RadCom

RADIO SOCIETY OF GREAT BRITAIN
ADVANCING AMATEUR RADIO SINCE 1913

AUGUST 2015
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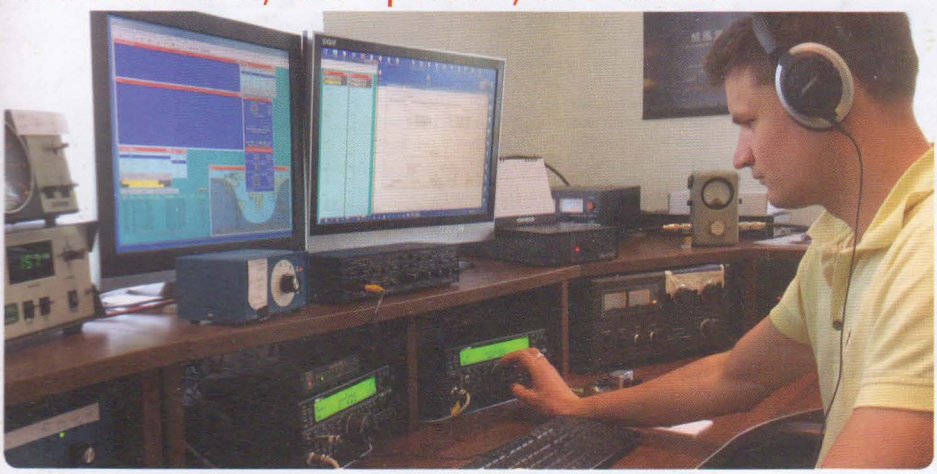
Friedrichshafen

Europe's biggest amateur radio show

One-letter call, one operator, two radios



MODXR describes operating SO2R as G9W in the CQ WPX CW Contest

Home-integrated SDR

Transceiver, amplifier and auto ATU in a box

Stabilise your /p volts

Get a constant 13.8V from your gel cells

WATERS & STANTON

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MFJ-269C HF-UHF Antenna Analyser

Isn't it time that you made antenna adjustments more quickly and more accurately? That's exactly what this analyser does. Improve your antenna performance and have full data information displayed.
* Freq Coverage 1.8-170, 415-450 MHz
* Frequency Counter * LCD readout
* SWR & impedance or SWR Bargraph
* Coaxial loss meter * VSWR Meter
* Signal Generator * FreqCounter)

£369.95c

MFJ-259C HF-VHF Antenna Analyser

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

£279.95c

AMERITRON AL-811XCE 600W

Legal limit amplifier with valve peformance and low cost valve replacement cost.

1.8 - 30MHz (Inc WARC) • Output: 600W PEP • Input: 50 Ohms 50W (typ) 100W (max) • Valves: 3 x 811A • Meters: Grid & Plate current Plate Voltage • Matching: Pi-network 50 Ohms • Voltage: 1,500V • Built-in 230V AC supply • By-pass switch • Shielded RF compartment • Matches Solid State Rigs • Switching: Close for transmit • Cooling: Quiet fan 20 cubic fpm • Size: 380 x 350 x 210mm Weight: 14.51kg

£929.95 d
£1,069.95 d

AL-811HXCE - 800W version of above.

MFJ-945E 300W 1.8-50MHz Coax

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

£133.95c

MFJ-971 1.8-30MHz Portable ATU

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

£125.95c

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 300 W and has internal 4:1 balun and 12 v illumination.

£139.95c

MFJ-949E 300W HF ATU + Load

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

£171.95c

ORDER NOW!

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MFJ

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.

£259.95c

MFJ-991B 300W Auto ATU

First dual power level Tuner -- Select 300 Watt SSB/CW and match 6-1 600 Ohm antennas Orselect 150 Watt SSB/CW and match extra wide-range6 -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.

£229.95c

MFJ-652 Voice Equaliser

MFJ-652 - Voice Band Equaliser (300Hz, 600 Hz, 1.2kHz, 2.4kHz center frequencies), low noise Preamp, UniversalMic-Interface, headphone monitor, PTT, Auxiliary-in, RF proof, aluminium case. 71/4W x 21/4H x 5D inches.

£136.95c

MFJ-901B

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

£109.95c

MFJ-986 1.5kW 1.8-30MHz ATU

Differential-T Tuner usesa differential capacitor making tuning easier. Broadband coverage ends constant re-tuning. A rugged roller inductor atuthat handles 1500 Watts PEP SSB power and covers 1.8 - 30 MHz continuously.

£379.95c

MFJ-989D 1.5kW ATU

New and improved! The world's most popular legal limit antennatunerjustgot 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.

£419.95c

MFJ-969 Antenna Tuner

300 Watts PEP SSB, antenna tuner, widest matching range, Cross-Needle SWR/ Wattmeter.

The MFJ-969 Antenna Tuner gives you MFJs superb AirCore Roller Inductor and full 6 meteres through 160 Meter coverage!

£219.95d

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.

£109.95c

MFJ-461 - Morse Code Reader

Place this tiny pocket size portable MFJ Morse Code / CW Reader near your receivers speaker. Then watch Morse code signals turn into solid text messagesas they scroll acrossan easy-to-read LCD display.

£94.95c

MFJ-890UK DX Prediction

- Beacon frequencies:14.1, 18.110, 21.150, 24.930, 28.200 MHz
- Configurable to local 60kHz Time Signal
- Built-inAtomic ClockReceiver
- Internal jumpers to program
- WWVH, WWV, JJY, MSF
- Manual Syncor AtomicSync
- Green LED shows synchronised time signal
- Eighteen Red LED's on World Map LED's light up showing current DX beacon
- 5 bands to choose from
- Supply 9V int or 12V Ext.

£129.95c

HEIL SOUND™

Heil PR-40 Series

The Heil PR-40 represents completely new dynamic microphone technology designed to give the clearest sound possible. You will be surprised by the clarity of sound when used on web casts and Ham Radio. With the rich and crisp sound of the PR-40 series, you are gauranteed to be theenvyof otherradiohams.

- Frequency response: 28 Hz to 18 kHz.
- Body Material: Zinc.
- Generating Element: Copper Wound dynamic with Neodymium magnet structure.
- Impedance: Balanced 600 Ohms Output, 3 pin XLR.
- Polar Pattern: End fire, Cardioid, uniform front to back discrimination.
- Output Level: -53.9 dB @ 1,000 Hz.
- Finish: Anodised Champagne Matt, Black and Gold, Chrome or Gold.
- NetWeight: 1 35 oz.

£289.95c - Champagne Matt
£369.95c - Chrome, B&G, Silver

WATSON

Watson W-8681-PROII

- Time display, including Hour, Minutes, Date / Indoorair humidity/temperaturemeasure and display.
- Outdoor air humidity/temperature receiving and display /Wind speed and wind direction display.
- Wind chill and Dew point temperature display / Rainfall data in hour, day, week, monthand totalsince lastreset.
- Barometricpressuredisplay / Upload weatherdatato internet automatically.
- Lux Meter (solar power index) / High Visibility Colour LCD Display.

The W-8681 -PRO is a professional wireless weather station with colour LCD display, robust sensors and wi-fi, and requires no connecting cable between the LCD monitor and the remote weather sensors.

£199.95c

Watson W-8681-MKII

This is a wireless weather station that requires no connecting cable between the LCD monitor and the remote weather sensors. The range depends upon local obstructions but the normal 150m range will satisfy most requirements.
- Time and date are locked to the German DCF longwave atomic standard signal.
- Displays historic data.
- Software programme that allows you to link your LCD panel to your PC viatheincluded USBlead.
- Weatheralarm thatis triggered by data sensors.
- Touch LCD screen.
- Display Indoor Air Pressure & History Frequency 868MHz

£79.95c

Watson W-8683

£29.95c

- Indoor Temperature F° /C°
- Outdoor Temperature F° / C°
- Dew Point Display
- Max. / Min. Temperature Record
- Indoor Humidity % RH
- Outdoor Humidity % RH

This model can display a wide range of data and is ideal for a wide range of uses. The smart free standing display is bright and can also be wall mounted.The external temperature/humidity detector can be mounted outside and is wirelessleyconnected on 433MHz. A complete weather forecaster and weather station in one very compact and portable package. You could even take it on holiday!

Heil Handie Talkie Headset (HTH)

NEW

The new Handie Talkie Headset (HTH), from Heil sound is a singlesided, lightweight headset, which provides high quality, discreet two way communications.
- Reversible Earpiece for left or right orientation.
- In-Line PTT with lapel clip for secure/convenient placement of PTT.
- Flexible gooseneck mic boom for optimal placement of the microphone.
- Durable fibre reinforced cabling.
- Adjustable Headband made of durable PVC.

£34.95 Compatible with: Icom, Yaesu & Kenwood

Heil PR10RPKG & PR10PKG

This small but mighty microphone will bring your radio to life with high quality speed reproduction and perfect balance. It is built around a full 1-1/8" diameter dynamic element and produces high quality sound from 85Hz to 16kHz.
ThePR-10 Package includes a LB-1 table base.
The PR-10 Packages areavailable in red with a white LED light or black with a blue LED light.

- Output Connection: 3 pin XLR PR 10
- Generating Element: Heil Dynamic
- Frequency Response: 85 Hz - 16 kHz
- Polar Pattern: Cardioid
- Impedance: 600 ohms balanced
- Output Level: -55 dB @ 1,000 Hz
- Diaphragm: 1 1/8" Low-mass aluminium
- Weight: PR 10: 12 oz LB-1: 22.5 oz
- Mic Finish: Black SatinEpoxy

£249.95c

Watson W-8681-SOLAR

- Touch LCD Screen
- Atomic Locked Day, Date & Time
- Indoor / Outdoor Temperature °F / °C + Max / Min
- Wind Speed & Direction
- Rain Gauge (Self-Emptying) & History Indoor / Outdoor Humidity
- Barometerwith Trenddate
- Weather Forecaster & Alarm
- USB Connection to PC (Windows 2000 or later)
- "EasyWeather" PC Software Control & Data Programme
- Historic Data Storage & Display
- Indoor Air Pressure & History
- Frequency 868MHz

BACK IN STOCK

The W-8681-ST1 wireless transmitter uses solar energy to recharge it's internal AA size rechargeable batteries. This product will power all the sensorsconnected to it and transmit thedata to the main unit. The W-8681 is a wireless weather station that requires no connecting cable between the LCD monitor and the remote weather sensors.

£99.95c

Watson W-8685

- Indoortemperature F°/C°
- Outdoor temperature F°/C°
- Max./Min. Temperature memory
- Wireless link to outdoor sensor
- 12 / 24 hour clock
- Alarm feature
- Rollingdate
- Bright LCD Display
- Displaymodule 60 x75mm
- Blister packaging foreasy display
- Totally Portable
- Long Battery Life

£9.95c

Watson W-8682-MKII

BACK IN STOCK

- Transmission Distance In Field: 100m (300ft)
- Frequency: 868MHz
- Wireless - no more wires!
- Comes with everything you need to set it up in your garden.

A Complete Wireless Weather Station. The W-8682-MKII is ideal for radio enthusiasts and nonnal domestic use. This offers quite exceptional value. It gives a clear picture of the current and future weather in your locality. There areno wires, so that outside sensor canbe placedanywhere outside that is convenient. You get a self contained outside sensorthat links back by wireless to the base station display.

£49.95c

ICOM

Try Before You Buy!
The UK's **Largest** Demo Store

WATERS & STANTON
EUROPE'S HAM STORE

We are able to demonstrate all the latest ICOM products. This underlines our enthusiasm for this great range of ham radio products. We can demonstrate everything from 160m to 23cms. Justin, G0KSC and Peter, G3OJV are happy to arrange demos on Icom products. Can't decide what you want? Either call in or call us for advice.

IC-5100 Deluxe £679d

The ID-5100E Deluxe VHF/UHF dual band digital mobile transceiver features a large responsive touch screen, integrated GPS, optional Bluetooth® connectivity and support for Android™ devices.

IC-7100 £1058.95d

The IC-7100 is a new transceiver from Icom that offers 100W from 1.8-50MHz, 50W on 4m and 2m and 35W on 70cms. A big leap forward with the new colour touch screen and a convenient built-in speaker in the remote head unit.

IC-7200 HF - 6m £825d

A rugged HF base station that offers superb performance with digital DSP for selectivity.

IC-7230E £269d

This stunning new VHF/UHF dual band mobile transceiver provides VHF/VHF, UHF/UHF simultaneous receive capability as well as VHF/UHF receive. An independent tuning knob, separate controller and large display makes it ideal for easy, intuitive mobile operation

YAESU

FTM-400DE £524d

Yaesu FTM-400DE dual band mobile transceiver operates on 2m and 70cm. Features 4 modes: V/D mode - Voice and Data communication, Voice FR/ Data FR - uses the full rate of data capacity for voice/transferring data and Analog FM - effective with weak signal strength .

£29.00 Cashback Available!

FT-450D HF-6m £549.00d

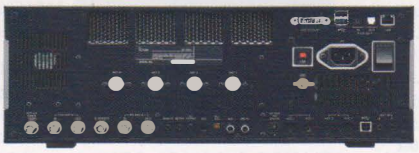
Proof that you can get Yaesu's quality without breaking the bank! You still get the 160m - 6m at 100W and a host of features that make this one of our best sellers. Look at the price!

Yaesu FT-DX1200 £1,139.95d

The FT DX 1200 provides up to 100 Watts on SSB, CW, FM, and AM (25 Watts carrier) and a rugged state of the art highly balanced receiver circuit configuration for top performance on today's crowded bands.

The ICOM IC-7851 HF 6m

NEW



- Four 32-bit Floating Point DSP.
- +40 dBm ultra high Intercept Point.
- Automatic Tracking Preselector
- Two Independent Receiver Circuits
- 200 Watts Output
- Antenna Control
- 7 Inch Wide ColorTFT LCD
- SD Card Slot
- RTTY/PSK31 Operation without PC
- Manual Digital IF Notch Filter
- Configurable AGC
- Dual Scope Function
- Dual Passband Tuning
- DigitalVoice Recorder
- Ethernet Port
- Voice Synthesizer
- RS-232 Port

£8,999.00

The 3rd generation flag ship transceiver from Icom is here...

With the design of the IC-7851, Icom's engineers focused on a new Local Oscillator (LO) that drastically reduces the phase noise. As a result of this design, the purity of the LO achieves a Reciprocal Mixing Dynamic Range (RMDR) of 110dB. In addition to the incredibly clean LO allowing you to hear the weak signals, the new spectrum scope design enables you to see the weak ones! Faster processors higher input gain, higher display resolution and a cleaner signal from the receiver's LO will give you a new window into the RF world.

Yaesu FT-817ND £448.95c

The Yaesu FT-817ND is the world's first self contained, battery-powered, Multi-mode Portable Transceiver covering HF, VHF, and UHF bands! Providing up to five watts of power output, the FT-817ND is designed for operation on the 160-10 meter HF bands, plus 6 meter, 2 meter, and 70 cm bands. Whether your preffered operating mode isSSB, CW, AM, FM, Packet, or SSB-based Digital modes the FT-817ND wil be ready. **£36.00 Cashback Available!**

Yaesu FT-1DE £278.00d

- Compact Size
- Rugged Case with Water
- Protection
- High Power and Long Life
- Operation
- AF Dual Control
- Automatic Mode Selection
- Smart Navigation Function
- Wideband Receive Coverage

£29.00 Cashback Available!

KENWOOD

Kenwood TS-2000E £1,424.00d

The Kenwood TS-2000E all-Mode Multi-Band Transceiver operates on HF/50/144/430 MHz Bands. Comes with Dual channel receivers, a built in ATU, TNC and computer COM port offering today's demanding Amateur operator high performance standards without the compromising limitations.

Kenwood TS-2000X £1689d

The Kenwood TS-2000X all-Mode Multi-Band Transceiver operates on HF/50/144/430/1200 MHz Bands. Offering greater frequency range than the TS-2000E. It's dual channel receivers, a built in ATU, TNC and computer COM port allows for today's demanding high performance standards without the compromising limitations.

IC-7700 HF-6m £5,745.00d

The IC-7700 HF/50MHz transceiver shares many features with its big brother, the world famous IC-7800. With two independent DSP units, a +40dBm* 3rd order intercept point and ultra wide dynamic range to name but a few of the features.

- 110dB dynamic range.
- +40dBm 3rd order Intercept Point.
- More than +110dBm 2nd order intercept point.
- High specification inband IMD.
- Band pass filter and mechanical relays.
- DIGI-SEL (Digital pre-selector) function.
- Pre-amplifiers.
- 1st mixer.
- Two AGC Loops.
- 7-inch wide colour TFT LCD

Icom ID-51E-PLUS £399.00c

- Lightweight & Compact Body.
- V/V, U/U, V/U Dualwatch.
- DR (D-STAR Repeater) Mode Operation.
- Integrated GPS Receiver.
- Independent AM/FM Receiver.
- Voice Memory Function.
- MicroSD Card Slot.
- Total 1304 Memory Channels.
- 5W Output Power.

ID-51E PLUS is an evolution of the popular ID-51E which is popular within the D-STAR Amateur radio community. The new model incorporates popular features found in the original including integrated GPS, an independent AM/FM receiver and V/V, U/U, V/U Dualwatch, but also includes enhancements for digital operation and compatibility with the RS-MS1A free Android application.

Kenwood TS-990S £5,589.95d

The TS-990S heralds a new era in HF technology from Kenwood. Designed from the ground up, this new design incorporates features that are unique to ham radio.

- HF/50MHz Flagship Base Station.
- 200 watts output from S0V FET Push-pull PA stage.
- +40dBm Intercept Point RX.
- Main RX - Down Conversion on all bands.
- 270Hz/500Hz/2.7kHz/6kHz/15kHz Roofing

Kenwood TS-590SG £1269.95d

The enhanced TS-590SG provides affordable, high performance amateur operation on the HF and 6 meter bands. The TS-590SG has the best dynamic range in its class. handling unwanted adjacent off frequency signals with end results of excellent receive performance.

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

WATERS & STANTON

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Opening: Tuesday - Saturday 9.15am - 5pm

Web: www.wsplc.com
Blog: blog.wsplc.com

VISA MasterCard PayPal

Sponsors of RSGB Club Of The Year

DIAMOND ANTENNA

DIAMOND GSV-3000 £219.95c

The Diamond GSV-3000 is a variable volts 30A max power supply so it is suitable for most HF radios.

The GSV-3000 has 30A continuous rating at 100% duty cycle, the DC output range is adjustable from 1 to 15 Volt with a maximum of 3 mVpp ripple.

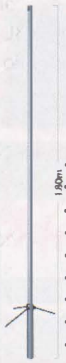
DIAMOND MX-2000 £84.95c

The Diamond MX-2000 is a Mobile Triplexer that splits a single SO-239 input into three PL-259 outputs.

Outputs are:
1.6 - 160MHz
110 -170MHz
300 - 50MHz

Contact us for more information on our range of Duplexers and Triplexers!

DIAMOND X-5000 £129.95d



X-5000 Diamond 2m/70cm/23cm Fixed Station Vertical. This model is made of fibre glass construction, pre-tuned and fully weatherproofed. Mast mounting brackets are included!

- Frequency bands 2m/70cm/23cm
- Gain 4.5/8.3/11.7dB
- Power 100W
- Type 6/8, 3x5/8, 7x5/8
- Length 1.8m
- Radial length 19cm
- Mast size 30-62mm
- Wind velocity 60m/sec
- Weight 0.9kg

DIAMOND VX-1000 £129.95d

The diamond VX-1000 is made of fibre glass, pre-tuned and fully weatherproof. No radials are required and mast mounting brackets are included!

- Length: 1.42m / Weight: 0.8kg
- Gain:1.),2.15dBi(144MHz),5.5dBi(430MHz)
- Max power rating: 150W SSB(Total)
- Impedance:50ohms
- VSWR: Less than 1.5:1
- Rated wind velocity: 60m/sec.
- Mast diameter accepted: 30mm to 62mm

Handheld Transceivers

YAESU

FT-252 2m Handy £69.95

Genuine Yaesu
Genuine Quality!

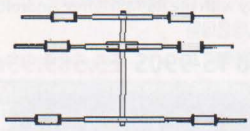
- 144-146MHz
- Rx 139-174MHz
- Loud 800mW Audio
- Tx 5W, 2W and 500mW
- CTCSS & DCS Tx & Rx
- 9 DTMF Auto Dial Memories
- 1Ah Li-ion Battery & Charger

VX-3E	2m / 70cm Handy Wideband receive	**£119.00c**
VX-6E	2m/70cms handy, Wideband Receive	**£164.005c**
VX-8DE	6/2m/70cm Upgraded APRS	**£259.00c**
TH-F7E	2m/70cm + wide receive inc. SSB	**£236.95c**
TH-D72E	2m/70cm GPS & TNC + SiRF	**£426.95c**
KG-UV8D	2m/70cm Handheld	**£99.95c**
IC-V80E	2m 5.5W hand held transceiver	**£104.95c**
ID-51E PLUS	2m/70cm DSTAR handy transceiver	**£399.00c**
FT-210E	2m handheld transceiver	**£99.95c**

2 year warranty on Yaesu radios!

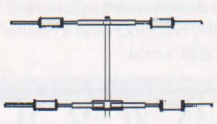
Mosley Mini Yagis - They really Work!

MINI-32-AW 5 BANDS 3 ELEMENTS £449.95 d



Bands:	10-12-15-17-20m
Power	1Kw SSB
Gain	10=6.1 15=4.2 20=3.5 (dB)
F/B Ratio	10=16 15=13 20=12 (dB)
12m & 17m	Unity gain and F/B Ratio
Boom	6ft
Longest El.	19.8ft
Turn Radius	10.3ft
Weight	12.5 lbs
Mast Size	1.5"

MINI-32-A 3 BANDS 2 ELEMENTS £349.95 d



Bands:	10-15-20m
Power	1Kw SSB 500WCW
Gain	10=6.1 15=4.2 20=3.5 (dB)
F/B Ratio	10=16 15=13 20=12 (dB)
Boom	6ft
Longest El.	19.8ft
Turn Radius	10.3ft
Weight	8 lbs
Mast Size	1.5"

Simple Small Garden recommendation. If space is really tight then we recommend that you consider the Mini 10-15-20m dipole. Just 20ft long, it can be installed at the top of a mast without a rotator. This gives you a very neat fixed dipole that weighs very little and only needs a single mast support. Handles full UK power. £239.95.

WATSON

W-SDRX1 SDR Receiver

The W-SDRX1 is a super wide-band USB SDR Receiver which offers incredible performance across its operating range of 100kHz to 2GHz.

It has two SMA antenna sockets, one for HF(100kHz to 30MHz) and the other for VHF/UHF(30MHz to 2GHz).

As well as the addition of HF frequencies the W-SDRX1 also has built in bandpass filtering for improved performance.

Stock turnover is fast so pick one up whilst you can!

£99.95c Carriage Charges: A-£4, B-£5, C-£8.50, D-£11

UK's Largest Selection of SDR Ham Radio

APACHE LABS

We are exclusive distributors of the range of Apache Labs SDR transceivers.

ANAN-200DE

The ANAN-200D is the most powerful Amateur Radio Transceiver available today, it builds on the very successful OpenHPSDR Hermes and the Apache Labs Angelia designs and offers unprecedented performance/ functionality not available in any other HF/6M radio transceiver. **£3449.95 d**

ANAN-10EE

Here's is the new intro level transceiver from Apache Labs. 10W output on 160m to 6m with 2 receiver slices and the Apache Labs performance! **£999.95**

ANAN-10E	10W	**£1359.95 d**
ANAN-100E	100W	**£1959.95 d**
ANAN-100DE	100W (dual Rx)	**£2849.95 d**

Tmate-2

Allows Apache Labs & FlexRadio to have analogue VFO and button control surface. **£269.95 c**

FlexRadio Systems®

Software Defined Radios

The FlexRadio software now makes remote operation so much easier.

Flex-6700

The latest transceiver from Flex radio offers LF - 77MHz operation and receive on 2m. This model has dual hardware receivers. **£5799**

Other Models

Flex-6700R	Receiver	**£4699.95 d**
Flex-6500	Transceiver	**£3499.95 d**
Flex-6300	Transceiver	**£1869.95 d**

Expert Help

Justin, G0KSC, designer of the InnovAntenna range, is now our SDR consultant. He will be happy to pass on his experience of SDR from LF to Moonbounce!

Dual Band 6m & 4m Yagi

Single Feed Point.

70-50-YAG-6	**6 el** (3/3) 5 6/4m Yagi 1.175m boom	**£139.95**
70-50-YAG-8	**8 el** (4/4) 6/4m Yagi 2.1m boom	**£184.95**
70-50-YAG-9	**9 el** (4/5) 6/4m Yagi 3.5m	**£212**
70-50-YAG-11	**11 el** (6/5) 6/4m Yagi 4.9m boom	**£254.95**
70-50-YAG-12	**12 el** (6/6) 6/4m Yagi 5.4m boom	**£339**

NEW VHF QUADS
Even Fits In Your Attic!

144-LFAQ-2 **2m 2 el** 14cms Boom! 6.7dBi Gain **£49.95**

144-LFAQ-3	**3 el 2m** Quad 70cm boom 9.5dBi	**£74.95**
144-LFAQ-4	**4 el 2m** Quad 1.26m boom 10.6dBi	**£84.95**
50-LFAQ-2	**2 el 6m** Quad 40cm boom 6.8dBi	**£99.95**
70-LFAQ-2	**2 el 4m** Quad 29cms boom 6.7dBi	**£79.95**
70-LFAQ-3	**3 el 4m** Quad 1.18m boom 8.9dBi	**£93.45**

The new VHF quads offer super compact size yet remarkable performance.

VertiGo HF MultiBand "No Trap" Verticals

40m - 10m Self Supporting. Models up to 1.5kW

NEW

The new **VertiGo** models, made by InnovAnntennas, have removed trap losses and are completely self-supporting. They use a base mounted auto ATU with coax DC feed. You even get gain on some bands!

VertiGo-33H	**VertiGo-43H**		
* 10m Tall	* 14m Tall	**VertiGo-33** (Less ATU)	**£199**
* 40m-10m	* 60m-10m	**VertiGO-43** (Less ATU)	**£249**
* 1.5kW	* 1.5kW	**Vertigo-33H** with ATU	**£879**
* Self Supporting	* Self Supporting	**VertGO-43H** with ATU	**£929**
		VertiGo-33L (600W)	**£539**
		VertiGo-43L (600W)	**£589**

ANTENNA ANALYSER VAA-1

£249.95c

- 500kHz - 60MHz
- Minimum Steps: 100Hz
- Scan width: 300kHz - 48MHz
- VSWR: 1.0 to 99.9
- Impedance: 0.1 - 999 Ω
- Interal Lithium cell
- Colour LCD Screen
- USB Charging lead

Another winning product from W & S. Here's a great new antenna analyser that gives you a fast way of adjusting your antenna. You can read VSWR and impedance in a clear graphical form, on the sharp colour display. The analyser has a built in rechargeable battery that can conveniently be recharged from a USB source. This offers total portability, no matter where you choose to use it.

Contents

RadCom

THE RADIO SOCIETY OF GREAT BRITAIN'S MEMBERS' MAGAZINE

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Notices to readers concerning errors and omissions and advertisments can be found at www.rsgb.org/radcom

RadCom is published by the Radio Society of Great Britain as its official journal and is sent free and post paid to all Members of the Society.
The September edition of *RadCom* is expected to arrive with most Members by 22 August, although this can take up to a week longer in some cases; international deliveries can take longer still.

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Online *RadCom*: www.rsgb.org/radcom/Technical supplements
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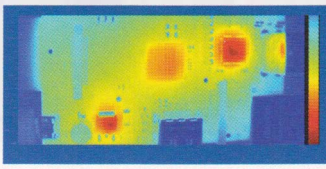


Thermal imaging for the radio amateur – look at the world in a new way! – p24

Cover image: Visitors try out radios on display at Ham Radio, Friedrichshafen.

Image: Christa Thoma, copyright Messe Friedrichshafen.

Technical Features

Due to circumstances beyond our control we are unable to include Homebrew this month but it will be back in September.

Regulars

You can support DX-15

The RSGB's Youth Committee is running a Kenwood-sponsored Youth DXpedition and will be active as MC0RYC from the Brecon Beacons in Wales from 23 to 30 July. They'll be on all HF bands and VHF including satellite operations.

Throughout the course of the week, the young Members will be taking part in a range of activities including operating SOTA summits Pen-y-fan (SOTA reference GW/SW-001) and Waun-Fach (SOTA reference GW/SW-002). Provided the weather isn't too bad, SOTA activations will be taking place on 25 and 26 July in the afternoon and on the 28th and 29th at 1200UTC.

They will be doing many other activities including ARDF, antenna-building workshops and encouraging good radio operation. As well as having fun, training the young Members to be competent and confident radio amateurs is also important.

You can support them by following their progress on Twitter (@theRSGByouth), working the Youth DXpedition or listening for the callsign MC0RYC during the IOTA Contest over the weekend 25 and 26 July. Please work the young team if you can, so they can experience the full flow of a big contest. A dedicated e-mail address has been set up if you have any questions or would like to set up a sked: m0ryc@rsgb.org.uk

A QSL card will be available for those who wish to receive one, both direct and via the Bureau. The team are keen to encourage responsible QSLing and OQRS will be available via *Club Log*.

DX15 has been made possible by generous sponsorship from Kenwood as principal sponsor and other prime sponsors SOTA, the RCF and the RSGB Legacy Fund.

Club of the Year 2015

Once again, we are indebted to Waters and Stanton for their generous sponsorship of this competition.

This year, the theme will be promoting amateur radio and we will again be judging entries in two categories: clubs with less than 25 members and clubs with 25 or more members – during 2015 – and there will be separate prizes for each category. There's still plenty of time to organise some amateur radio events to showcase the hobby. Entry is simple; you will need to fill out a form detailing the activities the club has undertaken – exams, special events, outreach and promotion as well as normal club activity – see www.rsgb.org/coty

The judging criteria look at elements such as how successful has the club been in encouraging 'new blood' into their membership, what initiatives have the club taken during the year to develop the skills and interests of their members, how active is the club on the air and what outreach activity has the club undertaken to promote amateur radio.

In order to determine regional winners, entries will be judged and ranked by a Regional Manager from outside of the region to ensure impartiality. The Board will determine the national winners using a published scoring system.

Practical Club Nights

The Inspire Group is doing some research for the Society on the benefits and challenges of running regular practical sessions during club nights. Does your club organise this type of event? If so, we'd like to hear about your experiences and find out what worked, what didn't and what you'd like to do if you had the resources. Please contact Michael, G0POT via g0pot@metalkettle.co.uk or 01635 672 787.

PSC volunteer needed

The RSGB Propagation Studies Committee (PSC) is seeking someone to develop a web program that graphically displays HF propagation predictions. The propagation information will be obtained by running ITURHFProp and utilising its text-based output. No prior experience in propagation is expected only a good web programming background. Interested parties should contact Gwyn Williams, G4FKH at g4fkh@sky.com.

Club of the Year presentations

The RSGB Region 2 Club of the Year 2014 trophy was awarded by Doug, GM6JRX (DRM for the Highlands) to Danny, MM3YHA Chairman of Pentland Firth Radio Hams with Rona, MM3YMU (the Club Secretary) holding the certificate.

Bob, GM4UYZ received the Region 1 Club of the Year 2014 trophy on behalf of Cockenzie & Port Seton ARC from Marcus, MM0ZIF. This was at a special event at the Museum of Flight where they managed 1302 QSOs in the log over the course of the day.

Recognising and Encouraging Volunteers

There is no doubt that the success of the RSGB's support for amateur radio is founded on the unstinting efforts of its volunteers. The Society *is* its Members and, if it were not for the input from the many Members who freely give of their time and expertise, the reach of the Society would be far less. Here we highlight the work of two areas of voluntary activity and give an insight into the roles that individual volunteers play that demonstrates the breadth and scope of voluntary endeavour.

VOLUNTEER SPOTLIGHT Intruder Watch

The RSGB Monitoring System, more popularly known as the Intruder Watch, is a small team of volunteer observers and forms part of the IARU Monitoring System. As such it submits reports of non-amateur transmissions heard on the primary HF amateur bands to both the Ofcom Monitoring Station at Baldock and the IARU Region 1. While most Intruder Watch activity is centred around the HF bands, Intruder Watch also assists Ofcom and AROS with reports of non-amateur transmissions in the VHF and UHF bands.

Intruders removed from our primary amateur bands include broadcast stations, military data transmissions, faulty positioning installations, coast stations, embassies, fax stations, faulty set-top boxes and numerous others.

Most information received by the co-ordinator arrives from regular observers, but occasional reports are also welcome from anyone who finds what may be an intruding signal on one of our primary amateur bands. This information can then be passed on to a suitably equipped observer for further investigation. All reports are welcome and will be acknowledged.

Data intruders are by far the most common and it is an area where we could use more support. Other non-data categories of intruding signals include CW, broadcast stations, speech and over-the-horizon radar (OTHR). Any report should include as much information as possible, but preferably frequency, date, time (UTC), mode of transmission, any identification signal or callsign, language used, text (where appropriate) and beam heading wherever possible.

Intruder Watch is looking for more volunteer observers so if you think you might like join our team do please send an e-mail to the Intruder Watch Co-ordinator, Vaughan Ravenscroft, M0VRR, via iw@rsgb.org.uk

TO BECOME A RSGB VOLUNTEER E-MAIL GM.DEPT@RSGB.ORG.UK

VOLUNTEER SPOTLIGHT RSGB Training and education Committee (TEC)

One of the joys of the TEC is working with amateurs who want to improve their skills and help others do the same. Whether it is studying for the exams, improving your teaching skills, writing exam questions, or reaching out to schools, you will find TEC members actively involved.

This year's big success has been the new Training the Trainers programme. With the pilot delivered right at the start of the year and three more finished or scheduled within 2015, demand has been very high. Everyone who attends finds them a lot of fun, stimulating and really useful for when they go back to their own clubs. They are an excellent chance to think about training in a different way.

Equally important are our Exam Writing workshops. The exam question databank is used to generate exam papers, so it is important that the exam questions are carefully thought through. The Workshops allow you to take a basic idea and polish that to a good standard. Exam questions also need to be tied to particular parts of the syllabus.

Behind the scenes, the RCF and the RSGB are undertaking a thorough review of the syllabuses for all three exams. This important work will bring the material up to date while also addressing issues such as balance between the three levels, the role of practical work and many other aspects.

We are also starting an exciting project for linking to schools, with the aim of supporting hard-pressed teachers with resources which will stimulate their pupils while also showing what radio can do. We know from Buildathons and On-Air days that school children can be hugely enthusiastic about radio, so this project has tremendous potential to fire-up the next generation.

Philip Willis, M0PHI

TO BECOME A RSGB VOLUNTEER E-MAIL GM.DEPT@RSGB.ORG.UK

Licence Revalidation

Ofcom has advised the Society that plans will be drawn up to revoke licences that have not been revalidated as required by the licence conditions. This is an on-going process and every month some 200 licences become due for revalidation. The quickest way to revalidate is to do so online via the Ofcom website, or by e-mail to amateur.validations@ofcom.org.uk This can be done at any time. If you need assistance in the process, Ofcom staff are available to help, but please be patient during times of heavy workload.

Robin Hewes, T.ENG, FSER, G3TDR (SK)

Robin Hewes, G3TDR, became a silent key in June. He was an enthusiastic member of the Society serving a term on the RSGB Council, during which he was the Events Organiser and Manager of many RSGB exhibitions and rallies.

He edited the *RSGB VHF Handbook* as well as contributing many original circuits and information. Together with George Jessop, G6JP, he produced the *RSGB Data Reference Book*, which had a worldwide sale.

His amateur radio work extended to his local club Echelford ARS where he served as Secretary, Chairman and President. He was also a volunteer operator at the Science Museum demonstration radio station, GB2SM.

He will be very much missed by his many friends.

Geoff Voller, G3JUL
President, Echelford Amateur Radio Society

Friedrichshafen

The RSGB team at Friedrichshafen welcomed the following Members and visitors to the stand.

2E0ORN
DC5KUA
DH5JBR
DJ2XB/ M0DXM
DK3QF/ G5BAS
DK4SR
DK5RV
DK6QI
DL1CLX
DL2SEW
DL3RR/ M1CPL
DL5YL
DL7TO
DL8JCT
DL9HAL
DL9KU/ OE5UHM
DL9SAW
DM1CM
DM2DXA
DO5MCL
EI2CR
EI7CD
EI7IG
EI8BP
EI8IU
EI9DZ
F1EYG
F5HNQ
F5TJC
F6CSQ
F6DGF
F6GNK
F8ATS
F9IE/ KD8SSP
G0DWV
G0FDZ
G0ING
G0KOK
G0KZT
G0MQP
G0MRF
G0OFN
G0PZA
G0VEH
G0VHL
G1POJ
G1SAA
G2L
G3KMA
G3LHZ
G3LQP
G3OGP
G3PRU
G3PYE/P
G3ROO
G3SVL
G3SWC
G3TCT
G3TCU
G3TJE
G3UVR
G3VGR
G3WKL
G3YBO
G3YJQ
G4ANN
G4BWP
G4CCC
G4CDY
G4CXQ
G4DDP
G4DPH
G4EFO
G4ERO
G4FAD
G4FNL
G4HGI
G4HNF
G4IRN
G4IUA
G4KDR
G4KGP
G4LOO
G4LRP
G4LUL
G4NEY
G4PZK
G4TMC
G4UEM
G4VSS
G4XRV
G5LP
G6GLP
G6JYB
G6YIQ
G7CZZ
G7LLQ
G8ATD
G8DZH
G8GQS
G8GTZ
G8JWT
G8PUO
G8ZZK
GB3PYE/P
GD0OUD
GD1MIP
GD6IA
GI4DOH/ GI5I
GI4FUE
GI4GUH
GM0SEI
GM0XAV
GM3PPE
GM3ZMA
GM4FDM
GW0ANA
GW3XJQ
GW4HAT
GW4ZAR
HA0HW
HA5MA
HB9AYX
HB9MDU
HB9TWS
I1CMA
I1POR
IK0AZG
IK2IZG
IK4RVG
IT9SPB
IU6AKY
IZ2IZG
IZ2NXF
IZ3GJY
IZ4FTG
JJ3NAW
JS6ROO
KW4CIV
LU2AM
LZ1ZQ
M0BIK
M0CAD
M0CFW/ JK3GAD
M0CZR
M0DDC/ G8AQO
M0GZQ/ HB9JCI
M0GUZ
M0LCR
M0LJD
M0NKR
M0RBI
M0TDD/ BY7KTO
M0TWM
M1ACB
M1BXF
M1HOG
M2W
M3ZKA
MD6KBW
MI5JYK
MM0JJV
MW0RLD
MW3WCS
N6WS
OE3EVA
OE3LHB
OH6HCQ
OH6JE
OK2NET
ON4RK
OZ2UN
OZ7AGR
PA0PA
PA3XA
PA9TV
PE1CMP
PJ4DX
PY2YP
S5IRU
SM5DEV
SM5ENX
SM5PEY
SP6EBK
SP7WME
SV1OI
SV1OZ
SV1QN
SV2OXX
VK4BAA
W2APF
YO5CUX
ZS4BS/ 7P8DG

UK Spectrum Strategy

In March 2014, the Prime Minister, David Cameron announced the UK Spectrum Strategy. The Department of Culture, Media and Sport (DCMS) has subsequently given significant prominence to the industry-led UK Spectrum Policy Forum which techUK is facilitating. The Forum has been established as a sounding board to Government and Ofcom on future approaches on spectrum with a view to maximising the social and economic value from the spectrum. The Prime Minister has stated the ambition to double "the economic benefits of spectrum to UK companies and consumers from roughly £50 billion today, to £100 billion in 2025". The UK Spectrum Policy Forum, open to all users of spectrum, is the main vehicle for harnessing user insights and informing these policy decisions.

On 30 June, Graham Murchie, RSGB Chairman and Murray Niman, Chairman of the RSGB Spectrum Forum presented to the UKSPG the case for amateur radio. The presentation can be found at www.rsgb.org/ukspf The UKSPF will be completing a report that will go to DCMS later in 2015 and this will include the benefits of amateur radio. The Forum recognised that amateur radio is not focussed on economic gain but that the social benefits are significant. This is an excellent example of how the RSGB works 'behind the scenes' to help ensure the future of amateur radio.

New DRMs Needed

There are two recent vacancies for the post of Deputy Regional Manager in Dorset and Northamptonshire. If you would like to be considered for the position, you should contact Pam Helliwell, G7SME at RM11@rsgb.org.uk and Steve Boden, G4XCK at rm13@rsgb.org.uk respectively.

Callsigns and Ofcom

Ofcom has published a policy on temporary callsigns and callsign enhancements, and the subject was discussed at a recent meeting between the RSGB and Ofcom. The RSGB has asked for clarification about the structure of temporary callsigns for special events since some very recent approvals do not follow the policy and, as written, this will restrict Ofcom's ability to accommodate some requests in future. Following the meeting, Ofcom officials have confirmed that they are content for clubs in England to decide themselves whether and when to enhance their club callsign with the Regional Secondary Locator 'X', thus continuing current custom and practice.

RSGB Board visits

The RSGB President, John Gould, G3WKL will be visiting Chester & DARC on 17 November. Barrie Palin, G4AHK, RSGB Board Member, will be attending the Rugby ATS Rally on 23 August and the Telford Hamfest on 6 September.

Exams Change

With the new UK amateur licence now in place, the exams need to change to reflect the current Licence Conditions. The RCF gave the appropriate notice in March that the new rules will be examined from 1 October. That notice is available on the RCF website under 'News'. The RSGB is now working on updates to the Foundation, Intermediate and Advanced training books and a further announcement will be made as soon as the 'Extras' are available. These should enable anyone preparing for an exam after 1 October to have the current rules clear in their mind. Please note that the old Licence Conditions will continue to be examined until the end of September. If anyone has any questions about these changes, please contact Philip Willis, M0PHI, who is chair of the RSGB Training & Education Committee, by e-mail to tec.chair@rsgb.org.uk

Photo gallery

The Society has a new photo gallery of the AGM trophies on the RSGB website. The gallery features high-quality photographs of all the awards. Hover your mouse over each award to see details of past and present winners, a description of the award, who donated it, and what it is awarded for. Click on an award to open a larger, more detailed image.

The photo gallery can be found at www.rsgb.org/agm-trophies.

Further galleries are under preparation, including contesting awards.

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 D R J Adair	G3BVB
Mr N A Champness	W2CIH

60 Years

Mr R M Page-Jones	G3JWI
Mr J E Smith	G3JZF
Mr D Maclennan	G3KGM
Mr J Greenwood	G3KRZ

50 Years

Mr P B E Willis	G3GLW
A Robinson	G3TQA
Mr J S Wright	G3VPW
Mr M A Shelley	GW3XJQ

RSGB shop

FROM P&P FREE OVER £30 SEE PAGE 78 FOR DETAILS

E&OE All prices shown plus p&p

Cold War Bunkers

By Nick Catford

Cold War Bunkers is a overview of all the underground, semi-underground and surface-built cold-war atomic and nuclear bunkers built in the British Isles. Lavishly illustrated on a high quality paper, this book provides over 450 photographs accompanied by comprehensive captions and authoritative text.

Nick Catford has been granted unprecedented access to many highly sensitive sites in order to compile the collection of high quality images reproduced in this *Cold War Bunkers*. Readers will find details of The Corsham Central Government War Headquarters (Burlington); The Regional War Rooms built during the early 1950s and the network of Civil Defence bunkers that supported them; The Regional Seats of Government (RSGs) of the 1960s, the SRHQs that were built at the end of that decade and into the 1970s, and the highly sophisticated and hugely expensive Regional Government Headquarters of the 1980s.

Cold War Bunkers is a fascinating and comprehensive view of all the British cold-war structures and is thoroughly recommended for everyone who has an interest in this topic.

Hardback Size 162x240mm, 288 pages,
ISBN: 9780 9564 4052 5
Non Members' Price: £24.99
RSGB Members' Price: £19.99 (20% off)

Second World War Secret Bunkers

By Nick McCamley

Second World War Secret Bunkers is another comprehensive overview of all the major underground sites developed in great secrecy by the British government and military establishment in preparation for the Second World War.

Sites illustrated include the vast Corsham network in Wiltshire: the army ammunition depots at Monkton Farleigh, Eastlays, Ridge and Tunnel Quarry; the Spring Quarry underground aircraft engine factory – reputedly the largest underground factory in the world; Copenacre and other Admiralty stores and the museum repository at Westwood that housed all the treasures from the British Museum, the V&A and forty other museums and Galleries.

This hardback book is illustrated with approximately 450 colour and B&W archive photos along with original engineer's drawings and plans. *Second World War Secret Bunkers* provides a great guide to the forerunners of the Cold War bunkers and is thoroughly recommended reading.

Hardback Size 250x250mm, 320 pages,
ISBN: 9780 9928 5542 0
Non Members' Price: £24.99
RSGB Members' Price: £19.99 (20% off)

Churchill's school for saboteurs *Station 17*

By Bernard O'Connor

By the outbreak of the Second World War, Guy Burgess, then an officer in Britain's Secret Intelligence Service had convinced his superiors that a special school be opened to teach sabotage.

Brickendonbury Manor, near Hertford, was chosen and named 'Station XVII'. Kim Philby was given the task of drawing up its syllabus. Instructors were recruited to train saboteurs from the Allied forces in both the theory and practice of using plastic explosives and time-delay devices. Heydrich's assassins, Josef Gabcik and Jan Kubis, were trained here, as were 'The Heroes of Telemark'. Many of the other Station XVII 'graduates' are also described, as are details of their operations.

This book investigates the history of Brickendonbury as Station XVII and tells the stories of the successes and failures of some of the estimated 1,200 saboteurs sent into occupied Europe. For those interested in the clandestine activity of WWII this book provides a unique insight into a little known corner of British History.

Size 170x198mm, 224 pages
ISBN: 9781 4456 4227 7
Non Members' Price: £9.99
RSGB Members' Price: £7.49 (25% off)

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

QSL Matters

Top of the reminder list this month is holidays! As always, if you are operating in another prefix area, please make sure you deposit and maintain collection envelopes with the appropriate sub manager for the operational prefix. Collecting cards direct from the prefix manager makes life easier for everyone and avoids delays and mistakes. For those visiting the Isle of Man or Channel Isles, don't forget to buy stamps on-site as mainland stamps are not valid for posting.

For those operating overseas with another call, does the RSGB database have all your personal callsigns in its database? If not, please login to the 'My Account' section of the RSGB website and update your info.

As we reach 500,000 cards sorted this year, remember that your hard working, volunteer, sub managers also take holidays, mostly after peak season. This often means that some despatches in the third quarter of the year have to be postponed by us and in turn by them, so please be aware.

It's also busy season for GB calls including museums and lighthouses so, mindful of the new fair usage policy in place for clubs, perhaps it's also time to set up an online request card system (OQRS) for your call or event?

BULGARIAN SAINTS AWARD. In recent years there have been monthly special event stations in LZ commemorating some of the many, Orthodox Bulgarian Saints, leading to an increase in QSL traffic. Please note that your QSL cards are not required to claim the award. Currently, we are receiving from LZ, several hundred decorative icon reply cards each month – take a look at www.lz1kcp.com

QSL SHOWER. Life's never dull at the RSGB's QSL bureau! There are always queries and more than enough work, but the bureau manager got more than he bargained for this month. Whilst driving with some 30,000 of crated cards collected from an outworker, he faced an unexpected bus, on the wrong side of the road, as it overtook a stationary vehicle. He was forced to make an emergency stop.

Two thirds of the mostly DL cards became air-borne, showering him and every corner of the vehicle, including the dashboard, windscreen and centre console. Instantly, cards slid under the seats filling both driver and passenger foot wells. He is pleased to report collision was avoided, no cards were harmed or lost and have now been re-sorted, it just took some extra time!

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 R Thatcher, 2E0NDT
Mr D Janowicz, 2E0SPH
Mr A Jones, 2W0EUO
Mr F Baches, DD5FM
Mr C Kalbertemp, DK8DV
Mr U Konnekar, DL8OBF
Mr P Bingham, G0OUN
Mr M Cox, G1KAN
Mr N Rees, G1ZLM
Mr D Paul, G4DZJ
Mr R Calver, G4JGX
Dr P Holley, G6NWC
Mr J Marks, G7FPJ
Mr C Jenkins-Powell, G7MFR
Mr G Bryce, G8LQN
Mr P Gill, GD3YTE
Mr B Clowes, GW4HBZ
Mr A Hancock, GW8BWX
Mr G Onorati, IK2WZN
Mr G Ampiotti, IZ2XBZ
Mr D L Dodge, K4CTV
Mr R Vanke, K8YAH
Mr E Bachner, K9OBZ
Mr D Smith, M0HVU
Mr P Gonzalez-Del-Valle, M0IEI
Mr L Van Wezel, M0LVW
Mr D Atkinson, M0WFF
Mr D Conway, M0YDC
Mr D Philip, M1ALX
Dr F Barnes, M1FRB
Mr S Cooper-Hutley, M3EHJ
Mr L Travis, M3NMW
Mr D Game, M6DKG
Mr A M Bowman, M6EJV
Mr C Haynes, M6EVX
Mr P M Mills, M6FEC
Mr C Ford, M6FEQ
Mr A Bailie, M6FHF
Mr R Aston, M6FNI
Mr D Spinks, M6FNP
Mr M Morgan-Lucas, M6GLU
J Illingworth, M6JIJ
Mr K Lord, M6KLU
Mr A Smith, M6KPO
Mr M Haynes, M6MHR
Mr J Blackwell, M6NMS
Mr A Johnson, M6OAJ
Mr K Winton, M6OJD
Mr P Bentley, M6PHK
Mr R Studeny, M6RIL
Mr R Kellow, M6RKJ
Mr R Krasnodebski, M6RZK
Dr S Collins, M6SLO
Mr B Woods, M6SSN
Mr M Smith, M6SZZ
Mr N Rapson, M6WNR
Mr G Brown, M6WTB
Mr A Eustace, M6YAO
Mr L A Corr, MI6LFK
Mr D Parkinson, MI6SJV
Mr J Coyle, MM0GQL
Mr K Jones, MM6FNQ
Mr J Brummell, MM6JIG
Mr K Marchbank, MM6VKO
Mr S J Brewer, MW0ATK
Mr D Robins, MW6FNV
Mr J Esselstrom, OH6JE
Mr R van der Meij, PA1RMY
Mr J Peverelli, PD2JHP
Mr P Le Brun, RS181352
Mr A J Stark, RS211975
Mr H Castellan, RS304556
Mr K Mitchell, RS304570
Mr S Williams, RS304638
Dr J Harrison, RS304683
Mr A Prestwich, RS304686
Mr D Harrison, RS304691
Norfolk Coast ARS, RS304699
Mr P Hector, RS304708
Mr G Nicholls, RS304725
Mr J Breward, RS304759
Mr P Mackay, RS304768
Mr N Page, RS304769
Mr J Lamb, RS304807
Mr D Beale, RS304819
Mr D Bambrough, RS304851
Mr D Stagg, RS304873
Mr S Pow, RS304892
Mr A Edwards, RS304899
Mr A J Street, RS304908
Mr C Peace, RS304936
Mr S Johnston, RS304986
Mr S Ellerton, RS304989
Mr F A Procom A/S, RS92240
Mr J Martinsson. SM5COI
Mr P Solly, VE3AD
Mr H Doornbos, VE3HED
Mr J Charlton, VE3NJC
Mr J Farnell, VK6JF
Mr H Rees, W5JHR
Mr S Porter, WA6TPR
Mr D Hall, ZL2OI
Mr D Duck, ZL4CDG
Mr R McNeill, ZL4IG

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

Mr R Beswick, 2E0FXT
Mr J Burnett, 2E0OAK
Mr J A McLelland, 2M0RMP
Mr L J Mackenzie, 2M1DCH
Mr R A McCreadie, G0FGX
Mr S P Hemsworth, G0JTT
Mr H Carruthers, G0NPQ
Mr K C Simmonds, G0PIB
Mr J H Copplestone, G0RFM
Mr S D Gray, G0RKD
Mr K C Deegan, G0UDG
Mr A J M Shaw, G1KXX
Mr S Turner, G1PPA
Mr P Neades, G1YFC
Mr M Carrington, G3EWE
Mr R G Street, G3TJA
Dr D L Tunnicliffe, G4BCA
Mr APL Hall, G4CYE
Mr R D Oldroyd, G4JFV
Mr C Sanders, G4KCM
Mr D J McLaughlin, G4RGH
Mr T L Mills, G4RQA
Mr D J M Rainer, G4VTQ
Mr P Harding, G4WUQ
Mr L L Jordan, G6GXE
Mr D J Pow, G6POW
Mr A J Bennett, G6YTW
Mr J B Whistlecraft, G7LXT
Mr S Butler, G8EQY
Mr P Leach, G8NSS
Mr J D Bishop, G8OYY
Mr S J Hopkins, G8PXB
Mr REA Burningham, G8UNP
Mr C Wall, GM1KHU
Mr G Salvadori, KI4VTV
Mr P Bowker, M0CAL
Mr R E Ropinski, M0ICU
Mr K Gamble, M0KIG
Mr G Rowberry, M0TXD
Mr R Vickerstaff, M1ADT
Mr W B Hill, M1BKF
Mr M R Stephens, M1MBZ
Mr J T Maguire, M3XTM
Mr G P Sheppard, M6BUJ
Mr G Haynes, M6GVP
Mr S Day, M6HES
Mr M W Taylor, M6HMS
Mr W Jones, M6IOK
Mr T Darrah, MI0HRV
Ribble Valley RAYNET Group, MQ0RVR

Special Event Stations Focus

GB6TSF. Riviera ARC will be attending the Torbay Steam Fair on 1 & 2 August, operating 40m and 2m but other bands may be used depending on band conditions.

GB2BRS. Felixstowe & District ARS will be putting on a special event station to celebrate the 75th Anniversary of the Battle of Britain. The station will be located at Bawdsey Radar Station, on the Suffolk coast, which was the home of wartime radar. The event will take place on 2 August, with activity mainly on HF. Further details on QRZ.com.

GB4BHL. Riviera ARC will be taking part in Lighthouses on the Air on 15 August using GB4BHL from the Napoleonic Fort at Berry Head with kind permission from Torbay Coast & Countryside Trust.

GB2BB. South Essex ARS will be operating a special event station at Bradwell Marina, Waterside Road, Bradwell on Sea CM07RB on 27 August as part of the RAF Bradwell Bay Memorial Flypast. The station will be operating from 10am to 4pm. There are other family attractions at the event. More details from Dave Speechley, G4UVJ on 01268 697 978.

GB4STS. There will be a special event station at St Saviours Church, Brookwood, Woking GU24 0AS on 12 September as part of the Brookwood on the Air. The day coincides with Churches on the Air. If you're involved in amateur radio or think your children might be interested, do bring them along on the day; there will be an educational and fun aspect with interactive displays, 'communication' related crafts and radio based coding/decoding challenges. There will be a selection of radio equipment, including VHF/UHF for local contacts, HF for longer distance and aircraft & satellite tracking. Tea, coffee and cakes will be available throughout the day. Any licensed (or learning) amateur radio operators in the area who wish to get involved should please get in touch with Mark, M0MXC by e-mail to GB4STS@brookwood.org.uk and details will be posted at www.brookwood.org.uk/gb4sts

International Air Ambulance Week

Taking place from 19 to 27 September, the intention of this event is to help support the many donation-funded flying medical services around the world. By operating your special event station during at least some of the 9 days you can help raise funds for these services.

