin that makes it obviously different. The software is under continuous development which means that new features will be added as time goes on.

One of the most obvious developments that new owners will appreciate is the excellent receiver performance. It is designed to cope with the modern demands imposed upon ham radio receivers caused by contests, big signals and crowded bands. The software lets you set a wide range of parameters that best suits your operating requirements.

The two models offer very similar performance parameters, covering 160m to 6m and up to 100W of power output. Both models can operate up to 4m, although the power out on 4m is at the milliwatt and needs amplification. Receive coverage also extends from 135MHz to 165MHz, thus taking in 2m.

Carriage Charges: A-£4, B-£5, C-£8.50, D-£11

# ELECRAFT®

## The K3 HF-6m
## The favourite for DXpeditions


The favourite HF transceiver for DXpeditions because it is light, reliable and has a performance that is above almost every other transceiver on the market. Yet for all that it costs a lot less than many. It is designed by enthusiasts who know what is needed by today's operators. It uses rock solid circuits and technology together with probably the best firmware update system currently on offer to owners. That means your radio is continually improving. And that is why you don't see many second hand ones on offer. If you thought you radio had a good receiver, then wait until you try a K3. Then you will realise why the K3 is so popular. And you can build on your investment with all kinds of additional accessories. .

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| K3/10-Kit | £1499 D | K3/100-Kit | £1999 D |
| K3/10-Finished & Calibrated | £1599 D | K3/100-Finished & Calibrated | £2099 D |

### K3 Roofing filters from stock!

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| KFL3A-250 | 250Hz 8-pole | £139.95 C | KFL3A-2.1K | £139.95 C |
| KFL3A-400 | 400Hz 8-pole | £139.95 C | KFL3A-2.8K | £139.95 C |
| KFL3A-500 | 500Hz 5-pole | £89.95 C | KFL3A-6K | £139.95 C |
| KFL3A-1K | 1KHz 8-pole | £139.95 C | KFL3B-FM | £139.95 C |

### K3 Accessories from stock. from

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| K144XV-K | Internal 2m 8W transverter. Excellent low noise receive performance | £299.95 C |
| KPA3-K | Internal 100W used to upgrade from the low power 10W model | £449.95 D |
| K144RFLK | K144XV Reference Lock | £99.95 C |
| KXV3A | RX Ant. IF Out and transverter interface. Also needed for use with P3 | £129.95 C |
| KTCXO3-1 | High Stability Ref Xtal | £109.95 C |
| KDVR3 | Digital Voice Recorder - recommend we fit as needs front panel removal | £144.95 C |
| KBPF3 | General Cov. Rx Bandpass filter. Improves GC performance | £169.95 C |
| MH2 | Hand Microphone with Up/Down buttons. Eletret type. | £64.95 |

## The KX3 - Are you Ready for Portable Performance & Fun?

**Firmware Update Adds Voice Recorder!**

- SSB CW FM AM
- PSK31 RTTY
- AA Battery Tray
- Variable Selectivity
- DSP Filtering
- Same display as K3
- CW Keyer
- Voice & CW memos
- VOX & Full QSK
- Dual Receive
- Stereo CW
- + Lots More!

*The KX3 represents a milestone in ham radio history. In the past twelve months it has outsold every other transceiver that we handle, by a very large margin. To many, it is the perfect transceiver. And independent tests show that it outperforms almost every other HF transceiver no matter the cost or make. That is a pretty impressive statistic in itself. But as the radio has so much to offer, it is hardly surprising. Features include: 10W output, SSB CW FM AM PSK31 RTTY, AA Battery Tray, Variable Selectivity, DSP, Large Display, CW Keyer, Voice and CW Memory, Full QSK and VOX, Dual Receive, Stereo CW, Amazing Dynamic Range etc. It all adds up to a very special radio. And with the coming 100W PA, KXPA100 and the 2014 release of the 2m transverter, it has become the classic radio for portable or QRP work.*

