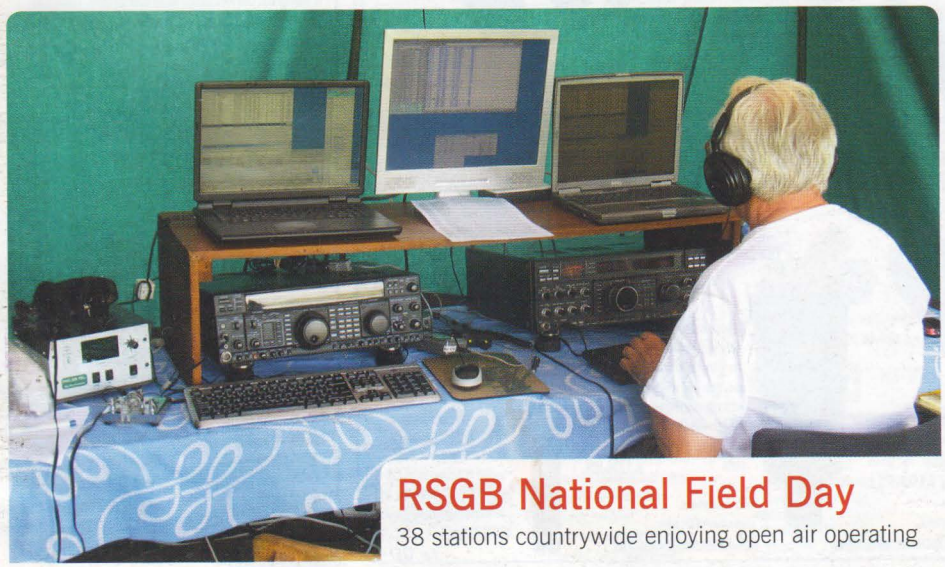
RadCom

RADIO SOCIETY OF GREAT BRITAIN ◆ ADVANCING AMATEUR RADIO SINCE 1913

NOVEMBER 2014
VOLUME 90
NUMBER 11
£4.95

Icom ID-5100

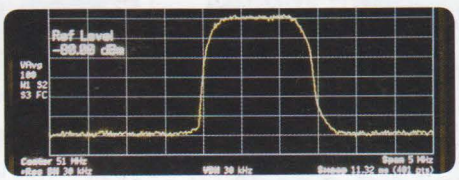
Sophisticated yet easy to use dual bander with D-Star, GPS, SD card, a global repeater list and more



RSGB National Field Day

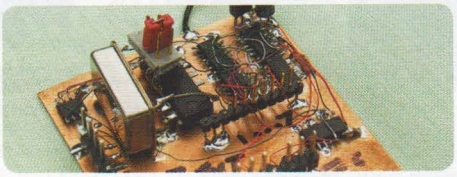
38 stations countrywide enjoying open air operating

ATV



Digital ATV experiments on 6m

Design Notes



Gold code generator for spread spectrum work

WATERS & STANTON

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Sposers of RSGB Club Of The Year

More Exclusive Yaesu Deals from Top UK Yaesu Dealer!

FT-897D HF & 70cms 100W £749 d

Price Inc. £50 Cash Back

The FT-897D is a very compact radio, like the FT-817ND on steroids. All modes and all bands in a very compact package .

FT-DX5000MP

We have the latest version of this great transceiver at a great price.This is the Yaesu Flag Ship radio that has proved itself with DXers around the world. Now offered at a really great price. £4225 d

YAESU
Choice of the World's top DX'ers

FT-991 Transceiver HF - 70cms

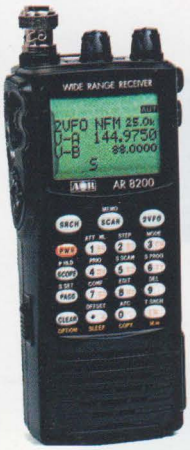
NEW

Coming soon at a very special price. Don't order one until you find out our amazing price. Email us to register your interest and be he first to know the "intro" price and OFFER.

The Best Handheld Scanner?

AOR AR-8200

All Bands
All Modes
All Occasions



The AR-8200 MK III is the kind of radio that you can carry around with you, and get serious wide band coverage reception of HF - UHF including SSB and CW. It's a radio that we sell to UK government organisations for monitoring and it could be a great travelling companion for ham enthusiasts.

£449.95

- 530kHz - 3GHz coverage
- AM FM FMW CW & SSB
- Inc rechargeable batts
- Multi steps Inc. 8.33kHz airband
- 1,000 memories (20 banks)
- Detachable MW bar antenna
- Noise limiter & attenuator
- Dual Freq. & MW bar antenna
- signal meter & PC socket fitted
- 4 x AA cells or Ext 12v

Part Exchange, Cash Back & Offers!

YAESU
Choice of the World's top DX'ers

In Stock!

FT-DX1200

Plus 15%Discount off any MFJ items ordered at the same time! (FT-DX1200 only)

£1199 d

FT-450D Special Price £619 !

FT-DX3000 HF & 6m Transceiver £1899

Includes £160 Cash Back

Peter Hart Review in RadCom:
"There is little I could find fault with."

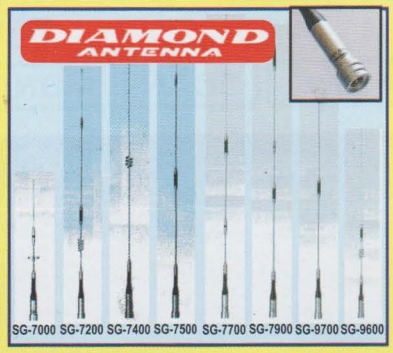
Plus 15%Discount off any MFJ items ordered at the same time! (FT-DX3000 only)

The new HF generation of base stations from Yaesu/ Built in auto ATU with advanced DSP and superb roofing filters.

Yaesu FT-1DE Dual Band Special Deal

£299

DIAMOND ANTENNA

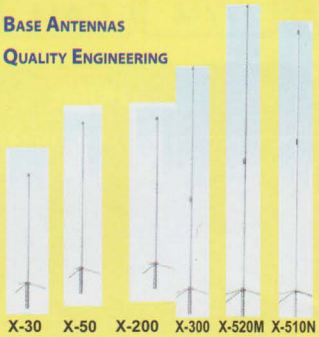


SG-7000 SG-7200 SG-7400 SG-7500 SG-7700 SG-7900 SG-9700 SG-9600

SG-2000	2m/5.2dB 1.59m	£79.95 C
SG-7000	2m/70cm 2.1/3.8dB 0.47m	£64.95 C
SG-7200	2m/70cm 3.2/5.7db 0.96m	£74.95 C
SG-7400	2m/70cm 2/5.5dB 0.99m	£69.95 C
SG-7500	2m/70cm 3.5/6dB 1.06m	£69.95 C
SG-7700	2m/70cm 4.3/6.8dB 1.27m	£89.95 C
SG-7900	2m/70cm 5/7.6dB 1.58m	£99.95 C
SG-9500M	2/70/23cm 3/6/9.7dB 1m	£89.95 C
SG-9600	6/2/70cmdB 0.82m	£82.95 C
SG-9700	6/2/70cm 0/3/5.8dB 1.07m	£89.95 C

DIAMOND ANTENNA

BASE ANTENNAS
QUALITY ENGINEERING



X-30 X-50 X-200 X-300 X-520M X-510N

X-30	2/70cm 3/5.5dB 1.3m 150W	£54.95 D
X-50	2/70 4.5/7.2dB 1.7m 200W	£64.95 D
X-200N	2/70cm 6/8dB 2.5m 200W	£89.95 D
X-300	2/70cm 6.5/9dB 3.1m 200W	£104.95 D
X-520M	2/70cm 8.3/11.7dB 2.5m	£154.94 D
X-510N	2/70cm 8.3/11.7dB 5.2m 200W	£149.95 D
X-700H	2/70cm 9.3/13dB 7.2m 200W	£249.95 D

HEIL SOUND

The Origin of Great Sounding Signals

It All Starts at The Microphone!
W&S Exclusive Ham & Pro Distributors

ProSet-3 Heaphones

ProSet-3
If you have never tried a pair of professional headphones, then you are in for a big Surprise. The ProSet 3 has a real "WOW" factor. At last you can hear exactly what is coming out of your receiver. Nothing missing and nothing added. A real investment.
£109.95 c

ProSet Boom Mic.

The favourite of contesters and DXpeditions

ProSet Elite Boom Mic Headset
Large dual headphone & boom mic. with HC-6 element and Phase Reversal System. £179.95 c

ProSet Elite IC Boom Mic Headset
Icom boom set inc Icom lead £189.95 c

ProSet- 6 Boom Mic Headset
Everything that you get with the ProSet Elite other than the phase reversal.
£149.95 c

We can supply matching cables for any radio

Fist Mic. HMM

The fist mic is back with an acoustic front vent to reduce noise and echo. Typical Heil quality.
Available from stock £79.95 c
Matching Rig leads available

Blue Tooth Set

HBA Blue Tooth Set.
Allows you to dispense with your microphone lead and wander all round the room if needed! For use with PR-781 mics. or other "PR" series microphones. A great idea. £109.95 c

Headset Adaptors for boom mics.
These are **AD-1** codes £18.95 for each radio type

Pro Series Mic

If you are looking for the very best microphone for ham radio, this is the one. Bob Heil designed this for use with top range transceivers using the same element as is used in the best broadcast mics. Available from stock. £179.95

Mic. Adaptors
These have **CC** codes
£35.95 for each radio type

Base Station Mic

Using the broadcast quality HC-6 insert, this is the ideal base station microphone for the modern transceiver with EQ control. This really is great value and gives you Heil quality at a great price. Call us with details of your radio and we advise on matching lead.
£69.95 c

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

WANTED DEAD OR ALIVE!

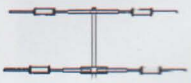
We will accept any ham radio equipment in part exchange, even non-working items in many cases.

Just a Phone Call Away! 01702 203353
email: sales@wsplc.com

Mosley Mini Antennas - USA

Fit For Your Garden!

MINI-32-A 3 BANDS 2 ELEMENTS



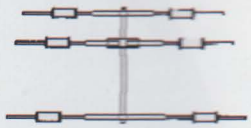
£349 d

Bands:	10-15-20m
Power	1Kw SSB 500W CW
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"

MINI-31-A 3 BANDS ROTARY DIPOLE

A rotary dipole (or fixed) that covers 10-15-20m 1kW. £239 d

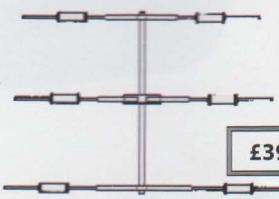
MINI-32-AW 5 BANDS 3 ELEMENTS



£449 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"

TA-33JR 3 EL. 3 BAND 1KW YAGI



£399

The all time favourite of many hams for many years. It has great performance with low profile. Time has shown that the low wind loading gives long life even in high winds. Easy maintenance and a great design.

Bands: 10-15-20m
Power 1Kw SSB
Gain 10=8 15=6.8 20=5.8 (dB)
F/B Ratio 20dB max on all bands
Boom 12ft
Longest El. 26.7ft
Turn Radius 14.7ft
Weight 21lbs
Mast Size 1.5

A Rotator for VHF Arrays and Mini Beams *

£119.95 c

hy-gain

The AR-303X comprises rotator motor and the control box. It requires simple 3 core cable to connect the two together.
* For mini beams we recommend 2 el models only in non exposed locations

ICOM ID-5100E

Dual Band FM & D-Star

ID-5100E Regular £569.96
* FREE SD Card
* Free 24-Hour UK Mainland Corier delivery.
* Built-in GPS Receiver
* Auto Repeater programming via GPS
* Touch Screen remote head.

ID-5100E Deluxe adds these features. £719.95
* Blue tooth Interface
* Blue Tooth Headset for hands-free
* Suction mount and accessories
* Save £126 on these extras!

Antenna Analyser VAA-1

£199.95

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

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

AR-Mini

Covers 100kHz - 1.3GHz AM FM & WFM. 1000 memos, 30 program features inc, CTCSS & DCS. Alphanumeric channels and a built-in bar antenna covering 100kHz - 5MHz. Inc. NiMH pack and charger. FREE software database for PC loading via www.aorja.com.

Here is your chance to snap up a bargain. This is quite a remarkable receiver. Ultra compact, but with an excellent and very sensitive receiver. And if you operate on 6m, 4m, 2m, 70cms and 23cms, you have a very handy monitor receiver.

~~£169.95~~ **£149.95c**
+ FREE CASE

The AR-8600 Mk III - A Most Remarkable Radio

an You Monitor Your Transmission?

Can You Listen 160m - 23cms All Modes?

This most remarkable receiver gives you amazing home station performance at a very reasonable price. All modes of operation from 530kHz right up to UHF 3GHz.

The nice clear display coupled with the keypad entry really makes this a smart and easy to operate receiver.

You can use a short whip antenna or a large external antenna, whilst the memories and scanning make it easy top hop from short wave to airband etc.

It's a reliable receiver that we are proud to offer and one that you will be proud to own.

£569

W & S are exclusive distributors of this radio and all AOR products.

FREE Next Day Delivery to all readers of this magazine.

VX-8DE

6m /2m/70cm

The VX-8DE TNC APRS/GPS provides an economical opportunity to obtain a handheld dedicated to APRS on all bands. This radio includes wideband receive 500kHz - 999MHz, Bluetooth option, IPX7 waterproof rating, includes AC charger and LiON 7.4v 11mAh battery pack.
£289.95c

Antenna Masts

FREE UK Delivery
(Mainland Only)

Roof top or EME array masts. Fully galvanised. Bottom bolt holes for mounting. Designed to have rotator at bottom and thrust bearing at top. The 2m model has a tilt hinge base. Both have 2.5" top hole.

Mast-Short 1.5m x 26.5cm **£245**
Mast-Long 2m x 31cm **£325**

10m Tiltover Mast Ground Mounted **£695**

The ideal mast for the smaller QTH. Galvanised and winch operated. Includes 3m mounting post (1m below ground) and ground socket for easy removal. Also provision for rotator mount.

8m Tiltover Tube Wall Mount Mast

This is a great mast for those who want to get just above the roof top and not upset the neighbours!

£350

SPECIAL EDITION

ID-51E 2m/70cm

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

£409.95c

TS-590S 160-6m Transceiver

Get A FREE MC-60S Base Mic- - - +
- - £50 off any additional items totalling £100 +

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

WATSON Coax Switches

Tidy Up Your Station with QUALity

CX-SW3PL
3-Way SO-239 1KW 2GHz

£46.94 c

CX-SW2PL	2-way SO-239	£29.95 c
CX-SW2N	2-way N type	£36.96 c
CX-SW-3N	3-way N type	£49.95 c
CX-SW4PL	4-way SO-239 typ	£59.95 c
CX-SW4N	4-way N type	£69.95 c

IC-7600 HF Transceiver HF - 6m

Dual DSP and three roofing filters. 3 , 6 & 15kHz
Double conversion superhet - super image rejection
Display 5.8" with ultra wide viewing angle.
Real time spectrum scope - USB for flash card or keyboard. 104dB dynamic range for great receiver performance
IN STOCK £2999.95c

Mobiles

TM-281E	2m FM 65W mobile.	£169.95c
FT-2900E	75 Watt 2m FM	£149.95c
FT-8900R	10/6/2m/70cm	£299.95c
ID-E880	50 W 2m/70cm + D-Star	£439.95c
FT-8800E	2m/70cm 50/30W	£279.95c
FT-7900E	2m/70 50/40W ide Rx	£219.95c
FTM-10E	2m/70cms with (£40 Cash Back)	£329.95c
TM-D710E	2m/70cms with APRS	£445.95c
FTM-350AE	2m/70cm GPS APRS	£399.95c
TM-V71E	2m/70cm Mobile, Echo Link	£299.95 c

Yaesu EXCLUSIVE FT-817ND OFFER £499

Why not add the Elecraft amazing coax and wire Auto ATU for a total of **£615 inc. CashBack**

Yaesu FT-450D HF-6m 100W

One of the most popular HF transceivers with built in ATU at a new incredible price. Don't miss out! **£619c!**

FT-400DE 2m/70cmv

One of the very latest dual band moniles from Yaesu at a great price.
FREE MH-85 A11U Mic

Yaesu FREE GIFTS

Yet Another FREE OFFER from your favourite Ham Radio Dealer

FT-857D Get FREE YSK-857 Remote kit
FT-8900R Get FREE YSK-8900 Remote kit
FT-8800 Get FREE YSK-8900 Remote kit
FT-7900 Get FREE YSK-7900 Remote kit

Handheld Transceivers

YAESU
Choice of the World's top DX'ers

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	£129.95c
VX-6E	2m/70cms handy, Wideband Receive	£179.95c
VX-7R	Triple band handy silver/black	£289.95c
VX-8DE	6/2m/70cm Upgraded APRS	£349.95c
IC-E80D	2m/70cm D-Star GPS ready	£299.95c
IC-E92D	2m/70cm + D-Star	£387.95c
TH-F7E	2m/70cm + wide receive inc. SSB	£236.95c
TH-D72E	2m/70cm GPS & TNC + SiRF	£426.95c
TG-UV2	2m/70cm with CTCSS DCS	£84.95c
KG-UV6D	2m/ 70cm 5W/4W SMA	£94.95c

ICOM BUDGET CLASS HF

IC-718 SSB CW 100W from 160m-10m. You won't find a more cost effective HF radio!
IC-7200 this 100 Watt radio covers 160m-6m and includes digital IF filters. **£839.95c**

YAESU HF - UHF Compacts - One Box! GREAT PRICES

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

FT-857D The great value mobile or base HF-6m 100W, 2m 50W 70cm 20W. **£629.95c** includes CashBack of £50

WATSON HF-VHF Mobile Whips

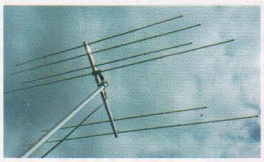
MultiRanger 9 £59.95c
- 80 - 2m non WARC
- Impedance: 50 Ohms
- Power Capacity: 120 Watts
- Connector: (PL-259)
- Length: 1.9m Max

MultiRanger 2000 £79.95c
This antenna is the same as the MultiRanger 9 but adds the WARC bands of 30m, 17m and 12m, 200Watts

ICOM IC-7100E

Exclusive W&S Offer

Get FREE (List £139)
InnovAntennas Dual Band 4m/6m 6 El. Yagi



All for £1249 *Offer Expires end of August*

KENWOOD

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

£779.95

GREAT VALUE

GREAT VALUE

£99.95

Signal Link USB

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

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

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Blog: blog.wsplc.com

VISA MasterCard PayPal

MFJ

MFJ-269 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, 415-450MHz
* Frequency Counter * LCD readout
* SWR & impedance or SWR Bargraph
* Coaxial loss meter * VSWR Meter
* Signal Generator * Freq Counter)

£378.95

MFJ-259B HF-VHF Antenna Analyser

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

£279.95

AMERITRON AL-811XCE 600W

£929.95

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

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 and reflected power -- at a glance

£133.95

MFJ-971 1.8-30MHz Portable ATU

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

£125.95

MFJ-941E 1.8-30MHz 300W ATU

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

£139.95

MFJ-949E 300W HF ATU + Load

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

£171.95

MFJ

MFJ-993B Auto ATU

One of our most popular auto antenna tuners that will match wire, balanced line and coax feeders. It not only tunes your antenna but also gives you a digital display showing characteristics of the matching.

- Automatically tunes unbalanced/balanced antennas
- 1.8-30 MHz with 4:1 current balun for balanced line
- .Now with 20,000 memories
- Antenna Switch and Efficient L-network design
- .Select 300 Watts (6-1600 Ω) or 150 Watts (6-3200 Ω)
- Digital SWR/Wattmeter Audio SWR meter
- Backlit LCD - Remote control port .- Radio interface £259.95

MFJ-16010 200W Wire Tuner

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

£68.95

MFJ-901B

The MFJ-901B is MFJs small and most affordable 200 Watt PEP Versa Tuner. Its designed to match virtually any transmitter (up to 200 Watts and can match coax and end fed antennas. £109.95

MFJ-986 1.5kW 1.8-30MHz ATU

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

£379.95

MFJ-989D 1.5kW ATU

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

£379.95

MFJ-962D 1.6kW ATU

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

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Having problems matching you G5RV with internal ATU? This is your easy answer. Just place between transceiver and antenna. Adjust and operate. Simple!

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- 1.8 - 30MHz • 300W • Ideal for rigs with auto ATUs • 7 load positions • Ground & By-pass position • SO-239 sockets • Connection for dummy load • Separate earth terminal • Size 150 x 42 x 90mm • Weight 415g

MFJ-652 Voice Equaliser

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

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This voice keyer allows you to record and send up to 5 messages with a total time of 75 seconds. You can also set up an auto repeat mode. Great for CQ and contesting.

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

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MFJ-926B 200W Remote ATY

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

£279.95

MFJ-993BRT 300W Remote ATU

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

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MFJ-402 Nano Size Paddle Key

t's a nano-size 2" x 3" x 1" and weighs just 3 ½ ounces! Speed adjusts 5-65 WPM, weight 25-75%, has lambic mode A or B, normal or "bug" mode and reverse.

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- Generates random characters & words • Simulated QSO generator • Group length Farnsworth mode • Tone control 280-1060Hz • Volume control • 3.5mm headphone socket • Supply 9V int. • Size 60 x 25 x 95mm

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MFJ-935B Indoor Loop Tuner

Just make yourself a "square" loop of wire around 1/8 wave long and enjoy indoor operation on 40-30m, or 20-17m etc. It really works!

£204.95

Power rating 150W
• Int Antenna current meter • Carry handle
• No power supply • Size 159 x 242 x 134mm • Weight 1.2kg

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£294.95

• DSP filter, fully programmable • 16 Factory pre-sets • Works with any Rx or trcvr • Plugs directly into audio out socket • Drives speaker or headset • Requires 12V DC at approx. 500mA . Improve your old receiver!

MFJ-1026 Noise Cancel Unit

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• Frequency range: 1.8 - 30MHz • Max power handling: 100W (Max) • Switching: RF sensed/control • Supply: Ext. 13.8V • Size: 210 x 60 x 150mm

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• 2x Separate 8-pin round and 8-pin modular input sockets • Mic select button Mic A & Mic B • Radio select button Radio A & Radio B • Separate speaker i/p & o/p sockets 3.5mm • Aux input 3.5mm • Internal jumpers to match different rigs etc. • Speaker volume control • Speaker On/Off button • PTT socket 1/4in • Headphone socket 1/4in • Rubber feet • Size: 210 x 35 x 140mm • Weight: 575g

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

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One of our most popular antenna tuners and offered at a very attractive price. It covers 1.8 - 30MHz and handles 200W. It is very versatile and handles end fed wires, balanced feeder and coax fed systems.

MFJ-704 Low Pass Filter

This filter is the sure way to suppress unwanted and unwelcome harmonics. It cuts off above 40MHz and can handle up to 400W.

£67.95

MFJ-928 Budget HF Auto ATU

Here's a great budget auto ATU that will handle up to 200W. Designed for coax feeder, it is a great way to add an auto ATU to your base station.

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This Super Battery Booster eliminates low voltage problems by boosting input voltages as low as 9 volts up to the desired 13.8 volts at up to 25 amps peak with a typical efficiency of close to 90%. Designed for car use direct from battery or the cigar socket.

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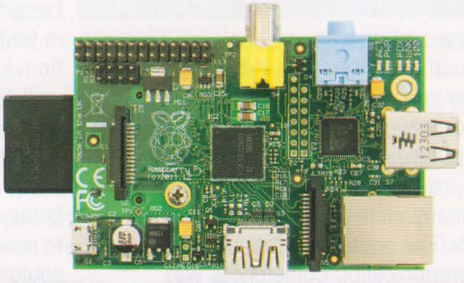

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Cover image: The Icom ID-5100 dual band D-Star transceiver.

Photo courtesy of G4WNC

Technical Features

Care and feeding of directional couplers, P18

Regulars

IARU Region 1 sets a challenging agenda

General view of the Final Plenary. Photo: G4JKS.

The International Amateur Radio Union is the 'umbrella' organisation for national radio societies around the world. It is organised into three Regions, reflecting the ITU Regional Structure. Each Region has a General Conference every three years. In 2014, it was the 23rd General Conference of IARU Region 1 that opened on Sunday 21 September with 43 Member Societies present in person and 17 Member Societies represented by proxies. Representatives of radio amateurs living in Europe, the Middle East and Africa met to agree and coordinate activity to safeguard and develop the future of amateur radio. IARU representatives from the Americas (Region 2), Asia-Pacific (Region 3) and the IARU International Secretariat, along with representatives from amateur radio societies in Kosovo and Tunisia, attended as observers.

Real progress was made at the meeting on a number of topics that are of key concern to UK radio amateurs. This came from getting people together over several days and facing them with the realities that we need to protect our spectrum as well as address the declining numbers of active radio amateurs. It was heartening to see the real progress made by Lisa Leenders, PA2LS, the Region 1 Youth Coordinator in this latter respect. Over the past three years Lisa has established Youth Coordinators in 21 national societies including the RSGB, held a Youth meeting at HamRadio, Friedrichshafen and organised the highly successful Youngsters on The Air (YOTA) event in the summer, which our own team will attest was a fantastic event. Lisa has organised the December YOTA month in which there will be 17 callsigns active in 14 countries, including Gx14YOTA, which will be on the air from 13 local clubs around the UK. Lisa has done some amazing PR for the new movement, including an active Facebook group and website www.ham-yota.com I have left her an open invitation to come and speak at next year's RSGB Convention.

Turning to the more mundane, the Conference reviewed the strategy of IARU Region 1, its finances and membership. The reserves are in good shape, especially as they are kept in Swiss Francs! The issue to which Conference looked, and in which we took a lead, along with six other Member Societies elected to the in-conference Finance Committee, was to ensure that investment of the significant reserves would be focused on protecting, developing and promoting amateur radio across the Region. For example, sizeable support was given to youth projects.

Region 1 operates through a number of permanent Committees, Working Groups and Coordinators. This includes EMC, Political Relations, Emergency Communications, Youth Programmes, ARDF, Development of Amateur Radio in developing countries (STARS Working Group), Spectrum development and protection via ITU, CEPT & the World Radiocommunication Conferences (External Relations Committee), Intruder Watch, Space and High Speed Telegraphy. The work and plans for the next three years of all of these groups and individuals was reviewed and, in a number of cases, updated.

Of particular importance to us was the amendment of the Terms of Reference for the EMC and Political Relations Committees that now provides a clear requirement for Region 1 to lobby at political, governmental and business levels on matters of EMC and related legislation and standards. The recognition of the importance of its standards work and the need to lobby saw the former EMC Working Group being elevated to the status of a permanent committee. This way, formal business on EMC matters can be transacted at the IARU Region 1 Interim Meetings (that are, as the title implies, approximately half-way between General Conferences). We are delighted to report that Hilary, G4JKS, an RSGB Past-President, is a member of the new Region 1 EMC Permanent Committee and took an active part in its discussions during the conference.

As usual there were a number of proposals in the key spectrum areas of LF/HF and VHF/UHF/microwave. Discussions extended over a range of areas including band planning, contests, remote working and innovative developments in the areas of satellites and digital TV. The position on future World Radiocommunication Conferences was also discussed. Conference considered and made recommendations in the areas of QSL management, responsible QSLing, malicious QRM, youth initiatives, copyright and article reproduction and CW procedures. A full report of the proceedings of the final Plenary will be published in due course on the IARU Region 1 website (www.iaru-r1.org) and we plan to run a more detailed account of some of the main decisions in these areas in the December *RadCom*.

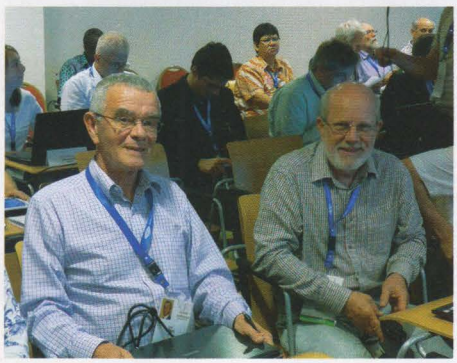
AWARDS. The Region 1 Roy Stevens, G2BVN, Memorial Trophy was awarded to Gaston Bertels, ON4WF, for his meritorious service to amateur radio over many years. Gaston was a past-chairman of the Eurocom Working Group, which preceded the current Political Relations Committee, and then took on chairing the Region 1 Amateur Radio Space Exploration Working Group, known under the somewhat enigmatic shorthand ARSPEX.

At the final dinner, at the end of the conference, IARU Region 1 Medals for services to Region 1 were awarded to the retiring President, Hans Blondeel Timmerman, PB2T, retiring Vice President, Hani Raad, OD5TE, the retiring Region 1 Treasurer, Andreas Thiemann, HB9JOE, and retiring Executive Committee members Nikola Percin, 9A5W and Panayot Danev, LZ1US. Michael Kastelic, OE1MCU the retiring Chair of the VHF/UHF/SHF Committee and Martin Harrison, G3USF, Region 1 Beacon Coordinator also received the prestigious medal. Martin has been Region 1 Beacon Coordinator for a number of years and has done much to encourage development of the effectiveness of beacons in order to assist day-to-day band usage as well as propagation study.

NEW COMMITTEE. Conference elected a new Executive Committee to serve for the next three years and, as you will probably have heard via GB2RS or our website, Don Beattie, G3BJ was elected IARU Region 1 President. Whilst it is exciting to have an RSGB Past-President and Life Vice-President elected as IARU Region 1 President (and we wish to extend our personal congratulations to Don and Hilary), the real pleasure is in recognising the strength that he, the very capable members of the new Executive Committee, committee and working group chairs, and other individual appointments bring to Region 1. The challenges ahead in terms of WRC15, continuing pressure from EMC and other spectrum users, as well as addressing the declining interest in amateur radio within the Region are not to be underestimated. Colin, G3PSM needs recognition in that he stood aside from being re-elected to the Executive Committee to serve his final 3-year term so that Don could be elected President (a Member Society can only have one delegate on the Executive Committee); Conference saw this

Final Plenary, left to right G3BJ, G3WKL, G6JYB, G4SWX, G3VZV and G4JKS. Photo: G4JKS.

as a magnanimous move and re-elected him Chair of the important External Relations Committee, where he can continue his excellent work supporting the core programmes such as the interfaces with ITU, CEPT and WRC15.



Don, G3BJ & John, G3WKL awaiting the start of a committee meeting. Photo: G4JKS.

Along with Don I am pleased to say that Faisal Alajmi, 9K2RR was elected Vice-President unopposed. The Secretary remains as Dennis Green, ZS4BS, and the new Treasurer is Eva Thiemann, HB9FPM. Other members of the Executive Committee are: Ranko Boca, 4O3A, Thilo Kootz, DL9KCE, Dave Court, EI3IO, Ivan Stauning, OZ7IS, and Oliver Tabakovski, Z32TO.

The RSGB continues to play a role in the Working Groups and Committees, and the following were elected at the Conference: Emergency Communications Coordinator: Greg Mossop, G0DUB, External Relations Committee Chair: Colin Thomas, G3PSM, Region 1 Amateur Radio Observation Service Coordinator: Mark Jones, G0MGX, HF Beacon Coordinator: Martin Harrison, G3USF, and Satellite Coordinator: Graham Shirville, G3VZV.

The main RSGB delegation comprised Murray Niman, G6JYB, Microwave Manager and Spectrum Forum Chair, John Regnault, G4SWX, VHF Manager and I. The Society also supported Don Beattie, G3BJ's attendance as he needed to listen to views and discuss his ideas for the future work of Region 1 with other Member Societies. We were extremely grateful too for the support within the conference from Hilary Claytonsmith, G4JKS and Graham Shirville, G3VZV who attended at their own expense. With many parallel committee or working group sessions we were able to provide good coverage of all meetings. Greg Mossop, G0DUP attended as Region 1 Emergency Communications Coordinator and, finally, I should acknowledge the work of Ian Greenshields, G4FSU who was kept busy most of the conference as Secretary to the Region 1 HF Committee.

One of the final parts of the conference is the location for the next conference. After a spirited presentation by IRTS to promote Dublin, and a bid by the Serbian national society, the decision was taken to hold the 2017 IARU Region 1 General Conference in Wildbad Kreuth, near Munich.

John Gould, G3WKL
RSGB President

Special Event Promotion Working Group

In support of the RSGB's desire to identify how best to promote amateur radio to recruit newcomers to the hobby, a working group is being set up to identify best practice when running special events open to members of the public. The focal point of this group is a Yahoo discussion forum where members are encouraged to share their experiences and approaches to organising and running special events with the aim of developing guides, resources, recommendations and a set of 'best practices' for all UK Clubs to share.
This working group needs your support and all UK Clubs and Societies are encouraged to participate to share their approaches to organising public events, what works well and what doesn't work so well. RSGB and Affiliated Club Members are welcome to join the Yahoo Group 'RSGB_Inspire' (https://groups.yahoo.com/neo/groups/rsgb_inspire/info) to take part in the discussion.
For more information please see page 8 of the October issue of *RadCom*.

Exam Question Writing Workshop

Have you ever thought that radio exam questions could be better written? Would you like to help strengthen the RCF exam question bank? The RSGB Training & Education Committee is committed to helping the RCF Exam Committee build and improve the exam question bank. Last year it organised a question writing workshop in Sheffield and a number of gaps in the bank were filled. A number of attendees went on to write more questions.

Some of those who attended the exam question workshop in Sheffield.

The next workshop will take place in Bath on Saturday 6 December. The aim of the workshop is to enable issues to be discussed openly so that attendees gain confidence in writing new questions on their own. There will be a couple of short presentations on what makes a good question and some examples of things that can go wrong. Attendees will be asked to bring some draft questions with them and share them with the group for peer review. Having gained some practice it is hoped attendees will submit further questions afterwards. RSGB Book tokens are available for a number of accepted questions.

Attendance is free for RSGB Members. Anyone interested in attending should contact Steve Hartley, G0FUW via tec.chair@rsgb.org.uk

UK Amateur Licence Review comment deadline

All Members are reminded that the closing date for responses to the Ofcom consultation paper *Updating the Amateur Radio Licence* (35-page/264KB PDF) is 20 October 2014. It is vital that anyone with an opinion on the proposals takes the time to put their views in writing, either by filling in the online response form or by letter.

The RSGB has put together a brief commentary to help illustrate some of the more significant changes proposed and this should be read in conjunction with the consultation document.

See http://rsgb.org/licencereview

Club of the Year

Once again, we are indebted to Waters and Stanton for their generous sponsorship of this competition. This year, we will be judging entries in two categories: Clubs with fewer than 25 members and clubs with 25 or more members (during 2014) and there will be separate prizes for each category.

We will also give weight to entries that are supportive of young people. The judging criteria are as follows:

- **Membership age profile**. How successful has the club been in encouraging 'new blood' into membership, particularly younger people?
- **Training and advancement of members.** What initiatives has the club taken during the year to develop the skills and interests of their members? Additional credit will be given for initiatives that the club is undertaking for the first time and/or are 'out of the ordinary'.
- **Spectrum use**. How active is the club onthe air and what new activities have been undertaken during the year.
- **Outreach and promotion**. What outreachactivity has the club undertaken to promote amateur radio?
- **Success stories**. An opportunity for the club to report on any activity not covered above that they are proud of.

These criteria will be used by the Regional Team in judging the Regional entries and by the Board when determining the overall National winners.

CONDITIONS OF ENTRY

- Only one entry per RSGB affiliated club/ group is allowed.
- Entries must be for club activities undertaken from 1 January 2014 – 31 December 2014.
- All entries must be received no later than midnight 31 January 2015.
- All entries must be a maximum of 1000 words. The maximum amount of photos/ pictures allowed is 6 per entry; however a club logo is allowed as an extra.
- All activities mentioned in an entry must be the work of the club and not done by individuals alone outside the club.
- All entries must have a declaration from 2 club officers (Chairperson, Secretary, Treasurer etc.) stating that the entry truly reflects the information provided and that all activities have been club activities, and not done as non-club members. No signatures are required.
- All entries must be in a standard electronic format - Postal entries are not allowed

Upon submission, all entries become copyright of the RSGB.

The regional judges have the right to enquire about the contents of any entry they receive and any entry containing false or misleading information may be disqualified. Please ensure that there is a contact person identified on the application to whom enquiries may be addressed.

PLEASE NOTE:

- Entries or part entries may be used forRSGB promotional purposes.
- The judge's decisions are final and no correspondence will be entered into.
- The winning clubs from each of the 13 Regions will be automatically entered into the National final.
- Entries received after the closing date will not be judged.
- On entering the competition, you agree to the these Conditions of Entry.

Reading & District ARC won the National Club of the Year trophy for 2013 and were presented with their cheque at the AGM. Will it be your club next?

PROCESS.

All entries must be received by the Manager of the Region in which the club or group has its main premises by the due date.

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. The National winners will be announced at the RSGB AGM in 2015.

Islands on the Air

As previously reported in *RadCom*, the RSGB's Islands on the Air (IOTA) programme has just celebrated its 50th anniversary as a premier DX programme, with participants travelling from near and far to be part of the celebrations in Windsor. It was an appropriate moment for the Board to begin to take steps to ensure the sustainability of the programme over the next 50 years.

The Board and the IOTA team want to ensure that the programme is properly resourced in terms of manpower, IT (including online island credit akin to Logbook of The World), and better web accessibility for newcomers so that the programme can grow, as well as remaining relevant to old hands. Obviously database permanence, ensuring backwards-compatibility is very important. We are calling this vision 'New IOTA'. It will be characterised by a partnership approach, utilising the motivation, skills and enthusiasm we believe exists within the IOTA community to enable the programme to reach its full potential.

Over the next nine months, a group drawn from this international community will develop a plan that will consider management and governance, IT, data management and security, partnering options and any other matters relevant to IOTA's future.

The plan is for a devolved structure that captures the great enthusiasm and skills of IOTA participants and carries the successes of this amateur radio DXing and contest programme forward into the next fifty years and beyond

Searchable *RadCom* Archive

The RSGB has launched a new searchable *RadCom* archive. The archive initially contains 14 years of editions, searchable by author and keywords. Search results for editions since October 2013 also come with hyperlinks to our digital editions so you can read the article online. We will be putting more editions online every month.

The archive is available at www.rsgb.org/main/publications-archives/radcom/search-archive/

If you have any comments about this new service, please e-mail membership.services@rsgb.org.uk

For any technical issues, please use our online IT and Web Helpdesk at www.rsgb.org/helpdesk

RSGB Radio Communication Handbook

New 12th edition

Whether you are an operator who wants to know what goes on 'under the hood', an avid constructor or someone keen to go on learning about electronics and communication radio, the *RSGB Radio Communication Handbook* is the one book you need. With nearly 600,000 words plus 2,000 illustrations and tables crammed into 864 pages it is not only a comprehensive guide to the technical side of amateur radio, it is terrific value too.

This edition of the *RSGB Radio Communication Handbook* has been thoroughly updated with many expanded features. You will find a completely revised HF Receivers chapter and the Propagation chapter has also been completely rewritten with an eye on improving clarity and understanding. There are new authors for the sections on Practical Microwave Antennas and the Low Frequencies. Based on the popular Homebrew column in *RadCom* there is a new chapter that follows the design and construction of an HF transceiver, and provides a host of valuable information and circuit ideas. Expanded chapters include Practical VHF-UHF Antennas, The Great Outdoors, Morse and Digital Communications. Many other chapters have had new, revised and updated parts. Since the last edition, there has been more use of microcomputers, such as the Raspberry Pi, in amateur radio projects; a new amateur band at 472kHz has also been created. These changes have been incorporated into the relevant chapters. Peter Hart's comparison chart of HF receiver performance has been updated, there's more on optical communications and new datamodes have been included.

New readers and old hands alike will find hundreds of pages packed with the distilled knowledge and experience of acknowledged experts on each topic. In amateur radio there is always plenty to learn and this book is the ideal way to expand your knowledge on your favourite activity, or to discover and explore something new.

FREE CD
Enclosed with the book there is a fully searchable electronic version of the Handbook in PDF format. You will find many bonus chapters that we couldn't squeeze into the book, samples of other RSGB publications and even a host of useful amateur radio software.

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ISBN: 9781 9050 8697 9
Non Members' Price: £32.99
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New Membership Website Portal

The new Membership website portal is now operational. The new service offers Members a page where all RSGB online Membership services can be easily accessed from one point.

From your Membership Services portal you will be able to:

- Update your Membership details
- Renew your Membership
- Reset the password you use to log in
- Add or remove your Membershipaccount roles and preferences
- Read the digital edition of *RadCom*, search the archive and browse back issues
- Download a Member's free admission voucher for Bletchley Park

In addition to these services, Members will also be able to browse news from their RSGB Region and find the contact details of their Regional team.

IMPORTANT CHANGES. Most RSGB Members will be able to login with their callsign and Membership number just as they did before, but now with the option of choosing a new password once they have logged in. However, there are some changes:

- You can now enter your username in either upper or lower case letters
- At login you can now have a password reminder e-mailed to you if you lose or forget your password
- Those logging in with RS numbers, ie RS123456, will experience a password reset on first login – the default password being so much like the user name is an obvious security risk – and a new password will be automatically created and e-mailed to you
- If you wish to renew your Membership you do not need to login to do so – even though the option is there in your Membership Services portal – and you can do so via the RSGB Shop as before.