The primary rule is that no radio amateur should accept any donations directly as donations and offers of funding should be made directly to whichever service you nominate when you complete the registration form to take part in the event. Registration will be mandatory and all stations taking part will be issued a registration number that will be listed on the website. Included in the list, alongside each registered station, will be a clickable link enabling direct donations to be made. Only donation-supported flying medical services are applicable, whether part or entirely donation funded. The location of the special event station will be anywhere you choose to set it up – club, home or, if you can manage the permissions to do it, a public place. It is your choice whether you apply for a special event callsign, or simply operate under your own. The registration facility will remain open until the end of the event each year. See www.radio-amateur-events.org/

Sussex Rally 2016

Building upon the success of SERF2015, the Sussex Electronics and Radio Fair 2016 is going to be a two day event. The Eastbourne Sports Park is booked from the evening of 3 June to the evening of the 5th. SERF 2016 will include the fields to offer those who wish to camp, or bring along their campervan or motorhome to setup for the weekend.
Further details may be found at www.serf.org.uk

New antennas

Martin Lynch & Sons has installed another new antenna on the new showroom in Staines. There is now a Ciro Professional Midi-Loop 80-20m on the roof alongside the other amateur radio aerials. The photo shows the installation taking place, fortunately in nice weather. www.hamradio.co.uk

BATC in Europe

More than 200 radio amateurs visited the British Amateur Television Club (BATC) stand at Ham Radio, the international amateur radio exhibition in Friedrichshafen, Germany. It was a very busy and worthwhile three-day event promoting both amateur television and the BATC. Enthusiasts from across Europe, and beyond, were shown demonstrations of the latest reduced bandwidth digital television (RB-TV) project with many commenting on how impressed they were with the MPEG-4 picture quality using just 500kHz bandwidth. The new USB tuner project MiniTiouner demonstrated by F6DZP also created a lot of interest.

The BATC shop enjoyed a brisk trade in items and club treasurer and 'ace salesman' Brian Summers, G8GQS used the event to help boost the club's membership to more than 950.

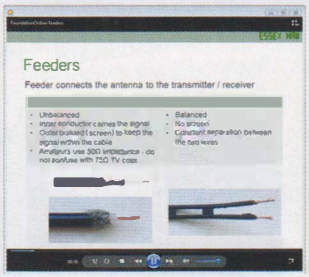
Training Academy

ML&S is pleased to announce a brand new training facility at their new location in Staines, Middlesex. Supported by the Echelford & Wey Valley radio clubs, Ham Radio Training Academy (HRTA) is on the first floor of Wessex House and is kindly sponsored by Yaesu Musen, Japan.

Initially offering training for the Foundation and Intermediate licences, the course will be run by two very experienced licenced operators together with a senior engineer from ML&S. In addition, the new venue will be running workshops with at least a four-part series of lecture streams over the next twelve months.

If you are interested in enrolling for training at the new Academy, please see www.hamradio.co.uk/training. Courses start in September 2015.

Foundation Online



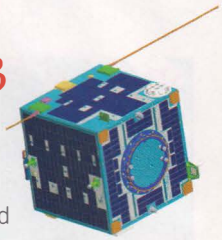
To help make it even easier for people to get started in amateur radio, Essex Ham has launched Foundation Online, an online course designed for those looking to study from home at their own pace, or to get a feel for the Foundation syllabus before joining a course run by a local club.

The course is split into nine modules, following along with the RSGB's *Foundation Licence Now!* book and is a mixture of online video tutorials, guided lessons and printable material. Each module ends with a short test to help make sure learners are on track, and help is available as may be required.

Foundation Online is free. It's not substitute for Foundation courses laid on by clubs, and it's hoped that learners will sign up and use the online course to cement their understanding of the Foundation syllabus as they progress. Practical assessments will still have to be completed in the presence of a registered assessor, and learners will need to take a test at an exam centre as normal. The course will also offer clubs not able to run Foundation training a 'distance learning' opportunity.

For more details, go to www.hamtrain.co.uk

Nine CAS-3 satellites



Nine satellites, designated CAS-3A to CAS3i, with payloads operating in the amateur bands, are expected be launched on 20 July from Taiyuan on the new CZ-6 rocket. The Chinese amateur satellite group CAMSAT says that six of the satellites, CAS-3A to CAS-3F, are equipped with substantially the same amateur radio payloads. This comprises a 20kHz bandwidth 435/145MHz 100mW linear transponder for SSB/CW communications, a CW telemetry beacon and an AX.25 19.2k/9.6k bps GMSK telemetry downlink. CAS-3G has 9k6 GMSK AX25 downlinks on 145MHz and 437MHz; CAS-3H carries 145MHz APRS, an FM transponder and a 437MHz CW beacon while CAS-3i has a 9k6 FSK telemetry downlink on 437MHz.

Professor Chris Budd OBE, G4NBG

Professor Chris Budd, G4NBG has been awarded an OBE in the Queen's Birthday Honors List for services to science and maths education. He has been a radio amateur and RSGB Member since his teens, when he was introduced to it by his grandfather who held a licence in the 1920s and was a radio scientist during the war. Chris was active first under G80PB and then G4NBG and, as a student, was President of G6UW, the Cambridge Wireless Society. He was a member of the Stevenage & DARS and then (working at Marconi) of the Chelmsford ARS.

Professor Budd joined the University of Bath in 1995, has published over 100 research papers, raised over £5m in research funding and founded (and still runs) the University's MSc in Modern Applied Mathematics. He is also the creator of Bath Taps into Science, a major hands-on science festival that has won several national prizes in the 14 years it has been running. The week of events aims not only to show students and families how the science and maths that they learn at school can be applied to the wider world, but also to inspire them to want to become a scientist or mathematician. Many radio amateurs have been involved in organising various activities at this event over the years.

His particular interests within amateur radio are 2m SSB operation; linking amateur radio with young people; the Raspberry Pi and amateur radio.

Ofcom Satellite Spectrum

Ofcom has published a statement giving effect to policy decisions to extend Recognised Spectrum Access (RSA) for Receive-Only Earth Stations (ROES) to two new frequency bands. RSA allows Ofcom to take into account, within national spectrum planning, the use of frequencies used for the reception of services that do not need to be licensed. In this instance, it relates to 'receive-only earth stations'. These are ground based terminals that are used to receive signals from meteorological satellites, earth exploration satellites and space missions, but do not transmit.

This document sets out that Ofcom has given effect to their decisions, extending RSA for ROES to the 7.85 – 7.90GHz and 25.5 – 26.5GHz bands. The Statutory Instruments that they made on 18 June come into force on 10 July and are available on the Government's legislation.gov.uk website.

Details are at http://stakeholders.ofcom.org.uk/consultations/rsa-earth-stations-statement/statement?utm_source=updates&utm_medium=email&utm_campaign=rsa-roes-statement-jun15.

Ray Aldous MBE, G8CBU

Ray Aldous, G8CBU was awarded the MBE in this year's Queen's Birthday Honours List for his service to Scouting.

Ray became interested in radio whilst he was a student at Luton Technical College. He and Rupert, G3KKT, who is now the Secretary of the RSGB, were close friends and neighbours and they were introduced to radio by Bill Green, G3QG.

Ray joined the RAF in 1951 as a wireless mechanic and was posted to Egypt. It was whilst there that he became a leader in the Scout movement. After leaving the Service, he continued as a leader with the 7th Luton troop, were he had been a Scout in his youth.

His interest in radio was re-kindled when he accompanied his Scouts to the 1966 JOTA station in Luton. Two years later he gained his amateur licence. This gave him the opportunity to introduce radio into his everyday Scouting. Stations were put on for District and County camps, courses run for Scouts to gain their Communicator badge and, of course, JOTA, which gave the troop a lot of publicity in the local press, raising the profile of both Scouting and amateur radio.

Ray has been involved in JOTA since 1966 and, over the years, has inspired a number of Scouts and leaders to become licenced and a few amateurs to get involved with Scouting. Ray has been a long standing member of the Worked All Britain group, often to be heard on their 40m net.

RSGB shop

FROM P&P FREE OVER £30 SEE PAGE 78 FOR DETAILS

E&OE All prices shown plus p&p

NEW

23% OFF

ONLY £9.99

RSGB Members' Price

Britain's Shield: Radar and the Defeat of the Luftwaffe

By: David Zimmerman

The story of Radar is one of the most intriguing of WWII. *Britain's Shield: Radar and the Defeat of the Luftwaffe*, sets out to explain the breakneck speed of the development of Radar in the face of an impending war and the ongoing showdowns between scientists and politicians. It goes on to explain its integration into Britain's air defences and the technological development of Radar during the war.

The development of the system in just five years is one of the most remarkable scientific and technological accomplishments of the twentieth century, as is the creation of the radar defences and its integration into the nation's air defences. The individual bravery and skill of the Battle of Britain pilots and the fighting qualities of their aircraft would have been in vain if they had not been part of a highly complex and sophisticated air defence system based on radar. This book looks at the development of the technology from the sound mirrors of the inter war years through to the battles between the Air Ministry's key scientific advisor Henry Tizard and the critical, cranky physicist Frederick Lindeman and even reappraises Winston Churchill's role in its development. *Britain's Shield: Radar and the Defeat of the Luftwaffe* shows how a small group of scientists, engineers, airmen and politicians accomplished this technological miracle and helped win WWII.

Britain's Shield: Radar and the Defeat of the Luftwaffe is for anyone interested in how science helped win the Battle of Britain and many will find it difficult to put down. Thoroughly recommended, this book provides a genuine sense of one of the first, greatest examples of the military use of modern electronic technology.

Size 124x198mm, 352 pages, ISBN: 9781 4456 0859 4
Non Members' Price: £12.99
RSGB Members' Price: £9.99 (23% off)

New Products

In the marketplace this month

HEIL HEADSET

Heil have a new single side, switchable headset for handheld radios with in-line PTT out that was first shown at the Dayton Hamvention. It's available for Icom, Kenwood/Baofeng and Yaesu/Vertex radios to start, with others to follow. It has a reversible earpiece for left or right orientation, flexible gooseneck mic boom, adjustable headband and in-line PTT with a lapel clip. It comes with a retail price of £34.95 inc VAT. www.wsplc.com

NEW ANTENNAS

There are two new products now available from M0CVO Antennas, the DL-10 and the DL-10/A. These are aimed at the QRP enthusiast and home constructor.

The DL-10 is a 10W dummy load and a 40dB attenuator enabling direct connection of a transmitter under test to equipment such as an oscilloscope, frequency counter, power meter or other item that requires a low voltage / power input. The frequency range is from 1–200MHz.

The DL-10/A, on the other hand, does not include the 10W dummy load and so can be used to attenuate output power for connection to any test equipment with a 50Ω resistive input or to an antenna for QRPP work (mW instead of watts).

More details are online at www.m0cvoantennas.com

LOOP ANTENNA

The Ciro Mazzoni Baby Loop is a 1m loop with continuous coverage from 6.6MHz to 29.8MHz. It can be used on a balcony or the roof and comes ready to use with mast clamp. The loop is made of 50mm aluminium tubing and both ends are welded onto the socket, with zero screw connections so no contact resistance. The tuning capacitor is not a simple variable capacitor but a huge variable plate capacitor fabricated out of aluminium, with an air dielectric. Both plates are also welded directly to the loop and are virtually indestructible on high power. The distance between the plates is 14mm on the smallest Baby-Loop antenna. A weather resistant actuator opens or closes the loop and thus tunes the plate capacitor. Capacitance can be varied by the motor and can be adjusted to achieve best SWR via a control unit in your shack. The automatic control unit has a tuning circuit installed and is operated via a small keypad: just enter the desired frequency, wait a few seconds for automatic tuning of the antenna and go. The current frequency and SWR is shown on the LCD display. Maximum power load is 250W continuous with the automatic control unit. Available from stock. ML&S are the sole distributors of Ciro Mazzoni Loops for UK & Ireland – see www.hamradio.co.uk

FLEX MAESTRO

The new Flex Maestro from FlexRadio was displayed for the first time on their stand at Dayton and again in Friedrichshafen. First UK deliveries of this control console for the Flex-6000 are expected at the end of 2015. It is an intuitive, plug-and-play control console that directs operation of any FLEX-6000 Signature Series transceiver without need of a traditional PC. The Maestro has a high definition 8 inch touch display with ergonomically designed controls for ease of use. The most frequently used radio controls are directly at your fingertips and designed to minimise hand motion for the most common operations. Like modern phones and tablets, capacitive touch control is provided on the large LC display for pan, zoom, tune, and menu operation. You can monitor the bands or work DX from anywhere as it is easy to carry, pack or go mobile. The price is expected to be around £900. See www.hamradio.co.uk

New Products

ICOM IC-7851 HF/50MHz TRANSCEIVER

Icom has launched the latest generation of their high end HF transceiver, the IC-7851. It incorporates a new local oscillator design that utilises a direct digital synthesiser (DDS) and a phase locked oscillator, an optimised roofing filter and enhanced spectrum scope. This new local oscillator design reduces phase noise and achieves a reciprocal mixing dynamic range of 110dB. The 1.2kHz optimised roofing filter overcomes the gap of a narrower roofing filter in an up-conversion receiver and greatly improves in-band adjacent signal performance. Other radio highlights include USB-enabled click and enhanced PC control. When combined with the optional Icom RS-BA1 software, the IC-7851's internal server promotes remote base station operation. The radio can connect directly to a router and does not require a second computer for audio or rig control. The IC-7851 also has a +40dBm 3rd order intercept point, 200W output power at full duty cycle and more. The radio is available to order from all authorised Icom amateur radio dealers with a suggested retail price of £9,000 inc VAT. See www.icom-uk.co.uk

ENCLOSURES WITH HEAT FINS

The latest addition to the 1455 series of extruded aluminium enclosures from Hammond Electronics is the 1455NHD that features six integral heat dissipating fins in the extrusion profile, providing enhanced cooling capability for when high thermal loads are expected from the housed equipment. Designed to house PCBs and discrete components, the 1455NHD is sized to accept the popular 100 x 160mm single Eurocard, which mounts horizontally into one of seven slots in the body of the enclosure. The two piece body has a removable plate in the base that gives good access to the interior, and both the top and base have large flat areas that give plenty of room for component mounting. Also extruded into the body are six internal and two external T Slots running the length of the enclosure. The external slots accept two removable mounting flanges for easy wall, shelf or bulkhead mounting; the internal ones can be used for mounting components using fixings that slide into the slot. The enclosure is available with a clear or black anodised finish.
See www.hammondmfg.com/1455NHD.htm

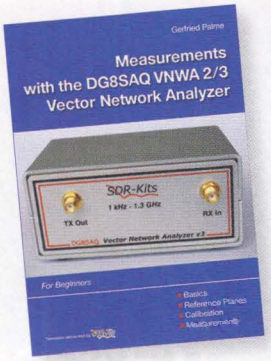
NEW BOOK

SDR Kits has published *Measurements with the DGS8SAQ VNWA 2/3 Vector Network Analyzer*, the English language version of Gerfried Palme's popular Step-by Step Guide for Beginners. The 165 page book features 28 guided measurement examples using easy to follow text and graphics, and is written for those wanting an introduction to the many uses of the versatile low cost DG8SAQ Network Analyzer.

Chapters include Basic Settings, Calibration Standards & Settings, Reference Planes & Phase, Smith Charts, S-Parameter Test Set, Amplifier Measurements, Antenna Matching, Phase Angle, Wave Resistance and more.

Further information about the book, including a full table of contents and sample pages, is available from the author's website www.dh8ag.de.

The book is available from www.sdr-kits.net and costs £25 + shipping.



SDR TRANSCEIVER

ML&S are pleased to announce another leading edge SDR product from Expert Electronics in Russia. The SunSDR1 Pro is a very compact SDR transceiver covering 160m to 2m. This device works with a PC via Ethernet (LAN) or via Wi-Fi. The receive path is based on the direct conversion principle, the transmission path on the direct synthesis principle. Retailing at £1599.95, the SDR2 Pro is available from ML&S Ltd. www.hamradio.co.uk/sunsdr2

WATERS & STANTON WEB STORE

Waters & Stanton has just launched a brand new, fully responsive web store and a new website that is fully responsive when browsing via your mobile, tablet or PC. Responsive websites are the next-generation step in e-commerce solutions and the new website will provide a much more fluid experience for customers. The new site is not populated with all products as yet, although dozens are being added daily. Fully interactive delivery management systems are also being added, which means customers will receive tracking information from logistics partners at almost that same time as the order button is pressed. http://wsplc.com/

IMORSE APP

Graham Jolley, G4BUF has written a Morse app named Morse Intercom. It started out as a way of getting his Morse speed back up but he soon realised there were several really good apps already out there to do that. What didn't appear to be available was a Morse app that would allow users to communicate in Morse over networks to enable live practice. Using the app you can send Morse to, and receive Morse from, other users of the app. One setting is 'One to Several' and that means that only a restricted group of users hear your transmissions and you only receive messages from members of that restricted group, which could help groups to practice without going on the air, especially in the early stages of learning. It's free and can be found in most app stores or go to tinyurl.com/morseapp

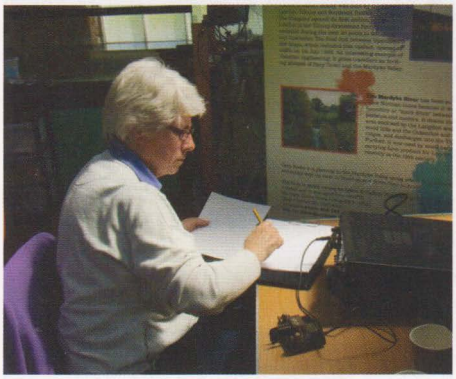
NEW COMMUNITY WEBSITE

Programming radios can be a bit daunting so a new website has been launched to share memory files for radios. With most modern radios programming is done by the PC, for many it is a dark art and pre-programmed files are needed. Memory files for various radios and updates will be available. As the site grows it is hoped that it will become a global portal for memory files. Go to www.codeplugcentral.co.uk

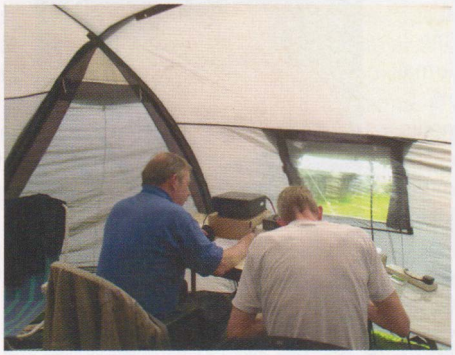
August 2015 • RadCom
Elaine Richards, G4LFM • radcom@rsgb.org.uk

Mills on the Air 2015

Reports from clubs taking part and showing amateur radio to the public



Stella talking to a South African station from Davy Down Pump House.



(Top & above) Huntingdonshire ARS operating GB2DWM from Duloe Tower Mill.

GB2DD. Members of Thurrock Acorns ARC operated from Davy Down Pump House. During the course of the day, the club had three stations operating and, using GB2DD (Davy Down), made contact with other radio stations located at different monuments around the UK. One of the early contacts established was with another pumping station located in Somerset. In total around 60 contacts were made during the day to stations located both in the UK and overseas. The countries contacted included South Africa, Italy, Poland, France and Belgium with the remainder within the UK. Visitors were encouraged to send greetings over the air whenever possible. The chairman, Nick, G4HCK, said that the day had been a huge success and he was delighted at the number of contacts made, all which were designed to raise the name of the Davy Down Pump House.

Nick, G4HCK

GB2DWM. Huntingdonshire ARS was granted permission to operate GB2DWM from Duloe Tower Mill, Eaton Socon. The advance party arrived on the previous Friday evening to erect the main tent and, despite dodging the odd heavy rain shower, everything was ready for the big event.

On Saturday, Team One worked on the tent area by setting out the tables, chairs, electric supply and the all important kettle and brew kit, then moved onto to the radio equipment and all the necessary logsheets, callsign info, notepads and pens. The club was fortunate to be able to set up two stations in the tent area, one for HF operation and one for HF and VHF utilising the club's Icom IC-7200 and the Yaesu FT-897D.

Team Two went about setting up the G5RV and mast in the large front garden, attaching one end to the antenna to the top of the Tower Mill via a rope, which the owner kindly lowered down and retrieved once the rope was secured to one end of the antenna. They also setup station two, a tripod telescopic mast that had a X-50 collinear mounted on it for VHF/UHF work, finally a 6m fishing pole antenna for the FT-897D to operate on HF.

The first QSO took place at 9.25am for station one and 9.30am for station two. There followed a manageable stream of calls with G1KWF on the mic with G6LSB logging until Clive, G3LKQ arrived and plugged in his key and we went over to CW. The rig developed a fault when transmitting and would just shut down, so out came the spare, an FT-450.

On Sunday the first call was logged at 8.25am with Steve, G1KWF at the mic again with Stuart, 2E0TMC logging. Various members took over at logging and operating to keep the station going.

At the end of the day a debrief took place with the owners, Steve and Sarah. A token of thanks was presented and a cake as it was the 200th year since the mill was built and also Sarah's birthday. They have agreed to let us operate again on site in 2016.

A round up of the activity is that we netted nearly 300 QSOs that included 44 mills plus stations in the UK and Europe; the nearest station on HF was in Eaton Socon (less than a mile away), the furthest was in Dimitrovgrad in East Russia, some 2033 miles away! On VHF SSB we worked a station in Eaton Socon one mile away, the furthest was Mow Cop near Congleton plus a brace of stations in Kent; on VHF we worked a 2E0 in Hatfield and GB0BWM Brill Mill in Buckinghamshire, all from that collinear: what fun!

Thanks to G1KWF, MOVTG, G3LKQ, G3KLE, G3NKQ, G7KJW with G3LWJ, G8AKL, G8BKG, 2E0TMC and G7DIU without whose support and dedication we could not have put on the SES.

David, 2E0DIP

GB2WM. Hilderstone Radio Club has been busy with two special event stations recently, one of which was for Mills on the Air. The members enjoyed the weekend at the White Mill in Sandwich using the callsign GB2WM. It was built in 1760 and still has most of its original wooden machinery. It was a special weekend for the mill with baking and brewing demonstrations and singers.

John Hislop

Hilderstone RC operators at the White Mill special event, not forgetting little Isabella of course!

GB2AWM. At the Braintree ARS meeting on 4 May we focused on planning for the Mills on the Air weekend. Once again we had been invited to operate from Alderford Water Mill, near Braintree. We decided to make some changes to, hopefully, improve the station performance. To be able to operate from a restored and working water mill with such an interesting history is indeed an honour. Set up was on the Friday and the station comprised of a 30ft mast

FT2DE

144/430 MHz DUAL BAND DIGITAL TRANSCEIVER

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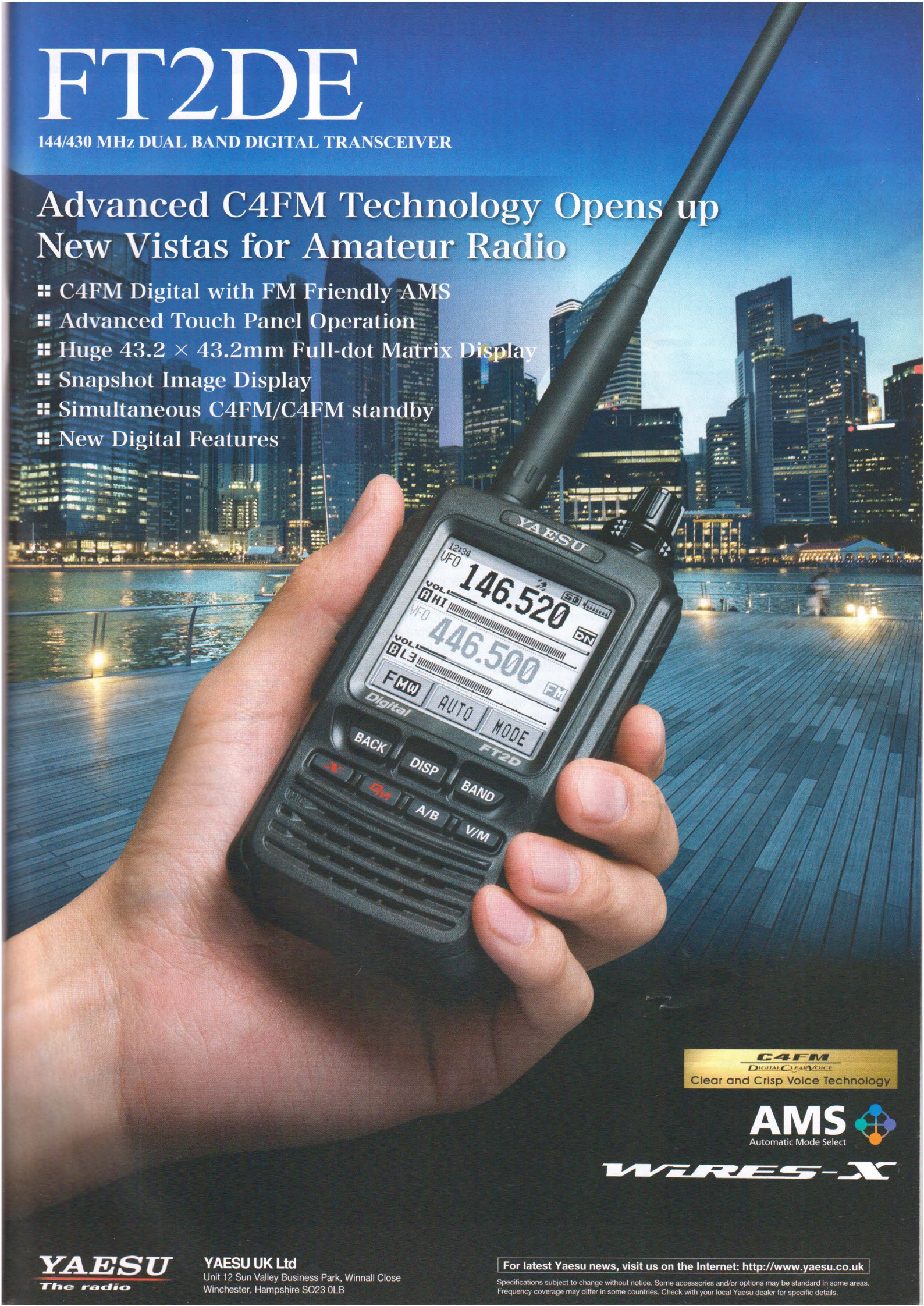

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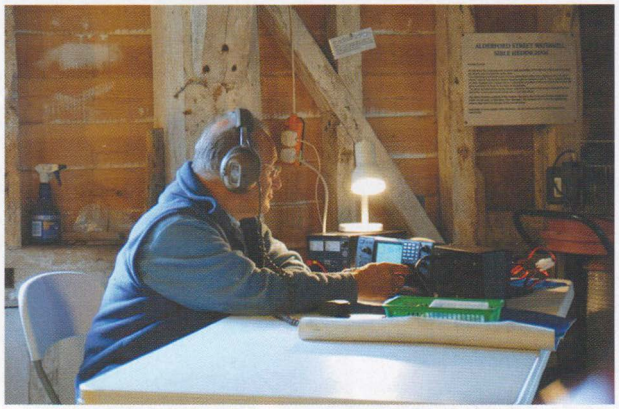


Braintree & DARS set up GB2AWM at Alderford Water Mill.

topped by a 2/70 collinear. The mast also acted as the centre for a 40m dipole. The HF station was the club's IC-746, with VHF attached to our FT-897. A total of 110 contacts were made, of which, 36 were mills and two of those were in Holland. As Alderford Water Mill was open to the public, the interest in what we were doing was quite keen.

For me, the highlight of the weekend was the sound of the mill wheel turning and the sound of the wooden teeth (not my teeth) meshing to drive the milling gear while you were talking to another mill. A most relaxing sound.

Tony, G0IAG

GB0SBM. South Bristol ARC has taken part in Mills on the Air since 2012 when we capitalised on the individual efforts of members David, G7BYN and Don, G0NQJ (SK) to organise a club event. After testing local venues, David and Don settled on Saltford Brass Mill on the River Avon between Bristol and Bath.

This year the mill was to reopen to the public following nearly two years of closure whilst volunteers and Bath and North East Somerset Council restored and repaired the Mill following damage caused by a falling tree. Interestingly, the Doomsday book records a mill on this site.

The station comprised Icom IC-706Mk1 HF multimode transceiver fed via an SGC auto ATU and ladder line to a 70' doublet antenna at about 20' above ground fed. Power was supplied from a 12V leisure battery ensuring that David, G7BYN would at least be able to start his van at the end of each day's operation and get home. The antenna was supported by two aluminium flag poles, one strapped to the mill's fence and other guyed into a freestanding position on the open ground adjacent to the mill. The choice of a balanced horizontal antenna close to the ground has proven to be most effective in radiating a signal beyond the confines of our river valley using NVIS type propagation.

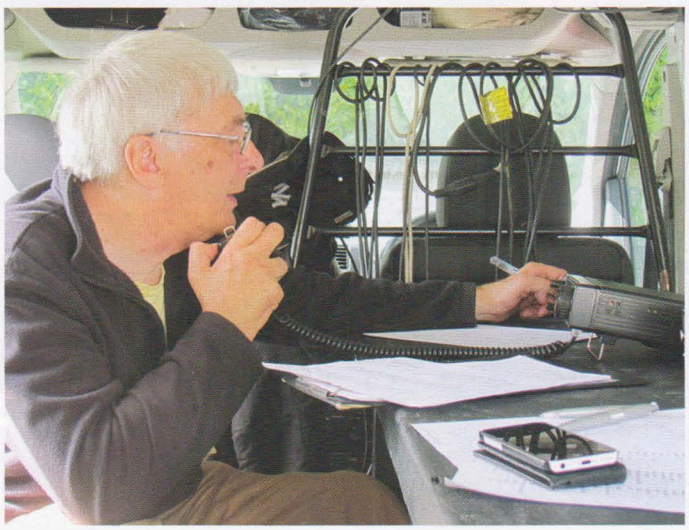
One of the downsides of supporting a watermill is that it is, by definition, situated alongside a waterway, which in turn is usually at the bottom of a valley.

Saturday's operation was undertaken by David, G7BYN, Andy, G7KNA, Julian, M0JCE and Eddie, M0LJT and we initially set out to bag the 10 mills required to qualify for the events certificate and so operated more in 'hunt and pounce' mode. Historically, we have always achieved the necessary number of contacts and usually present the mill with a copy of our certificate. In our first hour we managed to work 5 other mill special event stations along with a couple of other non mill special event stations. We stuck to 40m SSB and successfully worked all over the country and into near European countries. The Dutch are usually particularly active for this event, having a significant number of windmills at their disposal. Although there were many good and interesting contacts, one that sticks in the mind is with Declan who was operating EI100MFA, a commemorative station for the *Lusitania*, the Blue Ribband liner sunk off the coast of Ireland on 7 May 1915.

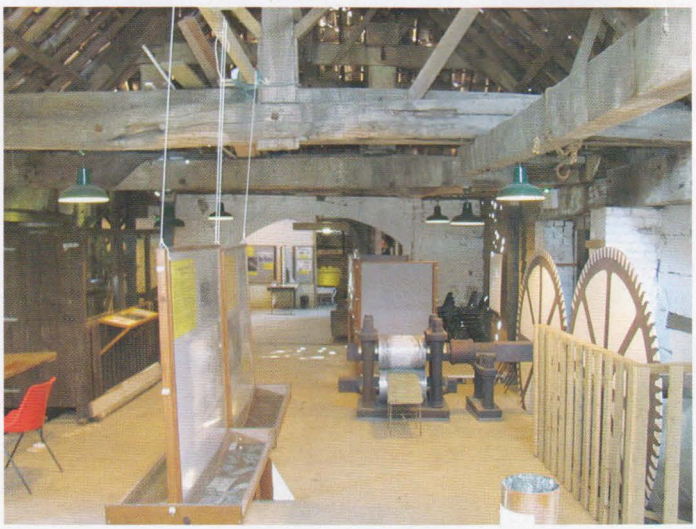
On Sunday, Eddie was replaced by Mark, M6FKV who had only passed his Foundation exam with the club less than a fortnight before the event. Despite this he happily took over the mic and proceeded to work 20 or so stations on Sunday afternoon.

Andy, G7KNA

GB0ETM. This year, owing to renovation work being carried out on Eling Tide Mill, Waterside New Forest Radio Club was unable to operate at the actual mill. However, with kind permission from the Commodore, our club was able to set up GB0ETM in the neighbouring Eling Sailing Club, which shares the mill building. The radio club's G5RV aerial was set up outside, with the kind cooperation of the sailing club. The earliest surviving reference to Eling Tide Mill appears in the Domesday Book, in 1086 AD and, over the centuries, it has had to be rebuilt many times. We believe the mill is the only fully working and productive tide



David, G7BYN operating GB0SBM at Saltford Brass Mill.



The interior of Saltford Brass Mill showing a mock up of the rolling mill.

Alan, G3TPV using his Morse key skills, Dave, 2E0JHD and Tim, G4YVY at Ealing Saling Club.

mill in the UK, harnessing the power of the tide to grind wheat into wholemeal flour.

GB0ETM was set up in the sailing club and run by Tim, G4YVY and Robin, GOOSG, with transportation assistance from Tony, G6MNL. During the weekend, club members and other amateurs visited the mill and helped to operate the station, including Dave, 2E0JHD, Alan, G3TPV who used his Morse key skills to advantage, Rhodri, 2E0CZT and Tony, G6MNL. The club's G5RV aerial, stretched between the sailing club's mast and a radio club mast, was fed by an FT-757 GX MkII transceiver barefoot. On 40m, in spite of the large number of competing stations, 127 successful contacts were made with UK and European amateur radio stations, including Guernsey, Northern Ireland, Ireland, Germany, France, The Netherlands, Switzerland and Poland. There was a last flurry of activity as the time to close the station down approached, so that unfortunately, some amateurs may have been disappointed.

Everyone involved agreed that holding the event in this maritime setting had been well worthwhile and great fun.

Rod, G6LVJ

GB2GW. Furness ARS operated GB2GW and took part in the annual Mills on the Air weekend from Gleaston Water Mill, near Ulverston. The mill and adjacent buildings have been restored by the current owners, Mike, G8ALE and Vicky Brereton, to provide public access to a working water corn mill. Club members operated on 40m using a TS-570 and a delta loop antenna, which is permanently installed at the mill. Band conditions proved to be reasonable and a total of 190 QSOs were made over the course of the weekend, including 45 other mill stations.

The QSO breakdown was: UK mills 40, Dutch mills 5, other GBs 4, G 96, GM 9, GW 9, GI 2, EI 2, Netherlands, Germany 3, France 3, Belgium 2, other 11.

Chris Leviston

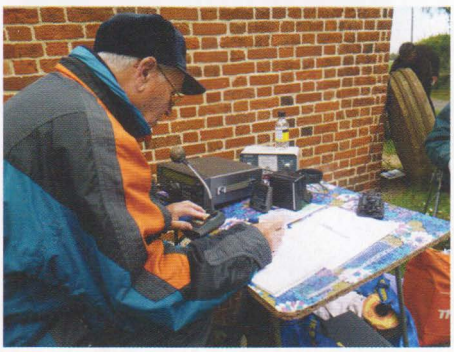
GB6CW. Stevenage & DARS operated GB6CW from Cromer Windmill at Ardley organised by Rob, G2BKZ and with kind permission of the mill helpers, Alan, Robin and Ken.

On the Friday afternoon, Ron, G4DDX, Martin, G0NJS, Nicolas, M1HOG, Eddie, G7CYQ and Rob, G2BKZ went to the mill and set up the aerials. They were able to fix them up on the sails of the Post Mill. Alan went to the top floor to release the large oak beam lock and safety chain so the sails coubd be rotated.

The ready-made 80m inverted V dipole and 2m beam were fixed to the sail and this was rotated up to the highest point; two lengths of coax were run down to the proposed operating positions. The beam worked, but the dipole had a weird resonance at 24MHz! It was obvious that there was a break on the inner of the coax.

Ron suggested we could turn the dipole into an inverted L by feeding the outer braid and one of the downleads. It tuned up OK with a home brew unbalanced Z Match on 80 and 40 and most of the HF bands. (Next year, we will hang the aerials from a halyard, so, if there is a problem, it can be fixed without having to turn the sails).

GB2GW was operated from Gleaston Water Mill.



G4DDX operating the station GB6CW.

The sail and antenna/feed attachments for GB6CW.

On the other side of the mill, Eddie set up another HF dipole on his Spider-Pole and another station was set up by Nicolas for 2m FM.

Over the day we had a few more operators visit. The best band seemed to be 40m with 80m virtually dead, save a couple of weak QSOs. Eddie made some contacts on 20, 17 and 15 metres. There were quite a few contesters and special callsigns being aired. The weather didn't deter several visitors to the open mill in the afternoon. Much interest was shown in our operations and we explained to them what it was all about.

On Sunday band conditions were pretty much the same with 40m being the fastest running. The overhead power lines gave us problems at times with buzzing, rasping noises, but overall, the band conditions were good. In all we made 165 contacts on a mixture of bands, non contest style and thoroughly enjoyed the weekend!

Martin, M0XJP

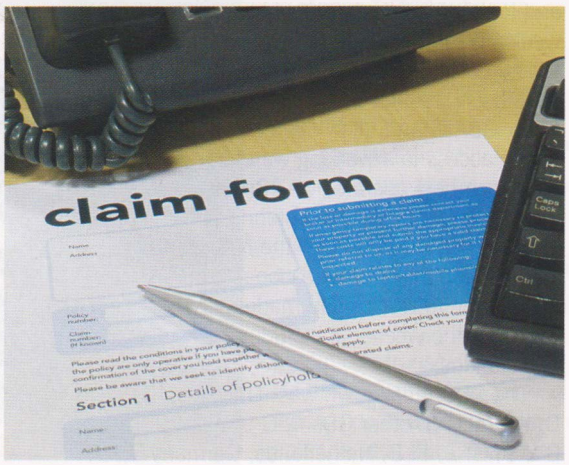
August 2015 • RadCom
Julian Dent • julian@southwestbroking.co.uk

Top tips when making an insurance claim

What should you do, or not do, when making a claim on your insurance policy?

CLAIMING. Making an insurance claim can be stressful at the best of times but, if you want your policy to pay out, it's important to get it right from the outset. This applies whether we are talking about an amateur radio insurance policy or a general household one, the process is similar.

The claims process isn't that well known (after all you don't expect to have to claim on a policy that often), but this lack of familiarity can lead to misunderstandings and often dissatisfaction with the outcome if a claim gets turned down unexpectedly by an insurer. Here are just a few of the most important things to bear in mind when making a claim.



It's important to get a claim right from the outset.

ACT QUICKLY. All policies contain details of when to notify a claim and this forms part of the contract of insurance. Failure to comply with the notification timescale can invalidate a policy. Best advice is to notify the broker/insurer immediately you become aware of a claim or a circumstance has arisen that could give rise to a claim. Remember that if an item has been stolen or your property has suffered malicious damage you need to report it, immediately, to the police as this will be a condition of most policies.

PROVIDE DETAIL PROMPTLY. Notifying the claim involves submitting a degree of information. Beware that without this detail the claim can't be fully validated. One repeater group had a claim last year for storm damage to a mast and antenna; they notified their broker fairly promptly of the claim but failed to provide any of the necessary detail including

- Date of incident
- Location of incident
- Supporting evidence including photos and purchase receipts
- Details of any action that had been taken to minimise the loss
- Engineer's report to substantiate cause of damage and viability of repair.

Several months later none of the details were forthcoming and this length of delay prejudiced the client's position to the point where the insurer could refuse to deal with the claim. One of the benefits of having an insurance broker to represent the client means that the broker might still be able to negotiate a settlement with the insurer, but this is by no means a foregone conclusion.

BE CLEAR. Check your cover and submit the claim under the correct heading. Be clear on what your policy *does* and *does not* cover before you take out the policy so that a claim is submitted appropriately. For example, out of all the claims for radio equipment that have crossed my desk, at least half of them have been storm damage. Insurers will be guided by the Met Office for determining if there was a 'storm' in the locality at the time of the damage; if the weather that caused the damage to the equipment at the time isn't classed as a storm by the Met Office then that claim will likely not be met as a 'storm' claim. Whilst this in itself can cause some frustration, perhaps more baffling is that if the same claim is instead resubmitted as accidental damage, the claim is likely to be considered. The remedy here is to ensure that you have an 'All Risks' policy in the first place and, if you can, check the Met Office records before submitting a claim for storm damage.

Historically, property was insured against specified perils such as fire, lightning, explosion, earthquake, storm, flood, theft and other events specified in the policy. However, over the years it has become common for policies to be arranged on an 'All Risks' basis. All Risks does not mean that the insured property is actually insured against every conceivable eventuality but rather it is insured against all risks other than those that are specifically excluded, as defined in the policy.

SUM INSURED. Be aware that the sum insured must be adequate to replace the damaged/lost equipment with brand new equipment. If the sum insured is inadequate then insurers will apply 'Average', which is the technical name given to reducing the claim settlement to reflect under insurance.

GATHER EVIDENCE. Keep receipts as proof of purchase. If your equipment has been damaged try and take photos at the time of the damage to show what's happened as well as the general scene to show, for example, the weather conditions or fire damage etc.

PROTOCOL. Contact your broker / insurer before calling out someone to fix your equipment. Depending upon the circumstances and the amount of the claim, your insurer may require two estimates for repair or replacement costs. If your fixed base station transceiver has been damaged, say by a power spike, it may not be practical to send the radio to more than one specialist firm for quotation. As in the case for making prompt notification of claims, contact your broker or insurer as soon as possible to discuss your particular circumstances as it may be possible to agree that only one estimate is required.

TIMESCALES. Claims can take time to validate, negotiate and agree settlement. Do not expect claims to be agreed and paid immediately. The more paperwork is made available to substantiate a claim and values being claimed, the quicker it will be to bring the claim to a conclusion. Typically, allow around 1 month from start to finish to settle a claim but this timescale is not definitive and more complex claims by their very nature may take longer to deal with.

Amateur radio is a highly technical and specialised hobby with very specific cover needs. Navigating these tricky technical areas of an insurance policy can be baffling, but a specialist broker is there to manage the process on your behalf. South West Broking is recognised by the RSGB as a specialist insurance broker who can provide advice and guidance when seeking this type of insurance.

If you have any other questions feel free to get in touch – we're here to help. You can contact us on 01454 806 503 or by e-mail to julian@southwestbroking.co.uk

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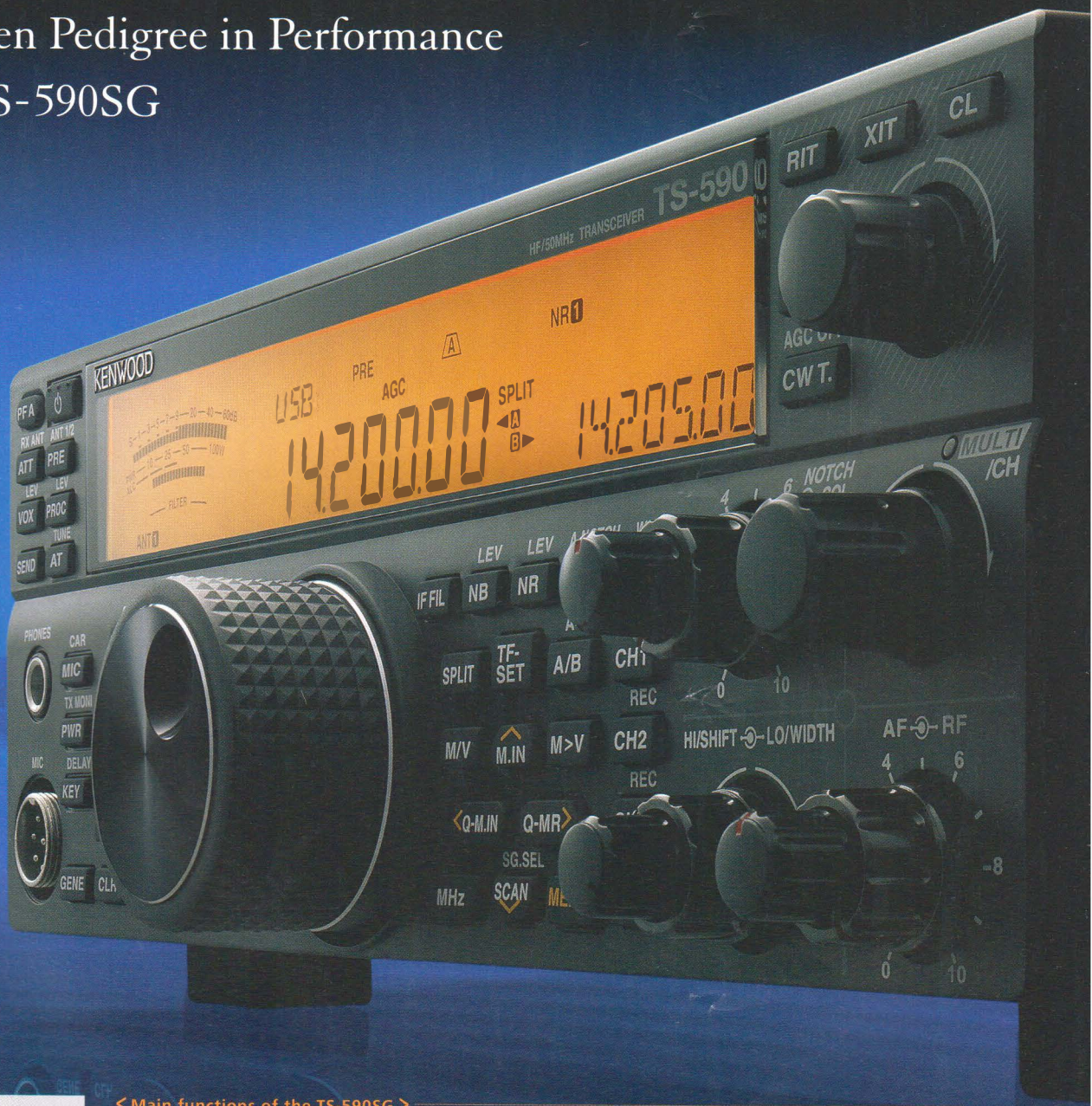

HF/50MHz TRANSCEIVER
TS-590SG

< Main functions of the TS-590SG >

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- Transceiver equalizer configurable by mode.
- FIL A/B configurable independently with VFO A/B (convenient during Split operation).

*Alterations may be made without notice to improve the ratings or the design of the transceiver.
*The photographic and printing processes may cause the coloration of the transceiver to appear different from that of the actual transceiver.

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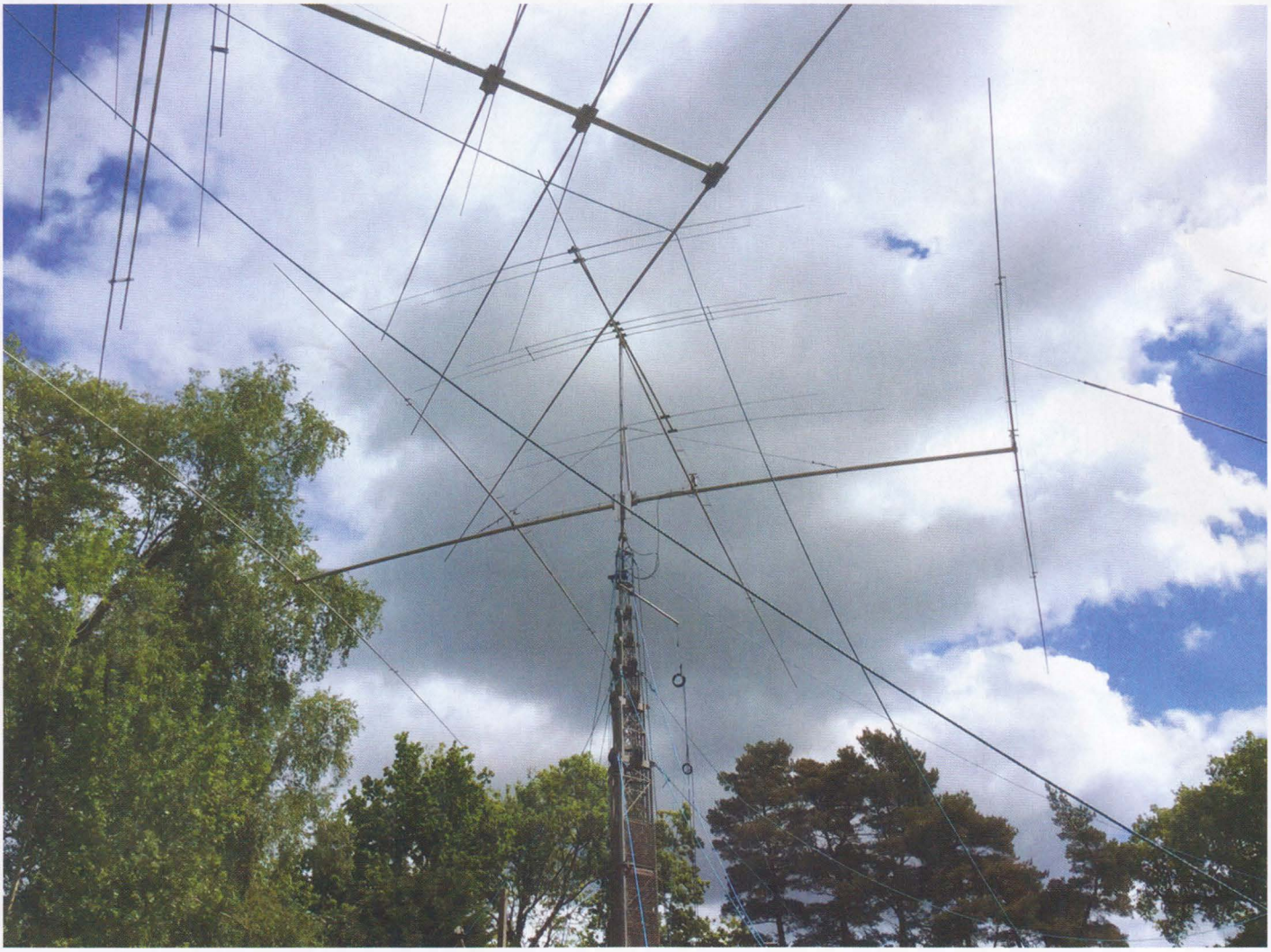


The antennas cranked down at end of contest due to high winds.

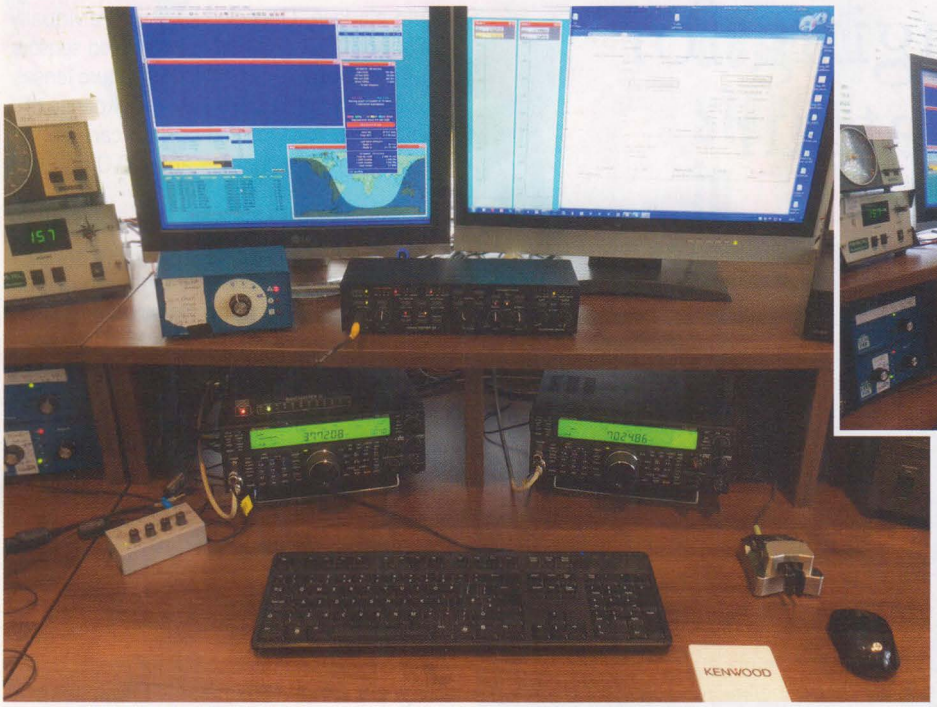
Using the Kenwood TS-590SG in a major contest

The very last full weekend of May offers some great CW fun in the form of the CQ WPX CW Contest. This is a 48 hour contest that challenges operators to contact as many stations with as many prefixes as possible. Single operators are only allowed to operate a maximum of 36 hours, which makes it more available to those who are not able to keep going for 48 hours – it's a bit more civilised, some may say!

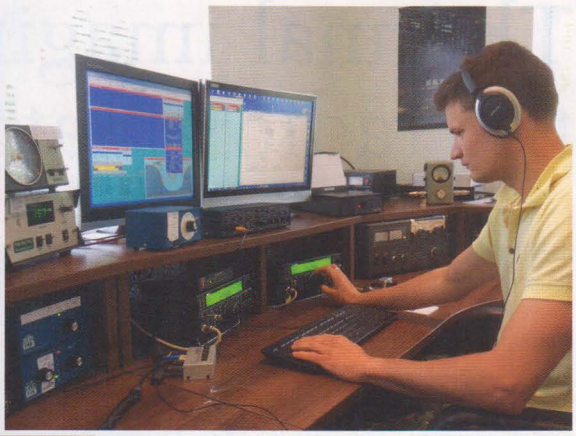
Over recent years Chris, G0DWV, has put in a huge effort building a DX/contest station at his QTH in Norfolk. Being a very good friend of mine, and a super fine fellow too, Chris has allowed me to operate from his QTH a couple of times over the past year or so using my contest callsign G9W. He has a pair of C31XR Yagis by Force 12 mounted on one tower (one fixed on the USA and the other rotatable above it), a 4-ele Yagi for 40m by M2 on a second tower and Chris put up a 4-ele tri-bander by Cushcraft on a third tower. This Cushcraft HF tri-bander would allow me to use a second radio to work stations on 10/15/20. LF antennas are a 4 square on 80m (phased verticals in a 'square' configuration, electrically switchable for direction) and a quarter wave vertical on 160m.

SO2R. Single Operator Two Radio (known as SO2R) is a system that allows an operator to maximise QSO numbers during a contest. When set up correctly, an operator can make QSOs on radio #1 and at times search on radio #2 for potential QSOs. Given that only one transmitted signal is allowed at any one time, the operator can interleave transmit signals between the transceivers to make contacts. Chris has a Microham MK2R+, a device that routes all transmit switching and audio feeds from the radios to the headphones. Various different 'states' can be set up depending on operator preference. For example, I like the arrangement that allows Rx through the headphones from radio #2 when Tx is enabled on radio #1. Given that CW messages can be sent from the function keys within a logging program from a PC, the operator does not need to listen to this audio – the time can be better utilised listening to radio #2, and vice versa. At times when you need to reach for the key to send a non PC stored message, one can switch back to enable audio through the headphones with ease.

USING THE TS-590SG. I was eager to try the TS-590SG in this configuration to see how it performed. There are some very appealing features about this transceiver that makes it a good choice. The display



The two TS-590SG radios in SO2R set up with Wintest logging software running on the screens.



Mark, M0DXR operating as G9W.

is exceptionally clear and this is important for prolonged periods of operating. You can select the display background colour from a number of shades/colours. I prefer green as it is kind to the eyes and allows frequency displays to be easily read. The size of the transceiver is very convenient as they require little movement between each radio's VFO. The VFO movement is very smooth and doesn't 'drag' when halting on a frequency, which helps with speedy search and pouncing. The narrow filtering, notch and noise reduction features are easily accessible – vitally important in DX and contest conditions. However, by far the most impressive feature about this transceiver is its receive performance. I was able to dig stations out of the noise with S9+40 adjacent signals by introducing 100Hz filters. Small adjustments to the Rx RIT allows an operator to 'run' using 200Hz CW filters without any problem at all and the position of the RIT control on 590SG being on the top right means you can access it very easily.

Conditions during the contest really put this rig to the test. 15m was exceptionally good – I was able to utilise the pair of C31XR Yagis to their full potential by power splitting into both of them simultaneously with one fixed on the USA and the other on the Far East. With this arrangement, I was having QSOs with the States, Japan, Hawaii, New Zealand and Alaska literally one after the other at 2300UTC! I've not known 15 to be this way for quite some time. A couple of dBs worth of improvement can be realised by taking the twin antenna feed out of circuit to just a single Yagi and this helped to hear a few of the weaker stations. Inter-station QRM was practically non-existent, which was quite remarkable given the proximity of the antennas. There was a presence on radio #2 of hash noise and a strong signal close to the harmonic from radio #1 (as to be expected) with the odd random burst of hash nearby but, other than that, the #2 TS-590SG was able to hear stations at S1. When the Yagis were pointed towards each other there was a small amount of hash on a harmonic band. There is an earth system in place but the addition of coaxial stubs could improve the harmonic issue, or perhaps placing an ATU in line tuned to the operating frequency could help. The station has a set of switched band pass filters from Dunestar, the 600 series with band decoders on each radio to power them. Band pass filters are essential to avoid damage to the other radio, especially when running amplifiers.