### KX3 Accessories from stock. from

| | | |
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| MH3 | Hand Microphone | £64.95 B |
| KXFL3 | Dual Passband g Filter | £129.95 C |
| KXAT3 | Automatic Antenna Tuner | £169.95 C |
| KXPD3 | Iambic Keyer Paddle for KX3 | £129.95 C |
| KXBC3 | Internal Charger for board | £64.95 B |

| | |
|---|---|
| KX3 Kit-Kit | £899 D |
| KX3 Built & Calbrated | £959 D |

## The T1A Auto ATU 160 - 10m

*Ideal for the FT-817*
*Matches a Wide Range Of Antennas*


This month we focus on an amazing little Auto Atu that is just great for those who operate low power up to around 15W. The TI will handle just about any antenna that is coax or end fed wire. For balanced line, just add a balun. The beauty of this unit is that it is self powered via an internal PP3 battery. The unit only draws current when it is tuning. Once it has adjusted itself it draws virtually no current. So the battery life is extremely long. The unit is also light weight and can be used in all kinds of applications. Strap it to your FT-817 or put it in a waterproof box and use it to feed an outdoor vertical. It could also be inserted at the centre of a portable dipole. This is a ready built unit that has all kinds of antenna applications.

## The KPA-500 HF-6M 500W Solid State Linear
## Same Size as K3 - Works with Any Radio


### Ideal for True UK Power Limit - 6dB + Gain Over 100W Rigs

It's the perfect match for the K3 with totally silent T/R, and perfect QSK for CW operators. No warm up time and auto preset power reduction to the K3 (when KPA-500 active) on a band to band basis. All achieved using the optional AUX connecting lead. But you don't need to be a K3 owner to use this amplifier. Just connect RF input and and PTT to the amp. No ALC connection neededed with most modern rigs. You still get auto band changing via the RF frequency sensor. Typical drive for 500W is about 25-30W. Built-in PSU. Same size as K3!

## KAT-500 Auto 500W ATU

Incredible matching capability. This auto ATU will match just about anything up to 10:1 VSWR on an unbalanced line. (Use external 4:1 balun for balanced line.) It has three antenna outputs and integrates easily with the KPA-500 and K3. It can also be used with other linear amplifiers and handles up to 3:1 at 1kW.

**Built and tested £729 Kit £679.**

## The NEW KXPA100 100W Linear Amplifier (FT-817 Ready!)

*We are now taking orders for the new 100W amplifier that is the perfect partner for the KX3 or indeed the Yaesu FT-817. Like all of Elecraft products, this one has undergone extensive testing and is now having the final firmware tweaks. We have a demo model with the internal Auto ATU. The combined system is very versatile, combining QRP operation with QRO base station operation. And the total cost compares favourably with the K3. We expect to be able to deliver the first units sometime in November. So please register your interest now.*

***KXPA100K £699 KXPA100F £749 KXAT100K £299 KXAT100F £349***

## P3 Panoramic Display

The P3 really adds performance to your K3 transceiver. It will display live spectrum up to 200kHz wide with Average feature that lets you suppress noise spikes. A press of the cursor button QSYs the K3 to the display signal. The P3 is self powered from the K3. All leads supplied. You will need the KXV3A board fitted inside the K3. We can arrange this modification to your K3 if needed or supply the board.

### Why Would I Need a P3

There is a growing awareness that modern operation requires the ability to see what is going on away from the frequency of operation. Modern operation often involves tuning up and down the band looking for signals, and this particularly on a quiet band such as can happen on 10m or 6m. Having a visual display of a big slice of a band can save a lot of tuning and the chance of otherwise missing a signal. An extension of the normal graphic display is the waterfall display. This makes it very easy to spot weak signals amongst noise and is regularly used for spotting beacons. With the P3 you can not only spot a signal but place the cursor over the signal to immediately QSY to that spot in the band. You can also have the best of both worlds with a split screen. And lastly you can make some meaningful signal strength measurements and wave analysis.

Carriage Charges: A-£4, B-£5, C-£8.50, D-£11