The Membership Services portal supersedes the section called 'MyRSGB'. A similar portal for affiliated clubs will be available from 1 November 2014.

FEEDBACK AND OPINIONS. We would like to know what you think of the new Membership Services portal. Please send feedback to membership.services@rsgb.org.uk
Please note we do not intend to publish any contributions on the web or elsewhere.

TECHNICAL ISSUES. Any questions or problems concerning the Membership Services portal should be submitted through our online helpdesk system at www.rsgb.org/helpdesk.

QSL Matters

More Members than usual visited the QSL stand at the National Hamfest recently. Perhaps it was the display of classic radios, promoting the OQRS message? Feedback on the now-established Members Only and 'send-all-send-any' policy was most encouraging. It's clearly having an effect on QSL turnaround times, whilst giving assurance for many that no cards are waiting in envelopes – a pat on the back for our dedicated sub manager team.

Last month's column about helping us to save time to sort more cards also came in for much comment. One Member asked, "Why is it better to send more cards less often, in a single package?"

In a nutshell, it costs you less and makes sorting easier because we have fewer envelopes to open! The most cost effective way of sending cards for most Members is as follows:

- For light users, wait until you have about 35 cards and send using a Second Class, Large Letter stamp (73p).
- For moderate users, wait until you have 1kg of cards (about 300) and send using the Small Parcel service (£2.80p).
- Please remember to include your *RadCom* wrapper with every despatch.

SUB MANAGER UPDATES. Busy sub manager Ian Fugler, G4IIY (currently handling five G4 groups) is consolidating letters B-C into his commitment in an enlarged group, now G4A-C.

Following our announcement last month that G3W-X manager Prof Colin Bayliss had passed away suddenly, Jim Peden, G3ZQQ has stepped in, enlarging his already sizable commitment to G3Y-Zs and RSGB Members with Special Prefix calls. He now covers G3W-Z.

G4S-G4U and M5 manager Steve Shenstone, M5BFL has moved to Kent – see the RSGB website for details before sending more collection envelopes. His e-mail address is unchanged.

M3 and M6 manager Roy Taylor, M0RRV continues to experience difficulties in tracing Members with M3 callsigns. He currently has significant numbers of envelopes not displaying RSGB Membership numbers. Roy asks us to remind everyone, especially those upgrading to other calls, to keep their information current by using the new Membership Services Portal when you log onto the RSGB website (see above). Members should list not only their current call but also any previous or additional calls (such as, M3-6 or 2 Series). This can also be done by telephone to Bedford HQ – speak to the sales department.

AROS Co-ordinator

The Amateur Radio Observation Service (AROS) Coordinator runs our team of volunteer observers and liaises with Ofcom's Enforcement Team. The RSGB Board is pleased to announce that Mark Jones, G0MGX has been appointed to succeed Keith Bassett, G7NBU who is retiring. AROS works behind the scenes, largely independent of the rest of the RSGB, to assist radio amateurs and others by investigating reports of licence infringements and poor operating, which might bring the hobby into disrepute.

CONGRATULATIONS

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

60 years

Mr P Cohen	GM3LKY
Mr A B Woolford	G3SNN

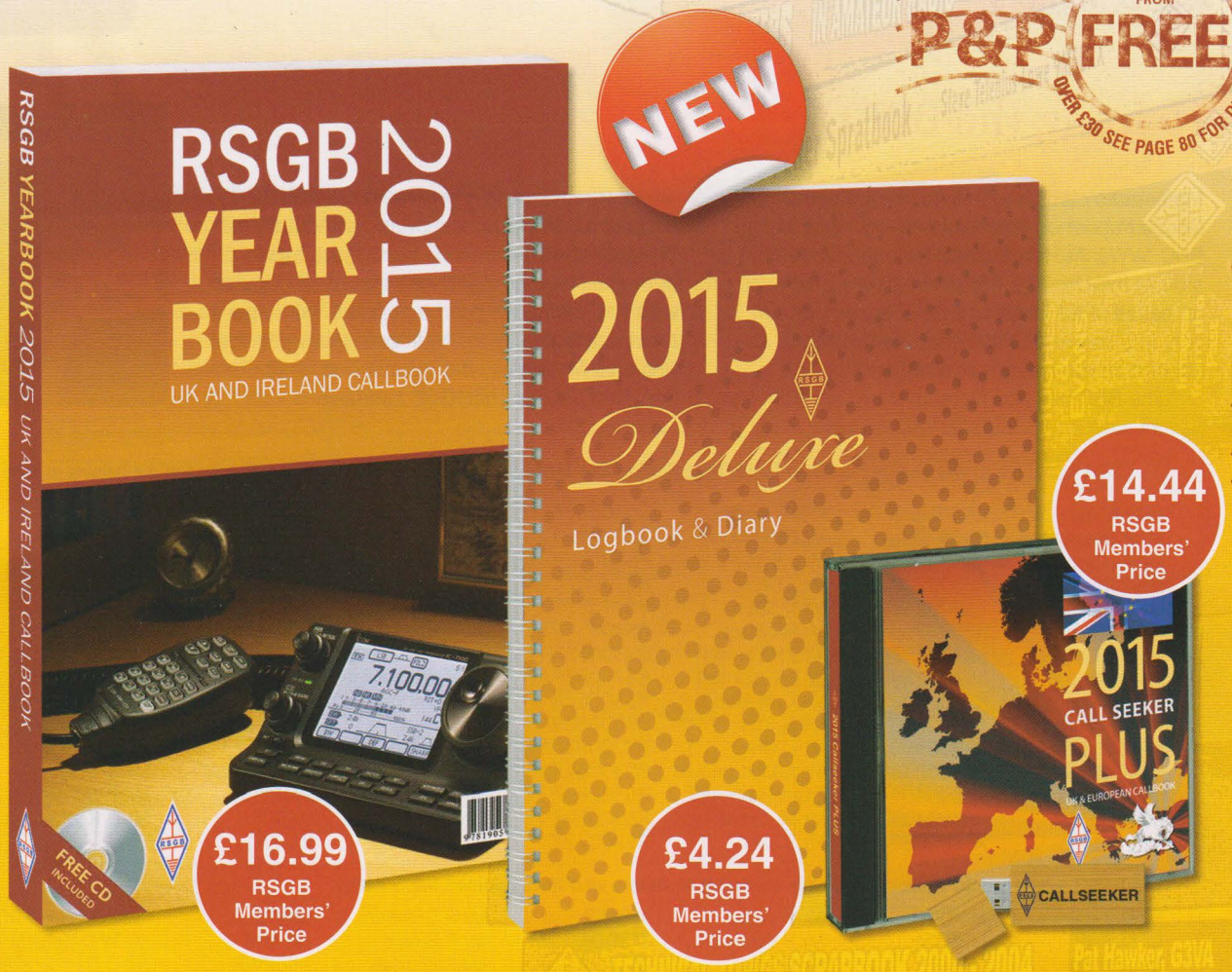
50 years

Mr L L N Cobb	G3UI
Mr D M Gresswell	G3PWY
Mr D W Eaton	G3TAO
Mr P S Duncan	G3TKA
Mr A M Fentham	G3TON
Mr R A W Stevens	G3TVI
Mr D W Fill	G3UBB
Mr J P H Burden	G3UBX
Mr D J Aldridge	G3VGR
Mr I F Peterkin	G3WDU
Mr P G Brooker	G3WXC
Mr A Strong	G3WXI
Mr J K Gibson	G3WYN
Mr P A Ellis	G3YAS
Mr P J Marcham	G3YXZ
Mr A K Sinclair	GD3TNS
Guernsey ARS	GU3HFN
Mr P Herman-Cranmer	G4TFP
Mr P C Shepherd	G0KXX

RSGB shop

FROM P&P FREE OVER £30 SEE PAGE 80 FOR DETAILS

E&OE All prices shown plus p&p



RSGB Yearbook 2015

Edited by Mike Browne, G3DIH

The *RSGB Yearbook 2015* is our biggest ever with 544 pages of the latest callsign information and much more

With over 84,000 amateur radio licences on issue, the *RSGB Yearbook 2015* remains the very latest callsign information available. Added to the callsign data there are 176 pages of invaluable amateur radio reference information.

Callsigns are cross referenced by post code and surname making searching easy. You will find all manner of local information organised into regions. There are details of how the Society is organised, the services it offers, committees, who to contact for assistance, etc. National clubs are not forgotten and these are profiled along with featured local clubs. There is a wide range of information sections included, and listings of special contest and events.

FREE CD
Provides all of the information pages from the *RSGB Yearbook 2015* in a fully searchable format, with over 600Mb of bonus material.

210x297mm 544 pages
ISBN: 9781 9050 8696 2
Non Members' Price: £19.99
RSGB Members' Price: £16.99

RSGB Deluxe Log Book & Diary 2015

There are logbooks and then there is the RSGB Deluxe Log Book & Diary 2015

Providing much more than any regular logbook that are only somewhere to note your QSLs, the *RSGB Deluxe Log Book & Diary 2015* has much more to offer.

This popular annual logbook contains a wealth of extra material just where you want it, when you want it, at your fingertips in your shack.

Not only are the very latest UK band plans included but you will find a useful DXCC prefix list, RSGB QSL Bureau information, RSGB Contest Calendar and information, a locator map (and an explanation of how locators work), repeaters - pretty much everything you need to know.

There is also a diary section, notes pages, handy lists of operating abbreviations & codes of activity and a generous amateur radio station log section for you to record a whole year of your activity.

The attractive design means you will also want to keep it for years to come.

Non Members' Price: £4.99
RSGB Members' Price: £4.24

Callseeker Plus 2015

If you want the ability to search all the UK callsigns and across Europe too, added to which you want to have all the reference information from the *RSGB Yearbook 2015* then you need the *Callseeker Plus 2015*.

CD The easy to use and highly popular *Callseeker plus 2015* contains the most up-to-date listings of United Kingdom and Republic of Ireland amateurs' callsigns along with comprehensive coverage of callsigns from across Europe. *Callseeker plus 2015* provides much more as you will find all the pages of the information section from the RSGB Yearbook are included in an easily searchable PDF. The CD also boasts a host of "extras" from across Europe, including hundreds of Megabytes of useful amateur radio software.

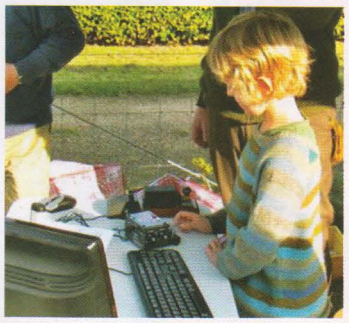
Memory Stick The *Callseeker Plus 2015* is also available in and easy to use USB Memory Stick version. This new limited edition Eco version of the Callseeker CD is in a 60x20mm bamboo shell that is a stylish alternative to the CD version. All that is included on the regular *RSGB Callseeker 2014* CD is included here.

Cheaper than a *RSGB Yearbook 2015* and with more callsigns – *Callseeker Plus 2015* what a bargain!

Non Members' Price: £16.99
RSGB Members' Price: £14.44

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

Helping the BBC



Many radio clubs and individual radio amateurs stepped up when volunteers were sought for the BBC 'WW1 At Home' exhibitions that were held all around the UK. The RSGB received a thank you on behalf of all those who volunteered and ran very impressive displays showing the public all about communications of that period.

"The BBC has had incredible support from local amateur radio clubs wherever we've been and we couldn't have run our events without them. They all worked extremely hard at the events on our behalf as the activity has proved so popular with the public. It's been a pleasure working with them and we'd like to thank both them and the Regional Managers who got involved" said Ceri Saunders, Researcher, BBC Learning.

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 A Mason	RS300220	Mrs A Ross	RS300544	Mr A Spurr	RS300730	Mr N Thomison	W9IGY
Mr R Greenwood	RS300221	Mr N Bristow	RS300559	Botkyrka R A	SK0HB	Dr R Rikoski	W9ZD
Mr P Hewitt	RS300223	Mr J Sydney	RS300569	Mr N Rashleigh	VE3LC	Mr D Shaw	WA0EMX
Mr G Davies	RS300229	Mr J Drew	RS300574	Mr B Allison	VE3NJK	Mr M Cohen	WA2ARS
Mr S Coombes	RS300249	Mr D Shaw	RS300577	Mr D Rajnacith	VE3OOI	Mr J Garland	WA5FLT
Mr B Beard	RS300255	Mr N Jessop	RS300579	Mr B Rawlings	VE3QN	Mr C W Dole	WB0NPR
Mr A Young	RS300257	Mr J Wilkinson	RS300588	Mr I MacFarquhar	VE9IM	Mr M Cohen	WA2ARS
Mr C Wilson	RS300259	Dr B Wilkinson	RS300589	Mr R Kowalski	VE9UHF	Mr J Garland	WA5FLT
Mr N C Jones	RS300300	Ms C McBride	RS300628	Mr S Sullivan	VK2OAA	Mr C W Dole	WB0NPR
Mr R Hampson	RS300309	Ms S Gray	RS300629	Mr G Head	VK6FSGH	Dr G Lemaster	WB5OYP
Mr R Williams	RS300328	Mr D Gray	RS300630	Mr J Krout	W0YQG	Mr L Larks	WB6QZK
Mr K Missenden	RS300336	Mr A Mohammed	RS300677	Mr M Gruber	W1MG	Mr W Moore	WD4HXG
Mrs S Johnson	RS300404	Essex Ham ART	RS300694	Mr H Hazelrigg	W4PH	Mr T Wilheit	WX4TW
Mr R Heslop	RS300409	Mr M James	RS300697	Mr J Ross	W5XTL	Mr D Radford	ZS5DR
Mr L Burton	RS300439	Mr S Sabo	RS300724	Mr D Jenkins	W6JWL		

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

Mr P J Halpin	M0EEH	Mr K Wood	M3AXZ	Mr R Griffiths	M6RGI	Waterlooville ARC	MX0SSP
Dr M Roe	M0GXM	Mr P Weaver	M3GDK	Mr P Briggs	M6XRB	Mr W D Coleman	N2BC
Mr D H Prior	M0HPT	Mr J Dove	M3XDO	Mr P Warriner	MI6PWR	Mr G Danylchenko	VE3YTZ
Mr S Slarke	M0MUF	Mr A A Williams	M3XIH	Mr D W Gonella	MM1BTJ	Mr J Knoblock	W3RFC
Mr D W le Grove	M0TIN	Mr A Yates	M6BGK	Mr L Hayward	MW0SEC	Mr J Luhn	W5AOO
Mr G A Stephens	M1GRA	Mr J Grove	M6BXG	Mr E Dobson	MW3WCS	Mr M J Dusa	W9MJD

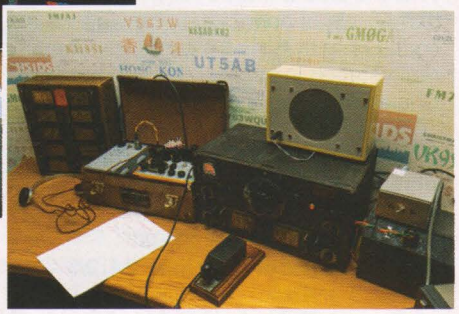
Para-Sets at the NRC

On 11 September the RSGB's National Radio Centre (NRC) hosted an attempt to recreate the some of the clandestine communications of World War II. The Milton Keynes ARS Para-Set group, in co-operation with '*Les radios de la Résistance*' (TM3RCA) attempted to recreate a WWII Para-Set net between Dijon, France and the Bletchley Park museum (GB2BP).

Sadly the gods of the æther were not smiling and communications were dogged by QRM and QSB between Bletchley Park and Dijon. However, signals were briefly copied by the main station at the NRC, GB3RS, using its FTdx-5000 transceiver and a Stepp-IR antenna.

The event was organised in France by Philippe Givet, F5IYJ and *Les radios de la Résistance* and supported by the MKARS Para-Set group in the UK by John Pether, G4JGG, Andy Cygan, G7JQL and Peter Davies, M0PJD.

Philippe Givet, F5IYJ and, on the right, M. Rebsamen, Minister of Work, M. Millot, Mayor of Dijon and M. Delzant, *Préfet de Région*.



The Para-Set and HRO installed at the National Radio Centre.

Yaesu Competition

At the National Hamfest, Waters & Stanton drew the winner of the Yaesu competition they have been running since the Spring. Customers who bought Yaesu radios from W&S returned their warranty cards to go into competition to win a FTM-400DE dual band radio transceiver from W&S plus a Diamond X-50 dual band base station antenna, together worth more than £600.

The photo shows (l-r) Peter Waters, G3OJV with the Diamond antenna, Dean Croome (Yaesu) with the FTM-400DE, Jeff Stanton, G6XYU and Ailsa Turbett (Yaesu). The prize winner will be notified of his good fortune.

Contests, Anyone?

Capel Battery Contest Group (Maidstone YMCA ARS) is seeking new members to join them for next year's Field Day contests. You don't have to be a member of the Maidstone Club, as they will be affiliating Capel Battery Contest Group to the RSGB. Currently they enter VHF NFD, HF SSB and the 144MHz Trophy Contest. If enough CW operators come forward they have some parties interested in doing HF NFD and could provide support and a site. They have access to Capel Battery ,overlooking Folkestone and Littleswitzerland. No contest experience is required as they believe that 'we all had to start somewhere'. They say that they don't take things too seriously and if they end up last, so be it. Enjoying radio is more important.

IPARC Contest

The International Police Association Radio Club (IPARC) invites all radio amateurs of the world to take part in the IPARC Contest that takes place on 1 and 2 November. It's CW on the 1st from 0600 to 1000UTC and 1400 to 1800UTC, then SSB on the 2nd at the same times. Operation is on a number of bands and frequency ranges and no contest QSOs outside those frequencies count.

The exchange is signal report, serial number and members of IPARC also exchange IPA with US members including their state. Logs must be in by 31 December and full rules are available (in English) at www.iparc.de

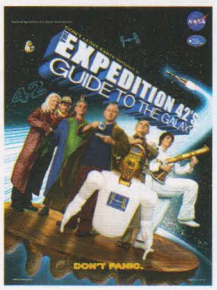
Calling Marconi Enthusiasts

At the September Skills Night run by the Chelmsford ARS, Terry, G3VFC asked for help identifying a mystery component. It's apparently part of a 50 ohm dummy load power meter, and is stamped with Marconi.

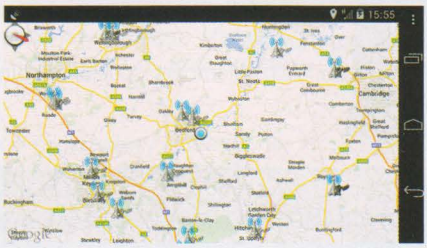
If you can help Terry out with any information about this, please go to www.essexham.co.uk/mmo

ISS Poster

Radio amateur and astronaut Samantha Cristoforetti, IZ0UDF has put the final touches to the official crew poster for the International Space Station (ISS) Expedition 42. It is now available to download from the AMSAT-UK website (http://amsat-uk.org/2014/09/30/iss-expedition-42-poster-released/). The poster parodies the popular *The Hitchhiker's Guide to the Galaxy* by Douglas Adams and is generally thought to be the best ISS crew poster yet released.



RFinder special offer



RFinder is the official Repeater Directory App of RSGB. To celebrate the partnership, RFinder is offering UK customers a six month bonus for new purchases and renewals of RFinder until the end of October.

RFinder is the World Wide Repeater Directory, with 170+ countries and 50,000+ repeaters world wide, available on Android and Apple devices. It is accessible from web.rfinder.net, routes.rfinder.net, RT Systems, CHIRP, RadioBuddy, GPS POI's for your favourite GPS unit and two more upcoming third party applications on Windows and OS X.

If you are an existing user, you can renew and get your extra 6 months. Don't forget to put your current e-mail address in before you click the Subscribe button.

5MHz News

The latest edition of *The 5MHz Newsletter* is now available for free download from http://tinyurl.com/m9a9puy or the RSGB 5MHz webpage. Edition No 11 features the latest 5MHz News, plus a Midsummer's Day on 5MHz and BeaconSpot looks at the new Swiss 5MHz Beacon.

Previous copies are also available for download from http://tinyurl.com/p22gybh

At a recent meeting with their regulator, ICASA, SARL – the South African Radio League – reached an agreement to exchange their 5MHz channel at 5250kHz, which is used for propagation experiments, for the more common beacon channel of 5290kHz. On 4 October, ZS6KTS and the other stations in the South African 5MHz WSPR Cluster changed over frequency. Their other channel at 5260kHz remains in use as normal for general contacts

The Worldwide 5MHz Amateur Allocations chart can be found at http://tinyurl.com/pjhd943

Open Day

Blackmore Vale ARS in Shaftesbury is holding an Open Day on Saturday 8 November at their Charlton club site from 10am to 4pm and inviting fellow amateurs, the general public and schools from the local area. The aim of the Open Day is for club members to demonstrate as many aspects of amateur radio as possible; they have also called for help on activities they do not cater for from some of the other local clubs. They have been in contact with Michael, G0POT in regard to the RSGB Inspire initiative ,and he will be attending.

Bring a book, buy a book

At the G-QRP Convention in Ripponden on 25 October, the traditional Bring a Book Buy a Book stall will be operating in aid of Children in Need. Last year over £600 was donated to the appeal. The book exchange has provided some fantastic opportunities to share books around and obtain rare and treasured books from others at very reasonable cost, whilst supporting a very worthy cause. Richard, G4UGF says that he has empty tables ready to accept books from those turning out their book shelves. If you are not attending the convention then Richard is QTHR.

New Products

In the market place this month

WEATHER STATION

This complete wireless weather station will give you a picture of the current weather at your location. With historic data stored for retrieval, you can indulge your inner meteorologist and try to predict what's coming next. It's easy to set up with no wires and the outdoor sensor can be placed anywhere convenient up to 100m away. So, what data can you view?

The outdoor unit has an anemometer, which is a device used for measuring wind speed (did you know that terms comes from the Greek word anemos, meaning wind?) as well as a weather vane for determining the wind direction. To get accurate measurements you need to set the unit up so that the directions (north, south, etc) are aligned correctly. There is also a self-emptying rain gauge that is set to empty every 0.3mm. You can attach a tube type rain gauge and, once you have compared the readings between the two and noted the difference, you will have access to much more accurate rainfall measurements for individual spells of rain.

The temperature and humidity sensors are contained within the oudoor transmitter unit, which is covered by a radiation shield (under the rain collector) to avoid inaccurate results due to direct solar radiation. Both readings can be further calibrated if the user wishes.

The outdoor unit requires 2 AA batteries, which can supply up to 24 months of readings. It operates on a frequency of 868MHz and takes readings every 48 seconds. It is supplied with a stub mast that the user attaches to a suitable mast (or pole) and it should be placed away from obstructions such as buildings.

The indoor unit requires 3 AA cells and these will provide up to 12 months of measurements. The date and time displayed is locked to the German DCF long wave atomic standard signal that is easily received in the UK. This gives atomic clock accuracy in the comfort of your own home. As well as the information on the display, the unit has alarms for high/low external readings on temperature, wind speed, rain, humidity, dew point and wind chill. The internal alarms can be set for high/low temperature and humidity. If the outside unit registers an alarm condition, the indoor unit sounds an alarm for 120 seconds and the display flashes until the weather condition returns below the set level.

The Watson W-8682-MkII is available for £49.95 as an RSGB Members' special offer in conjunction with Waters & Stanton, see opposite.

ULTRA PORTABLE 6m BEAM

Portable specialists SOTABEAMS have brought out the SB6, a lightweight portable beam antenna for the six metre band. 50MHz is a great band for portable operating; it supports so many different modes of propagation that results are often surprising, with some amazing DX being possible. The SB6 has been designed to be very quick to set up and use, with assembly taking less than 90 seconds. As it has been designed for portable use, the packed-length and weight are low at 55cm (22in) and 700g (1.54lb). The SB6 has a calculated gain of 11dBi and front to back ratio of 24dB when mounted at its design height of 4 metres above ground level. The SB6 has been tested in contests.

www.sotabeams.co.uk/sb6-6m-ultra-portable-beam/

QUASAR 82 ANTENNA

The Quasar 82, or Q82, is a 0.82 wavelength monoband vertical antenna for the 10 or 11m band. Each antenna is individually hand-built and tested and users can expect an SWR of 1.8:1 or lower. It is rated at 2kW using SO239 or 3.5kW using Amphenol N sockets and weighs 14kg including the mounting. Gain figures are quoted as typically 3dB over a dipole and the angle of radiation is 3dB up on a dipole at 0 degrees. See www.vortexantennas.co.uk

MONOBAND MULTIMODE 70MHz TRANSCEIVER

The NR-4SC is a simple to use 10 watt 4m SSB/CW transceiver. The radio operates USB and CW and uses a single conversion design with an IF frequency of 10.7MHz. Front end bandpass filters limit out of band signals into the RF preamp stage. It has a built-in iambic keyer, analogue S-meter and built-in loudspeaker. With wide and narrow filtering and fast and slow selectable AGC. The radio has a quoted sensitivity of -130dBm and blocking dynamic range 107dB. The full spec can be found at www.nobleradio.eu

Watson W-8682 MKII Weather Station Offer

The RSGB has teamed up with Waters & Stanton to bring our members this great weather station at an extra special price. By buying this offer today RSGB members also receive a Watson W-8685 inside/outside temperature gauge/clock with alarm worth £9.95 free of charge. UK customers also get FREE post and Packing worth £8.50 making a total saving of £18.45 on this offer.

If you are interested in having a weather station or are looking for a great gift, this offer provides real value. The Watson W-8682 MKII Weather Station is a complete wireless linked weather station includes everything you need in one box (except batteries). With a bright backlit display this unit delivers a mass of useful information for the amateur weather forecaster. The W-8682 records and displays historic weather data along with displays of factors such as wind chill and dew points. There is weather forecasting system that even alarm functions for certain weather conditions. Best of all there is not a wire in sight as the system is wireless and fully self contained. There isn't even a power cable as it runs on simple AA and AAA batteries. This makes mounting really easy. The internal unit can be hung on a wall or used free standing whilst the external unit includes a short support mast and clamps to attach the assembled sensors to. The beauty of wireless control is that you can mount the sensors up to 50m away from the internal unit.

The free Watson W-8685 inside/outside temperature gauge and clock with alarm function works independently of the main weather station. It is also wirelessly linked and could easily make a gift in its own right.

This weather station offer is exceptional value. If you are interested in meteorology or simply looking for a great gift this is ideal.

A full technical specification can be found on the RSGB shop website.

FREE GIFT WORTH £9.95

your RSGB Members' Offer

Only £49.95

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

Haynes Meteorology Manual

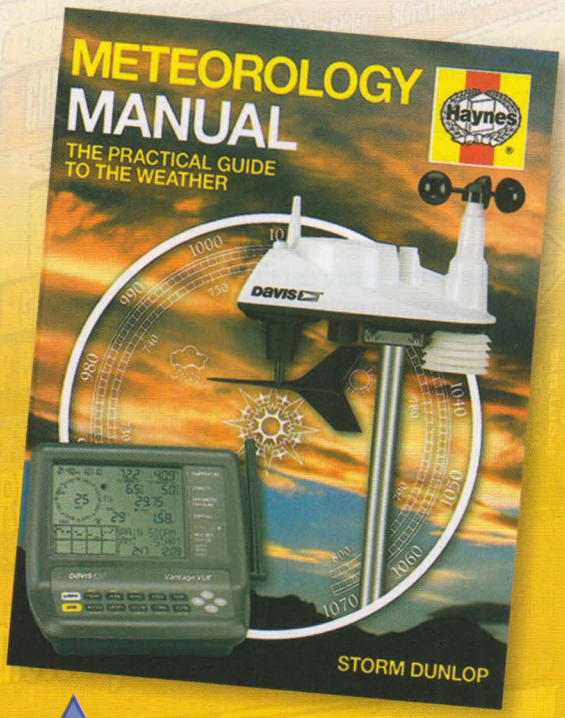
The practical guide to the weather

By Storm Dunlop

There is growing interest in learning about how weather systems are formed, what causes variations in the weather, and how to study and predict the movement of weather systems to enable accurate weather forecasting. The Haynes Meteorology Manual provides an easy-to-read introduction for newcomers to the subject, while providing a sufficient level of detail to prove useful to those who already have a basic understanding.

The hardback Haynes Meteorology Manual is a fascinating and comprehensively illustrated book which begins by exploring the major processes at work in the atmosphere, and explains how energy from the Sun is transferred, by winds and ocean currents, around the world. The seasonal patterns of winds and temperatures, and the motion of high- and low-pressure systems are also examined, providing a solid grounding to understand how global and local weather systems develop. Weather processes and precipitation – weather processes, clouds, precipitation and deposits on the ground, visibility, local winds and effects, showers and storms, uncommon and severe weather, light, colours and optical phenomena.

With the aid of over 400 colour photographs and explanatory illustrations, the down-to-earth text the Haynes Meteorology Manual is a great book. Provided at a special price for RSGB member of 25% off the usual retail price this book would be a great gift or treat for anyone interested in the atmosphere and observing the weather.



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ATV

BATC Convention - and DATV on 6m & 10m?

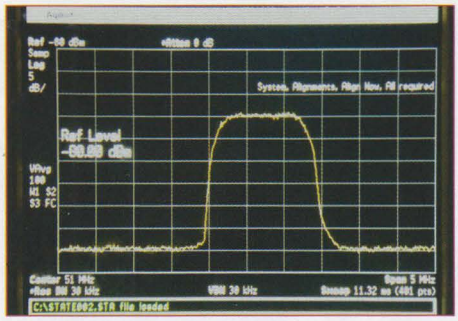

PHOTO 1: The spectrum of a DATV transmission on the 6m band using a symbol rate of 1.1333MS/sec.

CONVENTION. The BATC Convention was held in Basingstoke, Hampshire this year with many demonstrations, Bring & Buy tables and a series of lectures. It was well supported on both days by the membership. There followed on the Sunday afternoon an Extraordinary General Meeting and General Meeting. Again we had a good turnout for these with over 50 members present. Many members travelled a considerable distance just to attend these meetings. The EGM was to approve the new Constitution, this was approved by 90% of the members present. At the GM the Chairman, Noel, presented the achievements of the BATC over the last two years and Brian, the Treasurer, presented a review of the accounts. The Financial Report was approved by 96% of the members present.

Finally, the former BATC Chairman, Trevor Brown, presented a motion of No Confidence in the current committee. If successful he would replace the current committee with his own team who would take over running the Club. This motion failed with 90% of members present voting against Trevor's motion.

So the committee continues as before with the addition of one new member, Clive Reynolds, who offered to join the committee at the GM. Clive lives in Hull. The next BATC Convention will be in Finningley, Doncaster next year [1].

ATV BANDS. Traditionally, amateur TV transmissions take place in the 23, 13 and 3cm bands. With the pressure on spectrum space and the availability of digital transmission that uses less bandwidth, new technology is enabling other bands to be considered.

The 70cm band has been in use for DATV over the past few years using a symbol rate of 2.0MS/sec to achieve a bandwidth of about 2MHz at 437MHz. In Belgium and The Netherlands, they use 436MHz and 2.5MS/s.

In France, F6DZP and others have been using very low symbol rates and H264 encoding to achieve bandwidths as low as 250kHz. Surprisingly good results have been achieved, opening the way to transmitting digital TV on the 10m band and maybe other HF bands [2]. This, of course, needs a special receiver as domestic and commercial DVB-S receivers will not work with H264 encoding or below a symbol rate of about 1MS/sec. This work should not be confused with traditional SSTV modes that are unsuited to live video transmission.

Using domestic or commercial receivers and surplus encoding equipment, 1.5MHz is the lowest bandwidth that can easily be achieved with a symbol rate of 1.133MS/sec and an FEC of 3/4. This would allow DATV to be used on many of the bands from 10m (28MHz) and up. Clearly, care must be taken not to cause interference with other signals on these bands but as these bands sometimes have relatively little activity, the occasional use of ATV is unlikely to cause a problem.

Photo 1 shows the spectrum of a DATV transmission on the 6m band using a symbol rate of 1.1333MS/sec. Only the top 1.5MHz of the band is used, leaving the lower 500kHz completely free for SSB DX and beacon use.

Please let me know if you are experimenting with narrow bandwidths on these lower bands.

ATV QSO PARTY. The annual Australia ATV International QSO Party is organised by Mick, VK3CH, near Melbourne, and was held on 29 and 30 August this year. The idea is that as many stations as possible are linked together via their local ATV repeaters and the repeaters are linked together via the BATC streaming service or by using Skype. Mick controlled the party using the local VK3RTV repeaters in the mountains near Melbourne. A large number of members from Australia and the USA took part. In the UK, G8GTZ, G8ADM and G8LES transmitted to the world via the GB3HV repeater. Keep an eye out for next year's party. I hope that more UK amateurs and repeaters will be involved.

Rallies & Events

The BATC will be at the West London Radio and Electronics Fair on 9 November.

ATV Contest Dates

6-7 December; BATC Repeater Contest

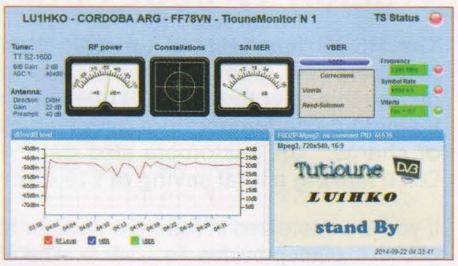

PHOTO 2: Results of Tutioune monitor receiving DVB-S transmissions on various bands.

GEO-STATIONARY ATV SATELLITE. The Qatar Amateur Radio Society has just released further details about the Es'hailSat satellite that is being built for the Qatar Satellite Company. This new satellite will be located at 26°E, just to the east of the satellites used for Sky broadcasting to the UK. It is primarily for domestic satellite broadcasting and other communications services. However, it will be the first geostationary satellite to include transponders for amateur use. Two will be installed, one for multiple audio channels and another for two digital ATV channels. The antennas will cover most of Europe, the Middle East and Africa. The TV frequencies allocated for amateur use are:

- Uplink (13cm), clockwise polarisation, 2401.5-2409.5MHz
- Downlink (3cm), anti-clockwise polorisation, 10491.0-10499.0MHz

The home based uplink antenna could be a regular helical 13cm antenna and the downlink receiving antenna could be a regular domestic satellite fixed dish with the appropriate LNB. The 8MHz wide transponder is designed to have two TV channels; allowing for a guard band each channel could be 3.5MHz wide, which would allow for a symbol rate of 3MS/sec with an FEC of 3/4, including stereo audio and some data. This satellite is due to be launched in autumn 2016. Who will be the first to work South Africa via satellite on ATV? Updates will be available at [3] and [4].

TUTIOUNE DVB-S MONITORING. Many stations have a web page showing the results of their Tutioune monitor, developed by F6DZP, receiving DVB-S on various bands (**Photo 2**). There is now a web page [5] with a list of these stations around the world. Click on the nearest station to you and transmit. You will be able to see the performance of your transmission and the pictures. This is very useful when setting up a new PA or to check your transmission when nobody is about.

Not much individual news this month; please send anything about ATV to my e-mail address above.

WEBSEARCH

[1] www.batc.org.uk
[2] www.vivadatv.org/viewtopic.php?f=72&t=332
[3] http://amsat-uk.org/
[4] www.eshailsat.qa/Fleet.aspx
[5] www.vivadatv.org/tutioune.php

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Eamon Skelton, EI9GQ • e-mail: hbradio@eircom.net

Homebrew

Directional couplers

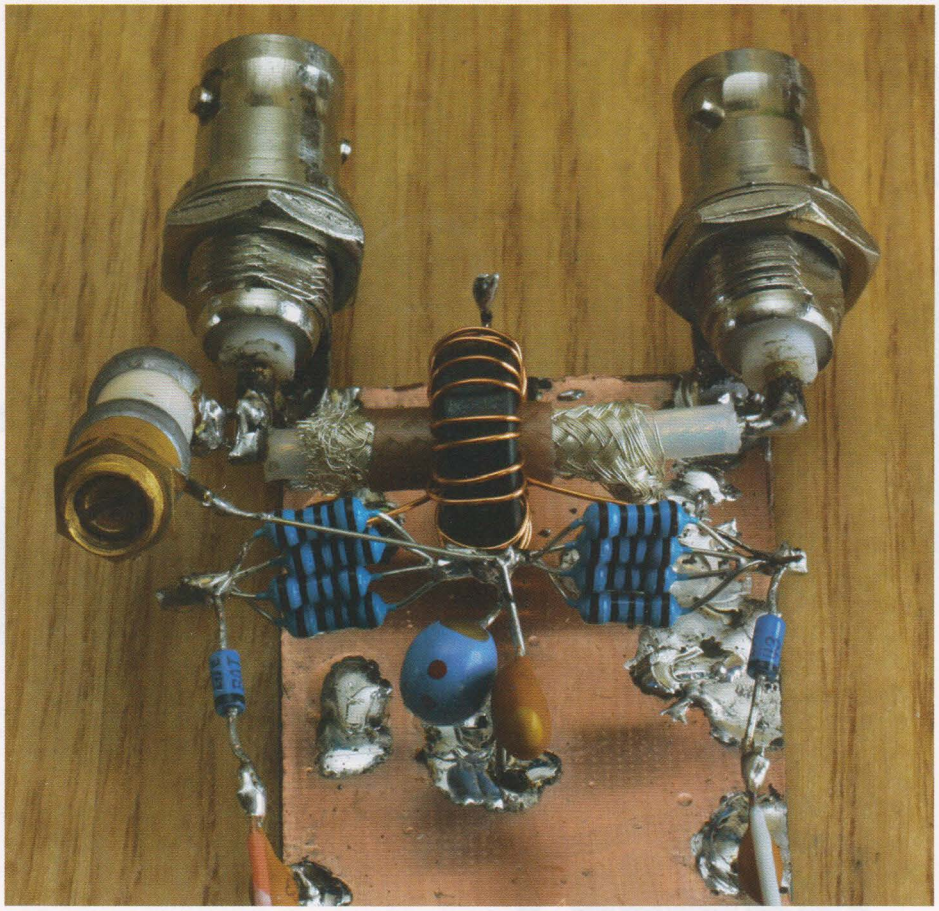

PHOTO 1: This directional coupler may look a bit cobbled-together but it has been tested and found satisfactory at powers of up to 250W from Top Band to 10m.

INTRODUCTION. Simple non-directional couplers of the type discussed in last month's Homebrew can be used to sample the magnitude of current or voltage on a transmission line. The output from the coupler will only give an accurate measure of power transmission in the ideal case of a perfectly matched line where SWR = 1:1. In the case of a line that is mismatched due to operator error, equipment failure or deliberate mismatch in the case of a tuned feeder, very large errors are possible. A measured line voltage of 100V rms would indicate 200W on a flat 50Ω line or just 20W where the line impedance at the point of measurement is 500Ω. This uncertainty is a particular problem for radio amateurs because we tend to use many different frequency bands, often using the same aerial to cover several bands.

Last month's discussion about RF couplers prompted several readers to send comments and observations via e-mail. I am particularly grateful to David Wicks, G3YYD and Nic Hamilton, G4TXG for their help and valuable insight.

Couplers used in broadband instruments like directional wattmeters, SWR meters and return loss bridges must have almost ideal characteristics. A good design must be reproducible, accurate and predictable over a very wide bandwidth. I have always found there is a certain element of voodoo involved in the construction of directional couplers. The ferrite cores that give the best transformer bandwidth are usually unmarked and unobtainable devices from the bottom of the junkbox. Sometimes the use of electrostatic shielding between transformer primary and secondary windings will result in improved performance; on other occasions, an unshielded design may work best. Our task is to find a reliable and easily reproducible directional coupler design suitable for use in a broadband directional power meter. This instrument will be expected to provide accurate measurements from 160m to at least 10m and preferably to 6m.

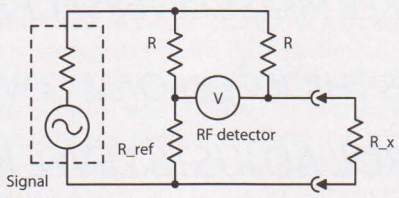

FIGURE 1: Basic return loss bridge circuit. The RF detector indicates a null when R_x = R_ref.

THE RETURN LOSS BRIDGE. Despite its simplicity and low cost, the return loss bridge (RLB) is one of the most useful instruments available to the home constructor.

The basic RLB is shown in **Figure 1**. The circuit is a form of Wheatstone bridge consisting of four resistors. The top half of the bridge consists of a pair of identical resistors (R). The bottom half of the bridge consists of a reference resistor (R_ref) and the unknown resistance (R_x). When the value of the unknown resistance is identical to the reference value, the bridge is perfectly balanced and none of the generator power is delivered to the detector. As 50Ω is almost universally used as the standard for RF interconnections, a typical RLB will use three 50Ω resistors and will be balanced by a 50Ω resistance on the test port.