TABLE 1: G9W claimed score.

Band	QSOs
160m	24
80m	182
40m	1008
20m	847
15m	1108
10m	52

Total: **3221**
Prefixes: **1112**
Total Score: **9,815,624**

ANTENNAS. The contest itself was great fun. The 4 square that Chris has built is like a power house! I received e-mails from USA operators commenting on the size of the signal, which was fantastic! The elements are elevated with the base at around 7 feet and around 2 wire radials under each vertical. There are trees all over the place between these verticals, but it did not seem to affect the super performance of this antenna system.

The 40m Yagi is a killer antenna! It's up around 80 feet so perhaps could do with being a little higher, but even so, 40m proved to be a key band for me. The WPX Contests offer double points on 160, 80 and 40 metres so when propagation allows QSOs, ideally outside Europe, the operator really should be here. I found it very challenging planning my off-times. Given that a maximum of 36 hours is allowed, 12 hours of off-time must occur. Weighing up the best time to be QRT needs consideration of when are the most QSO points on offer. I found the best times to go QRT to be between the hours of 1000 and 1300 and secondly around 2100 to 0000, ensuring I was back to work USA on the low bands for double points at midnight. I find that a Japan opening is very important in WPX as it offers so many prefixes (therefore boosting the score as multiplier points are available for every unique prefix worked). With conditions the way they were, I literally was able to work hundreds of JAs on 15, but interestingly none on 40m. That's the way propagation goes sometimes.

The results take time to be confirmed with all the log checking that is required. However, initial indications show that this operation has set a new all-time English record. Hopefully the coffee worked and I did not log too many mistakes – we'll see. The G9W claimed score can be seen in **Table 1**.

THANKS. I'd like to thank Chris for the use of his station. His antenna system and comfortable shack made it even more pleasurable. I like to enter contests from my home QTH where I only have space for a small wire or vertical. But it is nice from time to time to experience the large stations and I am thankful to a handful of very kind radio amateurs that offer their station for me to be a guest operator. This is true ham spirit. I'd like to think that one day I will be able to open my station too.

August 2015 • RadCom
Giles Read, G1MFG • giles.read@rsgb.org.uk

Thermal imaging for the radio amateur

INTRODUCTION. Thermal imaging is, quite simply, 'seeing' heat emissions. Everything above Absolute Zero radiates various amounts of heat; the amount of radiation – and its frequency spectrum – depends on the temperature. Human skin can detect *strong* thermal radiation – just wave the back of your hand near a hot kettle, or bask in the sun. We're *much* better at detecting visible light; thermal imaging is all about making heat sources visible to our limited senses.

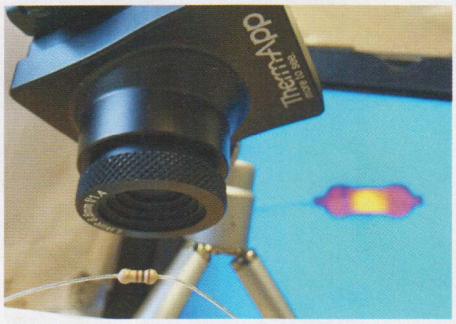


PHOTO 1: A thermal imager viewing a resistor.

WHAT CAN IT DO FOR ME? Quite simply, thermal imaging lets you see what's hot and what's not. **Photo 1** shows a Therm-App [1] imager viewing a warm resistor, with the thermal image shown on a tablet behind it.

Photo 2 shows a dramatic-looking inductor in an auto-ATU. The temperature scale at the top of the image shows that the maximum temperature was 34 Celsius, so although the windings were running warm they weren't overheating.

Photo 3 is a series of shots of an IRF230. The visible image on the left is replicated by the thermal image in the centre. This gives an interesting lesson in 'emissivity', which is a measure of how 'brightly' things 'glow' (radiate) for a given temperature. Very broadly speaking, shiny surfaces don't radiate as well as matt black (which is why heatsinks are usually black). In this instance the epoxy seals for the lead-out wires have far higher emissivity than the metal and silicon of the rest of the device, so they appear hotter (redder) than they really were. The case temperature was actually hot enough to melt solder when the centre image was taken; the low emissivity of the silicon die meant it appeared much cooler than reality. On the right is an extreme close-up of the die – unusual thermal microscopy.

Photo 4 is a mains power inlet. You can see the electricity meter on the top left and the supply fuses bottom right, slightly above ambient temperature but nothing to worry about. Fuses or wires running hot are very easy to spot because they 'shine' brightly.

A large collection of relatively high-res thermal images can be found at [2].

WHY IT'S USEFUL. You soon get the 'feel' of looking at equipment with a thermal camera, because you can immediately see the hot spots. Some parts, eg power transistors, you'd expect to be hot, but anything else usually spells trouble. This can dramatically speed troubleshooting. For example, if one transistor in a push-pull circuit is very hot – or cold – then there's an obvious indicator of a problem. Overheating transformers, wires, resistors or indeed anything running hot can be seen at a glance. A thermal imager is still an expensive toy for an individual but if a club bought one and rented it to members for a few pounds a time, it could well be a worthwhile investment, and very useful.

HOW IT WORKS. A lens at the front focuses energy from the scene onto an array of heat-detecting pixels. Several different sensing materials can be used, each with different properties. Some require cooling to quite a low temperature but many operate at room temperature. Cooled sensors offer much better sensitivity but are expensive, need cool-down time and often require consumables like liquid nitrogen. Uncooled sensors are virtually instant-on. The sensitivity of uncooled sensors can be improved by using wide-aperture lenses (*f*/1.2 is typical) but this is at the expense of depth of focus. Uncooled sensors can see temperature differences of about 0.07°C.

EMISSIVITY. As mentioned earlier, not all surfaces emit equally, even if they're at the same temperature. The rule of thumb is that the shinier a thing is, the worse it emits heat. Most thermal camera software includes an adjustment for material emissivity so that it can make the necessary compensation.

HOW MUCH? There is now a wide variety of uncooled thermal imaging equipment available, ranging from about £200 upwards. The key factor is resolution – the number of thermal pixels. Thermal cameras are much lower resolution than visible cameras, partly due to manufacturing difficulties. The lowest resolution truly useful for recognisable images is about 160x120 (0.019Mpix). Typical examples are the Flir One [3] and Seek [4], which cost about £200 and use a smartphone as a display. Some low-res imagers combine a lower resolution thermal image with a visible light picture to obtain the appearance of a sharper image.

The next useful step up is a 320x240 (0.077Mpix) sensor, roughly equivalent to a VHS camcorder. These start at around £1000, and include the 384x288 (0.11Mpix) Therm-App [1], which was used for the images in this article and has interchangeable lenses. Sensors up to about 1280x1024 (1.3Mpix) are available, but are *very* expensive.

Used (usually ex-firefighting) thermal cameras can often be found on eBay from about £100, often relatively insensitive pyroelectric vidicon devices from the 1980s.

Prices are dropping rapidly as new imagers appear on the consumer market. I think thermal imaging is just about to take off big-time. Before long I reckon there'll be a thermal imager in every engineer's toolkit.

WEBSEARCH

[1] www.therm-app.com
[2] www.flickr.com/groups/therm-app-users/pool/
[3] www.flir.co.uk/flirone/
[4] www.thermal.com

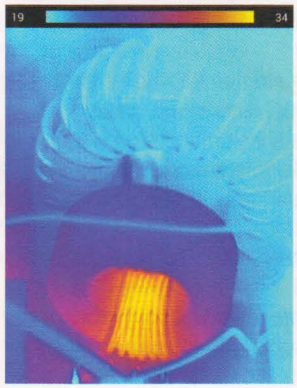


PHOTO 2: Inside an auto-ATU.

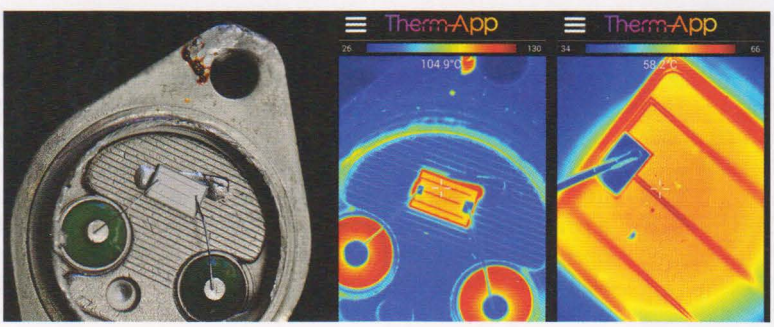


PHOTO 3: Inside an operating IRF230 'cabriolet' with the top sawn off (tnx G4JNT).

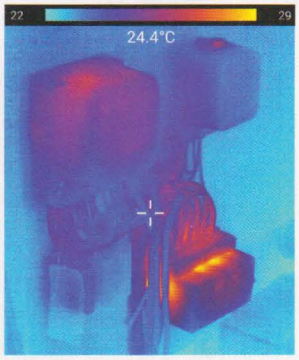
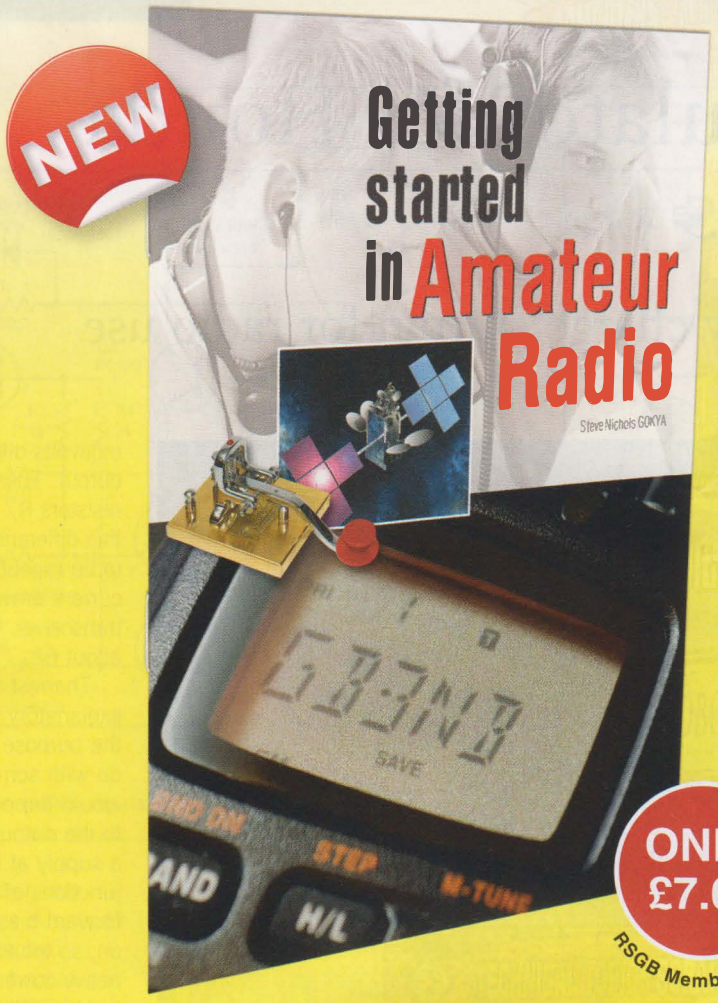


PHOTO 4: An electricity supply cupboard.



Getting started in Amateur Radio

By Steve Nichols, G0KYA

Amateur radio is amazing. It has so many different facets and possibilities that there is something for everyone. *Getting Started in Amateur Radio* sets out to explore what is possible and get you started on a voyage of discovery.

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Getting Started in Amateur Radio provides information on the activities to explore when using your first VHF/UHF or HF station and what other equipment you might need. There is a section on practical antennas vital to every radio amateur and details of operating using CW (Morse code), FM, SSB, Digital and more. What you can expect from the different amateur radio bands is covered and there is even a section devoted to long distance operation (DXing), amateur radio contesting, and amateur radio awards. The coverage doesn't stop there and readers will also find the microwave and LF bands discussed along with Moonbounce or Earth-Moon-Earth transmissions (EME). There is even a practical guide to getting a licence if you don't already have one.

Filled with tips and practical information to get you started, *Getting Started in Amateur Radio* provides the ideal book for those interested in amateur radio, the newly licensed or even those looking to widen their amateur radio outlook.

Size 174x240mm, 96 pages
ISBN: 9781 9101 9311 2
Non Members' Price: £8.99
RSGB Members' Price: £7.64

August 2015 • RadCom
Mike Hall, G3USC • mikehall2@btinternet.com

A DC regulator for Honda generators

Tame the 'battery charge' output for radio use

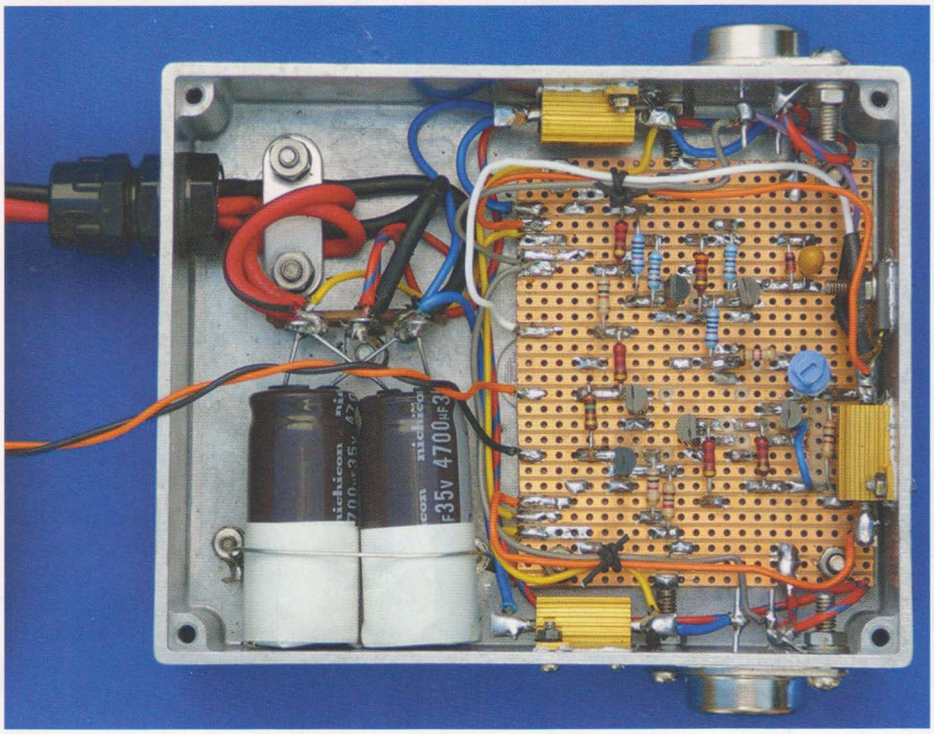

PHOTO 1: The completed regulator unit.

RAISON DÊTRE. Why use the DC output of a generator when there is mains voltage available from its main output? Well, the radio would then need its heavy AC supply unit, but, more relevant, if powered by a vehicle battery it can then be used for listening only, or for transmitting at low power for long periods without having to start the generator. The AC output can be held in reserve for use by a linear amplifier (or for making the tea!).

The design came about because the DC output of my Honda generator is full-wave rectified AC at a nominal 430Hz (860Hz pulses) intended only for charging a battery. The graph in **Figure 1** (re-drawn from information in a Honda service manual) shows the voltage rise versus current drawn and I was able to verify it quite closely by applying the generator's output to a large 22,000μF capacitor and a few parallel loads. It's clear that the raw DC is quite unusable: a light load or a battery in poor condition would allow an alarmingly high voltage to develop. I quickly discovered that running an expensive radio from a battery being thus charged is a risky business because the resulting voltage can well exceed the allowed upper limit. My Kenwood radio can tolerate 13.8V plus 15%; on charge I could see its supply voltage rising steadily up to that limit and heading up beyond it.

Whilst it was designed primarily for use with the DC output of my Honda EU20i 2kW generator when operating /P, the regulator to be described could no doubt be used with other generators. There are a couple of notes later in the text regarding this. The circuit could also be used as an ordinary 13.8V regulator to be fed from a transformer-rectifier arrangement, though C1 and C2 would have to be made bigger. 2 x 22,000μF would probably suffuce.

OPERATION. The circuit of the regulator is shown in **Figure 2** and it can be seen to be the not-so-common low dropout arrangement, there being the possibility of only a few hundred millivolts differential between input and output. The current sensing and sharing resistors R7 and R8 unfortunately add to this differential, but a limiter was deemed to be essential because of the high peak current drawn at syllabic rate by a 100W transceiver. Output current is limited to about 6A.

The rest of the circuit will be self-explanatory to the experienced eye, but the purpose of Q5 and Q6 could perhaps do with some explanation. Consider what would happen if a battery were connected to the output terminals in the absence of a supply at the input. The collector-base junctions of Q3 and Q4 would then become forward biased, and because Q7 is turned on, so too will Q2, allowing it to pass a heavy current. This is partly limited by R2, but it is still a large current. Q5 and Q6 therefore act as a secondary comparator that monitors the input voltage and only allows proper operation of the main comparator Q7 and Q8 when the input voltage is greater than that at the output. When the generator is not running, there will be a small residual current of around 50mA drawn from the battery, so it should not be left connected for extended periods with the generator stopped.

It will be noted that the upper end of R12 is connected to the collector of Q2 rather than to the common positive rail. This creates a further control loop that, again, acts to turn Q7 and Q2 off and prevents excessive current flowing via

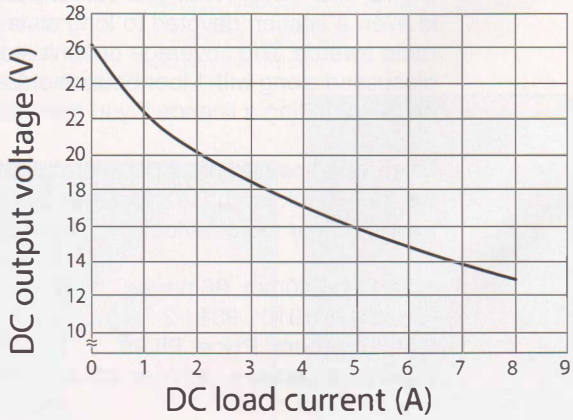

FIGURE 1: Typical voltage vs load for a generator '12V' output.

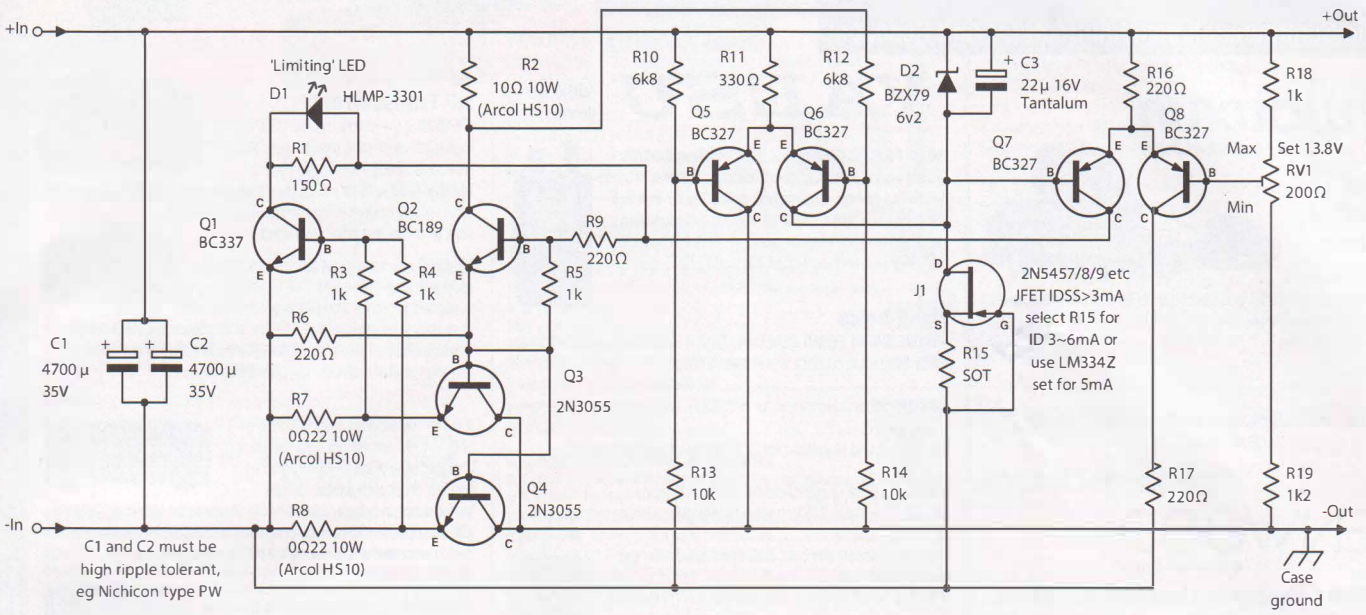

FIGURE 2: Circuit diagram of the voltage regulator.

Q2 and the forward biased base-emitter junctions of Q3 and Q4, this time supplied by the generator before it has reached the set output voltage. This effect could have been avoided by connecting Q2 in Darlington fashion to Q3 and Q4, with all their collectors connected together, but that would have increased the minimum in-out differential.

CONSTRUCTION. The use of a properly made PC board would have made a much smaller and neater assembly, but my regulator, seen in Photo 1, was built on stripboard, copper side up to allow assembly errors (which I am prone to make) to be easily corrected. Resistors are lifted slightly to prevent the possibility of unwanted shorts. The three power transistors, and their associated high power resistors R2, R7 and R8, which are metal case types, are bolted to the sides of the Eddystone 120 x 95 x 30mm diecast box (Maplin N90BQ). Whilst lower wattage circuit board resistors could have been chosen, I felt it desirable to conduct any generated heat away quickly; the box is a closed one, after all. I don't believe that the transistor types are critical. Most low frequency TO-3 or TO-220 silicon devices can be substituted for Q3 and Q4, any TO-126 device for Q2, and any small-signal types of the correct polarity and having a reasonable beta in the current range up to 25mA will do for the others. Q3 and Q4 probably do not need isolation from the case (check the tab connection if a TO-220), but Q2 must have its mica washer.

I used a 4m length of 10A twin cable as the feed from the generator. On the output side a 0.5m length of similar cable is used, fitted with Anderson Powerpole connectors at the far end, which goes to a 4-way Powerpole junction box. A 1m length of 25A cable with Powerpole connectors goes to the battery. These useful parts, and the cable, are available from several sources including SOTAbeams.

IN USE. The generator has two modes of operation: continuous, rather noisy full power; and ECO mode, which is relatively much quieter unless it is fully loaded to 1,600 watts. The AC mains output is derived from an inverter and is said to have good waveform purity and frequency stability. It has its own regulator and, in ECO mode, the load is sensed and the engine throttle is adjusted accordingly. DC generation is quite separate from the AC side, but since the voltage is somewhat dependent on the engine speed it varies according to the AC load when switched to ECO mode.

With a light AC load in ECO mode the DC output is quite low, but the generator can usefully be operated in this mode if the radio is drawing only moderate current, although the battery voltage may be reduced to 12.5V or so when transmitting. Q3 and Q4 will be fully saturated in this mode, as the regulator tries to restore the output to 13.8V. When transmitting at the 100W level the generator may not be able to replenish the battery charge between overs unless the ECO mode is switched off, when the 6A Limiter LED will flash on speech peaks or key-down. However, the ECO mode is fine when running the radio at 35W, which is the level required by my linear amplifier. The regulator runs nice and cool at this level. The generator hardly seems to notice the amplifier running on its AC output at 400W PEP and it causes only small engine speed variations under speech conditions.

I suggest setting RV1 with the generator's ECO mode switched off and with the battery and radio connected, slowly increasing the voltage from minimum up to 13.8V. The voltage has a small positive temperature coefficient, so carry out the final adjustment after a minute or two. It goes without saying that the battery must be in good condition and probably should not be one that has been discarded from a vehicle because it would no longer start its engine. Its function, after all, is to supply the high current peaks required when transmitting without its voltage sagging appreciably.

OTHER GENERATORS. There are a number of other makes of generator that have a similar 12V output with similar characteristics to that on my Honda EU20i. Perhaps the most important point to note is that for this circuit to work properly, the generator DC output must not be grounded to the chassis.

I noted earlier that a small reverse current flows into the circuit when the generator is not running. I did consider using a diode to prevent this residual back current but decided that the forward voltage loss wasn't worth it, given that I only ever use the setup for relatively short periods. It might be a different matter if the circuit was permanently connected to a standby battery (eg for off-grid use).

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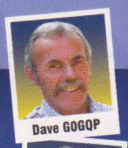
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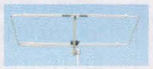

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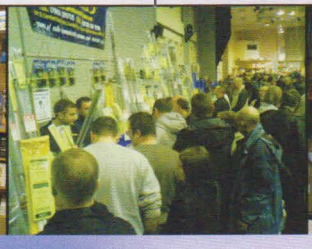

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Antennas

Searching for a compact beam antenna and polar plot scales

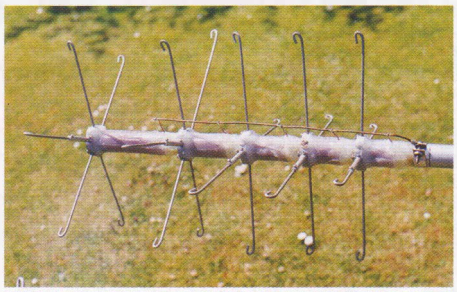

PHOTO 1: The multiband loading method used on the MQ-2. One of these devices is fixed to each end of each element.

THE MQ-2 ANTENNA. The Holy Grail of antenna design is to reduce the physical size of an antenna while at the same time maintaining a reasonable performance. For a parasitic beam antenna, one method is to use element end loading. The MQ-2 antenna (and its later derivatives) achieve this by using inductance and capacity 'spokes' to enable the elements to resonate on the 20, 17, 15, 12 and 10 metre bands. The multiband loading arrangement is shown in **Photo 1**. One of the spokes in each set is constructed so that its length can be varied. This is achieved using an adjuster, comprising a sleeve with small clamping screws. This allows the resonant frequency to be set at a specific part of the band.

The parasitic element is tuned as a reflector and uses a diamond configuration, although the benefits of using this arrangement are not clear. The MQ-2 antenna is shown in **Photo 2.**

Some while ago I reviewed this antenna [1]. While commenting on its small size, the element lengths being 3.6m (11ft 9in) and the boom length 1.37m (4ft 6in), I did mention its lack of directivity on 14MHz and 18MHz and the difficulties in trying to match the antenna to the feeder on all the bands. It is probable that other users of the MQ-2 experienced problems and had discarded it. The MQ-2 has been superseded by the MQ-26SR but judging by the specification it hasn't changed very much.

I felt that the basic design of this antenna was sound so I bought the review model with a view investigating it further.

MODIFYING THE MQ-2. I modelled single band two-element beam for 14MHz using *EZNEC* and the results, shown in **Figure 1**, showed promise. As a result I modified the MQ-2 as follows. The element lengths were changed from 3.6m (11ft 9in) to 4.49m (4ft 8in) and the boom length from 1.37m (4ft 6in) to 2.1m (6ft 10in). In practice this meant replacing most of the metalwork. The original element tubing diameter is 25.4mm (1.0in) outside diameter; the loading assembly at the ends of the elements have been machined to 22mm to fit inside this tubing.

The electrical diagram of the modified antenna is shown in **Figure 2.** You will notice that the parasitic element has been changed from a diamond configuration to a conventional arrangement. This was done because I could find no references to the advantage of the more complex diamond structure.

The reflector and driven elements are the same length but the driven element is cut in the centre so that it can be fed directly with coaxial cable. The inductance of each of the loading assemblies needs to be reduced to compensate for the extra element length. This was achieved by removing one turn from each of the five coils on each of the loading assemblies.

The modification to the MQ-2 made a big improvement to the 14 and 18MHz bands. On the higher frequencies there was no noticeable improvement in gain or front-to-back but the improvement in the impedance bandwidth on all bands is most marked. In fact the performances on the various bands are similar to those predicted by *EZNEC*.

The antenna, shown in **Photo 3**, was in use for several years and weathered several storms without any problem. More recently I have now removed the parasitic element and use the antenna as a rotary multiband dipole. There is no noticeable permanent deterioration in performance caused by wet weather.

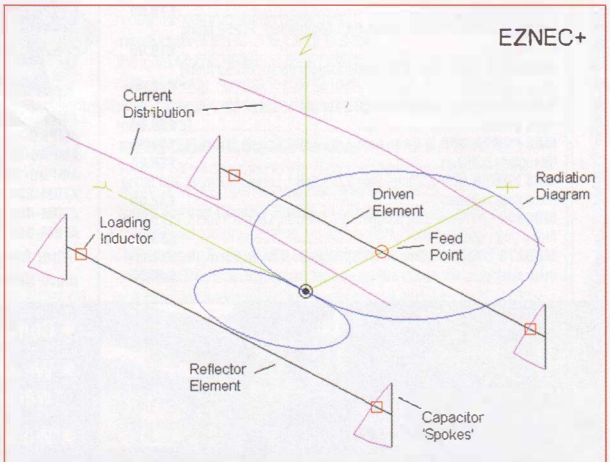

FIGURE 1: A single band two-element beam for 14MHz using end loading modelled using *EZNEC*. Free space diagram, 0.1λ spacing, gain 5.4dBi, 16dB F/B.

G3VXJ AND HIS MQ-2. I recently gave a talk on antennas to the Worthing and District Amateur Radio Club and mentioned this modification to the MQ-2. Bob, G3VXJ, who was in the audience, told me of a similar modification he had made to a MQ-2. He modelled a design using *ELNEC*, which gave him the confidence to go for a real implementation.

G3VXJ notes "The boom of my modified MQ-2 is 100 inches, which is approximately 1/8 wavelength on 20m (the closest spacing recommended in antenna literature) and 1/4 wave on 10m (which is about the maximum recommended). The elements are 186 inches to the start of the 'traps' and then 2x18 inches for the 'trap' set, making the overall element length 222 inches. By Pythagoras this results in a turning radius of 10ft, which was my maximum target."

Clearly 20m is the most difficult band to obtain gain and directivity and the best that can be achieved is shown in **Figure 3.** Bear in mind that this is plotted using a logarithmic (linear dB) scale; more about this later. The appearance of the modified antenna was very similar to the one shown in **Photo 3.**

G3VXJ goes on to say "I estimate (by using the current distribution on the elements) that the gain would be 1.5dB down on an equivalent full size 2 element 20m beam – so maybe up to 4dB gain over a dipole when optimised. A spec of 3dB gain (1/2 an S-point) with some directivity and front to back ratio was a good enough target for me! My polar plot shows just under 2 S-point front to back ratio (say 10dB), implying 5dB of forward gain. If you take off the 1.5dB lost by element shortening this nets out at 3.5dB of gain over a dipole, which seems about right. On 20m I get about 250kHz of bandwidth for 2:1 SWR and the whole band is easily tuned by my rig's auto ATU.

"My beam first went up in 1990 using Altron 'traps', which only covered 20/15/10m. When TGM brought out the MQ2 (about 1999 I think) I immediately upgraded my 'traps' to add 17/12m to my beam. Incidentally I resonated my traps only by reducing the length of some spokes for each band without touching the coils. This method worked even for 10m where, surprisingly, I still have 2 spokes per trap at almost their full length.

"I have used this beam now for about 25 years it has been very successful and durable for me. In fact it took me to the top of the DXCC Honor Roll in 2005!"

POLAR DIAGRAMS. The range of intensities measured in plotting these diagrams can exceed 50dB so the scaling of the polar graphs used to represent the antenna radiation pattern is of some consequence. It

PHOTO 2: The original MQ-2 multiband antenna.

PHOTO 3 (right): The modified MQ-2 antenna is fixed to the chimney using a double clamp. Even though the modification has resulted in a larger antenna it is still a very compact multi-band beam, as can be seen by comparison with the UHF TV antenna at the base of the chimney.

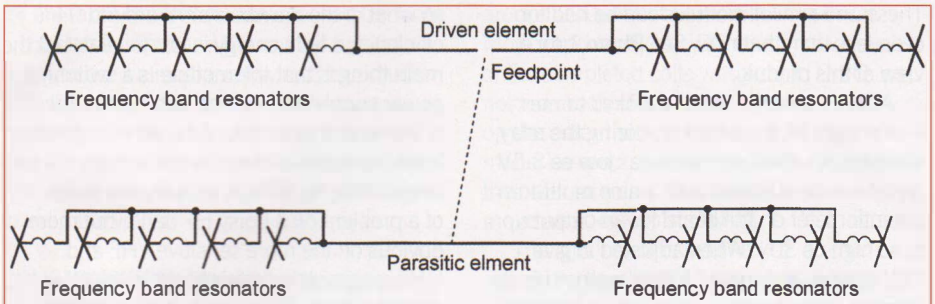

FIGURE 2: Electrical diagram of the modified antenna MQ-2.

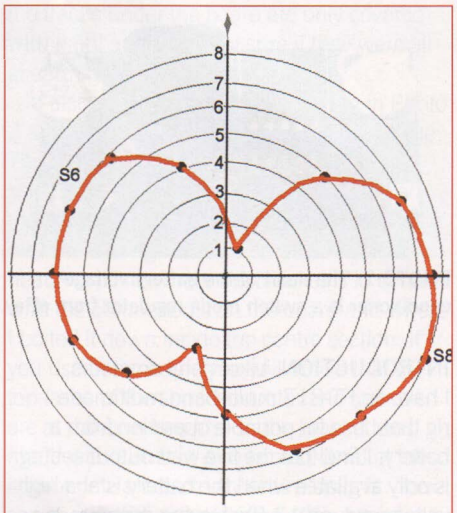

FIGURE 3: Measured polar diagram using a S-meter Logarithmic (Linear dB) scale obtained using a signal from a local amateur and plotted from the station receiver S-meter readings at known beam headings.

is important, when comparing the radiation patterns of antennas, to be aware of the type of scale used.

The first example is a linear plot of a 9-ele VHF Yagi, see **Figure 4**. You would get this type of plot if you used a diode field strength meter. It can only show features of the field strength from a maximum signal strength down about -15 to -20dB or so, which gives a very optimistic picture of directivity and suppresses the minor lobes. The linear scale has the advantage of being very sensitive to changes in level in the region of maximum signal strength and is useful for making gain comparisons between different antennas. The linear plot was used in all early radio and antenna books to illustrate antenna radiation patterns but have been superseded in modern antenna literature.

If your main interest is a low noise antenna, as described by Ian White in [2], then you will be more interested in the proportions of the minor lobes of the antenna. The polar diagram plotted on a logarithmic (Linear dB) grid is of the same VHF Yagi antenna is shown in **Figure 5**. The display shows the radiation pattern over a range of 50dB and emphasises these minor lobes to enable them to be examined in more detail.

The ARRL devised a polar diagram having a Log Periodic Grid. Instead of the graduations varying linearly with the log of the field intensity they vary periodically. The constant of this periodicity is 0.89 for 2dB intervals. This represents a compromise between the extremes of linear and linear dB grids so far described. It possesses good sensitivity to small changes in maximum signal while at the same time is able to display the minor lobes. A field strength polar diagram of the 9 element VHF beam antenna using this scale is shown in **Figure 6**.

REFERENCES

[1] Review of the MQ2 minibeam, *Practical Wireless*, August 1999

[2] In Practice, Ian White, GM3SEK, *RadCom*, Nov 2009

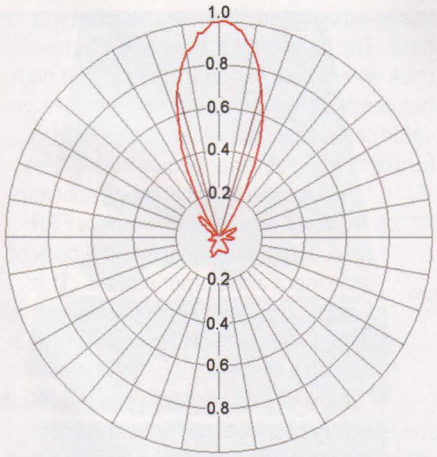

FIGURE 4: Polar diagram of a 9 element VHF Yagi using a linear scale.

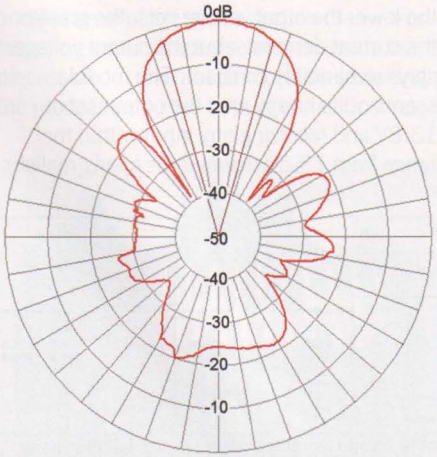

FIGURE 5: Polar diagram of a 9 element VHF Yagi using a linear log plot.

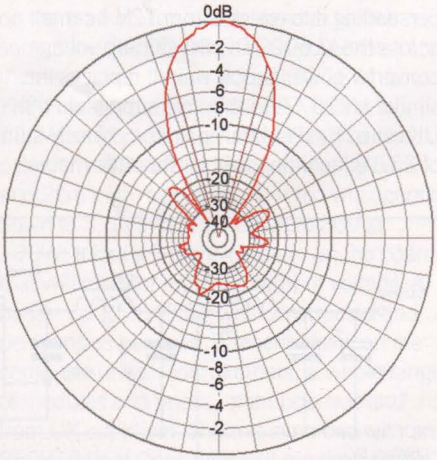

FIGURE 6: Polar diagram of a 9 element VHF Yagi using the ARRL Log Periodic plot.

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A battery voltage conditioner for QRP rigs

Keep your voltage at 13.8 – no matter what

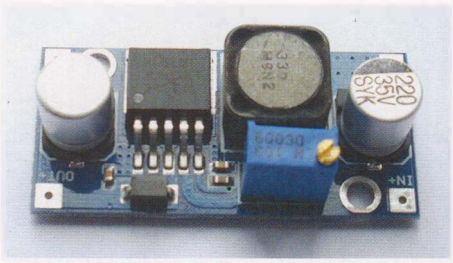

PHOTO 1: The heart of the battery voltage conditioner is a switch mode regulator from eBay.

INTRODUCTION. Like many amateurs, I have an FT-817 multi-band multimode rig that I use for portable operation from a battery. I find that the five watt output setting is only available when the battery is at a high voltage around 13.8V. Having driven to my favourite /P spot and using the car battery, things are fine for a while until I notice that the rig has detected a drop in car battery voltage and is now delivering 2.5W (as per spec) on its second power setting. Things are the same using a lead-acid gel battery or NiMh battery pack except the switch to low power occurs rather sooner. Duncan, G4DFV tells me this also happens with other low power rigs such as the Icom IC-703.

The cure I have found for this lies in a very low cost diminutive little module currently available from several suppliers on eBay. I originally found out about these modules as I had purchased a coaxial relay made for operation on 28V and I was looking for an alternative to the usual pulsing circuits for persuading it to operate from 12V. I came across the XL6009 DC-DC step-up voltage converter power supply unit (it replaces the similar LM2577 unit) from a supplier in the UK called RasPi Mart. I paid the princely sum of £3.18 including post for this little marvel. These and similar modules can be had for even less than that now. See **Photo 1** for a view of this module.

At just 2cm by 4.3cm, it looked to me like it might fill the bill for powering the relay, since its input voltage can be as low as 3.5V and it can be adjusted with a nice multi-turn potentiometer on the board for an output up to as high as 30V. When adjusted to give 28V output, an input of 12V is well within its comfort range and the relay duly performed correctly. Some discussion with fellow builders ensued and it became apparent that this little module is well under-used in this application – a few amps of output current might be possible.

A test setup with the multimeter and a selection of high-wattage wire-wound resistors confirmed that output currents of 2 to 3A are indeed possible. The semiconductor device and the inductor on the board tended to get a little warm, but since the efficiency of the module is given as around 94%, not much heat is produced. The measured current consumption of my FT-817 varies from around 0.5A on receive to just under 2A on transmit at high power, so it seemed that it might indeed be possible to use the module to supply the rig with a constant 13.8V almost regardless of battery voltage.

PRINCIPLES. The way the module works seems to be that you set the desired output voltage, leaving the input voltage to look after itself (within limits). All that happens is that the lower the input voltage gets, the greater the current demand – but the output voltage stays remarkably constant. The module seems quite happy with the output set at 13.8V and receiving any input within the range from 13.5V downwards to any realistic level that a car battery might reach. I use mine plugged into the accessory socket in the car where the wiring, fuse, and switching resistances all take their toll and the output voltage is often in the 12V to 12.5V range. This is insufficient for the rig to operate at the 5W level. Before this project I had connected directly to the battery terminals to try and recover as much voltage as possible but even this only worked for a while. Now, it is far more convenient to just plug into the accessory socket and away I go at 5W.

PROS AND CONS. We've seen the benefits, so what of the drawbacks? At around 94% efficiency, a little energy is lost to heat, but the main thing is that the module is a switching power supply and as well as the heat, there is the hash it produces. A certain (low) noise level is present all over the entire frequency range of the rig. This is actually not much of a problem on a noisy HF band, but more obvious on the more sensitive VHF and UHF ranges. It is certainly not in the class of obliterating all signals, but weak signal reception is a problem. I live about 200km from the 144MHz and 432MHz beacons at GB3ANG and on a simple dipole at car roof height I can still hear the beacons, but they are accompanied by the higher noise level from the module when it is in use.

NOISE SOLUTIONS. I thought about switching the module off and bypassing it on receive, leaving it on for transmit only, but that could lead to a more complicated circuit involving the PTT line, so I wondered whether I could improve things using screening and filtering, thus leaving the module on all the time. The quick answer here is that it is possible to completely remove any trace of the hash the module produces using the simple circuit I have developed. I find that when monitoring the beacon even with an indoor dipole on a table at 1m or so above ground level, there is no sign of any noise from this unit other than a click when it is turned on.

The circuit is shown in **Figure 1**. Use this as a basis and, like me, use what you have. The inner toroids have a few turns of thick wire and are an attempt to form a high frequency filter in combination with the low value capacitors. The outer toroids form further filtering at lower frequencies. There are a selection of ceramic capacitors at various points and two low ESR electrolytic capacitors on the back of the input and output sockets. This outer layer of defence is aimed at HF generally. Both input and output circuits are protected in the same way as I was not sure where the hash would leak out. Use two different types of sockets for input and output so you cannot get them the wrong way round! I used a phono socket

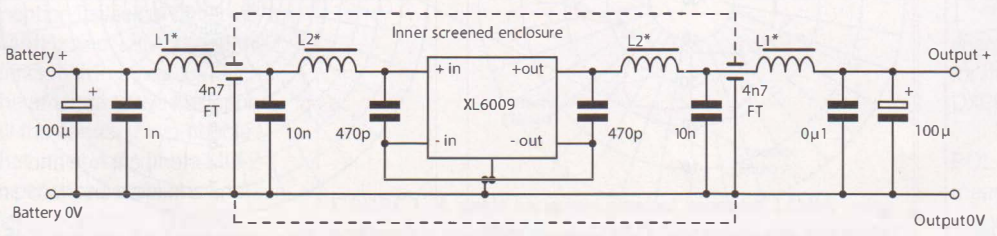

FIGURE 1: Circuit diagram of the battery voltage conditioner. * see text for details of L1 and L2.

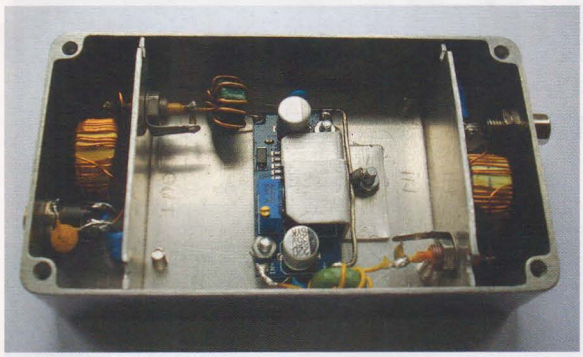

PHOTO 2: The module is under the aluminium bracket (centre).

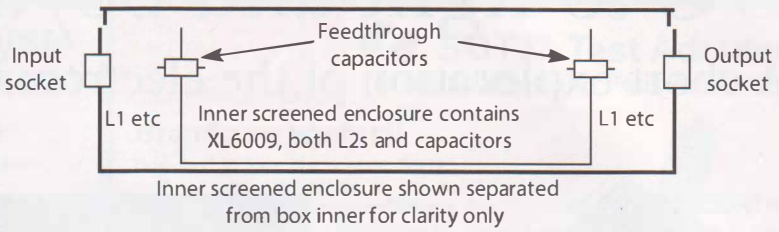

FIGURE 2: General arrangement of the inner screened enclosure, feedthrough capacitors and connecting sockets.

for the input (the connections looked OK for a couple of amps) and the normal hole and pin type used almost everywhere for power supply to electronic devices for the output to the rig. Keep the lead between this unit and the rig as short as practicable since any resistance here will act against all your efforts to keep the voltage up to 13.8V!

CONSTRUCTION. Physically, the module is placed in a screened box within a box, using low-pass filters utilising toroidal coils and a range of capacitors on both input and output circuits. I used a commonly available 4 by 2 by 1 inch diecast aluminium box (I got mine from Maplin) and a piece of thin aluminium sheet formed into a square U shape that is shaped to form a close fit to the diecast box and lid when put in place (see **Figure 2**). **Photos 2** and **3** also show how I shaped the tops of the U shaped screen to accommodate the die cast box lid to make a good fit. This creates three screened enclosures in a row within the die cast box, the centre one only being accessible through the two side ones.

The larger toroids (marked L1 in the circuit diagram, Figure 1) in the side boxes were from the junk box: they actually came from defunct mains light dimmers. They are about 2cm diameter and 1cm thick. I removed most of the wire (about 24swg) until there was a single layer winding of around 50 turns on each. I think these toroids are of iron dust construction and the inductance was around 200μH but none of this is critical. More importantly, the DC resistance of each of the completed coils was around 0.2Ω, so not too much of the precious voltage is lost on the output side of the circuit. It does not matter so much on the input side. I cosseted the outer toroids in black foam to prevent any movement, eg whilst driving.

The small toroids (marked L2 on the circuit diagram) in the centre box directly connected to the power converter board were from a broken 'wall wart' type switch mode power supply and were of ferrite construction. For the record these were about 15mm in diameter and 8mm thick. I had 7 or 8 turns of 18 SWG wire on each, which resulted in an inductance of around 75μH and a DC resistance below the 0.1Ω resolution of my meter. I am being deliberately vague here as it simply does not matter much. I was building a very basic low-pass filter that is trying to pass DC and stop any RF getting out of the centre section. I had two bolt-in 4700pF feed through capacitors connecting the centre box to each side box, but I daresay that these were used simply because I had them. An insulated wire through a small hole (1mm dia) with capacitors to earth either side of the screen would do at a pinch. Like most things I build, this is a bit belt and braces so a less careful approach would still be worthwhile. Use what you have.

The module was mounted using its two holes, using an extra nut on each of the two screws to act as spacers between the module and the base of the centre section (as well as fastening the U shaped screening inside the diecast box). I was not comfortable fastening the module flat to the base of the enclosure; the tracks under the board are only covered with paint and I was not sure if they were all at earth potential anyway.

I also made a small bracket (seen in Photo 2 and Photo 3) to go over part of the module. This helps to conduct heat away from the semiconductor device (and the inductor on the module) to the case. It also creates a little more screening. I used a small amount of heatsink paste where the bracket is in contact with the components on the board and where I bolted it down inside the centre section. If you use this module you will notice that the top faces of the semiconductor and the coil are at different heights, so the bracket was made with a split in it so I could bend at the appropriate places to achieve a snug fit. You can see all this in the photos. Why have I been so careful in burying the module in this way? Look at it like this; the module hisses and growls (in an electrical sense of course) and you are building a cage around it to prevent this noise escaping!

After completing construction, all that remains to do is to power up from a 12V source and set the output of the module to 13.8V. It would be wise to test it before connecting to your expensive rig! Try a 4.7Ω wire wound resistor or a 21W car indicator lamp as a load. Once this has been done, fasten the lid down and you are ready to operate at the higher power level for longer.

MORE POWER. If you want more power, then look at the range of these modules on the market. You simply need to search something like DC-DC converter and lots of them come up. I have a type LTC 1871 from YKS Power Ltd, also from eBay. This is a 100W rated module, a little larger than the project module at slightly over 4cm by 6cm and 2cm high, see **Photo 4**. It too will operate down to 3.5V and produce up to 30V at 100W! It has a 3 digit voltmeter on the board that will monitor input and output voltage. A bargain at £5.84! It is well constructed and performs as per spec. A recent check on the computer reveals lots of others, a whole range of modules and prices, often post free and from UK suppliers. There is even one with an 850W rating! Good luck and may you spend many /P operating hours at full (QRP) power – as I am now able to do.

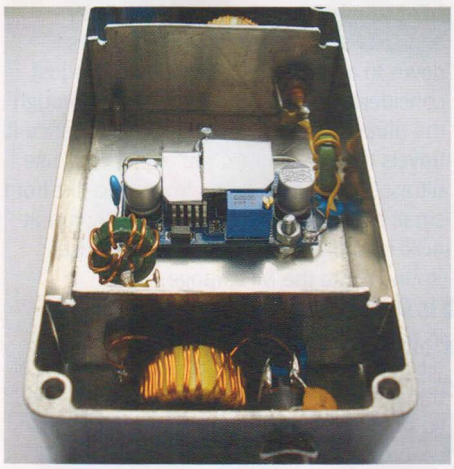

PHOTO 3: L1, L2 and the feedthrough capacitors are clearly seen here.

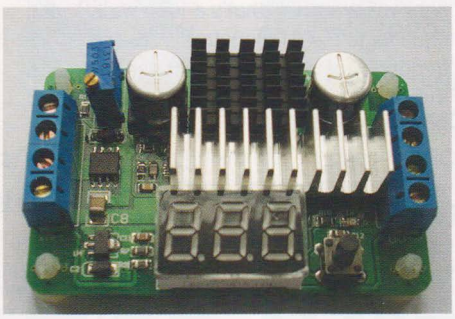

PHOTO 4: Higher power switch mode modules like this 100W version are readily available.

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DC to light and beyond

A short exploration of the electromagnetic spectrum

INTRODUCTION. I recently read a short article about the electromagnetic spectrum. It was very simple and directed at absolute beginners with an interest in astronomy. This was similar to, but not the same as the section of the Foundation course. The article raised some interesting questions such as:

- What is the longest wave possible?
- What is the highest frequency possible?
- What effect does the Doppler Effect have on radio waves?

On the face of it the answers seem easy: DC is the longest wave and infinity is the highest frequency – but these answers are wrong!

Other questions arise from the ones above such as;

- What are radio astronomers listening to?
- Why do we have to use VHF to talk to the moon, and not HF?

Some of the concepts that follow in this article shed light on the behaviour of radio waves – and that is, of course, of great interest to us amateurs.

PHOTO 1: Thermal imaging of 'light' around 10μm shows warm things like people clearly when it's too dark for a normal camera to see properly. Image from tinyurl.com/RC-8-15-A

SO, WHERE TO START? Perhaps we should begin with the standard spectrum diagram that we are all familiar with, **Figure 1**. This covers waves from about 1km long, down to the minute nanometre (nm, 10^{-9}m) lengths of gamma rays.

We were taught that there is a fixed relationship between wavelength and frequency as, in a vacuum, all waves travel at the speed of light – approximately 300,000km per second. This means that some of our regular spots we know and love are known as follows: 2m, 145MHz; 70cm, 430MHz, then there are some HF favourites: 20m, 14.5MHz and 80m, 3.5MHz. The conversion of wavelength to frequency is very approximate but the conversions are well known and used.

To help keep track where we have got to I will start at the longest wavelengths and lowest frequencies and progress upward to the highest frequencies and the shortest wavelengths. I will not strictly adhere to all the preferred groupings of frequencies as for this article some could be skipped altogether.

LONG WAVES. To get started, and just for interest, let's look at some very long wavelengths – universe-size wavelengths. The frequency will be low, but just how low?

A 1Hz electromagnetic (EM) wave has a length of 300,000km so 0.1Hz is 3M km (3,000,000km or 3 x 10^9 metres). 0.01Hz is 10 times longer, so that's 30M km or 3 x 10^{10}m, and so on.

Whilst it is possible to have an arbitrarily low frequency, and thus an arbitrarily long wavelength, how about a wavelength that will just fit into the known universe? That distance is currently thought to be 93 billion light years across (that's a long walk!), and equates to 9 x 10^{26} metres. This has a frequency of 3 x 10^{-23} Hz, or very, very low in anyone's book. Roughly one cycle every thousand million million years in fact.

Although we're thinking about a single wave there could also be fractions of even longer ones present. However, to be strictly accurate there is no 'longest wave' or lowest frequency as the wave length approaches infinity, and the frequency zero, but neither actually reach there! Only DC is static and a steady state does not have a waveform.

AUDIO. We can see in Figure 1 that the electromagnetic waves at the lower end of the frequency scale coincide with audio and vibration. Human hearing ranges from about 20Hz up to 20kHz (with the upper limit reducing with age) and sounds also continue in the ultrasonic up to about 50kHz, where some animals can hear and bats echo-locate. Vibration ranges down to about 1Hz, below which it is just considered movement, and upward through the ultrasonic dependant on the substance it travels through. For example, jewellers use ultrasonic cleaning baths to remove dirt from small clock parts and these typically run at 40kHz; ultrasonic medical imaging uses 'sounds' into the MHz range.

These movements are mechanical in nature and so cannot be classed as electromagnetic. Sound is just movement of the air (or a solid, eg noises in water), and so of course these waves cannot exist in a vacuum!

Heat, on the other hand, is part of the electromagnetic spectrum and will travel

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through a vacuum. To prove it, just stand out in the sun on a hot day! The sun is a long way away and there's a lot of vacuum between it and the top of the Earth's atmosphere.

We will consider heat together with cosmic rays and gamma radiation later.

MULTIPLIERS. Before we get too far it might be a good idea to refresh ourselves of our multipliers, as in this article we will come across some big and 'huge' numbers (and some pretty small ones as well). **Table 1** gives some idea of the range of wavelengths and frequencies we're looking at.

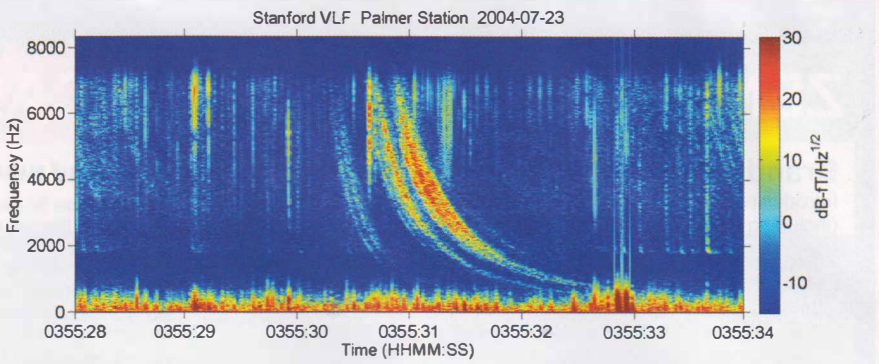

FIGURE 2: Typical waterfall diagram of atmospheric VLF 'whistlers'. Image: GFDL 1.2

VLF (3 TO 30kHz). The Very Low Frequency (VLF) sector of the electromagnetic spectrum is just in and above the part of the audio spectrum described earlier, however electromagnetic waves and sound are quite different. To illustrate the difference, we can send an AC signal for long distances along a copper wire, however if we bang or shake the wire, the vibration attenuates to nothing in a very short distance.

Here in the VLF sector we find specialist applications such as search and rescue (SAR) beacons that transmit through sea water; we also encounter the geomagnetic generated 'whistlers' [1] as shown in the spectrum diagram of **Figure 2**.

Sound systems in audio applications do in fact also transfer the energy of these frequencies by conduction in the wires. We are warned that in cases of EMC interference, our radio signals can be received by these wires, so, although they use different mediums they share the same spectrum.

LF (30 TO 300kHz). This area is generally now used for long distance commercial broadcasting with the famous BBC 'long wave' transmissions, now Radio 4, on 1500m (198 kHz).

The use of high power and the reliance on ground wave propagation ensure reliable coverage.