A load with a resistance other than 50Ω or a reactance other than zero will unbalance the bridge and some power will be delivered to the detector. The greatest imbalance occurs when the test port is connected to a short- or open circuit. This results in a low value of return loss, with all available power delivered to the detector and none to the test port. When the bridge is balanced, all available power is absorbed by the resistor and none is delivered to the detector. This represents a high value of return loss (RL), theoretically approaching infinity. High RL indicates a good match to 50Ω, or a low SWR. As shown, the bridge contains no reactive components and will work reliably over a very wide bandwidth. A real-world device will have accuracy and bandwidth limitations due to stray reactances and the imperfect nature of the components used.

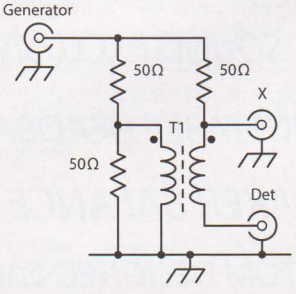

FIGURE 2: A simple yet practical return loss bridge.

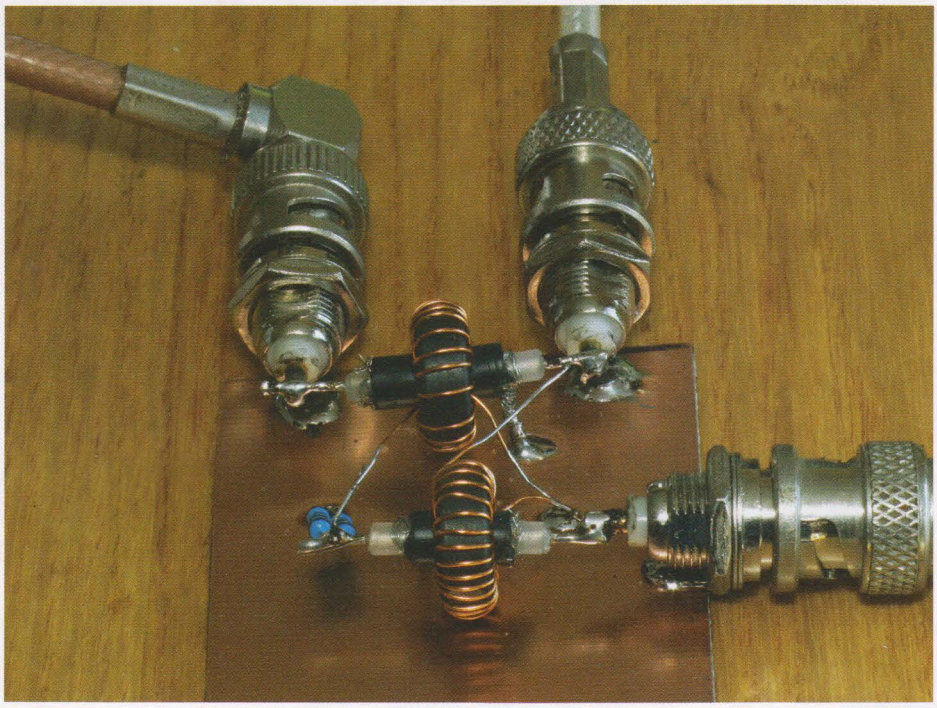

PHOTO 2: Prototype Tandem Match. Note that the coax braids are each earthed at only one end.

A PRACTICAL RLB AND HYBRID COMBINER. Figure 2 shows a simple 50Ω RLB. The 50Ω resistors are made from parallel pairs of 100Ω, 1% tolerance, metal film resistors (Maplin M100R or similar). These have proven reliable from LF to VHF. The RLB can be housed in a screened enclosure made from scrap PCB laminate or in a small metal project box. The generator, detector and X port connections are via 50Ω coaxial connectors. I use BNC type connectors for RLBs and most other home made test instruments.

Provided that you observe good VHF/UHF practice and keep all lead lengths and ground connections as short as possible, the resistors and coax connectors should perform flawlessly from LF to several hundred MHz. The use of leadless surface mount resistors and suitable connectors will extend the useful frequency range into the UHF and microwave region. The component most likely to limit the useful bandwidth and accuracy of the RLB is the transformer between the centre of the bridge and the detector port.

The transformer is a simple 1:1 transmission line type. This acts as a balun between the resistive bridge and the unbalanced detector port. A general rule of thumb for transformers states that the inductive reactance of a transformer winding should be several times greater than the working impedance of the circuit. Minimum XL values of at least 3-4 times the working impedance are required to ensure good low frequency performance. XL of 50Ω at 1MHz is an inductance of just under 8μH. If the bridge is to be used at or below this frequency, inductance in the tens of μH will be required.

I used 15 turns of twisted pair on an FT37-43 toroid core. The resulting inductance is just over 78μH. This should be adequate for our purposes. Ideally, the transformer would be wound with 15 turns of 50Ω coax line. As this is not achievable in practice, I have used a length of twisted pair made from two lengths of 0.375mm enamelled copper wire. This should be satisfactory provided that the length of twisted pair is no more than a small fraction of a wavelength.

TESTING. The bridge was tested using a signal generator and a spectrum analyser as a sensitive power meter to sample the signal on the detector port. Loss from the generator port to port X was an accurate 6dB from LF to well over 200MHz. With port X open circuit, loss to the detector port was 12dB. I was pleased to find the loss to the detector port was perfectly flat from LF to 100MHz and better than ±1dB to 200MHz. Directivity was measured by placing a 50Ω termination on port X. This increased generator-to-detector port loss by 40-45dB at HF and better than 30dB at frequencies up to 200MHz. 40dB RL indicates an SWR of 1.02:1 and 30dB = 1.06:1 SWR. The Mini-Circuits RL/VSWR chart [1] is a handy reference when working with a RLB. The bridge was also tested with a few known values of mismatch like 25Ω, 100Ω and 150Ω. In every case, the measured RL gave an accurate indication of the degree of mismatch.

The RLB has many uses. It can be used for calculating feedline SWR, checking inter-stage matching, aligning filters, measuring coax loss plus indirect measurements of inductance and capacitance. The excellent port-to-port isolation of the RLB makes it suitable for use as a -6dB hybrid combiner. This allows signals from two generators to be combined while maintaining good isolation between the generators. One generator is connector to the gen port, the other generator is connected to the det port. The combined signals appear at port X. Good isolation between generators is important for two-tone linearity tests.

POWER AND SWR MEASUREMENT AT HIGHER POWER LEVELS. Resistive bridges will always waste some of the applied generator power by dissipating it as heat in the resistors. In the case of our RLB, only 25% is delivered to the load. Obviously, this is not ideal for real-time monitoring of a high power transmitter. In-line power and SWR meters use a different type of bridge. There are several circuits in common use. **Figure 3** shows a directional coupler based on a current transformer and a simple resistive divider as a voltage sampling circuit. The R1/R2 voltage ratio is adjusted to match the voltage developed across R3 by the current transformer. When the line is matched, current and voltage are in phase and the equal voltages from the current and voltage samplers are effectively cancelled out. This indicates zero reflected power. If the line is reversed by swapping the input and output connections, the phase of the current sampled by the transformer will be reversed and a detector across point A-B will indicate forward power.

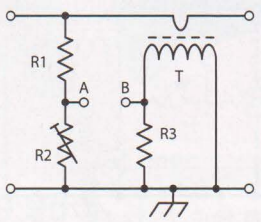

FIGURE 3: Directional coupler based on a current transformer and a resistive divider.

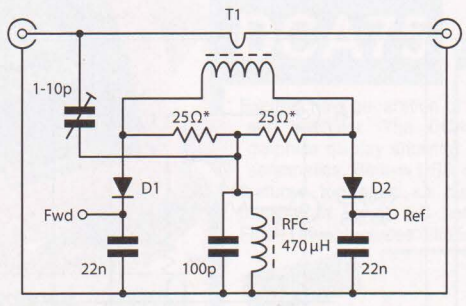

FIGURE 4: Directional coupler with diode detectors providing forward and reflected power outputs.

DIRECTIONAL COUPLER FOR A SIMPLE SWR METER. Figure 4 shows a directional coupler with diode detectors and separate outputs

for forward and reflected power. This removes the need to reverse the direction of the bridge for forward and reflected measurements. Voltage sampling is via a simple capacitive divider. Current sampling transformer T1 has a single turn primary consisting of a short length of coax. This type of coupler was described in detail last month. One side of the coax braid is grounded and the other side is left disconnected so that the outer conductor is used as an electrostatic shield between primary and secondary. The secondary of T2 is 24 turns of 0.375mm enamelled wire on an FT50-43 toroid core. This fits comfortably over a short length of RG58 or similar coax cable. The 1-10pF capacitor is a UHF piston type. This is arranged with the brass screw side away from the higher voltages on the through-line. The 25Ω resistors are made from four parallel connected 100Ω metal film types. The detector diodes are Schottky signal diodes such as 1N5711 or BAT43. OA91 or similar types of germanium point-contact diode would make a good substitute. The only adjustment required is to balance the bridge by adjusting the piston capacitor. To do this, terminate the output with a known good 50Ω dummy load. Start at low power levels. Use an insulated adjustment tool and keep your fingers away from higher RF voltages generated by power levels above a few watts. This type of directional coupler is ideal for use in HF SWR meters. The rather tatty assembled circuit is shown in **Photo 1**. This coupler has been tested at power levels up to 250W at various frequencies from 160m to 10m.

'TANDEM MATCH' COUPLER FOR USE IN A DIRECTIONAL POWER METER. The type of directional coupler in this project is widely known as the 'Tandem Match' since it was used in a popular directional power meter project with the same name **[2]**. The basic Tandem Match circuit is shown in **Figure 5**. The circuit is based on a pair of identical transformers. T1 is used for current sampling and T2 is the voltage sampler. The transformers in my prototype circuit have 24 turns of 0.375mm enamelled wire on FT50-43 toroid cores. This gives a coupling factor of 27.6dB. With a core AL value of 440, 24 turns gives inductance values of $24^2 \times 440 = 253\mu H$. This should extend the frequency range well down in the LF region. The assembled Tandem Match is shown in **Photo 2**. The circuit is simple, elegant and symmetrical. No adjustment is required. Coupling factor is determined by the transformer turns ratio and the impedance for a balanced bridge is determined by the 50Ω terminating resistors at each side of T2. Note that the photo shows one side of T2 terminated by a BNC connector. This was used for measuring coupling factor and directivity while testing the coupler. The final circuit has two 50Ω resistors (2 x 100Ω in parallel) and a couple of 1N5711 diodes as RF detectors/rectifiers. The capacitors at the detector outputs are each 22nF, but the exact value isn't critical.

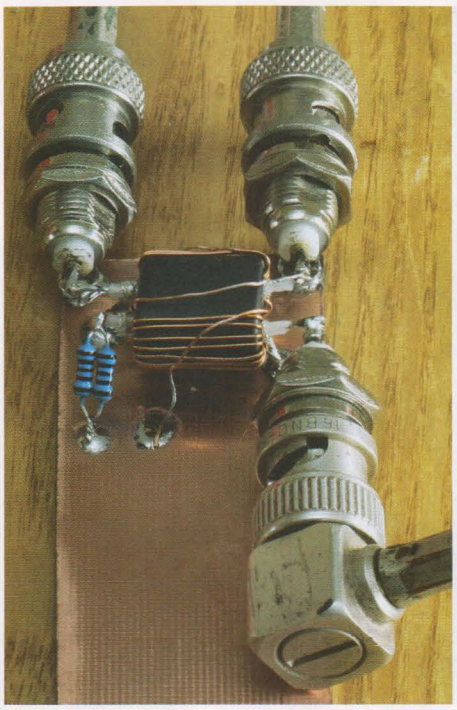

PHOTO 3: A -20dB directional coupler built around a binocular-style ferrite core.

TESTING. Through-line return loss was measured at better than 30dB up to 23MHz, 25dB up to 40MHz and 20dB up to 80MHz. Coupled output is absolutely flat at just over 27dB from 100kHz to 150MHz. Directivity is better than 30dB to 20MHz, 25dB to 31MHz and just 20dB at 51MHz.

It is possible to make Tandem Match style couplers using a single ferrite device. Two-hole 'binocular' types of ferrite core can offer good isolation between two coils wound separately on the same lump of ferrite. **Photo 3** shows a -20dB directional coupler built around a BN-61-202 ferrite core. The transformers are each 1/10 turns made from enamelled copper and miniature coax. Measured performance is excellent from 2.5MHz to beyond 100MHz. LF performance is relatively poor: RL at 1MHz is just 14dB because just 10 turns on a relatively low permeability core does not provide sufficient inductance for LF operation. Using a higher permeability ferrite would probably improve LF performance.

AN ALTERNATIVE COUPLER CONFIGURATION. The left side of **Figure 6** shows an RF current sampler based on a 1:1 transformer. The windings are a length of coax line wound on a ferrite core. At HF and VHF, a straight one turn winding will be adequate; for LF/MF, several turns may be required. The centre core of the cable acts as the primary winding and the outer braid as the secondary winding. Bandwidth tends to improve with increasing values of coupling loss. This type of coupler was suggested by G4TXG. A quick test using three turns of 50Ω coax wound on a Maplin N88AB core and a 1.666Ω resistor made up from 6 parallel connected 10Ω resistors showed promising results. Coupling was found to be flat from 200kHz to 100MHz. The right hand side of Figure 6 shows a -30dB directional coupler based on the same circuit. This is a combined voltage and current sampler. The addition of a voltage sampling circuit only requires a single resistor.

Next month: boxing up the directional wattmeter.

WEBSEARCH

[1] www.minicircuits.com/app/DG03-111.pdf
[2] The Tandem Match – An Accurate Directional Wattmeter – John Grebenkemper, KI6WX, *ARRL Handbook 1993* and *QST*, Jan 1987

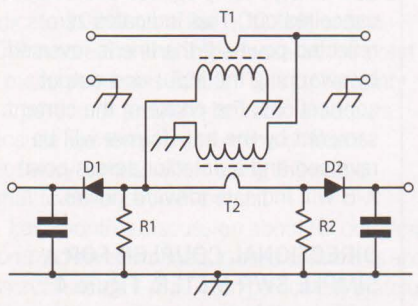

FIGURE 5: The basic Tandem Match circuit.

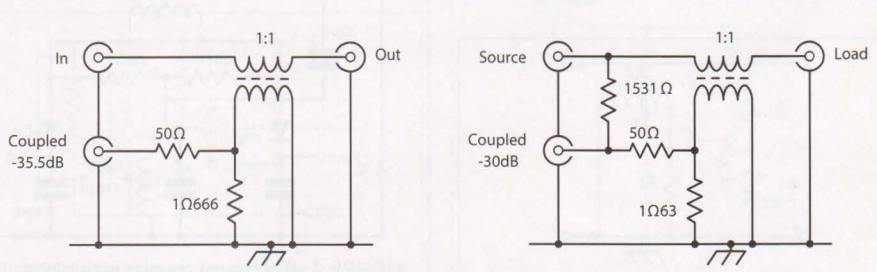

FIGURE 6: (left) RF current sampler based on a 1:1 transformer; (right) a -30dB directional coupler based on the same circuit (see text).

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Mike Richards, G4WNC • e-mail: mike@photobyte.org

ID-5100 dual band mobile for VHF and UHF

Analogue and digital in one box

The all-new Icom ID-5100 dual band mobile rig is bristling with features designed to enhance your mobile operating including dual receivers so you can simultaneously monitor any two frequencies. The ID-5100's integrated GPS unit and global repeater lists makes light work of all types of analogue and D-Star operating whilst the touch-screen head unit puts all the controls literally at your fingertips. The D in the model name ensures that the ID-5100 is fully compliant with the D-Star network and has everything you need to make the most of this digital mode. This review is based on a pre-production sample of the ID-5100.

CONNECTING-UP. The ID-5100 is supplied as a rugged base unit that houses most of the electronics and a remotely mounted head unit that provides the display, control and GPS facilities. The base unit has a tough steel case with a cast alloy, fan cooled, heatsink at the rear and is clearly intended to be tucked away out of sight. However, you should note that the standard ID-5100 package does not include mounting hardware for either the head or base units. This was done to give the owner the flexibility to choose a mounting system to suit the installation. A range of Icom mounting hardware is available but it is on the expensive side. However, Icom UK are offering an ID-5100 DeLuxe kit that includes all the mounting hardware for the head and base units plus the Bluetooth unit and the matching headset.

To help with the initial setup, the ID-5100 is supplied with a printed Basic Manual (90 pages) and a full manual (352 pages) supplied on CD. It's great to have a printed basic manual to help you get started. Well done Icom for this. I was particularly impressed with the quality of the full manual as it was a very well indexed PDF file. Although this was a sizeable document (352 pages), the chapters and sub-sections had been very well set out, thus making it particularly easy to use. The operational explanations in the manual were also very well done with lots of screen shots to guide the reader.

The fused 3m power lead is connected to a free, two-pin socket that emerges from the rear of the base unit. The power requirements are the usual vehicle supply of 13.8V DC. Current consumption depends very much on the transmit power but the maximum demand when transmitting on the 50W high power setting is 13 amps. The antenna connection comprised a single SO-239 series socket on the base unit. Also on the rear panel of the base unit was a Data socket that can be used for cloning or low-speed D-Star data communications. Next are two multi-function external speaker jacks. Whilst the base unit includes an internal speaker, the fact that it's likely to be tucked away means that most installations will require the use of an external speaker. The ID-5100 can drive a standard 8 ohm external speaker and the two speaker jacks have some crafty interconnections. If you use two external speakers they will be split between the A and B receive channels. By physically spacing these speakers it is easy to identify the active channel simply by the location of the sound. If you use a single external speaker connected to SP1, both channels will be automatically fed to that speaker. When not used with an external

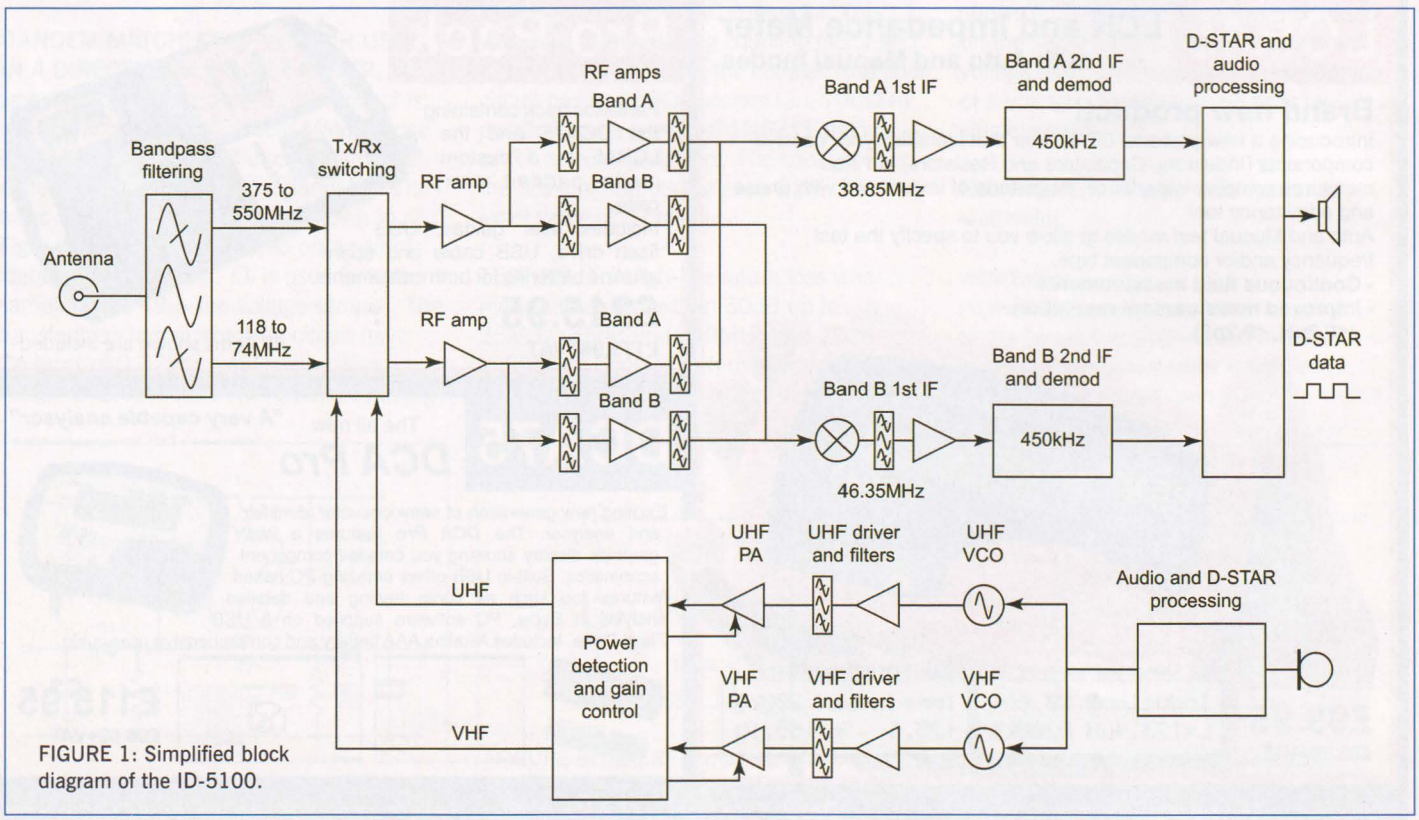

FIGURE 1: Simplified block diagram of the ID-5100.

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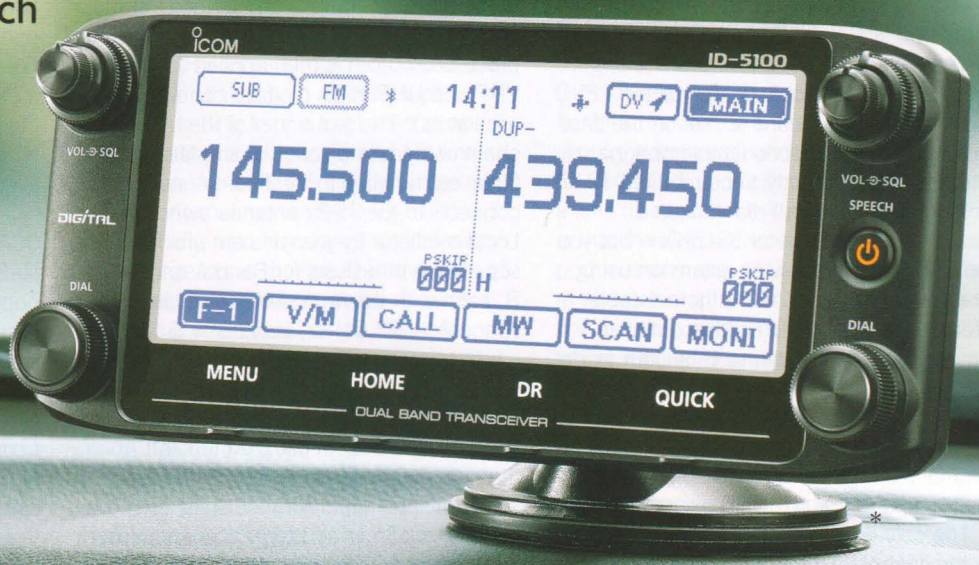

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* Mobile sucker mount may not be supplied with standard model.

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PHOTO 1: ID-5100 control unit.

speaker, the SP2 speaker jack can be used for computer control of the ID-5100 using Icom's well proven Ci-V serial data protocol. This could be very useful for base-station operation.

Moving on to the front panel of the base unit, there is a small RJ series connector for connecting the head unit cable ,along with an RJ-45 microphone connector. Locating the microphone socket on the base unit means that an optional microphone extension cable is likely to be required for most installations. I didn't need a microphone extension for the review but you could easily homebrew an extension using screened CAT-5e or CAT-6 Ethernet cable. Alternatively, you could use the optional Bluetooth interface and use Bluetooth to manage the audio link to the ID-5100 – more on this later. The only other item on the base unit was an SD-card socket. This is used for storing recordings and can also be used to update the ID-5100's repeater lists.

The only connector on the head unit was for the control lead to the base unit.

INSIDE THE ID-5100. Icom UK were very helpful, as always, and provided all the technical information necessary to get under the skin of the ID-5100. I've shown my simplified block diagram of the ID-5100 in **Figure 1**. Let's start from the antenna, where the signal is split into separate VHF (118-174MHz) and UHF (375-550MHz) bands and applied to the Tx/Rx switching. The Rx side of VHF and UHF bands is passed via a limiter to a pair of RF amplifiers. The outputs from the RF amplifiers are both split into Band A and Band B outputs and fed to duplicate RF amplifier and filtering stages. The VHF and UHF band A outputs are then combined and fed to the Band A first IF stage operating at 38.85MHz. The B channels are also combined and passed to a duplicate 1st IF stage but using an IF of 46.35MHz. Both of the 1st IF stages employ crystal band-pass filtering. The 1st IF stages then feeds a pair of identical 2nd IF stages that use a 450kHz IF and employ switchable ceramic filters for adjusting the FM bandwidth. The detector output is then split, with one output feeding the analogue audio chain whilst the other is sent to the digital D-STAR processor.

The transmit chain starts with a microphone amplifier that feeds a specialist audio processor chip linked to the D-Star DSP (Digital Signal Processing). The processed output is then applied to the VHF and UHF VCOs (voltage controlled oscillators). The remainder of the transmit chain comprises a series of amplifiers and filters culminating in the final PA stage that connects to the Tx/Rx antenna switching. Local oscillator frequencies are provided by separate synthesisers for Band A and Band B, each with its own reference oscillator (Band A = 12.8MHz, Band B = 5.3MHz).

OPERATION. For a sophisticated dual-band rig, Icom have done a great job of making the ID-5100 easy to use. At the heart of the operation is the excellent, large, touch screen display unit. With a display area of 125mm x 53mm and large character sizes it is very easy to read in a wide range of lighting conditions. In its default setup, the ID-5100 starts in Dual-Watch mode with the display split in two showing the Main band on the left and the Sub band on the right. The only rotary controls on the ID-5100 are a concentric volume/squelch combination and separate tuning knobs on each side of the display, **Photo 1**. The retention of rotary controls for volume/squelch and tuning is ideal and provides much better control than many digital or touch-screen implementations. The volume and squelch controls use traditional analogue pots, thus giving very smooth adjustment of both settings. The tuning/dial knobs employ rotary shaft encoders with detents producing 24 clicks per revolution. This is ideal as FM/DV operations on the VHF/UHF bands are all channelised, so click steps are exactly what's required.

The Dual Watch default operating mode employs two independent receiver channels and splits the display as shown in Photo 1. Moving around the bands manually was simply a case of rotating the appropriate tuning knob. Setting the tuning steps was done by touching and holding the kHz part of the frequency display and then selecting the required steps from the pop-up menu. There were 9 step choices available, ranging from 5kHz through to 50kHz. I thought the touch screen was particularly well designed and accurate in use. Icom have employed a resistive touch screen system that requires a firm pressure to operate. This gave a much more positive selection than some of the capacitive designs that are often a tad too sensitive, especially for mobile use. The ID-5100 also emits a useful short beep to confirm each touch screen selection. If you hate beeps, don't fret: the volume can be adjusted or turned off completely.

To tune quickly I could press and hold the MHz display and, after a short pause, the Dial knob tuned in rapid 1MHz steps. Switching bands was also touch screen driven and included access to the civil air band as well as direct frequency entry to any part of the extended frequency coverage. For those occasions when you want to keep a check on the local repeater the ID-5100 includes a standard Priority channel facility where it will check the designated frequency every 5 seconds.

SCANNING. For most operators, the ID-5100's scanning options will be the most popular way to locate activity. The D-5100 is supplied pre-loaded with a comprehensive global repeater database for 2m and 70cm that includes both analogue and digital repeaters. This will obviously change quite frequently so Icom keep an up-to-date list online. This can be downloaded to an SD card using any internet-connected PC and then read into the ID-5100 using the SD-card slot on the base unit.

The ID-5100 scanning rates are very fast and certainly fast enough to rapidly scan across all the local 2m and 70cm repeater channels and not miss a call. This is a very powerful feature, especially as 2m and 70cm activity is often a bit sparse in some parts of the country. In addition to scanning the repeater channels, the ID-5100 can be set up to scan other memory channels and frequency bands. The extended receive coverage of the ID-5100 includes the civil air band and AM transmissions so it was easy to set up a custom scan to cover the local airports or the entire air band.

D-STAR. As you would expect from an Icom rig, the ID-5100 fully supports the D-Star modes and does a good job of simplifying the operation. As mentioned elsewhere, the integrated repeater database includes a global listing of D-Star repeaters so everything you need is pre-loaded into the rig. Before using a D-Star gateway for the first time you will need to register your callsign but after that, the D-5100 makes the process very straightforward.

When making making my first call I used the local repeater search facility that listed all the local digital repeaters in distance order. A single press on the required entry completed the selection and I was ready to go. Even gateway calls were simply a case of choosing the required gateway from an on-screen listing. The combination of a comprehensive repeater listing along with the integrated GPS made basic D-Star operation quick and easy. You can, of course, simultaneously monitor two channels of D-Star activity.

In addition to the common D-Star modes, the ID-5100 also supports some of the more advanced features such as low-speed data communications, Enhanced Monitor Request (EMR) and digital squelch.

MEMORY SYSTEM. As you would expect, the ID-5100 includes a comprehensive memory system that comprises 1,000 basic channels, 4 call channels, 50 program scan edges and 1,200 repeater memories! Each of the basic memories can store the frequency, station name, GPS info, bank allocation and a skip setting to exclude it from scan results.

BLUETOOTH CONNECTION & PHONE. The review model was supplied with the optional UT-133 Bluetooth module along with the VS-3 headset. The Bluetooth module opens up two new ways to use the ID-5100. The most obvious is to be able to connect the ID-5100 to a Bluetooth headset so that you can eliminate the wiring that always seems to get wrapped around the gearstick! The other is to be able to link the ID-5100 to your mobile phone. Let's start with the headset. As you can see from **Photo 2**, the VS-3 comprises a pair of earpieces that plug into the Bluetooth module that then clips onto your shirt or lapel. However, before I could use the headset I had to go through the usual Bluetooth pairing process to allow the units to communicate. I only had to do this once, as the VS-3 automatically connected to the ID-5100 when it was in range. As part of the connection process, the speaker output from the base unit is muted. In addition to the microphone, the VS-3 lapel module has the PTT button, headset volume control and three assignable buttons that could be used for frequency/channel changing, etc. The Bluetooth headset worked very well with good audio reports though I don't personally find the drop-in ear buds very comfortable. You can, of course, use a different Bluetooth headset. Providing it uses the standard Bluetooth headset protocol it should work ok.

To use your phone with the ID-5100 you first need an Android-based phone as the RS-MS1A app is only available on the Android platform at the time of writing. The app is very neat and allows you to control many of the ID-5100's settings including setting up D-Star routes. Once connected in a D-Star contact you can send text messages from the phone and also share photos – clever.

INTERNAL GPS. The ID-5100 comes with a fully integrated GPS unit that adds a wide range of useful features. In addition to being able to send position reports via D-Star, the GPS data facilitates the inclusion of local repeater searches. This is an excellent idea that makes mobile operation so much simpler. No matter where you are, you can choose to run a local repeater scan to identify local activity. The scan uses the ID-5100's comprehensive global repeater database along with the GPS data to identify the local repeaters and build a dedicated scan based around those repeaters. The scan covers both VHF and UHF repeaters and you can choose analogue, digital or both repeater types. The range setting for the local scan seemed to be pre-set at a fairly optimistic 150km. Also, when manually selecting repeaters from the internal memory, the ID-5100 will automatically report the range and bearing to each repeater in the list. This is a real timesaver for mobile operators and helps ensure that you can select the best local repeater wherever you are. The bearing and range information can also be used to give an indication of the prevailing propagation conditions and potential range.

The internal GPS is based around a combined GPS module and chip antenna that's located in the top of the remote head unit. The sensitivity of the review model's GPS seemed lower than I would have expected from a modern GPS unit. When compared to my LG G-2 smartphone in the same position, I found that my phone could find 8 usable satellites whilst the ID-5100 only found 4. I also ran a comparison with a MTK3339 GPS module at the same location and that showed a similar result. It's also worth noting that the ID-5100 has no provision for an external GPS antenna. This will be an important factor if you have a modern vehicle fitted with an athermic windscreen. Unfortunately, the coatings used to reduce UV and glare in these windscreens act as a very effective RF screen for GPS signals. If you have one of these windscreens you will need to use a re-radiating GPS antenna to get a usable signal inside the vehicle. These units are readily available for around £40 from popular online suppliers.

The only other GPS problem I spotted was the occasional very slow position acquisition time. It would appear that the ID-5100's GPS does a complete cold start every time the rig is powered up. When in a very good location on a hill top, a fix was obtained within a couple of minutes. However, in less favourable locations but where my phone could still find 8 satellites, the ID-5100's GPS took up to 10 minutes to acquire a fix. Most modern GPS modules are able to acquire a fix in well under a minute so the ID-5100 GPS acquisition performance is a little disappointing. The one saving grace is that the ID-5100 keeps a log of recent positions and uses the last known position in absence of a fix from the GPS. As a result, you can still use the GPS linked searches whilst waiting for an accurate fix from the internal unit. However, if you're expecting to transmit position reports whilst mobile you could potentially lose the first 10 minutes of your journey. I contacted Icom UK regarding the sensitivity and they reported that the production models have improved performance.

SUMMARY. The new ID-5100 is an impressive VHF/UHF mobile rig that makes operating on these bands about as easy as it can get. The integration of the GPS and repeater listings provides the foundation for effortless operation of both D-Star and analogue modes. The receiver was extremely sensitive and produced very good quality audio. The transmit chain was equally well specified and I received excellent audio reports throughout the review period. The optional Bluetooth connectivity was well worth considering and provides the flexibility to use a range of Bluetooth audio devices with the ID-5100.

The basic ID-5100 without mounting hardware costs £569.95 whilst the ID-5100 Deluxe costs £719.95 and includes the mounting hardware, Bluetooth module and the VS-3 Bluetooth headset. Both prices include VAT at 20%. Further details are available from the Icom UK website, www.icomuk.co.uk

PHOTO 2: Icom VS-3 Bluetooth headset.

November 2014 • RadCom
Steve Nichols, GOKYA • e-mail: infotechcomms@googlemail.com

New headset and interface

The Shure BRH440M headset and 'Mike-Link' interface

For contesting, special event station operating and for use at any location where there is a lot of extraneous noise, a headset can be a real boon. That is, wearing a pair of headphones with a built-in boom microphone can free up your hands to control the radio or use a keyboard for logging, plus it makes it a lot easier to hear weak contacts.

The RF Connection in Maryland, USA, has come up with a new headset and interface combination that it hopes will take the amateur world by storm. It has married a professional Shure BRH440m headset with its 'Mike-Link' interface. The net result is a combination that gives you much more than a set of headphones and a microphone.

NO EXTERNAL NOISE. The Shure BRH440M headset is aimed at broadcast professionals – and it shows. The BRH440M is a two-ear headset with a closed, 'circumaural' design that effectively cuts out external noise. When I put the headphones on I could hear virtually nothing but the radio – ideal for field day and other events.

The headphones are very well made and offer superb sound quality. They even include an auto-mute feature as soon as the microphone boom is raised vertically. That is, if you move the microphone upwards it automatically switches it out of circuit. So even with the rig's VOX on you can't accidentally transmit.

MIKE-LINK. RF Connection's Joel Knoblock, W3RFC has made them attractive to amateurs with his 'Mike-Link' interface. This has an integral lead fitted with a micro XLR connector that fits into the headphones. This clicks firmly into place, but can be removed quickly by using the release sleeve. Two further cables then connect the interface box to your rig's 6.35mm (quarter inch) stereo headphone output and microphone socket. Different cables are available for different radios and can be specified at the time of purchase.

The Mike-Link interface is an impedance-matching device that matches a low impedance microphone to higher impedances as used by most amateur radio transceivers. It also includes by default an optional active preamp to drive the higher transmitter audio levels required by Icom transceivers. This can be deselected by way of a jumper switch inside the case.

It also includes a 3.5mm socket for a foot switch and has ferrite RF suppression chokes fitted inside to help prevent RF audio breakthrough.

The Mike-Link interface box has a single PTT button in the middle, plus switches on the side for both stereo/mono and reverse/in phase selection. The reverse/in phase switch can come in useful when listening to CW as it gives two different 'audio images' to reduce operator fatigue. You can also use your radio's VOX control.

IN USE. So how well does it work? In a word, 'superbly'. The headset is very comfortable, although the enclosed nature of the earpieces can get a little warm over long periods – the price you pay for external noise reduction.

The received audio quality was excellent with just the right balance between rich audio without being too bassy (the frequency response is said to be 30Hz to >15kHz).

Audio reports using the boom mic were fine.

The Mike-Link interface box has a single PTT button in the middle, plus switches on the side.

AVAILABILITY. The Shure headset and Mike Link cost $249 + $64.75 delivery to the UK (make sure you specify the required rig interface cable) and you can order by going to www.therfc.com. Joel is also considering a kit version of the Mike-Link, perhaps for the European market. Our thanks to The RF Connection for the loan of the headset.

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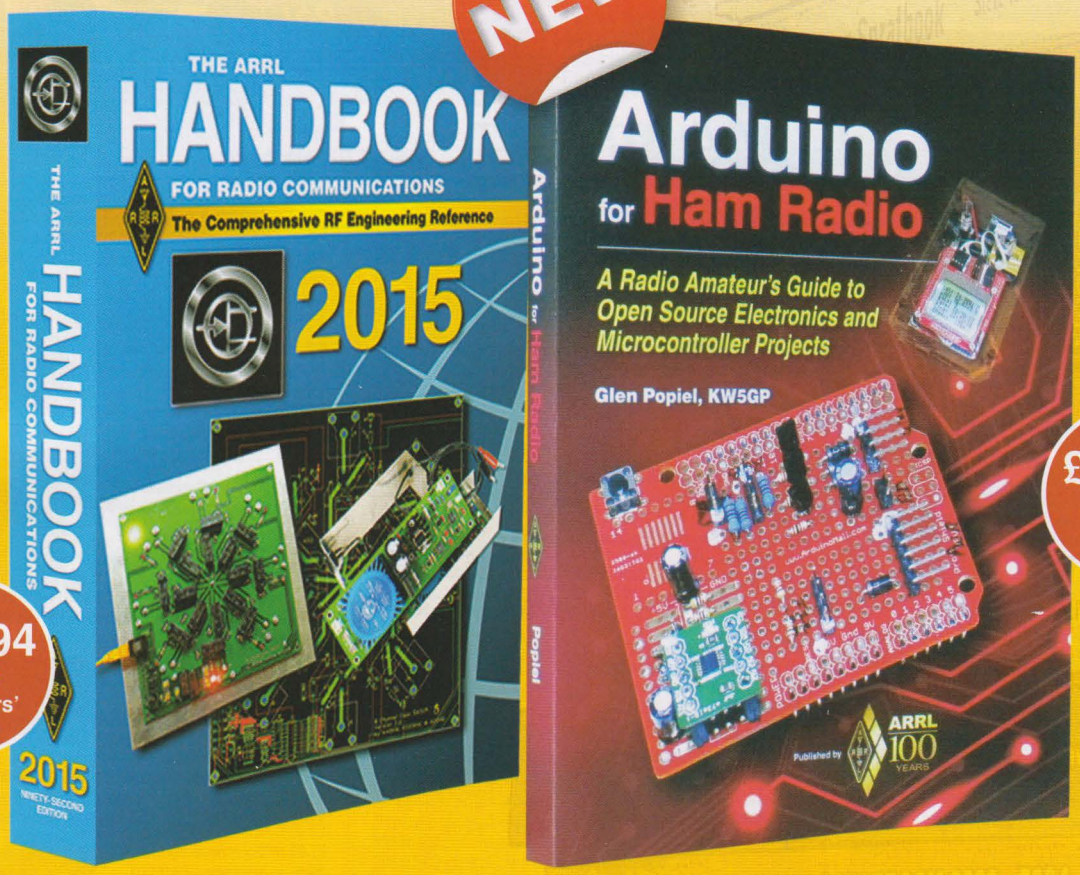

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By: Glen Popiel, KW5GP

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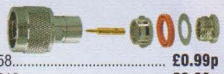

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Getting started in... radio astronomy, part 1

Studying galactic radio emissions from your own back garden

PHOTO 1: Grote Reber, W9GFZ (1911-2002). Image courtesy of NRAO/AUI.

INTRODUCTION. The radio region of the electromagnetic spectrum supports an enormous range of applications. One of these involves applying human ingenuity to pluck a weak signal from a noisy background and then extract information from it. Sounds familiar? Well, I don't know about you, but I'm thinking about radio astronomy.

A LONG TRADITION. In a sense, amateur radio spawned radio astronomy. The first true radio astronomer, Grote Reber, W9GFZ, was determined to make the scientific world take notice of Karl Jansky's chance discovery in 1932 of radio noise originating from the centre of the Milky Way. The professionals were reluctant to do so, partly because of the lack of funds in the Great Depression and partly because Jansky's results ran counter to the accepted wisdom of the time. So Reber built his own 9 metre diameter dish, together with a 3.3GHz receiver – a profoundly non-'amateur' achievement for 1937 – and started observing, eventually producing the first map of the radio sky as it apears at 160MHz. Around the same time Dennis Heightman, G6DH, Nelly Corry, G2YL and Eric Williams, G2XC were trying to convince Edward Appleton of a link between solar activity and the sudden loss of short wave communications. Ever since then, callsigns have continued to feature in the radio astronomy community, not least that of G3CY, Professor Sir Martin Ryle, Nobel Prize winner and Astronomer Royal.