MF (300kHz to 3MHz). The 'medium wave' band is full of regional broadcast stations mixed with navigation beacons for shipping and aviation. It is also the home of the old ship to shore transmissions, which are gradually being replaced with satellite links.

This band is very affected by the sun and propagation between day and night shows slow but dramatic changes. As with transmissions in the LF band, broadcasters use loads of power and big antennas. Interaction between ground waves and ionospheric reflections cause problems for listeners in 'fringe' areas.

Amateurs have 'Top Band' here, just below 2MHz. It tends to be used for the gentlemen's rag chewing spot, as fading (QSB) is unlikely to affect long overs. However it has also been a fertile band for DX hunters, especially during the solar minimum periods when D region absorption is at a minimum.

HF (3 to 30MHz). The 'short waves' that we amateurs are known to haunt by public perception. This is the area of the spectrum where we generally take the most interest. It contains our main intercontinental DX frequencies and our best known bands. Propagation and the ionosphere are the most closely monitored subjects, so at this point we will explore the effects of our atmosphere.

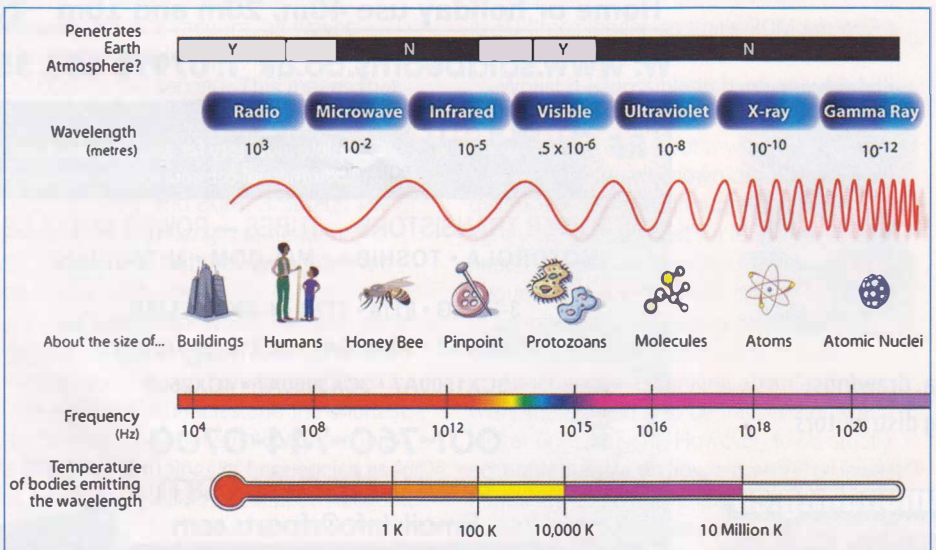

FIGURE 1: Standard spectrum diagram covering audio frequencies to gamma rays. Image: NASA

Refraction of radio waves. We are taught that VHF waves travel in straight lines and only bend a little, so their range is just beyond the visible horizon. If this is the case, why do HF waves bend so easily in the F layers to bounce right round the world?

The clue is in the apparent energy level of waves of different frequencies. For example we know that X- rays will travel right through us, while light won't. As a general rule the higher the frequency the higher its energy level. This appears as the penetrating ability of a wave. More on this later.

The Maximum Useable Frequency (MUF) is the frequency at which the HF waves cease to be refracted by the ionosphere and are passed straight through, either to be lost out into space or attenuated down to nothing. This frequency varies considerably but is usually found around 6MHz.

For us amateurs the frequencies just below the MUF contain the 5MHz or 60m band. The characteristics here involve NVIS or Near Vertical Incident Sky waves. Courtesy of the Primary Users, this band has been rich in experimentation these last few years.

Atmospheric absorption of waves. We'll get a little ahead of ourselves here. We know that for waves originating at ground level, HF will be either absorbed by the D layer, or refracted, or reflected, by the E and F layers and will hardly escape the Earth's atmosphere. If we want to talk to the moon (or use moon bounce) we will most likely use the 2m band or any reliable frequency higher than the MUF. If we want to talk to orbiting spacemen we will probably use UHF and big dishes. Radar will penetrate the atmosphere; however a higher band, infra red, is almost totally blocked, by water vapour and clouds. When we reach light,

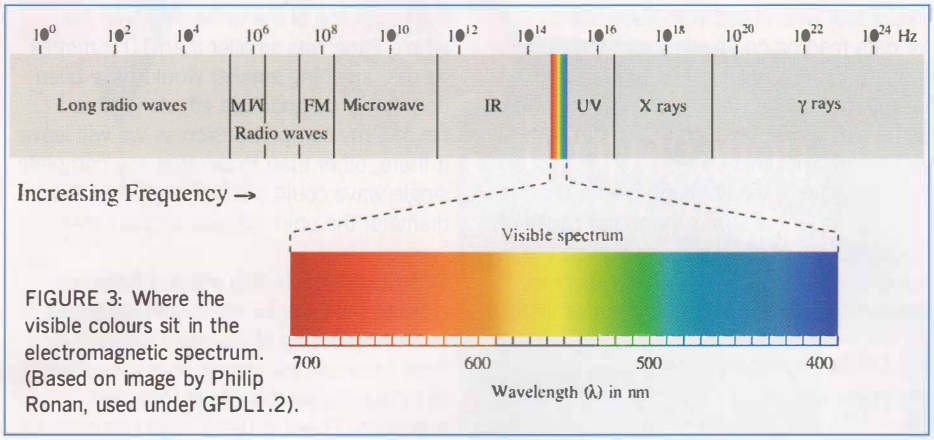

FIGURE 3: Where the visible colours sit in the electromagnetic spectrum. (Based on image by Philip Ronan, used under GFDL1.2).

virtually all gets through most of the time; this is the atmospheric sweet spot!

As we go on up in frequency we find that the incoming solar ultra violet is blocked by the ionisation effect in the high atmosphere, particularly by ionised ozone. Passing on up toward gamma rays, these tend to be blocked by collisions with atoms in the highest and thinnest levels of the atmosphere. These collisions cause a reduction in the energy levels of the secondary particles and a change of particle types.

The science of the breakdown of the very high energy gamma ray particles is quite complex but is well worth exploring if you are interested, however it beyond the scope of this article. What is worth mentioning however is that these high energy particles appear to be waves at the same time. Light for instance is thought to be a frequency, while it is known also to be a very small particle, the photon. The photon vibrates at its apparent frequency. Without going into too much physics the smaller a particle, the higher the frequency that it can vibrate.

For us radio amateurs we usually deal in electrons that, compared with photons, are huge – and therefore vibrate a lot slower.

VHF (30 TO 300MHz). In the author's experience, VHF tends to be 'used' more than 'experimented with'. There is one outstanding experiment awaiting success and that is the first two way contact across the Atlantic using 2 metres.

The 'Magic Band' at 6m is probably an exception to this; however, as a competition medium, VHF is very well used.

Most of our band plans for VHF tend to show similar 'channelization' to the commercial users in adjacent bands. Over the years users have migrated to their most suitable segments of the spectrum. For example the lower end is preferred by vehicle operators where the ability of these signals to follow uneven ground and penetrate foliage is an advantage. In the middle, the aviation industry and sound broadcasters can be found. At the upper end, short range hand held users can be found. Signals generally travel only along the line of sight (in practice they go slightly further than the optical horizon) but some reflections do occur, eg off buildings.

UHF (300MHz to 3GHz). UHF is really an upward extension to the VHF. At the lower end the advantages of the smaller antennas made it popular with the hand held industry. The TV broadcasters found that the bandwidth available gives them the 'room' to broadcast huge quantities data – vision, colour, sound and text services – all crammed into multiple channel transponders at the main transmitter sites. Although the line of sight rules still apply, considerable propagation is found using reflections and refractions of buildings in the urban environment, thus allowing mobile phones in this band to work in the office!

Toward the top of this frequency range are the lower satellite downlink frequencies, with TV and GPS the best-known uses. There is also a huge proliferation of low power networks around 2.4GHz.

MICROWAVE AND RADAR (3GHz to 3THz). As we leave the UHF and go even higher we enter the line of sight microwave region. This we use for point to point transmissions with real 'line of sight' only. These waves have become very energetic and resist most attempts to bend them round corners. Anyone considering trying it will have to become used to using wave guides and similar plumbing hardware. Radar uses these properties to bounce off targets and return signals to their source. With the increase in frequencies in this region of the spectrum comes a health warning! As we shall see later, the *energy* levels (not power levels) increase and become penetrating to the human body, this can, and will cause health problems, so exercise extreme caution when thinking of generating and transmitting these frequencies!

For us amateurs this should be the end of the story as the highest frequency allocation available to us in the UK is 250GHz; but we don't need a licence to use light!

HEAT AND INFRARED (~3 to 300THz). As mentioned earlier, heat is an electromagnetic radiation. It is also conducted in a similar fashion to electricity, so heat will travel through a copper bar with ease.

Regrettably, heat is generally of little use as a communication medium but is very useful for passive motion sensing as we can 'feel' the warmth of hot objects even in total darkness.

This region of the spectrum lies between the highest radar frequencies and visible light. Radar will not penetrate very far into the end of a short metal bar, whereas heat will travel from one end to the other. Strangely, light won't penetrate it either!

As the frequency increases, so does the temperature. The far infrared is of course invisible but is detected as heat. However if it has a high enough temperature (frequency) it rises to be 'near infrared' (ie close to visible light); increased even further it leaves the infrared and it appears at very low end of the (red) light sector.

Anyone lucky enough to have watched a blacksmith at work will be able to see and experience the effects. A bar of black iron, heated, will still look black, but will radiate heat. Put back in the fire to heat further it will start to visibly glow dull cherry red. Even more heating will raise the colour to bright yellow, a very high temperature!

Infrared cameras and detectors can show movement of people in complete darkness, either by using invisible near-infrared light or, at longer wavelengths, thanks to the fact that we radiate heat. **Photo 1** shows a comparison of a visible (upper) and thermal image (lower) showing how warm things – like people – 'glow' of their own accord in the longer thermal wavelengths. We have difficulty feeling other people's heat at a distance, but can feel the presence of a hot soldering iron close up!

VISIBLE LIGHT (~400-1000THz). Light is a form of electromagnetic radiation and the visible part that we humans can see. It ranges from deep red to deep violet. These colours are the low and high limits of our eyes' receiving range. The red end has a wavelength of about 700nm and a frequency of 400THz, whilst violet has a wavelength of about 400nm and a frequency of 790THz. Everyone's red and violet limits vary slightly but, either way, we can only perceive a tiny part of the electromagnetic spectrum. **Figure 3** shows how the (tiny) visible portion of the electromagnetic spectrum relates to other frequencies.

Light is a useful medium to illustrate some of the ideas presented here. In a rainbow we can see most of the visible spectrum of sunlight being refracted back from water droplets in the air. The red end is bent round sharper than the violet end. This

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shows that the lower a frequency the less energy it has and the easier it can be bent. Sunsets also show the same effect where atmospheric refraction bends the deep red light so it is visible, when in reality the sun has already set below the horizon.

Light as a communication medium can be used in a number of ways for example flashing beacons (lighthouses) for sea navigation, airport beacons flashing a slow Morse ident' for over flying aircraft. Even Scouts use torches and heliographs to pass messages. Probably the most important medium for light communication in the modern world is the optical fibre used for phone and broadband data! The low end frequencies used are in the near infrared and so are not visible to the naked eye, hence the warning NEVER stare into the end of an optical fibre where there is any chance chance that is in use: it could be carrying enough optical power to fry your eye.

At this point of the spectrum we really leave the sectors that can be used for regular communication.

ULTRAVIOLET (1 – 30EHz). This sector starts just beyond the visible spectrum and extends upward in frequency to lower energy X-rays. For us down on the ground the ultra violet radiation that reaches us from the sun will cause sunburn and cause paint and printed colours to fade. Long wave UV (just above visible) is sometime called 'black light' and its effects can be seen in dimly lit discos, causing some paints, dyes and textiles to glow with fluorescence. It is a very useful tool when used with fluorescent inks for data reading on envelopes in the mail system. Extremely short UV light is used for microchip photolithography in much the same way as we produce PCBs, but with much smaller dimensions.

Higher up in the atmosphere the UV radiation from the sun is the major cause of the ionisation of the layers we use and rely upon to work our DX. Luckily for us most of the sun's UV is blocked by the atmosphere.

X-RAYS AND ABOVE (30EHz and up). At the upper end of the spectrum we get to some interesting and exotic frequencies and wavelengths.

As the spectrum frequency increases above the UV we progressively pass into the region of 'soft' X-rays. These in turn lead to 'hard' X-rays, with increasing penetrating ability. Medical X-ray machines typically use a wavelength of 5μm, which is a frequency around 6 x 10^{17}Hz. I expect one could modulate an X-Ray beam to pass information (and I recently discovered that NASA is conducting such experiments), however I would not like to be standing on the receiving end!

Increasing the frequency even further, we reach gamma rays. These are found emanating from nuclear fusion and fission and naturally from cosmic events in outer space. The shortest recorded wavelength signal was from a black hole out in deepest space with a wavelength of 10^{-21} metres.

The shortest wavelength possible would have been recorded at the Big Bang at the beginning of the universe. Here the whole thing was smaller than 10^{-35} metres across; anything smaller would have been dominated by quantum effects (and is beyond my comprehension so we will leave it there, other than to say that any complete single wave could not be longer than the diameter the universe was at that time).

CONCLUSION. In this article I have not covered the Doppler effect (the stretching and compressing of waves), neither have I covered the energy levels involved in increasing sectors of the frequency spectrum. These subjects might be covered in a later article.

The electromagnetic spectrum, as we have seen, extends far further than our regular amateur band limits. It ranges from very, very low frequency vibrations right through to the very highest energy galactic gamma rays. We have seen that radio waves, like the rest of the electromagnetic spectrum, can be attenuated, refracted, reflected and stretched, by a number of means.

I hope that by exploring the spectrum it sheds some light on the behaviour of the radio frequency bands that are available to us to use and experiment in. It could, I hope, encourage you to have a go and experiment with something different. Remember that as amateurs we try to 'bend the rules to see what happens'; only by doing this will new discoveries be made.

WEBSEARCH

[1] https://en.wikipedia.org/wiki/Whistler_(radio)

TABLE 1: Wavelengths from huge to tiny plus the corresponding frequencies and examples.

Wavelength (λ)		Magnitude§	Frequency		Typically§	Radio band
3,000,000,000,000,000m	3Pm	Light year	0.0000001Hz	100nHz		
300,000,000,000,000m	300Tm		0.000001Hz	1μHz		
30,000,000,000,00m	30Tm		0.00001Hz	10μHz		
3,000,000,000,000m	3Tm	Uranus orbit	0.0001Hz	100μHz		
300,000,000,000m	300Gm	Mars orbit	0.001Hz	1mHz		
30,000,000,000m	30Gm		0.01Hz	10mHz		
3,000,000,000m	3Gm		0.1Hz	100mHz	Movement	
300,000,000m	300Mm	Moon orbit	1Hz	1Hz		
30,000,000m	30Mm		10Hz	10Hz	Vibration	
3,000,000m	3Mm		100Hz	100Hz		
300,000m	300km	ISS altitude	1,000Hz	1kHz	Audio	VLF
30,000m	30km	Marathon	10,000Hz	10kHz		
3,000m	3km		100,000Hz	100kHz		LF (LW)
300m	300m		1,000,000Hz	1MHz	Ultrasound scanner	MF (MW)
30m	30m	HGV lorry	10,000,000Hz	10MHz		HF (SW)
3m	3m		100,000,000Hz	100MHz		VHF (FM)
0.3m	300mm	Adult foot	1,000,000,000Hz	1GHz	Microwave oven	UHF
0.03m	30mm		10,000,000,000Hz	10GHz	Radar	SHF
0.003m	3mm		100,000,000,000Hz	100GHz		EHF
0.00003m	300μm	Aluminium foil	1,000,000,000,000Hz	1THz		'Terahertz'
0.000003m	30μm		10,000,000,000,000Hz	10THz	Thermal imaging	
0.0000003m	3μm	Blood cell	100,000,000,000,000Hz	100THz	Infrared light	
0.00000003m	300nm		1,000,000,000,000,000Hz	1EHz	Ultraviolet light	
0.000000003m	30nm	CPU transistor	10,000,000,000,000,000Hz	10EHz	Extreme UV light / X-rays	
0.0000000003m	3nm		100,000,000,000,000,000Hz	100EHz	Gamma rays	

§ = very roughly the size range indicated and not intended as an accurate measurement, eg a marathon run is 42.195km.

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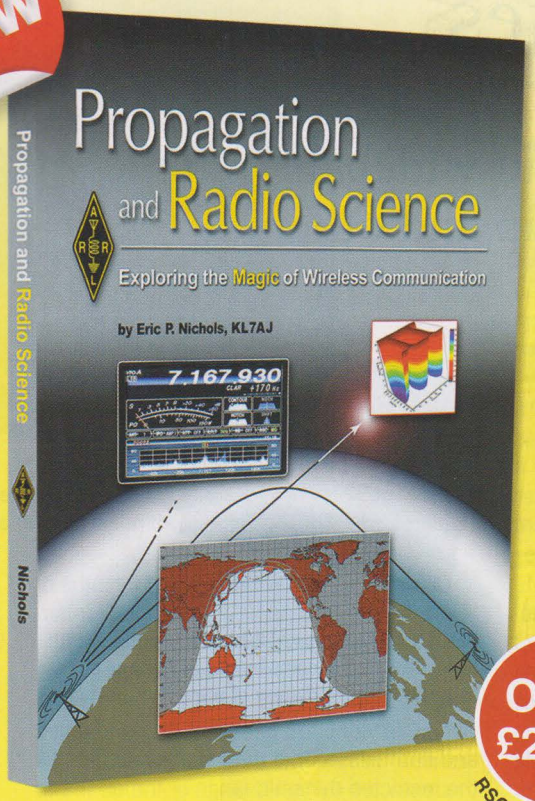

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ARRL Propagation and Radio Science

Exploring the Magic of Wireless Communication

By: Eric P. Nichols, KL7AJ

There are countless ways for radio signals to travel from transmitter to receiver, and understanding how radio waves interact with their environment is an important factor in successful radio communications. While amateurs can maximize station performance and reliability with the right equipment, knowledge and skill, we cannot control propagation. Through scientific exploration and experimentation, we can improve our understanding of propagation and how it affects radio signals. *ARRL Propagation and Radio Science* sets out to demystify this subject with an easy to understand approach.

ARRL Propagation and Radio Science is packed with information and readers will find chapters covering topics polarization, gain, and other antenna matters, the ground wave, the anomalous ionosphere, neutral propagation, NVIS modes & methods, the reflection process and much more. There are even intriguing chapters such as 'Matters About Matter', 'The Optical Factor', 'Demystifying the Ionosphere', 'Magnetic Personality', 'Instrumentation & Interpretation', 'Free Electron Propagation', 'Cheaper Than Dirt', 'Diversity Methods', 'WWV and Channel Probes', 'Software and Other Tools', 'Keeping Up with Kepler and Friends', 'Your Friend the S Meter', 'Loads of Modes', 'Sea Shanty' and 'Unexplored Territory'

Providing a comprehensive overview of one of the most fascinating and rewarding activities in Amateur Radio *ARRL Propagation and Radio Science* is an excellent read. Author Eric Nichols, KL7AJ, uses his lively, engaging approach to present the complex subject of radio propagation in simple, easy-to-understand terms. This book covers topics ranging from theoretical exploration to practical application. It explains the phenomena we observe on the amateur bands and invites you to embark on the journey through the still-unknown radio propagation universe.

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Design Notes

The latest roundup – including a cautionary tale about wideband glitches from the Si5351 chip and others

ANALOGUE / DIGITAL EXPERIMENTER'S PLATFORM. If you want to play with programmable logic and combine that with analogue signals and processing, there is a low cost route that combines everything in a single board. It is the Cypress Semiconductor PSoC (programmable system on chip). The PSoC is a true programmable embedded system-on-chip, integrating configurable analogue and digital peripheral functions, memory and a microcontroller all on a single chip. The I/O pins are programmable and can be configured as analogue or digital.

You first build up the circuit or system you need on a computer using the *Digikey* software or *SPICE*. The software has a schematic capture utility where you place digital and analogue devices where you want them, pull up spec sheets for each device, then fill out parameters for each device. Add control code in C, then just load your design onto one chip and away you go. Full details are available from **[1]**, which gives you access to examples, free software, explanations and examples. The prototype board is $25.

AIRSPY SDR. The concept of simple low cost SDRs consisting of an RF tuner into A/D converter all bundled onto a small USB plug in have been moving on rapidly over the last few years. We started out with the RTL Dongle, originally designed for TV and broadcast radio but 'hacked' or modified and used with custom software as a general purpose software radio. This low cost unit is widely used, but its 8-bit sampling at up to a few MSamples / second means dynamic range is poor and it really is only properly suited to casual VHF through to UHF reception. It is barely useable as a spectrum analyser. In this column in November 2014 we saw the Mirics SDR-Play module, which offered 10-bit sampling at potentially up to 10MHz bandwidth, plus a response that properly extends down into HF. This was more useful as a general purpose receiver and is beginning to show promise as a useful piece of test equipment to have around the shack.

Now there is the Airspy SDR. At the time of writing I haven't yet got my hands on one, but hope to report more next time. The Airspy was actually designed for amateurs

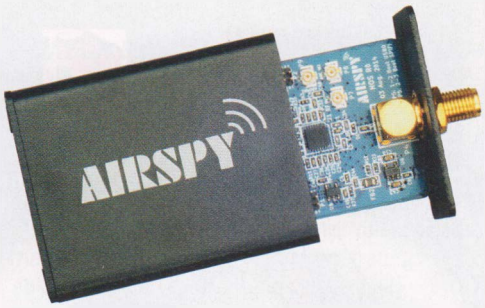

PHOTO 1: The Airspy 12-bit 10MHz bandwidth SDR, designed to complement *SDR#* and similar software. Image courtesy of www.SecQuest.co.uk

and enthusiasts as a means of overcoming the restricted dynamic range of the off the shelf products. It tunes 24-1800MHz and, with 12-bit sampling, will inherently offer at least 12dB better dynamic range than the 10-bit A/D in the SDR-Play and 24dB more than the RTL Dongle. Also, unlike the earlier products, its reference can be locked to an external clock – making it useful for exact frequency measurement and as a signal analyser.

It claims that no drivers are required and is 100% plug-and-play on Windows Vista, 7, 8 and 8.1. A range of software can be used with the Airspy, including *SDR#, Linrad, SDR-Console, GQRX* and *HDSDR* (via an additional driver). See **[2]** for more details.

A2200 GPS MODULE CHANGES. The Maestro A2200 low cost GPS module is useful as a source of accurate timing and navigation data. It was described here in March 2014 and is available from Farnell **[3]** and other catalogue suppliers for less than £10. However, I purchased another one recently and discovered the manufacturers have made a few changes to the firmware. The default on the original version delivered the serial data, the NMEA stream, at 4800 baud. On firing up the latest module it didn't work with my design and I discovered the NMEA data was coming out of the module at 115200 baud. Vaguely recalling a mention on a group posting a while back, a bit of digging revealed all.

The latest version offers four baud rates: 4800, 9600, 38400 or 115200, selected by pull up/down resistors on pins 15 and 16 (pull up to the internal 1.8V logic supply). For 4800 baud both pins need to pulled high. The firmware revision for this change is -9333, shown on the label on the module. The user manual version 1.5 onwards details this modified setup. Apart from the NMEA baud rate setting, it seems to work just the same as the earlier version. For full details, download the data sheet from the suppliers or search the web for Maestro A2200. Photo **2** is one of my homemade PCBs for this module with PIC controller, showing the tacked-on pull up resistors to the right of the module.

PLL SYNTHESISERS WITH INTERNAL VCOs. Phase locked loop synthesisers have been described in this column several times over the last few years. There are now some very nice devices for generating frequencies from a few tens of MHz to several GHz with no additional dividers or RF hardware needed. The latest Fractional-N designs (see for example the April and November 2012 editions of this column) offer virtually continuous tuning with small steps, all highly stable and locked to a master reference oscillator.

Some of the most useful ones come with internal voltage controlled oscillators (VCO). This really is a big leap forward, although it does introduce a number of 'issues'. The VCO is often the most expensive part of a synthesiser if a ready-made packaged module is used, or one of the more critical and complicated parts to build from scratch. In addition, most external VCOs only cover a restricted frequency band. Now, a number of synthesiser chips include an internal VCO, tuneable over a wide range, thus making a single chip synthesiser a far easier proposition. But these internal VCOs come with quite a lot of additional baggage and need more complex programming; they are not necessarily as good a solution as might first appear. So what's wrong, and where do we need to take care?

To be useful, the VCO has to cover a wide range. Being an all-silicon design, the resonator will have a lower Q than any external one would and this alone means higher phase noise; but modern designs are usually good *enough*. The wide tuning issue is more significant. The manufacturers don't know where any user will want to run their device, so they have to make it cover as wide a range as possible to be economic to make. Output dividers allow it to reach lower frequencies, with typical integrated VCOs running at several GHz. Often the chip is offered in several variants with identical logic circuitry, but a VCO that covers a different range in each variant. For example the LTC6946 Integer-N synthesiser is made in three versions that tune 2.24 to 3.74GHz, 3.08 to 4.91GHz and 3.84 to 5.79GHz, followed by an output divider that can be programmed from any value to

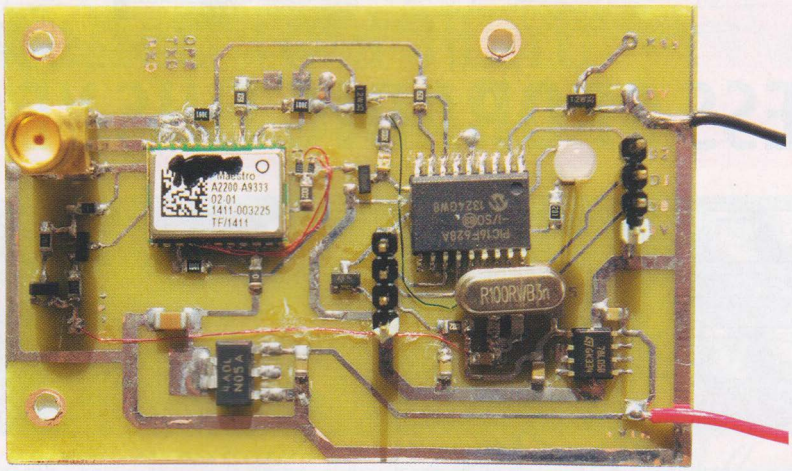

PHOTO 2: A2200 GPS module with PIC controller. The two pull up resistors that had to be added for setting the NMEA baud rate in the latest firmware revision are to the right of the white GPS module.

1 to 6, for output down to 373MHz. The LMX2541 Fractional-N device appears in six guises with overlapping bands covering 1.99 to 4GHz and an output divider up to 63 for direct generation down to 32MHz. The MAX2870 has a VCO with an octave band (2:1 frequency range) and binary dividers to give continuous coverage of 24MHz to 6GHz with no gaps. But it is getting the wide tuning range that generates big problems. For optimum phase noise and low spurii, the VCO really ought to have a restricted tuning range – expressed in MHz/V of tuning voltage. The more sensitive it is, the more that noise and interference on the tuning voltage will transfer into wideband noise on the generated signal. To cover a wide tuning range, many hundreds of MHz or even several GHz per volt would theoretically be required. The two requirements are diametrically opposed. To overcome these problems, the manufacturers resort to clever tricks with the internal VCO, then hide these as much as possible from the user. The main one is to preset the VCO close to the wanted frequency, so the voltage tuning only has to adjust it over a relatively narrow range to maintain lock.

This sounds simple enough to do and should be, but for one thing. The chip doesn't actually know what frequency it is being asked to generate! So it doesn't know what to preset the VCO to. The user defines the internal register settings for the various dividers to lock the VCO to the reference input, but the chip hasn't a clue what VCO frequency the values will result in. The way round is that the user 'tells' the chip the approximate frequency of the reference – in the case of the LMX2541 to the nearest MHz. The chip then uses this information, along with the divider settings to estimate the VCO pretune point, then switch in or out additional capacitors and inductors to get close to start with. It may (and I speculate here) even measure the approximate free running VCO frequency.

The result is usually very successful, with effective tuning sensitivities, after presetting, of a few tens of MHz/volt, or even lower. A far cry from the GHz/V that 'ought' to be needed, and a sensitivity comparable with external VCO designs capable of low phase noise. But it is this presetting, or calibration process that causes problems.

If the synthesiser is only used to generate a stable, unchanging frequency then we see no problem, but if the synthesiser is used in an agile application, like generating multi frequency modulation (in our case, WSJT modes or WSPR) or in frequency hopping, this need to calibrate the VCO can be a headache. Every time the registers are reprogrammed, the chip recalculates the VCO presets, then goes away and does some optimisation. Few details are ever supplied in data sheets, apart from a note that the loop will be unlocked and the VCO free running for a few cycles of the comparison frequency; typically a few microseconds. Here is the problem. If we are reprogramming the chip several times a second to generate modulation, a few-microsecond glitch every time generates an awful lot of interference.

We first noticed this while testing the LMX2541 Fract-N source generating JT65 for the next generation of 432MHz beacons. Every time the Fractional, or F, register was reprogrammed for a new tone, a wideband spike appeared – very visible on a spectrum analyser and definitely audible for tens of kHz each side of the carrier. Completely unacceptable – and it nearly killed the project. The data sheet clearly states that a recalibration procedure is executed every time that register is changed – but I'd missed the implications! Fortunately there was a workaround. Generating the tones using the Denominator, or D, register, no recalibration is performed when its value alters. So a relatively straightforward software change allowed the project to proceed. When this glitch was queried on the TI users' website, the manufacturers agreed there was no way round it, but that a later synthesiser chip did include the option to turn off the VCO recalibration cycle for just this task. I have yet to investigate.

Other chips may not be so fortunate. Several users report wideband glitches when using the popular Si5351 chip, used in designs and kits for transmitters generating WSPR and other modes. This device is less well documented than the LMX2541, but having a huge operational tuning range it must have a similar recalibration going in inside.

So, we really do need to be careful jumping in and using the most convenient and easiest devices around. In retrospect, the 432MHz beacons probably ought to have been built using an external VCO design, but fortunately the workaround does seem to give results acceptable to all.

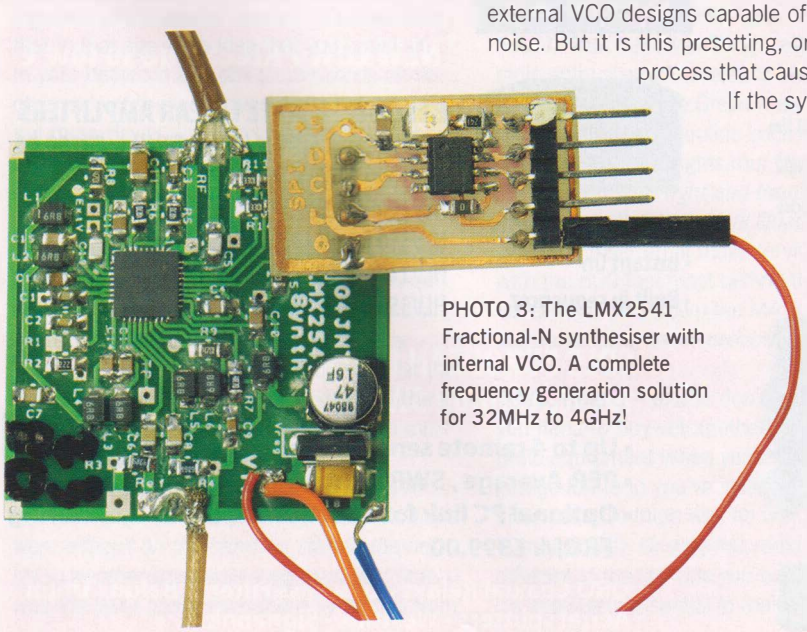

PHOTO 3: The LMX2541 Fractional-N synthesiser with internal VCO. A complete frequency generation solution for 32MHz to 4GHz!

WEBSEARCH

[1] PSoC system on a chip – www.cypress.com/go/CY8CKIT-042
[2] Airspy SDR – www.airspy.com and the UK site agents are www.airspy.co.uk
[3] Farnell – www.Farnell.com (search for A2200)

Hitched to a Ham

(Written by a long-suffering wife)

GOLDEN RULES. Here are seven golden rules on how to enjoy amateur radio without it leading to divorce. No guarantee is given: these rules are for guidance only – you still need to put the toilet seat down and ask for directions when you are lost.

SUNDAY. I am writing this on a Sunday morning at home with my partner of five years enjoying the one day of the week when neither of us is working. However – it is now 10am and instead of enjoying a leisurely coffee together and a share of the Sunday papers, he is sat in the shed with headphones on, apparently talking to a large black box. When I say talking, I don't mean 'English' or 'northern' or any language I might be able to understand but instead a code where people aren't called John or Pete but are addressed by a strange combination of letters and numbers that apparently is supposed to mean something.

I arrived home from my 6am Sunday morning walk in the rain (a perfectly normal way to behave and no, we don't have a dog) to find my partner nowhere in the house – eventually to be discovered in the back garden wandering round with bits of rope 'mending his aerial' ahead of this morning's 10 o'clock event. **Rule 1 – please don't try and explain exactly what it is that is happening at 10 o'clock on a Sunday morning.** The knowledge that you will be out of the way until 11 o'clock is sufficient – leaving us to entertain the milkman or catch up with the soaps.

Now – I can remember hearing about CB radios being around in the 1970's and although it seemed to simply be an excuse for pimply adolescent males to congregate together with a shared interest – I understand that in that age – the idea that you could sit in your bedroom and talk to somebody on the other side of the world was pretty impressive, but these days I am sure I have heard of other ways you can do this without needing to spend Sunday morning adjusting aerials or sitting in a shed looking like an extra from a 1920's black and white film. **Rule 2 – please don't try and explain the difference between CB radios, ham radio or amateur radio.** It's like the Offside Rule – I am sure it's really important but I have managed to get by for the last 45 years without needing to know: I think I can cope without having it explained to me.

RETURNING. My partner has just come in from the shed early, explaining that "*conditions were difficult on the band we started the net on so another band was suggested and that was the last I heard from them.*" And this from somebody who *had* to be the first in our street to get signed up for super speedy broadband as the internet connection was way too slow! (It's a good job that I *was* writing this and not entertaining the milkman, as he has arrived back in 40 minutes early.) On seeing I was in the middle of writing this, he began to explain what exactly it was he was involved in – as expected, using a strange code of letters and numbers – thereby breaking Rule 1.

Rule 3 – please don't try and explain why, when *we* are able to talk to anybody anywhere in the world, sending text, photos, videos etc with just a small device that fits snugly into a pocket, *you* need a 40 foot mast in the back garden. (I do understand there are important uses such as communicating during emergencies such as major natural disasters. Like the 1953 floods.)

AERIALS. Rule 4 – please don't explain the difference between aerials, masts and antennas (you're right – I *don't* know, but I don't *need* to know: do *you* know the difference between kitten heels and stiletto heels?) That's another thing – ask an amateur radio enthusiast for directions and he won't say "turn right at the Green Man" (that's a pub by the way, not a Caroline Lucas supporter) or left at the traffic lights, but "*turn just after the mast on your right and then left after the house with the Cubical Quad*". We once agreed to meet up at those services on the M4 with the 500 foot mast behind them – I had travelled up and down the M4 every week for six months and *never noticed the mast*.

TOYS. Rule 5 – please don't try to justify why you need to buy yet another piece of amateur radio equipment when you *already* have a garage full (and you've just sold the car on eBay because there was no way it would fit in the garage). Or why *this* radio is subtly different to the last one you bought. Or why it's absolutely essential to make a detour to Plymouth on our trip from Cambridge to Bristol in order to pick up your latest purchase. Just buy it and do what you need to do to pick it up. But remember, in return, don't question why we need yet another pair of black trousers when there are already seventeen pairs of black trousers already in the wardrobe (they **are** all different – but believe me you would not want us to explain the difference when you could be out there adjusting your wavebands.)

VISITS. Rule 6 – If you want to visit an extremely interesting amateur radio museum because you are passing through the area whilst on holiday together, please recognise that we may not want to spend *quite* as long browsing the exhibits as you do. In some cases, less than a day is sufficient. By the way, the amateur's definition of "passing through" is getting within two counties (in the UK) or anything in the same time zone (when travelling in the USA). I remember arriving at a particular museum to find the two elderly male volunteers downstairs overjoyed at getting not just one visitor but two – they were clearly very enthusiastic about the things on show and my partner was in his element. I made polite noises as I looked at yet another decrepit old radio but it was clear that my heart wasn't in it. As soon as it was reasonably polite to do so I left them both talking to my partner (in the strange code previously mentioned) and went upstairs, where I found a small cafe. The woman serving the tea tentatively asked if I was accompanying a ham rather than being one myself. When I agreed that this was the case, a smile broke over her face and she admitted she helped out in the cafe whilst her husband volunteered downstairs, but she longed for a bit of conversation on something – anything – other than amateur radio. We then spent a very pleasant forty minutes talking about all sorts of things that definitely made the visit more enjoyable for me. I'm afraid it reminded me of a trip I took in the early 1990's to the Pencil Museum in Cumbria with two Fine Art students – I had no idea there was so much to know about pencils and yet now I can't remember any of it.

FINALLY. Rule 7 – However much you enjoy indulging your hobby and in reality it's great just to see your partner doing something he enjoys (and we realise it could be worse: you could be into football) – at some point it's a good idea to put *RadCom* down for a few minutes and make 'er indoors a nice cuppa.

This is the first piece I have written for a magazine but I do have high ambitions: I will know I have 'made it' when my article is included as part of the guest publication on "Have I got news for you?" They've had *Catfish Insider*, *Rug Hooking*, *Lighthouse Digest* and *Toothpick Bulletin* so why not *RadCom*?

And *finally*, finally: should you be married to somebody who enjoys ham radio AND football – I would give up now.

August 2015 • RadCom
Andrew Churchley, G4EAQ • techtran@onetel.com

The G4EAQ integrated SDR transceiver

Excellent performance, neatly packaged

PHOTO 1: Integrated SDR transceiver showing cooling vents and chamfered front panel slots.

THE SDR BUG BITES. Four years ago, it bit me. I built the Finningley 80m SDR receiver [1] and was totally blown over with its exceptional performance, delivered at very low cost. The frequency range was easily extended within the 80m band [2]. Later on, I used SDR receivers to observe diverse waterfall images of on-air signals [3]. I knew then that I absolutely had to have an SDR transceiver, to replace my old but still much-respected Kenwood TS-440SAT transceiver.

A FlexRadio 1500 transceiver with its companion Power SDR v2.2.5 software gave outstanding performance and an incredible range of software-driven facilities. After persistent attempts, its 5W of RF power resulted in UK and European contacts. Eventually I had my first QRP contact with West Coast USA. But, and it is a *big* but, these QRP pleasures required great patience. Low power is totally drowned out by competition from today's more powerful stations. So I now had power hunger.

THE LINEAR AMPLIFIER. After a long search for a low-cost linear amplifier to provide greater output power, it emerged that the HLA 150+ by RM of Italy would fit the bill. Driven by 5W of SSB power from the Flex 1500, well over 100W output is made available. If at a later stage the drive were increased to 10W, then up to 250W SSB output would become available. The linear amplifier includes a set of automatically-switched low pass filters covering all HF bands, to prevent unwanted emissions. It runs silently, convection-cooled by only its surrounding fins. Beware of cheaper, similar RF amplifiers – they are unlikely to have the filters and may have been designed originally for Citizen's Band use. Such amplifiers can cause spurious emissions. Following on-air testing and QSOs with the HLA 150+ linear amplifier, I was delighted by the performance of all my new equipment. But problems remained. In particular, the station was assembled from units that were disparate in appearance and spread out along the bench top. Behind them, cables snaked out untidily – problems well-known to just about all radio amateurs!

CRITERIA FOR A NEW INTEGRATED SDR TRANSCEIVER UNIT. All along, desired criteria were forming in my mind for a new assembly of RF units in a single enclosure. In addition to the greater output power already achieved, I wanted:

- compact, tidy, all-in-one integration
- shorter interconnecting leads contained and hidden at the rear
- high portability for possible remote use
- good mechanical strength
- high thermal dissipation capability
- excellent RF– and DC earthing
- ease of access to all internal RF units
- maximum use of pre-existing equipment
- a functional front panel arrangement
- a degree of 'retro-styling' and low cost.

PHOTO 2: Double-decker chassis with ATU, fuse box, dummy load cooling fins and linear amplifier.

Suitable RF units already available at G4EAQ Towers comprised a Manson 12VDC 30A (peak) linear PSU, an MFJ-993B Intellituner ATU, a 100W, 50Ω dummy load and the Flex 1500 transceiver. In addition to the recently-acquired linear amplifier, only a chassis and outer casing were lacking. A simplified block diagram of the integrated transceiver is shown in **Figure 1**.

DESIGN AND CONSTRUCTION. A long search commenced for a metal box to contain a double-decker chassis carrying the RF units. Ex-computer servers, ammo boxes, aluminium suitcases and the like were all considered. Eventually, a defunct Heathkit HW1 01 transceiver was spotted at about £30. I once owned one of these, and knew the generously-sized aluminium case includes numerous ventilation slots (see **Photo 1**) to release heat from the 19 thermionic valves (these sets made good shack warmers!) so thermal dissipation would be enhanced.

Stripped of all its internal components and valves (for later sale), the case would be ideal to hold all my RF units in double-decker arrangement, greatly reducing the equipment footprint. The case also pandered somewhat to my 'retro urge'. To hide scratches, it was sprayed with black metallic auto paint and transparent lacquer. Two chromium-plated handles were fitted to a new front panel, completing the 'retro look'. These are invaluable for carrying the finished transceiver unit, for moving it about on the bench and for tipping it onto its face to gain access to connections at the rear – why ever did we stop fitting those useful chromium-plated handles?

The double-decker chassis of 4mm thick sheet aluminium is seen from the rear in **Photo 2**. This heavy gauge was chosen for its excellent electrical and thermal conductivity. It is more than adequately strong to resist flexing under the weight of the units. It must be pointed out that experience in marking-out, drilling, filing and bending of aluminium sheet is essential, especially for this thick grade. At least a large vice and a drill-press will be required. Sheet aluminium in a wide range of sizes and thicknesses is available at competitive prices on eBay. The sizes purchased were sufficient to make the two main plates and all four connecting brackets. The plates were cut to size by hacksaw. They were then smoothed along all edges, the corners filed quarter-round and all edges were chamfered lightly at 45° degrees. Hard work, but I never said this project was for the faint-hearted! No dimensions are specified, because this article is intended for guidance of the wise, rather than being an exact prescription.

Each unit is held down by screws to its respective plate. The rubber feet of the Flex 1500 transceiver were unscrewed and stored. Slightly longer screws were substituted, to hold it firmly onto the plate, but note that they were carefully chosen so they were not long enough to do damage inside the transceiver.

In a second mounting method, the aerial tuning unit was held by homemade aluminium side brackets (just left of centre in **Photo 3**). These brought its case edges firmly down into contact with the aluminium plate. The paint was first sanded off these bottom

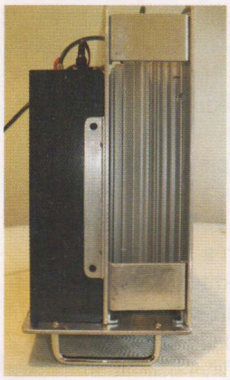

PHOTO 3: Side view of integrated SDR transceiver chassis.

edges, to ensure excellent earthing connection with the plate. In belt-and braces approach, earth connection terminals provided at the rear of the Flex 1500 and the MFJ Intellituner were fitted with separate earthing brackets (see the GROUND terminal near the centre of Photo 2). To avoid projections where they might scratch the units, the heads of self-tapping screws were countersunk into the plates. Sharp tips of projecting screws were ground off. If required in the future, all units can be removed and returned to their as-new states, without loss of value.

The front panel, again in 4mm aluminium, is connected by small brackets and screws to the double-decker chassis and includes rectangular letter-box apertures, as seen in the photos. Edges of the apertures, being chamfered all round at 45°, offer wider viewing angles onto the LED indicators, rotary knob, push buttons and switches. Elsewhere, the panel hides blank areas of the RF unit faces. This unifies and simplifies appearance. It largely conceals extraneous detail and tones-down the fanciful baby-blue front of the RM linear amplifier.

HEAT AND POWER. Generous case ventilation mentioned earlier, combined with the high thermal conductivity of the plates, allowed free arrangement of the RF units. There is no need to confine all heat-dissipating equipment to the top plate. In fact the final arrangement locates the transceiver, linear amplifier and dummy load (all heat dissipaters) on the bottom plate. Some spare space is left for possible future improvements. The final design is the result of trying many different arrangements. Attempts at symmetry were obviously futile from the start. Instead, the chosen layout places all the most-used controls to the right . This is important for station layout and operation, described later.

Although the powered RF units are internally fused, a separate fuse box was added inside the main casing. This takes car type blade fuses and supplies up to 6 outputs. A LED is in parallel with each fuse, so if one blows, its corresponding LED will light up, identifying the defective circuit. This speeds troubleshooting. At present, only three fused outputs are used.

The dummy load (lower right of Photo 2) comprises a thick-film 50Ω 100W resistor screwed to a heat sink with generous cooling fins. Heat dissipation is further enhanced by screwing the heat sink down onto the lower plate. The dummy load largely hides the rear of the Flex 1500. Conveniently, the Intellituner ATU includes an SO239 output socket designated antenna 2. This is pushbutton-selectable from the front panel. The dummy load is connected to this socket and is invaluable for setting up and off-air testing.

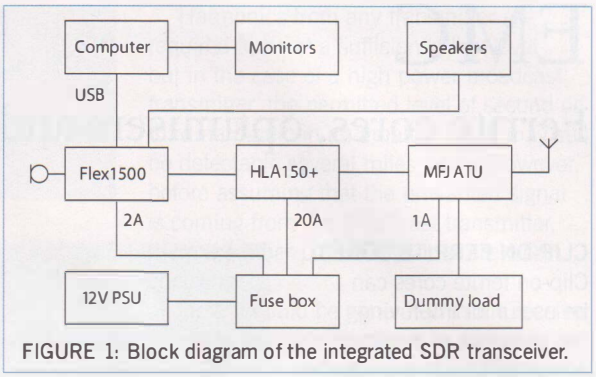

FIGURE 1: Block diagram of the integrated SDR transceiver.

EXTERNAL EQUIPMENT OF THE STATION. The linear mains PSU could not be fitted inside the casing – and is quite heavy. Obviously, for portable use in the car it will not be needed, so its separation and external location (see left side of Photo 4) are appropriate. The antenna used at the home station is my favourite horizontal loop antenna, connected to the Intellituner by balanced feeder.

STATION OPERATION. The station includes three 19" monitor screens. On the bench space in front of them, a Kenwood MC-60 microphone and a Microsoft M705 radio mouse (highly recommended) are seen. They are used frequently and are operated by the right hand. The mouse includes a flywheel, allowing spinning for rapid tuning: reminiscent of the wonderful old Eddystone receiver tuning knobs. The right hand is kept busy by clicking on numerous on-screen controls of the Power SDR display on the monitors. It is also used to drag signals into the transceiver pass band. The controls on the right hand side of the integrated SDR transceiver fall conveniently to the left hand of the operator. Once set up, these controls are only used infrequently. I find this station arrangement ergonomically pleasing.

Having three screens is very useful. In one particular arrangement the receiver display occupies the central screen, the left screen displays a logging program and the right screen displays QRZ.com pages. Many other display combinations are feasible, including one where the waterfall display is stretched out across all three screens.

VALUE FOR MONEY. The PSU, ATU and dummy load were associated with my earlier station (and may well out-live the present arrangement) so they were already available at zero additional cost. The Flex 1500, linear amplifier, metal work and fuse box were all new. So for an estimated total around £1000, I have a clean, powerful transceiver with excellent potential.

Even today I am still discovering valuable new features in the amazing Power SDR software from Flex Radio. One example of an unlooked-for convenience feature discovered recently, is an option for programmable keyboard operation. This is built-into the software and available for immediate use. I am in no doubt that, in years to come, I shall be discovering many more useful features of this software, and enjoying operation of my new Integrated SDR transceiver.

Did the new transceiver unit meet all my criteria? Yes – admirably.

Although fully complete and operational, the integrated SDR transceiver may be only a work in progress! At a recent amateur radio rally I spotted a more powerful, used linear amplifier and could not help wondering whether it might fit into my casing. Shortly after, I saw the *RadCom* review of the ELAD Multi-Use SDR Transceiver **[4]**, which has a suitable 5W output and many attractive features. Still, I have the advantage of being able to make change flexibly and at moderate expense whenever required, simply by altering the front panel and internal fastenings. That is considerably less costly than buying the latest all-singing all-dancing black box equivalent. In the future, newer units, perhaps dongle-like, may easily find a place in the venerable HW101 enclosure. Readers may find the modular form of construction described attractive because of its flexibility and the ease of achieving good results. Hopefully, a good fraction of my equipment will far outlive that obsolescence which all too soon, can afflict unitary commercial transceivers.

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[1] Kanga Finningley 80m SDR, G4EAQ, *RadCom* Aug 2011
[2] Extending the Finningley 80m SDR, G4EAQ, *RadCom* February 2012
[3] Signals viewed in the waterfall display of an SDR, G4EAQ, *RadCom* November 2013
[4] Elad FDM-DUO review, Mike Richards, G4WNC, *RadCom* March 2015

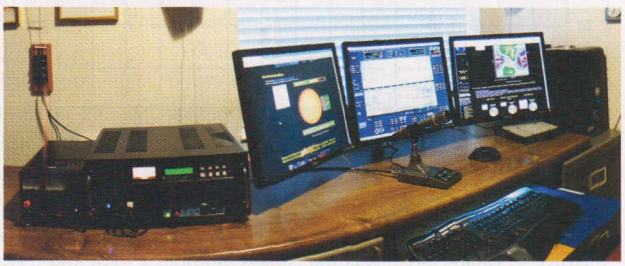

PHOTO 4: Operational arrangement of the station.

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EMC

Ferrite cores, optimisers and broadcast QRM

CLIP-ON FERRITE CORES.

Clip-on ferrite cores can be useful for improving the immunity of electronic equipment such as an audio amplifier, or for reducing emissions from many types of electronic equipment if the unwanted signal is getting in or out via interconnecting cables rather than radiating directly. They are useful when the ends of the cable are not accessible to thread through a ferrite ring but are only effective if a suitable grade of ferrite is used with enough turns for the frequencies of interest.

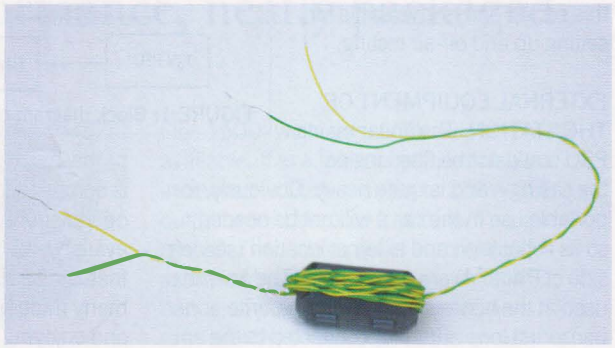

PHOTO 1: A twisted pair common-mode choke wound on a clip-on ferrite core

Clip-on ferrite cores are normally specified by the impedance of one 'turn', ie when the cable goes straight through the core. The manufacturer's data sheet typically specifies the impedance at frequencies such as of 10, 25, 50 or 100MHz. Some of the best clip-on ferrite cores have an impedance of 100Ω at 10MHz and 200Ω at 100MHz. The best shape for the core is a long tube, where the length of the core is at least 2.5 times the diameter of the hole, eg 34mm long core with 13mm diameter hole or 20mm long core with 5mm diameter hole.

One of the most useful sizes of clip-on ferrites for amateur radio EMC use has a 13mm diameter hole and a length of at least 34mm, for example TDK ZCAT3035-1330, Wurth Elektronik 74271222, Fair-Rite 0443164151 or KEMET ESD-SR-20H5. These and a wide range of other types of clip-on ferrite core are available from trade suppliers such as CPC/Farnell and RS Components. It is normally possible to place an order from such suppliers without the need for a trade account but there may be a minimum order charge or a significant post and packing charge for orders below a certain value.

Maplin Electronics stocks a limited range of clip-on ferrite cores with hole diameters from 2.4mm to 10mm but not the larger type with a 13mm hole. The Maplin HEM3018 (N95AB) has a 6.5 mm diameter hole and this may be large enough for very thin wires. Alternatively, the Maplin HEM3017 (N94AB) has a 10mm diameter hole but its shorter core it gives less than half the impedance for a single turn so it would need about 50% more turns than the HEM3018 type.

Clip-on ferrite cores are designed to reduce radiated emissions from cables at VHF and an impedance of about 100-200Ω can give a significant reduction such as 10dB at frequencies where the cable is resonant. At HF however, one turn is not likely to have much effect and multiple turns are required to provide a useful amount of impedance. Up to a certain frequency, the impedance is proportional to the number of turns squared so 3 turns gives as much impedance as 9 cores in series and 5 turns give as much impedance as 25 cores in series. At 10MHz for example, a TDK ZCAT3035-1330 ferrite core has a typical impedance of 100Ω for a single turn while 7 turns give 49 times as much impedance, or 4.9kΩ. That's the sort of impedance to aim for – or better still 10kΩ if possible. It is important that the two halves of the core close together without the slightest air gap as this would greatly reduce the inductance.

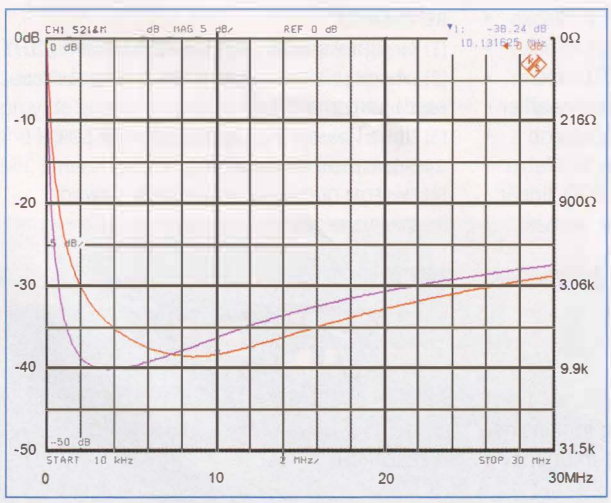

FIGURE 1: Characteristics of the chokes in Photo 1 (red) and Photo 2 (purple).

LAB TESTS.

An example of a common-mode choke wound on a TDK ZCAT1325-0530A core is shown in **Photo 1**. This is quite a small core with a 5mm diameter hole that could be used to make a compact in-line filter. It has been wound with 10 turns of twisted pair made of thin 30 AWG Kynar insulated wire. This has much thicker insulation and higher breakdown voltage compared to enamelled copper wire and this makes it more suitable for applications such as reducing emissions from a DSL modem or improving its immunity to amateur transmissions. Alternatively, the larger ZCAT3035-1330 with a 13mm diameter hole gives almost identical results with only seven turns and can accommodate thicker wire.

The red trace in **Figure 1** shows the characteristics of the ZCAT1325-0530A choke measured in a 50Ω test circuit using a network analyser. 0dB is at the top of the trace with -50dB at the bottom. The -30dB line corresponds to an impedance of approximately 3kΩ, which is good, and -40dB corresponds to 10kΩ, which is excellent. The impedance reaches a peak at 9MHz then falls at higher frequencies due to stray capacitance between the windings.

These clip-on ferrite cores are primarily designed for VHF use and the performance falls off quite sharply below about 6MHz. For improved performance at 1.8MHz and 3.5MHz, a different grade of ferrite is required with higher permeability such as Ferroxcube 4A11. **Photo 2** shows 24 turns of 30 AWG Kynar insulated twisted pair wound on a small ring core with 13mm o/d and 6.8mm i/d. This is a Philips type TN13/7.5/5-4A11 where the pink colour indicates 4A11 grade of ferrite. Now that these rings are made by Ferroxcube, it is not entirely clear whether they are still colour coded but the characteristics are the same. It is essential to get the correct 4A11 grade of ferrite, not some other grade such as 3C90. These particular cores are not easily available in small quantities however and alternatives are being evaluated.