RADIO ASTRONOMY IN TODAY'S WORLD. So does radio astronomy have relevance for today's radio amateur? Perhaps not as regards a 2m QSO, but understanding how radio signals are generated and their behaviour in the presence of plasma, electric and magnetic fields, plus facing the challenges of experimentation and development, are very much in the tradition of the hobby. Radio amateurs and radio astronomers also have a common interest in the increasing pollution of the electromagnetic spectrum through the introduction of poorly-regulated new technologies such as PLT and solar panels. Raising the profile of this problem, through increased and wider participation in both fields, can only help in trying to slow the rate at which we are needlessly losing this natural asset.

REALITY CHECK. But can radio amateurs 'do' practical radio astronomy? As noted at the start of this article, we are dealing with weak signals – in fact very weak signals. The flux densities associated with 'Deep Sky' objects such as radio galaxies, supernova remnants and pulsars are a million times less than those discernable by modern communications receivers. Nor do we have the ability to declare a radio-quiet zone for 50 miles around the shack. However there are celestial objects that can be detected by relatively simple equipment, if not directly, then by some consequential reaction. These provide relatively simple, low-cost entry points to the science.

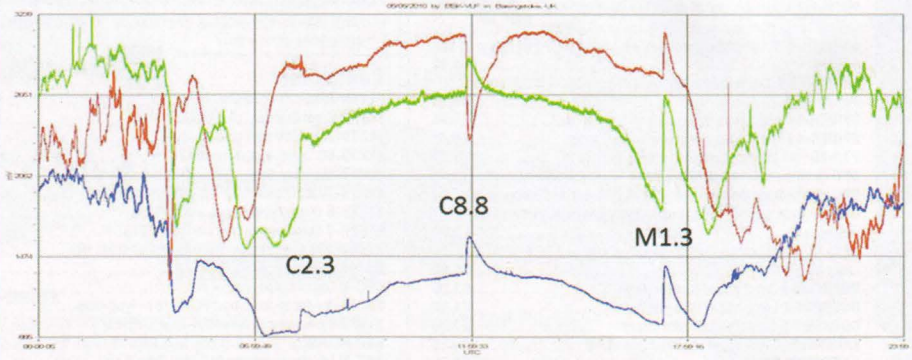

FIGURE 1: Three X-ray flares revealed by Sudden Ionospheric Disturbances on 5 May 2011. The monitored stations were Anthorn (Red), St Assise (Green) and Skelton (Blue). Note that signal levels are random between sunset and sunrise. Image courtesy of G4CSD.

The following projects provide a stepped introduction to radio astronomy and illustrate the potential for amateur involvement. I have given several talks about practical radio astronomy to local astronomical societies and have found a lot of interest when people realise how simple it can be to get started. There is considerable potential for cooperation between radio amateurs and local astronomical societies who often own optical observatory sites that could be used for radio astronomy work.

SUDDEN IONOSPHERIC DISTURBANCES.

The simplest application for the beginner is that of detecting X-ray flares erupting on the Sun, or, more accurately, detecting their subsequent impact upon the Earth. These explosions are the result of the twisted, tortured magnetic fields associated with active areas around sunspots suddenly 'snapping' to a simpler configuration. The result is a conversion of the energy held within these magnetic fields to thermal energy and, in particular, a rapid increase in X-ray and ultraviolet emissions known as an X-ray flare. Eight minutes later this wall of energy slams into the Earth's ionosphere, dramatically increasing ionisation levels, as shown in **Figure 1**. The predominant structure during daytime hours is the D-layer and the change in its reflectivity can be measured by monitoring distant VLF transmitters. The most useful of these are the Skelton (22.1kHz), Anthorn (19.6kHz), St Assise (20.9 kHz) and Rhauderfehn (23.4 kHz) transmitters, though there are several more stations receivable in the UK **[1]**. Few communication receivers cover the VLF band and one answer is a purpose-built receiver such as that sold by the UK Radio Astronomy Association (UKRAA) **[2]**. This produces a slowly varying DC output that can be used to drive a data logger and charting application such as *Radio SkyPipe* **[3]** or the *Starbase* application **[4]**.

The best antenna for this application is a magnetic loop, which offers some discrimination against local interference. The more turns and the bigger the cross-sectional area the better, but the best results are obtained by bringing the coil to resonance, which limits the number of turns to about 125 and the size to about 450mm per side. A switched or variable capacitor of 0 – 3000pF is then needed to resonate the loop for the various VLF stations.

Alternatively, many modern computer sound cards can sample at a rate of 96kHz or more and hence can easily handle VLF signals. The freely downloadable *Spectrum Lab* application **[5]** by Wolfgang Buescher, DL4YHF can then be used to chart the variation in signal levels throughout the day. This needs a non-resonant loop if you are to monitor multiple stations. One solution is a 10 metre 25-way printer cable with the connectors cut off and the individual cores daisy-chained together. The simplest option is to just connect this to the microphone socket of the computer, though this does present impedance issues and many sound cards also apply AGC to this input. A much better solution is to add a suitable amplifier and connect to the Line Input socket, assuming your computer has one! Renato Romero's site **[6]** is the standard reference site for VLF work and includes several designs for both amplifiers and loop antennas, whilst another useful site is Paul Nicholson's **[7]**, which includes an extensive Linux toolkit for those wanting to do their own development work.

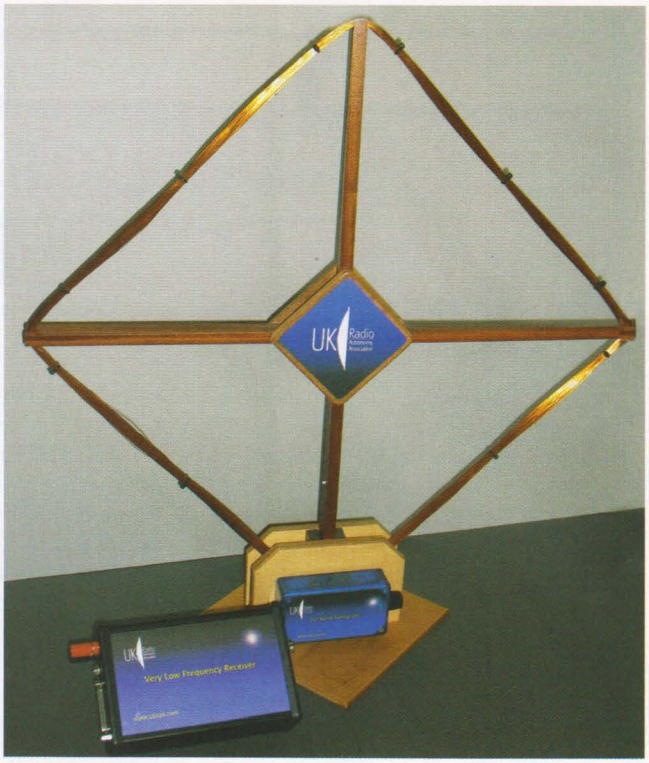

PHOTO 2: Loop antenna and tuneable 12-35kHz VLF receiver from UKRAA. Image courtesy of G4CSD.

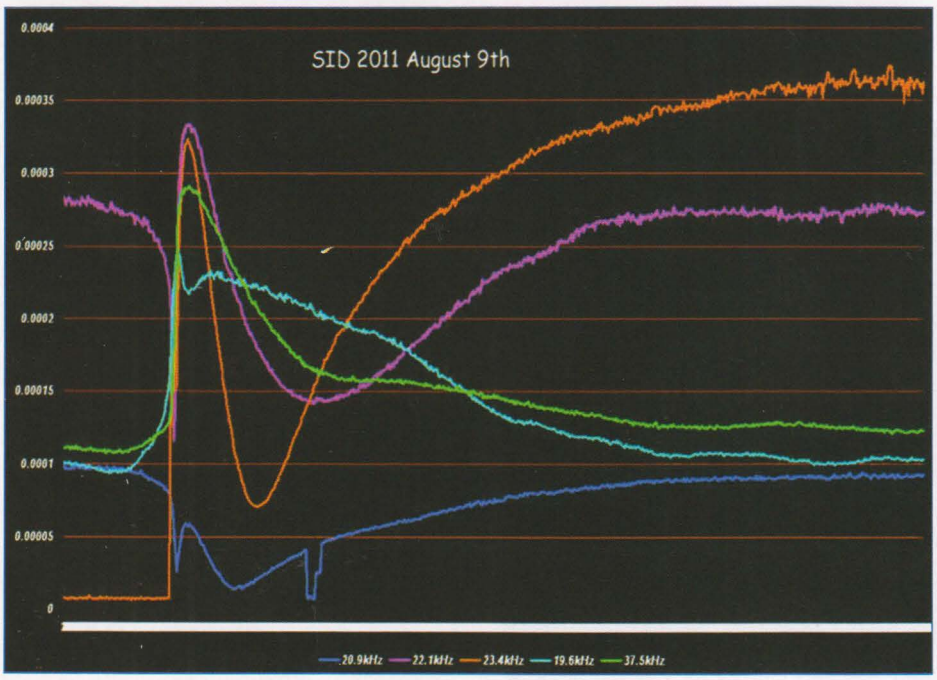

FIGURE 2: The effect of a very strong (X-class) flare on five VLF signals over about five hours. Image courtesy of Mark Edwards.

The impact of an X-ray flare (**Figure 2**) is not confined to a change in the reflectivity of the ionosphere. The increased conductivity leads to a massive increase in the Ring Currents that circulate within the ionosphere, which in turn generate their own magnetic field that then modifies that of the Earth's magnetosphere. A very powerful X-ray flare can result in a magnetic Solar Flare Effect (SFE) event, alternatively known as a magnetic crotchet. The strength of the famous Carrington super-flare of 1856 (the repetition of which could have very significant effects today) has been estimated at X42, a thousand times the size of any flare seen in modern times, through analysis of the magnetic crotchets recorded at the time at the Kew and Greenwich observatories. It is now possible to buy magnetometers that are sensitive enough to detect these rare events, though finding a magnetically quiet area can be problematic. I have mine at the end of the garden but still find sudden massive spikes occurring due

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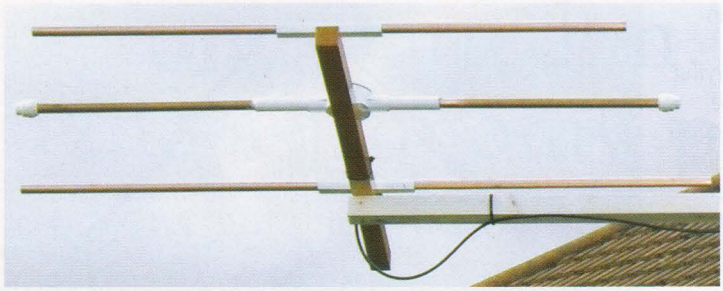

PHOTO 3: Simple 3-element Yagis like this are adequate for meteor scatter experiments.

to a patrolling feline with a magnetic collar (known as Maggy Mog).

The biggest impact on the Earth's magnetosphere is from the solar wind, and in particular from the Coronal Mass Ejections associated with some flares. Although we are now well into the domain of geophysics, adding a magnetometer into the system gives you the ability to time the arrival of a CME from the resulting sudden magnetic impulse, as well as the original time of departure from the Sun using the SID created by the flare event.

METEOR SCATTER. Radio amateurs are well aware of the potential for using the plasma trail created as a meteoroid burns up in the atmosphere to reflect radio signals for long distance working. The same effect can be used to study meteor activity by monitoring the bursts of radio signal reflected from a distant transmitter. The heyday of this activity was in the era of analogue TV transmitters where the vision carrier provided plenty of suitable sources at a variety of distances. Digital television has seen the end of these discrete carriers but the GRAVES space surveillance radar on 143.05MHz [8] provides an excellent source for experimenting with meteor observing. The frequency makes for a compact antenna with a wide beamwidth design preferable to cover as much of the sky as possible. Gain is not an issue here as GRAVES is so strong that EME reception is possible even without a preamp using a homebrew 3 element Yagi such as that shown in **Photo 3**. Other people have reported receiving meteor 'pings' using long wires and HF 'Tribander' antennas, so why not give it a go with your existing antenna? **Figure 3** shows the sort of thing you might expect to see.

Meteor activity is very dynamic, with the profile of both sporadic meteors and showers telling us something about the makeup and mechanics of the solar system. Sporadic activity varies throughout the day, peaking in the early morning with a minimum in the afternoon and early evening. Meteor showers occur on certain dates throughout the year, but their activity profile can vary from year to year [9]. There is also the chance of unexpected outbursts. Meteor scatter can also reveal details of how the plasma trail develops and dissipates, with echoes lasting up to a minute or more.

Any communications receiver covering 143MHz and with a USB setting will reveal meteor 'pings' but the AGC function can get in the way of serious observing and should be disabled if possible. Secondhand Icom IC-PCR1000s are a popular choice, whilst the FUNcube dongle provides a convenient and compact alternative. People have also reported success with the budget TV dongles. The issues here can be intermodulation from broadcast and pager transmitters, plus a wide range of 'sproggies' and broadband noise from the solar panels that are an increasing feature of the domestic environment.

The G4CQM 'MetScat' antenna [10] has been designed for easy construction and its broad beamwidth makes it ideal for capturing reflections over a broad expanse of sky. As well as meteor events I regularly observe transits of the International Space Station and moonbounce signals, even without a preamp and with 30 metres of RG-58 downlead.

Once again, the *Spectrum Lab* application is an excellent tool for serious meteor observing, due to its flexible 'Conditional Actions' scripting application. This can be used to trigger on meteor events and record event start times and durations in a text file, which can then be used for later analysis using a spreadsheet application. Alternatively, the data can be saved in a suitable format for subsequent uploading to the Radio Meteor Observing Bulletin website [11]. It is also possible to trigger screen captures of notable events to show the structure of the meteor trail and how it evolves during the event.

GRAVES is an ideal source for an introduction to meteor scatter due to the sheer amount of power it puts out, but it does have its disadvantages. The antenna pattern is not published and there is some question as to whether meteor scatter received in northern Europe is as a result of rear lobe emissions. In addition, the way in which the antenna beam is stepped across the sky means that different parts of the meteor trail are illuminated every 0.8 seconds, complicating the analysis of how it disperses. A better solution would be a purpose-built meteor beacon of the type operated by the BRAMS group in Belgium, running 150W at 49.97MHz [12]. I have picked up meteor reflections from this beacon but it is too far away for real work. A UK initiative along the same lines would be great project for a group of astronomy and amateur radio activists.

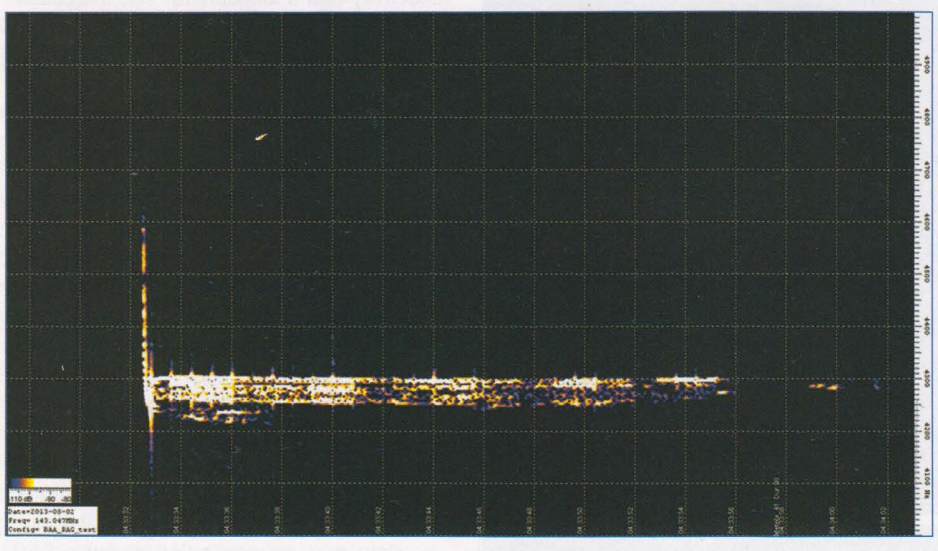

FIGURE 3: The high power signal from GRAVES allows you to watch meteor trails as they disperse with time. Note that the vertical axis shows the Doppler-shifted frequency of individual plasma tubes in the trail. Image courtesy of G4CSD.

WEBSEARCH

[1] Complete list of VLF transmitters, their locations and satellite images:
http://sidstation.loudet.org/stations-list-en.xhtml
[2] www.ukraa.com/www/
[3] http://radiosky.com/skypipeishere.html
[4] www.ukraa.com/www/starbase.html
[5] www.qsl.net/dl4yhf/
[6] www.vlf.it/
[7] http://abelian.org/
[8] GRAVES radar system:
www.itr-datanet.com/~pe1itr/graves/
[9] For details of meteor shower dates see
www.meteorwatch.org/meteor-info/meteor-showers-2014/
[10] Derek Hilleard, G4CQM 'MetScat' antenna:
http://g4cqm.www.idnet.com/
[11] www.rmob.org/index.php
[12] http://brams.aeronomie.be/

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Book Review

Completely spoiled for choice this month with a bumper crop

ARRL Handbook 2015

The *ARRL Handbook* covers everything from the fundamentals of radio to the technology at the forefront of up-to-date innovation and invention. And it's not just a book – it comes complete with a CD that includes all of the text and illustrations of the book in fully searchable PDF format, plus a number of useful pieces of software including a new version of the filter design program *ELSIE*™.

As is traditional for the *ARRL Handbook*, there is a healthy mix of theoretical and practical material. As some aspects of amateur radio increasingly include software elements, so the *ARRL Handbook* now covers such things as software defined radio. Digital communications, particularly the new emerging digital voice standards (both with and without internet backbone elements) are covered, as are many other digimodes from the traditional to the cutting-edge.

But it's an analogue world we live in and the *ARRL Handbook* keeps its feet firmly planted here, too. There are many descriptive sections on everything from antenna design to electronic troubleshooting. As is traditional, several new projects are featured in the new edition. These include a simple adjustable tracking power supply, an eight-channel remote control antenna switch and a tri-band Moxon antenna.

It is interesting to see that the already comprehensive coverage of propagation has been updated in line with the progress of Solar Cycle 24.

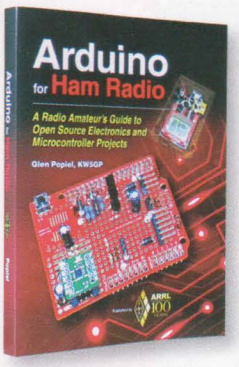
One might think that a book in its 92nd edition would be going a little stale but that's far from the case with the *ARRL Handbook*. The editing cycle is such that in each new edition there is a mixture of brand new material and sections carried over from the previous version; over a period of a few years the cumulative effects are enormous. If you haven't seen a copy of the *ARRL Handbook* for a couple of years then it's well worth getting an up to date copy – and it's a good investment for any radio club, too.

Put the *ARRL Handbook* high on your shortlist of reference books.

ISBN 978-1-6259-5019-2
1320 pages, 276 x 208mm
Non Members' price £46.99
Members' price £39.94

Arduino for Ham Radio

by Glen Popel, KW5GP



Arduino is one of those words that either means a lot to you or is something that you've vaguely heard of and mean to check out one day. If you're in the latter category, this could be just the book for you. The name Arduino covers a (small) range of microprocessor building-block boards, normally based on an Amtel ATmega processor. The clever thing is that these processor boards – brains, if you like – have carefully-placed expansion connectors containing input/output lines, onto which expansion boards known as 'shields' can be plugged, Lego-style, to increase the functionality. Examples include relay drivers, sensor interfaces, LCD or TV drivers, sets of pushbuttons, LEDs, GPS and RF link systems like Wi-Fi and Xbee. About 50 pages of the book are devoted to looking at the various Arduino boards and the many types of shield: there are a *lot*.

But in order to make anything useful, we need software as well as hardware. We're given a brief introduction to the Ardiuno Development Environment and, the basic concepts of Arduino.

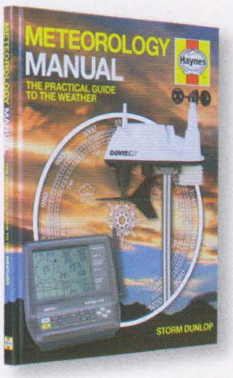
Practical projects are the order of the day with this book and it starts with creating a random code Morse practice generator. The book continues with projects of increasing sophistication such as a digital compass, weather station RF probe, talking VSWR meter, waveform generator, satellite tracker, lightning detector and more. One or two of the projects involve mains voltage and you'll have to be careful to translate from American standards for things like voltage, connectors, earthing and so on.

I didn't get the chance to actually try my hand at any of the projects but they do seem to be well documented and, perhaps most importantly, not scary. Arduino is used by people of all ages, from schoolchildren to pensioners, is inexpensive and by all accounts fun, and this book provides a friendly introduction with an amateur radio slant. What more could you want?

ISBN 9-781-6259-5016-1
352 pages, 275 x 208mm
Non Members' price £28.99
Members' price £24.64

Haynes Meteorology Manual

by Storm Dunlop



I know one should never judge a book by its cover but my eye was immediately caught by author's name – Storm – which did make me smile.

The British, in particular, are traditionally fascinated by the weather. The nature of our small island and its influences including the Arctic, Gulf Stream and continental patterns make for an ever-changing scene; when I first went to the north coast of Scotland I was told that if I didn't like the look of the weather I should wait fifteen minutes and check again, for it was certain to have changed. And, by and large, they were right.

But centuries of careful observation have detected a certain predictability in all this chaos, and thus the science of meteorology was born. This book sets out to reveal the mysteries and help you understand how the world's ever-changing temperatures, pressures, winds, clouds and humidity affect whether it's going to rain next Tuesday.

Storm's book does appear to give you quite a comprehensive grounding in weather. As with most Haynes manuals it is abundantly illustrated with high quality drawings and images, including a lot of photos of cloud formations along with details of how they're formed, why, and what they mean, plus satellite imagery, sea flow diagrams, heat transfer and more. Towards the end of the book there are sections on observations and observing techniques, including information relating to amateur weather stations such as the one on page 14 of this issue of *RadCom*.

Definitely an interesting read.

ISBN 9-780-8573-3272-1
172 pages, 278 x 215mm
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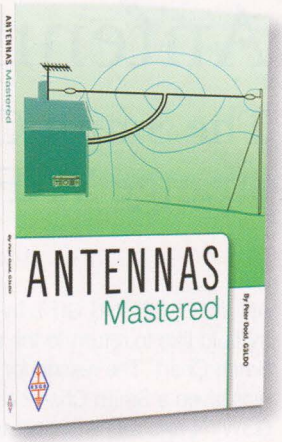
Antennas Mastered

by Peter Dodd, G3LDO

Peter Dodd, G3LDO is an acknowledged authority on antennas and has been writing for *RadCom* for over 40 years. This book is a comprehensive anthology of his articles, beginning with his 1972 piece on the assessment of HF aerials using VHF aerials in which he describes testing scale models of a 3-ele beam, a Quad, Birdcage and a ZL Special on 2m to determine their vertical and horizontal radiation patterns far more conveniently than trying it with the real things – and long before computer modelling became available to amateurs.

The book is in two sections. The first, and by far the largest, is a reproduction of all the G3LDO Antennas columns from January 2002 to December 2013 inclusive. In that time Peter has covered an enormous range of antenna-related topics and it is fabulous to see the articles gathered together for the first time in one place. Over the years the column has investigated some weird and wonderful – sorry, highly innovative – antenna designs, whilst never losing sight of simpler matters such as feeding a half wave dipole or choosing and fitting the right kind of coax connector.

The second part of the book reproduces Peter's standalone articles from the aforementioned 1972 investigation up to his perhaps-controversial 2009 review of loop fed Yagis designed by G0KSC. En route we revisit the evaluation of the G2AJV toroidal antenna – a radical, remarkably small HF antenna that looks like nothing else I've ever encountered and, according to the article, "appears to work very well once the problems of matching are overcome … particularly useful for low band HF, particularly where space is at a premium".



Overall, this book follows an established and very popular pattern of such publications, having much in common with (but different material from) predecessors such as Pat Hawker, G3VA's *Antenna Topics* and the *Technical Topics Scrapbook*. As such it completely achieves its objective and provides a single go-to reference for all of Peter Dodd's articles. Well worth a punt.

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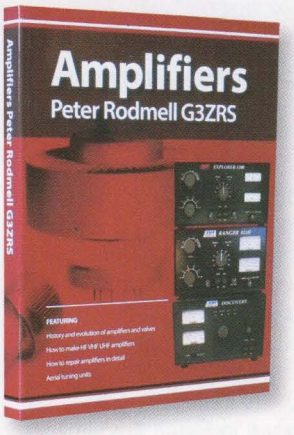
Amplifiers

by Peter Rodmell, G3ZRS



This book is a labour of love by Peter Rodmell, the founder of Linear Amp UK Ltd. In it, he explores the history and evolution of valves and RF power amplifiers, how to make and repair HF, VHF and UHF amplifiers and, as a bonus, takes a look at antenna tuning units.

Starting from first principles ('how does the valve work?') and a round-up of types in common use (including a brief mention of the magnificent 3CX15000A7 that will put out nearly 30kW). We then have an overview of some of the classic amplifiers, including a whole chapter devoted to the Kenwood TL-922 – including fault-finding. We're really into the meat of the book at this point, with similar chapters on 3-500Z and 572B amplifiers and then a fascinatingly detailed couple of chapters on the evolution of the Challenger HF and Discovery VHF and UHF amplifiers. Like the rest of the book, these chapters are very well illustrated with photos and circuit diagrams aplenty.

Tinkerers will love the chapters on how to make amplifiers for HF, 6, 4 2m and 70cm, which together distil decades of experience into a packed 90 pages or so and are probably worth the price of the book on their own. Ancillary circuits are well catered for too, including PSU, soft start, biasing, input matching, metering and so on, including various other niceties such as safety. In many respects, this candid work is an engineers' bible for linear amplifiers.

I really liked this book, largely because of the friendly and straightforward way it is written. Peter tells it like it is and shares his experience – including opinions, innovations, hints and tips – in a very accessible, readable and above all well-illustrated manner. It's an expensive book, but well worth considering.

ISBN 978-0-9930-3510-4
304 pages, 275 x 210mm
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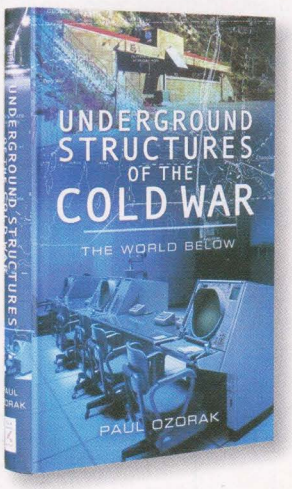
Underground Structures of the Cold War

by Paul Ozorak

I don't quite know why but there seems to have been a surge in popularity recently of 'now it can be told'-type books that reveal previously-classified details of the work that various governments have undertaken on behalf of their populations in an attempt to keep them safe from outside aggression. Some of the examples are fairly well known – for instance Cheyenne Mountain in the USA or the Rock of Gibraltar that has, by all accounts, more tunnels bored through it than a Swiss cheese has holes. But many, many more are still secret.

This book is utterly amazing in the breadth of its coverage. The contents list is a who's who of the Cold War and other conflicts – I counted no fewer than 64 countries, many of which have details separated out into separate sub-sections. Norway, for instance, has sections on military bunkers, the National Bunker, civil defence, the Global Seed Vault and other facilities. I was amazed to learn that Norway had some 3000 military bunkers, providing facilities for home forces as well as hosting British, American, German and Dutch military contingents. The National Bunker, built to accommodate 600 people from the Royal Family and Prime Minister downwards, was constructed near the aptly-named town of Hole in the 1960s. A new facility was created in Oslo in the 1980s so one can only speculate whether the hole in Hole is still wholly maintained at a state of readiness.

There is plenty of fiction in the world about vast underground labyrinths (just pick your favourite James Bond baddie) but this book has the ring of truth about it *and* is supported by photos – lots of photos – of the inside of some of these places, as well as their secret entrances. As I went through the book I checked the odd reference via Google, for instance the claims by *Diggers of the Underground Planet* group of a huge secret railway system called Metro-2 underneath Moscow. This book is full of stuff like that, and endlessly fascinating. It really is a must-read.



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November 2014 • RadCom
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Antennas

The Smith Chart calculator and the strange VHF antenna

PHOTO 2: The mystery VHF antenna.

AN INTERESTING GIFT. In this Antennas, I would like to return to the subject of the Smith Chart. The reason for this is that I was given a Smith Chart calculator by Ken, G3WYN and this is shown in **Photo 1**. The inventor of this chart, Phillip H Smith, when asked why he had devised this chart explained, "From the time I could operate a slide rule I've been interested in graphical representations of mathematical relationships".

I have previously written simplified descriptions of the Smith Chart in **[1]** and **[2]**. In these I described impedance as expressed in two parts; resistive and reactive. An impedance having an resistance of 80Ω and a inductive reactance 34Ω is conventionally written as 80 +j34.

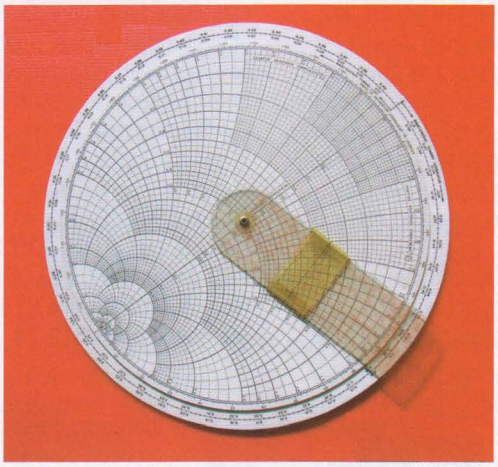


PHOTO 1: Smith Chart calculator with rotatable wavelength scale and a number of radially scaled parameters on a centre-pivoted cursor based on [7].

The j symbol bothers a lot of people. This is probably due to the way it is described in literature as 'the square root of minus one' or 'imaginary'. Furthermore, impedance is described as 'complex'. All these terms are derived from the mathematics used in impedance calculations. For our consideration, j can simply be regarded as a convention for reactance. The '+j' indicates inductive reactance and a '-j' capacitive reactance. When the antenna is at its resonant frequency the +j and -j parts are equal and opposite so only the resistive part remains.

An impedance value can be plotted as coordinates on a rectangular chart or map in just the same way that a QTH longitude and latitude can be plotted on a map. Our impedance value of R80 +j34 would be plotted on an impedance map or chart as shown in **Figure 1**.

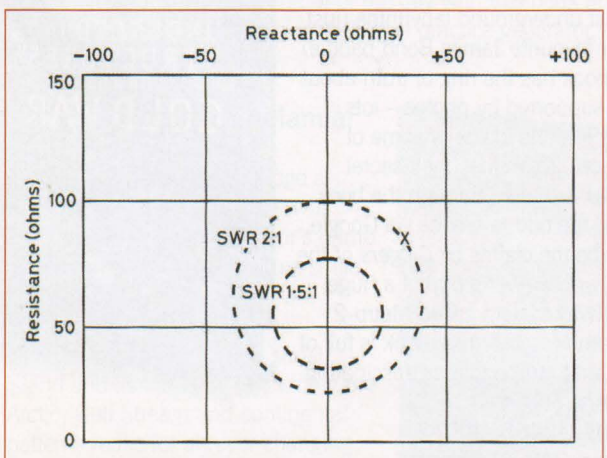


FIGURE 1: Cartesian plot of frequency where an impedance of R80 +j34 is marked with an X. The outer dotted circle indicated an SWR of 2:1; the inner circle is 1.5:1.

The dotted circles in Figure 1 are contours of constant impedance and the impedance value under discussion falls on this outer circle. It follows that a vast number of impedance values also fall on this circle including R100 +j0 and R25 +j0.

The chart shown in **Figure 2** is similar to the one shown in Figure 1. It can be considered as just a different projection, just as maps have different projections, such as the Mercator projection or the Great Circle projection. The most obvious difference with this circle diagram is that nearly all the coordinate lines are sections of a circle instead of being straight. It also has the resistance scale decreasing towards the top. Furthermore, with this projection, the SWR circles are concentric, centred on the 50Ω point, which is known as the prime centre.

The chart shown in Figure 2 has the prime centre as 50 because it is designed to plot impedance relative to 50Ω. Also the range of impedances is limited to make the chart easier to read if extreme values of impedance are not used, a method described in **[3]**.

The complete Smith Chart shown in **Figure 3** is described in **[4]** as a circle chart. It is more complex because it it covers almost all possible impedances within the circle. It has additional scales around the circumference; one of these is calibrated in wavelengths for calculating the impedance transformations over lengths of transmission line.

Most Smith Charts, including this one, are normalised so that they can be used at any impedance and not restricted to 50Ω. This is achieved by assigning a value of 1 to the prime centre and, in a 50Ω system, multiplying this prime centre value by 50. Other values on the chart would be 0.5 for 25Ω and 2 for 100Ω. Normalisation also extends the use of the chart to convert impedance to admittance and vice versa.

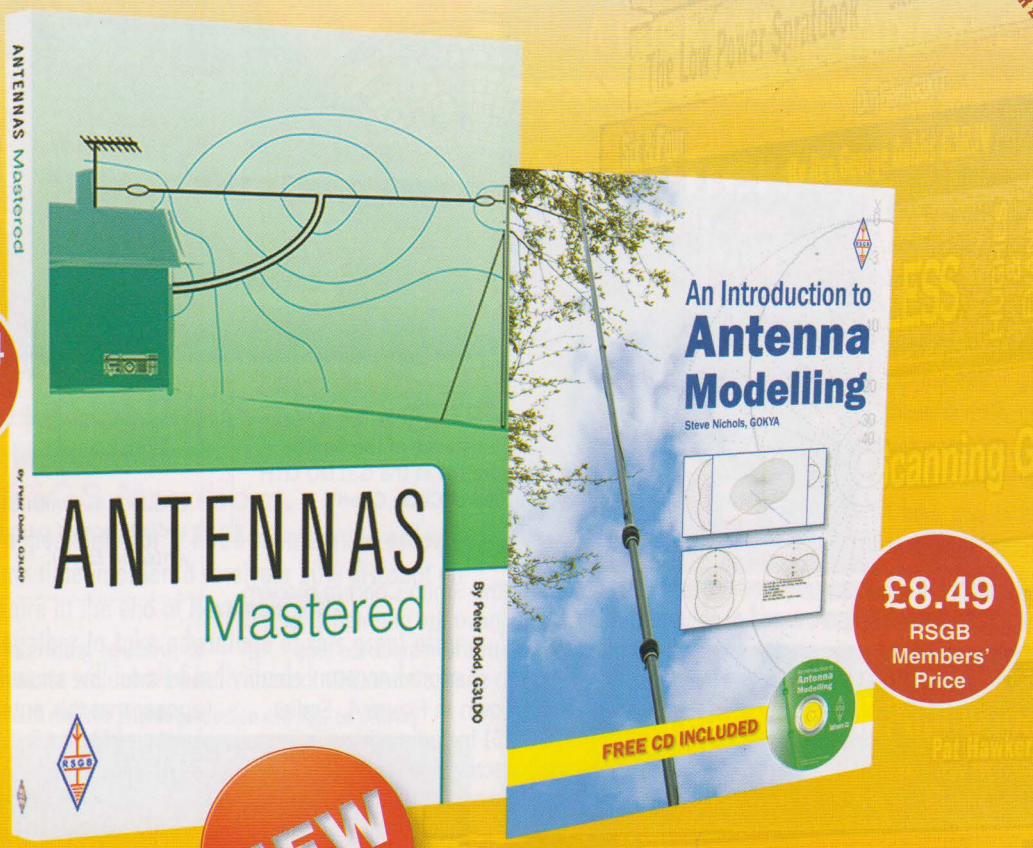
There are several ways of quantifying transmission line and load (antenna) mismatch, the most common are:

- Standing wave ratio (SWR), which represents the ratio between the maximum and minimum amplitude of the standing wave.
- Reflection coefficient |p|, which represents the amplitude of the reflection
- Return loss (RL), which represents the reflection coefficient in dB.

The chart in Figure 3 can be used to make a simple calculator that can be used to obtain an SWR value from a given impedance. The SWR scale on the cursor is known as a radially scaled parameter because it pivots on the prime centre to span the radius of the chart.

Going back to our G3WYN Smith Chart shown in Photo 1, you can see that it has many of these parameters. Unfortunately the plastic material from which the cursor is constructed has darkened with age so it is difficult to see the various scales.

The Smith Chart shown in **Figure 4** is more comprehensive. The following example shows how it can be used to extract SWR, |p| and RL from a measured impedance of



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NEW

Antennas Mastered

By Peter Dodd, G3LDO

Peter Dodd, G3LDO has long been acknowledged as one of the leading experts on antennas in the world. For over a decade 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 and a collection of other antenna articles from over the years that have appeared in *RadCom*.

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's 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 in over 280 A4 pages of antenna gold.

Also contained within the *Antennas Mastered* pages you will find several standalone articles written for *RadCom*. Organised in the order they were written, *Antennas Mastered* provides a fascinating look at the practical side of antennas and the comprehensive index provided allows the reader to access any specific subject.

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 interested in antennas and the practical solutions they need.

Size 210x297mm, 288 pages, ISBN: 9781 9101 9303 7
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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 programs 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.

An Introduction to Antenna Modelling provides an easy way to design and 'test' your antennas without ever lifting a saw or picking up wire cutters

FREE CD
This book is enhanced by the inclusion of CD that not only contains the MMANA-GAL software so you can get started immediately but much more. There are sample antenna files and event other antenna modelling software including EZNEC, MININEC Pro and 4nec2. There are also over 30 other amateur radio programmes included.

Size 174x240mm 80 pages ISBN: 9781 9101 9300 6
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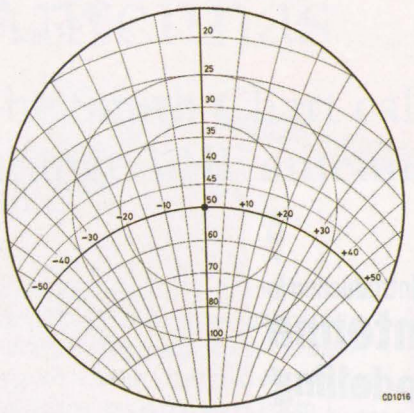

FIGURE 2: 50Ω basic simplified circle impedance chart.

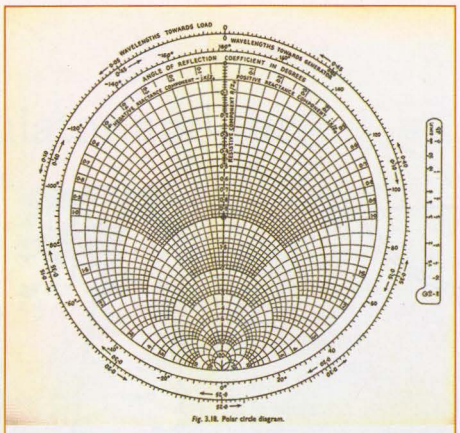

FIGURE 3: Earliest instance of the Smith Chart in the literature [4] at the G3LDO QTH although it is labelled a 'Circle Chart'.

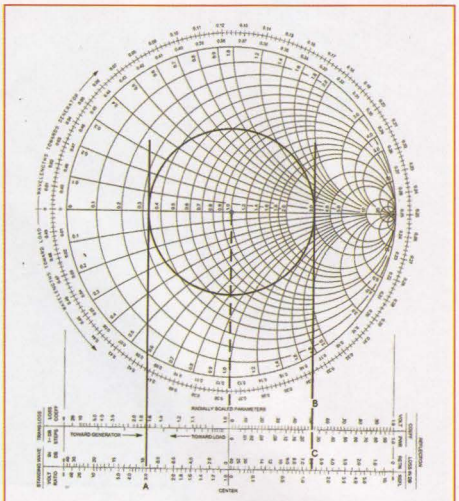

FIGURE 4: Smith Chart with comprehensive radially scaled parameters (from *ARRL Antenna Book*).

R30+j40. The chart is normalised so the impedance has to be divided by 50 to obtain a value that can be recorded on the chart, which in this case is R0.6 +j 0.8. Its position on the chart is marked with an X. Use a compass to draw a circle whose radius is prime centre to the X. Two vertical tangential lines can be drawn from the circle and these will fall on the appropriate radial scaled parameters; in this case A for SWR = 3.0:1, B for |p| = 5V and C for RL = 6dB.

You may not be familiar with the return loss parameter. It is in common use in professional literature these days. The way it works is that if a load has a return loss of 10dB then 1/10 of the incident power is reflected. The higher the return loss, the less power is actually lost. To my mind this makes the term return loss rather counter intuitive. I may not be alone. The Editor-in-Chief of the IEEE noted **[5]** that the occasional incorrect use of the term return loss has grown into a flood of misuse and that 30% of antenna papers submitted have used return loss incorrectly.

Descriptions of the Smith Chart in modern literature normally have the orientation of the Smith Chart with the resistance axis horizontal, with the short circuit (SC) location at the far left as shown in Figure 4. Earlier literature, [3] [4] **[6]** including those in Smith's original descriptions of his chart **[7]**, show the resistance axis vertical, as in Figures 2 and 3.

WHAT IS IT? Our radio club president, John Slater, G8FMJ, recently retired from his business as a radio/TV engineer and retailer. He brought along several boxes of goodies from his shop clearouts to a club meeting. In one of these boxes was an item that was thought to be an antenna so everyone looked to me for an explanation as to what it was. I had to confess to having never seen anything like it before but agreed to take it home and to try to analyse it.

The antenna shown in **Photo 2** was connected to an MFJ-269; it indicated a low SWR as the instrument was tuned towards the top end of the VHF band at 177MHz, which is as high frequency as it would go. I then used the AIM 4170 to produce graphs of impedance and SWR and these are shown in **Figure 5**. It would appear that this antenna was probably used for the old band 3 ITV channels on 176-214MHz.

A SAD LOSS. Just at the time I was completing this column in late August we learned that John Slater, G8FMJ, had died very suddenly. As I had already mentioned, John was the Worthing and District Amateur Radio Club President and was the son of Al Slater G3FXB, the well-known contester and DXer. John was the driving force behind the club and his cheerful presence will be sadly missed.

PHOTO 3: John Slater, G8FMJ, (left) presenting the Club Championship Award for 2013 to Peter Robinson, G8MSQ.

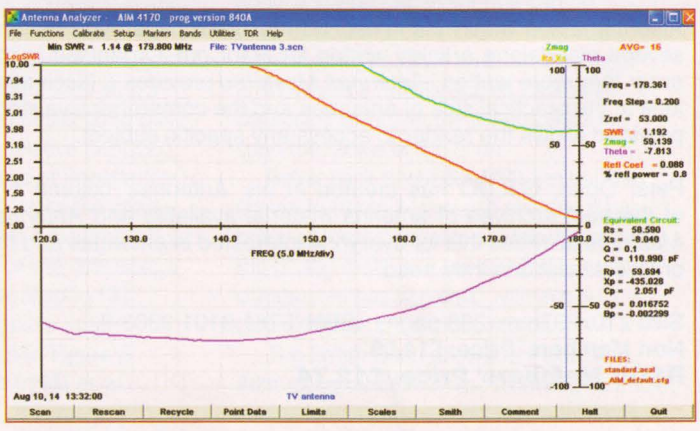

FIGURE 5: Analysis of the antenna shown in Photo 2.

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[2] The User Friendly Smith Chart, *RadCom* April 1995
[3] *VHF Line Techniques*, C S Glenhill, BSc Tech, AMIEE 1960
[4] *The Services Textbook of Radio, Volume 5, Transmission and Propagation* 1958
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[6] *The ARRL Antenna Book* (1984)
[7] An improved Transmission Line Calculator, *Electronics* January 1944

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A simple SMD project

A Panoramic Adapter Tap (PAT) for your radio, using surface mount technology

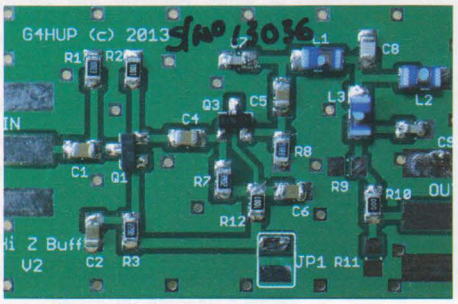

PHOTO 1: Assembled PAT board.

INTRODUCTION. This project has come directly from my 'Surface Mount for the Terrified' presentation and workshop at the 2013 RSGB Convention and (at the time of writing) I plan to repeat and update the workshops at the 2014 Convention, with this and other newer projects available as the 'build' options.

Over the last few years, software defined radio (SDR) technology has made enormous inroads into amateur radio products and operating practices. Routinely we now place the majority of the 'hard work' of our communications in the PC rather than in the radio, with filtering and demodulation being performed in software. But there are still many 'conventional' radios being used and giving very good service without the benefits of SDR. However, there is one over-riding advantage to having SDR capabilities that is not generally available even on most of the main manufacturers 'conventional' radio products: a real-time, panoramic view of part of the band we are working on, giving us a whole new operating experience.

WHY DO YOU NEED AN SDR ON YOUR RIG? Although, increasingly, the 'traditional' radio manufacturers are including elements of SDR in their products, there is only one rig/product that I am aware of that gives the full benefits of SDR technology – and even then it requires an optional purchase to achieve it. Many radios have a spectrum display or band scope of some form, ranging from early, rather crude first attempts on low-res character LCDs to the magnificently detailed displays of the current mid- to top-of-the-range offerings from the major suppliers. But, as any serious weak-signal VHF or microwave operator already knows, the great value of SDR technology lies not in the fully adjustable filter cut-offs and the spectral displays, but in the waterfall display. This is by far the most useful aspect of SDR for the identification of weak signals. Signals that are too low to stand out in the spectrum display will just blend in with the random noise, or 'grass' at the bottom of the display – they are invisible. But, turn on the waterfall and you will start to see faint traces down the screen as the consistency between the 'random samples' is established over the integration period. Where there is noise, you will see no correlation – but where there is a faint signal, it is plainly obvious.

In **Figure 1** you can see three beacon signals received via an SDR. As displayed, this screen shot is taken with a high degree of integration of the signal, compressing the visible noise level against which the signal appears. The centre signal (GB3MHX) and the left signal are both large enough to see even when there is no integration, but the signal to the right of GB3MHX would be essentially invisible in the spectral display – in the waterfall, the trace is clearly visible. Thus the advantage of having the display is that you are able to see where there are weak signals around you in the band.

ADDING SDR CAPABILITIES TO RADIOS. Almost any radio can have this magic capability added to it – all that is needed is an output at the intermediate frequency (IF) and an SDR to connect it to. A simple buffer board can be installed and your choice of both SDR product (within the confines of the IF used, of course) and operating software can be added. The Panoramic Adaptor Tap (PAT) described here provides this solution as far as the IF connection is concerned.

No gain is required in the PAT buffer – its job is to isolate the IF of the rig from anything that may be connected externally. The boards have a gain of about 1dB in practice; see **Table 1**.

CONSIDERATIONS IN SPLITTING THE IF. There are two main requirements: the need to extract signal without causing any degradation of the forward path through the radio and the need to ensure that there is no risk of feeding 'extraneous' signals back into the rig's IF path. Some SDRs, especially simple quadrature mixer types such as the SoftRock variety, have relatively high levels of their own local oscillator present at their inputs. When attached directly to an antenna, they may radiate a little, but this does not degrade the performance. However, if that signal gets fed into your existing receiver's IF, it may cause all kinds of issues and distortion and give a worse performance than you perceived without the SDR!

Looking around the internet, there are a number of ways that amateurs have taken an IF output for purposes such as this. Some are as simple as a single capacitor. Given the foregoing paragraph, the real need is for a high impedance input buffer, which will avoid loading the IF and reducing the signal levels passed through to the detector stages. Furthermore, to avoid feed-in problems, the buffer also needs a high reverse isolation, so that any signals presented to the output of the buffer are not propagated back to the input.

THE PAT BOARD. The PAT board has been designed and developed with the previously noted considerations in mind. It also fulfilled other objectives, including being small enough to fit in almost any rig and being simple enough to present a worthwhile entry-level project to surface mount construction. Although there are a wide variation of rig models and types, they can all be served by some simple variations in the PAT builds.

Amateur transceivers tend to have internal regulated rails for both the Rx and Tx functions. Portable rigs, such as the FT-817, have a nominal +5V RxB. As a generalisation, base rigs have voltages between +8V (Icom, Yaesu) and 13.8V (Kenwood, as in TS-2000). This variation is catered for by a single resistor change on the PAT board. The other difference is in the IF used. But again, there are a few nominal ranges. Depending on the rig architecture, either the first IF or the second IF may be the more appropriate to use (discussed later). There is nothing in the buffer amplifier stages that is frequency dependent, but I do recommend having a low pass filter to avoid any other signals from the rig getting passed through – this will help to minimise the risk of any high side local oscillator

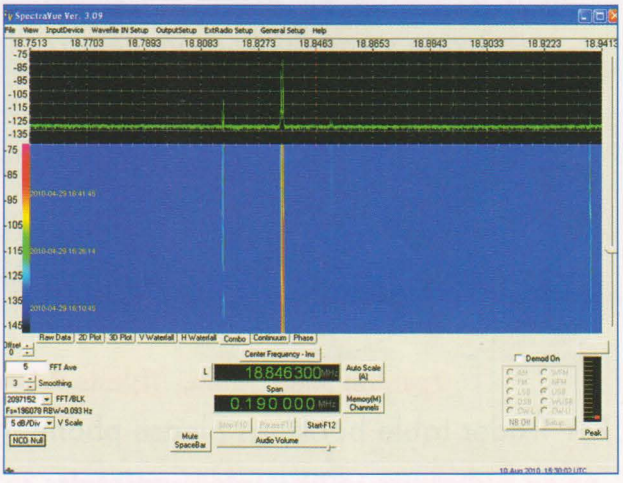

FIGURE 1: Reception of 10GHz beacons using SDR.

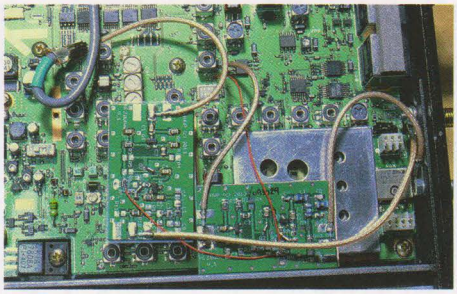

PHOTO 2: Two PATs installed in an FT-897.

remnants that have got through the mixer causing strong signal issues in the SDR. Typical LPF frequencies are 6, 12, 15, 50, 70 and 140MHz. Other frequencies can be accommodated easily.

INSTALLING IN RIGS. The PAT board (see **Photo 1**) is 25mm x 40mm – it fits snugly in an FT-817, and can be 'lost' in the majority of larger rigs. The best mounting option is to use double sided adhesive tape to stick it to the top of one of the screening cans, in a convenient position close to the IF pick up point and the rear panel. Exactly where this is will vary from rig to rig. Example installation instructions for a number of popular radios are available on the PAT website [1]. Even if yours is not amongst them, it is worth checking these to pick up tips for dealing with you own installation.

You will need to locate a suitable place to pick up the IF signal – this could be on the input side of the filter or on the output side of the filter (a narrower view, but cleaner outside the wanted range). I have found that with a 15kHz wide first IF roofing filter, a useful SDR display of between 30 and 50kHz can be seen, which is enough for many applications.

Figure 2 shows the output from my TS-2000 during a 6m Sporadic-E opening in June. The display is of the CW segment of the band, around 50.100MHz. Displayed bandwidth is approximately 33kHz: in fact, a satisfactory display up to about 50kHz wide can be obtained, although signals towards the edge of the display will show at lower levels, due to being on the slope of the IF filter.

The best pickup point may not be on the filter itself. There is another issue that needs to be considered here. In many rigs the IF is 'bi-directional' – it is part of the IF chain for both Rx and Tx. In satellite-capable rigs (eg FT-847, TS-2000) this is not the case, but in most others it is. It is preferable not to allow Tx path IF signals into the SDR, as they are likely to be rather larger than Rx signals, and may cause overload in the SDR. Radios with bi-directional IF filters usually have a diode switch arrangement around the filter; it is better to collect your signal from an Rx path outside the diode switch in such cases. I still also recommend powering PAT from a switched RxB line, giving additional protection against feeding Tx signals into the SDR.

Miniature coax or a short single wire may be used for the input connection – if you use coax, only ground the braid at the PAT end.

Finally, you need to get the output signal from PAT out of the radio. If there is sufficient real estate on the back panel, mounting a small socket (eg SMA) is a good method – but this may mean taking a drill to your radio. In many cases there are rear panel ventilation slots and, while these are there for a purpose, most radios can easily stand having a small bit of this space blocked off by an SMA or similar small socket mounted across it. Alternatively, a flying lead can be brought out through the slot, or a hole, and terminated in a cable end plug.

Power for the board must be available, and the RxB line is the recommended choice. Usually, this can be a single positive connection, since the shield connection on the output coax will provide the ground connection for the supply. However, where a flying lead cable exit is used, it will also be necessary to provide a separate DC ground to the PAT board.

WHICH SDR TO USE? The only real consideration is that the SDR must cover the transceiver's IF. Of course, different SDR products use different software, and some of them are proprietary. There are many hardware and software options for the SDR: it really is about deciding what works for you.

At the cheapest end, especially for the higher IFs, the ubiquitous RTL DVB dongles (with appropriate software, such as *SDR#*) can be very effective [2]. The only issue is that they can be prone to overload, so strong signals may cause some distortion. An alternative is the FUNcube Dongle Pro+, which has much better inbuilt filtering and can be used with more 'conventional' SDR software such as *SpectraVue*, as well as *SDR#* and other programs.

For lower IFs the SDR-IQ is an excellent radio, although expensive. A SoftRock makes a really cheap solution that could be dedicated to this service alone.

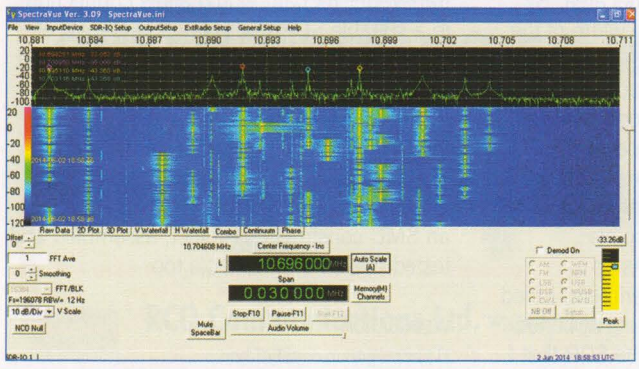

FIGURE 2: Output from TS-2000 during 50MHz Es opening, June 2014.

OTHER METHODS OF USE. The foregoing has focussed on using the PAT board to extract the IF. However, there are actually three ways if may be connected, depending on what you want.

The following comments are principles to help you decide how you want to use the external SDR function. I should sound a note here that due to modern construction methods used in our rigs, not all of the points that we may identify from the circuit diagram as being ideal for making the connection we want may actually be accessible inside the rig! Very often, in deference to compactness, many of the components and connection points are on the underside of PCBs, or within sealed screened enclosures. In this respect, older rigs can be easier to work on than some of the latest.

Application 1 – visibility of the segment around the tuned frequency of the radio. If all you want is to see the 30 to 50kHz of spectrum immediately around the frequency you are tuned to, then the original installation concept is for you – connect the PAT input to the output of the 1st (or in some cases 2nd) IF filter. The SDR must be set to the appropriate IF of the radio and, as you tune your radio, the signals will move through your visible 'window' on the screen. As you change bands, what is on your screen will track what you do with the radio, without any further intervention on the SDR. This is how I set things up in Figure 2.

Application 2 – wider spectral visibility around the tuned frequency. If you want a wider view, you can try to pick up the *input* of the filter. In all other respects, the behaviour should be the same as Application 1. It should be possible to achieve visibility of the whole band (depending on your SDR setting) but of course, the display will still 'tune' with the rig, so not all the signals you see will necessarily be in the band. Also note that since you will be looking between the mixer and the filter, you will also be likely to see some extraneous 'signals' due to mixer products, which would be removed by the filter for normal reception. Often these signals will 'tune' in the opposite direction to main movement of the display as you change the frequency on the rig.

Application 3 – visibility of the band – second independent receiver function. This method will give effectively the same result as Application 2, but the SDR display will be completely independent of the Rx tuning. This may have some advantages, however it is not achievable on all rigs. By picking up the Rx signal before the first mixer, it only has the processing of the rig's bandpass filters and any amplification applied to it: the signal is still at the antenna frequency. This means that you must tune your SDR to the band you want to receive/monitor and the signals will not track the rig as you change frequency. Using this method, it is quite likely

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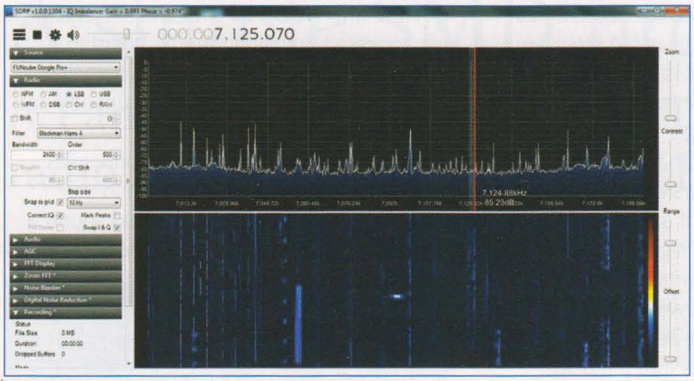

FIGURE 3: 40m band as 2nd Rx function, using a FUNcube Dongle Pro+ and *SDR#*.

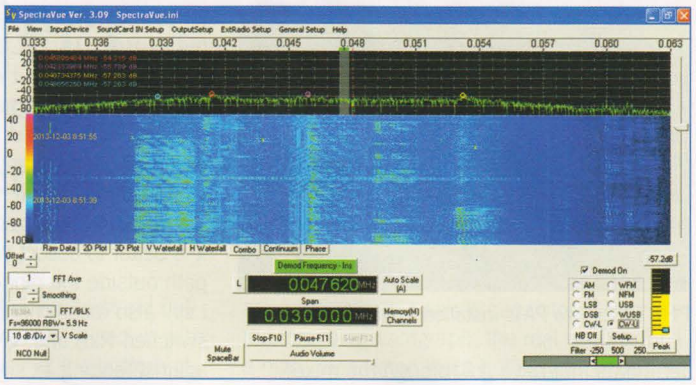

FIGURE 4: 40m band SSB segment as IF tap, with FUNcube Dongle Pro and *Spectravue* 3.09.

that you will also use the SDR to demodulate some of the signals – it's much quicker than tuning the rig to an interesting-looking signal. As many modern radios use 'block' filtering (eg 1-2MHz, 2-4MHz, 4-8MHz, 8-16MHz, and 16-32MHz) you may be able to monitor frequencies other than the currently-selected amateur band. For instance, when the rig is set to 40m and using its 4-8MHz bank, you could have the SDR Rx monitoring any other segment within that filter passband – eg the 5MHz allocations. Or using the 8-16MHz block, when on 20m, you could be monitoring 30m as well.

SUITABLE TRANSCEIVERS. You can fit the PAT to almost any radio, but you may not be able to see all bands in the case of HF/VHF/UHF rigs. This is due to the architecture used by the manufacturers. Yaesu, for example, tend to bring all the various input stages to a common point, then starting the mixing process – this is great, since it means there is one place to connect the PAT, and you will see on your SDR the band of choice anywhere between 1.8MHz and 435MHz. The FT-817, 847, 857, and 897 all use this approach.

Kenwood and Icom do not consistently use this approach – for example, in the TS-2000 the first point at which all the bands (including 23cm in the X version) meet in the signal path is at the second IF (10.695MHz). They have used a very similar architecture in the TS-790 series. The Icom IC-910 also uses different first IFs for the different bands.

In summary, if it's an HF or HF/6m radio you're dealing with then it is almost certain that the 2nd Rx function is feasible. If you have a full coverage (HF/VHF/UHF) radio other than Yaesu, then probably not. It would still be possible to put in a PAT for a specific band, but if you can't see everything it's a bit limiting. Several versions of the PAT are available for different configurations, IFs and so on; the differences are relatively minor and mainly concern whether any filtering is included and, if so, on what frequency.

FITTING A PAT. Detailed fitting procedures for a number of radios can be found on the G4HUP website [1]. As an example, I fitted *two* PAT boards to my FT-897, at the first and second IF, for comparison purposes. **Photo 2** shows the general arrangement and **Photo 3** shows how I mounted SMA output sockets in the ventilation slots, as mentioned earlier. The first PAT, seen on the lower right of the photo, was installed on top of the large screening can. The second, which gets its input signal from J1003, where the Rx signal enters the PCB from the PA Unit, was also attached to a (smaller) screening can. Both boards share the same power connection, derived from the RxB line, so both outputs are self muting on Tx.

Operating Comparisons. **Figure 3** and **Figure 4** provide a useful comparison of the capabilities of the two options, in spite of being acquired with different SDRs and software. These pictures are both captured off the FT-897 seen in Photo 2.

Figure 3, from the 2nd Rx PAT, shows almost the whole band. The SDR is set roughly to the band centre (in this case). You can see a wide variety of signals across the band, from the CW segment at the left hand end through data and into the shared SSB segment towards the right. Any signal can be clicked on and demodulated on the PC – just remember to select the appropriate demod/filters in the control panel area. By adjusting the SDR settings, the width of the display (in spectrum terms) can be reduced, showing more detail, so you could focus in on just one frequency range or mode segment. The display is flat across the spectrum, demonstrating equal sensitivity at all points.

As an experiment, I tried looking at bands on the SDR that I wasn't tuned to on the radio. With the FT-897 I could see 30m, 20m and 17m on the SDR when the radio was switched to any one of them – ie the relevant block filter covers from below 10MHz to over 18MHz.

Figure 4 shows the view using the IF tap facility, providing a span of about 30kHz across the screen in this case, although slightly wider views are possible. The response is clearly declining at the outer edges of the sweep, due to the filter passband. The frequency display does not reflect the actual IF of the rig. As a FUNcube Dongle is being used as the SDR, the separate *FCHiD* utility controls the frequency in *Spectravue*; that is not an artefact of the PAT approach, but is a function of the SDR/software architecture.

CONCLUSIONS. Whether you use the PAT as a 2nd Rx or IF tap depends what you prefer, or what you find most useful in terms of visibility. I find the 'narrow' view of the IF filter system adequate in cases such as 6m Es, where I prefer to sit in the CW segment. The SDR only needs to cover the IF of your rig. However, on a crowded HF band, the wider view of the 2nd Rx can help to spot the quiet parts of the band – or where the activity is – but your SDR must cover at least the same frequency range as your radio. You can also quickly demodulate the signal on the PC to confirm what is happening. Just remember to net the Tx before trying to reply…

Another use for the 2nd Rx function is at the IF output of transverters (28 or 144MHz). Installing the PAT in the transverter Rx path would allow connection to a suitable SDR to display a large part of the band. In this way there is no need to get inside your rig.

Full operation and construction details of the PAT board can be found on the author's website [1]. You can also purchase kits for PAT and, although this is really intended as an SMD construction project, assembled and tested boards are available too.

TABLE 1: PAT gain at different intermediate frequencies.

Intermediate frequency	Reverse isolation	Net gain
12MHz (eg TS-2000)	>60dB	0.7dB
45MHz (eg FT-840, 847, TS-440)	>40dB	1.1dB
70MHz (eg FT-450, 817, 857, 897, IC-706 etc)	~40dB	1.3-1.5dB

WEBSEARCH

[1] http://g4hup.com/PAT.htm
[2] GOCHO, *RadCom*, December 2013

November 2014 • RadCom
Mark Holmes, M0ZLE • Chairman, Lincoln Short Wave Club

National Hamfest 2014

Another successful show

Hailed as the UK's largest two-day amateur radio rally and the biggest and best show ever, this year's event certainly didn't disappoint. Thousands of visitors descended on the Newark Showground over two days at the end of September. The Lincoln Short Wave Club, along with helpers from other local clubs, once again put on a show to remember.

The main exhibition hall was full to capacity and resembled an Aladdin's cave made just for radio amateurs. The event was busy both days and traders both large and small offered for sale the widest variety of components and equipment available, all in one location. The car boot/flea market was very busy too with visitors queuing at the gates ready to grab themselves a bargain. The Bring and Buy stand was again another popular attraction, as too were the many club stands and on demand Morse tests that ran throughout the show. Congratulations to each of the successful candidates.

GB14NH was operating throughout the event, run this year by the Camb-Hams on behalf of the club. An impressive 1,213 QSOs were logged that included 65 DXCCs over the two days of operation. Visitors were encouraged to operate the station and some jumped at the opportunity – one even bringing his own Morse key!

The RSGB was out in force and well represented with numerous committee stands. Ofcom was also kept busy on both days by amateurs seeking technical licencing advice and guidance.

A raffle took place on the two days with over 20 prizes up for grabs. The organisers would like to thank all the exhibitors who kindly donated the prizes.

Organising and running the National Hamfest is no easy task and the tireless efforts of the Lincoln Short Wave Club and other local clubs should not go unnoticed. Months of planning goes into organising the show with preparations already underway for next year – not bad for a bunch of 'amateurs'. As the event grows each year, the organising committee are interested in any ideas you would like to see at the next show, please make your ideas known to *hamfest@rsgb.org.uk*

If you missed the Hamfest this year, don't worry, be sure to make an effort to come along and visit the National Hamfest next year – it is promises to be even better! Keep an eye on www.nationalhamfest.org.uk

SSB Electronics SP200 preamplifier

A 144MHz band mast head switchable preamp

INTRODUCTION. The SP200 is a low noise masthead preamplifier for the amateur 144MHz (2 metre) band. The unit is one of a range of masthead switchable preamplifiers from German manufacturer, SSB Electronics, covering the 50, 144 and 432MHz bands. SSB Electronics also supply a range of other RF related devices including higher performance preamplifiers to both the professional and amateur markets [1]. The unit should be used with a sequencer or with the built in RF VOX to ensure that the preamplifier is switched out of circuit correctly.

OUT OF THE BOX. The preamplifier comes with a mast mounting bracket and datasheet in a well packed cardboard carton sitting on a bed of loose fill. (**Photo 1**). The UV-resistant plastic outer housing acts as weatherproofing and, if removed by taking out the 4 stainless steel screws, reveals the preamp inside a partially seam soldered tinplate box (**Photo 2**) allowing access to the gain control. The tinplate box sits on an aluminium base, through which protrude two N type female connectors to connect to the antenna (ANT) and the transceiver (TRX) and an SO239 (UHF) connector for the +13.8 volt supply. These connectors must face downward when installed on a mast, so that the plastic box acts as an 'umbrella' to keep the water out. It should not be installed 'upside down' unless further sealing measures are taken. That said, the unit looks robust enough to survive regular 'Field Day handling' and, if correctly installed, should survive the vagaries of the British weather.

SPECIFICATION. **Table 1** shows the specification given in the supplied data sheet. No specification is given for the time taken for the preamp to change over to transmit through mode. Note that three separate power ratings are given:

- Switching power with RF-Vox, (see RF-VOX below) this is assumed to be the maximum CW power that can be used if RF-Vox is used to cause the preamplifier to switch in to through (transmit) mode.
- Permissible power (PEP), the maximum safe SSB mode through power.
- Permissible power (FM), the maximum safe CW/FM/JT mode through power.

PHOTO 1: The contents of the box.

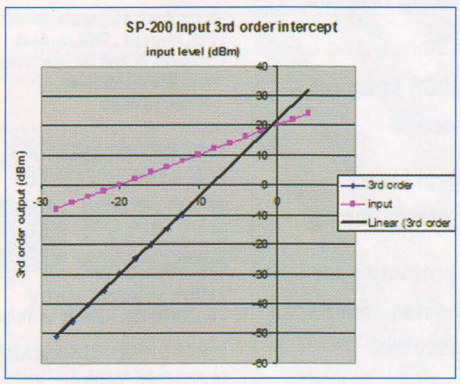

FIGURE 1: The SP200 input 3rd order intercept plot.

INITIAL OBSERVATIONS BEFORE TESTING. **Sequencing**. The data sheet recommends the SSB electronics DCW2004B sequencer that was not supplied with the test unit, but one can assume that any sequencer can be used that ensures that the preamplifier is switched out of circuit before RF power above the specified switching power is applied to its input connector.

RF VOX. The RF VOX feature initially confused me somewhat, and the datasheet is unclear just how it works in practice. The datasheet states 'Switching capacity' but does not define it. Initially I thought, "does this mean that one must apply more than 100 watts to the unit to cause the preamp to switch out of circuit without damage to the preamp or is 100 watts the maximum power that can be applied to the unit to operate the RF VOX circuitry safely?" After further investigation (see Measured Performance) it seems to mean the latter, but this lack of definition is a major inadequacy with the documentation. The unwary may be tempted to apply more than 100 watts to the preamp and destroy it! I decided not to apply 100 watts to the output of the unit, just to be sure.

For peace of mind I would always recommend the use of a sequence controller with preamplifiers. Such a sequencer should delay the application of RF power to the preamplifier switch until at least 100ms has elapsed to allow for contact bounce on the changeover relay.

MEASURED PERFORMANCE. For this review I used the following equipment or assistance:

- Vector Network Analyser: HP8754A with 8502 transmission/reflection test set.
- Noise figure meter: HP8970A with 346B noise source and 8493c 10dB attenuator.
- RF signal generator: Marconi 2024
- RF power meter: HP436A with 8484A power head and assorted attenuators
- Frequency reference: G3RUH and GPSDO
- Resistive power combiner: Mini-Circuits PSC 2-11-1
- UHF attenuator: 0-140dB Marconi TF2163
- Spectrum Analyser: HP 8592B
- Digital storage oscilloscope: Owon PDS5022S

The swept frequency response was measured at an input level of -35dBm using the vector network analyser. The shape of the plot on a 50MHz sweep width is shown in **Photo 3**. The centre frequency, 3dB and 1dB bandwidths are recorded in **Table 2**, along with the minimum and maximum in-band gains that can be set by the gain control.

Noise figure is notoriously difficult to measure and is often the source of heated arguments on e-mail reflectors. Using my 8970A meter I recorded results that are consistent with the claims made by the manufacturer. One important thing to note is that the noise figure degrades to close to 1dB at 146MHz when the gain control is set to minimum. Users who are looking for the absolute lowest noise figure, such as for EME use, should note this result carefully and use the amplifier set to maximum gain.

Third order input and output intercept points measurement is a measure of the amplifier's ability to handle large signals. To measure the 3rd order intercept, the preamplifier was fed with two carriers 100kHz apart via a resistive combiner and a switchable attenuator and looking at the output signal on a spectrum analyser. The 3rd order intermodulation products (pairs) appear at 3 times the frequency spacing of the input carriers. The intercept point is obtained graphically by plotting the output power versus the input power both on dB scales. Two curves are drawn, shown in **Figure 1**; one for the linearly amplified signal at an input tone frequency and one for the 3rd order product. Both curves are extended

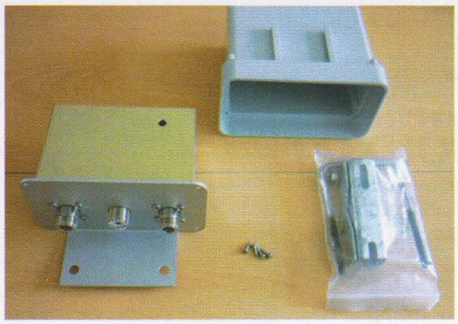

PHOTO 2: The preamp with its waterproof box removed

with straight lines and the point where the curves intersect is the intercept point. It can be read off from the input or output power axis, leading to input or output intercept point, respectively (IIP3/OIP3). The value of IIP3 and OIP3 I measured are consistent with the claims made by the manufacturer. **

Once again, the measured values recorded in Table 2 are consistent with the claims made by the manufacturer. A preamplifier designed for lowest noise will not have a high input return loss, so be aware of this if using the preamp straight after a filter: the filter will not be correctly terminated and hence may not perform as expected.

I decided not to test any of the claims of maximum transmit power, as doing so could result in the destruction of the preamplifier! Instead, I measured the minimum power applied that needed to be applied to the preamplifier output that would result in it switching in to transmit (through) mode. The result is shown in Table 2. Just half a watt is sufficient to trip the relay.

To measure the changeover time, to simulate switching from Rx to Tx and back I applied an RF signal to the transceiver port and used a digital storage oscilloscope to measure the time taken for it to appear at the output port on removal of the 13.8V supply. I used the removal of the supply to trigger the oscilloscope. Interestingly, the Tx to Rx switching time is very much longer than the Rx to Tx time, so the preamplifier does have a long delay returning to receive to allow for the decay of drive power. This delay was clearly audible in use, but should be still short enough to support most digital modes.

CONCLUSIONS. Within the bounds of measurement tolerances, the SP-200 preamplifier meets the manufacturer's specifications and claims. An independent set of measurements made on different test equipment by G4DDK confirmed this statement. The only specification I have not directly checked is the RF power handling capability when RF is being switched. In fact my only issues are with the supplied documentation, where more application information could have been included, particularly in the area of sequencing, control and protection. Having repaired a number of the SP2000's predecessors over the years, this area clearly needs more attention by suppliers to avoid accidental damage in use.

At the time of writing, the SSB Electronics website [1] shows that the unit retails at €398. While this is around the same order of price as a well known German VHF transverter module, this apparent anomaly can be justified in that the SP200 unit is a complete 'plug and play', weather proofed, RF switched unit ready to connect into a system with no additional parts or system design required. My thanks for the loan of the review item. The DX Shop is now the UK agent for SSB Electronics (www.thedxshop.com).

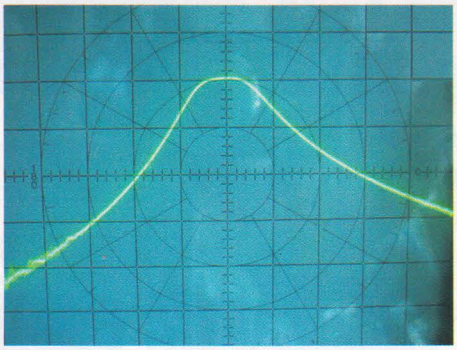

PHOTO 3: Plot of the frequency response on a 50MHz sweep width, vertical axis 10dB/division.

WEBSEARCH

[1] SSB Electronics website: www.ssb.de

TABLE 1: The datasheet gives the following specification for the 144MHz unit.

Technical Specification	SP-200
Frequency Range [MHz]:	144-146
Noise figure (at 20°C) (NF) [dB]:	0.45 ±0.05
Gain (S21) [dB]:	Adjustable from 10-20dB
Switching power with RF-Vox [W]:	100
Permissible power (PEP) [W]:	750
Permissible power (FM) [W]:	500
Insertion loss. [dB]:	0.04
Return loss act. TX [dB]:	36
Return loss (S11) [dB]:	3.5
Output return loss (S22) [dB]:	30
O-IP3 [dBm]:	16
I-IP3 [dBm]:	-4
Supply volt/current [V/mA]:	12-14/220
Mast diameter [mm]:	58

TABLE 2: Measured results compared to specification from [1].

Specification	From ssb.de website	Measured *
Frequency Range [MHz]:	144-146	See text
Centre frequency [MHz]:	145	145.75
3dB bandwidth [MHz]:	Not specified	7.3
1dB bandwidth [MHz]:	Not specified	4.9
Noise figure (at 20°C) (NF) [dB]:	0.45 ±0.05	See text
144MHz NF at maximum gain (20dB) (measured at 25°C) (NF) [dB]:	Not specified	0.49
145MHz NF at maximum gain (20dB) (measured at 25°C) (NF) [dB]:	Not specified	0.47
146MHz NF at maximum gain (20dB) (measured at 25°C) (NF) [dB]:	Not specified	0.47
144MHz NF at minimum gain (11.7dB) (measured at 25°C) (NF) [dB]:	Not specified	0.76
145MHz NF at minimum gain (12.2dB) (measured at 25°C) (NF) [dB]:	Not specified	0.76
146MHz NF at minimum gain (12.3dB) (measured at 25°C) (NF) [dB]:	Not specified	0.95
Gain (S21) [dB]:	Adjustable from 10-20	11.7 - 20
Switching power with RF-Vox [W]:	100	**Minimum** switching power 0.5W
Permissible power (PEP) [W]:	750	Not measured
Permissible power (FM) [W]:	500	Not measured
Insertion loss [dB]:	0.04	0.07dB
Return loss act. TX [dB]:	36	>30dB
Return loss (S11) [dB]:	3.5	3.5dB at 144MHz rising to 8dB at 155MHz
Output return loss (S22) [dB]:	30	>30dB
Output IP3 [dBm]:	16	18 (see Figure 1)
Input IP3 [dBm]**:	-4	-2 (see Figure 1)
Supply volt/current [V/mA]:	12-14/220	13.5/210
RX to TX changeover time (ms)	Not specified	25
TX to RX changeover time (ms)	Not specified	380

*Note that these measurements were made using 'good amateur radio standard' test equipment that does not necessarily carry a current professional calibration certificate.

**The input IP3 two tone was independently measured by G4DDK at lower input levels up to -38dBm and was found to be -3.5dBm. He noted that above -38dBm the IIP3 started to creep up to levels corresponding to my figure of -2dBm, which is a good indication compression has started to happen. IIP3 is extremely sensitive to compression.

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KG-UV950PL Now with 4m !!!

WOUXUN®

Up to a full 50W output on 4m, this unique QuadBand mobile/base from Wouxun will be available mid-late September. Bands covered are 4m / 6m / 2m / 70cm.

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NEW PRODUCT

The KG-UV8D

The World's First Handie with a Large Format Blue Colour Display Screen.

- ✓ + 5W Output on 2/70
- ✓ + 1700mA battery as standard
- ✓ Duplex cross-band repeating
- ✓ Duplex working (one TX while the other one RX simultaneously)
- ✓ Twin receiving (RX simultaneously on same band)
- ✓ Large colour display screen
- ✓ DTMF encode and decode

The KG-UVD8D is available with charger, battery, antenna, belt clip etc, for only £99.99.

The KG-UV8D Pro-Pack

Buy a new KG-UV8D with all the most popular accessories bundled together for a VERY special price. Only £149.99

- ✓ KG-UVD8D New Dual Band Handie
- ✓ Dual-Band Mobile Antenna
- ✓ Desk Top Charger (110-234v & 12V input) & Power Cord
- ✓ Cigar Car Charger
- ✓ Headset with PTT & Mic
- ✓ Eliminator
- ✓ Remote Mic/Speaker
- ✓ Gel Case
- ✓ 1700mA Li-Ion Battery
- ✓ 2600mA Heavy Duty Li-Ion Battery
- ✓ PC Programming Lead
- ✓ PC Drivers & Software
- ✓ Antenna Adapter

KG-UV6DL 4m + 2m Handie

To replace the KG-UVD1PL, this new version offers the same features as its 2/70 brother but on the very popular 70MHz & 144MHz bands. **ML&S Price: £119.99**

KG-679E/2M

2m FM Handie. Also available for 70cm!
KG 679E/2M **NOW ONLY £49.99**
KG-679E/U 70cm (400-470MHz) **£64.99**
or with Voice Scrambler KG-689E/U **£69.99**

Wouxun KG-UV950P. Quad band heaven for £229.99!

50W on 10m, 45W on 6m, 45W on 2m, 35W on 70cm

- ✓ Quad Band operation on 10m/6m/2m/70cm
- ✓ AM Airband receive
- ✓ Remote head
- ✓ Free DTMF & KeyBoard entry mic
- ✓ Twin Band simultaneous reception (V+V/U+U/V+U)
- ✓ Full Duplex mode
- ✓ Same Band repeat on two combined radios

Also available with 4/6/2/70. KG-UV950PL: £249.99

MODEL Leixen VV-898

FREE SOFTWARE & LEAD

The lowest priced DUAL BAND mobile in the UK!

Simple to use, no frills full 2m and 70cm DUAL BAND Mobile. Nice clear & bright LCD display, fantastic crisp clear audio, supplied mobile bracket, microphone, DC lead and Handbook. Also included, programming Windows 7 software & cable for easy PC set-up of channels, CTCSS, offset etc. plus all simplex channels. 200 memories as standard and a healthy 4W or 10W output on both bands.

All this for a frankly ridiculous £99.95. Why not buy two?

CommRadio CR-1a

A highly compact communications 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.

ML&S Price: £529.95

For more details see:
www.hamradio.co.uk/cr1

FUNcube Dongle Pro+ £149.95

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

Looking for a hands free mic for you car that actually works?

The MS-5. A safety microphone for mobile or base use that really is "plug & play". Available for most Icom, Kenwood & Yaesu Radios.

Only £39.95

Perseus VLF-LF-HF Receiver

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

Save £100 this month. Only £599.95

Perseus-FM+

High Performance FM 88-108MHz adapter for the Perseus SDR Receiver.

Available now. **£299.95**

New at ML&S! Messi & Paoloni Low Loss professional Coaxial Cable.

Modern manufacturing makes it possible to produce technically better and better coaxial cables. **Messi & Paoloni** is an Italian manufacturer, who is relatively unknown in the UK, but will celebrate its 70th anniversary in 2016, and has been producing high-quality coaxial cables for ages. Cables from Messi & Paoloni (M&P) have low attenuation, low weight, excellent environment resistance and attractive prices.

Coaxial cables do not only have the three parameters "diameter, attenuation, price". Managing Director Stefano Messi comments on just a few;

For instance, **the braid** is produced by using a braiding machine with 24 spools, while others have 16 resp. 19 spools only. This guarantees excellent screening efficiency, very good mechanic stability and great flexibility.