The purple trace in Figure 1 shows the characteristics of this ring core choke in a 50Ω test circuit. It can be seen that the impedance reaches a peak at 4MHz then starts to fall due to stray capacitance between the windings and it crosses the red trace at 7MHz.

Connecting the two types of common-mode choke in gives a very high performance filter, as shown in **Figure 2**. This series combination has more than 40dB loss (more than 10kΩ impedance) from 1.8MHz to about 26MHz. As the

PHOTO 2: A twisted pair common-mode choke wound on a ferrite ring core

impedance is so high, results at the high frequency end are sensitive to proximity effects and are somewhat variable. This series combination could form the basis of a high performance compact in-line DSL line filter.

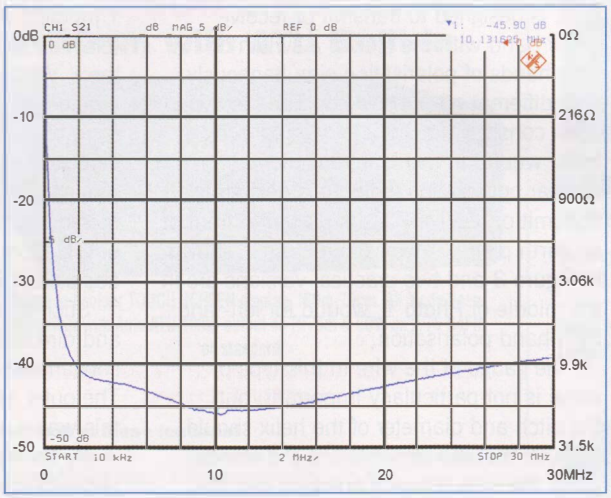

FIGURE 2: Characteristics of the chokes in Photo 1 and Photo 2 connected in series.

SOLAR PV OPTIMISERS.

Some optimisers for solar PV systems can be a significant source of RF interference in the HF bands and up to 144MHz. Solar PV power optimisers are separate from the main inverter or grid connected power conditioner (GCPC). The optimisers are either add-on modules installed behind the panels or they may be embedded in the panel by the manufacturer. They adjust the load on each panel individually to its maximum power point (MPPT). This increases efficiency when panels are connected in series, particularly when not all panels receive the same amount of light due to partial shading.

Each optimiser is a DC/DC converter using a switching regulator that can generate RFI. They claim compliance to IEC61000-6-2, IEC61000-6-3 but a problem with these standards is that they allow higher conducted emissions from DC power ports than from AC power ports.

It may not be easy to find out whether a particular solar PV installation has optimisers fitted or not and if so what make and model they are. Optimisers are normally fitted in an inaccessible and hidden position behind or inside the panels on the roof.

One clue as to whether optimisers are fitted is to look at an SDR waterfall display of the interference radiated by the solar PV system. It may be possible to resolve multiple spectral lines close together and if there is only one inverter, this suggests that there are multiple optimisers. Optimisers can automatically change mode from switching mode (which generates RFI) to a straight-through mode that is quiet. This can cause the number of spectral lines to vary. In some cases the RFI may suddenly stop even when the sun is shining and this can make EMC measurements difficult.

Optimisers may have some form of data communication with the inverter. One Member reports that his own solar PV system produces a small amount of QRM on 50MHz, like a rough warbling effect, and he proved this was from the solar PV system by turning the system off at the mains. On checking the HF bands, there were signals similar to RTTY or data signals on some frequencies. At first these were thought to be commercial operators but in the summer there were very high levels of data-like noise especially on 5MHz and on many other frequencies.

It therefore appears that some types of optimisers for solar PV systems conduct their own RTTY QSOs between the optimiser and the inverter via cable but they advertise their presence by radiating these data signals. This may be a useful way to identify particular makes and models of optimiser. We would be interested to hear from Members who have any information on how the optimisers communicate with the panels and any identifying characteristics such as the frequencies that they radiate.

BROADCAST HARMONICS?

Some Members who live within a few miles of high power AM broadcast transmitters have noticed signals in amateur bands that appear to be harmonics of the broadcast transmitter. For example, 2 x 909kHz = 1818kHz, or 3 x 1215kHz = 3645kHz.

Whenever you find a radio signal in an amateur band from a non-amateur source such as broadcast, the first thing to consider is whether it really exists on that frequency or whether it is a spurious response of the receiver, overloading of the receiver, or something non-linear nearby.

Harmonics from any transmitter are required to be at a sufficiently low level but in the case of a high power broadcast transmitter, the permitted level of second or third harmonic in an amateur band may still be detectable several miles away. However, before assuming that the unwanted signal is coming from the broadcast transmitter, there are other possibilities that are worth checking.

First, it could be generated in the receiver. One way to check for this is to switch in an RF attenuator and see how much the level of the broadcast signal reduces relative to other signals on the band. If for example 10dB attenuation makes other signals reduce by 10dB but the broadcast harmonic falls by 20dB or more, this suggests that it is being generated in the receiver.

Another possibility is an environmental non-linearity or 'rusty bolt' effect. This could be a corroded connection on the amateur aerial or earth stake (if any) or on some other metalwork or bonding wires nearby. For example in Barnet, there is a powerful MF broadcast transmitter at Saffron Green a few miles away and another not far away at Brookmans Park. Something like a long wire fence can pick up volts (or tens of volts) of broadcast signals and rusty or corroded joints can rectify this, causing the fence wire to re-radiate harmonics or intermodulation products. For frequencies f1 and f2, intermod products would include $2f1 \pm f2$ and $2f2 \pm f1$. For example, (2 x 1548kHz) - 1215kHz = 1881kHz, which falls within an amateur band. In this case the two frequencies come from different transmitter sites so that is a sure sign that the signal on 1881kHz is not coming from either transmitter but is being generated in the receiver or nearby by something non-linear.

An active dipole antenna is another possibility. Even if it is not being used for receiving, it is likely to have back-to-back diodes across the input for protection and if these are driven into conduction by strong local broadcast signals they will generate and re-radiate harmonics nearby.

Mains wiring can also pick up broadcast signals and if there is something that rectifies the mains, the rectifier diodes can generate harmonics or intermod products. A characteristic of this is 100Hz mains hum on the AM signal, which suggests that the harmonic is being generated locally by something connected to the mains.

A way of checking whether a broadcast harmonic is locally generated is to take a portable or mobile receiver away from a built-up area and see if the harmonic disappears.

WEBSEARCH

CPC Farnell: http://cpc.farnell.com
RS Components: http://uk.rs-online.com
Maplin Electronics: www.maplin.co.uk

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Moving On

Aerials for circular polarisation, part 2

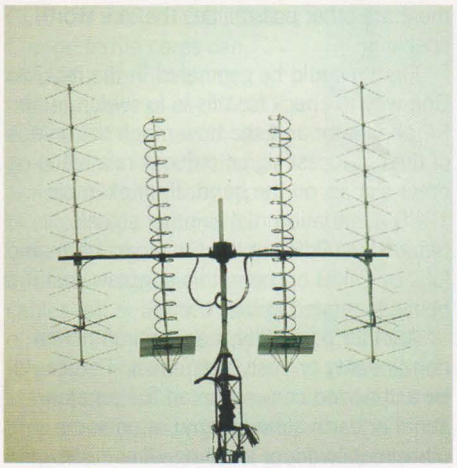

PHOTO 1: Two crossed Yagis (outer antennas) and two helical antennas for left- and right-hand circular polarisation. Photo courtesy of David Jefferies, G3DJR, PhD Stanford.

RECAP. Last month was a mostly theoretical look at how circular polarisation works. Now it's time to finish off and examine real aerials that can produce and receive circular polarisation in practical systems.

AERIALS. There are two main types of circularly polarised aerial: the first of which is designed to transmit and receive one hand only, and the second, a more flexible type, is designed to transmit or receive either hand with the flick of a switch or both hands of polarisation simultaneously with different output sockets. The first type often consists of a spiral of wire forming a helix, wound in the same direction as the circular polarisation which it is desired to transmit or receive. This is placed in front of an earth plane. A typical structure is shown in **Figure 3** and two practical versions are in the middle of **Photo 1**, wound for left- and right-hand polarisation.

The gauge of the wire in this type of aerial is not particularly important, but the pitch and diameter of the helix should be such that the circumferential distance along the wire between one turn and the next is about 1¼ wavelengths and the pitch (ie the spacing between turns) is ¼ of a wavelength. The action may be compared to an end-fire array in which all the elements are driven. The ground plane, acting as a reflector, should be at least half a wavelength square. This configuration will produce near-perfect circular polarisation over a moderate bandwidth if the number of turns in the helix exceeds about six. The input impedance of such designs is usually about 140Ω. This type of helically wound aerial should not be confused with the helically wound shortened monopole, commonly seen as a 'rubber duck' on a handheld, in which both the pitch and the circumferential distance between turns is very much less than a wavelength. These short aerials radiate in what is known as the 'normal' or 'radial' mode (like a shortened quarter wave whip), whereas helically wound circular polarised aerials radiate in an 'axial' mode (along the length, like a Yagi).

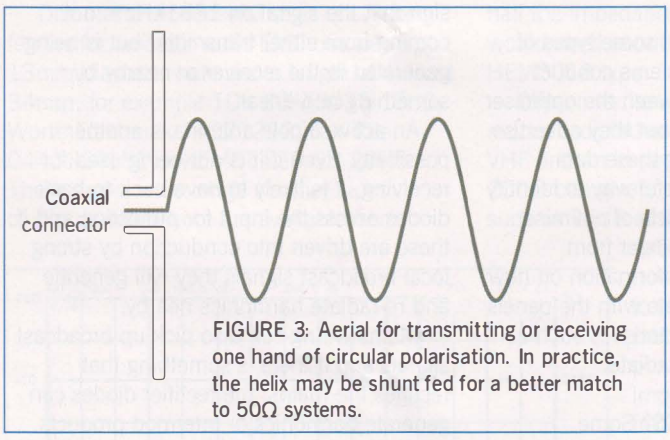

FIGURE 3: Aerial for transmitting or receiving one hand of circular polarisation. In practice, the helix may be shunt fed for a better match to 50Ω systems.

Another way of making a circularly polarised signal is to synthesise the circular polarisation by using two linearly polarised dipoles at right angles. If the dipoles are in the same plane, they need to be fed from a Y junction with a quarter of a wavelength (electrical) extra feed length in one arm of the Y. Which arm has the extra length in it determines which hand is transmitted (or received). However, if the crossed dipoles are staggered in the direction of propagation by ¼ of a wavelength, they can be fed exactly in phase to produce circular polarisation. These two situations are depicted in **Figure 4a** and **Figure 4b**.

Such aerials may have crossed reflectors and directors associated with them to concentrate or narrow the radiated beam. The outer aerials in Photo 1 are made in this way.

By having control of the relative phase between the vertical and horizontal input and output feeders of the aerials shown in Figure 4a, and 4b, either left or right hand circular polarisation may be produced and received. Also, both left and right hand polarisation together, but independently carrying different information on the same frequency may be produced.

USE. Circular polarisation has many uses. It is useful in broadcasting, particularly on FM radio, where the signals can be picked up equally well by antennas that are horizontally polarised (eg rooftop domestic Yagis) or vertically (eg car radios and 'trannies' – there's an old word!). The vagaries of propagation affect circular polarisation less, too, meaning that as you drive around your car radio don't suffer anything like the same amount of mobile 'flutter' as your 2m or 70cm amateur gear. Satellite and EME enthusiasts also often use circular polarisation, which helps ameliorate the effects of Faraday rotation [1] on linearly polarised VHF signals as they go through the ionosphere.

WEBSEARCH

[1] http://en.wikipedia.org/wiki/Faraday_effect

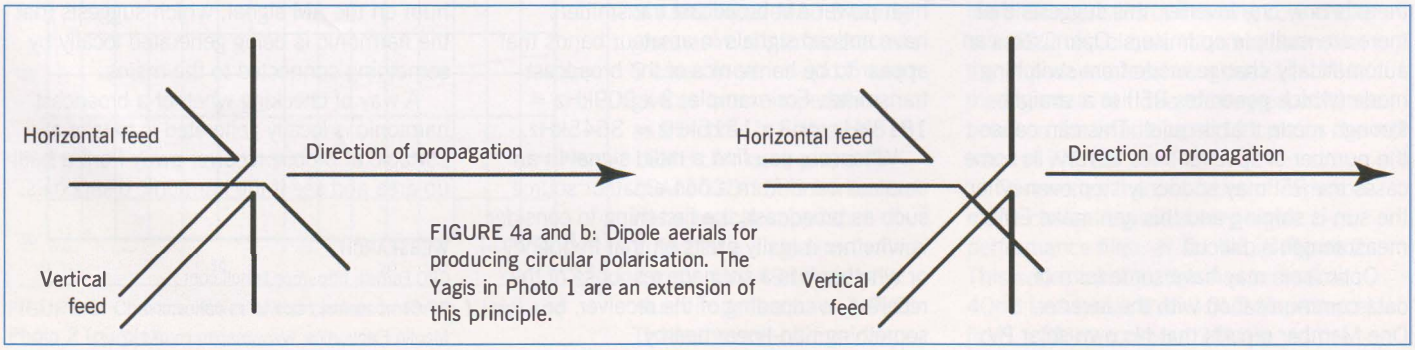

FIGURE 4a and b: Dipole aerials for producing circular polarisation. The Yagis in Photo 1 are an extension of this principle.

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Kent Morse Practice Oscillator	£31.95	Kent Single Paddle Key	£95.95
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CIRO MAZZONI PROFESSIONAL LOOPS IN TWO SIZES. BABY LOOP & MIDI LOOP.

Over the years manufacturers and indeed home brewers have been trying to make reliable Magnetic Loops because of their extreme compact size, frequency range and immunity to noise.

Finally, an Italian manufacturer **Ciro Mazzoni** has perfected the design and is able to offer two versions covering the entire 80m-10m range built to ultra-professional standards.

BABY-LOOP
6.6MHz-29.8MHz with controller: **£849.95**

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ML&S are the sole distributors of Ciro Mazzoni Loops for UK & Ireland.

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ML&S Price: £1999.95 ON DEMO & IN STOCK NOW!

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ML&S ONLY £899.95

For more info see: HamRadio.co.uk/fdmduo

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A highly compact comms receiver covering HF-VHF. All mode, PC interface. The CR-1a has two additional features. IQ Data socket with fully disclosed Interface Protocol for 3rd party developers and a 200kHz Spectral Display when hooked up to a PC. 500kHz-30MHz.

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- 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
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- 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!

ELAD FDM-S2 £449.95

Direct sampling receiver based on 122.88MHz 16bit single channel ADC converter covering HF 6m and offering the possibility to exploiting the under-sampling mode.

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1.8-460MHz with 1.3M Whip!.....£129.95
Wonder-TCP
40-10m Tuneable Counterpoise....£59.95
or buy both together for only £169.95!

Wonderwand Antennas U.K.
The UK's favourite rig-mounted antenna system!

New! WonderLoop 4010. 40m -10m

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 40m-10m 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.

ML&S PRICE ONLY £99.95
For full info & video see: www.hamradio.co.uk/wonderloop

HighEndFed Antennas

A professional range of End Fed Wire antennas from the Netherlands. Each antenna is hand made, individually tested for resonance and SWR. All you have to do is take it out of the box and string the antenna up in the air, add a coax feed back to you radio.

HEF/3Band	40/20/10m 200W, 11.85m Long	£134.95
HEF/5Band	80/40/20/15/10m 200W, 23m Long	£149.95
HEF/40m-QRO	40m Mono Bander, 2kW Only 20m Long	£219.95
HEF/20m-QRO	20m Mono Bander, 2kW, Only 10m Long	£199.95

For the full range see www.hamradio.co.uk/hyendfed

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A complete portable antenna packaged based around the world's best selling SuperStick

MP1 DLR Package includes:

- MP1B antenna (SuperSlider Coil, SW1 SuperWhip, 2 extension rods and nut)
- MR1C Counterpoise
- TM2 SuperPod Tripod
- UM2 SuperMount
- GB1 Go Bag
- FG1 Frequency Guide
- MC80 80-meter coil

Super Antenna Features:

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- Frequency Range: VHF 48 to 144MHz continuous
- SWR: 1.5 : 1 or better
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- Also configurable for up to 450MHz
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NEW IMPROVED VERSION

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Diamond Antennas - Huge selection always available

DIAMOND

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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 £99.95
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 £99.95

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

Duplexers/Triplexers

MX-72N	1.6-150/400-460MHz Duplexer	£44.95
MX-62M	1.6-56/140-470MHz Duplexer	£69.95
MX-610	HF/6+2+70 (for FT-8900)	£59.95
MX-2000	6/2/70 Triplexer	£91.95
MX-3000N	2/70/23 Triplexer	£86.95

Switches

CX-210 A	2-way, SO-239 Die Cast	£53.95
CX-210N	2-way, N-Type, Die Cast	£82.95
CX-310 A	3-way, SO-239, Die Cast	£89.95
CX-310N	3-way, N-Type, Die Cast	£114.95

mRS MiniVNA Antenna Analysers

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

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MiniVNA Pro with Bluetooth 100kHz-200MHz **£329.95**

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

Hustler Antennas

HUSTLER

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.

See web for full listing!

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.

DXE-UT-8213 Coax Cable Stripper

ONLY £47.99!

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

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Full range of Messi & Paoloni Low Loss Professional Coaxial Cable in stock now!

M&P ULTRAFLEX 7

7.3 LowLoss cable, 50 Ohm, double shielded. £29.70 for 25m.

M&P ULTRAFLEX 10

10.3mm LowLoss cable, 50 Ohm, "alternative for RG-213" £42.30 for 25m.

M&P BroadPro50 double jacket

12.4mm LowLoss cable, 50 Ohm, double jacket. £54.75 for 25m.

Any of our cables can be ordered in any length you require. There is a 10% discount for 100m+. If you require specific lengths then please call.

RF Explorer 3G Combo Hand Held Spectrum Analyser

Up until now the RF enthusiast have had to limit themselves to cheap "RF Power Detector/ Frequency counter" devices. But these are limited to display data for a single point of maximum power, and traditionally power metrics are too unreliable, in the order of 20dBor even 30dB inaccuracy. In contrast, a spectrum analyser like RF Explorer will display full frequency spectrum in the band, including carrier and modulated shape, it will display Spread Spectrum activity, if that exists, and will show bandwidth to monitor collisions, frequency deviation from expected tone,etc. **ONLY £199.95**

MyDel-Sark110 Vector Impedance Antenna

The SARK-110 Antenna Analyser is a pocket size instrument providing fast and accurate measurement of the vector impedance, VSWR, vector reflection coefficient, return loss, and R-L-C (as series or parallel equivalent circuits). Typical applications include checking and tuning antennas, impedance matching, component test, cable fault location, measuring coaxial cable losses, and cutting coaxial cables to precise electrical lengths. The SARK-110 has full vector measurement capability and accurately resolves the resistive, capacitive and inductive components of a load. The measurement reference plane is automatic adjusted via the Open/Short/Load calibration standard to enable the accurate impedance measurements at the end of an intermediate coaxial cable. **ONLY £329.94**

MFJ Products - Lots more MFJ stocked!

MFJ

MFJ-974HB	Manual ATU for balanced line antennas, 160-10m	£199.96
MFJ-974	as above but without 160m	Special! £179.95
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MFJ-949E	Manual ATU metered, Dummy Load, 1.8-30MHz, 300W	£199.95
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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	£259.95
MFJ-1786X	Magnetic Loop 10-30MHz, 150W re-built & re-aligned by ML&S	£479.95
MFJ-1788X	Magnetic Loop 7-22MHz, 150W re-built & re-aligned by ML&S	£529.95
MFJ-259C	Antenna Analyser 530kHz-230MHz	£289.95
MFJ-266	V/U Portable Antenna Analyser 1.5-185MHz + 300-490MHz	Free UK carriage £339.95
MFJ-269C	530KHz-230MHz, 415-470MHz Analyser	£389.95

LDG Auto Tuner Range Factory appointed distributor

ML&S have the largest stock of LDG outside the US.

LDG

Now Available! RT-600

The RT-600 is a 600 watt PEP coax in / coax out remote tuner designed to be placed near the feedpoint of the antenna. Place the RT-600 near the feedpoint and the virtually eliminate all feedline loss due to SWR. DC powered over the coax by the RC-600 control unit (included). £349.99

DM-990	Large Twin Meter for Kenwood TS-990S	In stock only £159.95
RT-100	100W Weather proof remote Auto ATU	£189.95
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
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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
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Z-100Plus	Ultimate autotuner for Yaesu FT-817D	£141.95
Z-11 ProII	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 1:1 balun 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
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Daiwa Meters

All featuring cross needle display offering unrivalled accuracy for SWR & Power

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CN-102L	1.8-200MHz. 20/200/2kW	£89.95
CN-103LN	140-525MHz. 20/200W. N-Type	£89.95
CN-801HP	1.8-200MHz. 20/200/2kW. PEP Reading. Large display	£109.95
CN-801HP3	1.8-200MHz. 30/300/3kW. PEP Reading. Large display	£129.95
CN-801VN	140-525MHz. 20/200W. N-Type	£94.95

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Ciro Mazzoni Professional Loops

In Two Sizes. Baby Loop & Midi Loop.

NEW PRODUCT

Over the years manufacturers and indeed home brewers have been trying to make reliable Magnetic Loops because of their extreme compact size, frequency range and immunity to noise.

Finally, an Italian manufacturer Ciro Mazzoni has perfected the design and is able to offer two versions covering the entire 80m-10m range built to ultra-professional standards.

Baby-Loop
6.6MHz-29.8MHz with controller: £849.95

Midi-Loop
3.5MHz-14.5MHz with controller: £989.95

Available from stock. ML&S are the sole distributors of Ciro Mazzoni Loops for UK & Ireland.

As recently installed at the ML&S Superstore.

Ciro Mazzoni loops are made of pure aluminium and even the Baby-Loop uses 50mm (2 inch) diameter of tubing. Because of the large surface area, there is less loss of gain and both ends are welded onto the socket, with zero screw connections so no contact resistance.

The tuning capacitor on both loops is not a simple variable capacitor but a huge variable plate capacitor fabricated out of aluminium, with an air-dielectric. Both plates are also welded directly to the loop and are virtually indestructible on high power. The distance between the plates is 14mm (ca. 1/2 inch) on the smallest Baby-Loop antenna.

A weather resistant actuator opens or closes the loop and thus tunes the plate capacitor (SWR tuning).

Capacitance can be varied by the motor and can be adjusted to achieve best SWR via a control unit in your shack. In spite of their compact size, the antennas are resonant in a wide frequency-range - do you know of any antenna which has a diameter of just one meter (ca. 38 inch) but a frequency range of 40m-10m without gaps?? Check out the new Baby & Midi-Loops from Ciro-Mazzoni.

The automatic control unit has a tuning circuit installed and is operated via a small keypad: just enter the desired frequency, wait a few seconds for automatic tuning of the antenna and go. No trying, no lost notes on settings, no checking with the SWR meter. The current frequency and SWR is shown on the LCD display. Maximum power load is 250W continuous with the automatic control unit.

For more info see hamradio.co.uk/ciroloops

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Large demonstration areas, expert advice and after sales, repairs on-site and a huge range always in stock

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The Big Camp 2015

Six thousand young people join in activities including amateur radio

Mike, 2E0MLJ showcasing *RadCom* and the RSGB Youth Committee to West Yorkshire Scouts at The Big Camp.

TEAM EFFORT. The Big Camp happens every three years and is hosted by the West Yorkshire Scouts in the scenic venue of the Great Yorkshire Showground in Harrogate. It attracts over 6,000 scouts and leaders from all over Yorkshire and was the ideal venue to showcase amateur radio and some of the things we do. This 6,000 included Scouts, Cubs, Beavers, Explorers and Guides.

Jamie Williams, 2E0SDV and I represented the RSGB Youth Committee and we worked with Denby Dale ARS. The club had a team of 10 at the camp: Darran, G0BWB, Jean, G0LPV, Kevin, G1FYS, Gerald, G3SDY, Denese, G1DEN, Chris, G8PUT, Barbra, M6CPG, Horia, M6KPA and David, 2E0EDL.

GB2TBC. I arrived on the Friday and it was quite quiet as it didn't open to Scouts until the evening. That evening, not many young people coming along to the radio room to operate, so we went on the air with the special callsign GB2TBC and worked some stations. The first night was mainly UK stations enquiring about the event and getting our WAB square.

Saturday was another story with young people starting to come in, mainly in the afternoon. With things like zip wires, free falls, drop slides, ice wall climbing, laser shooting and axe throwing it's not surprising they took a while to get to us! Yet with all of this, amateur radio still was a big hit and the radio room was full to the limit at times during the day.

SMOKE OR STEAM? Saturday evening tested our fire procedures and implementations when Jamie, 2E0SDV could see smoke. We quickly evacuated all of the young people from the shack, only to find out that Darran, G0BWB had turned the kettle on a minute previously and it was the steam from the kettle. So congratulations to Jamie for both testing out the fire procedures and winning the 'plank of the week' award.

BUSY BANDS. It was evident that there was a contest taking place on 40m that evening as there were lots of contest stations on the band. Despite this, I found a frequency and started calling CQ. About 30 minutes in to working a pile up I started hearing "CQ contest Italy Zulu QRP" and that station completely took over the frequency and ruined the pile up I had (not sure they had heard about the DX code of conduct). We were then joined in the shack by Peter, a very enthusiastic Scout who took a shine to radio. He operated some stations on HF and spoke to some people with great skill and confidence and was pretty much in the radio room all weekend. I was delighted to present Peter his Communicator badge at the conclusion of the event.

Radio wise on the Saturday evening we made some great contacts on 17m including Australia, Japan and many US stations.

The Sunday morning was good for amateur radio as it wasn't nice at all outside and all of the Scouts came inside and started flooding in to the shack. The only problem was that all the bands seemed to be closed.

Sunday evening was another story though as Jamie, 2E0SDV managed to work Nicaragua, Puerto Rico, Kentucky and Guatemala on just 2.5 watts using data.

My favourite part of the weekend had to be a chat I had with one of the Explorers who I asked where I was from. When I said I was from Cornwall I was met with the response: "Isn't that a type of pasty" to which I laughed and replied: "No it's a place". Then I got a reply of: "Oh, is that South Yorkshire then?" What can I say...

One of the uplifting parts of the weekend was the enthusiasm shown by the Scout leaders asking for help with activities such as Thinking Day on the Air and Jamboree on the Air as well as things involved in the Communicator badge too.

JOIN IN YOTA. It's worth a mention that Youngsters On The Air (YOTA) month will be coming in December, so any clubs that would like to help with activities for Scouts to get their Communicator badge would be well received. The RSGB will support any club with promotional material. If you'd like to help, please get in contact.

GREAT EVENT. I would like to conclude by saying a massive thank you and congratulations to the Denby Dale ARS, who were the main part of amateur radio for The Big Camp. They were such a positive and upbeat group that had the right attitude to amateur radio and youth involvement. They managed to actively engage the young people and had a good balance between older and younger members. One of the younger members of the club, Horia, M6KPA, aged 20, was a truly fantastic radio operator and always had a smile on his face, as did all of the other club members. Their efforts were recognised by presenting them with an ARDF & satellite operations book at the conclusion of the weekend.

If you'd like to find out about anymore youth activities or what the committee is up to then please go to our page on the website at rsgb.org/youth-committee and follow us on Twitter @theRSGByouth.

August 2015 • RadCom
Elaine Richards, G4LFM • elaine.richards@rsgb.org.uk

RSGB Convention & National Hamfest

Dates for your diary: 9-11 October and 25-26 September

RSGB CONVENTION

Kent's Hill Park Training & Conference Centre, Milton Keynes MK7 6BZ is the venue for this year's RSGB Convention. As we go to press, 42 of a possible 59 lecture spaces have been filled (some of the most popular talks will be repeated to enable as many people as possible to attend). A wide range of topics are covered this year from DXpeditions to contesting hints and the Raspberry Pi to meteor scatter, and there is a mixture of popular returning lecturers and new faces too as well as lectures from other parts of the world via Skype. Details on the lectures booked so far appear on the RSGB website at www. rsgb.org/convention

Just as important as the lectures are the social aspects and the Convention is a great opportunity for people to catch up with friends who they might not have met since the previous event. In terms of organised events, delegates who arrive on Friday can attend an informal buffet-style dinner that is supported by the sponsor, Martin Lynch & Sons.

Catching up with friends in the social area.

There is ample space for people to chat over coffee or something stronger and to accommodate small group meetings throughout the event.

On Saturday night there is the Convention dinner and this year we are delighted that Howard Long, G6LVB (of FUNcube Dongle fame) will be our after-dinner speaker. Numbers for the Convention dinner are limited and delegates should note that this is the only catering provided on Saturday evening within the conference venue.

DISCOUNTED TICKETS. Day tickets, dinner tickets as well as weekend packages can be booked online, see www.rsgb.org/convention and the Early Bird discount for hotel bookings runs until 18 August. Day tickets booked online before 30 September save £5 on the at-the-door price.

NATIONAL HAMFEST

The National Hamfest is an increasingly popular event, with the number of visitors increasing year on year. This year it is being held on Friday 25 and Saturday 26 September. Organised by the Lincoln Short Wave Club in association with the Radio Society of Great Britain and assisted by many local radio clubs and societies it is held in the George Stephenson Pavilion, Newark & Nottingham Showground, Lincoln Road, Winthorpe, Newark NG24 2NY. The venue

The RSGB always has an impressive display.


Radios, antennas and other equipment on show.

has easy connections via road and rail to most parts of the UK and local connections are available from Newark Northgate Station that is served by both Virgin East Coast and Hull Trains. The showground is approximately 2 miles from the nearest A1 junction.

This year there are a few changes to arrangements that have been made in response to the feedback from visitors over past years including more outside seating for those who wish to take a break from the bustle of the traders and car boot areas.

Parking for those with 'blue badges' will be relocated nearer to the exhibition hall, within a central dedicated area of the main car park. This change will enable traffic movements to be minimised within the main arena and offer a hard surfaced pathway to the main exhibition area, avoiding grassed areas that in the past have caused some problems for those with mobility scooters and wheelchairs.

The organisers have promised that the food will not run out early (as was the case in 2014). A menu has been planned that will facilitate quick replenishment if necessary.

The outside car boot area has been increasingly busy over the past couple of years and it has been noted than many of the visitors prefer to bring their own tables to promote their wares, in common with most traditional car boot events. It has therefore been decided that no tables will be provided this year (a note to this effect has already been posted on the Hamfest website, www.nationalhamfest.org.uk). This has allowed the organisers to avoid a price increase for car boot traders , which will remain at £15 for cars and £10 extra for trailers. Larger vans will be charged at a higher rate.

All of the major manufactures will be represented again this year, and the majority of the traders who attended in previous years have already secured their space for this year. There are also several new traders. A plethora of recently launched products will be available to view and there are some new product announcements promised.

A number of outside demonstration areas are planned. Already confirmed is a display of military radio equipment kindly organised by the Vintage Military Radio Amateur Radio society (VMARS). In addition, CambHams will again be in attendance with their mobile station vehicle and will be operating the Hamfest special event station on most bands. It is also planned to have working demonstrations of a number of the emerging and more established digital voice modes including D-Star, C4FM and DMR.

Advanced 'early bird' tickets for a single (stated) day or for both days will be on sale via the dedicated Hamfest website. Early bird tickets at the discounted rate of £4 per day will only be available until 1 August, after which advanced tickets may be purchased until 31 August at the standard rate of £5 per day. Camping packages including entrance tickets are also available again this year.

To book or find out more, visit www.nationalhamfest.org.uk

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QRP

News from Five Days in May and the Dayton Hamvention

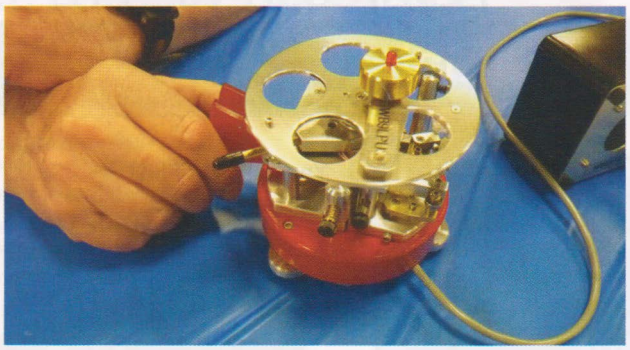


PHOTO 1: The RotoBug employs the rotation of a variable mass to provide the power for the string of automatic dots and the rotation of another variable mass to provide the power for a string of dashes.

THE RADIO CONSTRUCTOR AS ARTISAN. There is a saying attributed to St Augustine that says "Those who sing, pray twice". I am not a singer but I have been a radio constructor for more than 50 years. There is great satisfaction in running a radio station in which some, if not all, of the equipment is made by the operator. "By all means, go to college. But in the summers, learn a manual trade. You're likely to be less damaged, and quite possibly better paid, as an independent tradesman than as a cubicle-dwelling tender of information systems", says Matthew Crawford of the University of Virginia in *Why We Make Things and Why it Matters*. The craftsman has no need of well-articulated self-justification; he can simply point. The lights come on. The engine starts. The tap runs. The wall stands.

Although I have been building radios and allied equipment for a long time, I would not describe myself as a craftsman. A sense of utility surrounds the work of my hands. My outer cases, when I use one, have been described as 'aluminium GBH' fashioned to hide the messy internal wiring from the outside world. But I do know many constructors whose equipment is externally and internally beautiful. For example, I have always loved the homebuilt equipment of George Burt, GM3OXX. It is not only extremely functional but it looks like jewellery.

BEAUTIFUL KEYS. Another radio amateur who produces beautiful equipment is Richard (Rich) Meiss, WB9LPU. Rich makes exceptional Morse keys many of which are described in his website WB9LPU's Key Corner. He says of his fledgling website, "My site will be largely devoted to telegraph keys of all sorts. It will include a photo gallery of my collection of commercial, military and amateur keys, as well as paddles and bugs from a variety of sources. Because I am somewhat obsessed with designing and building keys, the site will have lots of pictures and accounts of past, present and future design projects." Perhaps the most attractive of Rich's keys are the fully-automatic RotoBug or the Auto-Roto Twin. Both are works of art and at the same time very practical Morse keys. They offer automatic dots and dashes on the appropriate paddle by purely mechanical means; no electronics are required for the key.

I have followed Rich's keys for several years at the 'show and tell' section at the Four Days in May QRP Symposium run in parallel with the Dayton Hamvention, the largest amateur radio event in the world. The Hamvention is held in Dayton, Ohio, each May and claims to attract over 20,000 visitors. It takes place over a weekend (Friday, Saturday and Sunday) and in more recent years the American QRP Amateur Club International (QRPARCI) has added a symposium and special events on the Thursday to produce the Four Days in May. Thursday is a whole day of presentations turning the three days into four. A QRP banquet, a Buildathon and a large Show and Tell for constructors to display their work are all arranged to take place in a local hotel booked to provide accommodation and a social context to the event.

LARGE FLEAMARKET. It is a good event and I have been fortunate enough to attend it almost every year since it began, over 30 years ago. Sadly the last Four Days in May was my last; my pension doesn't really give me enough funding and my health has not been at its best recently. During all this time I have shared a room with several fellow QRP Club members. In the last few years my companion has been Colin Turner, G3VTT. I often think it a pity that so few UK radio rallies or club meetings run a 'Show and Tell'. It could be that so few radio amateurs make their equipment these days that we would not have enough homebrew projects to show off.

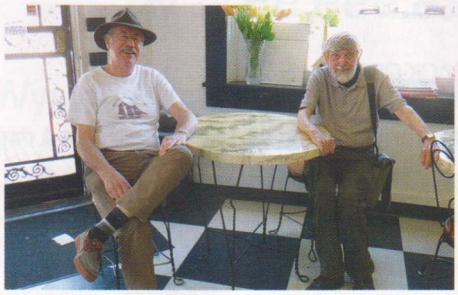


PHOTO 2: Colin Turner, G3VTT and George, G3RJV at Dayton Hamvention.

PHOTO 3: Colin Turner, G3VTT looking through the junk at the Hamvention.

PHOTO 4: Rex Harper, W1REX of QRPme (http://www.qrpme.com/).

Another of the endearing features of the Dayton Hamvention is the massive flea market in the car park. It can have up to 2,000 amateur traders trying to offload their surplus equipment and miscellaneous junk. Most seasoned bargain hunters know to look for what is under each table or in those grubby second-hand plastic bags because that is where the bargains may be found.

AWARDS. I have had many happy and constructive times at Dayton. This has been an odd year in that I have been presented with several awards: the Calcutta Key from the RSGB; long service certificate from the G QRP Club; and from the QRPARCI in the USA, a certificate 40 years of service. Perhaps my favourite, although I ought not to have a favourite, was presented by the Dayton Amateur Radio Association for Technical Excellence. The Plaque reads ".... has selflessly helped many radio amateurs build their own equipment through the art of self-learning and simple construction projects..."

One of the nicest things anyone has said!

Book Review

Propagation and a look back at wartime radar

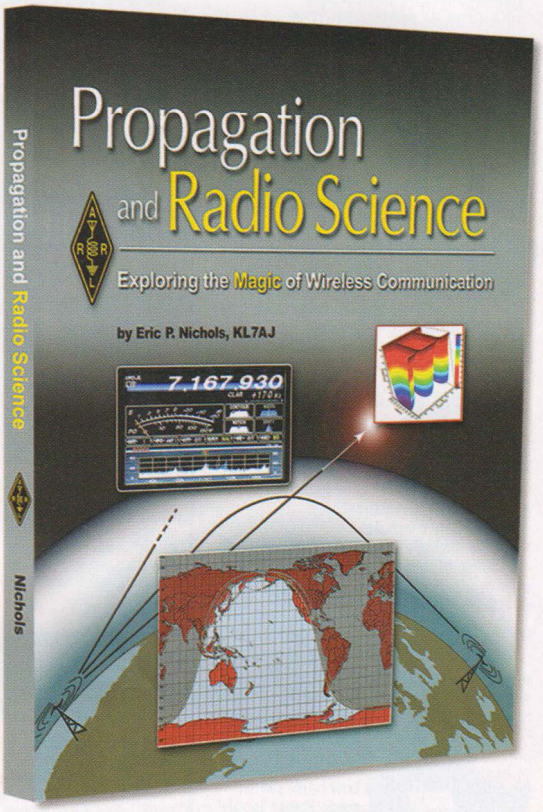
Propagation and Radio Science

by Eric P Nichols, KL7AJ

I honestly wasn't quite sure what to make of this book. The subtitle, 'Exploring the Magic of Wireless Communication' doesn't really shed light on what a fellow-reviewer described as "not what most people would expect from a propagation book – zany is a good way to describe it". But that's not to say it isn't a *good* book, and there is quite a lot of good physics in it. It caused a great deal of interest at its first European appearance (in Friedrichshafen this year) and covers a remarkable amount of radio and physics theory. One finds the "depressing" Radar Equation, Free Electron Propagation, the WWV broadcast format, Orbital Mechanics in a Nutshell and many more curios. The choice of language is interesting, too – for example, selectively quoting from the "So What" section of the "Matters About Matter" chapter, "With these thoughts rattling around in our collective cranial cavities, we need to segue back to the matter of matter. ... There are a lot of alphabets in the soup ... There's a lot of material to keep track of, but as long as we periodically touch bases with the basics, things will fall into place". Quirky.

This ARRL publication and is more US-centric than most. Specifically, it's Alaska-centric, and deals mainly with propagation effects and physics from the viewpoint of high latitudes.

There is no doubt that this book covers a vast amount of ground in a style that is quite different from the amateur radio norms. It seems to be a thought-provoking review of the physics of propagation for those who would like to do hands-on experiments. Certainly, if you have an interest in propagation (and what amateur doesn't?) then this book will make you think in new ways.



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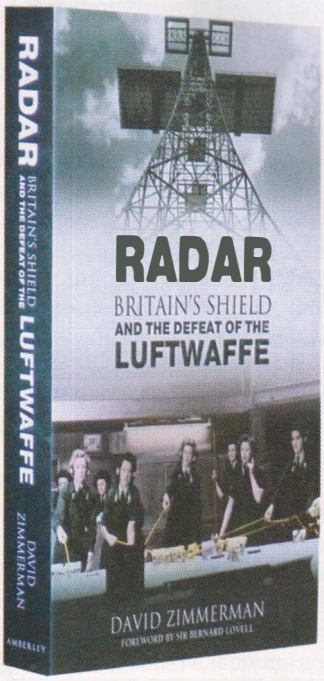

Radar, Britain's Shield and the Defeat of the Luftwaffe

by David Zimmerman

Today, we take radar for granted. For example, as I write this, on the hottest day of the last nine years, I have a weather radar monitor on my computer showing thunder clouds in the South West. But it wasn't always that way, and this fascinating book charts the development of radar from the earliest theories to its key role in World War 2.

The story starts with the early development of aerial bombardment in World War 1, starting on Christmas Eve 1914 with small German seaplane dropping a bomb that landed relatively harmlessly in a garden near Dover. Things quickly escalated, however, and soon it became clear that countermeasures were needed for this new aerial menace. Directional sound location started shortly thereafter, culminating in the acoustic mirrors at Denge and other places that could detect an aircraft at 10 or 20 miles. But this technology was rendered obsolete almost overnight by the development of Radio Direction Finding (RDF), now known as radar.

By the early 1930s the 'fluttering' effect caused by passing aircraft had been noticed by engineers in the UK and USA and this was tested directly in Watson-Watt's now-famous experiments in 1935 that led to the development of radar. Put like that, it all sounds very simple but in fact – as this book makes clear – there was an awful lot more to it than that. We learn of some of the political, financial and technological hurdles, the key players and much more. I was surprised just how much detail this book contains. Early VHF fighter radios, Chain Home (of course), the dining room at Bawdsey Manor, photos of vintage equipment and installations (not to mention the people involved) – it's all here.

This is a nicely written, well researched and very detailed book that sheds new light on the development and use of a new technology at a time of unprecedented national crisis.

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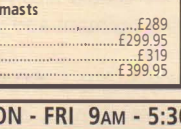

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LF

Make a date for the 9 August Activity Day

The Elad FDM-Duo SDR transceiver looks as if it's going to be very useful on LF and MF.

MOBILE MF. Andy, F6CNI has been testing a 'mobile' setup on 472kHz. He mounted a 2m whip on his (stationary) car and loaded and matched it to 50Ω. With a 2W transmitter he calculated an ERP of about 150μW. Perhaps due to the low Tx power, only one station copied his WSPR test; F6GEX at 72km distance. I remember trying something similar many years ago on 136kHz with a couple of hundred watts. It worked quite well, but I never managed to get it to a state where I could use it on the move.

MORE CONTACTS PLEASE. There has been a lot of heated discussion on the LF forums regarding the validity of reports given by modes such as *Opera* that use an internet back-channel allowing the software to compare received data with information about active stations. The suspicion is that a marginal decode will correlate sufficiently with a callsign from the list of active stations drawn from the internet to produce a false positive. To be fair to *Opera*, these marginal correlations are indicated as such but people still tend to want to believe that they are 100% real. Read more on this subject in the Data column in the June *RadCom*.

The *Opera* developer has taken these concerns on board and released a new version that doesn't upload these debatable 'Dynamic' decodes to the PSK reporter map. It also logs the audio tone frequency of the correlation thus giving another means to check validity. It's available from https://rosmodem.wordpress.com

It's no worse than making a sked with a station to send *QRSS* at a certain time and frequency and then imagining that you can see a faint line on the *Argo* screen! But that is not a contact and will not count for any record books.

I feel that beacon modes such as WSPR or *Opera* should be more often used to facilitate a QSO. Run them for a few days to find out when the band is open to your intended station and then revert to a mode such as JT9 or QRSS to make a two-way contact.

SUMMER DX. As has been noted in previous years, summer conditions can be very good for DX as long as you are prepared to burn the midnight oil. Stefan, DK7FC's 472kHz transmissions have been regularly spotted in the USA and Canada right up to the summer solstice. G3XDV's 136kHz tests have been copied all around Europe, including Greece. The main problem limiting range is static from thunderstorms.

NEW TRANSCEIVER FOR LF. I recently bought an Elad FDM-Duo SDR transceiver and am pleased to report that it looks as though it's going to be very useful on LF and MF. The built-in PA will produce about 8W but is restricted to amateur bands above 1.8MHz, however if the '0dBm' output port is selected the FDM-Duo will transmit anywhere in its range – which goes from 54MHz down to about 10kHz. Receive sensitivity is very good on 136kHz, in fact it would probably benefit from a little more attenuation than the built-in 12dB switchable attenuator provides. The 0dBm output shows a clean 250mV RMS signal into 50Ω on 472kHz, dropping slightly to 225mV on 136kHz.

This transceiver is very versatile as it can be used on its own with most functions accessible via the front panel, or with the bundled *FDM-SW2* Windows software that opens up a lot more possibilities. As I wanted to try the radio with modes such as WSPR I was keen to find out how easy that would be.

The Elad connects to a computer with three USB leads, one for receive functions, one for transmit and one for control. Quite why they didn't incorporate a USB hub so that only one lead is required I don't know! I had to use a mini hub whilst trying the software out on my Windows 8 tablet, which only has one micro-USB socket. It worked fine.

The FDM-SW2 software sends receive audio to the default sound output device so in order to get that into WSPR I selected 'stereo mix' (sometimes called 'what you hear') as the record source for the sound card, effectively routing its output to its input, and specified the sound card as WSPR's input. The output of the WSPR program was sent to 'FDM-DUO audio device' and I set up CAT control as if it were a Kenwood TS-480, which the Elad emulates. WSPR then keyed the transmitter and received the audio stream to which I was listening. I imagine other software could be set up to work in a similar manner.

0dBm, or 1mW into 50Ω, is not a great deal of power but on eBay I found a 32dB amplifier that claims to produce 1.5W when given a 0dBm input between 1 and 500MHz. I am hoping that when this arrives from Hong Kong it will enable me to drive my normal LF Txs from the Elad. I will just need to extend its LF response a little, most likely by increasing the values of the DC feed chokes and coupling capacitors. I'll let you know how it goes.

UK WEB SDR WITH LF. Southampton University Wireless Society has added an LF and MF receiver to its VHF – microwave web SDR at Farnham. It uses an RTL TV dongle as a receiver covering from a few kHz to 2MHz so it can be used on 136 and 472kHz as well as on Top Band. Unfortunately, the temporary active aerial is only half way up the mast and is picking up a lot of mains buzz, mostly above 300kHz, making reception on 472kHz difficult at present. Results on 136kHz are better and it is hoped that once filters are constructed the aerial can be relocated to the top of the mast where there should be less noise. You can find it at http://websdr.suws.org.uk

LF/MF ACTIVITY DAY? I'm often asked 'when should I listen for signals' and it has also been suggested that an activity day should be scheduled so that we could all appear on the bands at the same time and make a few contacts. This would give listeners a chance to see what they could hear. Let's do it on Sunday 9 August. Make a note in your diary!

HF

Summer doldrums but there's still some DX about

Sunspots and solar flux bounced back again in June but the seasonal changes in atmospheric chemistry meant that conditions were poor. They went from bad to worse near the end of the month when coronal mass ejections caused several days of geomagnetic storms and closed the higher HF bands completely. But there were some openings across the north pole on occasions – see the comments by M0BJL later.

THE ART OF LISTENING. Over the years there have been many discussions about whether innovations like the packet cluster and reverse beacon networks are killing off the art of listening and it seems to me that they may be. Rob, M0VFC, commented that when he was on Tristan da Cunha a couple of years ago any band change would result in at least 30 minutes of CQing with no takers before he eventually appeared on the cluster and got an immense pile-up. Similarly the PJ7PK IOTA DXpeditioners could get no response to their CQs until they called someone else and got spotted. CW and data stations should be noticed more quickly by the various skimmers feeding the reverse beacon network but there is no guarantee of this.

Two recent IOTA DXpeditions illustrated this point well. I'm normally guilty of cluster watching but I wanted to work these stations before the pile-up developed so I left my FT-1000's twin receivers running on the two most likely frequencies and was able to work both stations within seconds of their first CQs. The spots appeared about 10 minutes later so there was a small window for the diligent listener to make an easy QSO.

Part of the listening art involves being alert for an unusual sound, language or accent. Signals coming through the auroral zone around the poles often have a fluttery sound that will distinguish them from more common DX. An Indonesian or Japanese accent may indicate a rare IOTA and an Australian or New Zealand voice will probably provide an interesting DX opportunity. So let's try not to be totally reliant on the cluster – there will probably be DX on the band even if the cluster hasn't reported it yet.

THE ENIGMA STATIONS. Polish amateurs are marking the work of the Polish Cipher Bureau on the Enigma cipher in the 1930s by running a group of special event stations during August. The details were in the last *RadCom* and can also be found at enigmaaward.eu. This year's event is in honour of the mathematician Marian Rejewski but there were two other key mathematical players in Poland – Jerzy Rozycki and Henryk Zygalski. To learn more of the Enigma story download your free admission ticket from the RSGB website and go along to Bletchley Park where you can also see the National Radio Centre and (for an extra charge) the National Museum of Computing.

DXPEDITIONS. Ariel, NY4G will be QRV as FP/NY4G from St Pierre (NA-032) until 23 July. He will operate CW, SSB and RTTY on 40-10 metres. There is a website at www.fp-ny4g2015.com.

Oliver, W6NV will be QRV in the CQWW SSB contest from St Helena – possibly as ZD7N. He will then go to Ascension and be QRV until 4 December as ZD8W.

IARU President Tim, VE6SH, will be back in Antigua (NA-100) operating as V29SH from 28 July to 8 August with an emphasis on 17 and 12 metres.

There was some activity in June by T31LP from the rare DXCC entity of Central Kiribati but reports suggest that it was from a ship offshore from Nikumaroro Island so will not count for DXCC or IOTA. The expedition was in the area looking for evidence to support a theory that Amelia Earhart's final flight in 1937 ended on that island. The DX community is still waiting for a major land based operation from this DXCC as it is the 16th most wanted entity in Europe according to *Club Log*.

Jim, 7K4QOK, Tack, JE1CKA, Miho, JJ2VLY and Yutaka, JQ2GYU will be active as S79HN from Praslin Island (AF-024), Seychelles on 16-20 July. They will operate CW, RTTY and SSB on 40-6 metres, but on 40 will be between 7050 and 7100kHz.

Geoff, G8OFQ will be working again as a volunteer at the Giant Tortoise Breeding Centre on Isabela Island, Galapagos (SA-004) until 27 September. He will be QRV as HC8/G8OFQ on 160-6 metres during his spare time, which is likely to be between 2100 and 0500UTC. See his QRZ.com page for more information.

Tony, ZL2AGY plans to be back on Rarotonga Island (OC-013), South Cook Islands until 6 August. He'll be QRV CW only as E51AGY. Last time he was there he used the call E51FOC.

Geoff, ZL3GA will be active from Efate Island (OC-035) Vanuatu as YJ0GA from 21-27 July.

IOTA. The IOTA Contest takes place over the last weekend of July and is a great chance to get IOTA credits without needing a QSL card (as long as the other station uploads his log and the QSO details are adjudicated OK). There will be huge numbers of islands on the air and I only have space (and information) about a few of them so keep an eye on the cluster and keep tuning around.

A large group of operators from Taiwan, Japan, Hong Kong and Macau will be active as BOOK from Kinmen Island (AS-102) on 24-27 July.

CT7ACG, GOMMI, MOGAV and M3VCQ will be active as CR5CW from the island of Culatra (EU-145) on 24-27 July.

A team from the Hellenic Amateur Radio Association of Australia will be active on all bands and modes as VK2SSI from South Solitary Island (OC-194) on 26-28 July. They have a website at www.vk2ssi.com.

A group of six operators will be active as R3RRC/0 from Brusneva Island (AS-082) on 24-29 July. QSL via RZ3EC, direct or bureau (OQRS on *Club Log*). The DXpedition website is www.as082.org.

G0LZL, G0SYP, G3SHF, M0DCG, M0TJU, M1PTR and M5KJM will be active as GI5O from Rathlin Island (EU-122) on 24-26 July.

Pete, 2E0SQL will be active as 2U0SQL from Guernsey (EU-114) on 22-28 July and will participate in the IOTA Contest as GU9V along with 2U0TKB, M0PCB and M0TZO.

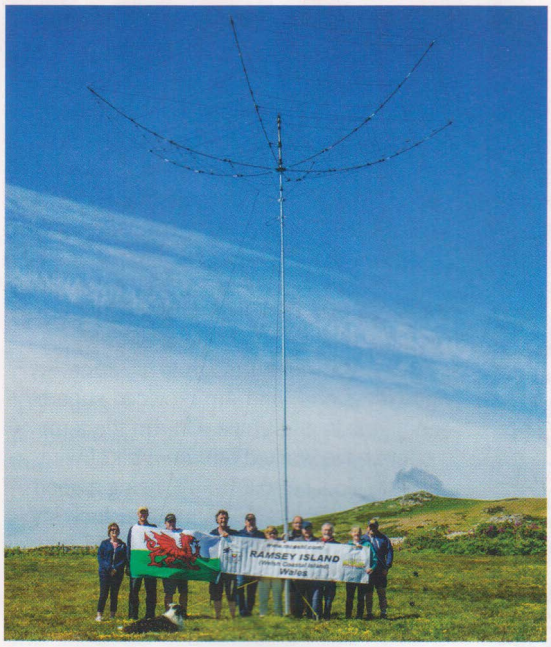
Three operators will be active as ZW8K from Ilha Grande de Santa Isabel (SA-025) on 23-26 July, including an entry in the IOTA Contest. For more information see http://zw8d.webnode.com/

MM0TFU is planning to be QRV from Arran (EU-123) from 22-27 July.

Four South African operators will be QRV as ZS1FUN from Dassen Island (AF-064) on 15-16 August.

CORRESPONDENCE. Peter, G4XEX took advantage of the dip in conditions to service his antennas but still managed some DX during the All Asian CW contest and the run-up to it when many people were getting their stations ready. His highlights were 5U5U for an all time new one (ATNO) and

Carson, ZS8C visiting M0BJL's QTH.



The MCOSHL Ramsey Island team.

several Hawaiian stations on 18MHz in the morning. Other catches included: 28MHz CW – Vietnam, Timor Leste and Thailand; 24MHz CW – Mongolia, Timor Leste and Surinam; 21MHz SSB – Singapore, Hong Kong, and the Congo; 21MHz CW – Mongolia, Rodrigues, Malaysia, Laos, Ecuador and Montserrat; 18MHz SSB – Hawaii, Korea, Niger and Egypt; 18MHz CW – Hawaii and Sri Lanka; 14MHz CW – Mongolia.

Andrew, GW3OQK wrote in to note that people these days are forgetting how to report 'chirp' in a CW signal. Chirp is a quick change in the CW tone when the key is closed and the note may go up or down in frequency. This is normally due to the VFO being pulled by a change in loading or a change in HT voltage. It used to be a common problem but is quite rare these days unless someone is testing some vintage valve equipment. The correct report for a strong but chirpy signal would probably be 599C and not say 597 as the number is only varied if the signal is continuously defective. Andrew also notes that key clicks should be reported by adding the letter K at the end of the RST.

Tom, G4IDL has mastered his new FT-5000 and used it to pick up some CW DX despite the poor conditions. He found: 24MHz – Grenada; 21MHz – Peru, Mongolia, Motserrat; 18MHz – Kenya, Malaysia, Montserrat, Burkina Faso; 14MHz – South Cook Is, Montserrat, Burkina Faso, Thailand, Greenland; and on 10MHz – Market Reef and Timor Leste.

Shaun, M0BJL wrote in initially with news of a visit from Carson ZS8C but went on to explain that he had been focussing on the Pacific and found a fairly regular evening opening over the North Pole on 21MHz at some time between 2130 and 0030 with strong signals from eg Japan, Wallis & Futuna, New Caledonia and the Mariana Islands. He notes that the opening can be brief and shuts quickly but was fairly reliable in June. *RadCom* readers may want to see if it is still there in July.

Ken, CT7AGZ noted more 'getaways' than QSOs in June but did find two ATNOs in the shape of Burkina Faso and Hong Kong. His catches included: 28MHz – St Martin; 24MHz – Surinam, St Martin and Cayman Islands; 21MHz – China, Korea, Hawaii, New Zealand, Mongolia and numerous Caribbean and South American stations; 18MHz – Hong Kong, Sri Lanka, Turkmenistan, South Africa, Kenya and the Caribbean; 14MHz – South Cooks, Burkina Faso, Lord Howe and Market Reef; 10MHz – Tahiti and Market Reef; and 7MHz – Tahiti and Cape Verde Islands.

Peter, G3HQT also took time out for antenna work on his MA5V vertical. He nevertheless found a few new ones including: 21MHz – Niger (RTTY), UAE, Burkina Faso, Gambia (PSK); 14MHz – South Cooks (CW), Jordan (RTTY).

Fred, G3SVK thought conditions were rather disappointing for the All Asia CW contest but did work into China and Japan on 14 and 21MHz. 14MHz seems to have been by far his best band. His almost exclusively CW DX included: 28MHz – UAE and Tanzania; 24MHz – UAE; 21MHz – Japan, China, Thailand, Palau, Timor Leste, Caribbean and South America; 18MHz – China, Japan, Hong Kong, Brunei, UAE, Bahrain, Kenya, Rodrigues, Caribbean stations and South America; 14MHz – Australia, Palau, Thailand, Japan, Tahiti, South Cook Islands, China, Vietnam, Timor Leste, India, Sri Lanka, Moldova, Caribbean and South America; 10MHz – Australia, Northern Mariana Islands, Market Reef, Greenland, Curacao and Montserrat; 7MHz – New Zealand, Timor Leste, Caribbean and South America.

Finally, Gordon, G3PXT has been taking advantage of Sporadic-E on 6 but also kept an ear on the HF bands (without using the cluster) to find: 28MHz – Chile, Brazil, Argentina, Vietnam and Zambia; 21MHz Japan, Qatar, Djibouti, USA, Oman and Kenya; 18MHz Saudi Arabia and Greenland; 14MHz – New Zealand, Thailand and Saudi Arabia.

TABLE 1: 2015 worked DXCC entities (ranked by All).

Call	CW	SSB	Data	All
G1XOW	0	229	0	229
G4XEX	126	148	57	209
G3SVK	209	0	0	209
G3HQT	164	0	102	183
CT7AGZ	172	0	0	172
G1MSE	0	170	0	170
G4IDL	164	0	0	164
G3PXT	66	114	112	149
G0RPM	56	70	88	124
M0BVE	113	0	0	113
G4FVK	43	67	0	82

Oliver, ZD8W at Friedrichshafen.

THANKS. As always to my correspondents, DX-World, 425 DX News and Daily DX.

TABLE 2: Forthcoming DXpeditions.

Until 23 July	FP/NY4G
Until 6 August	E51AGY
Until 25 August	VK4AAC/5 OC-139
21-27 July	YJ0GA
22-27 July	MM0TFU/P EU-123
22-28 July	GM3RCV/P St Kilda
22-28 July	2U0SQL EU-114
23-26 July	XR1T SA-069
23-26 July	GM2AS/GM5TO EU-123
23-26 July	SM7/M1KTA+SD7B EU-138
23-26 July	XM2J NA-128
23-26 July	CR5CW EU-145
23-26 July	ZW8K SA-025
24-26 July	GI5O EU-122
24-27 July	BO0K AS-102
24-27 July	CR5CW EU-145
24-29 July	R3RRC/0 AS-082
25-26 July	OZ/DL2JRM EU-172
25-26 July	GM7V EU-010
25-26 July	GU9V EU-114
25-26 July	YE3IOTA OC-237
26-28 July	VK2SSI OC-194
28 July – 8 August	V29SH
Mid-late July	NA-212
3-10 Aug	NA-248 NEW by VE3LYC
8-16 Aug (3 days)	AS-172
15-16 Aug	ZS1FUN AF-064
16-19 Aug	F/G6AY/P EU-157
21-23 Aug	EU-112 by GM ops
1st week of Sept	AS-203 NEW
4-19 Sept	K6W Wake
15-29 Sept	Niue E6GG by G ops
18-30 Sept	Z21MG
24 Sept-14 Oct	T2GC
1-12 October	TX3X Chesterfield
13-28 Oct	V73D
20-27 Oct	TO4K etc St Barthelemy
28 Oct – 3 Nov	T32DX
31 Oct-10 Nov	3W3MD
Oct/Nov	Mannihiki by N7QT
14-23 Nov	VK9WA Willis Is
16-23 Dec	VK2IAY/9
Jan/Feb 2016	VP8 (South Ga and South Sand)
Early 2016	Juan de Nova
11-26 Jan 2016	Palmyra
16 March – 8 April	VK0EK Heard I

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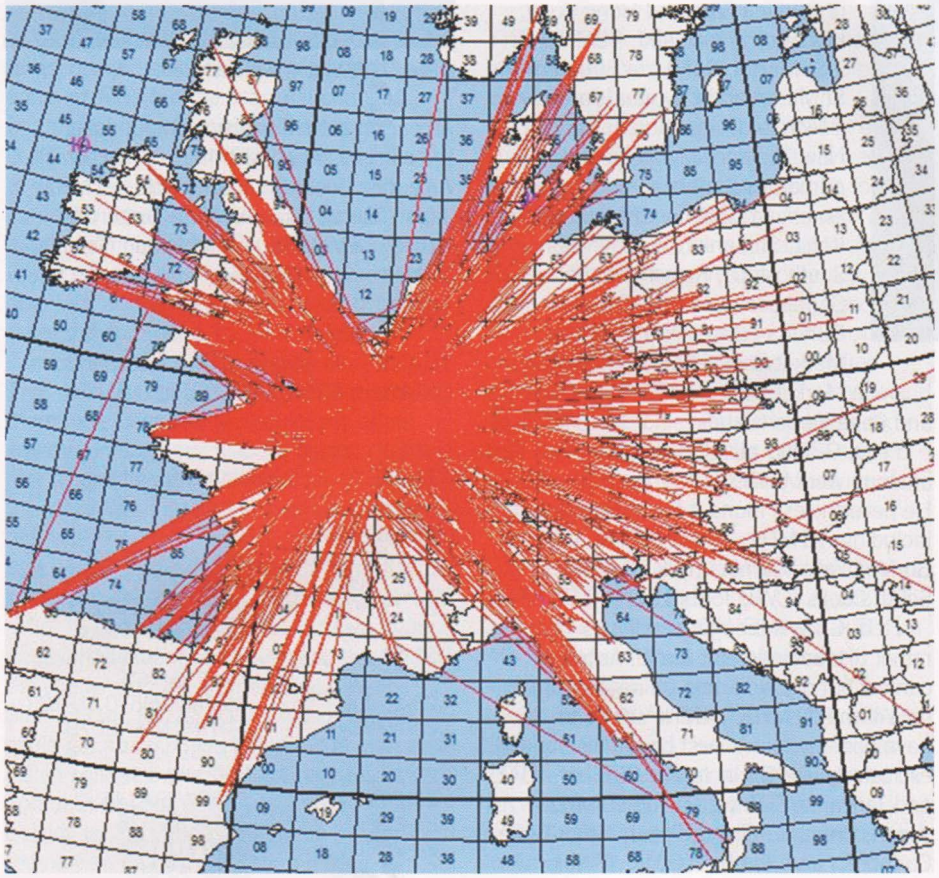
VHF/UHF

A real mixed bag of Sporadic-E, aurora, meteor scatter and DXpeditions



The Sporadic-E on 22 June. Courtesy of MMM ON VHF.

JUNE ROUNDUP. The main event for June is the arrival of the Sporadic-E season that starts building in May and increases in intensity and maximum usable frequency (MUF) during June through to July (and in some cases into August). First indications can be seen on 10 metres where skip conditions to Central, Southern and Eastern Europe become good and, as the MUF rises, 6 and 4m generally come into play. In extreme cases, 2m can also support Sporadic-E (Es) propagation.

After a few minor openings during the month, 22 June brought an intense opening with MUF reaching well above 144MHz. A classic single hop cloud area gave the whole UK a chance to work some long distance contacts in southern and eastern Europe. Check out events on the Make More Miles On VHF site [1] that gives station reports and graphical mapping of the contacts in more detail.

More Es on the lower VHF bands during the IARU 50MHz contest and the RSGB UK Activity Contests produced some excellent DX into the Caribbean (KP4S and NP4A were in great demand) and, on the Tuesday night, the Balkans area was worked with 2000km+ distances. Hot on the heels of the 22 June 144MHz Es event, a series of incoming coronal mass ejections (CME) produced excellent mid latitude auroral propagation on 6, 4 and 2m. Two big signal European DXpeditions took place, both producing super signals in UK. OJ0B (Market Reef) operated by a team lead by Jussi, OH6ZZ were QRV on 2m meteor scatter and EME, making 462 QSOs between the two modes. Market Reef has, up until now, been a very rare DXCC on HF let alone VHF. The OJ0B DXpedition was dedicated to the late Lenna, OH1NL and Bill, W6DNG who completed the first valid EME Moonbounce QSO on 11 April 1964. TF3ML/P also appeared on 2m using meteor scatter techniques to activate the rare Icelandic locator square. Further afield there were more EME DXpeditions QRV on 2m with KB7Q in rare US State Wyoming and C6ANS in The Bahamas.

BAND REPORTS. Mike, M5MUF (IO92) sent in a fantastic daily log of activity from 27 May right through to 15 June. Sporadic-E on 6 and 4m provided superb conditions to all Europe. On 4m the term 'I could have worked him on a bit of wire' certainly applied to CT1HZE being a good S3 with just a 6" (150mm) wire stuck into the transverter antenna socket where he was end-stopping for about a minute with the main antenna re connected.

There was a mixed bag of 6m Es on 28 May, working TK5MH (JN41), DK1FW (JN48) before moving to 4m and working 9A2SB (JN95) and 9H1CG (JM75) on SSB. By early evening, conditions swung towards Iberia, with EA1YV (IN52) and EA1BLA (IN53) both worked. On 6m, 4X4DK (KM71) was heard but he was unable to break the European pile up. For a bit of light relief his first MS QSO this year was working DK2PH (JO41) on 4m FSK441. More Es working followed on the 29th with EA8DBM (IL18) and SM2GCQ (KP15), UW8SM (KN28) on 50MHz CW, then S57D (JN76) on 70MHz SSB. Moving into 3 June and some nice conditions on 4m Es, with HA1WA (JN87), 9A3WL (JN86) and EA8DBM (IL18) worked.

As 4m subsided he dropped back to 6m to work OE3DIA (JN88) for a new square. Briefly, on the 4th, it was open to OH on 6m in the morning, with OH7UE (KP52) worked CW and IZ7FLS (JN81) and E74QA (JN93) SSB during the afternoon. Again the main clouds stayed well away from UK airspace, but eastern EU had a good 144MHz opening and transatlantic on 6m. Seems to be a developing pattern this year with the Es clouds preferring to stay over the Balkans, the Baltic or Poland, leaving the UK just out of reach. And when they come westwards, IO92 gets a nice reflection into the middle of the Mediterranean Sea.

This seems to be the poorest first week of June for Es he can recall, wondering whether this year's El Niño event is shifting the jet stream and upsetting the usual wind-shear pattern across Europe – a question for G3YLA, perhaps?

On the 8th he caught a brief aurora in the afternoon and heard GM3WOJ (IO77) on 4m, but not strong. It might have been workable if there had been fewer other (T9) CQers on 70.2 at the time. Just as he was about to switch off and give up for the day he made a few contacts on 4m using

just 8W, OK2BRD (JN99) and OK1MAC (JN79) with SSB, and SQ9RFE (JN99) in FM mode. The 9th was better on Es and he managed some new ones in between, with LY3UE (KO24) providing a new country and square on 4m. In the afternoon, conditions were good to the east on 4m with YO3DDZ (KN34), YP0Y (KN16) and HA9MDP (JN87) worked. A quick spell on 6m CW netted US0SU (KN28) and new DXCC CN8KD (IM63).

On the 10th there was only one contact, DJ2TX (JO33) worked on 2m tropo – IO92 was once again on the edge of the propagation. The 11th was a real mixed bag that proved that the one thing worse than being too far from the Es cloud is being too close to it. Beacon CS5BLA was putting in a good Es signal on 6m, but didn't last even until breakfast. On 4m he had an MS QSO with OK7GU (JN69) using FSK441 but it was late afternoon before Es came back, when CT1HZE and CT1FFU were both worked on 4m with huge signals using just 8W his end.

By evening time, conditions had intensified and also come too close to IO92 to work much, but he did grab a few QSOs on 6m, including two new squares CT2FYQ (IM68) worked on JT65A and YL3IQ (KO17) in SSB. Others on 6m included S52NR (JN75), YT5LAS (JN94) and 9A5CY (JN85). Mike rounded off the day with a 2m MS FSK441 QSO with DK3XT (JN49). A couple of new squares on 6m worked using JT65A mode: OK2JNB (JN89) and LA5TFA (JP99). The 13th and 14th didn't come to much with EA6BB (JM19) on 6m CW, CW to S51DI (JN76) and HA5HK (JN97) and SSB to 9A6R (JN83), OM3BD (JN88*) and on 6m SB6A (JO57) for a new square.

NEWCOMER TO VHF. Although Martin, G5FM (IO81) has been licensed since 1978, he's a newcomer to VHF and a new rig has given him the chance to try 6m. Successfully loading up one of his HF dipoles allowed him to copy his local 6m repeater without any problem. For the first week at least, not much was copied but, on 16 June, 6m burst into life with the band full of stations. Wall to wall signals from all over Europe at excellent strength and Martin couldn't believe what he was hearing. In quick succession, Croatia, Slovenia, Italy, Corsica; Sardinia; Austria were all in the log with everything being a new country or locator square. Trying out CW as well as SSB brought more QSOs that were classic Sporadic-E events.

ACTIVE ON 144MHz. Steve, G4TRA (IO81) reports a very active 144MHz period working OJ0B (JP90) for a new DXCC. He added a further 19 new squares to his QRA total, one on SSB F1AZJ (JN28) and the rest were via meteor scatter including OZ/DJ60L (JN47), LA60J (JO38), EB1DNK (IN61), OE2LCM (JN67), IV3RKD (JN66), IC8FAX (JN70), EA5RM (IM98), LY2SA (KO14), LY/DL1RNW (KO23), IZ8BXM (JN71), EU3AI (KO22), YO50CZ (KN17), UR5BFX (KN29), YL2GD (KO37) and OH6AYA (KP22).

Contacts worthy of mention are F5BOF (JN33) who was trying his very first MS QSO, CS7AEL (IM69) also trying meteor scatter for the first time, just using a single four element Yagi with 50W and only one breaking the 2000km; IK7EZN (JN90) at 2008km. June brings to a close Steve's first 12 months on 2m from his QTH. In the first three months, a 9-ele antenna and 160W were used upgraded to an 11-ele LNA, plus 400W to expand the locator and DXCC total. The current total is 250 squares and 41 DXCC worked, which is no record but lots of fun and shows what you can do with average equipment and modern digital formats on this exciting band.

MIXED MODE OPERATING. Dave, G4IDR (IO93) enjoys a real mixture of operating modes at his QTH. On 6m using a 6-ele homebrew LFA he worked some reasonable Sporadic-E across Europe but A45XR at 5972km is Dave's best DX of the year so far on the band.

Switching to 2m, this time with an 11-ele LFA antenna, stations worked included GS3PYE/P and OJ0B (Market Reef). With an improved 2m EME setup Dave took advantage of 5 to 6dB of ground gain working VP8DQE (Falkland Islands), OK1CU, EA2AGZ, RK3FG, I2FAK, 7Q7EME (2 Yagi station), EI4DQ and PA0JMV. Rare stations also worked via EME were KB7Q (Wyoming), C6ANS (Bahamas) (which took 4 days of chasing) and topped off with OJ0B. Many of the stations worked were two-Yagi antenna stations compared to Dave's single Yagi.

FIRST QSO ON 4m. Lyn, GW8JLY (IO81) reports that since a renewal of kit in the shack with 4m now available, a first QSO was made with CT1HZE in IM57NH. CT1FFU (IM59) soon followed as did 9A2SB (JN95GM), DG3YEV (JN68NL), S51ZO (JN86DR), S50B (JN75XU) and S57A (JN65TW).

On 14 June, Lyn worked S50B (JN65UM) and 9H1BT (JM75EU). With just a 2-ele HB9CV at 15ft AGL, breaking pile ups isn't easy, however patience produced excellent results. On the 16th, Lyn worked SV6KRV (KM09) and IW9HII (JM67) for 2 new locators. The QSO with SV6KRV was only his 2nd QSO with SV on 2m in 41 years.

On the 18th, Lyn completed QSOs with IC8AJU (JN70CN), IZ8WGU (JM88AQ), I8KPV (JN70KO), I5TWK/8 (JN70FS) and IZ7FLS (JN81EB). Other new locators worked via meteor scatter were EB1DNK (IN62CI), EU3AI (KO22CE) and, on the 6th, LY/DL1RNW (KO23DX). On the 10th Market Reef (OJ0B) also worked for a new DXCC.

EME HIGHLIGHTS. Using EME, the highlights for John, G4SWX (JO02) have to be C6ANS FL15 on 9 June and OJ0B JP90 on the 10th, these were both new DXCCs. Both had large pile ups and it took almost two hours each time to get through. RN6MA (LN06) was a new one and with only 100W and 2 x 14-ele. OZ1HNE and IK1FJI were worked on CW EME on the 13th.

On 2m meteor scatter there were quite a few new ones, EU3AI (KO22) on 29 May, LY/DL1RNW (KO23) on 6 June, OJ0B (JP90) on the 10th. The best of the lot was TF3ML/P (HP93) on the 18th, which produced real fireworks of 3 or 4 bursts each period with many 10-12dB. Needless to say this was a very fast QSO.

Sporadic-E occurred on 9 and 18 June but only 3 stations were worked. Further Es QSOs included SV6KRW (KM09), CT1HZE (IM57) and IT9CJC in JM76. The openings have not been particularly good, or frequent this year, an opinion echoed by many operators. There was some fair Baltic tropo on the evening of 10th with SP1JNY coming through well.

SIGN OFF. Thanks to the many reports sent in this month and from new contributors as well. More DX means more reports and certainly receiving new users to VHF is very welcome. Thanks again, 73.

WEBSEARCH

[1] www.mmmonvhf.de/

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GHz Bands

Beginners & experts

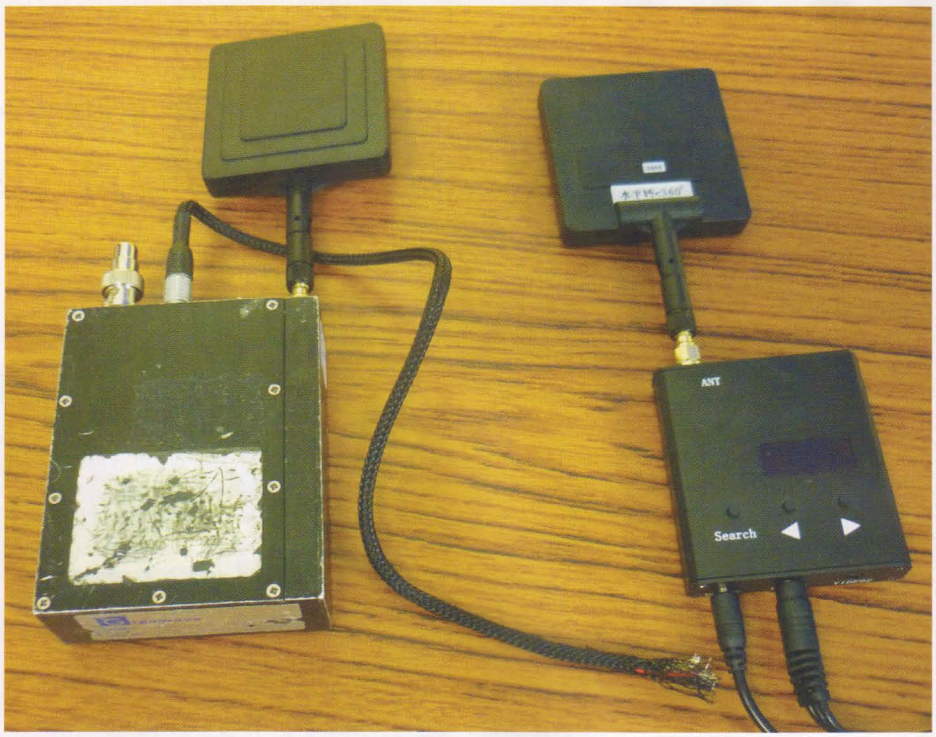

PHOTO 1: 5.7GHz Tx and Rx units used by G8DTF.

GETTING BEGINNERS ON TO THE GHz BANDS. There has been much discussion recently within the UK Microwave Group Committee as to the best way to attract beginners to the GHz bands and make better use of the huge amount of spectrum to which we have access. The first question I asked was, "what is a beginner? Is it someone with a Foundation licence? Is it an experienced VHF DX operator who is looking for a new challenge? Is it a frustrated HF/VHF operator who's got a noisy site and a small backyard and can't compete with the big guns?" The answer is all three, and each needs a slightly different approach. For me, the attraction was to be able to put up a 'competitive' system with antennas that, to the untrained eye, look little different from domestic TV antennas. This is the real USP (unique selling point) for the GHz bands. Even with a QRO 1.3GHz station and a high gain antenna you are unlikely to suffer from, or cause interference to, domestic equipment and upset your neighbours, so that's a real plus. OK, activity is lower than on HF but each QSO above 1GHz is a challenge and as much fun can be had chasing squares as chasing DXpeditions. The homebrew and system engineering aspects of the GHz bands is the real challenge. Systems can be really optimised and construction has to be so much more precise, but once you master simple PCB manufacture and the fundamentals of receiver and antenna performance you are up and running. Gone are the days when the GHz bands were 'plumbing'; I was taken aback at a radio club recently when I was asked "where are all the waveguides in your microwave equipment?" My response was, "in the same dustbin as the valves". I was also offered vintage microwave parts that I politely declined, feeling a little like a 16 year old who'd just been offered a cassette Walkman by his uncle! Microwavers have moved on and we need to tell a few more people! I'd love feedback from beginners and would welcome ideas and offers of help from existing microwavers to educate and attract more amateurs in to our part of the hobby.

5.7GHz AS A 'STARTER' BAND. Correspondence with Chris, GW4DGU raised the following interesting suggestion. "If we look back at the history of amateur microwaving in the UK, much of the past activity has followed the availability of cheap surplus kit. Things like klystrons in the fifties and sixties and later, in the '70s and '80s, Gunn Doppler modules. All of these tended to drive people to 10GHz. I wonder whether current technology shouldn't be driving us a bit more positively towards 5.7GHz? The availability of 5GHz Wi-Fi and video senders has generated not only a resource of complete units, but a large number of easily accessible components at 'consumer' prices. That's certainly not the case at 10GHz, where most available components are still aimed at professional users." Chris is right, many video senders and receivers can be 'repurposed' to transmit and receive in the 5.7GHz amateur band and there are inexpensive PA units around on the surplus market. Patch feeds and satellite TV dishes make good antennas for these units. UKuG Chairman Bob, G8DTF brought some of these 'starter' bits to the Harwell (Formerly RAL) Microwave Round Table in June (**Photo 1**). The transmitter on the left is surplus from Vislink [1] branded 'Gigawave' and is a 5.7GHz 600mW video transmitter meant for attachment to a portable news gathering camera. The receiver is unbranded, but maybe someone will recognise it from the photo. The antennas are simple Wi-Fi patch antennas. I understand that these units turned up on a surplus stand at the Martlesham Round Table this year. Perhaps the supplier would like to contact me if he has any more? I'm

TABLE 1: Effect of coax cable type on system performance – antenna pointed at 170K horizon.

Coax type shack to preamp	Coax type preamp to antenna	Rx noise figure	System NF (dB)	System sensitivity (dBm)	Total Tx loss (dB)	Power at antenna
RG213	RG213	1.14	2.84	-153.5	5.7	9.4W
RG213	LDF2-50	0.85	2.65	-154.0	5.4	10W
LDF2-50	RG213	1.1	2.82	-153.6	2.78	18.5W
LDF2-50	LDF2-50	0.81	2.62	-154	2.52	19.6W

TABLE 2: Effect of coax cable type on system performance – antenna pointed at cold sky.

Coax type shack to preamp	Coax type preamp to antenna	Rx noise figure	System NF (dB)	System sensitivity (dBm)	Total Tx loss (dB)	Power at antenna
RG213	RG213	1.14	1.38	-157.5	5.7	9.4W
RG213	LDF2-50	0.85	1.1	-158.6	5.4	10W
LDF2-50	RG213	1.1	1.34	-157.6	2.78	18.5W
LDF2-50	LDF2-50	0.81	1.06	-158.8	2.52	19.6W

hoping Bob will publish more details and availability of the units in due course. An article is planned for *Scatterpoint* [2] soon.

MASTHEAD PREAMPS, COAX AND SYSTEM SENSITIVITY. Here is a simple case study to highlight the effect of feeder cable performance on the GHz bands, by comparing lossy RG-213 to 3/8 inch LDF 2-50 Heliax cable in a typical 1.3GHz installation. Such a system might be a multiband transceiver with a noise figure of 5dB, a 35W PA in the shack, a masthead preamp (LNA) with a gain of 27dB and a noise figure of 0.35dB. Coax relay and connector losses might amount to 0.25dB. Shack to preamp cable length is 15m, preamp to antenna is 1.5m Calculations are all made using the VK3UM *EMEcalc* program [3] assuming a horizon noise temperature of 170K and 120Hz Rx bandwidth.

The effect on RF power and receiver sensitivity for different combinations of RG213 and LDF2-50 are shown in **Table 1**.

We have always been told that *the loss between the antenna and the preamp* is the critical factor in system performance, but the example in Table 1 seems to shows that there is little to be gained (on receiver performance at least) by changing to low loss coax! Even though we get a comforting improvement in the overall receiver noise figure of 0.31dB, best to worst *sensitivity* varies by only half a dB. What? Those calculations have to be wrong? No, the key here is the horizon temperature of 170K. Without elevation, your antenna is 'looking at' some combination of 'cold' sky at around 10K and ground, trees and houses at 290K. Doing the same calculations with your antenna elevated and looking just at cold sky at 10K you see a very different result, shown in **Table 2**.

Here, taking best to worst figures, we see better sensitivity and an improvement of 1.3dB in sensitivity for the same change of cables and receiver noise figure. The noise the antenna sees is the limiting factor on sensitivity. Finally, removing the masthead preamp completely, your receiver noise figure and sensitivity are MUCH worse, and the difference between RG213 and LDF250 is as per **Table 3**.

So the moral is, do the sums. Use a masthead preamp, but, unless you're doing satellites or EME, don't get too hung up on the effects of coax loss on your receiver performance!

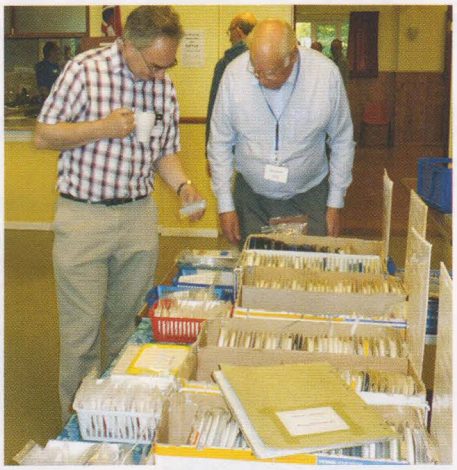

PHOTO 2: The UKuG Chipbank at the Harwell Round table. (Photo: G6JYB).

RAIN SCATTER DX. Right on cue, after writing my introduction to rain scatter last month, in June we were presented with some excellent GHz bands rain scatter conditions. On the 5th many near-continent 10GHz beacons were receivable here including PE9GHZ and PI7RTD. I had CW QSOs with F6DKW and F5DQK both in JN18, SSB with PA0BAT at 59+ in JO31, ON4IY in JO20, F1NPX/P in JN19 and my ODX was DF6IY at 59+ at 689km in JN48. I 'lost' the rain over the horizon by around teatime, but John, G3XDY who is 80km further East than me and with a clear takeoff over the North Sea came on later. He reports extensive scatter points from SE to NE and direct beam headings worked for most QSOs. John spent most time on 10GHz, only moving to the lower bands to make tests with a couple of German stations late in the event. He started at about 1545UTC with DF6IY in JN48EU, a new square with signals peaking 57s. He then returned a couple of hours later and worked DK7QX (JO42), DJ2QZ/P (JO31), DL5EAG (JO31), DH1VY/P (JN39), DL3IAS (JN49) and DL7QY (JN59) over the period to 2040UTC. John also found good beacon signals from PI7ALK (JO22), PE9GHZ (JO11), ON0GHZ (JO20), LX1DB (JN39), F5ZTR (JN19), DB0GHZ (JO34). Tests with OZ7Z failed despite good signals from the DB0GHZ beacon. On 5.7GHz John heard beacons F6DWG (JN19) and HB9G (JN36) and late in the event, tried with DL7QY without success but did work DL3IAS (JN49) on 3.4GHz, signals were stronger from DL3IAS than on 5.7GHz, and also included brief 'pings' from lightning scatter. It's possible that the predominant mode was aircraft scatter rather than rain scatter for this contact. DL7QY heard G3XDY briefly but they could not complete a 2 way contact. It seems that UK stations West of the Meridian were too far away to get in to the scatter points, Neil, G4BRK (IO91hp) listened on 9/13cm but didn't hear anything and Mike, G0MJW (IO91io) got home from work too late to catch it anyway! The following week, on the 12th and 13th, we had repeat openings when I again worked PA0BAT at 59S and had a backscatter QSO with G3RGK (IO91ON), who is south-west of me and screened by the Chilterns. Dave heard me calling CQ to the south-east towards a scatterpoint in JO11 square (off the coast from Ostend) and we exchanged 53S/57S reports on CW with Dave running just 300mW! We managed to exchange reports on SSB as well but spreading was quite severe due to the backscatter.

BEACON NEWS. In June, Brian, G4NNS visited the GB3MCB site near St Austell in Cornwall and re-tuned the OCXO to put the beacon back onto its correct frequency of 10368.980MHz. Brian notes that being just an OCXO with a "cheap and cheerful" crystal it'll probably keep moving! Over 5 years or so it had moved down 160kHz to 10368.964MHz. Reports will be much appreciated via beaconspot.eu [4]. Disappointing news is that the GB3CLE Clee Hill 1.3GHz beacon is now QRT and, at the request of the keeper, the NoV has been withdrawn by Ofcom. I'm not sure of the full circumstances, but it leaves a gap in the 1.3GHz beacon coverage and that we won't be able to fill in a hurry – just like the three other 1.3GHz beacon applications that are 'stuck in the system' at present [5].

RAL ROUND TABLE AT NEW VENUE. I attended the Harwell Radio Club's annual GHz bands Round Table at its new venue, Hagbourne Village hall near Didcot. It was well attended with a wide range of entertaining talks, plus noise figure measurement and network analysis available. The UK Microwave group's Chipbank, the members' free component service, was in attendance again, and you can see from **Photo 2** just how well stocked it is these days. The photo shows John, G3XDY (right) discussing component choices with the Chipbank custodian Mike, G3LYP. Thanks to G8CUL, G0MJW, G8NVI and their team for organising it.

Please keep reports coming in to me via email, or join the conversation on Twitter @g4bao hashtag #GHz_Bands.

TABLE 3: Sensitivity comparison without a masthead preamp.

Coax type shack to antenna	Rx noise figure	System NF (dB)	System sensitivity (dBm)
RG213	13.05	13.4	-139.9
LDF2-50	7.29	9.9	-143.8

WEBSEARCH

[1] Vislink (Gigawave) – www.vislink.com
[2] *Scatterpoint* – www.microwavers.org/scatterpoint.htm
[3] *EME calc* – www.vk3um.com/eme%20calculator.html
[4] Beaconspot – www.beaconspot.eu
[5] 1.3GHz beacon applications – www.ukrepeater.net/vetting_beacons.php

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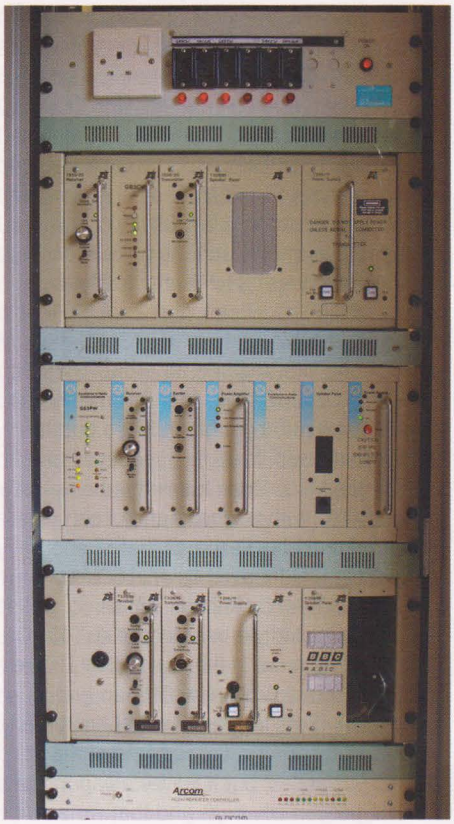
The GB3ZW 6m repeater

The highs and lows of getting a 6m repeater on the air



The three repeaters – GB3CW, GB3PW and GB3ZW – in their rack.

Photo 1

Photo 2

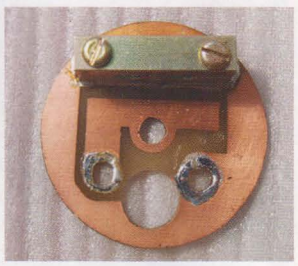


Photo 3

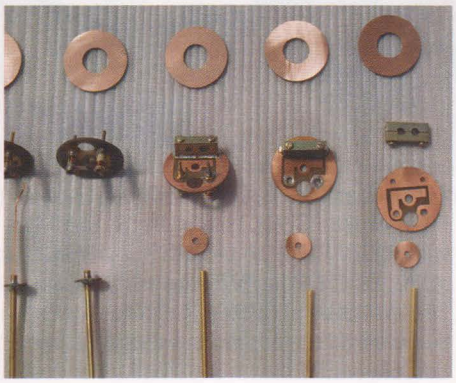


Photo 4

MAKING A START. At the 2011 AGM of Powys ARC, it was agreed to install a 6m repeater co-sited with GB3CW/GB3PW at a private radio site, Bryn Gwyn, 10km SW of Newtown, Powys. GB3CW and GB3PW have been operating from this site for 32 and 29 years respectively. It has taken much effort by many radio amateurs to achieve a final, working installation. This article details not only the trials and tribulations of the project but it is also intended to be an aspiration to other groups showing that with a concentrated, focussed effort, it is possible...

THE TECHNICAL EQUIPMENT. With there being no equivalent regular commercial repeaters on 6m, this could have meant a lot of work in converting a low-band repeater. However, the group had their first stroke of luck when, in 2012, Evan, GW7UNV spotted on eBay, a commercial repeater for sale that appeared to meet our requirements.

After meeting the seller, Adam, G1MAW, at the September Telford Hamfest, a deal was done. It turned out to be an ex-BBC Band 1 in-band, talk-back unit, a Tait T335 already converted by KW Electronics. Being crystal controlled it would be a fairly simple job to put it on the correct frequency. Having procured that important piece of hardware, the next step was to apply for the licence.

To satisfy the limited loading constraints on the guyed mast, single antenna working was the order of the day. A search was made for a suitable unit that would likely be a J Beam. On enquiring with the new company, Amphenol J-Beam, we were told that they no longer catered for that frequency range. It was suggested that Vine Antennas be tried for a 'one-off' and that turned out to be the answer. The group are grateful to Ron Stone, GW3YDX for building and supplying a Vinecom™ single folded dipole.

The duplexer was based on the design of KF6YB [1]. This design is well-proven but it was found that the biggest problem was to locate six suitable offcuts, each of diameter 1.625" and at least 2m long, of foam-filled Andrew Heliax™ or RFS Cellflex™ feeder. It seems that surplus offcuts are now carefully recycled as the scrap price of copper has been appreciating and as such none were to be found in the UK. Despite many phone calls and e-mails it appeared as if all possibilities and avenues had been exhausted.

There now came a second stroke of luck when, thankfully, out of the blue came an e-mail from Dave, G4OYX with the promise of the exact offcuts required that would become available during April 2013, and they were only some 30 miles away! Thanks to Muff Murfin, the MD of Sunshine Radio in Ludlow, from having zero coax we ended up with more than 35 metres at no cost! Muff had engaged Dave, G4OYX to project engineer their new 1kW ERP 105.9MHz FM installation at the Babcock HF site at Woofferton and only 214m of feeder had been required from a procurement of 250m.

THE DUPLEXER BUILD. This part of the project fell to Dave, GW8GLO who had offered to build the tuned cavity filters and, after consulting the KF6YB information, he decided that six filters would be sufficient to give the required isolation, using three on receive and three on transmit. One added benefit of the ex-BBC repeater was that it came with a circulator that promised to give some extra isolation.

MAKING THE FILTERS. The offcuts were cut to length using the calculator on the KF6YB website. For the transmitter leg on 50.81MHz this gave 94.87cm and for the receive leg on 51.830MHz it gave 102.23cm. It was noted that these lengths were considerably shorter than if air-dielectric coax had been used.

The first job was to remove a precise, circular cross-section of the foam insulation, **Photo 1**, to allow for the fitting of the tuning inductors and capacitors. These components were mounted on custom-made printed circuit boards.

The next job was to flatten the corrugations to allow the PCB to fit easily, **Photo 2**. The PCB was fabricated as shown in **Photo 3**; note that the components are built within the coaxial cable, which considerably aids electronic, thermal and mechanical stability.

The components to tune the filter were as shown in **Photo 4** and absolute dimensions

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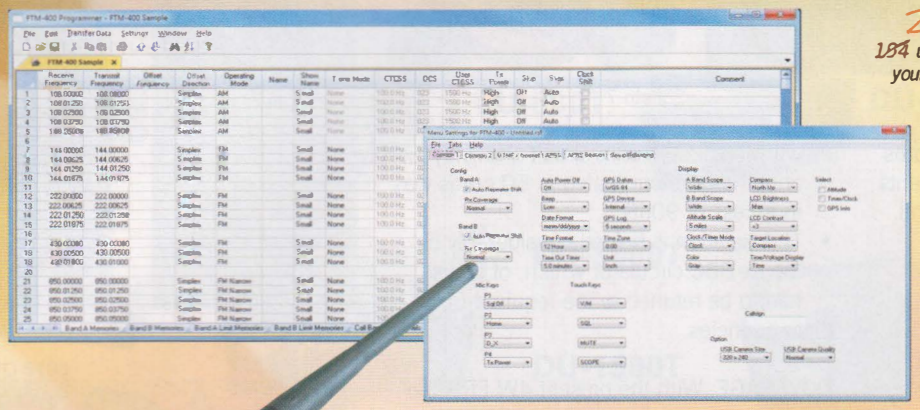

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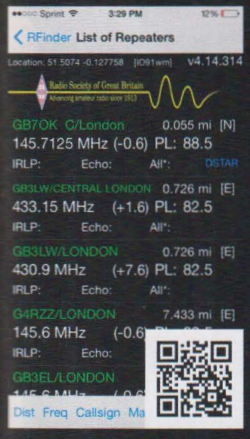

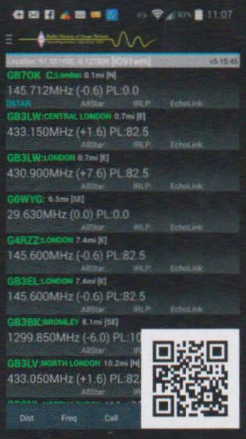

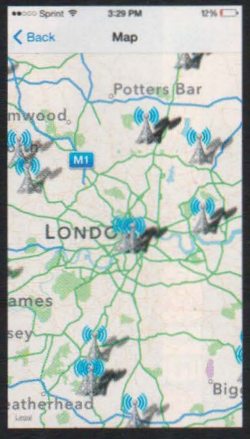

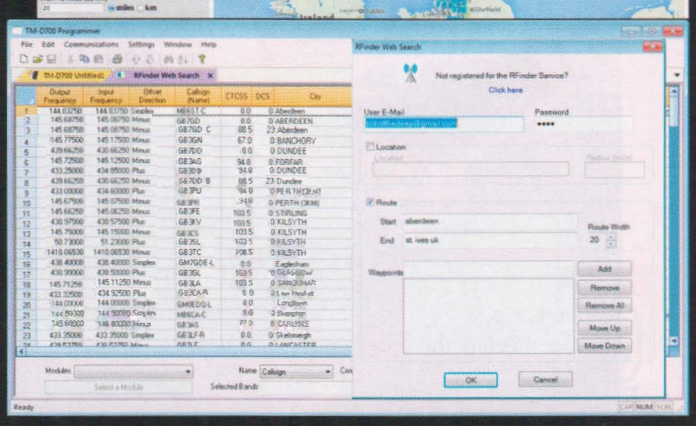

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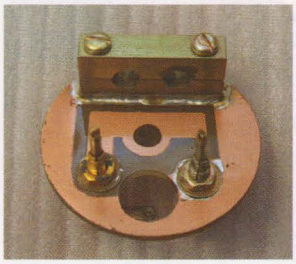

Photo 5

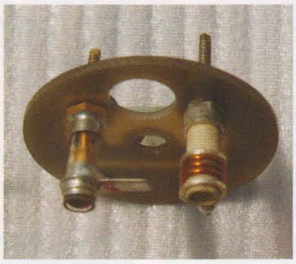

Photo 6

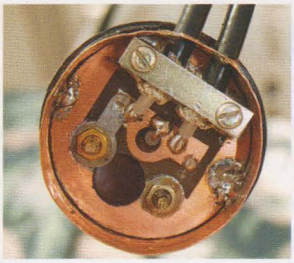

Photo 7

Photo 8

Photo 9

were specific to the RFS coax used. **Photos 5**, **6** and **7** show the singular arrangements and finally the completed termination end. The finished filter is in **Photo 8**.

To further ensure mechanical and thermal stability, Dave came up with a brilliant idea – why not fit them on the rear door of the cabinet? This is illustrated in **Photo 9** with **Photo 10** showing a close-up of the circulator.

This was now adding up to quite a weighty unit so it became necessary to transport them to the site on a roof rack courtesy of Hugh, MODSZ; though unloading was interesting! These 'action shots' are shown in **Photos 11** and **12**.

Finally, the door with filters were installed on the rear of the cabinet that houses the three repeaters. Note that the filters are flexibly held in fabricated wooden brackets with bungee rope to allow for any movement caused by varying temperatures. The Group are grateful to Andy, MW0DDE for manufacturing these. Above the 6m filters is space for the future 2m filters (see later).

SPECIFICATIONS AND RF MEASUREMENTS.

The final specifications turned out to be quite satisfactory as illustrated by the following results:

- Transmitter to antenna loss 3.5dB
- Antenna to receiver loss 4.0dB
- Transmitter notch to antenna at receive frequency (51.83MHz) -75dB Receiver notch at transmit frequency (50.81MHz) -75dB
- The rejection between Tx and Rx ports with the circulator in circuit and with the antenna port terminated in 50 ohms was in excess of 90dB
- The isolation is helped considerably by the ex-BBC circulator which, of course, had to be retuned to the required 6m frequencies.

COVERAGE.

With the present 4W ERP, the 6m service area has broadly matched the prediction map from the ETCC. It is hoped that the addition of a power amplifier to the service will fill in the voids within the primary coverage. The Group are actively searching for a suitable PA.

NEXT STEPS.

The Group still has some surplus coax and Dave, GW8GLO has now made a set of filters for the 2m GB3PW repeater that has allowed single aerial working. The Group still has more surplus coax if anyone else is interested going down a similar route.

ROLL OF HONOUR.

The author is grateful to the following and apologises if any persons have been missed. Evan, GW7UNV for the initial effort in locating the repeater unit. Dave, GW8GLO for adapting the KF6YB duplexer design and for manufacturing and tuning the filters. Dave, G4OYX for sourcing the coax and editing the manuscript for this article. Muff Murfin, MD of Sunshine Radio, Ludlow for his generous donation of the surplus feeder. Ron, GW3YDX for designing and manufacturing the Vinecom™ antenna. Terry, GW0EZY for installing the antennal and providing transport. Hugh, MODSZ for transport and building maintenance. Andy, MW0DDE for manufacturing the brackets so they could be mounted on the rear door of the cabinet. Members of the Powys Amateur Radio Club for financing the project. The RSGB/ETCC/Ofcom for clearance of the application and subsequent licence. Alan England, the PMR site owner for TFL Group, Neyland, for allowing the three amateur repeaters to be installed at the Bryn Gwyn site.

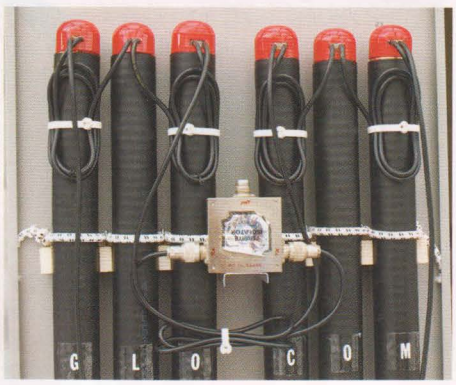

Photo 10

WEBSEARCH

[1] www.qsl.net/kf6yb/newplexer.html

Photo 11

Photo 12

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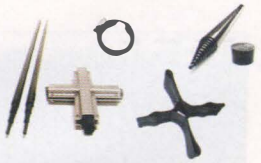

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Data

Latest news on datamodes from beacons

PI4 BEACON MODE. Not 0.7854 or 45 degrees, but the new datamode that is rapidly gaining in popularity for beacons. Over the last decade a number of VHF through to microwave beacons have been upgraded with high stability locked sources. Several of their operators have taken the opportunity to include a data mode as part of the transmission. Offering opportunities for reception and decoding at signal levels several dB lower than would be possible by ear, unattended or automatic detection and logging also becomes a possibility. The first beacon to adopt machine generated modes (MGM) was GB3VHF on 144.430MHz in Kent, soon followed by the suite of microwave beacons forming the Bell Hill complex in Dorset on the 2.3 to 24GHz bands [1]. These carry mostly the wider spaced JT4G modulation although GB3SCF on 3.4GHz uses JT65C. All the WSJT modes work with a two minute cycle, about 50 seconds of transmission starting on the even numbered minute followed by CW and a period of plain carrier. This two minute cycle has proved a bit annoying for some. Those who want a period of plain carrier for frequency calibration, for anyone who just wants to listen to the Morse, and even the interminable wait watching the screen for the MGM to decode.

Bo, OZ2M a leading light in the OZ7IGY project, one of the oldest amateur beacons around, took a look at the use of MGM on beacons and concluded that by modifying the transmission cycle and modulation slightly, an improved one minute cycle of carrier, CW and MGM could be achieved [2]. The result is PI4.

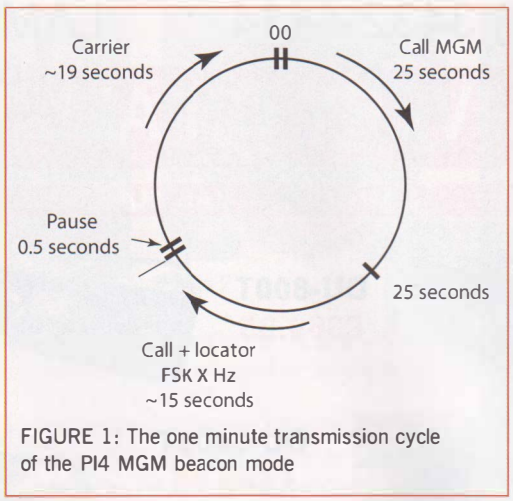

FIGURE 1: The one minute transmission cycle of the PI4 MGM beacon mode

In concept this is very similar to JT4G but with a slightly faster symbol rate (6Hz instead of 4.375Hz) and a shorter message carrying just the callsign of up to 8 characters, completing in 25 seconds. This still gives time for a CW message and 20 seconds of plain carrier in the one minute cycle. **Figure 1** shows the transmission cycle of a typical PI4 beacon.

In terms of raw weak signal performance the 6Hz of PI4 versus the 4.4Hz S/N bandwidth of WSJT perhaps means about 1dB less S/N sensitivity, but this is offset by the shorter message structure that permits more use of short lived transient paths like aircraft scatter and random reflections. Otherwise the error correction and decoding capabilities are near enough identical to JT4.

The first beacon to carry PI4 in the UK was GB3MHZ on 10GHz and the modifications to this were described by G4DDK in June's GHz column.

RECEIVING PI4. Although very similar in error correction coding and structure to JT4, PI4 has little else in common with WSJT and requires different software to receive it. Dedicated PI4 decoding and monitoring software has been developed by the OZ group, and a dedicated package can be downloaded by following the Software link from [2]. The *PI-Rx* program doesn't just decode the message, it has been designed as a complete beacon monitoring tool so in addition it also measures the S/N of the carrier period provided the carrier is correctly placed in relation to the tones. The user screen is shown in **Figure 2**. Other information shown relates to the quality of the received signal. For short burst type signals, the Q value provides a percentage of correct symbols that were received. A full decode of the message is usually possible with about 50% of the symbols – this is the same as for the WSJT modes and WSPR. Both JT4 and WSPR use very nearly identical error correction coding to PI4.

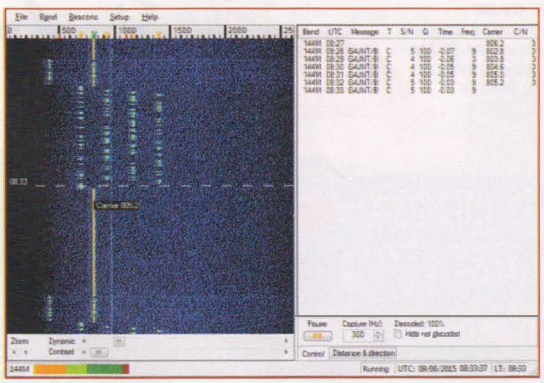

FIGURE 2: PI-Rx PI4 decoding and beacon monitoring software for a correctly tuned signal with the 'approved' tone spacings. The continuous line at approximately 970Hz is a locally generated spur.

THE NUMBERS. Everything in PI4 is based on the 12kHz sampling rate of all the latest soundcards. The symbol rate is exactly 6Hz, or 12000/2000. The decoder works around an FFT bin size of 12000/2048 = 5.859Hz so, unlike WSJT, the tones are not perfectly orthogonal. In a true orthogonal multi frequency FSK schemes, keying sidebands are arranged so their nulls sit exactly on top of the other tones, minimising intersymbol interference. This is guaranteed by ensuring there is an exact relationship between symbol rate and tone spacing. However, this is only important where the keying sidebands and spacing overlap. Such is the case in JT4A/B, JT65A/B and WSPR. But with the tone spacing for PI4 being 40 times the symbol rate, at 234.4Hz, orthogonality becomes irrelevant. The tone spacing in PI4 results in overall span for the MGM tones of a little over 700Hz.

Unlike all the various WSJT implementations on beacons, the position of the carrier and the space tone for FSK CW keying has been written into the PI4 specification. The carrier rests at tone 0.5, ie between tones 0 and 1, and the decoder will then be optimally tuned when this delivers a tone of 800Hz. CW FSK space (or 'key up') frequency is 400Hz lower, resulting in a total frequency span of just under 1kHz. The correct tone distribution for a (very nearly) correctly tuned signal is shown in Figure 2. Of course, builders aren't obliged to adopt the same relationship for carrier and CW space frequency, and in fact the PI-Rx software can accept several carrier tone locations where it will identify and measure its S/N properly.

OPERA AND SMALL PERSONAL BEACONS. This On-Off beacon mode continues in popularity, with its own dedicated Yahoo group. A number of users have established small personal beacons on 50 and latterly 70MHz, using Si5351 based exciter and transmitter hardware. As mentioned in this month's Design Notes, this synthesiser chip can produce nasty wideband switching transients when used for MFSK generation. Using it with *Opera* is fine as the frequency is never changed. But some users are also setting them up for WSPR transmission, where transients *do* appear, are very noticeable and have been reported. So please take care when building or using frequency sources that use this chip in personal beacons. Be especially careful when using it to drive high power amplifiers – you could cause other people a lot of problems!

WEBSEARCH

[1] Bell Hill beacons – www.scrbg.org
(also described in detail in the September 2006 *RadCom*)
[2] OZ2M Next Generation Beacon Project – http://rudius.net/oz2m/ngnb/index.htm

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Sport Radio

WSJT in the UKACs and more about 2Tone

THE SOUND OF SILENCE. From IO78TA, 40km North of Inverness, Clive O'Hennessy, GM4VVX wrote to tell me of his experiences in the UK Activity Contests (UKAC). Basically, it's a lost cause if he relies on SSB or CW, so Clive uses the WSJT suite of modes instead.

Starting on WSJT modes begins with a free download of the software from the WSJT website. Clive's tip is; "if using Windows 7, don't put the program straight on your C drive. I had a few problems trying to run it from this. A few comments on ON4KST soon put me right. Put the program in its own folder and you'll have no problems.

"Initial setup is quite easily followed with the User Manual, which is downloaded at the same time as the program. I set my mic gain to half, the PC sound card to half and got perfect operation. If a few trial runs prove that receivers cannot decode you, try backing off the mic gain. Because the WSJT transmission is very close to key down in terms of output, back off the rig and/or amplifier or things will quickly get very hot. My main driver on 144MHz is a very old TR-751E, running about 20W into a Linear Amp UK Discovery, which gives a nice 400W out for 20W in. The linear runs cool, but the TR-751E needs an extra fan on the back. With a 10-ele Yagi by Vine Antennas this setup has given me EME contacts with 283 operators (to date). The Rx is assisted with a SSB SP2000 masthead preamp." With no elevation control, Clive can only work EME at moonrise or moonset, although he can work the 'big boys' with the moon up to 30 degrees. The smallest stations he has worked via EME were running 200W with a single 12-ele, and 140W into a 4x9-ele. Many hundreds of QSOs via meteor scatter have been made using FSK441 on 2m.

On 50MHz Clive uses a Yaesu FT-897 set at 80W out and an extra fan on top. There is no amplifier or pre-amp. On 4m he uses the FT-897 plus a TH7OH transverter by SP2DMB and a Gemini power amp (no preamp).

"In the UKACs on all frequencies on which I operate – 2m, 4m and 6m – activity is *very* low in the area of the Scottish Highlands that is my QTH. On the day before the contests I resort to sending e-mails, to remind operators that there is a contest and to try to keep some sort of VHF activity in the far North. This can give me anything between two and twelve QSOs in an evening. Long hours of CQs and 'search and pounce' made me look to anything that can fill the hours of torture by white noise. I tried a few calls with WSJT modes via MS and was surprised that EU operators answered. Being cheeky I added the odd WSJT QSO to my contest entries in the UKAC. They were accepted and even commented on in the results.

Photo 1: GM4VVX beside his VHF antennas.

"The use of WSJT modes in a contest is not going to make a great difference to the scores, as it is very slow to complete a QSO. Sometimes up to an hour is required to exchange all the QSO info.

WSJT using JT6M is very good at making fringe tropo QSOs though. The musical tones of JT6M seem to cut through city hash, though even a quick solid copy contact will take a minimum of four minutes. This is much too slow to be of interest to serious and leading contesters, but for the likes of myself out in the sticks it gives a QSO eventually – plus you know somebody is actually listening for you. A normal CQ into an apparently dead band in a contest is extremely frustrating, as I cannot tell if my signal is being copied or buried in Southern QRM.

"I am now getting the odd request for a QSO via MS from Southern UK operators, who value a new locator multiplier against the time taken to get a QSO this way. A bit of a sore point to me is that WSJT modes are only allowed in the AX section.

"Because of contest inactivity locally I started to have a go at the Nordic Activity Contests, after I received an invitation to take part from the organisers. See http://www.vushf.dk/pages/contest/nac/nacopen.htm Last year I won the Overseas Section of the NACs on 6m and 4m. 2m in the NACs seems to be well supported in the Nordic area, so it's very hard to get someone to try a meteor scatter QSO." An interesting rule of the NACs is that 'You need just a single Nordic QSO to make an entry, then *all* QSOs count'.

"On 4m and 6m is looks as if the WSJT modes are preferred in the NACs, because I often get more requests for a meteor scatter QSO than I can cope with."

Photo 1 shows Clive's VHF antennas. The tower is a single section of a 60ft tower. He lives in a very windy site, so safety considerations mean keeping the antennas low. When there are gales the tower luffs over to lay on top of the gatepost, with the antennas resting on a trestle. The top antenna is a 4-ele for 50MHz by Sandpiper, the centre antenna is a long spaced 10-ele for 144MHz by Vine Antennas, and the bottom antenna is a 6-ele for 70MHz by Sandpiper.