The **inserted copper foil** (M&P-AIRBORNE 5: aluminium foil) is laminated with a though plastic foil for additional tensile strength and to prevent the metal foil from tearing when there is a small bend radius or misuse. The screening efficiency with a range of 100-2000 MHz is thus better than 105dB! Both absorption of interferences (man-made noise or the signal of neighbour stations when cables are laid parallel) and emission of HF from the cable is reduced vastly.

The **air-foamed dielectric** is composed of a triple layer: high density/shut surface inside and outside and inside hollow spaces. This way wetness inside the cable can be reduced a lot, even if the outer isolation has been damaged.

The **inner conductor** consists of 99,99% pure copper, which is soft annealed to improve mechanic properties. Depending on the cable the jacket consists of either black PVC with an extra UV resistant coating, or of watertight polyethylene. With all these measurements the cables from M&P have a very stable SWR and constant impedance even over a long period of time.
When it comes to performance specifications, the manufacturer's approach is very conservative. Power ratings are calculated in a very cautious manner and are valid for 'key down' operation like FM or RTTY. In SSB operation a 5-6 seconds transmission time followed by the same reception interval allows to double the power handling mentioned. However, the specified 'max. peak power' must not be exceeded!

M&P ULTRAFLEX 7
7.3 LowLoss cable, 50 Ohm, double shielded

ULTRAFLEX 7 is designed similar to the AIRBORNE 5, but has a plastic-coated copper foil and stranded inner conductors. It is a standard cable for higher performance and with lower attenuation, at 50m length only about 1dB at 2m band. The jacket is made of PVC with UV protecting coating. Capacity: 3,7KW at 3.5 MHz and 1KW at 144 MHz. Our connectors for Aircell 7® fit as well.

M&P ULTRAFLEX 10
10.3mm LowLoss cable, 50 Ohm, "alternative for RG-213"

Standard cable with outer diameter similar to RG-213, but about half attenuation. Notice: with a cable length of 40m you get out 3dB more than with RG-213 at 70cm band, so twice the power. This cable is suited for high performance and for use up to GHz range. Design is similar to AC7 Plus: stranded inner conductors made of soft annealed pure copper, triple layered air-foamed dielectric, plastic-coated copper foil, copper braid made of 144 wires in 24 spools, outer jacket PVC. Capacity: 7.7KW at 1.8 MHz and 2.8KW at 144 MHz, with the buffer mentioned above. 0,8dB attenuation at 50m length at 2m band. Our connectors for Ecoflex 10® fit as well.

M&P BroadPro50 double jacket
12.4mm LowLoss cable, 50 Ohm, double jacket

Here's a different approach. This cable has a solid inner conductor with 2,7mm diameter, but this isn't the main advantage. The trick here is the outer jacket. It is double layered: the outer layer is made of PVC. The inner layer consist of red polyethylene. Though, watertight and red. It is red so that you can see damage after 'misuse' at first glance. If only the outer layer is damaged: self-amalgamating duct tape or heat shrink sleeve with glue on the inside applied at the breach, repair done! And if the inner layer is damaged too? Well, additionally copper braid and copper foil are waxed with paraffin-like grease, which also improves the cable's flexibility, too.

This cable was designed at the request of a DXpeditions team, who damaged their cables multiple times by accident when dragging it over sharp rock edges. Maybe you don't plan to do a DXpedition, but you could still need it, maybe for field day? With its solid inner conductor and double jacket the cable is very robust. Or you need a cable which can be buried in the ground or laid in water permanently. Our connectors for Ecoflex 10® fit as well.

For more details (and factory video) including their excellent range of connectors search our website under "ultraflex"

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Large Colour Touch Screen Display.
The all new FTM-400DE offers 4 modes of transmission including Voice & Data at the same time, Voice FR Mode, Data FR mode & Analogue FM. Massive 3.5" colour display, Dual receive and more.

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See www.hamradio.co.uk/ftm400 **ONLY £529.95**

Yaesu FT-1D

Very first Dual Band Full Digital Handie using C4FM & FDMA Digital technology.

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Yaesu DR-1XE

The most advanced mixed-mode repeater available today.

ONLY £1279.99 with £400 Cash Back Offer (ends 30th Dec)

Yaesu FT-450D

Only £689.95

The baby of the range but not in performance or functionality. Full feature HF-6M base transceiver with large easy to read display.

Autumn & Winter HF Sales Promotion – From Yaesu Musen!

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Only £1995.95

Big brother of the FTdx1200 boasting additional readout, down-conversion architecture receiver like its bigger brother FTdx5000.

Yaesu FTdx9000 series

ML&S Price: Call for details

Yaesu FTdx5000 Ltd

200 Watt Base transceiver with Pan-adapter display & balanced speaker system, internal PSU & ATU. MP Spec includes OXCO Hi-Stab Oscillator & additional roofing filter.

Only £3999.95
Or without SM-5000 Pan-adapter. £3799.95

Yaesu FT-897D

The UK Military really do use this radio, 160m-70cm, compact & rugged.

Only £699.95

Yaesu FTdx1200

The Yaesu FTdx1200 provides sophisticated operation on 160 to 6 meters with up to 100 Watts on SSB, CW, and FM (25 Watts AM carrier).

Only £1399.95
See ML&S video review hamradio.co.uk/ftdx1200video

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160m-70cm HF Base/Mobile. Still our best selling HF Mobile Radio.
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Includes YSK-857 Remote Head Kit

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Rugged 50W 2m FM **£129.95**

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2m 75W, MiL spec, high performance **£149.95**

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High-power FM on 10m, 6m, 2m & 70cm. When your local repeater is busy, slip onto 10m & work DX!
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With FREE YSK-8900 Remote Kit

NEW Yaesu FT-252 2M Handie
A compact, simple to operate 2M Handheld Transceiver that provides up to 5 Watts of RF power, along with loud audio output (800 mW)
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Yaesu VR-120D 100kHz - 1300MHz FM/WFM/A **£139.95**

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1kW HF/6m Solid State Fully Automatic 1kW HF/6m Linear Amplifier with matching power supply and internal Auto-ATU. **Last one available, call for a superb deal.**

MD-100a8x Base Station Microphone **£139.95**

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Yaesu Rotators

Largest stocks in the UK and, of course, the best prices. Cable extra.

G-450	£339.95
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G-650C	£379.95
G-1000DXC	£499.95
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GS-065 Mast bearing	£57.14
GC-038 Lower clamps	£34.95
Rotator cable 25m	£69.95
Rotator cable 40m	£123.95
Rotator connector plugs	£25.95

Yaesu FT-991. HF-70cm

Replacement for the FT-847GX?

All mode, including C4FM Digital, 100W, 3.5" Display.

See hamradio.co.uk/ft991 for more info and video.

New Elad FDM-S2

Latest 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.

New BabyStar D-Star Node

UHF, 10mW standalone D-Star Hotspot offering the D-Star Network without the need to run a PC.
RRP £299.95
Special Intro price: £239.95

New DSO-Quad pocket Oscilloscope

Tiny pocket size 4 channel digital oscilloscope for common engineering tasks. Built-in signal generator, internal Lipo battery. **£149.95**

CG SB-2000 Mk11 Radio Interface

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

Only £89.99

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

Complete set of interface cables for your radio £19.95.
For more info see: www.hamradio.co.uk/cg2000

EVX-539 *A REAL solution to operation through the UK's DMR repeaters.*

- Continuous rotary channel switch (either continuous channel select of 512 channels or 16 group settings of 32 channels) • 3 side buttons (programmable - dual function) • 4 front panel buttons (programmable - dual function) • Accessory connector socket • 8 character alphanumeric display • Large rotary channel selector • Angled rotary On/Off and volume control • Tri colour LED • Large textured PTT • Rugged die-cast chassis • Audio Companding • Clear Voice • Dynamic Tx power control • VOX (Internal and External) • 5 tone • Stun/Revive/Kill (5 Tone) • Voice Inversion Encryption built in • Option Board Capable • MIL 810 CDEFG • IP 57 (with accessory cover fitted) • CTCSS / DCS, 2 Tone En/Decode, MDC1200 En/Decode, DTMF En/Decode • Programmable channel spacing 12.5/20/25KHz • Analogue/Digital Scan • ARTS II (Automatic Range Transpond System with MDC1200 auto ID) • Radio Check (Digital) • Channel Announcement (dealer recordable / multi language) • Remote Monitor (Digital) • Pre-programmed Texting (Digital) • Basic/Enhanced Privacy (Digital) • Stun/Revive (Digital)

Accessories supplied:
- New style 'push on' belt clip
- Accessory socket dust cover
- Operating manual
- Li-Ion Battery pack
- Charger
- Antenna

Vertex Standard

A commercial grade transceiver built to last from a name that's been around for years?

Easy to operate with fundamental features instantly accessible, allowing users to operate while still concentrating on the job in hand.

Available in both 5W 2m or 70cm versions. Only £299.95!

Tigertronics SL-USB From only £99.95

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

Call to discuss your rig-to-cable requirements.

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Made of heavy duty black acrylic with a beautiful high gloss finish especially designed to fit the Elecraft KX3.
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MyDEL — Ideal for powering any main rig or accessory requiring 13.8 Volts at up to 120 Amps.

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You kept asking for it so we asked the factory to build us another run.

25Amps, 9-15V DC, super light with digital metering for Volts & Amps. **£89.95**

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MyDEL MP-304Mk11

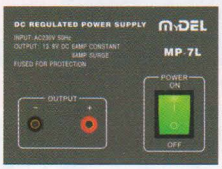
New addition to the MyDEL range of PSU's. Heavy Duty LINEAR 30Amp

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

NEW MP-7L

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

ML&S Price: £29.95



MyDEL MP-50SW111

50 Amp DC power supply. **£125.00**

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

Diamond GSV-3000

* Output voltage 1 - 15V DC & 13.8V Fixed * Output current 25A continuous (CE protocol) * Built-in cooling fan * Supply 230V AC 50Hz * Size 250 x 150 x 240mm * Weight 9.5kg

RRP £209.95

ML&S £159.95

New product!

MyDEL SW-2PL

Made from solid die-cast alloy, 2kW DC-30MHz, 250W .5-1GHz and SO-239 sockets.

Only £29.95

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New product!

CG-FS02 Heavy Duty Foot Switch.

Your house will probably fall down before you break this new remote Foot Switch from CG. All metal construction with 1m heavy duty screened cable and terminated with 1/4" jack plug.

Only £29.95

ALPHA DELTA COMMUNICATIONS, INC.

Alpha Delta Antennas

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

Delta-2B	2-way position SO-239 switch (1kW) for use up to 1.3GHz..... **£59.95**
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AD-ATT3G50	0MHz to 3GHz (200W) surge protector. N-Female Connector..... **54.95**
AD-ATT3G50/HP	0MHz to 3GHz (2kW) surge protector. N-Female Connector..... **£56.95**
AD-ATT3G50U	0MHz to 500MHz (200W) surge protector. SO-239 Connector..... **£49.95**
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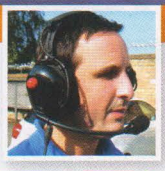
Delta-DX-A	160m, 80m and 40m 1/4 twin slope trap antenna. This antenna combines the tremendous DX firepower of the 1/4-wave slope with the wide bandwidth of the 1/2-wave dipole. One leg is 67ft long and the other is 55ft long..... **£89.95**
Delta-DX-B	160m, 80m, 40m and 30m single slope trapped antenna. This antenna is designed for limited space installations, were room does not allow for large wire antennas; it only requires 60ft of space providing amazing DX performance at installation heights of 35ft..... **£89.95**
Delta-DX-CC	80m, 40m, 20m, 15m and 10m dipole. This antenna is parallel length dipole with no traps; overall length is 82ft..... **£139.95**
Delta-DX-DD	80m and 40m dipole. This antenna is parallel length dipole with no traps; overall length is 82ft..... **£119.95**
Delta-DX-EE	40m, 20m, 15m, 10m dipole, it can be used on 30m, 17m, 12m with an ATU. This antenna is not trapped, and has an overall length of 40ft..... **£129.95**
Delta-DX-LB	160m - 80m, and 40m Low Band dipole. This antenna performance and 2:1 VSWR bandwidth depends on the height and surrounding objects; overall length is 100ft..... **£119.96**
DX-LB-PLUS	160m, 80m, 40m and 20m - 10m Low Band dipole. This antenna performance and 2:1 VSWR bandwidth depends on the height and surrounding objects; overall length is 100ft..... **£169.95**
DX-Series	Full-size utilized monoband dipole. These dipoles are using the Delta-C Centre Insulator with built-in Arc-Purge Surge Suppressor. **DX-20:** 20m Monoband Dipole at 33ft long **DX-40:** 40m Monoband Dipole at 66ft long **DX-80:** 80m Monoband Dipole at 133ft long..... **£49.95**
DX-Ultra	Medium wave to 30MHz 80ft AM Broadcast Dipole. Efficient, low-noise dipole for military, government, etc., use..... **£149.95**
AD-Delta C	Hardware Kit contains the following: 1 x Dipole Centre. 2 x Dog Bones. 1 x Surge Protection Block..... **£29.95**
Delta-SEP	Replacement/spare Arc-Plug™ Static Electricity Protector. This unit is usually attached to the back of the Alpha Delta Centre T Balun..... **£14.95**

Have you seen TX Factor yet? Episode 5 out now!

TX Factor is a TV Show dedicated to Ham Radio. See Hamradio.co.uk/txfactor

In Episode 5 of TX Factor, Nick Bennett 2E0 FGQ visits Silcoates School in West Yorkshire which has over 30 students with Amateur Radio Licences, Mike Marsh G1IAR meets some top DX-ers at the Island's On The Air Convention and Bob McCreadie G0FGX meets Amateur Radio's future at YOTA U.K. The team also go portable to put the amazing Super Antenna to the test!

RADIOSPORT HEADSETS



Whether for DXing, contesting, field day, or casual everyday use we think you'll agree Radiosport headsets have the features you want. ML&S are proud to have been appointed their distributor and have stock today.

All headsets are supplied with GEL Cushions giving extra comfort and FREE cloth covers.

RS60CF Deluxe Dream Edition Stereo Headset with boom (as featured)	**£179.95**
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PTT-FS-RCA Foot switch with 7ft cable with phono plug	**£44.95**
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How about an additional 3.5mm socket on the opposite ear cup to allow "tethering" of another headset for a logger or maybe just an additional pair of ears?

NEW! ELAD FDM-Duo

Multi-Use 5W SDR Transceiver

£899.95

Crafted out of beautiful aluminium, if Ferrari were to ever build a radio, this would be it. Designed using the very latest SDR technology, 10kHz-54MHz, Direct Conversion RX operating at 122.88MHz. The small transceiver employs a fast analog-digital-converter that samples the received HF directly into digital signals and a downstream DSP module provides for filtering and processing. Another ARM processor handles the signals of the control unit. All Mode, in stock·

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

Kent Morse Keys

Kent Morse Practice Oscillator.	£31.95	Kent Single Paddle Key.	£95.95
Kent Twin Paddle Key.	£114.95	Kent Single Paddle Key Kit.	£94.95
Kent Twin Paddle Key Kit.	£98.95	Kent KT-1 Professional.	£109.95
Kent Hand Key.	£99.95	Kent Vail Lever Correspondent Replica.	£219.95
Kent Hand Key Kit.	£86.95		

Alpin HF Linear Amplifiers

Very special prices for two very special amplifiers

Offering extraordinary value for money, Alpin offer superbly engineered HF & 6m Linear amplifiers with excellent reliability. To date we haven't had one back for repair!

Alpin 100Mk11
HF+6m Linear Amplifier 1kW+ PEP output.
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Alpin 200
HF Linear Amplifier 2kW PEP Output from 2 x 4CX800A's.
RRP £3499.95
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Ameritron Amplifiers

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

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

See web for full range and specifications.

MyDEL Antenna Tuner

New! CG-3000R

The best value remote wire antenna tuner now with remote control included.

Save £30! Only £259.95 until end 2014.

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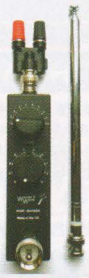

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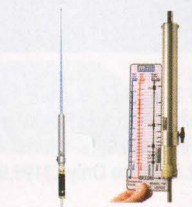

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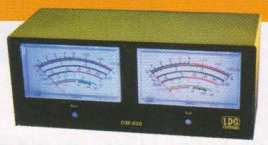

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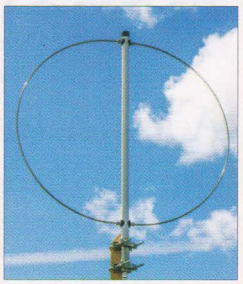

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November 2014 • RadCom

Max Callé (SWL), Ben Allen, M0BZE & Ivan Ivanov, M0YGM • e-mail: Ben.Allen@beds.ac.uk

A solar powered Raspberry Pi setup for remote reception of FUNcube-1 signals

A sixth-former's four week project to bring SDR and space technology to remote locations

Professor Ben Allen with the system.

FUNCUBE-1. The FUNcube-1 satellite is a 10cm^3 CubeSat designed to educate and enthuse students about radio, computing, physics and electronics. Built by members of AMSAT-UK and launched on a Soyuz rocket in 2013, it orbits the earth every 94.2 minutes, with up to 6 passes around the UK each day. Three of these passes are during the daytime, at which point FUNcube-1 broadcasts in 'educational' mode, where status information and other telemetry data can be used for further analysis. In later hours, it enters 'amateur radio' mode, where radio amateurs can tune in to send and receive transmissions via the transponder.

So far, the 145.935MHz telemetry signal has been decoded by around 750 stations, a number that is steadily growing. With this project, the aim was to find a way of combining systems in order to create a fun and interesting means of receiving these signals that demonstrates space technology, computer systems, solar power and wireless. Once ruggedised, the resulting system may be deployed in remote locations to receive FUNcube-1 telemetry data on parts of the orbit not currently covered. It may also be expanded to receive a variety of other signals of interest.

RASPBERRY PI. The Raspberry Pi (R-Pi) is a credit card sized Linux based computer made in the UK (hooray!) that has been produced and developed by the Raspberry Pi Foundation. There are currently 3 models: A, B and B+. The 'A' model has just 256MB of RAM, whereas the B and B+ models have 512MB. All of them are based on a 700MHz CPU that has computing resources similar to that of a smartphone (the average PC now has clock frequencies in excess of 2GHz).

The aim of the Raspberry Pi project is to educate and enthuse people from all backgrounds about computing and electronics, and it's certainly worked! The Pi has been used in everything from devices that open curtains to integration into a range of commercial embedded electronics products. Its low price (£25-£35) and very high versatility has made it the go-to choice for many amateurs, enthusiast and professionals.

SDR. Years ago, setting up a radio listening station required a relatively large amount of expensive analogue hardware. Now, it is possible to make a much cheaper system using a SDR dongle, relevant software and a suitable computer program.

An SDR (software defined radio) is a device where much of the important radio hardware (eg filters, demodulators etc) are replaced by software. SDRs have made amateur radio much more accessible ever since their inception. The FUNcube Dongle is a well known example of an SDR dongle, however we're not using it. Why? Mainly because the FUNcube Dongle won't easily work with a Raspberry Pi at the present time due to driver and power issues. Instead, I'm using a fairly cheap 'RTL' SDR dongle along with a separate preamplifier to improve the signal. This SDR dongle is fully compatible with the software listed in this article, but do ensure your chosen dongle is also compatible. Advice for many common SDR dongles can be found on relevant web pages.

THE HARDWARE. To build the system I used, you need the following components: a 12V sealed lead acid battery, 12V solar panel (with an integrated charging circuit), 'RTL' dongle, Wi-Fi dongle; preamplifier, antenna, Raspberry Pi, DC-DC converter, powered USB hub and a remote PC. The system connects as shown in **Figure 1** but I do have a word of warning for anyone who wants to try this for themselves: be careful to ensure that your USB hub does not feed power back into the Pi (non-USB compliant devices). If yours does, please make sure to carefully modify it to prevent power backfeeding into the Pi, which may cause serious damage to the Pi and the converter. Connecting it to the converter without modifying it carries a risk of fire.

POWER REQUIREMENTS. Solar panels are still quite expensive (though they are getting cheaper) and one is needed for this system.

A solar panel that won't break the bank is preferred, but it's still important to ensure that there is enough power available to run the system. So, right at the start, I calculated the size of panel needed to power the system shown in the diagram.

In any solar power system, a battery is required so that the system can operate even if the panel was to provide power intermittently. All of the power calculations here are based on a worst-case scenario assuming a British winter, 24 hours a day operation with only 8 hours of cloudy daytime. Most readily available solar panels produce 12V, so I used a 12V battery. Battery capacity and charge is measured in ampere-hours (1Ah being equal to the charge transferred by a current of 1A for 1 hour). I calculated that the current drawn from the battery would be about 1A, so the battery would transfer 24Ah of charge per day. In order for the solar panel to provide this charge in 8 hours it would need to produce at least 3A of continuous current. Using P=IV, I calculated the power requirement of the panel to be at least 36W.

Due to the possibility of cloudy days, I would recommend using a much larger panel, just to be safe [1]. For the battery, I would suggest that the battery should always have at least 50% charge and thus a 12V sealed lead acid battery with a capacity of at least 50Ah is suggested.

SOFTWARE. To operate the system, I used the following software:

- *rtl-sdr*: a very useful program that includes an option to output the signal over TCP, used on the R-Pi to control the RTL dongle
- *SDR#:* a very good PC program that can demodulate signals from a range of sources including SDR dongles, and output them elsewhere
- *FUNcube Dashboard*: PC program that decodes the signal and sends it to the FUNcube data warehouse via the internet
- *PuTTY*: used on the PC for remote access to control the Raspberry Pi
- *Orbitron*: a satellite tracking program for the PC used in this project to provide Doppler frequency correction
- *VB-Cable*: a free 'virtual audio cable' used to provide a connection between *SDR#* and the *FUNcube Dashboard* both running on the remote PC.

Rtl-sdr. The first software that I installed on the R-Pi was *rtl-sdr*. The installation process is a little unusual as it uses the command line of a Linux terminal.

The website provides full instructions on how to install and run *rtl-sdr* as a TCP server, including a solution to a very common error where the kernel driver does not allow *rtl-sdr* to access the USB dongle.

To test that the software had installed correctly, I used a test command. At this point I initially received an error because the driver was already being used. To fix this, I 'blacklisted' the appropriate modules. All the instructions needed can be found at [2].

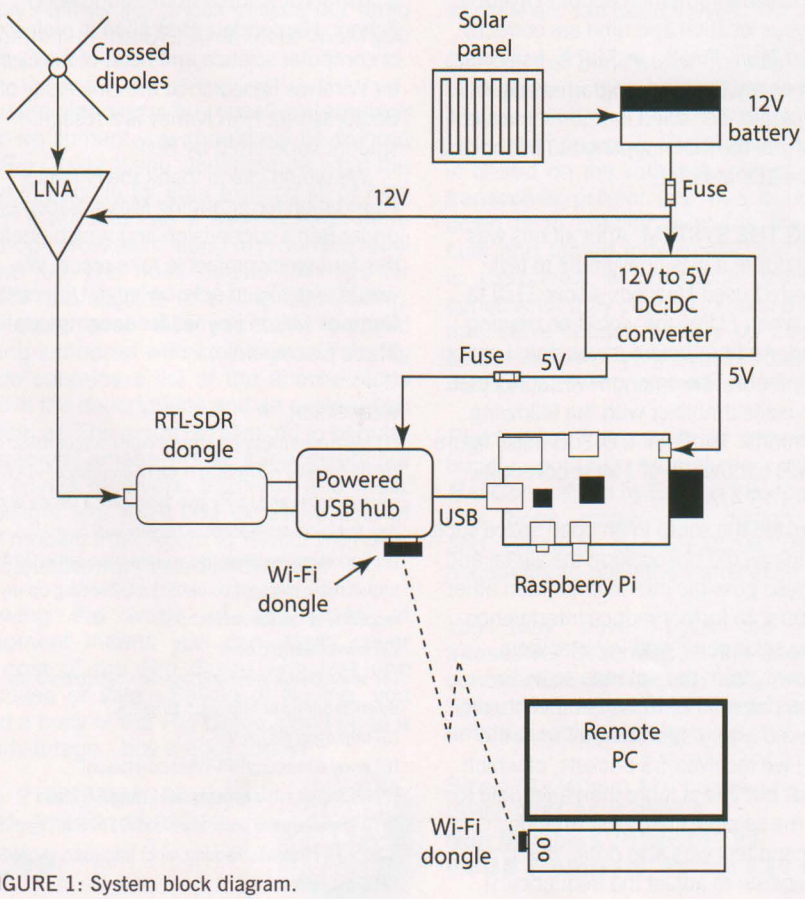


FIGURE 1: System block diagram.

SDR#. Setup for *SDR#* is very straight forward. I downloaded the latest version from the website [3] onto the remote PC. In the file that downloads, there's a 'sdr-install' directory, which I moved to the desktop. Then, within that folder, there's a file called 'install'. I ran this and a command prompt window popped up, showing that it was installing. When done, there was a new folder in 'sdr-install' called 'sdrsharp', within which there are a whole load of files. At this stage the only file I wanted was 'SDRSharp.exe'.

When run, the window displayed various pieces of status information and some menus. To make sure that it worked, I tested the TCP server (the Pi) operating with the RTL dongle with an ethernet cable between the two computers.

Within *SDR#* I selected 'RTL-SDR / TCP' as my source, and then went into the configuration settings (the little cog icon) and typed out the IP address of the Pi on the local network. (To find out the IP address of the Pi on the network, I used the command 'ifconfig' in the Linux terminal on the Pi, which displays information about the connection.) On the Pi side; I entered this command:
Rtl_tcp –a [IP Address of Pi]
This comes up with a few lines of information about sample rate, tuned frequency etc. In *SDR#* I clicked the 'play' button to begin receiving the signals from the Pi. At first, I couldn't get a good signal, but then discovered that you have to adjust the RF gain in the settings, where I adjusted it to about 2/3 of maximum.

This time, the signal was received and demodulated as a wide FM signal and *Voila*! Initially I tried to receive an FM broadcast station to prove the system was operational. The broadcast signal was very strong and so the choice of antenna was not critical and the LNA was omitted.

PuTTY. *PuTTY* is an *SSH* client that can be used to remotely control Linux machines over a network using a Windows PC. Since the Pi has to be run 'headlessly' (ie without a monitor, keyboard or mouse) this is a vital part of the whole system. I downloaded the Windows installer to my PC from the *PuTTY* website [4].

Once downloaded and installed, I set up a keyboard shortcut to open a session more quickly. This will save you a lot of time if you do this for any program that you'll be opening and closing often.

When opening up *PuTTY*, it defaults to the 'Session' tab. To connect to the Pi, the IP address needs to go in the 'host name' box. If you're trying this for yourself: do not change the port; it should default to 22, which is for *SSH*.

Max Callé (SWL), Ben Allen, M0BZE & Ivan Ivanov, M0YGM • e-mail: Ben.Allen@beds.ac.uk

After making sure that the connection type was 'SSH', I opened up the session. As a security measure, you'll be asked to confirm that you trust the source; so long as you know that it is the Pi you're connecting to, click 'Yes'. Testing it was fairly straightforward: starting up the TCP server on the Pi via *PuTTY* and seeing if it could then be detected by *SDR#*. The *PuTTY* window displays exactly what would be shown on the R-Pi.

FUNCUBE DASHBOARD. *FUNcube Dashboard* can be downloaded from [5] and the installation is straightforward. To be able to decode the data from FUNcube-1 the first requirement is to sign up; you will then be sent an authorisation code by e-mail. Once I had done this, I had to enable *SDR#* to send the signal to the dashboard. To do this I used *VB-Cable*, described next.

VB-CABLE. *VB-Cable* is a free and open source virtual audio cable. It's used to send audio from one program on your PC to another and is an alternative to *Virtual Audio Cable*, although it only allows for one connection.

Once installed on to the PC, two new options appear in the sound settings of the PC: *VB-Cable* input and *VB-Cable* output. To connect *SDR#*, I changed the sound output to the *VB-Cable*. Then, in *FUNcube dashboard* I went to File -> Settings and changed the input to *VB-Cable*.

Once done, I tested the configuration using the ethernet connection between the R-Pi and the PC, which showed it working; in the dashboard, noise was seen on the signal display (which can also be heard if 'monitor audio' is ticked on the dashboard).

WI-FI ACCESS POINT. The connection between the PC and the Pi can be wireless, as this would allow the receiver system to be located some distance from the PC, eg, once ruggedised, it could be placed on a suitable roof. I set up the Pi as a Wi-Fi access point using instructions I found at [6]. I set up a static IP address for the Pi, then gave it an SSID and a PSK (name and password for encryption) according to the instructions.

Once set up, I tested to see whether or not a Wi-Fi enabled device (my smartphone) could connect to the network. After I confirmed that this worked, I connected the PC to the Pi and confirmed that I could still control the Pi using *PuTTY*.

DOPPLER COMPENSATION. When an object is moving past or toward a point, any sound or radio signal it emits will experience the Doppler effect [7] at the remote point. This is what happens when an emergency vehicle moves past you with the sirens on – you hear a distinctive change in note as it passes you. The same thing happens with radio signals from a satellite. When the satellite is coming towards us the waves compress, and they spread out when moving away. This results in a change in received frequency sufficient to require re-tuning a receiver, and the geometry of a low earth orbit satellite pass is such that the frequency changes are more complex than the simple single shift observed from a passing siren.

A 'pass' of FUNcube-1 lasts for about 10 minutes and it is helpful to automatically compensate for the frequency changes. It is possible to calculate the correction for Doppler and this system needs to be autonomous. To make it work on its own, you need suitable software to do the work for you.

I searched on the internet and found a solution: using *Orbitron* to track the satellite, *MyDDE* to allow for Doppler shift, and the satellite tracking plugin for *SDR#*. *MyDDE* is at [8] and instructions can be found on the 'HamRadio Sat' YouTube channel.

I downloaded *Orbitron* from [9] and installed it. Then I put the *MyDDE* files inside *Orbitron*'s install location (in Program Files). To install the satellite 'plugin' on *SDR#*, I opened the file and followed the instructions in the README file.

In *Orbitron*, I updated the list of satellites and opened the list of amateur satellites, then selected FUNcube AO-73. Once selected, I went to the 'rotor/radio' tab and selected '*MyDDE*' as my driver. When I clicked the button to run it, it asked me to locate it. Once that was done, a window popped up that displayed information about FUNcube. Ensure your location and time are correctly set on *Orbitron*. Finally, in *SDR#*, I selected *Orbitron* as my tracking program using the Tracker plugin. I enabled it, and then tested it with a satellite that happened to be moving above me at that point.

TESTING THE SYSTEM. After all this was said and done, it was finally time to test the system. I used *Heavens Above* [10] to find out when FUNcube would be passing overhead. An hour before it was due, I set up the equipment. The antenna was connected to a low-noise amplifier with the following specifications: 19dB gain; 0.2dB noise figure and a 3dB bandwidth of 1MHz covering 145.4 – 146.4MHz.

We tested the setup in an open space such that buildings did not occlude the signal and to minimise possible interference from other Wi-Fi users. To further reduce interference risks, the solar panel and inverter were moved away from the antenna so as to minimise potential EMC issues. Eventually, we received a very strong signal from the satellite; we received 53 packets, of which 16 failed, but this is more than adequate to display the satellite status information.

A second test was also done, this time using *Orbitron* to adjust the frequency. If you're using *Orbitron* to adjust for the Doppler Effect, be careful about the downlink settings in *Orbitron*. Ensure that the correct centre frequency is set in *Orbitron*, and remember to account for the frequency offset that occurs from using upper sideband.

FURTHER WORK. This part of the project worked and was finished, however there was still a little more to do. Although the signal we received was very good, the data was not sent to the FUNcube data warehouse because we were not connected to the internet. This is a relatively simple problem to solve, because a PC can connect to two networks at once.

More importantly, the system should, ideally, be ruggedised for the environments it will exist in. I found that a suitable solution would be to use a large weatherproof box with cable routes. The box has to be large enough such that the heat generated by all the components does not become concentrated in one area, which could potentially damage the components.

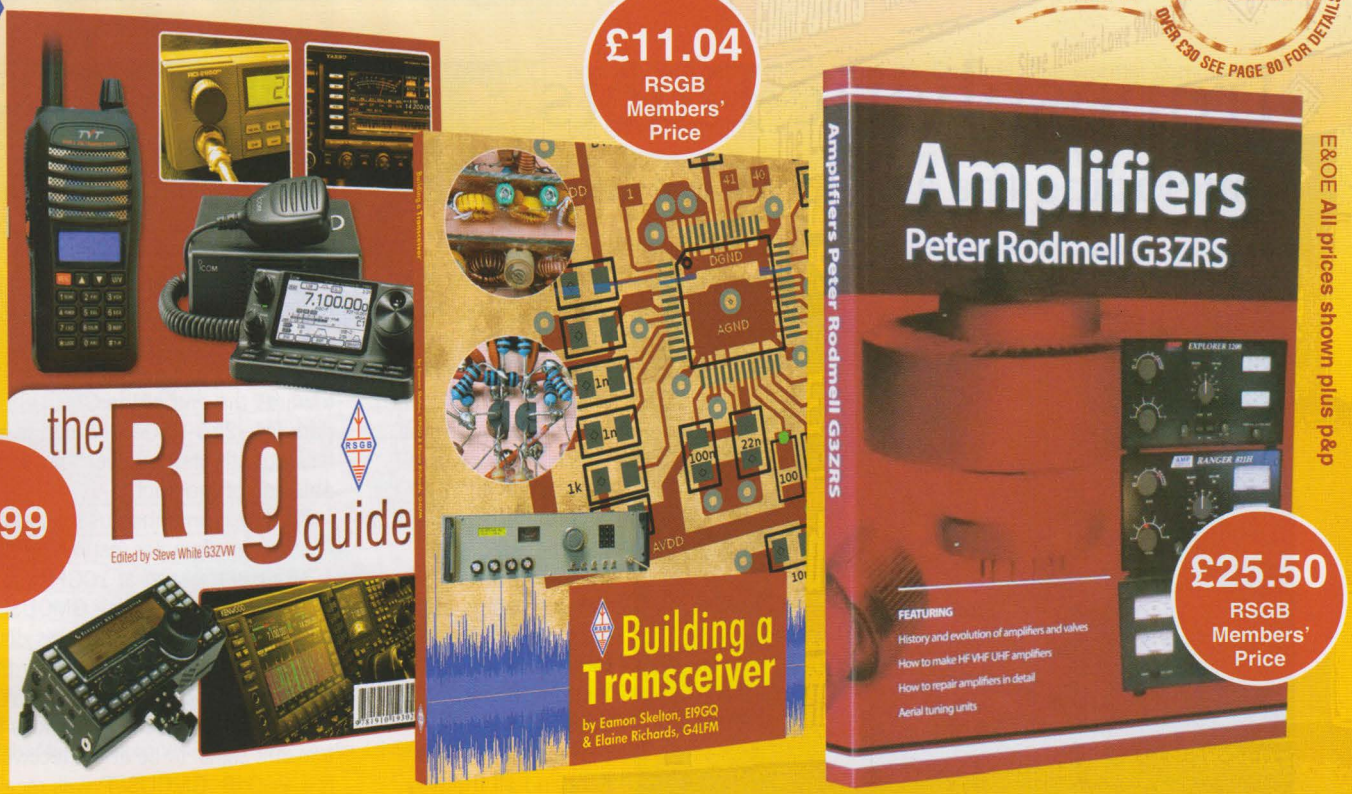
Finally, I would suggest restricting the access to the Pi's wireless network so that the PC was the only device that could connect. The Pi can only manage one connection while running RTL-TCP; using more devices increases the Pi's resource demand and the likelihood of failure. To prevent this I would suggest blocking access to all MAC addresses except the PC's.

ABOUT THE AUTHORS. Max Callé is a sixth-form student from Roundwood School, Harpenden. Ben Allen is professor of computer science and head of the Centre for Wireless Research at the University of Bedfordshire. Ivan Ivanov is a research student supervised by Ben.

We would like to thank the Nuffield Foundation for arranging Max's placement under Ben's supervision and which enabled this four week project to take place. We would also like to acknowledge University Campus Milton Keynes for accommodating Max's placement.

WEBSEARCH

[1] Most manufacturers specify panel output based on strong summer sunlight at noon (illuminance ~1kW per square metre) and rarely give figures for a cloudy winter's day; the output difference is usually well over 10:1 – Ed
[2] Report on installing *rtl-sdr*: http://goo.gl/LkvQO4 or http://zr6aic.blogspot.co.uk/2013/02/setting-up-my-raspberry-pi-as-sdr-server.html
[3] www.sdrsharp.com
[4] www.chiark.greenend.org.uk/~sgtatham/putty/download.html or http://goo.gl/IgtIPK
[5] http://goo.gl/jJjauV
[6] www.elinux.org/RPI-Wireless-Hotspot
[7] https://en.wikipedia.org/wiki/Doppler_effect
[8] www.mediafire.com/download/91u26ud7rgtp9in/SDR%23+SatelliteTracking.rar or http://goo.gl/cfWS8X
[9] www.stoff.pl/
[10] www.heavens-above.org



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Tropospheric Ducts

Concluding the article with a look at case studies

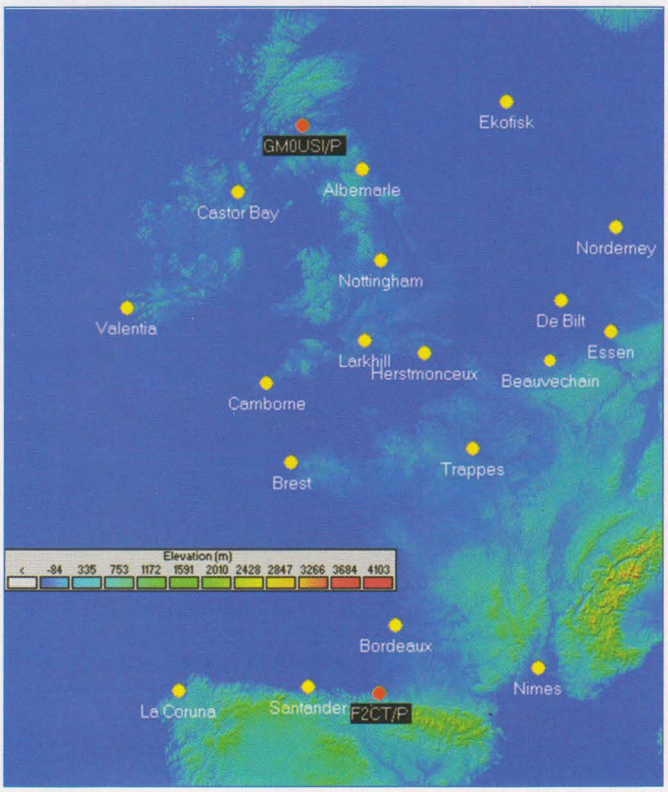

FIGURE 3: Map showing location of GM0USI/P, F2CT/P and nearby radiosonde stations.

RECAP. Last month we learned how radiosonde data can be analysed using relevant equations to help us identify and characterise tropospheric ducts. Now we present two case studies of real-world tropospheric ducting at microwave frequencies

CASE STUDY 1: GM0USI/P-F2CT/P AT 10GHz. On 15 September 2012, GM0USI/P established the UK distance record for a 10GHz contact with F2CT/P via tropospheric propagation. GM0USI/P was at an altitude of 330m, while F2CT/P was on top of Mount Baigura in the Pyrenees in France at ~890m above sea level. The distance between the two stations was 1428km [12].

To understand how this feat was achieved, first we consider the two station locations (red dots) as shown in **Figure 3**, as well as the locations of most of the radiosonde launch sites relevant to this discussion (yellow dots). We then consider the modified refractivity profiles derived from some of these radiosonde measurements.

Figure 4 shows the modified refractivity profile from the Camborne radiosonde data at 1200UTC on 15 September 2012, in which a strong elevated duct is evident. The duct top is at ~1200m and its depth is ~320m. This elevated duct was probably a result of the extended high pressure system observed over Western Europe (ie a subsidence duct).

Table 2 lists the duct parameters derived from radiosonde measurements at sites close to the radio path. Clearly, a strong elevated duct was present that extended from Scotland all the way down to the Pyrenees that was capable of supporting frequencies below 100MHz. As subsidence ducts are not likely to exceed a few hundred kilometres in extent [1], this particular duct would, therefore, appear to have been exceptional considering its near-constant height over its entire length.

Figure 5 shows the paths of some tropo contacts that occurred on 15 September 2012, listed on the Make More Miles on VHF website [13]. Most of these paths were over the western part of France. Furthermore, a large number of these contacts were at 144MHz, which is consistent with the minimum frequency calculations in Table 2.

Figure 6 shows the predicted path loss versus distance and altitude from GM0USI/P assuming the modified refractivity profile above Brest in France (roughly mid-path). A flat Earth is used here for convenience of viewing. The path loss scale ranges from below 150dB (red) to >250dB (dark blue). The vertical height scale is 2000m and the horizontal distance scale is 1500km.

Between altitudes of ~800-1200m, the simulation shows significantly reduced path loss owing to the existence of the elevated duct. The predicted path loss towards the end of the GM0USI/P-F2CT/P path is ~230-250dB, which is a large path loss but still much lower than that in the absence of the duct.

The dish antennas used at each end were ~80cm in diameter (estimated directivity is ~38.5dBi for each at 10GHz, so realised gain will be slightly less). GM0USI/P delivered ~9W of transmit power to his dish antenna. Assuming a low noise figure for the F2CT/P receiver (eg 1dB) and a 500Hz CW bandwidth, the maximum possible path loss for the transmit signal to be at the receiver noise floor is ~260dB. GM0USI/P was received at RST 529, so the path loss predictions shown in Figure 6 are consistent with the actual signal levels that occurred on the day.

GM0USI/P attempted to contact stations in Paris but was not successful. The reason for the links to Paris not working becomes clear when radiosonde data from Trappes (near Paris) is analysed. While an elevated trapping layer existed along a path to the south of GM0USI/P, there was no duct above Trappes. Even if an elevated duct had been present over Paris, Figure 6 suggests the path loss to low altitude stations would have been excessive and still have prevented a contact from taking place.

Although GM0USI/P was not at the same height as the duct, there was still sufficient RF energy to couple into the duct and establish the link with F2CT/P. **Figure 7** shows the predicted path loss assuming that GM0USI/P had been on top of a Munro (a Scottish mountain above 3000 feet or 914m) on this particular day.

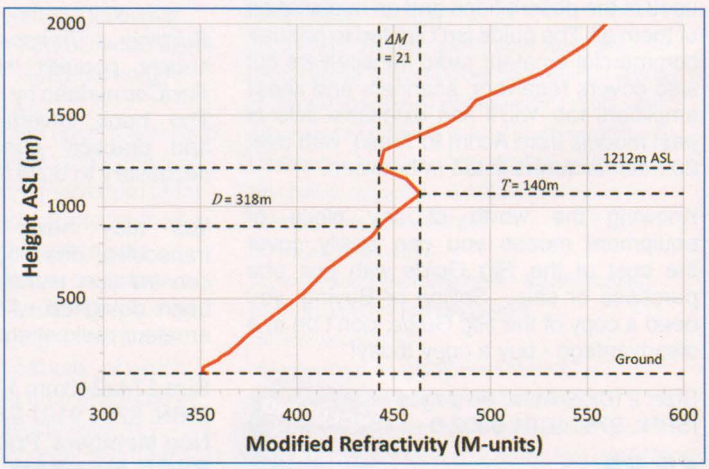

FIGURE 4: Modified refractivity profile for Camborne radiosonde measurements at 1200UTC on 15 September 2012.

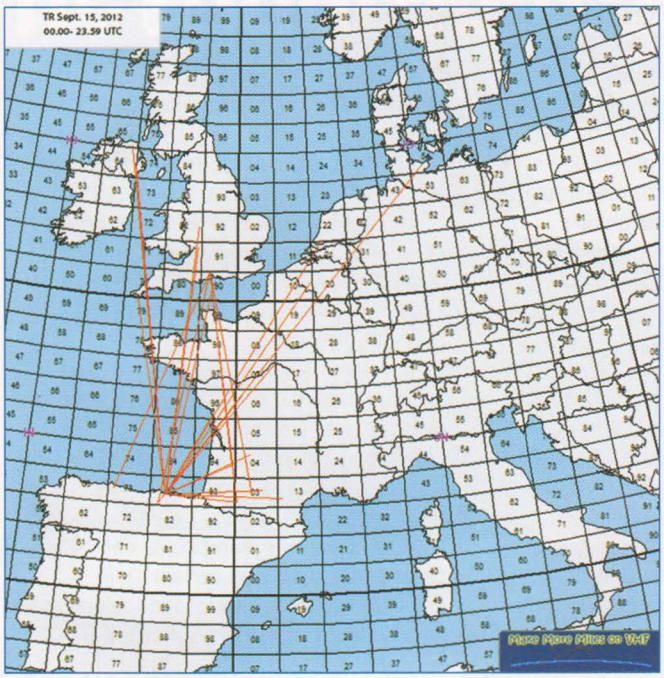

FIGURE 5: Make More Miles on VHF tropo summary for 15 September 2012.

His signal might have been ~40-60dB stronger and possibly 'armchair copy' owing to more efficient coupling into the duct. It might even have been possible to make contact with low altitude stations owing to signal leakage from the duct. However, the act of carrying all of his microwave equipment to this height would have been a commendable achievement in its own right.

Also evident in Figure 7 is an up-down oscillatory path taken by the radio waves as they propagate through the duct. The duct depth *D* for an elevated duct is larger than the trapping layer thickness *T*, as shown in the example in Figure 1. On their upward path, the radio waves are bent back down owing to refraction/reflection in the trapping layer. It would then appear that the radio waves are bent back upwards through the same processes in the lower part of the duct just below the trapping layer. While some refraction will take place, this 'upward' bending of the path is an artefact of viewing the Earth as flat (note the use of modified refractivity in this work) and, in reality, the Earth's curvature plays an important role here.

For example, consider radio waves propagating in a near-straight line above the surface of the Earth. At some point, they will be at their closest to the Earth but owing to the Earth's curvature, the height of the radio waves will increase again as they propagate beyond this point until the next downward refraction/reflection takes place in the trapping layer. For surface-based ducts, there is the added possibility of ground reflections taking place.

CASE STUDY 2: GB3SEE-G4BAO AT 24GHz. Late at night on 9 July 2013, G4BAO received the 24GHz beacon GB3SEE, which is 115km distant. This beacon is normally well below the noise floor for G4BAO but on this particular night, signal levels peaked sufficiently for it to be heard on CW. Discussions between G4BAO and fellow microwave enthusiasts followed in an attempt to understand the propagation mechanism [14].

Inspection of weather chart archives shows that there was a high pressure system positioned over the UK for much of early July. This high pressure system might be expected to generate elevated ducts through subsidence (ie subsidence ducts), which was actually the case when radiosonde data from this period is analysed (GOMJW actually observed an elevated trapping layer as he flew over the Midlands on 8 July 2013 [14]).

Advection ducts can also be associated with high pressure systems, when warm dry air is carried by advection from the European Continent out over the North Sea and the Channel. The warmer continental air interacts with the underlying cooler, moist air just above the sea surface to form a surface-based duct [15].

Figure 8 shows the modified refractivity profile for the Larkhill radiosonde measurements at 0600UTC on 10 July 2013. Clearly evident is an elevated trapping layer with its top at 377m that is sufficiently strong to form a surface-based duct. Later radiosonde measurements at 0900UTC indicate that this surface-based duct had disappeared suggesting that it was indeed caused by advection [15].

Table 3 lists the characteristics of the surface-based ducts determined from radiosonde measurements close to the GB3SEE-G4BAO link on the 9/10 July 2013. The heights of tops of the ducts were different, as were their depths and strengths. However, the radiosonde measurements show that surface-based ducts were present across a large part of the southern UK. In other words, the propagation phenomena that enabled the GB3SEE-G4BAO 24GHz link to work were not unique or limited to the 'hot London bowl'. Furthermore, there was significant Europe-wide activity at VHF and UHF around this time period owing to the extensive ducting [16].

Figure 9 shows the simulated path loss versus height and distance from the GB3SEE 24GHz beacon using the modified

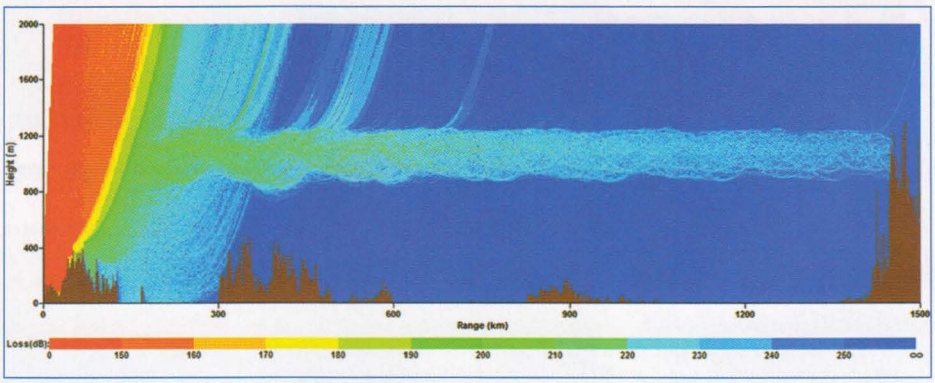

FIGURE 6: Predicted path loss for GM0USI/P-F2CT/P link at 10GHz using modified refractivity profile from Brest radiosonde data at 1200UTC on 15 September 2012

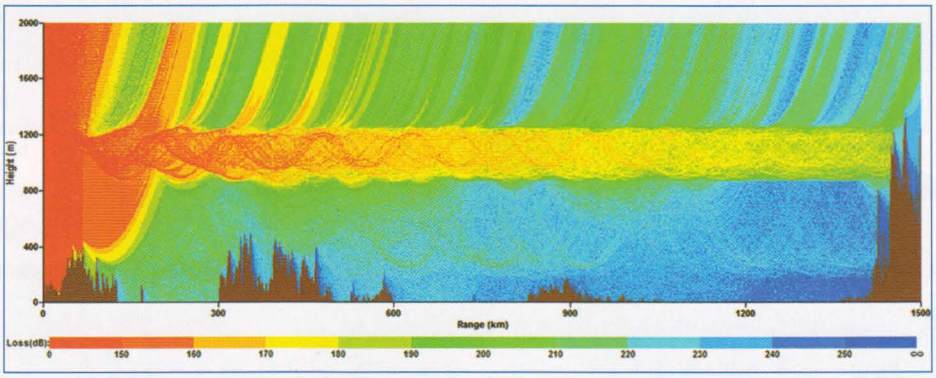

FIGURE 7: Predicted path loss for GM0USI/P-F2CT/P link at 10GHz using modified refractivity profile from Brest radiosonde data at 1200UTC on 15 September 2012 assuming GM0USI/P at altitude of 1000m.

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refractivity profile shown in Figure 8. The path loss scale ranges from below 150dB (red) to above 250dB (dark blue). The vertical height scale is 500m and the horizontal distance scale is 120km. The up-down oscillatory paths of the radio waves within the duct are clearly seen but it would appear that they do not extend down to the ground at ~115km from GB3SEE (location of G4BAO). Ground reflections are also evident in Figure 9 at ranges less than ~60km from GB3SEE.

The simulation does, however, indicate that the radio path was assisted by knife-edge diffraction via the hill at ~90km distance from GB3SEE. Also, the simulated path loss at 115km is approaching 200dB, which is that value described by G4BAO for the link likely to succeed [14].

Additional path loss simulations using different modified refractivity profiles (top of the duct either higher or lower than that shown in Figure 8) were carried out but the predicted path loss was greater than that shown in Figure 9. It would appear that for this particular path geometry, the duct height and strength were just right for the GB3SEE 24GHz beacon to be received by G4BAO with the assistance of knife-edge diffraction.

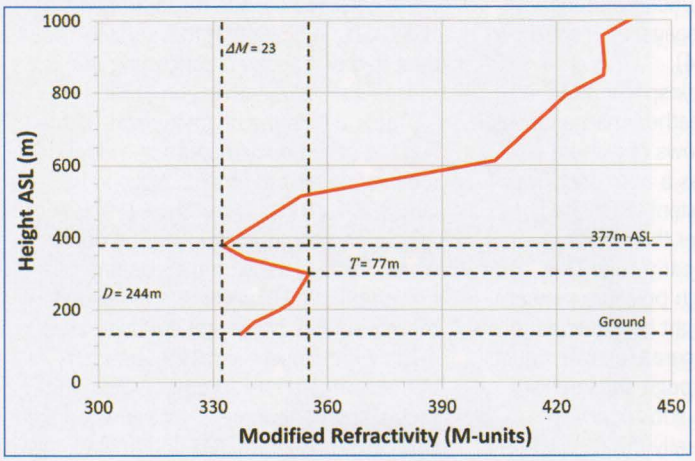

FIGURE 8: Modified refractivity profile for Larkhill radiosonde measurements at 0600UTC on 10 July 2013.

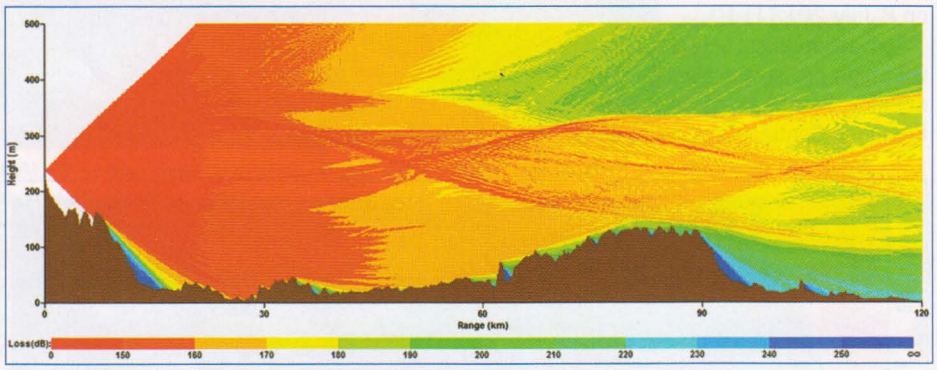

FIGURE 9: Predicted path loss for GB3SEE-G4BAO link at 24GHz using modified refractivity profile from Larkhill radiosonde data at 0600UTC on 10 July 2013

TABLE 2: Elevated duct parameters obtained from radiosondes close to GM0USI/P-F2CT/P link at 1200UTC on 15 September 2012.

Station	Altitude of duct top (m)	Depth of duct (m)	ΔM (*M* units)	f_{min} (MHz)
Castor Bay	1192	226	14	95
Nottingham	810	249	17	78
Camborne	1212	318	21	54
Brest	1264	384	32	37
Bordeaux	1362	242	25	66

SUMMARY. This article has presented important equations that when used for the analysis of radiosonde measurement data allows tropospheric ducts in the atmosphere to be identified and classified as either surface-based ducts or elevated ducts.

Furthermore, the duct characteristics, such as the change in modified refractivity over the trapping layer and the duct depth, can be used to provide information on the critical angle and minimum frequency supported by the duct.

Analysis of radiosonde data can help us to understand why certain radio links worked under tropospheric ducting conditions, while others did not. By way of example, two case studies were presented of notable tropospheric ducting via 1) an elevated duct and 2) a surface-based duct.

There is an element of luck associated with amateur radio communication via tropospheric ducts because it relies on weather processes, path geometry and people to be in the right place at the right time. However, operator skill can improve the chances.

This article has shown how to analyse radiosonde measurement data to derive modified refractivity profiles for the troposphere overhead. With this knowledge, readers can identify and characterise tropospheric ducts for themselves. This understanding might even help to increase the chances of success with this fascinating propagation mode.

WEBSEARCH

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[13] Make More Miles on VHF, www.mmmonvhf.de/tr.php?year=2012&month=09&day=15
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[16] R Staples, G4HGI, VHF/UHF, *RadCom* Sep 2013

TABLE 3: Surface-based duct parameters obtained from radiosondes launched close to GB3SEE-G4BAO link on 9/10 July 2013.

Station	Date (Time)	Altitude of Duct Top (m)	Depth of Duct (m)	ΔM (*M* units)	f_{min} (MHz)
Ekofisk	9 July 2013 (1200UTC)	149	120	39	160
Camborne	10 July 2013 (0000UTC)	217	129	10	293
Herstmonceux	10 July 2013 (0000UTC)	258	206	14	157
Nottingham	10 July 2013 (0000UTC)	233	76	2	752
Larkhill	10 July 2013 (0600UTC)	377	244	23	103

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HF

The bands are alive once again

CONDITIONS UP. Band conditions picked up massively in September with solar flux around the 180 level for a while and DX coming through on all bands. Perhaps the most surprising openings were directly over the North Pole with 5W1SA coming through on 12m, V73NS and C21GC on various bands, and the 3D2s (Fiji and Rotuma) workable on 17 and 15m. On good days there were JAs and VKs on 15 from breakfast time and even on bad days the band usually opened for a while around mid-day. Evenings also produced 15m DX with signals from Hawaii, Tahiti, Alaska and New Zealand from 1800-2100UTC on a number of days. Victor, E51CG in the South Cooks even reported hearing me on 10m around 1915UTC but sadly I couldn't hear him. There were a few days of minor geomagnetic storms but, for the most part, propagation was good.

The nights are now getting longer so it is time to start thinking about LF (though there's some LF DX around all year of course). There should be interesting stations on 80 and 40 from an hour or so before sunset to an hour or so after sunrise – but you're likely to need a reasonable antenna to hear or work many of them. The period after sunrise is a particularly good time for us on both 80 and 40 as the rest of Europe loses propagation leaving the UK with a fairly clear shot at anything in the Caribbean, eastern Pacific, or South America. If you want to work Mexico then 0900UTC on 40m may be the best bet.

LONG PATHS. Last month I mentioned long path openings but I think it is worth spending a bit more time on the topic and listing the main ones I am aware of.

The best known is on 20m to VK/ZL just after dawn. Signals can be extremely strong coming in from the night-time zone – possibly due to an ionospheric tilt effect at dawn that can launch a 'whispering gallery' mode and allow the signal to omit several earth reflections. As our winter progresses, this 20m long path can extend up to 15m and possibly higher, as well as covering areas to the north of Australia where the long path dips lower into the summer hemisphere. During September there were several VK signals coming in long path on 15m around 0715UTC and there could be P29s, H44s or YJs next month.

Another regular long path opening is to the west coast of the USA (and parts of Polynesia) firing into the night time zone over Africa around 1600UTC. This is quite a reliable route and may be the only way to work some of the FO stations whose QTHs are on the wrong side of a mountain for short path. I don't recall hearing this path on frequencies above 14MHz but it does extend down to 40 and 80 during the middle of our winter.

A third fairly well known route is to VK/ZL over South America on 14MHz and above around 1900UTC or later. This works better during summer than winter. FK8CE was heard on 12m via this path on a couple of days in September as were several ZLs though, in their case, they are so close to the antipodal point that long versus short path is a bit of an academic issue (and all directions lead there anyway).

Finally, a reliable route that I have mentioned before is to KH6 and T32 over Africa on 28MHz around 0800-0900UTC during the autumn/winter/spring period. You can test for this opening by listening out for the KH6WO beacon on 28.200MHz that should transmit for a few seconds every 3 minutes. It would be interesting to know if this opening also covers the FO zones.

DXPEDITIONS. Many apologies to Phil, G3SWH and Georg, DK7LX for omitting last month to mention their trip to the Bahamas and the Turks and Caicos Islands that should have just concluded. I hope that if you needed them you found them.

Rod, VK6MH (aka GM4AWB) will be QRV as VK0MH from Macquarie Island (AN-005) from early November for about six months. Rod visited Chris, GM3WOJ during September for some pile-up training and Chris also donated a netbook with a full suite of amateur radio software. Real time updates to *Club Log* may be possible if the island internet connection is good enough.

The VK0EK Heard Island (AN-003) DXpedition now seems to be on track for November next year following a change of vessel to the *Akademik Shokalskiy* instead of the *SA Agulhas*. A side trip to Kerguelen may be included in the plans.

A DXpedition to the Andaman and possibly the Nicobar Islands is being organised for November. The islands are one single DXCC entity, but they count for two separate IOTA groups: AS-001 for the Andamans, and AS-033 for the 'most wanted' Nicobars. The callsign will be VU4KV for both operations and exact dates will be published once the logistics are in place. The operating team includes Krish, W4VKU (VU2VKU), Prasad, VU2PTT, Pai, VU2PAI, Nandu, VU2NKS, Kumar, VU2BGS, Chetan, VU3DMP, Deepak, VU2CDP, Sangeeth, A45WH (VU2WH), Kiran, VU3KPL and Aravind, VU2ABS.

G1XOW in his shack.

The DXpedition will begin with a short activity from Campbell Bay, Great Nicobar by three operators (VU2VKU, VU2PAI and VU3DMP) with two stations on SSB and CW. The operation will be some time between 3 and 13 November. The team asks DXers to avoid working new band-slots at this stage. Those who need VU4 for DXCC purposes will have an opportunity to work the larger Andaman activation (five stations operated by the full team) that will take place from Neil Island for at least 10 days between 15 and 30 November.

The ARRL's touring callsign W1AW/n will be aired from the main island in KH8, American Samoa (OC-045), from 5-18 November by a team of about 10 operators. They plan to have three or four stations active on all bands from 1.8 to 28MHz. Outside the W1AW dates they may use KH8Q or their homecall/KH8. Three of the ops plan to be QRV from Western Samoa (5W1) before KH8 and during the CQWW SSB contest.

A large scale DXpedition to Malawi that was planned for late November into December seems to have moved to Spring 2015. The callsign will be the unusual 7QAA – with no second number in the callsign. There is a website at www.malawidx.org that explains the current operating plans. It looks like the first 10 days from 11-21 March will be CW only, followed by SSB and RTTY to the end of the month.

Joel, F3CJ, will be QRV as 9N7CJ from 23 October to 4 November. He plans to operate SSB on 20 and 17 metres (14200 and 18130kHz).

Stephane, F5UOW will be active as FR/F5UOW from Reunion Island (AF-016) from 29 October to 20 November. He will operate mainly CW with some SSB & RTTY.

David, ZS1BCE (who was ZS8Z from Marion Island in 2013-14) should now be QRV from Gough Island (AF-030) a remote part of the Tristan da Cunha group. David replaces ZS1HF (ZD9M) as radio technician at the South African weather station.

G8DX and M5RIC will be operating from Jersey (EU-013) as GJ8DX from 29 October to 4 November. They'll be on all bands, with an emphasis on the WARC bands, using CW, SSB and RTTY.

GM3WOJ (L) with VK0MH.

Antonio, IZ8CCW, Gabriele, I2VGW and a multi-national team from the Mediterraneo DX Club will be active as 5R8M from Nosy Be (AF-057) from 20 October to 4 November. They will operate RTTY, SSB & CW with four stations around the clock. They also plan to enter the CQ WW DX SSB Contest as 5R8C. Further information, including log search and OQRS, can be found at www.mdxc.org/5r8m/

Looking back there were a number of successful activities during September including E30FB from Eritrea by Zorro, JH1AJT. As it turned out Zorro was more active than his early announcements had suggested he would be – though he probably got little sleep while he was there. A larger scale DXpedition is quite likely in the near future. ZD9XF and ZD9ZS put Tristan da Cunha on the map. 3D2AG made it finally to Rotuma. S01WS was unavoidable on the bands for much of the month and TY1AA was worked all the way up to 6 metres.

CORRESPONDENCE. David, G0HCP drew my attention to the 'One Watt Wednesday' Challenge organised via HamRadioForum.net. The idea is to work as far as possible on a Wednesday, using no more than one watt, and any mode other than WSPR/JT65. He won during September with 1 watt of PSK to VK via the 20m long path opening (~23,000km) around 0700UTC.

Steve, G1XOW sent in a nice picture of his station. His main radio is an SDR that is out of sight but he has an Icom IC-706 as a backup. He has completely rebuilt the amplifiers and turned an old Heathkit SB220 into a dedicated 6m amp. On 20m he found Norfolk Island, Palau, Sable Island (the one-day DXpedition), Market Reef and Cameroun; on 17m Norfolk Island and Macau; on 15m Alaska, Benin and Mozambique ; on 12m Bhutan and Mozambique; and on 10m Eritrea, Benin, Ecuador and El Salvador.

David, G3UEG has a 6 element Optibeam for 10/12m but only a compact trapped dipole for 15/17/20 and a mobile whip for 40. He managed four new ones: Tristan da Cunha and Burkina Faso on 10m, Liberia on 15m and Nigeria on 20m. He also qualified for the top award for working the Russian F1 special event stations in just 6 days – and he had to use that 40m mobile whip propped up in his back garden to do it.

Tom, G4IDL is having a quiet month as building work has necessitated the removal of almost all his antennas – but he still managed to add another 12 entities to his 2014 DXCC score.

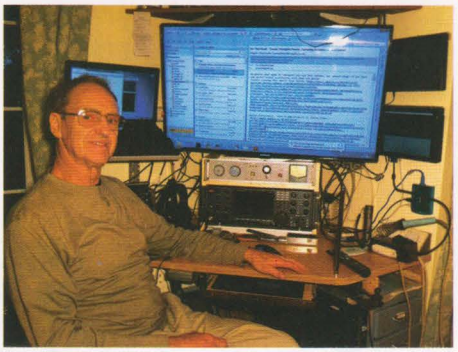
Peter, G3HQT found he had to do some quick repairs to his vertical when he touched the capacity hat and it fell off! Despite this setback he found a number of interesting contacts including: on 10m Botswana (CW); on 12m Tristan da Cunha (CW) and East Maysia (RTTY); on 15m Liberia and Antigua on CW and St Lucia on RTTY; on 17m East Malaysia (CW); on 20m Chad (CW); on 30m Mali, Benin and Sandy Island (VK6) all on CW; and on 40m Western Sahara on CW.

John, VK4OQ (formerly G3HCT) e-mailed to say that ZD9XF was his final DXCC entity for Honor Roll from Australia – congratulations John, you've had to wait a long time for this one.

Peter, G4XEX says that after a break of 30 years he has gone back to using some CW and is hoping to be a competent rag-chewer by this time next year. He found quite a bit of DX, albeit at weaker signal strengths than last year, including: on 10m CW Palau and Mali; on 12m CW St Kitts; on 15m CW Pakistan, Timor and Jamaica; on 15m SSB China, Korea, Saipan, Philippines and Mali; on 17m CW Timor, Djibouti and Mongolia; on 17m SSB Montserrat; and on 20m CW/SSB some Caribbean stations plus Asiatic Russia.

Dave, M0BVE found a few more for his collection including Botswana and Benin on 10, Tristan on 12, Ascension and Timor on 15, and Chad on 20.

Fred, G3SVK, was very busy with his key again last month. On 10m he worked Namibia, Mauritius, Rodrigues, Benin, Botswana, Zambia, Malawi, Antigua, Brazil and the Falklands; on 12m Kuwait, Panama, Indonesia, Malaysia, UAE, St Kitts, Sri Lanka, Tristan da Cunha, Benin, Namibia, Svalbard, Cuba and the Falklands; on 15m Djibouti, Timor, Ascension Island, Benin, New Caledonia, New Zealand, Antigua, Australia and the Falklands; on 17m numerous Caribbean stations plus China, Australia, Chad, Japan, Mongolia, Mauritius, Philippines, Tristan da Cunha, Papua New Guinea, Malaysia, Thailand, Falklands, New Zealand and Norfolk Island; on 20m Australia, New Zealand, Hawaii, Japan, Brunei, Papua, South Africa, Chad, the Falklands and numerous South American and Caribbean stations including the increasingly rare St Martin; on 30m Australia, New Zealand, Norfolk Island, New Caledonia, China, Japan, Hawaii, Papua, various South Americans and closer to home Monaco and Andorra; and finally on 40m Australia, New Zealand, Norfolk Island, Tristan, Namibia, and many others!



G3ROO in his shack.

Ian, G3ROO was spotted several times last month on 160m by stations in the Far East. He has a couple of 60ft masts supporting an 80m dipole that can also be reconfigured as a T for 160m. Ian has added a number of buried radials (including additions to his neighbours wire fences), as well as some elevated radials, and has four flag receiving antennas on a 40ft mast about 100 yards from his house. The flags apparently allow him to hear signals that are inaudible on the transmitting antenna. Even during summer conditions on 160m Ian was able to work into Korea and Japan with his improved setup.

THANKS... as always to my correspondents and to *425 DX News*, *Daily DX* and *DX-World* for the news.

TABLE 1: 2014 Worked DXCC Entities

Call	CW	SSB	Data	All
G3UEG	0	236	0	236
G1XOW	0	234	0	234
G3SVK	232	0	0	232
G3HQT	205	0	127	213
M0BVE	198	0	0	198
G4ZOY	143	152	118	196
G4XEX	18	181	74	189
G4IDL	170	0	0	170
MM0TWX	136	44	0	162
G4FVK	77	79	0	108

TABLE 2: Forthcoming DXpeditions

Until 10 October	D44KS
Until April 2015	VK0MH
Until 1 Nov	PJ6/G4IUF
Until 20 Oct	4W/G3ZEM
Until 29 Oct	ZK3Q ZK3E
Until 29 Oct	VK9DLX
Until 26 Oct	TX7G
19 – 31 Oct	4W/K7CO
20 Oct – 4 Nov	5R8M
22 Oct – 1Nov	Macao by EA ops
23 Oct – 4 Nov	9N7CJ
24– 30 Oct	T88HZ
Late October	5W1 by KH8 team
29 Oct – 4 Nov	GJ8DX
29 Oct – 20 Nov	FR/F5UOW
30 Oct – 10 Nov	FT4TA
3 – 30 Nov	VU4KV
5 – 18 Nov	W1AW/KH8
March 2015	7QAA
November 2015	VK0EK

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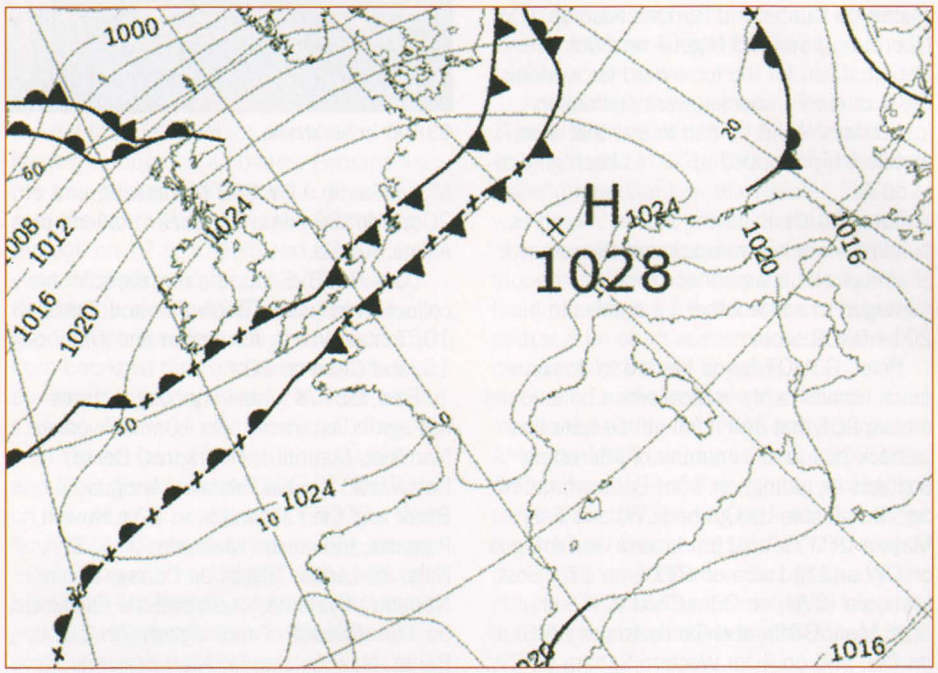
VHF/UHF

Strong solar activity and excellent tropo conditions return to VHF



Classic DX high pressure system on 27 September.

SEPTEMBER PROPAGATION. Despite relatively high sunspot numbers lately there really hadn't been too much in the way of fully Earth directed coronal mass ejection activity during August. However thanks to sunspot AR2158 on 9 and 10 September, two solar storms headed toward Earth with all the hallmarks of producing some aurora propagation. As predicted, a pair of CMEs hit Earth's magnetic field in quick succession on 11 and 12 September. The result was a G3-class geomagnetic storm, the most intense of the year so far. At the peak of the storm there were considerable visual displays and disturbances to the HF bands. From a VHF radio perspective, higher latitude stations in the UK enjoyed fairly modest DX into Scandinavia, Three auroral 'beacons' GM4VVX, GM6VXB and GM3WOJ were heard working some DX but pretty weak in IO83. Clearly this event will be remembered for its visual, rather than radio experience!

Sporadic-E also made a welcome appearance on 14 September giving the lower VHF bands a reasonable two hour opening to Scandinavia. The footprint was particularly widespread from GM and GI down to GW and the south coast of England. The MUF was reported to peak around 95MHz with high pressure systems over the UK and most of Europe from late August and through September, so the potential for tropospheric openings was considerable. The IARU 144MHz contest provided the usual crop of well elevated high power stations throughout Europe who give the chance to work new squares and DXCCs to many.

Rolling through the month, isolated openings to EA, CT and EA8 were worked but mainly by coastal stations taking the sea path advantage. Finally, in the last weekend in September, 2m and 70cm opened up mainly from southern UK to central Europe with excellent DX contacts being made well over 1000km. UK beacons were widely spotted on 2m and 70cm, none more so than GB3VHF (JO01) that was well received in JO50 by DK2EA. The good tropo conditions extended well into the microwave bands 'to 23cm and beyond' with significantly tighter ducting.

BAND REPORTS. Joe, GOJJG (JO02) describes VHF activity as pretty low despite the reasonable conditions in early September. During the 2m UK Activity Contest (UKAC), Joe noticed significant enhancement to the north and north east with Chris, G4FZN/P (IO94) 'end stop' for most of the contest. Good DX was worked notably OZ9KY (JO45) and OZ2ELA (JO55) in addition to the 'regular' OZ1ALS in JO44. 70cm was also lively during the UKAC (signals up but no DX), but generally through the month activity was quiet. Joe is still keen to try tests in the 70cm activity periods on Wednesday evening and Sunday mornings and hopefully the autumn and winter will draw a few more to their shacks. Excellent tropo on 27 September helped Joe log some nice DX; HG1DRD in JN86 at 1292km, OK1KCW (JN69) and DJ6XH (JN57). DK2GR (JN59) was worked on both bands 2m and 70cm.

Although QRV on 4 bands, Bob, G8HGN (JO01) says his main activity was on 2m taking advantage of the increase in activity during the September 144MHz Trophy contest and the UKAC in the first week of the month. 6m was quite poor over the period with a lack of Sporadic-E (Es) made worse by a 'getaway' in the form of TY1AA in Benin who was heard, but due to an unforeseen problem, Bob had to go QRT just at the wrong time! 70cm highlights included DG1KJG (JO30), DF1JC (JO31), DB5KN (JO31) and DL8DAU in JO40. 2m QSOs included OZ1ALS (JO44), DL2OM, DG1RUG (JO30), DK5KMA/P, DL0GTH, DH1NFL (JO50), DA2T, DN2VHF (JO41), F8KID, F4FCW (JN38), HB9EOU (JN37), TM0W (JN36), F6HJO/P, F6KSD/P (JN27), F5OOM/P (JN28), DL0GM (JO31), DA0FF, DL8DAU, DR2X (JO40), F8BPN/P, F5XU/P (JN15), TM9A (JN39), F1BIH/P (JN17), DK0A (JN48), F5ODK/P (JN16), DP4D, DM5C, DK0ZB, DF0WD (JO42) and DK3BK in JO53.

September wasn't a great month for Mike, M5MUF (IO92). However, looking back to August and the Perseids on 2m running just 25 watts, Mike managed a few MS contacts. It's hard with the low power, but not impossible when the rocks are good. He prefers to work random, although a few people are willing to try skeds. Sadly, some run away as soon as they hear you are QRP, but others are fired up by the challenge. One successful sked with OK1UGA (JO80) completed in 23 minutes. Random successes were with SP3IYM (JO82), HA6VV/P (JN97) and HB9FAP (JN47). A test with UA2FT came close but the last rock resolutely refused to fall, and UR7D (KN18) was putting in some tremendous reflections, but Mike could not attract their attention. All in all he was quite pleased with the 4 QSOs and 3 new squares on 2m. So the motto is, even on low power – try it! Mike caught the Es opening to Sweden on 14 September and worked SM3EVR (JP82) with strong signals on SSB. 4m netted a few more MS QSOs in the tail-end of the Perseids, with SP8CUR (KO10), DL3YEE (JO50) and EI2FG (IO61)

making it into the log. 2m provided a bit of fun in the shape of the UKACs on 2nd and the Trophy Contest on 6 and 7 September. The UKAC session saw quite good mid-range conditions and although G8PNN/P (IO95) was audible even off the back of the beam, very few GMs were heard compared to usual. The Trophy weekend netted a reasonable haul of continental QSOs (3x F, 2x ON, 8x PA and 3x DL), and for once Mike's best DX wasn't DF0MU, but TM9A in JN39 at 709km. As usual, just the 25W and 10 element, however it shows what can be done with this kind of equipment.

John, GW4MBN (IO71) has been busy on 4m using meteor scatter during the month concentrating on using the FSK441 mode in the *WSJT* software suite. Stations worked included some German stations who had the temporary permits available. Highlights completed QSOs were with GD0TEP, DL3YEE, PF7M, DJ5BV, DK5EW, GM8OEG, PA2IP, OZ1JXY, LA4YGA, PA5KM, IS0AWZ and IK0BZY.

Throughout late August and September Peter, G8BCG (IO70) continued working great 50MHz DX via EME. 24 August gave EME QSOs with VK7JG, EA8DBM, K7RWT and a new initial #120 with K8OC. Into September and on the 6th, KG6DX was worked via EME for new a country. EA3AKY also followed for new country #60 and initial #122. EME continued into September and on the 8th LZ2CC was worked for initial #123 plus S59A and OH8MGK. On the 9th, W7GJ was worked and then, amazingly, QSOs in CW and SSB with S59A. 9 - 10 September was another EME night of low path loss but bad Faraday rotation. He heard VP8NO with good signal, but Peter failed to complete with HA0DU during the same evening, however four new initials were a good compensation: VK4WTN #124, VE1PZ #125, NW0W #126 and W9RM #127. The incoming CME on 12 September certainly had an effect on propagation. On the 14th, C5YK and TY1AA were both worked on CW at decent strength with FR4NT copied briefly during the evening. On the 16th, TY1AA was audible on both CW and (briefly) on SSB. ZS4TX/6 using 5W was heard for about 45 seconds whilst working into Portugal (CT1). Peter also worked the first ZS (South Africa) stations of the season, ZS4TX/6, for over an hour. On the 18th, ZS4TX/6 was peaking at 599 and ZS6AYE was worked on SSB but unfortunately Peter's PST61 rotator failed (again) – albeit stuck in the direction of South Africa! The 19th to 21st brought a mix of DX with nice openings to ZP and PY, a new EME initial with Marc, VK8MS (#128) plus EME QSOs with N3XX and OA4TT and terrestrial with TY1AA and TJ3SN, which were a real surprise on an apparently flat band. There were also regular visits to the Looe Music Festival at the same time! 24 September gave Peter a chance for a DXers BBQ – the difference being it was in Austin, Texas, courtesy of W6JKV/K5AND! The 6m RSGB UKAC contest gave a rapid 86 QSOs in 75 minutes before QRT.

THE UKSMG WINTER MARATHON. Thanks to Dave, G8FXM from the UK Six Metre Group who passes on this information. Following on from last year's successful pilot, the UKSMG will be holding its second Winter Marathon this year from 1 December 2014 to 31 January 2015. The USMG Winter Marathon aims to promote activity during the months and is open to all six metre enthusiasts. This is a truly global event and entrants from anywhere in the world are invited. There is no contest exchange so with the exception of calls made via EME or repeaters, any other QSO made on six metres during the contest period qualifies. This includes QSOs made during other events like the RSGB 50/70/144/432MHz Christmas Cumulative etc. Entry is easy, just upload your logs in ADIF format to the UKSMG website and join in the fun [1].

70cm ACTIVITY PERIODS. Just a reminder that the 70cm activity periods are still going strong. Despite competition from other contests etc there are a number of enthusiastic supporters who are QRV on Sundays from 9am – 11am and 7pm – 9pm. Some excellent DX has been worked and more stations are now monitoring 432.200 as a matter of course.

MOBILE AROUND EUROPE. Recently the opportunity to try an interesting little activity arose when the XYL and I went on a driving holiday through France, Southern Germany, Austria and Northern Italy. As we were about to depart from IO83PL, I quickly decided to pull the FT-897D from the shack, hook it up to a lighter plug and install the 144MHz magnetic mounted 5/8 whip on the roof of the car. This kit hadn't been used for many years so it was a little touch and go whether it would work. I hadn't thought clearly where the rig would go (as I couldn't find the mounting bracket) and the FT-897 is not exactly small so a strategic position between the two front seats was found. Driving around to the front of the house with the whip clearly visible I was waiting for the shrieks of disapproval – but surprisingly it was decided to be a good idea by 'Management' so we proceeded on our way down south to Kent.