2TONE – PART 2. More now on 2Tone RTTY software, by G3YYD. "Moving 30 years forward in time the *de facto* RTTY decoder was PC based using DSP principles, rather than analogue electronics. The one in almost universal use was MMTTY by JE3HHT. Its software interface integrated with N1MM contesting software, which I was using at the time. The design is essentially an updated version of the Irvin Hoff ST-6, which I knew to be sub-optimal. Back then I didn't have time to learn DSP and Windows programming techniques, but when I retired my major project would be to learn and implement DSP and Windows programming techniques.

"On retiring in 2008 I e-mailed my old friend Peter Martinez, G3PLX, who I helped develop AMTOR in 1978, along with various other systems. He gave me an entry into the arcane world of Windows sound card programming and made a small program for me to calculate the FIR parameters for a Raised Cosine filter. The first version of 2Tone decoder was a console window (DOS window), which I ran in parallel with MMTTY. Performance was good, even for this first version. I then acquired Petzold's book on Windows programming and produced a Windows version of 2Tone. This gave me a decided competitive advantage in RTTY contesting. I then adapted this version to interface to N1MM as if it was MMTTY, and added an AFSK transmit feature so I could use 2Tone without the need for MMTTY. In

RSGB HF Events

Date	Event	Times (UTC)	Mode(s)	Band(s)	Exchange
Aug 2	RoPoCo 2 *	0700-0830	CW	3.5	RST + full Postcode received
Aug 12	80m Club Sprint	1900-2000	CW	3.5	Both callsigns + SN + name
Aug 27	80m Club Sprint	1900-2000	SSB	3.5	Both callsigns + SN + name

RSGB VHF Events

Date	Event	Times (UTC)	Mode(s)	Band(s)	Exchange
Aug 1	144MHz Backpacker #4	1300-1700	All	144	RS(T) + SN + Locator + Postcode
Aug 1	144MHz Low Power +	1400-2000	All	144	RS(T) + SN + Locator + Postcode
Aug 2	432MHz Low Power +	0800-1200	All	432	RS(T) + SN + Locator + Postcode
Aug 4	144MHz UKAC	1900-2130	All	144	RS(T) + SN + Locator
Aug 11	432MHz UKAC	1900-2130	All	432	RS(T) + SN + Locator
Aug 18	1.3GHz UKAC	1900-2130	All	1.3G	RS(T) + SN + Locator
Aug 25	50MHz UKAC	1900-2130	All	50	RS(T) + SN + Locator
Aug 25	SHF UKAC ~	1900-2130	All	2.3-10G	RS(T) + SN + Locator

Best of the Rest Events

Date	Event	Times (UTC)	Mode(s)	Band(s)	Exchange (info)
Aug 8-9	WAE DX CW	0000-2359	CW	3.5-28	RST + SN (Eu works non-Eu only)
Aug 16	UKuG	0900-1700	All	24/47G	RS(T) + SN + Locator
Aug 30	UKuG	0600-1800	All	5.7/10G	RS(T) + SN + Locator
Aug 30	IRTS 2m Counties	1300-1500	SSB/FM	144	RS(T) + SN (EIs & GIs also give county)

* HF Championship event. + VHF Championship event. ~ Different bands at different times
For all the latest RSGB contest information and results, visit www.rsgbcc.org

the process I also added separate decoders that were optimised for different propagation conditions; frequency selective, flutter and spread.

"As regards 2Tone decoding internals, I will use analogue terminology to describe what is being done within the DSP, as this is more accessible for the majority of readers. Note that DSP calculations are orders of magnitude more accurate and precise than any analogue electronics could be and can implement systems that are impossible to implement using analogue electronic components.

"First, the received audio is split into two separate streams. One stream is multiplied (mixed) with the wanted tone frequency and the other with a 90 degree shifted version, producing I and Q outputs which are then individually low pass filtered by an equalised raised cosine filter. This filter, which has a bandwidth of baud rate/2, provides an ISI-free filter at the decision sampling point. The amplitude of the signal is then detected by $\sqrt{(I^2+Q^2)}$. This produces a detected signal with no audio ripple. The IQ receiver acts as a bandpass filter, with a bandwidth of baud rate Hz at -6dB and with the parameters used >-90dB at twice the baud rate.

"The slideback detector of the old analogue TU could only use information from the current instant in time and in the past, but with DSP it is also possible to look into the future, through the use of storage buffers. In determining the threshold value to be used, 2Tone looks at the past character, the current character and the next character. By doing this, combined with its Signal to Noise Ratio measurements, it calculates a very accurate threshold value for each of the tones.

"The amplitudes and thresholds of the two tones, along with their individual SNR, are square law combined to produce the final result, to determine whether a Mark or Space tone was sent. 2Tone also takes advantage of this delay and the asynchronous format of RTTY, by combining the start and stop bits over three character times. This combining preserves character synchronisation, so that character error rate is determined by errors in the five data bits that make up the 7.5 bits of a perfect RTTY character."

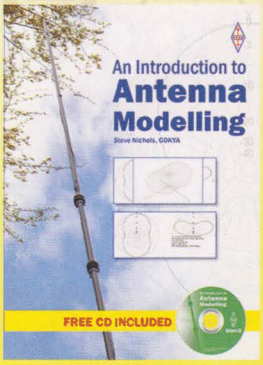
Next month, we will look at the transmit internals of 2Tone.

THIS MONTH'S EVENTS. The first RSGB HF contest of the month is RoPoCo 2 (CW), on the morning of Sunday 2nd. In your first QSO send a signal report and your full Postcode. In subsequent QSOs send a signal report and the Postcode you received in your previous QSO. Please note that the power limit is 100 watts for everyone (licence terms permitting!). QSOs with non-UK stations don't count and should not appear in your log. Depending on how a question in the Contest Committee's 2015 White Paper is answered, this might be the last time RoPoCo 2 is held in the morning. It might move to an evening slot, like RoPoCo 1 (SSB). The new series of 80m Club Sprints starts this month. Depending on how another question in the Contest Committee's 2015 White Paper is answered, this might be the final year of the 80m Club Sprints, which have been running since 2007 but never really gained momentum. The CW leg is on Wednesday 12th and SSB leg on Thursday 27th. There are 10-watt and 100-watt sections and – because this is a sprint – a reminder that if you call CQ/QRZ and made a QSO you must then vacate the frequency.

On VHF, the first weekend of August is dedicated to low power. The first contest to begin – at 1300UTC on Saturday 1st – is the fourth session of the 2m Backpacker series. It runs for four hours and the power limit is 3 watts or 10 watts, depending on which section you enter. One hour later the 2m Low Power Contest begins. It runs for six hours and the power limit is 25 watts. The 70cm Low Power Contest runs for four hours the following morning (Sunday 2nd). In both Low Power contests the multipliers are Countries, Postcodes and Locator squares. Then we move into the UKACs for the remainder of the month; 2m on Tuesday 4th, 70cm on Tuesday 11th, 23cm on Tuesday 18th, and 6m + SHF on Tuesday 25th.

The Worked All Europe (WAE) contest runs for the entire 48 hours of the weekend of 8-9th. Europe works non-Europe only in this contest, so there tends to be a lot of DX working. Next we have two UK Microwave Group (UKuG) events; 24/47GHz on Sunday 16th and 5.7/10GHz on Sunday 30th. Finally, the IRTS (Irish) 2m Counties Contest takes place for two hours on Sunday 30th.

The very best



An Introduction to Antenna Modelling

By Steve Nichols, G0KYA

For many years the only way for most radio amateurs to work out how well an antenna design would work was to build it and find out. The arrival of computer based antenna modelling programmes has changed this. This book looks at the Free MMANA-GAL antenna modelling program that will let you design and optimise a whole host of antennas, and all on your PC.

An Introduction to Antenna Modelling has been written by antenna guru Steve Nichols G0KYA and shows you step-by-step how to input antennas designs into MMANA-GAL, how to adapt designs you are given and how to optimise your designs for the best performance. By the time you have finished you should be able to model a whole host of antennas including dipoles, the G5RV, the W3DZZ trapped dipole, verticals, off-centre fed dipoles (OCFD), magnetic loop antennas and many more.

Building antennas can be hard work. You have to work out what you want to build, source the appropriate copper wire or tubing, measure everything carefully and spend hours putting it all together. But it needn't be like that *An Introduction to Antenna Modelling* provides an easy way to design and 'test' your antennas.

FREE CD

This book is enhanced by the inclusion of a CD containing the MMANA-GAL software.

Size 174x240mm 80 pages ISBN: 9781 9101 9300 6
Non Members' Price £9.99
RSGB Members' Price £8.49

RSGB Antenna File

The Radio Society of Great Britain (RSGB) has been promoting Antenna experimentation for 100 years and for most of this time publishing the work done in its monthly journal. *RadCom* has therefore developed a reputation for producing some of the best material on antennas published anywhere. This book is a compilation of some of the best articles about antennas that have been published by the RSGB in recent years.

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, the RSGB Antenna File contains dozens of 'how to' constructional articles, complemented by many features explaining how antennas work, facts about feed lines, antenna matching, earthing and much more besides. The doublet, Moxon and 'Super Moxon', cubical quad, 'low noise' and 'long' Yagis, log periodic, loaded dipole, horizontal loop, magnetic loop, delta loop and J-pole are just some of the antenna designs featured in this book.

The *RSGB Antenna File* reproduces the articles as originally published and is broken down into five logical sections. HF Antennas is the first, followed by VHF, UHF and Microwave Antennas.

There are nearly 120 antenna articles here crammed into 288 pages with information on antennas of all types which will be of interest to all antenna experimenters everywhere.

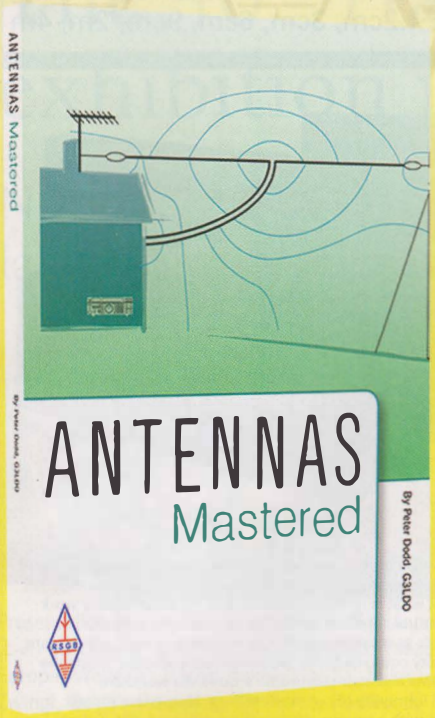
Size 210x297mm, 288pages,
ISBN: 9781 9050 8687 0
Non Members' Price £14.99
RSGB Members' Price £12.74

OTHER ANTENNA BOOKS YOU MAY LIKE

FROM P&P FREE

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.

Antenna books



Antennas Mastered

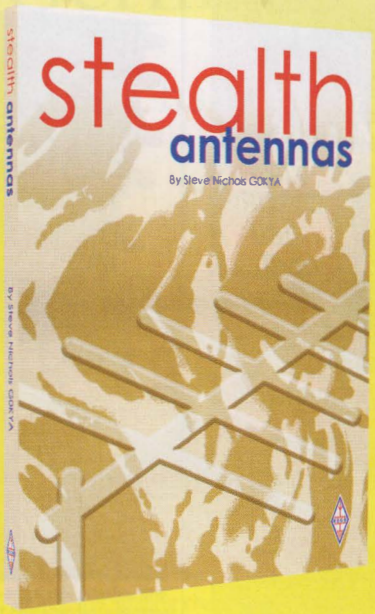
By Peter Dodd, G3LDO

Peter Dodd, G3LDO has long been acknowledged as one of the leading experts on antennas in the world. He has been the regular antenna columnist of the Radio Society of Great Britain's journal *RadCom*. This book brings together in a scrapbook format his work from this regular column.

Antennas Mastered is packed with everything imaginable connected with antennas. Readers will find practical solutions that cover all bands, antenna types, ATUs, Meters, Software and much besides. Peter set out the intention in writing the 'Antennas' column was as he stated "The main purpose of this column is to address problems readers may have installing and adjusting antennas from suburban sites that may be regarded as a challenge; although any antenna subject that is considered to be of interest to readers will be discussed or described". This has held true over the years and readers will be staggered by the breadth of material covered.

Peter Dodd, G3LDO has created in his 'Antennas' column one of the best archives of antenna material available and *Antennas Mastered* provides this for everyone.

Size 210x297mm, 288 pages,
ISBN: 9781 9101 9303 7
Non Members' Price £14.99
RSGB Members' Price £12.74



Steaith Antennas

By Steve Nichols, G0KYA

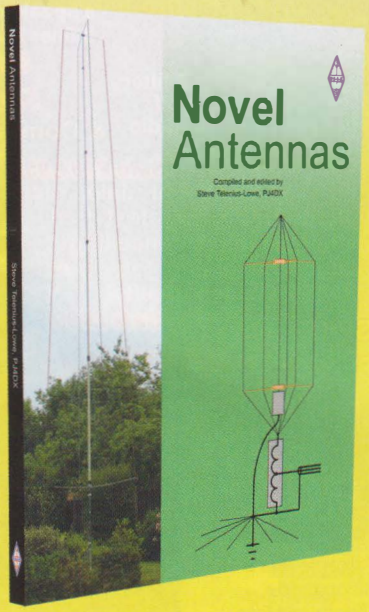
The first edition of *Stealth Antennas* quickly became the 'must have' antenna book for everyone who wasn't living in acres of land. This brand new second edition now provides even more for those with tiny postage stamp-size gardens, intolerant neighbours, or planning permission problems.

Many amateur radio operators are faced with the fear of interference being caused to televisions, telephones, and anything with a plug on it. In these circumstances a stealth antenna may be the solution to allow you to get on the air.

From using house rain gutters and drain pipes, or a magnetic loop in the loft, through to a tuned loop around the window frame *Stealth Antennas* provides a wide range of ingenious antenna solutions. Designs include magnetic loops, tuned wire loops, small verticals, zig-zag loaded dipoles and even reviews of a number of commercially-made stealth antennas. Along with new antenna reviews there are two completely new chapters.

Stealth Antennas continues to be the 'must have' antenna book for everyone.

Size 174x240mm, 224 pages
ISBN: 9781 9101 9305 1
Non Members' Price £14.99
RSGB Members' Price £12.74



Novel Antennas

Compiled and edited by
Steve Telenius-Lowe, PJ4DX

Radio Amateurs to one extent or another all experiment with antennas to get the best performance they can. But few have ever considered anything beyond the basic antenna designs - this book tries to set that right with a myriad of 'novel' antenna designs from around the world.

In this book, you will find the choke dipole; the 'Super Moxon', which adds a pair of directors to the standard Moxon Rectangle design; an orthoganally steered receive antenna that provides incredible levels of rejection of interfering signals; the home-made 'Wonder Whip' for QRP portable operation; a mobile antenna that can double as a car roof rack and, yes, the original Spiderbeam construction project described by its designer. Probably the most novel antenna in *Novel Antennas* is the 'PICaYAGI' by Peter Rhodes, G3XJP.

With material included from no less than 57 different authors it shows the ingenuity of radio amateurs around the world knows no bounds. With designs from numerous countries there will be something of interest to all antenna experimenters.

Size: 174x240, 192 pages,
ISBN: 9781 9101 9310 5
Non Members' Price £14.99
RSGB Members' Price £12.74

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

The 40th Ham Radio exhibition in Germany

New radio and ATV at Friedrichshafen, Europe's largest amateur radio show

The 'New Radio' concept – with an open applications layer on top of more flexible firmware and codecs – more info soon at www.newradio.eu.

Presentation of 'New Radio' on the OeVSV stand. (L-R) Mr Ogawa, Icom Inc, Paul Bigwood, Yaesu Europe, Wolfgang Bachschwelg, OeVSV, Mike Zwingl, OeVSV President, Mr Bürke, Kenwood, Europe, Steffen Schoeppe, DARC President, Christian Entsfellner, DARC Board and RTA Chairman.

The annual Friedrichshafen Ham Radio event marked its 40th birthday this year. The show took place from 26 to 28 June and saw over 17,000 enthusiasts visit. Three large exhibition halls were dedicated to the show along with areas for lectures, socialising and a large camping area. There were 197 exhibitors from 38 countries showing everything from antennas to radios and their accessories. One hall housed a combination of national amateur radio societies including a huge area for DARC, the host society, along with major manufacturers and vendors. The RSGB stand had steady interest throughout the show as books, subscriptions and IOTA mugs all proved popular. Two other halls housed a very substantial 'flea market' with an astonishing variety of surplus from over 330 different traders. A fourth hall was used for a parallel Makers Fair event. At Maker

Graham Sommerville, bhi at Friedrichshafen.

BATC stand, the smiling chap is Graham, G3VZV.

World, visitors were invited not only to be an audience but also to participate. The program of workshops invited young and old to try their hand at making with the 60 exhibitors who showed what is possible with a bit of inventiveness, some creativity and the drive to implement.

One highlight was the radioing freeclimber Emil Konstadinov, who hung from the hall roof and sent messages in Morse code!

There were names readers from the UK would recognise including bhi who had a stand showing their latest product, the compact in-line unit for eliminating noise. Paul Bigwood, G3WYW from Yaesu said, "The show went well and on Friday, we had more visitors than in recent years. Yaesu attend three major amateur radio shows: in Tokyo, in Dayton, and here in Friedrichshafen". Those interested in VHF and above will recognise the name Kuhne from adverts in *RadCom*, Jutta Kuhne said, "Coming to the Ham Radio was definitely worth it. Proximity to customers is important. Many visitors come and want to talk".

DIGITAL TECHNOLOGY. A notable theme this year was the advancement of digital technologies. Several new HF/VHF SDR-based developments were on show from FlexRadio, SunSDR and Hilberling. Major vendors such as Yaesu, Icom and Kenwood all had stands that prominently featured their latest offerings.

Significantly, looking further ahead, was the launch of the 'New Radio' initiative led by the Austrian and German national societies (OeVSV and DARC). This highlighted that amateur radio equipment needs to move further into the 21st century and towards 'smart' radios with adaptable voice flex codecs as well as a more open applications layer (and less need for a separate PC) – perhaps more akin to a smartphone. Whilst the outcome is not certain, discussions with major vendors have commenced and the outline requirements were part of a presentation to key representatives at the show.

Whilst this sounds aspirational, on display was also real hardware. The OeVSV stand featured ongoing developments to breakdown digital voice codec and network barriers between DMR, D-Star and C4FM. This is being followed closed by the Society's spectrum managers, given its potential for interoperability and spectrum efficiency.

Complementing the 'New Radio' initiative was a very attractive looking BATC stand (shared with the German AGAF society) showcasing new Digital ATV developments including the pioneering reduced bandwidth work on 146-147MHz. Whilst that band is UK-specific, the overall work has been influential in the growth of 437MHz DATV in European countries.

MEETINGS. Friedrichshafen is also the venue for IARU Region 1 to hold informal meetings outside its normal conference cycle. So with WRC-15 and EMC matters being topical, a special extended session was led by Region 1 President Don Beattie, G3BJ, and EMC Chair Thilo Kootze, DL9KCE, on frequency allocations and standardisation processes. One of the key messages from this was how all national societies could collaborate and interact with their regulators and acquire seats on key committees/delegations in order to influence positions/voting.

The VHF Microwave committee (C5) also met informally. Updates were given for the formal meetings/Conference due in 2016 and 2017. RSGB will be launching its consultation for the 2016 interim meeting in Vienna later this year which is significant as it will hold the first meeting of the new EMC Committee (C7).

DIARY DATE. The next Ham Radio will take place in Friedrichshafen from 24 to 26 June 2016 and will be accompanied by another Maker World on 25 and 26 June.

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 radcom@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: Fraser Road Radio Club, Region 9, Graham, G0NBI, 01234 832 700, 29 Oct, 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 September issue is 20 July and for October it's 24 August. For GB2RS, the deadline is 10am on the Thursday of the week of broadcast.

INTERNATIONAL

Pafos Radio Club, Cyprus
Richard, 5B4AJG, 00 357 97 857 891
5b4ajg@gmail.com www.cyhams.org
Apologies to those who have tried to contact Pafos Radio Club in recent months and discovered an incorrect e-mail.

NATIONAL

Amateur Radio Caravan and Camping Club
www.arcc.org.uk
Weekly net every Tuesday and Thursday 3.770 at 8pm. Meet this month at Copt Oak, Leics. Further details: membership@arcc.org.uk.

AMSAT-UK
http://amsat-uk.org/
Weekly net every Sunday 10am, 3.780MHz, sometimes QSY to 40m (~7.1) due to condx

British Amateur Radio Teledata Group
bartg@bartg.org.uk, www.bartg.org.uk
Membership is open to anyone interested in amateur radio datacoms. Datacoms contests and awards organised.

British Railways Amateur Radio Society
John, M0ZAA, M0ZAA@BRARS.info, www.BRARS.info
Membership is open to anyone interested in amateur radio and railways.

Civil Service Amateur Radio Society
Weekly net every Tuesday, 8pm, 3.763MHz

Radio Amateur Old Timers' Association
MemSec@RAOTA.org, www.RAOTA.org
Membership is open to anyone active in amateur radio. Maintaining the traditions and spirit of amateur radio. Nets on Wednesday 3.763MHz at 1000, 1.963MHz at 2100, Thursday 7.163MHz at 1100, 3.763MHz at 1930 and Sunday 3.763MHz at 1000.

REGION 1: SCOTLAND SOUTH & WESTERN ISLES

REGIONAL MANAGER: MARCUS HAZEL-MCGOWN, MM0ZIF, RM1@RSGB.ORG.UK

Cockenzie & Port Seton ARC
Bob, GM4UYZ, 01875 811 723
7 Club night
15, 16 International Lighthouse Weekend with GB2LBN
19 On air activity day
21 22nd annual mini-rally night at 6pm. Bring along your own 'junk' and sell it yourself. Entrance fee £2 for everyone.

Kilmarnock & Loudoun ARC
Graham, MM3GDC,
mm3gdc@btinternet.com
11, 25 Club meeting

Lothians RS
Mike, MM0MLB,
secretary@lothiansradiosociety.com
12, 26 Summer pub night

Stirling & District ARS
John, gm0fsv@gm6nx.com
2, 9, 16, 23, 30 10.30am till late afternoon for construction, RCE training, projects and operating

West of Scotland ARS (Glasgow)
James, 2M0UOS, 2m0uos@gmail.com
7, 14, 21, 28 Club night

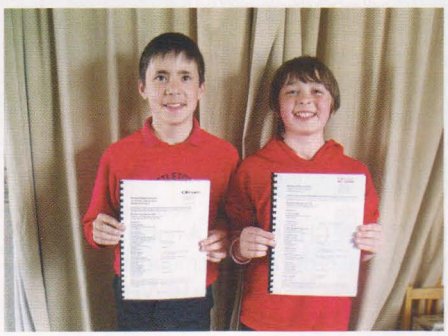
Ayr Amateur Radio Group has now closed for the summer recess, resuming on 3 September. Recent activites include a station at the Scottish Maritime Museum for Museums on the Air, a couple of very successful events for the Scouts (thanks to the Renfrewshire club who allowed use of their shack), which saw many of the Scouts gain their Communications badge and club member Dave, GM3WIL achieving his 50 years of RSGB Membership.
If anyone has any marine equipment that they no longer want the club would be very grateful as the Scottish Maritime Museum has approached the club to create a semi permanent station and display. Any donation would have to be within Central Scotland. Negotiations with the new owners of Turnberry are also underway for access during International Lighthouses and Lightship Weekend in August.

REGION 2: SCOTLAND NORTH & NORTHERN ISLES

REGIONAL MANAGER: DENNY MORRISON, GM1BAN, RM2@RSGB.ORG.UK

Aberdeen ARS
Fred, MM0ODL, 01975 651 365
6 Junk sale
15, 16 Lighthouses on the Air, Walker Park
20 Talk
27 Construction and On the Air
31 Preparation for GB2GNL

Andrew, MM6FGR (age 12) and Keoni, MM6FNQ (age 11) both recently gained their Foundation licenses with **Pentland Firth Radio Hams**. Their tutor was Jim, GM4EFR.



DEADLINES

The deadline for the September issue is 20 July and the deadline for October issue is 24 August.

Don't forget your club activities count towards your RSGB Club of the Year

REGION 3: NORTH WEST

REGIONAL MANAGER: KATH WILSON, M1CNY, RM3@RSGB.ORG.UK

Bolton Wireless Club
boltonwireless@gmail.com
10, 24 Club meeting

Chester & DRS
Bruce, M0CVP, 01244 343 825
4, 11, 18, 25 No meetings, but check the website for portable operating events

Chorley & DARS
Sammi, M6SXI, M6SXI.sr@gmail.com
8 Fleetwood Yacht Club

South Manchester R&CC
Ron, G3SVW, 01619 693 999
13 Advanced course #4
20 Real Ale, Dave G4UGM
24 Monday technical forum
27 Space Weather Terminology, Ron G3SVW

Stockport Radio Society
Heather, 07506 904422
2 VW Show, Tatton Park
4 EGM
11 Tutors meeting
13 On air from members QTH
18 Society meeting
25 Skills night from HQ, SSTV with 2E0JEK G6RSU and M0TJU, 2m, HF & Morse nets

Thornton Cleveleys ARS
John, G4FRK, 01253 862 810
3 Natter night & club on air
10 Foxhunt
17 Practical
24 Living & working in Saudi, Mick, G4EZM
31 Closed

June was a busy month for **Furness ARS**. The Foundation course at the beginning of the month had four successful passes, so thanks to the training team. Club members look forward to hearing and working the new M6 calls on the air. **Mid** June saw the club's annual summer BBQ at Gleaston Water, an evening was blessed with glorious sunshine, delicious food and plenty of good conversation.
During June two big special events stations were run. The first was GB8CMC for 800 years since the Magna Carta and the second GB125SL, commemorating 125 years since the birth of Stan Laurel in Ulverston.

REGION 4: NORTH EAST

REGIONAL MANAGER: NIGEL FERGUSON, G0BPK, RM4@RSGB.ORG.UK

Angel of the North ARC
Nancy, G7UUR, 01914 770 036
3, 17, 24 Come along and take to the air
10 BBQ at Windmill Hills Community Centre
31 Closed

Denby Dale RC
Darran, G0BWB, 07974 423227,
1 Yorkshire Day, GB6YD from Cartworth Moor
12, 26 On the air ±145.575MHz at 7.30pm

Halifax & DARS
Martin, M0GQB, 01422 341 317
5, 12, 19, 26 Open net, 145.400MHz, 7.30pm
6, 13, 20, 27 Net with West Yorkshire RAFARS, 145.350, 7pm
11 Portable operating evening

Hornsea ARC
Gordon, G3WOV, 01377 240 573
5 Invasion of Kuwait - Flight BA-149
12 Foxhunt and CW Sprint
19 Sounds Good 3
26 Sounds Good 4

Otley ARS
David, M0HLL, 01423 522618
4 2m UKAC, Club night
11 Club Night, Preparation for 50th anniversary weekend
18 G3UNA tech talk
25 6m UKAC, Club Night
29, 30 50th anniversary weekend

Ripon & DARS
David, G3UNA, 01423 860 778
6, 13 Club night
20, 27 SSB Field Day Preparations

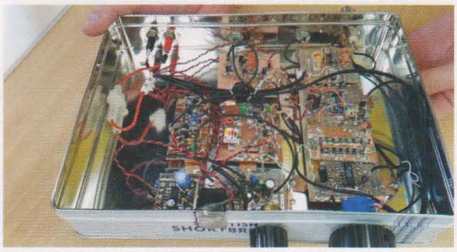
Sheffield & District WS
Krystyna, 2E0KSH, 07884 065 375
5 DF hunt
19 Portable operating night

Sheffield ARC
David, G6DCT, littlewood20@btinternet.com
3 Shack night operating M0RCU
10 Club night
17 Satellite working, Steve, M1ERS
24 Club night
31 Closed

Mark, M6IOL proudly shows off his pass certificate for his Foundation licence at **Wearside Electronic ARS**. He is now studying for his Intermediate. Congratulations from all members.

Rob, M3BFG enjoying the beef/pork dip night at **Wearside Electronic ARS** – the smile says it all!

A home made transceiver for 40 and 20m in a biscuit tin constructed by John, M0GFN, demonstrated at **Wearside Electronics ARS**. The tranceiver was designed and constructed by John and members were very impressed.



The **Region 4 team** attended the LAMFest rally at Elsecar Heritage Centre. The rally, organised by LAM Communications, raised money for the Yorkshire Air Ambulance. The team were pleased to meet friends, old and new, some from as far afield as Western Australia. There was a steady stream of customers to the book stall and several joined the RSGB. The photo shows Adrian, G1BRB, DRM44 before the doors opened, they were too busy after that to take photos! The Region 4 team will be at Finningley on 16 August and the BATC convention on 5 & 6 September.

REGION 5: WEST MIDLANDS

REGIONAL MANAGER: MARTYN VINCENT, G3UKV, RM5@RSGB.ORG.UK

Bromsgrove & DARC
Dave, M6DKT, 07584 025 156
5, 12, 19, 26 Data night
7, 14, 21, 28 Club night

Central RAC
Martin, G1TYV, 07948 027 994
6 Group meeting
15 Meeting at Barr Beacon, 10am – 5pm

Coventry ARS
John, G8SEQ, 07958 777 363
3, 10, 17, 24, 31 Club net 8pm, 145.375MHz FM and/or 7.16MHz ±QRM
7 Open Evening
9 Fillongley Agricultural Show, CV7 8AG
14 BBQ & Portable Night, Newbold Comyn
20 Skittles night at Brandon Social Club
21 3rd Round G4ZMC Trophy, Newbold on Avon
28 Radio workshop

Dudley & DARS
Carl, M0ZCR, m0zcr@live.co.uk
4 UKAC 2m, Night on the air
11 On the Air & natter night
18 Club social, open discussion
25 M0RSD on Air

Gloucester AR&ES
Anne, 2E1GKY, 01242 699 595 daytime
3, 10, 17, 24, 31 No meeting, club net on 145.550MHz
5, 12, 19, 26 Club net 7.30pm starting on 145.500MHz
6, 13, 20 27 7.30pm net on 145.550MHz

Malvern Hills RAC
Dave, G4IDF, 01905 351 568
11 Matching – amateurs do it with real & imaginary parts, Roger, G4BVY

Midland ARS
Norman, G8BHE, 07808 078 003
5 Open meeting, training classes
12 Shack on the air, training classes
19 Mobile Rally visits, shack on the air, training classes
23 Rugby ATS Radio Rally
26 Open meeting, shack on the air, training classes

Mid-Warwickshire ARS
Don, G4CYG, 01926 424 465
1 Yorkshire Day Field Day
11 Barbecue at Fred's
25 No meeting

Salop ARS
salopamateurradio@gmail.com
5, 12, 19, 26 CW net, 4.30pm
144.070MHz; Net 8:30pm on GB3LH
6 Natter night / committee meeting
13 Meteor Scatter, Nik, M5DND
20 Table top sale
27 G3SRT on the air

South Birmingham RS
Gemma, M6GKG, gemmagordon.m6gkg@gmail.com
3, 10 Stripping units down in the shack
4, 11, 18, 25 Coffee morning in the shack 11am to 1pm, visitors very welcome
6 Training class, Dave, G8OWL
14 Work in the shack
29 Getting ready for Telford Rally
31 No meeting

Sutton Coldfield ARS
Robert Bird, spirit.guide@hotmail.co.uk
2, 16, 23, 30 Open net, 50.135MHz SSB from8.30pm
3, 17, 31 Open net, ±145.250from 7.30pm
9 WWI and Victorian day at Whittington Barracks with GB4MOA from 10am, open net, 50.135MHz SSB from 8.30pm
10, 24 Club meeting
11 Open net 70.475MHz FM from 7 30pm
29 Canals on the Air from Fazeley Mill Marina from 10am, GB4FCM

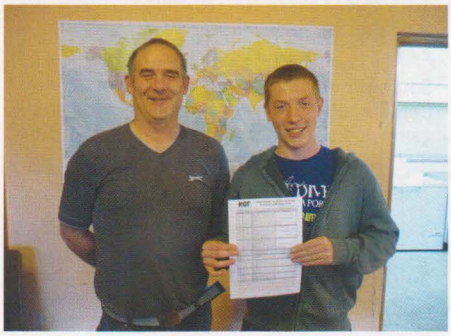
Telford & DARS
John, M0JZH, 07824 737 716, m0jzh@yahoo.co.uk
5 Committee meeting, GX3ZME on the air HF
12 Microwaves explained
19 Getting ready for the Telford Hamfest
26 Analysing antennas on the Village Field

Wythall Radio Club
Chris, G0EYO, 07710 412 819
1 2pm Backpackers 144MHz contest, 3pm 144MHz Low Power contest
2 8am 80m RoPoCo CW, 9am RSGB 432MHz Low Power contest, club net 145.225 or GB3WL 8pm
4 Morse Class, Wythall Carnival Preparation Evening, UKAC
7, 14, 21, 28 Nibbles Night in the Shack
9, 23, 30 Club net 145.225 or GB3WL, 8pm
11 Morse Class, Committee Meeting

12, 27 80m Club Sprint
16 Wythall Carnival, Club net 145.225 or GB3WL, 8pm
18, 25 Morse Class
31 Curry night at Monsoon

Gloucester AR&ES are feeling quite proud that Alys Kerr passed her Foundation exam at the age of 10. Thanks to the dedicated tutor, Les, G0ULH. Also in the picture is Anne, 2E1GKY, exam secretary. Alys is now the very proud owner of M6FNS and was presented the RSGB book Getting Started in Amateur Radio by Les, G0ULH.

Midland ARS saw Sea Cadet Brad, M6VJX pass his Intermediate exam with the club. He's shown here with trainer Steve, M0SSV. Congratulations.



REGION 6: NORTH WALES

REGIONAL MANAGER: LIZ CABBAN, GW0ETU, RM6@RSGB.ORG.UK

Dragon ARC
Stewart, GW0ETF, 07833 620 733
3 Handling portable antenna masts, GW0ETF
17 Marine communications, MW3MEY

REGION 7: SOUTH WALES

REGIONAL MANAGER: JIMMY SNEDDON, MW0EQL, RM7@RSGB.ORG.UK

Aberystwyth & DARS
Ray, GW7AGG, 01970 611 853
13 No meeting
27 Club net, 145.500 then 145.550MHz

Llanelli ARS
Craig, MW0MXT, 01269 845 773
3 Social evening
10 On the Air & raffle
17 Social evening & DVD night
24 Junk sale & raffle
31 Closed

Newport (Mon) ARS
Ross, GW3NWS. 01633 880 146
15 East Usk Lighthouse for ILLW using GB4EUL

Carmarthen ARS run a range of training courses on demand, subject to numbers. If you are interested, please send an e-mail to GW4RVA via t.nicholas@btinternet.com or telephone 01267 23714.

REGION 8: NORTHERN IRELAND

REGIONAL MANAGER: PHILIP HOSEY, MI0MSO, RM8@RSGB.ORG.UK

June's CW Field Fay yielded 872 contacts with 42 countries including The Falkland Islands and South Korea for **Bangor & DARS**. Richard, GI4DOH, Keith, GI0SSA and Colin, GI0RQK braved the cold and high winds to achieve this creditable score at Ballyrobert. They were aided and supported by Stephen, GI0HHV and Bertie, GI4POC among others.

Stephen Morrow (left) and Stephen Horner have recently passed their Advanced exam with **Causeway Coast and Glens ARC**.

Leonard Corr (left) passed his Foundation licence and Kenny McDonald passed his Intermediate licence with **Causeway Coast and Glens ARC**.

DEADLINES

The deadline for the September Around Your Region is 20 July. The next deadlines are 24 August and 21 September

REGION 9: LONDON & THAMES VALLEY

REGIONAL MANAGER: LARRY SMITH, G4OXY, RM9@RSGB.ORG.UK

Bracknell ARC
Andy, M0HAK, andy@m0hak.co.uk
5, 19, 26 Club net, 8pm, 145.375MHz
12 Club night, BBQ

Burnham Beeches RC
Dave, G4XDU, 01628 625 720
3 Pub Meeting, Pineapple Dorney
17 Operating evening at club HQ

Echelford ARS
John, G4GSC, 01784 451 898
13 The signal generator & spectrum analyser, Bob G3OOU. Bring in any Tx or Rx for measurements, up to 100W
27 On air, CW practice, Bring & Buy, natter night

Edgware & DRS
Mike, G4RNW, 02089 500 658
8 No meeting
27 Natter night

Harwell ARS
Malcolm, G8NRP, 01235 524 844
11 No meeting

Newbury & DARS
Rob, G4LMW, 01635 862 737
26 Arduino computers and how to use them in the shack, Paul, G3WYW

Reading & DARC
Pete, G8FRC, 01189 695 697
13 On the air, Dave, M0DHO
27 Social at the bar, Woodford Park

Southgate ARC
Mr K Mendum, G8RPA, g8rpa@arrl.net
12 Barbecue in the Spinney

REGION 10: SOUTH & SOUTH EAST

REGIONAL MANAGER: MICHAEL SENIOR, G4EFO, RM10@RSGB.ORG.UK

Brede Steam ARS
Dan Adkin, M0HOW, 01424 882 008, Daniel@adkin.net
5, 12, 19, 26 at the shack

Bromley & DARS
Andy, G4WGZ, 01689 878 089
18 Social operating (TBC)

Coulsdon ATS
Mike, M1CCF, 020 8654 2582
10 Barbecue at G4RWW QTH

Cray Valley RS
Richard, G7GLW, 07831 715797
6 The history of Eltham through its street names, Margaret Taylor
20 HF propagation video

Crystal Palace R&EC
Bob, G3OOU, 01737 552 170
7 Club project, a digital LC meter

Darenth Valley RS
Mike, G8AXA, 01689 856935
12 Radio on the air
26 Preparation for SSB NFD & 144 trophy

Dorking & DRS
David, M6DJB, djb.abraxas@btinternet.com
25 Social evening

Hastings E&RC
Gordon, 01424 431 909
26 Construction contest

Horndean & DARC
Stuart, G0FYX, 02392 472 846
6 Natter night/social evening
20 The World War One Remembrance Museum by the curator, Charles Haskell

Horsham ARC
Adrian, G4LRP, 07714 664 957
6 BBC Outside Broadcasting, Tony, G0OVA
20 Social, The Countryman

Itchen Valley ARC
Quintin, M1ENU, 023 8078 7799
7, 28 Net on 145.525MHz 8pm
14 Members' Forum
28 Coax and cable losses, Mike from Alton Antennas

Mid-Sussex ARS
Sue, G6YPY, 01273 845 103
7 Fox Hunt
14 TBA
21 Radio night and table top sale
28 Treasure hunt

Surrey Radio Contact Club
John, G3MCX, 020 8688 3322
2, 9, 16, 23, 30 Net, 1905kHz, 9.30am
3 The Crystal Palace Story (1851-1936), Barrie McKay of the The Crystal Palace Museum
7, 14, 21, 28 Net, 145.350MHz FM 8pm
17 Chat and fix-it, John, G8MNY

Sutton & Cheam RS
John, G0BWV, 020 8644 9945
20 Early wireless licences, Dr Elizabeth Bruton

Swindon & DARC
Jonathan, M0ZGB, m0zgb@btinternet.com
6, 13, 20, 27 club closed, portable activity from Barbury Castle CP

West Kent ARS
Keith, G4JED, info@wkars.org.uk
10 On-air and natter night

Wimbledon & DARS
Kim, G6JXA, 07812 735 507
2 WDARS summer camp ends
14, 28 No meeting

Worthing & DARC
Gordon, 2E0GTG, gordon.h128@gmail.com
2 Sunday breakfast 9-10am
5 Discussion evening
12 Bringing radios back to life, Andy, M6RFE
15 Lighthouse Weekend, Shoreham
19 Club barbecue
26 G3WOR on the air

In May, Dariusz became the first candidate from **Hastings ERC** to sit both the Foundation and Intermediate exams on the same day. He is now the proud holder of 2E0SPH and is studying for the Advanced exam on 19 August.

Dover ARC would like to congratulate Michael Dewing, Ian Lockyer, Ross Birch, Harry Newman and Derek Taylor who passed their Intermediate exam.

Brede Steam ARS will be participating in Lighthouses & Lightships on the Air in August, using GB1DLH. The station will be situated at Dungeness Lifeboat Station, who kindly let the club use their communications room for the weekend and anyone can come and visit. Operators will be using all HF bands including VHF and UHF. Equipment used will be a full size G5RV, TS-2000 and an 811 linear. In the past the club have amassed around 350 QSLs and it is hoped this year to top the 400.

REGION 11: SOUTH WEST & CHANNEL ISLANDS

REGIONAL MANAGER: PAM HELLIWELL, G7SME, RM11@RSGB.ORG.UK

Appledore & DARC
Alan, M6CCH, 01237 422 833
17 Coax losses, measurement & effects, Terry, G4CHD

Bristol RSGB Group
Robin, G3TKF, robin@g3tkf.co.uk
31 HF propagation and TIDs, Prof Cathryn Mitchell (Bath Uni)

Cornish RAC
Steve, G7VOH, 01209 844 939
5 Committee meeting
6 Main Club meeting
14, 15, 16 GX4CRC at Steam Engine Rally
20 Club evening
28, 29, 30 GB2VWJ operating at Volkswagen Jamboree

Exeter ARS
Nick, M0NRJ, 01363 775 756
3 Net on 3.675MHz from 7.45pm
4 GB3EX Repeater Net at 7.45pm
7, 31 Net on 3.675MHz from 7.45pm
10 The RSGB, Keith, G7NBU
11, 18, 25 Net on 145.575MHz at 7.45pm
24 Surface Mounted Devices, Michal M0HRJ/SQ2CFG

Exmouth ARC
Mike, G1GZG, 01395 274 172
5 Summer BBQ
19 Transducers and their uses, John, M6AFF

Mid-Somerset ARC
David, G8BFV, 01749 670085
11 Planning for the special events of CHOTA and ROTA

Plymouth Radio Club
David, 2E0DTC, d.beck123@btinternet.com
11 Guest speaker

Poldhu ARC
Keith, G0WYS, g0wys@yahoo.co.uk
11 Visit from RSGB DRM, Mike Jones, 2E0MLJ

Riviera ARC
rivieraarc@gmail.com
5, 12, 19, 26 Net on 145.425MHz, 8pm
6, 20 club night

Saltash & DARC
Mark, M0WMB, 01752 215 546
6 Get together at the Engine House
20 HF operating

South Bristol ARC
Andrew, G7KNA, 07838 695 471
6 Darts tournament
13 ILLW briefing
15, 16 International Lighthouses and Lightships OTA
20 Summer BBQ
27 Open house, on the air night

Thornbury & South Gloucestershire ARC
tsgarc@gmail.com
5 D-Star
7, 14, 21, 28 Nets 145.500MHz to QSY, 8pm
8 Royal Signals Museum visit
12, 26 On the air night
16 Pizza at Paulo's
19 Project

Weston Super Mare RS
Paul, G3SDH, g3sdh@btinternet.com
3, 10, 24, 31 Natter night
17 Main meeting

Yeovil ARC
Rodney, M0RGE, 01935 825 791
6 Great Circle propagation, G3MYM
13 Mini talks
15 VJ Day: Special event 1-4pm
20 Morse Practice, G3MYM
27 Station on the air, problem solving

Riviera ARC meets on the 1st & 3rd Thursdays of the month at the Acorn Community Centre, Lummaton Cross, Torquay TQ2 8ET. The Centre has level access entry and is disabled friendly with ample parking on site. The club welcomes all comers to the hobby, both new licensees and old hands alike, especially visitors and holidaymakers. A weekly 2m net is held on Wednesdays at 8pm on 145.425MHz.

At the Bruton field day organised by Steve, G7AHP there was a good turn out by **Yeovil ARC** members and much interest from the school children. This will be the last time the club will be at Bruton as Steve, G7AHP is moving on to pastures new. The club would like to take this opportunity to thank Steve for all his efforts on behalf of the club.

Congratulations to new **Exeter ARS** members Skip, M0TCF and Matt, M0SBI after their successful Advanced exam. Matt completed both Intermediate and Advanced exams in just five months showing that hard work studying is really worth the effort.

The spring season of **Exeter ARS** talks included John, G8XQQ hosting a Test Your Rig evening where members had their equipment calibrated and checked for accurate operation. Nick, MONRJ demonstrated the Raspberry Pi and Banana Pi computers to show how easily members could learn a new operating system. Alan, G1JXI introduced the club to D-Star operations and then showed the QRP kit he had developed, packaged into custom-crafted foam casings in two Peli Storm cases. These contain all the parts needed to operate on all bands in all modes, including digital. Alan, G1JXI took his QRP kit along to high ground north of Exeter to represent the club in the June 2m QRP contest with Skip, MOTCF and Bas, GOFGE. Favourable weather and no mud in the field meant a successful day and topping their contact log record from previous years.

Thornbury & South Gloucester ARC held its first field event, specifically to plan and play radio and antenna systems. It was both a well-attended and successful event with all members playing a full and active part. Many members got to test their own antennas including a home brew J pole and a Hexbeam.

CLUB OF THE YEAR 2015

The RSGB is indebted to Waters and Stanton for their sponsorship of this competition. There's still plenty of time to organise some amateur radio events to showcase the hobby. Entry is simple; you will need to fill out a form detailing the activities the club has undertaken – exams, special events, outreach and promotion as well as normal club activity.

Plymouth Radio Club demonstrated amateur radio using GB2AFD at the Armed Forces Day on Plymouth Hoe. The radio caravan proved to be a crowd puller, not only for the general public at large but both service and ex-service members too. A small team manned the transceivers throughout the day, with contacts to New Zealand; USA; Spain and Switzerland, just to name a few.

Plymouth Radio Club took part in Lord Mayor's Day in Plymouth. He visited the radio caravan where the club was demonstrating amateur radio. The photo shows members of the club with the Lord Mayor Cllr Dr John Mahony.

REGION 12: EAST & EAST ANGLIA

REGIONAL MANAGER: STEVE THOMAS, M1ACB, RM12@RSGB.ORG.UK

Braintree & DARS
John, M5AJB, 01787 460 947
3, 17 tba

Cambridge & DARC
David, M0ZEB, 01353 778 093
14 Building and testing a Moxon aerial, Dave, G6KWA

Chelmsford ARS
secretary@g0mwt.org.uk
4 Constructors Competition at Oaklands Museum
17 Skills workshop at Danbury Village Hall

Felixstowe & DARS
Paul, G4YQC, pjw@btinternet.com
3, 17, 31 Net 145.400MHz 8pm
8, 9 Intermediate course weekend 1
15, 16 Intermediate course weekend 2

Loughton & Epping Forest ARS
John, G0VEH@lefars.org.uk
7 Logbook of the World, eQSL.cc and the QSL Bureau, Marc, G0TOC
21 Club meeting, VHF on the air

Malc A Williams, G0EGA
Malc, G0EGA, malc.williams@g0ega.co.uk
Malc will start a new GB2CW Morse class broadcast on 5 and 6 September and continue every subsequent weekend until 4 October. Transmissions are on 145.625MHz from 8pm local time and cover Norwich, Ipswich, Lowestoft, Great Yarmouth and surrounding areas

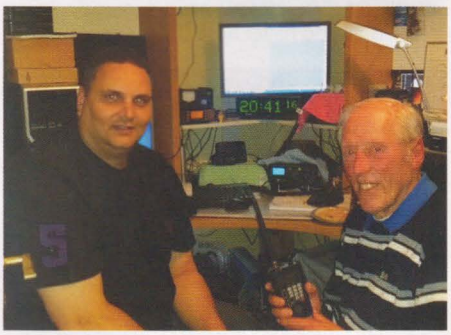
Norfolk ARC
Chris, G0DWV, 01603 898 678
5 Studying meteors by radio, Jeff Lashley
12 Visit by Elaine Richards, G4LFM, *RadCom* Editor
19 TBA
26 Informal, Bright Sparks, Morse

South Essex ARS
Terry, G1FBW, 07986 070 040
22 Annual Field Day and BBQ, Great Wakering

Thames ARG
Mark, M0IEO, 07940 579116
8, 9 Foundation course & exam
22-31 Camping; Crowsheath Farm

Thurrock Acorns ARC
Gordon, 2E0ELI, acorns@taarc.co.uk
18 Quiz and social evening

Thurrock Acorn ARC set up a demonstration station at the Davy Down Pump House. During the event, Alf Pryer spoke to one of the club members to see if someone could help him. One of Alf's interests is to listen to aircraft flight crew talking on their radios as they pass overhead. He had an air band radio and needed help to program the frequencies. An e-mail was sent out to club members and two who had similar radios and were happy to assist. Alf visited one of the amateur's homes where the necessary information was transferred onto the radio via a computer. The photo shows Ricky, M6DII with Alf holding the air band radio after the successful transfer of the data.



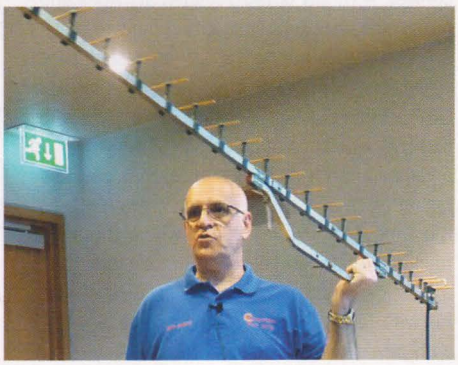
Thurrock Acorns ARC enjoyed a talk on oscilloscopes and how to use them from club member Steve, G4HXY. He introduced the topic by explaining what an oscilloscope can do and then proceeded to show, via diagrams, how to connect the oscilloscope up to the piece of radio equipment under test. After the explanation he then switched on an oscilloscope that he had brought and started to put some of the theory into practice so club members could see the picture that appeared on the screen. Members were then able to experiment with the equipment with Steve answering any questions that arose.

May ended with a 40th Anniversary special event station set up at a local Scout hall for **Braintree & DARS.** The station used GB4OAY and operated on 40m as well as 2m and 70cm. A total of 136 contacts were made over the two days. With Morse instruction and kit construction going on, there was a lot for visitors to see and do. It was a great event, lots of fun and very well supported by the members. In June the annual construction contest produced entries of high quality. Entries were a volt meter, two different 40m transceivers, a 10m transceiver, a Morse oscillator and a lightning detector. The winner (by 1 point) was the lightning detector designed and constructed by Howard, G6LXK. The rest of the evening was given over to Neville, G8CDG and a presentation of low cost construction kits for members and budding young amateurs to build including a volt meter, component tester, alarm clock, CW transceiver and more. June's activities finished with the annual fox hunt with Melvin, GOEMK as this year's fox. Four teams set off in pursuit homing in on Melvin's short transmissions on 70cm. He reduced his power on each transmission to throw the 'hounds' off the scent. Two teams managed to track him down.

At the recent Open Day at Waters and Stanton, they presented the Region 12 plaque for Club of the Year with certificate and bottle of champagne to the Essex Ham group represented by Pete Sipple and supporters.

Congratulations to all the candidates on the recent Intermediate course run by **Chelmsford ARS.** Indicative marks show that all 12 candidates achieved their pass and should soon be on-air as 2EOs. CARS is fortunate to have so many dedicated volunteers willing to provide the training, organise refreshments and carry out the marking of all 12 exam papers. The PowerPoint slides can be freely downloaded from the club's website.

Dr John Worsnop G4BAO spoke to **Chelmsford ARS** on the microwave bands, which are home to construction, innovation and some great DX. The talk covered a bit of history from the first QSOs in the 1950s and John was keen to dispel some of the common myths related to propagation and distances. The focus was on narrowband terrestrial DX, but he also pointed out other aspects including data links, satellites/ISS, moon bounce and amateur TV. Having highlighted the 1000+km distances he had achieved, he then went on to explain the propagation mechanisms.



Thames ARG ran a special event station on Two Tree Island, Leigh-on-Sea to commemorate the collision, and subsequent loss, of two B17G Flying Fortresses into the sea between Southend Pier and Canvey Point. The two bombers were part of a formation returning to Kimbolton, Cambridgeshire, following a raid on V1 rocket launching sites in northern France. As the B17 that crashed off Canvey Point was named Heavenly Body II the callsign, GB2HBT, was chosen. TARG used a battery powered FT-847 with MFJ-993 AATU and a 3 element Force 12 LPA for 20m to 10m mounted on a 10 metre high calendar mast. Despite generally poor radio propagation and huge thunderstorms in Central Europe, they managed hundreds of QSOs over all over Europe and the Mediterranean. A few contacts were also made into Canada and the USA. The furthest was 4,700 miles to ZD7FT on Saint Helena Island in the South Pacific on 15m band at 1440UTC.

Clubs looking to promote the hobby within small communities may find it beneficial to attend local village fetes and community events. For the second year running, a small team of **Essex Hams** had a stand at the All Saints' Church Summer Fete in the small village of Springfield, near Chelmsford. On display this year, HF and VHF stations, decoding of weather satellites, plus a video and leaflets helping to explain what today's hobby is all about. The amateur radio stand took part in the kid's scavenger hunt, prompting both youngsters and parents to have a listen to live amateur radio .

Amateur Radio was well represented at the sixth Southend Raspberry Jam. The event was organised by the Southend-on-Sea Linux User Group, with members of **Essex Ham** invited along to represent the hobby. With so many attendees of Raspberry Jams technically-minded innovators, these events are a great opportunity to promote the benefits of amateur radio. Demos included SDRs, Raspberry Pi and Arduino crossover projects, SSTV and data modes, as well as a couple of more unusual demos from Nick, 2E0DVX – musical potatoes and a Morse key made from a screwdriver, some elastic bands and a Raspberry Pi. One of the team was asked to take part in TeachMeet, a series of lightning talks, on the subject of working the International Space Station. A 2m station was set up by Jakub, 2E0FTX for sending guest messages and Essex Ham, South Essex ARS, Thurrock Acorns ARC, Chelmsford ARS and Essex RAYNET were on hand to help explain amateur radio.

Another very popular Skills Night, hosted by the **Chelmsford ARS** training team, took place with almost 70 people in attendance. Attractions included Slim Jim antenna construction by Peter, MOPSD, working portable from Charlie, MOPZT,

a live CW station from the Essex CW Club, an Elecraft KX3 demonstration by Peter, G0DZB, APRS trackers as used by Essex RAYNET, a fiendish quiz and a display of data modes by Essex Ham. Highlight of the evening was a live contact with the ISS. A well-timed ISS pass allowed Steve, M0SHQ to send a packet to the ISS that was digipeated across Europe.

Essex Hams were joined Bob, G0FGX and Nick, 2E0FGQ from TX Factor, at a field day near Southend. TX Factor was in town covering various amateur radio youth activities and spent the day filming for upcoming shows. Steve, M0SHQ worked the SO-50 satellite from his FT-817, and offered those who've not work satellites before the chance to give it a try, whilst Chris, M6EDF launched one of his high altitude balloons. The SXHAM1 balloon climbed to an impressive 87,500 feet and travelled about 240km.

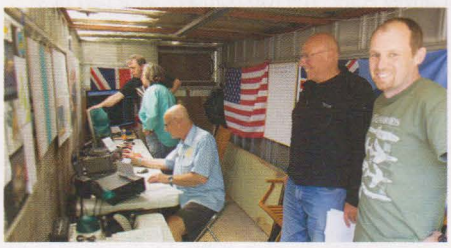
Norfolk Coast ARS is based in East Runton, near Cromer and three members have recently gained their Intermediate licences. Seen in the photo, celebrating with a glass of champagne, are (l-r) Alan, 2E0DMI, Paul, 2E0NAI and Reg, 2E0WBW.

DEADLINES

The deadline for the September Around Your Region is 20 July so send your news NOW!

The annual East Suffolk Wireless Rally took place in June organised by **Felixstowe & District ARS**. The event included a talk-in service provided by the East Suffolk RAYNET team and an RSGB bookstall manned by Steve, M1ACB and Keith, G7CIY. A small group of Essex Hams (pictured here) crossed the border from Essex to Suffolk to sample the rally, and the all-day breakfast! In the photo are Peter, G0DZB, Charlie, M0PZT, Dorothy, 2E0NCE, Richard, M0CLZ and Pete, M0PSX.

Norfolk ARC staged its ninth Radio Active weekend in June, attracting radio amateurs of all ages and raising more than £500 for cancer charities. The event was held in conjunction with the RSGB's 24-hour National Field Day CW contest. A variety of radio-related activities and fun events were held throughout the two-day event, along with three HF CW contest stations. A first this year was all three stations entering the QRP section showing what could be done with just 5W. Another station on site, G4ANT/P, made a valiant effort in the 6m contest that was also taking place over the weekend. There was also a fun family 2m foxhunt on foot where you had to track down hidden beacons. Sunday lunch was a roast carvery, courtesy of David, G7URP and his wife Tammy, M3PLU, plus a raffle was held with prizes kindly donated from a variety of radio manufacturers and retailers – bhi, DCP, Icom UK, JPR Electronics, Plummer Electrical North Walsham and Gaugemaster. The raffle raised £522, which was split equally between Cancer Research and Norfolk's own Big C Appeal.



REGION 13: EAST MIDLANDS

REGIONAL MANAGER: STEVE BODEN, G4XCK, RM13@RSGB.ORG.UK

Chesterfield & North Derbyshire ARS
Trev, M0TPX, 07972 232 757
5 Digital modes demo
12, 26 HF net 7.30pm
19 Hand held programming night

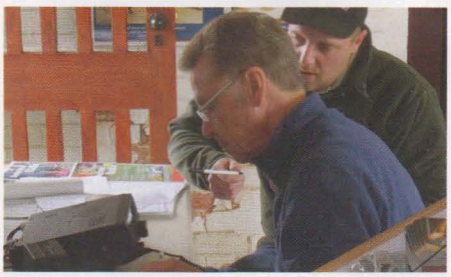
Loughborough & DARC
Chris, G1ETZ, 01509 504 319
4 Kite flying, subject to WX
11 70cm on air from Markfield
18 EME from the Glenmore Centre
25 Practical evening

Nunsfield House ARG
Ken, G3OCA, 01332 720 976
7 LU6W DXpedition video, Ken, G3OCA
14 Shack, natter night
21 3D printer
28 Programme planning meeting

RAF Waddington ARC
Bob, G3VCA, 07971 166 250
3, 10, 17, 24, 31 Net, 145.325MHz 8pm
9 Three Sisters Vineyard 1.30pm
13 Committee meeting

South Kesteven ARS
Andrew, M0NRD, 07969 062 859
5, 19 Informal

Welland Valley ARS
Peter, G4XEX, 01858 432 105
3 Net on 145.275MHz
17 Wi-Fi DXing revisited
23 Rugby RATS Rally



During the first International Museums Weekend, members of **South Kesteven ARS** assisted in the activation of GB2CAM at the Cranwell Aviation Heritage Centre. The Centre portrays the fascinating story of this historic establishment from its early days as a Royal Naval Air Service base to the current day. It is well worth a visit and entry is free. It was a difficult weekend conditions wise and with local QRM operation was at times difficult, however a good many contacts were made over the weekend. Arthur, M0GUU and Stewart, M0SDM can be seen operating.

Spalding DARS enjoyed a very informative talk and presentation on QRP operating at milli watt levels by Alistair, M0TEF. It was a fascinating insight on what can be achieved with QRP not only on CW but also SSB giving examples of some remarkable distances achieved by Keith, G0RQQ. Alistair also encouraged members to participate in the Lincoln Short Wave Club QRP challenge in the future. The photo shows Andrew, G8BYB, Alistair, M0TEF and Graham, G8NWC.

HF F-Layer Propagation Predictions for August 2015

Compiled by Gwyn Williams, G4FKH

Time (UTC)	3.5MHz 000011111220 246802468020	7.0MHz 000011111220 246802468020	10.1MHz 000011111220 246802468020	14.0MHz 000011111220 246802468020	18.1MHz 000011111220 246802468020	21.0MHz 000011111220 246802468020	24.9MHz 000011111220 246802468020	28.0MHz 000011111220 246802468020
*** Europe								
Moscow	66.....66	66.....666	666.....666	246555555653	124555545531	.1333333332.	..222222221.	..11111111..
*** Asia								
Yakutsk	.....	1.....111.2	221211122333	..222223112.	...1211.....	....1.....	.....	.....
Tokyo	.....2..	.....35..	.....2.5..	.....22.3..	.....111.1..	.....	.....	.....
Singapore	.....3.	4552	35553	.....1355.1	.....1233..	.....122..	.....	.....
Hyderabad	3	3555	3.....45.4	1.....344.2	..1...2322..	.....111..	.....	.....
Tel Aviv	66.....6	66.....666	666.....666	545555555556	324555545423	212355523212	1.11232121.1	..1111..11..
*** Oceania								
Wellington	.....	.....	.....2...	....11.....	...1.....	.....	.....	.....
Well (ZL) (LP)	.....	.44.....3..	345.....3..	334.....34.	212.....3.	1.1.....3.	.....1.	.....
Perth	.....2..	.....34.2	.....2.313	.....	.....	.....	.....	.....
Sydney	.....2..	.....44..	.....2332.	.....11..2.	.....	.....	.....	.....
Melbourne (LP)	.....	..2.....	.132.....	1122.....	..11.....	.....	.....	.....
Honolulu	.....	..1.....	..21.....	..111.....	....1.....	.....	.....	.....
Honolulu (LP)	.....	.....	.....	.....1...	.....2...	.....21..	.....11..	.....1...
W. Samoa	.....	.....	.....	.....	.....	.....	.....	.....
*** Africa								
Mauritius	3.....333	3.....4554	15542	.....3442.	.....232..	.....11...	.....	.....
Johanesburg	33.....33	33.....3554	.1.....5542	.....542.	..1....242..	..11..123...	.....111...	.....1....
Ibadan	554.....455	5552....2555	5553....3565	435421124555	214432335543	1.2433335521	..121112331.	...1111122..
Nairobi	34.....44.	55.....3555	552....24555	2242...35555	..3322245553	..1322345332	...212234211	...11112211.
Canary Isles	666.....66	7666.....666	6666.....666	646665555666	324655556664	213655556643	1.2433334432	..1322223321
*** S. America								
Buenos Aires	33.....	555.....24	444.....45	323.....243	..1.....332	.....21.	.....1..	.....
Rio de Janeiro	332.....3	555.....255	545.....455	323.....554	1.1.1...1432	....1...1421	.....12..	.....1..
Lima	33.....	544.....4	4342.....34	1.22.....33	.....12.	.....1..	.....	.....
Caracas	3.3.....	444.....4	4443.....34	1.232....133	....21..1221	.....2..	.....	.....
*** N. America								
Guatemala	.....	444.....3	3332.....3	1.11.....23	.....11.	.....1..	.....	.....
New Orleans	332.....	4441.....2	323.....2	11	.....	.....	.....	.....
Washington	4441.....2	55431....13	444221...124	111.12111233	.....11..221	.....11.	.....	.....
Quebec	444.....2	5542.....13	53322.1..124	1...11111232	.....11.122.	.....1..	.....	.....
Anchorage	.....	.....	..1.....	.....	.....	.....	.....	.....
Vancouver	.....	.2.....	.13.....1	.....1.	.....	.....	.....	.....
San Francisco	.2.....	.34.....	2231.....	..1.....	.....	.....	.....	.....
San Fran (LP)	.....	.....	.....	.....	.....	.....1....	.....1....	.....

Key: The figures represent approximate S-Meter readings, whilst the colours represent expected circuit reliability. **Black** equals low to very low probability, **Blue** equals good probability and **Red** equals a strong probability. No signal is expected when a '.' is shown. 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 August, September & October are respectively (SIDC classical method – Waldmeier's standard) 73, 72 & 69 and (combined method) 93, 92 & 89. The provisional mean sunspot number for June was 68.3. The daily maximum / minimum numbers were 127 on 7 June and 22 on 27 June.

RadCom

Classified Ads

For Sale

WANT A DATA INTERFACE?
You need an ISOTERM, Various models for your needs. PSK, WSJT, WSPR, CW & RTTY. NEW USB TRAVELLER Interface now available. See www.g3liv.co.uk

THINK ITS TIME TO TIDY UP YOUR MORSE KEY CONNECTIONS?
NEW GOLD PLATED UNIVERSAL CABLETIDYS for most BUG's and PADDLES, VIBROPLEX, JA7GHD,etc See www.g3liv.co.uk email:johnny@melvin.com tel: 0191 2843028

FIBREGLASS TUBE
High strength tube, square box, rod, and other sections all from stock in 6m lengths. Engineered Compositions, Chester. Tel: 01244 676000 e. barbara@engineered-composites.co.uk www.engineered-composites.co.uk

BAOFENG, TYT & VERO HANDHELDS
at best prices from authorised UK importer. Full range of accessories available. www.sinotel.co.uk, 01926-460203, sales@sinotel.co.uk

CTCSS ENCODER AND DECODER KITS,
DTMF Kits and Modules, PIC Microcontroller Development Kits. www.cstech.co.uk

USB CAT, CI-V & PROGRAMMING CABLES.
Control & programme your rig from your PC – logging, satellite tracking etc. SiLabs CP2102 or FTDI chipset for guaranteed reliability. For these and more great items go to www.technofix.co.uk

DISPOSAL SALE OF ELECTRONICS EQUIPMENT
From DC to Light (fibre optics). Over 100 items for sale. Not an Auction, more like a rally. Venue Peterborough. Details: email j.branson@ntlworld.com

RACAL RA17L COMMUNICATIONS RECEIVER.
Needs some attention to Tuning mechanism. Free to collector, W. Sussex, Peter G4PLT, Tel: 01444 871225, or 07792 924137; pteather10@btinternet.com

Aerials

M0CVO ANTENNAS
For all your amateur radio antenna needs. Full details at: www.m0cvoantennas.com

WESTERN HF 10
67ft wire dipole 160-6m, full details lookup m0bzi at: www.qrz.com buy direct: m0bzi@hotmail.co.uk or 07748331458 reviews at: http://g0kya.blogspot.com/2010_08_01_archive.html **or** http://www.eham.net/reviews/detail/9424

G WHIP ANTENNAS
Over 45 years of amateur & commercial business. Military specification at amateur prices. Famous resonant end feds, baluns, windoms, many different antennas, mostly made using kevlar mill spec wire. See Eham reports or www.gwhip.co.uk Tel: 07592 135431

G4TPH MAGLOOPS BACK IN PRODUCTION.
Remote tune and manual tune models for 40m through 10m. Details at www.g4tph.com

Wanted

VINTAGE RADIO & VALVES WANTED
national cash settlement for silent key, shack clearouts 07552678725, vintageradio@btinternet.com

Cards & Design

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1000 full colour both sides qsl cards £40 plus postage. 07720 580968 www.QSLers.co.uk

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Miscellaneous

ALL UK STATIONS – CALL IN ON OUR 'M1CRA' CHRISTIAN NETS!
WACRAL welcomes all amateurs to our Sunday morning 'GOOD NEWS' NETS, now at 0730-0830AM on 3747Khz and, again, at 2pm on 3747or 7147Khz. Our 2m SSB net at 3pm is held on144.205. Or, do join us on Wednesday evenings at 9.30pm, 3747Khz , for nationwide Christian fellowship and relaxed chat. See www.wacral.org for more net info and WACRAL details or just call G3XNX on 01803 854504 or derekg3xnx@talktalk.net

VINTAGE FIREWORK COLLECTOR
will pay cash and collect from anywhere call Tony - 07956 506300 Licensed explosive storage

PAFOS, CYPRUS.
Pafos, 2 bed villa. Simple HF station 300m ASL. www.domsvilla.co.uk

INTERMIP.NET WEBSITE HOSTING
Clubs or individuals. From £35.00+VAT p.a., includes email and domain. Goldthorn Services Limited t/a Intermip radcom@intermip.net www.intermip.net 03300 882909

Equipment

REPAIRS TO RECEIVERS, TRANSMITTERS
New/Old, valve/transistor. Call 07903 023437 for details: www.kentrigs.co.uk

RELIABLE REPAIRS
For all amateur and vintage equipment. Professional service, reasonable rates. Call: 01807 580376
E: radiorepairs@btconnect.com

Classified advertisements 58p per word (VAT inc.) with a minimum of 14 words £8.12.
All classified advertisements must be prepaid. Please write clearly. No responsibility accepted for errors. Latest date for acceptance is 1st of the month prior to publication
Payment to: RSGB, 3 Abbey Court, Priory Business Park, Bedford, MK44 3WH

Business Cards

For Business Card advertising Call Chris Danby on 01603 898678

Adertisers Index

FREE MEMBERS' ADS OF UP TO 40 WORDS

Send Members' Ads by e-mail to memads@rsgb.org.uk including your **name, callsign, contact info & location** (these details are not counted in the 40 word limit). Max 1 ad per Member per month; other important terms & conditions apply (see grey box on p93).

FOR SALE

19-ELE 70cm TONNA crossed Yagi, £45. JVL 13cm loop Yagi, £40. 2-2C39 23cm cavity amp with blower (needs tuning), £25. Homebrew QRP 80-10m Z-match, £15. 500Hz CW filter for TS-940, £25. All ONO. John, G3WFM, 01707 651 532, g3wfm@yahoo.co.uk (Potters Bar).

Alinco DJ-V17E 2m handheld transceiver, boxed with speaker microphone, charger, handbook etc. Excellent condition, £50. Brian, M1DMR, maybrian@ntlworld.com (Portsmouth).

ATBK-100 antenna base kit (fits Atlas 110/120). Brand new, still in original packaging, never opened, £50 + p&p at cost. John Allan, G4LTH, 01375 670 078 (Essex).

AVO MODEL 8 multimeter as new in original box with leads, original owner. Offers. Ken, G3OCA, 01332 720 976, g3oca1@ntlworld.com (Derby).

BOOKS. *Microwave Filters using Parallel Coupled Lines*, Leo Young, 1972 (softback), *Microwave Filters for Communication Systems*, Kudsia & O'Donovan, 1974 (hardback). FREE but £5 for postage. Simon Gosby, G8OVZ, 07702 986 422, simon.gosby@tesco.net (Hertford).

ELECRAFT K3 100W transceiver with K3 panoramic display, Nov 2014, S/N 8495, auto ATU, 2.7kHz filter, general coverage board, VGA terminal upgrade board, mic, all manuals. First class rig. £3,000 inc carriage. GM4HYR, melvynbond@btinternet.com (Edinburgh).

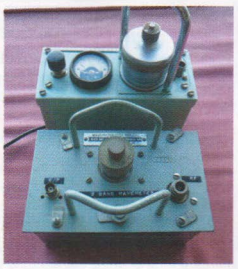
ELECRAFT KX3 with roofing filter and hand mic. Very good condition, owned from new. Never used outside! All assembled and supplied by Waters & Stanton. Serial number SN1150. £820 ONO. Steve Hemsley, G0DJE, 07925 262 951, hemsley_stephen@yahoo.co.uk (Thatcham).

EXPLORER 1000 linear amp, 1kW 80m to 10m including WARC bands. Two 3-500 valves. Owned over 15 years. Good condition. Photos available. Collection preferred or P&P at cost. £650. Martin, M0BCT, 01728 687 584, martin_m0bct@btinternet.com (Suffolk).

KENWOOD TS-440S transceiver in excellent condition, full working order, used as a standby from a smoke free environment. Complete with mic, handbook & box, £340. Brian, G4XVR, 07864 060 434 (Malpas, Cheshire).

KENWOOD TS-870S HF 100W base transceiver serial no 50500017, in good clean condition, with hand mic, original documentation and packaging, £625 ONO. Prefer buyer collects and inspects, otherwise postage at cost. Allan, M5ALU, 01778 347 295, a_horsfield@hotmail.com (Peterborough, Cambs).

MFJ-986 differential antenna tuner for coax, balanced wire antennas and end fed antennas. Scratch on one side has been painted over. Email for photos etc. £265 inc p&p. John, G3UCQ, 01736 752 982 (Cornwall).



S BAND CAVITY WAVEMETERS Two units, with integral diode detectors £25 and £35. UHF cavity resonator, covers 70cm and beyond, 30dB + notch, <0.5dB insertion loss, £30. G4UVZ, 01823 421 751, adrianwhatmore248@btinternet.com (Taunton).

SK SALE OBO 2EOMXB. Expert 1K–FA 1.8-50MHz solid state linear amplifier, good condition. Purchased June 2013. Original boxes, £1,900. Icom IC-756 PRO 3. Original boxes, Icom mic, £1,200. Good condition. Andrea, 01244 335 330 (Chester).

TENTEC JUPITER w/ant tuner. Second rig hence hardly used, absolutely as new condx. Manual, desk mic, software, £500. Fairhaven RD500 Radio Database all mode scanner/receiver 100kHz-1.75GHz, in excellent condx, manual and software, £300. Email for info and photos. Willy Wilson, GM3NUF, 01631 564 901 (Oban, Scotland).

YAESU FT-290R MK1 VHF multimode portable. Includes case, charger, mic, rubber duck & telescopic aerials, £100. AOR AR1000 handheld scanner and charger, £50. AOR AR 2001 desktop scanner, £60. Collection only please. Howard, G6FPF, 01422 350 580 (Halifax).

YAESU FT-840 with mic and manual, £180. Icom IC-726, no mic, £90. MFJ 945E ATU, £50. Datong automatic RF speech processor, £35. DG8SAQ VNWA vector analyser with extras, £300. Logikit CMOS-4 keyer, £45. Colyn, GD4EIP, 07624 413 036 (Isle of Man).

YAESU FT-950 HF/6m 100W all mode transceiver, boxed, VGC, no scratches, non smoker. Inbuilt ATU, 12V power lead and hand mic included, £750. Buyer collects or plus carriage. See https://youtu.be/r4Y-T2WKCRA. Richard, G4MKR, richardnbyford@gmail.com (Bedfordshire).

YAESU FTDx1200 HF/6m transceiver, complete with box, manual etc, all working 100%. Slight scuff mark to top. Comes with FFT1 decode module, £1,100. Inspection invited. Paul, GW4AMZ, 07789 116 295, paulbds@gmail.com (Colwyn Bay).

YAESU FTDx9000, immaculate, 14 months old, still under warranty, with matching SP-9000 speaker, includes all cables, manuals etc and the original boxes, non smoking shack, £5,000. Vincent Baines, G1PHK, 07841 695 256 (Pontefract).

YAESU YC-500J frequency counter, £80. Yaesu FR-50B Rx, £80. Yaesu FT/FP200 transceiver and PSU, £150. Icom IC-4e c/w leather case, speaker mic, box and circuit diagram, in exc condx, £100. Nigel, G4KZZ, 01723 890 786, nipro@btinternet.com (Filey).

WANTED

NEWSTAR DR111 DRM RECEIVER. Must be working and in good condition. Neil Savin, G0SVN, 07740 702 000, neil@savin.org (Maidenhead).

HELPLINES

Can anyone help? I have a Yaesu FT-101ZD that has become very poor on receive. I've been told that a FET, 3SK51-03 on the RF board is probably the culprit, but despite a search on the net I have had no luck in getting a replacement. Hoping there`s someone out there that can help. Dave, G3SKC, 01903 236 780, dave.loveridge@hotmail.co.uk (Devon).

Details of the connections for the Marconi Instruments unbalanced to balanced transformer type TM6221, and any application information. Dennis Goacher, G3LLZ, 01793 828 188 (Swindon).

RALLIES & EVENTS

Members of the RSGB Regional Team will be present with a bookstall at the rallies this month marked with an RSGB diamond

2 AUGUST – **26th KING'S LYNN ARC RALLY & CAR BOOT** – Gaywood Community Centre, PE30 4DZ. CP free, opening time 9am, admission £2, TS, B&B, CBS pitches, C, TI 145.550MHz. Ted, G4OZG, 01553 768 701, ted.haskett@talktalk.net. [www.klarc.org.uk].

2 AUGUST – **LORN RADIO RALLY** – Crianlarich Village Hall, Main Street, Crianlarich, Perthshire FK20 8QN. OT 10.30am, £2, B&B, new traders always welcome, no charge for tables. lornradioclub@gmail.com

9 AUGUST – **FLIGHT REFUELLING ARS HAMFEST** – Cobham Sports and Social Club Ground, Merley, near Wimborne, Dorset BH21 3DA. Talk In S22, CP, OT 10am to 4pm, disabled access at 9.30am, £3.50, Trade Stands, Car Boot Sale, Licensed Bar, Catering, Lectures/Seminars. Indoor & field pitches available. Tony Baker, G3PFM, 07743 475 018, hamfest@frars.org.uk. [www.frars.org.uk].

16 AUGUST NEW DATE – **FINNINGLEY ARS SUMMER RALLY** – The Hurst Radio Communications Centre, Belton Road, Sand toft, Doncaster DN8 5SX. Easily accessible from M180 J1/J2. OT 10am, £3, TS, CP, B&B, TI S21, RSGB bookstall. Kevin, G3AAF, 07831 614 640. [www.finningleyradiorally.co.uk].

21 AUGUST (Friday) – **22nd COCKENZIE & PORT SETON ARC MINI-RALLY** – Community Centre, Main Hall, Port Seton. Bring along your own 'junk' and sell it. Tables free, first come first served. OT 6pm-9pm, £2. C, DF. bob.gm4uyz@talktalk.net [www.cpsarc.com].

23 AUGUST – **RUGBY AMATEUR TRANSMITTING SOCIETY ANNUAL RADIO RALLY** – Princethorpe College, Princethorpe, Rugby CV23 9PX. £3, OT 10am-4pm, (8.30am sellers), CBC, C. Tony, G0OLS, 07759 684 411, rally@rugbyats.co.uk. [www.rugbyats.co.uk].

Rallies & Events

29 & 30 AUGUST – **OTLEY AMATEUR RADIO SOCIETY 50th ANNIVERSARY CELEBRATION WEEKEND** – The 'Shack', Clifton Village Hall, Newall Carr Road, Otley. Opening times 9am – 5pm both days, GB0ORS, displays, activities, SOTA plus the GX3RCM mobile promotional unit on the Chevin above Otley. info@otleyradio.org. [www.otleyradio.org].

30 AUGUST – **MILTON KEYNES ARS RALLY** – Longueville Hall, Hammond Park, Whaddon Road, Newton Longville, Milton Keynes MK17 0AT. Now even bigger so why not combine a visit to our rally with Bletchley Park and visit the National Radio Centre (NRC) as well? Modern venue with large indoor and outdoor areas. CP, OT 10am, £3, TS, TI, LB, C. Steve, G6KJU, 07866 673 192, rally@mkars.org.uk. [www.mkars.org.uk/mkars/rally].

31 AUGUST – **HUNTINGDONSHIRE ARS BANK HOLIDAY MONDAY RALLY** – Ernulf Academy, Barford Road, St Neots Cambridgeshire PE19 2SH. Opening time 10am (traders 8am). CP, CBS, FM, C, TS. Malcolm Hirst, M0OLG, 01480 214 282, henry_hirst@hotmail.com [www.radioclubs.net/huntsars].

5 & 6 SEPTEMBER – **BRITISH AMATEUR TELEVISION CLUB CONVENTION** – Finningley ARS HQ, The Hurst Communications Centre, Belton Road, Sandtoft, Doncaster DN8 5SX. £10 per day inc free tea & coffee. LEC, TS, demos. Convention Dinner on Saturday evening. Contact g8adm@btinternet.com [www.batc.org.uk].

6 SEPTEMBER – **TELFORD HAMFEST** – Enginuity Technology Centre, Coalbrookdale, Telford TF8 7DU. OT 10am – 4pm, £3, TI GB3TF (433.200) & on S21, TS, flea market, B&B, SIG, C, FAM, LEC, RSGB bookstall. Martyn, G3UKV, 01952 255 416. [www.telfordhamfest.co.uk].

12 SEPTEMBER – **CAISTER LIFEBOAT RADIO RALLY** – Caister Lifeboat Station, Tan Lane, Caister on Sea, Norfolk NR30 5DJ. OT 9.30am to 4:30pm (08.45am for sellers to setup), £1. Indoor tables £10 (booking available) CP, C, DIS, WIN. Zane, M1BFI, 07711 214 790, m1bfidx@ntlworld.com [www.m1bfidx.wix.com/cl-radio-rally].

13 SEPTEMBER – **BRITISH VINTAGE WIRELESS SOCIETY MURPHY DAY** – Mill Green Museum, Hatfield AL9 5PD. [www.bvws.org.uk].

13 SEPTEMBER – TORBAY ANNUAL COMMUNICATIONS FAIR – Newton Abbot Racecourse, Newton Abbot, Devon TQ12 3AF. B&B, C, DF, RSGB book stall, OT 9.30/10am, £2. Mike Dixon, leave a message on 01803 557 941, rally@tars.org.uk.

13 SEPTEMBER – **WEST KENT ARS RADIO AND ELECTRONICS FAIR** – Tunbridge Wells Grammar School for Boys, St John's Road, Tunbridge Wells, Kent TN4 9XB. TI, CP, £3, 9.45/10am, TS, B&B, C. Dave, G4OTV, 07795 211 166, rally@wkars.org.uk. [www.wkars.org.uk].

20 SEPTEMBER – **CHIPPENHAM & DARC 'MINI' INDOOR RADIO RALLY** – Neston Village Hall, Pool Green, Neston, Corsham, Wiltshire SN13 9SN. OT 9am (sellers, £5 per prebooked table) 10am (buyers), £2 (under 16 free), C. Parking on site is limited but disabled spaces will be made available. Main parking please in Leafield Way (trading estate), 5 min walk, not Pool Green rd. E-mail g0iue@btinternet.com or 07584 054 924 on the day only. [www.g3vre.org.uk].

25 & 26 SEPTEMBER – **NATIONAL HAMFEST** – brought to you by the RSGB in association with the Lincoln Short Wave Club. George Stephenson Pavilion, Newark and Nottinghamshire Showground, Lincoln Road, Winthorpe, Newark NG24 2NY (close to junction of A1/A46/A17). Free CP, TS, B&B, CB, C, SIG, Morse proficiency tests on demand, RSGB book stall, RSGB Services & Committees, DF, FM. [www.nationalhamfest.org.uk].

27 SEPTEMBER – **PENCOED ARC TABLE TOP SALE** – Pencoed Rugby Football Club, The Verlands, Felindre Road, Pencoed CF35 5PB. Tables £5 each (first come first served). OT 8.30am sellers, 9.30am buyers, £2. C. Madeline Roberts, 01639 885 126. www.mw0prg.co.uk/events.uk.

4 OCTOBER – **BRITISH VINTAGE WIRELESS SOCIETY AUTO JUMBLE** – The Angel Leisure Centre, Tonbridge, Kent TN9 1SF. OT 10.30am to 4.30pm. Stalls £30, admission £5, early admission from 9.30am £10. Bookings/enquiries 01892 540 022 (8pm to 9pm only). [www.audiojumble.co.uk].

4 OCTOBER – **BLACKWOOD ARS RALLY** – Rougemount School, Newport NP20 8QB. TI 145.550MHz, CP free, OT 10am, TS, CBS, B&B, SIG, C, LEC. Andy, 01495 220 687, andy@mw0mwz.co.uk.

4 OCTOBER – **HORNSEA AMATEUR RADIO CLUB RALLY** – Floral Hall, 7 The Esplanade, Hornsea, East Yorks HU18 1NQ. OT 10am, CP, TS, B&B, SIG, RSGB, RAFARS, LB, C, DF, WIN. Details from Rick, M0CZR, 01964 533 712, R106221@aol.com. [www.hornseaarc.co.uk].

9-11 OCTOBER – **RSGB CONVENTION** – The full convention programme of lectures for all interests will be available on the website later in the year. Principal sponsor Martin Lynch & Sons. [www.rsgbevents.org].

11 OCTOBER – **HACK GREEN BUNKER RALLY** – Hack Green Secret Nuclear Bunker, Nantwich, Cheshire CW5 8AL. Electronic equipment, amateur gear, components, military radio sets and vehicle spares. OT 10am, TS, C. Lucy, 01270 623 353, Lucy@hackgreen.co.uk. [www.hackgreen.co.uk].

17 OCTOBER – **NORTH WAKEFIELD RADIO CLUB RALLY** – Middleton Leisure Centre, Middleton Ring Road, Middleton, Leeds LS10 4AX. Tables £6 if you bring your own, our tables £12. B&B, C. Tony, G0JVI, 07740 003 159 or tonymawson@btinternet.com.

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 radcom@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. Submissions e-mailed to radcom@rsgb.org.uk should receive an acknowledgement within one or two working days.

We recommend you check whether the details of your event(s) are correct in this list and tell us if they're wrong.

Abbreviations: TI Talk-In; **CP** Car Park; **£** Admission; **OT** Opening time – time for disabled visitors appears first (eg 10.30/11am); **TS** Trade Stands; **FM** Flea Market; **CBS** Car Boot Sale; **B&B** Bring and Buy; **A** Auction; **SIG** Special Interest Groups; **MT** Morse tests; **MA** Foundation Morse Assessments; **LB** Licensed Bar; **C** Catering; **DF** Disabled Facilities; **WIN** prize draw, raffle; **LEC** Lectures/Seminars; **FAM** Family attractions; **CS** Camp Site.

RSGB MEMBERS' ADVERTISEMENTS

RSGB Members wishing to place an advertisement may do so free of charge by e-mail.

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. You should receive an automatic acknowledgement almost immediately – if you don't, please phone the *RadCom* office on 01234 832 714. 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.**

3) The Ad may not contain more than 40 words, excluding the information in (2), and may be edited for readability at our sole discretion. Longer ads may be accepted if there is a good reason, eg a shack clearance on behalf of a SK Member; e-mail us and ask.

4) Not more than one ad per month will be accepted from any member. 'Recurring' ads will not be accepted, but Members may re-submit the same advert each month if they wish.

5) E-mailed adverts may optionally include one photograph of the item(s) being offered. Images must be attached as a jpg file, at least 800 pixels wide and of good quality. By submitting any image you warrant that you own the copyright of that image and that you permit the RSGB to use it in any way. We will endeavour to publish photos with ads as space permits but cannot guarantee to publish any particular photo.

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 can now be accessed via Membership Services in the digital edition of the magazine.

SPECIAL EVENT 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
01/08/2015	GB2BHL	Bidston Hill Lighthouse	Wirral	LH	M0WAD
	GB1OL	Orkney Lighthouses	Orkney Islands	TLHV27	M5DWW
	GB2HB	Heavenly Body II	Essex	LH2	G4UVJ
	GB2BRS	Bawdsey Radar Station	Suffolk	TLHV27	G4YQC
02/08/2015	GB2CWM	Cold War Museum	Suffolk	LH	G4XVE
08/08/2015	GB2VJ	Victory Japan	Essex	LH	G4ZUL
12/08/2015	GB4IYD	International Youth Day	Doncaster	LH27	G0FUO
13/08/2015	GB1HA	Headcorn Aerodrome	Kent	TLHV27	G0UXG
	GB0REL	Lighthouse Light Ship Weekend	Co Antrim	LHV27	GI0PGC
14/08/2015	GB2LBN	Lighthouse Barns Ness	East Lothian	LH	GM4UYZ
	GB5RR	Rubha Reidh	Wester Ross	LH	G4IAR
	GB0NLH	Needles Light House	Isle of Wight	LH2	G0GMY
	GB5HCL	Hurst Castle Lighthouse	Lymington	LH2	M0KZC
	GB2BML	Blakeney Mariners Light	North Norfolk	TLH2	G3YOA
	GB2LK	Lighhouse Killantringan	Stranraeer	LHV27	GM0HPK
15/08/2015	GB0BCK	Intl Lighthouse Lightship Weekend	Moray	LH	M1ACM
	GB0TBW	Trinity Buoy Wharf	London	LH2	G0TOC
	GB4EUL	East Usis Lighthouse	Newport	L	GW4SUE
	GB4BHL	Berry Head Lighthouse	Torquay	LH2	G4XKH
	GB1DLH	Dungeness Light House	Dungeness	LHV27	M0SSR
	GB0PL	Paull Lighthouse	Paull	LH2	G4VHM
	GB0VJD	70th Year of Victory Over Japan	Yeovil	LHV27	M0KRP
17/08/2015	GB2KAA	Kent Air Ambulance	Kent	TLHV27	G0UXG
20/08/2015	GB100BVU	Blind Veterans UK	Llandudno	TLHV27	G0PQQ
21/08/2015	GB2KAA	Kent Air Ambulance	Kent	TLHV27	G0UXG
	GB0LVF	Llandrindod (Wells) Victorian Festival	Llandrindod Wells	LHV2	MW0GMH
24/08/2015	GB4MO	Military Odyssey	Kent	TLHV27	M1CCF
25/08/2015	GB4SBS	Second Bracknell Scouts	Sussex	TLHV27	M0XDF
26/08/2015	GB4STS	Saint Saviours	Surrey	LH27	M0MXC
29/08/2015	GB2LRS	Loughton Radio Society	Essex	LHV27	G0TOC
	GB2PPS	Papplewick Pumping Station	Notts	LH	G0UYQ
	GB1BNB	Bunkers On The Air	Lancashire	LH2	M0WSW
	GB4HSC	Great Britain for Hinckley Sea Cadets	Hinckley	TLHV27	G8BFF

18 OCTOBER – **GALASHIELS AND DISTRICT ARS RADIO RALLY** – The Volunteer Hall, St Johns Street, Galashiels, Scottish Borders TD1 3JX. OT 11.15, £2.50. B&B, TS, C. Jim, GM7LUN, 01896 850 245, gm7lun@qsl.net.

18 OCTOBER – **HOLSWORTHY AMATEUR RADIO RALLY** – Holsworthy Community College, Victoria Hill, Holsworthy EX22 6JD. TS, B&B, C, DIS. Register at http://harc.postalboard.com/login to make any enquiries. [www.radioclubs.net/harc/].

24 OCTOBER – **6th FOG ON THE TYNE RALLY** – Whitehall Road Methodist Church Hall, Bensham, Gateshead NE8 4LH, organised by Angel of the North ARC. Opening time 10.30am, £2, TS, B&B, RSGB bookstall, C, CP. Nancy Bone, G7UUR, 01914 770 036 (eves), nancybone2001@yahoo.co.uk. [www.anarc.net].

25 OCTOBER – **26th GREAT NORTHERN HAMFEST** – Barnsley Premier Leisure Complex, Queens Road, Barnsley S71 1AN or follow the brown Metrodome signs. GNHF in association with SYRG. Opening time 10am, TS, SIG, C, FAM. Ernie, G4LUE, 07984 191 873. [www.gnhf.co.uk].

1 NOVEMBER – **NORTH WALES RADIO RALLY** – Abergele Leisure Centre, LL22 7HT. Opening times 10.30am to 4.30pm, CP, C, DIS, TI, TS, B&B, RSGB bookstall, WIN. Gordon, 07733 531 766, mw0gbr@ymail.com.

8 NOVEMBER – **WEST LONDON RADIO & ELECTRONICS SHOW** (Kempton Rally) – Kempton Park Racecourse, Staines Road East, Sunbury on Thames, TW16 5AQ. TI, free CP, OT 9.50/10am. TS, FM, B&B, SIG, C, DF, WIN, LEC. Paul, M0CJX, 08451 650 351, info@radiofairs.co.uk. [www.radiofairs.co.uk].

15 NOVEMBER **NOTE NEW VENUE** – **CATS RADIO & ELECTRONICS BAZAAR** – Coulsdon Community Centre, Chipstead Valley Road, Coulsdon, Surrey CR5 3BE. Limited on site parking (50), nearby street parking is available. Nearest bus stop Coniston Road on the 166 bus route. Opening times 10am-2pm, admission £1 including a complimentary tea or coffee, B&B, C, DIS. Glenn, G4FVL, bazaar@catsradio.org.

15 NOVEMBER – **PLYMOUTH RADIO CLUB RALLY** – Harewood House, The Ridgeway, Plympton, Plymouth PL7 2AS. CP, TI, OT 10am, £2, TS, C. Sheila Hart, 2E0YSH, 07815 542 477, sheo@fsmail.net.

21 NOVEMBER – **ROCHDALE AND DISTRICT ARS TRADITIONAL RADIO RALLY** – St Vincent de Paul's, Caldershaw Road, off Edenfield Road (A680), Norden, Rochdale OL12 6BU. OT 10.15/10.30, £2.50 (concessions, under 12s & seniors), TI S22, C. Pitches £5. Dave, G0PUD, 0161 285 1600, dave.shaw1@sky.com. [www.radars.me.uk].

SILENT KEYS

We regret to record the passing of the following Members:

Name	Date
Mr L F G de Carteret, 2U0FER	7/5/2015
Mr J B Fallon, G0PTB	8/5/2015
Mr J Thompson, G0XVS	June 2015
Mr A R W Howard, G1TKX	17/6/2015
Mr A W W Timme, G3CWW	6/6/2015
Mr J Stockley, G3FMW	June 2015
Mr R Gerrard, G3NOM/HS0ZDZ	20/5/2015
Mr R R J Caines, G3ORC	2/6/2015
Mr B J Todd, G3PHW	25/5/2015
Mr L J Santer, G3PVB	13/2/2015
Mr E B Iddon, G3RZA	21/6/2015
Mr R S Hewes, G3TDR	19/6/2015
Mr J R Speller, GJ3YLN	2/5/2015
Mr B May, G4EXW	16/6/2015
Mr W Broxup, G4OPN	17/6/2015
Mr A B Smith, G6DJI	May 2015
Mr J E Mather, G6UNC	7/1/2015
Mr D Hamilton BEM, M0BVE	22/4/2015
Mr T W Coe, N7PTK	1/5/2015

SILENT KEY COLUMN ENTRIES

To notify the RSGB that a Member has passed away (and their subscription should end and they should be listed in Silent Keys), please e-mail sales@rsgb.org.uk or telephone 01234 832 700 and then select option 1. We will need to know the deceased's name, callsign or RS number and, if possible, date of death.

OBITUARIES

Oituaries are published at www.rsgb.org/sk. Please send submissions by e-mail (only) to sk@rsgb.org.uk. All submissions are moderated and may be edited for reasons of style, grammar, length etc. *Online obituaries are separate from the Silent Keys column.*

5 DECEMBER – **SOUTH LANCS WINTER RALLY** – Bickershaw Labour Club, Bickershaw Lane, Bickershaw, Wigan WN2 5TE. OT 9am, traders 7.30am. £2.50, B&B, C, DIS, CP, SIG, DF, TS, LB. Jason, 01942 735 828.

6 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. John, G4LRG, 01388 606 396.

2016

7 FEBRUARY – **31st CANVEY RADIO & ELECTRONICS RALLY** – 'The Paddocks', Long Road, Canvey Island, Essex SS8 0JA (southern end of A130). Catering, RSGB bookstall, Special Interest Groups, trade stands, free car park, venue has disabled facilities and is served by public transport. Vic Rogers, G6BHE, 07957 461694, Nvr1945@btinternet.com [www.southessex-ars.co.uk].

20 MARCH – **31st WYTHALL RC RALLY** – WRC HQ, Wythall Park, Silver St, Wythall B47 6LZ. OT 9.30/10am, £3.30, CP, TS, C, LB, DF. Mike, 07976 744 479, rally@g4vpd.com. [http://wythallradioclub.co.uk].

RADIO SOCIETY OF GREAT BRITAIN

ADVANCING AMATEUR RADIO SINCE 1913

Founded in 1913 incorporated 1926. RSGB is a trading name of Radio Society of Great Britain, a limited company registered in England and Wales with company number 00216431. Member society of the International Amateur Radio Union.

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

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

RSGB MEMBERSHIP

Annual rates from 1 January 2011

Full Membership (by Direct Debit). £47.00
(individual & club)
Family membership (by Direct Debit). £56.00

Paying other than by Direct Debit attracts a £4 premium.

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

Subscriptions include VAT where applicable.
Special arrangements exist for visually impaired persons.
Details and Membership application forms are available from RSGB HQ or see www.rsgb.org/join

YOUR RSGB

This page provides names and contact details for Board Members, Regional Managers, Committee Chairmen and Honorary Officers. Members seeking advice and guidance on any aspect of amateur radio or the Society's work are free to contact the relevant person below. Before doing so, please do check the comprehensive FAQs on the RSGB website, www.rsgb.org/faq/ to see if your question is answered there.

For HQ staff, both e-mail addresses and telephone details are provided, including the option to select when dialling through the RSGB switchboard (01234 832 700).

Chairmen and Honorary Officers:
These are all volunteers and give their time freely to support the Society. Members should respect the fact that many also have full time day jobs, and so e-mail is the appropriate method of communication.

THE RSGB BOARD

John Gould, G3WKL, e-mail: g3wkl@rsgb.org.uk

Graham Murchie, G4FSG, (Board Chairman)
e-mail: g4fsg@rsgb.org.uk
Stewart Bryant, G3YSX, e-mail: g3ysx@rsgb.org.uk
Steve Hartley, G0FUW, e-mail: g0fuw@rsgb.org.uk
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Len Paget, GM0ONX, e-mail: gm0onx@rsgb.org.uk
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Honorary Treasurer:
Richard Horton, G4AOJ, e-mail: g4aoj@rsgb.org.uk

Company Secretary:
Rupert R Thorogood, G3KKT, e-mail: g3kkt@rsgb.org.uk

Note: The General Manager, Company Secretary and Honorary Treasurer are not Directors, but are in attendance at Board Meetings.

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Region 1 – M Hazel-McGown, MM0ZIF, rm1@rsgb.org.uk
Region 2 – D Morrison, GM1BAN. rm2@rsgb.org.uk
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Region 4 – N Ferguson, G0BPK, rm4@rsgb.org.uk
Region 5 – M Vincent, G3UKV, rm5@rsgb.org.uk
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Region 12 – S Thomas, M1ACB, rm12@rsgb.org.uk
Region 13 – S Boden, G4XCK, rm13@rsgb.org.uk

SPECIALIST AREAS – CHAIRMEN & HONORARY OFFICERS

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Amateur Radio Direction Finding
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VHF Matters
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e-mail: vhf.manager@rsgb.org.uk

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

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Telephone: 01234 832 700, Option 4

Amateur Radio Examinations
e-mail: exams@rsgb.org.uk
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Elaine Richards, G4LFM or Giles Read, G1MFG
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GB2RS and Club News
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PLAY YOUR PART IN YOUR RSGB

Have Your Say
Let us know how we're doing! Through "Have Your Say" you can let us know your views and you will receive a reply from the General Manager or a Board Member.
Write to haveyoursay@rsgb.org.uk or go to www.rsgb.org/haveyoursay/

Consultations
From time to time you will find we are consulting the Membership on aspects of Society policy. You can find current consultations at www.rsgb.org/consultations/

National Radio Centre
Don't forget to tell your friends about the National Radio Centre at Bletchley Park. Full details at www.nationalradiocentre.com

Licensing & Special Event Stations
Licensing and Notices of Variation (NoVs) for special event stations are handled by Ofcom, 0207 981 3131, www.ofcom.org.uk, e-mail Spectrum.Licensing@ofcom.org.uk

FAQs
The RSGB has compiled the questions most frequently asked by Members at www.rsgb.org/faq/

Band Plan
The latest version of the band plan is always available on the website at www.rsgb.org/band-plans/

Good Operating Practice
The RSGB fully supports the code of conduct and encourages all amateurs to read the advice at www.rsgb.org/op-guidelines

RSGB Tech
The purpose of this service is to be the first port of call for technical queries on amateur radio matters. It is open to all radio amateurs. See http://groups.yahoo.com/group/rsgbtech/

RSGB Shop
All RSGB goods - books, filters, clothing etc - can be purchased online at www.rsgbshop.org/

Club Finder
Use the website to find your nearest radio club and check out the facilities they have to offer. www.rsgb.org/clubsandtraining/

WEBSITE

Main website: www.rsgb.org
Members Pages: Log in using your callsign as the user name and your Membership number, without the leading zeros (see your *RadCom* address label) as the password.
If you need to update your Membership details, please visit log in to Membership Services at www.rsgb.org/members

ATU

Robert Dancy, G3JRD

It was good to see in the July 2015 *RadCom* a couple of comments about ATUs, one even saying that the term 'Aerial Tuning Unit' is a 'glaring error' (G3PKW in Last Word). Ideally, any aerial should be properly resonant and the transmitter/feeder/aerial combination properly matched. At no time in the past 62 years have I used an ATU, unless a series tuning capacitor classifies as one. Admittedly they could be useful if you have very limited space and need to use a single antenna for several bands. All my HF antennas have been homebrew ones, mostly of 18 SWG wire.

[We would all agree that a resonant antenna is best but if I was to erect a Top Band dipole it would need to cross 10 neighbours' gardens on two different streets so, like many other amateurs, I am obliged to use compromise antennas and a matching unit – G1MFG]

LARGE LINEARS

This is a selection of the e-mails received on this subject – Ed.

Gordon, G8WWD

I have often wondered why you allow advertisements for high power linears to be carried in *RadCom*. However, the review of a 1.3kW linear in this month's magazine really takes the biscuit. Even on the low setting you are saying that this linear is over the legal power limit for the UK. Yes, I know you have non-UK members who may have higher power limits, but the primary market for *RadCom* is surely the UK amateur.

Why on earth is *RadCom* encouraging people to buy such a beast? OK, so you can say that there are cars on our roads that are capable of more than double the speed limit, so it is just the same, but I don't agree. Yes, you see plenty of people speeding on our roads, but I have yet to see anyone firing up a linear and then de-tuning or reducing the drive to give only 400W output. The standard tune up process is to 'tune for maximum smoke'!

I have to ask the question. Aren't you just encouraging people to break their licence conditions? I think you are and I think that is an irresponsible thing for our Society to be doing!

Alan Heritage, G4EOG

I applaud and support the great work done by the RSGB's spectrum defence activity in particular the defence fund and the EMC Committee. A great and vital contribution to keeping unwanted emissions from damaging the environment that underpins our hobby and vital professional communication systems.

However, I find the recent equipment review of the SPE Expert Linear Amplifier (*RadCom* July 2015) in total contradiction to the good work done by the RSGB to defend the spectrum. The spectral purity and output power levels of this product render it, in my opinion, unsuitable for the UK amateur market and to call it a 'linear amplifier' is misleading. Two issues are immediately clear from the article. First, the poor linearity quoted as "typically in the region of -20dB to -26dB relative to PEP" will lead to significant adjacent channel interference and falls outside of the requirements of para 7 1(b) of the UK Amateur Radio Licence. Secondly the UK Full Amateur licence only allows the use of 400W (26dBW) yet publishing this article seems to actively promoting its use at levels up to 1300W. Even on low power, this product exceeds the legal limit. Why is there not a restricted variant for the UK market as there clearly is for the US market?

The Society's policy is to bring Members independent, well respected opinion of new products. We do not recommend any particular equipment – it is for readers to use the content of reviews in their purchasing decisions. We, of course, encourage Members to comply with their licencing conditions but it is for individuals to decide how best to do that. Amateur equipment is a global market and one of the privileges of our licence conditions is that we are not restricted on what we can purchase or construct.

It is good practice to always operate an amplifier conservatively, just as motor vehicles are invariably driven well within the manufacturers maximum parameters and, indeed, the article reports that linearity improves when the power is reduced.

METALLURGY

Dave, K1NYK

After receiving an e-mail from Godfrey, G4GLM, I realised that I failed to translate US stainless steel names into their British counterparts.

Grade A2 equates to our industry name of AISI 304 and both are well suited for use outdoors. However, some caution is advised here as both countries also talk about a tool steel grade that's also called A2. Per the *RadCom* article, a magnet is attracted to tool and ordinary steels but not A2/304 or other so-called austenitic stainless steels (eg 316). Hardware and home centre stores typically use the industry grade names but there are specifications involved if the material is purchased from a steel centre. Here are some A2 stainless documents: BS970 304S15; Werkstoff 1.4306; DIN X5CrNiMo 17-12-2; UNS S30403.

Some other info may be helpful. If you are near the sea or near an area of a corrosive atmosphere (industrial area, etc), the British grade of A4 (AISI 316) would be better since it has better corrosion resistance than A2 (304).

It used to be that low carbon versions would be selected if the material were to be welded. In the States, low carbon is pretty much all that's available nowadays. The British BS970 specs for US grades 304L and 316L are 303S21 and 316S15, respectively.

RADIO CLOCKS

Ross, MI0ZAO

In answer to a letter in Last Word, July 2015. The antenna is similar to the ferrite rod antenna found in an ordinary LF/MF broadcast receiver, except quite a bit smaller. As it is for use at fixed frequency (60kHz in the case of MSF) there is no need for variable tuning components.

Believe it or not, it is possible to obtain radio controlled wristwatches – such as the Casio Wave Ceptor. How they implement the antenna on those remains a bit of a mystery to me!

Most radio controlled clocks only synchronise with MSF once every 24 hours – in between synchronisations the time is maintained by an ordinary quartz oscillator, which should be stable enough to keep time to within something in the region of a quarter to half a second a day.

You should therefore find that most of the circuitry of the radio controlled clock is similar to that of a standard quartz clock, but with the antenna and additional circuitry to allow synchronisation with MSF.

David Woolley, G3ZZF

Robert Dancy's basic premise about the size of tuned circuits is in error. These receivers are typically TRF designs using a resonant ferrite rod (ie an LC tuned circuit) as the preselector and a quartz crystal for the main selectivity. Datasheets are easy to find online. Although older devices, the datasheets for the AK2124 and AK2125 give a more detailed internal block diagram.

Phil, G0DOR

Here's a link to a brilliant site offering MSF atomic clock circuit boards 'free' to students and colleges. The board is 25 x 13 x 12 and aerial 60 x 13 (mm). It's not SDR but is certainly tiny. How they get similar circuits into watches really is amazing.

http://www.galsys.co.uk/modules/free-modules-for-students.html

https://www.pvelectronics.co.uk/index.php?main_page=product_info&products_id=2

DIRECTIONAL COUPLERS AND SWR BRIDGES

Mike Christieson, M0FCD

In this article the author mentions that in conventional microstrip directional couplers the directivity is limited. Readers might be interested in a simple addition that improves it significantly. The reason for limited

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directivity is that there are two coupling modes. Coupling between each line and the ground plane is around 90 percent in the dielectric material, whereas coupling between the two lines is around 50 percent in the material, the rest in air. This results in the effective dielectric constant for the two modes being unequal and hence limits directivity. Designs can be 'optimised', I hesitate to use the word 'frigged', but this results in unpredictable narrow-band performance. This limitation can be almost eliminated by placing over the coupled lines, and in close contact, a small section of the same dielectric material from which the coupler is constructed. This is realised by a piece of PCB material with no copper on either side, extending beyond the lines by perhaps 15% and is simply glued in place.

The coupler is now really of buried microstrip construction and the directivity much improved with very little complication.

Software simulation aids the design of these structures considerably, For example, *Sonnet Lite* is available free (see www.sonnetsoftware.com) and, although it appears arduous to get into, is well worth the effort.

GARDEN PARTY

Patrick J Gray, GOHYT

I was interested to see a photograph in *RadCom* of the RSGB President and General Manager representing the Society at the Queen's Garden Party at Buckingham Palace. And a fine looking pair they look too!

I was wondering whether the photograph should have been taken within the grounds of the Palace. I well remember in 1992 when I was invited to attend a Palace Garden Party as district commissioner for Scouts representing the Sunbury & Shepperton district, my letter of invitation came from the Lord Chamberlain's Office and it categorically stated that taking photographs within the Palace and grounds was strictly forbidden. There were facilities for photographs to be taken, but only on the outside of the Palace and then only street side.

I am sure that that the top representatives of our Society would not break the rules of the Lord Chamberlain's Office. I can only assume that those rules have been somewhat relaxed since the time of my invitation.

Please rest assured that we were very sensitive to the need to comply with protocol during our visit. I have to confess that we were surprised to find that camera phones were much in evidence throughout the garden in full view of Palace officials since we, also, were led to believe that there was a ban on photography. I suspect that this represents a practical compromise on the part of the Palace officials in that they recognise the desire for most invitees to have a personal photographic record of their attendance (a ban on which would be difficult if not impossible to enforce) and that this is tolerated in as far as it does not become intrusive. Graham Coomber, GONBI

MAST HOISTING

Reg, G8VHI

I read with interest the article on masts and hoisting systems. I spent 12 years in the Royal Air Force as an aerial rigger and have a few points readers may find interesting.

A gin pole is actually an item that is attached to a mast already in place to help raise another section of mast onto it. The correct term is a falling derrick. The mast should not be at 90 degrees to the derrick! Otherwise when the mast gets close to vertical the derrick may already be on the ground. If there are multiple guy points a slight bend should be used on the derrick.

Also the side guys on the derrick should be checked during raising or lowering. The reason being that if you have an irregular placing of guy points, the side guys can tighten or slacken off.

I hope this helps.

LIGHTHOUSE OPERATIONS

Heather Stanley

Stockport RS Contesters Group will be operating as GI5O from the East Lighthouse, Rathlin Island, EU-122 from 24th to 26th July, primarily for the IOTA Contest.

Operators: G0LZL, G0SYP, G3SHF, M0DCG, M0TJU, M1PTR and M5KJM.

QRP CONSIDERATION

Owen, 2E0GBD

The HF side very new to me and my interest is in QRP working. When making a CQ call, is there a frequency for QRP operation? Some amateurs are very nice and will make the effort to speak to a QRP station, others not so nice.

The G-QRP club recommends trying:
CW: 1.836MHz, 1.843MHz, 3.560MHz, 7.030MHz, (USA also uses 7.040), 10.106MHz, 10.116MHz, 14.060MHz, 18.086MHz, 18.096MHz, 18.106MHz, 21.060MHz, 24.906MHz and 28.060MHz.
SSB: 3.690MHz, 7.090MHz, 14.285MHz, 18.130MHz, 21.285MHz, 24.950MHz and 28.365MHz.

UP TO DATE

Alan Nixon

Having retired from work and now an OAP, I decided to dust off my radio equipment and return to active amateur radio involvement after many years of inactivity my only involvement having been the reading of *RadCom*.

I decided to visit websites for all the latest news, local clubs and associations, repeater groups, and other specialist user groups. However, if I was expecting to learn of the changes that had occurred during my absence I was to be very disappointed. finding that many websites had not been updated for many years, clubs that no longer met, rallies that happened three years ago AGMs that had been held months ago, repeaters that were going to be upgraded two years ago etc.

If organisations decide they need to have a website surely they also need to keep it up to date! The same goes for Facebook, Twitter and Yahoo pages.

ALL KINDS OF EVERYTHING

Ray J Howes, G4OWY

Amateur radio is about a huge number of people around the world all having fun – doing what they like doing best.

Some do it by joining into nets, some chasing DX whilst fighting pile-ups, others do it with handheld transceivers – keeping in touch with their friends on the local repeater, some get involved with running their local club. Then there are those who get their kicks working through satellites, bouncing signals off the Moon, building kits and antennas, or designing their own state of the art equipment. Others might be experimenting with microwaves, sending messages via the latest cutting edge technology, using AM or CW, slow-scan TV – or fast scan TV. Some go fox hunting – no, not those cute brown furry things. These people hunt down hidden transmitters. Some might travel to some remote rock in the middle of the Pacific Ocean (usually at their own expense), giving thousands of contacts to other amateurs around the world. Some altruistic amateurs give up their own time to show newcomers the ropes.

These are the majority and those that need to be remembered when we are being annoyed by the odd one who tunes up in the middle of an on-going QSO or who seem to hog the local repeater.

The world of amateur radio has something for everyone and every conceivable temperament. It sure is a wonderful hobby and we are a thoroughly spoiled lot.

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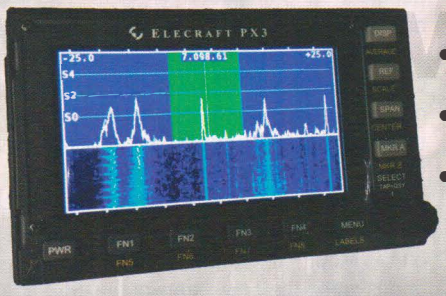

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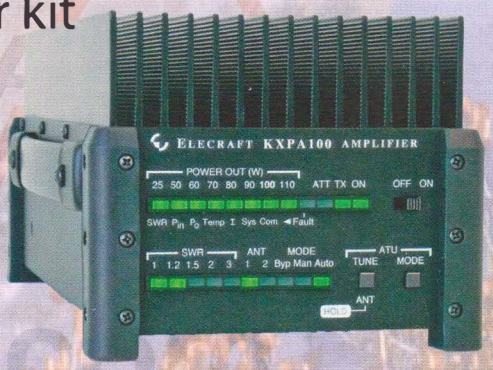

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