Fears of bad SWR didn't materialise so I started thinking of modes to operate, with FM obviously being the main focus. With a detour during the day we had planned to stay in Dover overnight on day one – which gave me the time to park up in various spots around Dover to operate on SSB and FM. St Margaret's was excellent with a crystal clear view across the channel but moving out from Dover towards Folkestone unveiled a jewel called Capel Le Ferne. Notwithstanding the excellent ice creams from the cliff side cafe we had a moving visit to the Battle of Britain Memorial Trust site that was excellent. Day 2 was a real slog in driving – catch the very early ferry and a long drive down to Friedrichshafen (the home of the HamRadio exhibition in June each year). No time for radio even though we passed through LX (Luxembourg), there were many traffic jams so we arrived very late. With 5 nights in 'FN' I managed some excellent QSOs through two repeaters DB0WV and DB0ZG. The former is a local repeater located in Illmensee just north of the Bodensee near Sigmaringen. Many of the operators are used to 'outsiders' coming in during HamRadio but they were surprised at this time of the year but as usual very friendly [2]. As Friedrichshafen is located right on the Bodensee Lake there were numerous repeaters in OE and HB9 to access however responses were few. DB0ZU is a mega repeater covering a vast area of Southern Germany and Northern Austria, located on the Zug Spitze Mountain directly on the Germany/ Austrian border on 145.725MHz [3]. It was so busy covering most of the southern Germany area it was difficult for a humble G station to get a look in! After a good break in FN it was time to move to our next stop near Innsbruck, a beautiful Tyrolean village called Gries im Sellrain in locator JN57NE. An amazing ski resort in winter but a truly beautiful alpine flowered haven during the summer months. At 2000m ASL I was expecting great things radio wise but with surrounding mountain lock out it was very difficult. With only 3 nights and lots of sightseeing to do I went for quality QSOs rather than quantity and in the end spoke to a couple of FN friends through DB0ZU back in Friedrichshafen. Yet another long drive home with all kinds of delays and another trip though LX – and you guessed it, no time for radio. The moral of this story is that if you are travelling into Europe and, indeed, if you are going to Ham Radio Friedrichshafen it is well worth taking a hand held or a mobile rig in the car.

CONCLUSION. Thanks indeed to all the contributors this month and next month some more exciting news regarding 70cm is in progress of completion.

WEBSEARCH

[1] http://uksmg.org/contest/winter-marathon-rules.php
[2] www.db0wv.de/
[3] www.db0zu.org/

November 2014 • RadCom
Dr John Worsnop, G4BAO • e-mail: john@g4bao.com

GHz Bands

PHOTO 1: The Pleumeur-Bodou dish at EME2014. Photo: G4DDK.

New EA 1.3GHz beacon heard in the UK and yet another exotic propagation mode

CONFERENCE SEASON. August and September is often a busy time for socialising amongst the GHz bands fraternity. August 2014 saw the biennial EME (moonbounce) conference **[1]**, this year held in France at the Parc du Radôme in Pleumeur-Bodou, the site of the first ever transatlantic satellite link-up between the US and Europe. The event was well attended by a worldwide audience of over a hundred EME enthusiasts and their partners. There were technical workshops, activity on 5.7GHz EME using the large dish (**Photo 1**) and a lecture programme with a largely GHz bands content. The UK GHz fraternity was well represented with number of UKuG members in attendance and technical papers presented by G4DDK and G4HUP.

On a slightly smaller scale, I attended the UK Microwave Group's Crawley Round Table in September. Attendance was up on last year and the majority of the South East's '24GHz and up' operators and beacon keepers were in attendance. Just a shame that there are so few of us! We were treated to a great Bring & Buy, plus a noise figure testing facility provided by Roger, G8CUB. Technical talks ranged from synthesisers for the mm wave bands by Roger, G8CUB, YIG based transverters by Geoff, G4HIZ and metalwork for microwaves by Mike, G3LYP. There was some fine equipment on show, notably G4HIZ's 10GHz /P system. **Photo 2** shows G1IKV next to it with a few 'hangers-on' in attendance. Look closely and you may see that John, G4EAT (2nd from left) seems to have found a new use for a coaxial patch cable! The winner of the Crawley heat of the G3VVB Constructor's Trophy was Mike, G3LYP (again!) for his neat and compact portable 3.4GHz receiver using an ex-Ionica 'Pizza box' patch antenna, attached to a short pole. The whole unit was reminiscent of a school crossing 'lollipop', but provided Mike with a useful hand held receiver for portable beacon monitoring. Thanks again to the Crawley Club for organising the event.

LIGHTNING SCATTER ON THE LOWER BANDS. In the past, Nick, GM4OGI **[2]** has reported for this column on his beacon monitoring activities from his QTH in Germany. On the evening of 10 July, during a severe thunderstorm over The Netherlands, he reported hearing 'lightning scatter' reflections from GB3MHZ on 1296.830MHz. On 18 August he also confirmed reception of an enhancement to GB3MHS on 3400.830MHz via lightning scatter. He reported, "I have just seen a HUGE horizontal lightning bolt; GB3MHZ returned a huge signal and GB3MHS leapt up in unison. These were not refraction returns, or do not appear to be so: they were very sharp-edged and accompanied by the usual clatter. He sent me ZIP file of the recordings on 3400MHz and a spectrum plot. Both are downloadable from **[3]** and I strongly recommend you look at them. If you play it through Spectravue or similar, you will see the signal and hear the processed audio revealing a lot of back clatter from the lightning strikes and the noise level increase until suddenly towards the end (time marker 0:09:45) there is a stroke and the beacon signal leaps up in strength. Afterwards there is a lot of amplitude and phase disruption, presumably due to refraction turbulence. I think you'll find it very interesting. Please note that the time of the recording is not UTC but CEST.

The image in the zip file shows GB3MHZ on 1.3GHz. For comparison purposes Nick has managed to capture five aircraft scatter returns in this image. These are characterised by slanted lines moving right to left or by some curved lines, while lightning scatter from the cloud to cloud lightning show as horizontal and more or less flat returns. You can plainly see the troposcatter on the signal too. This really needs more investigation the next time we get summer storms mid-path. Who will be the first UK station to report a lightning scatter QSO? I think with the very short returns it will need to be one of the JT modes such as ISCAT-A, which was designed for 10GHz aircraft scatter. If you have investigated this phenomenon yourself, please send me details.

BEACON NEWS. The new Spanish 1.3GHz beacon EA4TZ (IN93bf) on 1296.855MHz has been received in the UK on a number of days between July and September. First report was by Ralph, G4ALY (IO70vl) on 17 July at 825km and I received it here on the Fen Edge JO02cg (1016km) on 11 September after a tip from Keith, G4KIY up the road in Whittlesea (IO92wn) that he was receiving it. A number of CQs in that direction by both of us and calls on ON4KST for EA2TZ and other northern Spanish stations did not result in any QSOs. EA still eludes me on 1.3GHz!

The RSGB has a revised beacon support policy. It is not unlike the UKuG one but the guidance **[4]** is well worth reading if you run, or are planning to build, a beacon:

PHOTO 2: Attendees at Crawley with G4HIZ's 10GHz system L-R G1IKV, G4EAT, G4BAO and G6TRM. Photo: G0FDZ.

funding is available. This new RSGB policy now covers all the bands, whereas it used to be VHF/UHF only.

ACTIVITY NEWS. No UK tropo DX was reported to me this month. Just a few UK stations reported 10GHz QSOs around 400km in the contests and some aircraft scatter QSOs on the lower bands. The August round of the UKuG 5.7–24GHz contest was won, on both 10 and 5.7GHz, by Ian, G8KQW/P (IO81fd) with G8CUB/P (IO92xa) winning the 24GHz section (sadly, with just 2 QSOs). Conditions seemed pretty average and a number of stations were absent, but I was pleased to work my first Welsh stations for DXCC #10 on 10GHz thanks to GW3TKH/P and GW4HQX/P (IO81kr) who was running just 250mW!

Tuesday night UKAC activity continues to be good, with 73 entries on 1.3GHz for the September evening. G8XVJ/P (IO93) posted a magnificent 86 QSOs and 16 multipliers to lead the low power section and to sit second overall behind open leader G8OHM/P (IO92). Pretty impressive performance from G8XVJ with 10W to a single Yagi, compared to the 400W and 4x23-ele run by G8OHM! The restricted section leader was G3PYE/P (JO02ce) despite starting half an hour late due to equipment problems. SHF UKAC is very competitive this year with 2.3GHz producing some good QSOs over 300km despite average conditions. 3.4 and 5.7GHz are less so, with just a handful of entries. As a single operator entrant, I find 10GHz quite challenging when running in parallel with another band, despite the small number of participants compared to 2.3GHz. A lot of effort is needed to get a respectable score. Above 2.3GHz it's not about calling CQ or searching, but clever use of the ON4KST reflector to attract people's attention, finding the 2.3GHz stations who are equipped with other bands and trying to pull out the few, mainly weak signals. I had an equipment failure half way through the September SHF event when the soldering of one of my surface mount PIN diodes failed in the receive leg of my homebrew 2.3GHz transverter, so I didn't complete on the band. Conditions were well down, with all entrants commenting on this. Only a few broke through the 500km barrier on 2.3GHz (thanks to the ever-present GM4CXM (IO75tw) giving southern stations some aircraft scatter DX). I found 10GHz hard going, despite some rain scatter noticeable on some signals, simply because of the poor turnout. At the time of writing, the Restricted section leader, Mike, G0MJW (IO91io) had posted just 7 QSOs and 5 square multipliers.

COMMERCIAL INTERFERENCE TO AMATEUR BANDS. YouTube carries a video of how the 10GHz band sounds in Prague due to interference from commercial point to point (licence-free) internet links in the band **[5]** and it's pretty scary! You can see that any weaker amateur radio signals are being wiped out in some areas. The Czech Republic radio communication authority CTU has allocated a significant part of the 10GHz band (across the 10368MHz DX band) for free use by wireless internet providers.

Closer to home, concerns are rising about the 5.7GHz band. Martyn, G3UKV raised much discussion on the ukmicrowaves reflector and revealed quite a number of 5.7GHz operators getting problems from 5GHz point to point links and Wi-Fi. Ofcom document IR2007 **[6]** describes these fixed broadband services operating in the 5725–5850MHz band. John, G4EAT reported that, after six years on 5.7GHz, eighteen months ago he noticed S9+ signals filling the band. His local water tower, just 100m away had become a node for this new equipment using 4x20MHz channels that included the amateur band. John approached the operator and, after discussions, they agreed to try and keep the amateur channel free. However, when beaming directly at the water tower, adjacent channel signals are still breaking through strongly and he expects the same when LTE is introduced in the 2320MHz band on the adjacent telecom tower. It has been suggested that, as these services have 'free channel seeking' receivers, generating a quite legitimate signal in the amateur band such as a personal beacon might make the channel less attractive to them! With Wi-Fi routers it might be possible to lock the 5GHz channel on a neighbour's router at the lowest frequency possible, or even turn off 5GHz completely if the neighbour agrees. A good summary of 5GHz channel usage is at **[7]**. Sadly, we are finding more and more that our challenge on the GHz bands, like our VHF and HF colleagues, is no longer getting the best sensitivity but being able to co-exist with other users in and around our allocations.

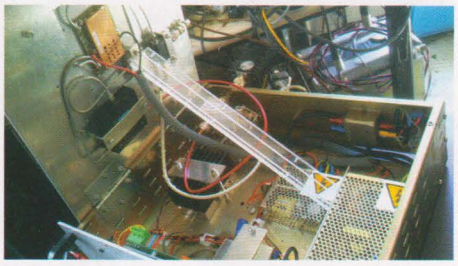


PHOTO 3: The EA2TZ 1.3GHz beacon hardware. Photo: EA2TZ.

REGULATORY UPDATE. There is more bad news from the Wireless institute of Australia (WIA) on their 3.4GHz band **[8]**. In summary, the next stage of proposed changes to microwave spectrum in Australia has now started with a draft direction from the Canberra government to licence spectrum overlapping the 3.4GHz amateur band for mobile broadband. This follows a previous consultation and other proposed changes in the 2.3GHz band in which the Wireless Institute of Australia (WIA) been actively involved. The latest changes pose a particularly serious threat on the harmonised use of 3400–3410MHz by the amateur and amateur satellite service as one of the proposed new commercial bands is 3400–3425MHz. While this might seem far away from the UK, it is just another example of the kind of pressure 'our' shared bands are under in this world of wireless connectivity.

SIGN OFF. No room for EME reports this month, but I've been steadily working on my 5.7GHz EME upgrade and heard my first signals on the band in August from OK1KIR, using my 1.9m dish. There has been plenty going on 'off the moon' in the GHz bands, but I'll leave you to read about it in the monthly *432 and up EME News* **[9]** by Al, K2UYH: the main source of GHz EME activity reports.

Please continue to send me reports and interesting tech snippets, either via email or join the conversation on Twitter @g4bao using the hashtag #GHz_bands. Upcoming events are at **[10]**.

WEBSEARCH

[1] EME 2014: www.eme2014.fr
[2] GM4OGI: gm4ogi@vodafone.de
[3] Lightning Scatter recording: www.g4bao.com/Files/GHz_Bands/Lightning Scatter.zip
[4] New RSGB beacon support policy: http://rsgb.org/main/operating/beacons-and-repeaters/beacon-policy/
[5] 10GHz interference in Prague: www.youtube.com/watch?v=rZbdjBhX-RU
[6] Ofcom IR2007: http://bit.ly/1yrXhTE
[7] UK 5GHz band usage www.solwise.co.uk/downloads/files/intheuk5ghz.pdf
[8] 3.4GHz in Australia: http://wia.org.au/newsevents/news/2014/20140823-1/index.php
[9] *432 and above EME News:* www.nitehawk.com/rasmit/em70cm.html
[10] 2014 microwave events list: http://microwavers.org/events.htm

Quin Collier, G3WRR • e-mail: q.g.collier@btinternet.com

RSGB National Field Day 2014

Station of overall winner G3KLH/P.

Results, your comments and the weather!

ENTRIES. The number of entrants in this year's National Field Day (NFD) was, at 38, exactly the same as in 2013 & 2012. However things were not as static as the numbers might suggest: 10 groups who were on last year did not participate this time and were replaced by first timers or groups who have not taken part for a year or two: and, as always, a few groups who had registered were unable to get on, for reasons such as sickness or unavailability of key personnel (excuse the pun) – hopefully they will have better luck next year. Furthermore, the balance between the sections was significantly different this year. The Open Section was down from 9 to 7 and the Low Power Section down from 9 to 6: this was exactly compensated by an increase in the Restricted Section from 20 to 25. Of these, 9 were in the Complex Antenna Category and 16 in the Simple Antenna Category, in contrast to 2013 when the numbers were exactly equal.

RESULTS. The full results for NFD 2014 are shown on the Contest Committee website at www.rsgbcc.org/cgi-bin/hfresults.pl?Contest=NFD&year=2014: trophy winners are summarised here.

The Open Section leader, and winner of the National Field Day Trophy, is Newbury & DARS (G3KLH/P), up from 5th last year: in second place, taking the G6ZR Memorial Trophy, is De Montfort University ARS (G3SDC/P), up from 3rd. In the Restricted Section, Sussex Downs CG (G4FNL/P), who have been hovering just below the leaders for several years and were 3rd in 2013, make first place, gaining the Bristol Trophy: Radio Ga Ga CG (G4IRN/P) – 5th last year – in second place win the Gravesend Trophy. And, in the Low Power Section, Reading & DARS (G3ULT/P), in a sort of home win, take the Reading Trophy for an impressive 5th consecutive first place. Other trophies winners are North of Scotland CG, GM2MP/P who gain the Scottish Trophy and Three As CG (GW0AAA/P), a single band 20m entry, who win the Frank Hoosen G3YF Trophy by a margin of 29 points (1.2%) over another single band entry from Castel Contest Group (GU4YOX/P).

ENTRANTS' COMMENTS. A good feel for the event as seen by those taking part can be obtained by reading their soapbox comments. These can be broken down into 3 main categories: the weather, conditions and problems experienced. The latter two are covered in separate sections below: the weather is covered here. A broad spectrum of views was expressed, indicating that there were wide variations across the UK. These ranged from 'glorious' to 'plenty of rain' (one group reported a flooded site and another deep mud), via 'mostly good', 'changeable' and 'cold and windy'. Quite a number commented that although the weather was not too bad during the contest itself, there was rain during set-up or take-down when it is least welcome – and in some cases both.

CONDITIONS. Although the total number of contacts made by UK entrants was, at 28,689, slightly up (by 1.3%) on 2013, the most frequent comment on conditions was 'poor', although the post event analysis of the logs below presents a rather different story. The only bands commented on specifically were 160m, which was felt to be noisy, with fewer stations to work than normal, and 10m where conditions were generally – but certainly not universally, presumably due to the random nature of Sporadic-E – felt to be better than normal for NFD.

160m broadly followed its usual pattern of a fairly brief spell of furious activity during the hours of darkness, starting at around 2100 and rising rapidly to a peak between 2215 & 2300 (all times are in UTC). Band behaviour was slightly anomalous this year: instead of declining gradually from the peak as normal, there were resurgences of activity around 0145 and 0245, with the last QSOs at around 0315: one entrant suggested that this may have been due to a late reduction in noise level. With the exception of a single W1 worked by 3 entrants, all contacts made by UK entrants were within Europe (23 countries in all), 79% of stations being with the UK or Germany.

80m, another night time band in NFD, followed a broadly similar pattern to 160m but over a longer period, with activity

G3TBK/P operated by G3TBK – note tablecloth providing enhanced feng shui!

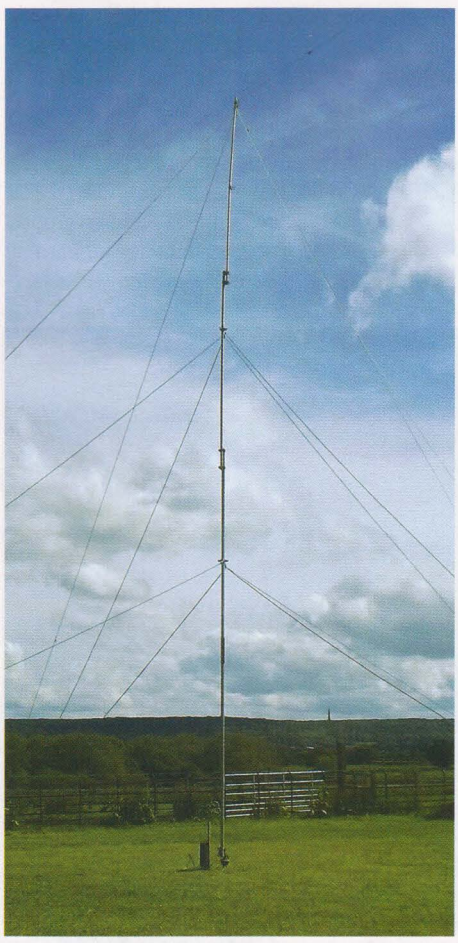
Aftermath of mast collapse at G3WRR/P.

between roughly 2000 and 0515, with 2 peaks around 2230 and 0245. A total of 34 countries appear in UK entrants' logs: although 95% of contacts were with Europe (70% with the UK and Germany), a fair number of East Coast North Americans appeared, together with a handful of African contacts from EA8 and South America represented by a single contact with CE.

40m fulfilled its usual role as NFD's 'reservoir capacitor band', with contacts to be made there when other, more time dependent, bands were less productive. As a result, the pattern of activity has something of a seesaw characteristic, with peaks around 2030 & 04006 and troughs around 1645 & 2230, plus a period between 1045 & 1245 when almost, but not quite, no contacts were made. 96% of the contacts were intra-Europe (the UK and Germany again being predominant among European contacts at 56%). Of the other continents, North America provided the most contacts – 130 – (nearly all East Coast USA and Canada) followed by Asia (mainly Asiatic Russians), Africa (all EA8), Oceania (VK2, VK4 & ZL3) and finally South America (PY & VP8).

20m was in good condition, with UK entrants making contacts with 81 countries (compared with 61 in 2013). The band provided 32% of all the contacts made, 40% more than the next most productive band (40m). Contacts were possible during the whole 24 hours. Although the going was rather slow between 2100 and 0400, it was not just the two 20m single band entries who were there: although these two made 30% of the contacts between those times, nearly two thirds of the entrants appeared on the band at least once in the same period. The band was active from the start of the contest, with traffic peaking between 1730 and 1845, continuing at useful levels until around 2130, and again between 0530 and the end, despite a lull between 1100 & 1315. 86% of QSOs were with Europe, followed by Asia (Asiatic Russians making the largest single contribution), North America (all US call areas worked), Africa (mostly EA8), Oceania and South America. Interesting DX worked (a highly subjective opinion of course) included 7Q, 9M2, 9M6, JA, LU, PY, VK2/3/6/7, VP8, YV, ZL2 & ZP.

Contacts could be made on 15m from the start of the contest until approximately 2000, peaking between 1545 and 1700, and again between 0600 and the end. Conditions appeared to less stable than those on the lower frequency bands, with QSO rates varying up and down over quite short periods of time. The majority of traffic (88%) was again with Europe, but a total of 64 countries were worked. After Europe, the most contacts were with Asia, North America (once again, all US call areas were worked) and South America In that order: this included some interesting DX such as 7Q, 9J, 9M2, M6, VP8 and – quite a rare one – OX.



One of the masts at G3MDG/P.

Activity on 10m peaked just after the start of the contest at around 1515 and dropped away sharply thereafter with last QSOs of the day made by 1800. It recommenced around 0700 and after an initial flurry subsided before really taking off around 0945, with the band remaining productive until the end at 1600, with two major peaks around 1130 and 1300. As with 15m, activity fluctuated considerably over periods of 15 minutes or so, but the double points available probably encouraged entrants to stick with the band. The vast majority of contacts (97%) were with Europe, but 120 or so outside Europe were made, with Asia again the most common followed by Africa and South America, with nothing at all from North America or Oceania. A total of 53 countries appear in the logs, some of the more interesting being 7Q, CX, PY, VP8 and ZS.

Of course, things felt rather different at the time (as reflected by some of the soapbox comments): operators, although having a rough idea of what time to be on which band, knew that conditions are different every year and will have been trading off the advantages of staying on a band that's already working against the need to look elsewhere for a better points rate and changing bands accordingly. As a result, the above post event analysis represents a rather one dimensional view of the reality!

STATIONS AND EQUIPMENT. In terms of equipment used, 4 out of 7 stations in the Open Section and 8 out of 25 in the Restricted Section chose to take advantage of the rule permitting the use of two transceivers. Only two types of transceiver were used in any quantity: the Elecraft K2/K3/KX3 series of which 23 were used (exactly half the entrants used one or more Elecraft rigs) and the Yaesu FT-1000 series – now a rather elderly but obviously still well regarded design – with 8 in use. The remainder were one or two off instances of different models from the other major manufacturers (Icom, Kenwood, Yaesu and Ten-Tec).

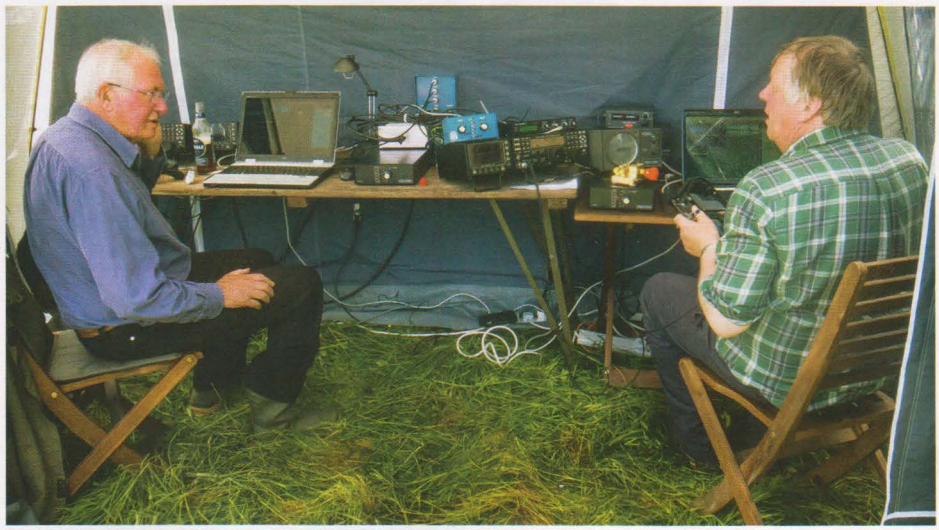
Antennas in the have become somewhat standardised in recent years, but (as intended) the introduction of the Restricted Section / Complex Antenna Category has reintroduced a degree of innovation and variation. In the Low Power Section doublets or inverted Vs with lengths between 125 & 264ft, generally 11m high, were most common. Restricted Section / Simple Antenna Category antennas were similar, but Windoms, OCFDs and a G5RV also appeared. Restricted Section / Complex Antenna Category stations tended to have

Station of GM3BSQ/P.

multiple dipoles or inverted Vs with centres at heights above 11m. And finally in the Open Section a beam (sometimes more than one) for the HF bands plus separate dipoles for the LF bands were the order of the day.

ADJUDICATION AND VERIFICATION. All UK entrants' logs were submitted via the CC Robot this year, making the adjudicator's task much less onerous. In addition to the UK logs, a total of 735 check logs from the other IARU Region 1 countries holding their CW Field Days the same weekend were made available via the usual log exchange procedure with Germany, Italy, Belgium, Switzerland and Russia. This enabled a very high level of cross checking to be carried out. As usual, the excellent *AdjSQL* program, developed in-house by Mike, G0JGV, was used: after a computer run time of around two and a half hours, just over 45 hours of adjudicator's brain time was used analysing the potential errors flagged by *AdjSQL* and preparing the results.

A particular area followed up this year was uniques (ie callsigns appearing in only one entrant's log). There is no problem with working genuine uniques – after all, it's only by working stations that others don't that enables the winners to be the winners! However, experience has shown that many apparent uniques are, in fact, busted calls: this year out of 195 uniques suspected of being busted calls, it was possible to identify the correct call in 147 cases (just over 75%).



Station of overall winner G3KLH/P - operators G3KLH (left) and G0ORH (right).

In addition to post event work, seven stations were inspected during the event by members of the Contest Committee and no transgressions were found.

SCHADENFREUDE CORNER. Many readers seem to enjoy hearing about the problems experienced by others (hence 'Schadenfreude') and this year provided a slightly richer crop of reported incidents than usual. In addition to the usual crop of computer difficulties that didn't show up when testing stations off site, antennas that wouldn't match and unspecified glitches that resulted in lost operating time, three groups reported generator problems (a perennial problem area, although reported less frequently in the last year or two), two groups reported total failure of masts and two groups had vehicles that needed to be towed from a muddy site by the farmer's tractor.

Most groups had individual problems, but one group had nearly all of them occur together this year and it is worth quoting their report verbatim here: "It was NFD from Hell – our vehicles got stuck in our first choice field due to the mud had to switch to alternate field. Then our vehicles got stuck in this field took 2 hours to get the vehicles out then we could start assembling the station. Had problems with the logging program – partially resolved. Then we found the antenna (trapped inverted V) would not tune on 160m, tried to take the antenna down but the pump up mast jammed and it was stuck in the UP position it was now getting dark so we had to run the evening with a compromised antenna so 160m was a disaster. Next morning a vehicle clipped the inverted V wire and destroyed one half of the antenna! We then spent the next two hours trying to get the pump up tower down managed this eventually. An experimental temporary antenna also failed to work due to a faulty coaxial cable. The only good thing was that it did not rain whilst packing up. Summary total disaster need to book better weather next time". Beat that!

Aftermath of mast collapse at G3WRR/P.

NFD 2015. Following the earlier White Paper activity conducted by the Contest Committee, it has been agreed that a couple of changes will be made to the rules for NFD 2015, with the aim of smoothing the progression of features from Low Power through to Open Section. In summary, stations in the Restricted Section – Simple Antenna Category will no longer be permitted to use a second transceiver or an on-site skimmer. It is intended that the 2015 rules incorporating the necessary changes will be published on the CC website by the end of 2014.

NFD next year will be held on the weekend of 6 and 7 June 2015 – club officers and potential entrants please put this date down in your diaries now!

November 2014 • RadCom
Steve White, G3ZVW • e-mail: steve.g3zvw@gmail.com

Sport Radio

A big change to SSB AFS and *N1MM Logger* gets a makeover

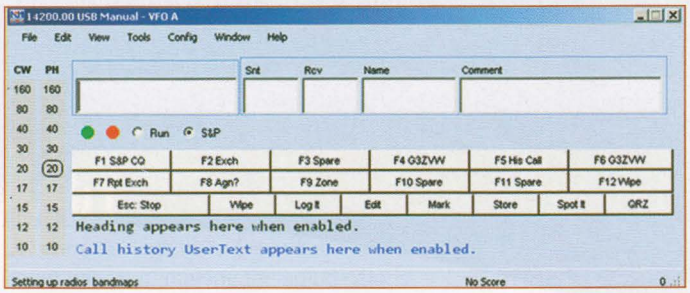


PHOTO 1: The main Window of N1MM+.

A MAJOR UPDATE. One of the most popular free logging programs – especially for contesting – is *N1MM Logger*. It was first released well over a decade ago, but updates have been issued and new facilities added continuously. In more recent times other loggers such as *WinTest* and *DXLog* have come along. The *N1MM* developers were obviously aware of the competition, but the basic structure of the package meant it wasn't easy to add some of the facilities the programmers wanted to. Furthermore, technological advances and the obsolescence of old versions of software (Windows XP and Visual Basic 6) were constraining development. Consequently, last year – and as I reported in this column last November – they embarked on a rewrite, to use Visual Studio .NET framework and SQLite. Open beta testing of the new package, known as *N1MM Logger+*, began in August. During that phase the developers expected a number of bugs to come to light, so new releases were issued daily. A public release should have happened by the time this column appears.

You can see in **Photo 1** that the basic N1MM screen layout that many are familiar with remains in N1MM+, although slightly different and with some additions. Menus have been redesigned and the program contains 96 new enhancements. N1MM+ is far more user configurable than N1MM. For example, skins, font types, font sizes, foreground and background colours can all be changed – and for a multi-operator station each can be defined for individual operators.

80M AFS 2015. Some of the questions in the 2014 White Paper from the Contest Committee were about the 80m AFS contests and H3 was specifically about overcrowding. The majority of those who expressed an opinion on the subject thought there was no need to change CW AFS because it wasn't overcrowded, so the rules of this are going to stay as they are. However, a majority did think something should be done to alleviate overcrowding in SSB AFS. Out of the three options presented there was a majority view that 40m should be introduced, to make it a dual-band contest. It's only right to add that there was no overwhelming mandate for this option, so the CC have agreed to include 40m in SSB AFS 2015 *as an experiment*. To encourage the use of both bands there will be normalisation of the scores, along the same lines as the datamodes sessions of the 80m Club Championship series, and to prevent interleaving QSOs across the two bands there will be a 10-minute rule. The IARU contest preferred segments of 80m will remain and the IARU contest preferred segments of 40m will be added. A question in a White Paper in 2015 will consult on whether to keep this arrangement, revert to 80m only for 2016, or maybe try something else.

My personal thoughts on the matter are that introducing 40m presents us with a *very* interesting prospect, because it will dramatically change the nature of SSB AFS. First and foremost, no longer will it be desirable for anyone to stake-out a frequency before kickoff and defend it for the whole of the contest. To make a good score it will be vital to switch bands, and probably a few times. It will also mean that people with small gardens or modest antennas will get more of a look in, because (1) on 40m it is far more likely they will be able to erect an efficient antenna, and (2) on 80m there will be a much higher turnover of frequencies, allowing others to inherit them.

68% of those who expressed an opinion about the times of day on which CW AFS and SSB AFS are held (question H2) voted for no change, so they are going to remain as 1400-1800UTC.

With a substantial increase in the available bandwidth there should be a lot less overcrowding, but the great imponderable is whether the addition of 40m will encourage more participation. If it does I don't think it will be by a huge amount, so overall the overcrowding should still be alleviated.

Propagation Studies Committee member Steve Nichols, G0KYA says the following about what can be expected of 7MHz during 80m/40m SSB AFS. "At the beginning of the contest contacts around the UK should be relatively easy, but as it progresses the critical frequency may drop and the skip lengthen. It may get progressively hard to work close-in stations, while remaining perfectly possible to work European stations. This is working on the basis that the sunspot number will be around 64 at that time. If you want to work UK stations, do it early in the contest for the best score."

AUTO CQ PAUSES. Back in August Ian, G3KZR (**Photo 2**) wrote to say "I participated in the Low Power Contest last Sunday and after a poor start on 80m things went well enough on 40m. However I became increasingly irritated by contestants who were calling CQ repetitively, but had already started the next CQ before I had finished sending my call sign just once (at about 22WPM). I was in the 3W section and would have been relatively weak, but I should not have been inaudible. I only persisted with the stronger signals anyway. This went on and on and wasted my time and theirs. It dawned on me that the pattern of behaviour was similar in all cases (at least six offenders) and that they must have been in auto CQ mode with a one second pause. A strong incoming signal would have been heard and the auto facility paused, but insufficient time was being allowed to hear a weaker signal before the CQ started up again. In any contest this strategy is wasteful of QSO opportunities, but in a QRP contest it is simply barmy.

"In the end I had the grim satisfaction that more than half the culprits ultimately replied to a CQ from me, when they were running out of stations to work. Am I alone in noticing this?"

I'd be surprised if Ian was the only person to notice the auto CQs with only a 1 second pause between them. I was going to hold this item until next July and mention just before next year's Low Power Contest, but it occurs to me there are some major CW contests this month and in one of them in particular the same practice might take place quite a lot. Last year the leading stations in the 2m Marconi CW contest didn't make huge numbers of QSOs. 55 in the 6-hour Single Op section equates to 9 QSOs per hour and 93 in the Single Fixed section equates to under 4 per hour, so I would imagine an auto CQ facility would be an extremely useful thing to employ. If I were to offer the entrants any advice,

RSGB HF Events

Date	Event	Times (UTC)	Mode(s)	Band(s)	Exchange
Nov 8	Club Calls §	2000-2300	SSB	1.8	RS + SN + Club code
Nov 12	80m Club Sprint	2000-2100	SSB	3.5	SN + name
Nov 15-16	2nd 1.8MHz *	2100-0100	CW	1.8	RST + SN + District code
Nov 27	80m Club Sprint	2000-2100	CW	3.5	SN + name

RSGB VHF Events

Date	Event	Times (UTC)	Mode(s)	Band(s)	Exchange
Nov 1-2	Marconi CW Δ	1400-1400	CW	144	RST + SN + Locator
Nov 4	144MHz UKAC	2000-2230	All	144	RS(T) + SN + Locator
Nov 11	432MHz UKAC	2000-2230	All	432	RS(T) + SN + Locator
Nov 18	1.3GHz UKAC	2000-2230	All	1.3G	RS(T) + SN + Locator
Nov 25	50MHz UKAC	2000-2230	All	50	RS(T) + SN + Locator
Nov 25	SHF UKAC	2000-2230	All	2.3-10G	RS(T) + SN + Locator

Best of the Rest Events

Date	Event	Times (UTC)	Mode(s)	Band(s)	Exchange/info
Nov 8-9	WAE DX RTTY	0000-2359	RTTY	3.5-28	RST + SN
Nov 23	UKuG Low Band	1000-1400	All	1.3-3.4G	RS(T) + SN + Locator
Nov 26	UKEICC 80m	2000-2100	CW	3.5	4-character Locator (Grid) square
Nov 29-30	CQWW DX CW	0000-2359	CW	1.8-28	RST + CQ Zone (UK=14)

Italics indicate that only provisional information was available.
* HF Championship event. + VHF Championship event. Δ VHF CW Championship event. § Super League event.
For all the latest RSGB contest information and results, visit www.rsgbcc.org

it would be to increase the pause time a little and listen carefully for weak callers. After all, there are likely to be some really weak callers on 2m and an extra second or two isn't going to make much difference to anyone's final score.

NEWS IN BRIEF. Pete Lindsay, G4CLA, who administers the Contest Committee website, has added a new feature. It allows users access of the results of individual contests from other years directly from the results pages, rather than having to go back and forth through the menus. So one click instead of four to scan through the results of each individual contest; I like that.

Several suggestions in the 2014 White Paper were not favoured by those who responded. 56% were against RSGB running data contests and 78% were against rewarding perfect logs, so the Contest Committee won't be seeking to organise any data contests or giving bonuses for perfect logs.

THIS MONTH'S EVENTS. The second event in the 2014-15 Super League series is 160m Club Calls Contest on Saturday 8th. It's a slightly more relaxed event than most and an ideal opportunity for clubs to boost their team score by putting a club station on the air and using the appropriate prefix to identify it. It's also a good excuse to give newer and less experienced operators a taste of contesting. Club Calls is a unique contest, in that part of the QSO exchange is a 4-letter abbreviation of your club's name. A list of affiliated clubs and their codes can be found at www.rsgbcc.org/hf/rules/2014/rafs.shtml. If you look and don't find a code for your club, please ask for one to be allocated. November is the final month of the 80m Sprints and this month we begin with SSB on Wednesday 12th. Then we have the 2nd 1.8MHz Contest. This one is CW only and has sections for UK and non-UK stations. It coincides with a number of other European contests, so please be aware that the European events don't all have the same exchange as the RSGB contest. Log what you receive. The last event of the month is the CW Sprint session on Thursday 27th.

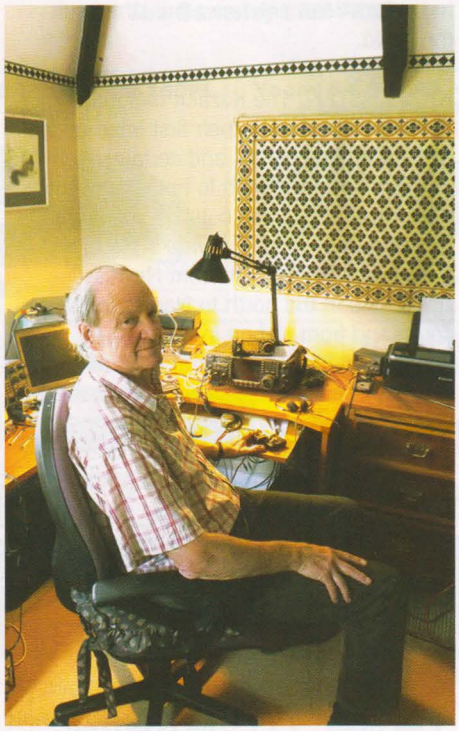


PHOTO 2: Ian Davies, G3KZR is his shack.

Moving on to VHF, the Marconi CW Contest takes place for 24 hours over the weekend of 1st-2nd. There are 24- and 6-hour sections for Single Op Fixed and Open (multi-op or portable) stations. It's the final event in this year's VHF CW Championship series. After that the UKACs rule the roost for the rest of the month; 2m on the 4th, 70cm on the 11th, 23cm on the 18th, and 6m + SHF on the 25th.

The WAE DX RTTY contest takes place for 48 hours on 8-9th. It's the last of this year's WAE series. Unlike the CW and SSB WAE contests (held in August and September), on RTTY everyone can work everyone. Remember that QTCs (reports of previously conducted contest QSOs) can add a lot of points to your total score, so it's worth reading the rules on the DARC web site to understand how they work. The UKuG Low Band Contest (1.3, 2.3 and 3.4GHz) is on Sunday 23rd. It's the final session of the year and shorter in duration than the others in the series, because the organisers want portables to be able to pack up and vacate their sites before it gets dark. The third in the UKEICC's series of 80m contests is on Wednesday 26th. This month it's back to CW. The session lasts one hour and at the end of it you have one hour to upload your log. The last contest of the month is the biggie, CQWW CW. Expect the CW portions of the HF contesting bands to be busy all weekend and some rarely activated countries to be put on the air.

ARDF

Record medal haul at world ARDF championships

YOUR RSGB
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The opening ceremony.


RSGB team, from left John, RS205838, Robert, G3ORI, David, M3WDD, Norbert, RS215312, Bob, G3ORY, David, G6HGE, Andrew, G4KWQ, Robin, RS213497 and Vlad, 2E0VLB.

CONGRATULATIONS. The National Anthem was not played at this year's World ARDF Championships in Kazakhstan. Instead, the RSGB team brought home four silver medals, two in the classic race team competitions and two individual classic awards. This is a record, beating the three medals won at the Region 1 ARDF Championships last year.

The most significant of these was the silver medal won by team leader David Williams, M3WDD in the M50 (men aged 50-59) category for the 2m classic race. This was our first podium appearance outside the M70 category and was notable because of the fiercely competitive nature of all the younger male categories. To beat off the strong eastern European challenge in this environment was a brilliant result for David.


David, M3WDD receiving the individual silver medal for the 2m M50 race.

KAZAKHSTAN. The Kazakh national society (KFRR) were staging their first international ARDF Championships and certainly had a superb area in which to hold the event. Kazakhstan is a huge country; the ninth largest in the world. If it was overlaid on Europe it would stretch from Newcastle-upon-Tyne in the north to Naples in the south and from Lisbon in the west to Istanbul in the east. Most of the country comprises featureless steppe (think, a flat version of Salisbury Plain that extends as far as the eye can see). The competition was centred on an area to the north of the capital Astana, which comprises some significant hills and a pine forest about 14km by 14km plus some picturesque lakes. The winter climate, with temperatures routinely down to -30°C, ensured that there is a total absence of nettles, bramble and bracken on the forest floor. The only impediment to being able to run freely in any direction are some scattered boulder fields.

OTHER RESULTS. In the M70 category, the team of Robert, G3ORI and Bob, G3ORY took the silver medal in both of the classic races. We were up against the Germans and the Swedes, with the latter taking the gold on 2m and the Germans the gold on 80m. Robert ran a brilliant 2m race to take the silver individual medal and at the same time to underpin our team success. With a highly talented Russian and an equally highly talented Ukrainian in the field, it made the individual medals hard to secure.

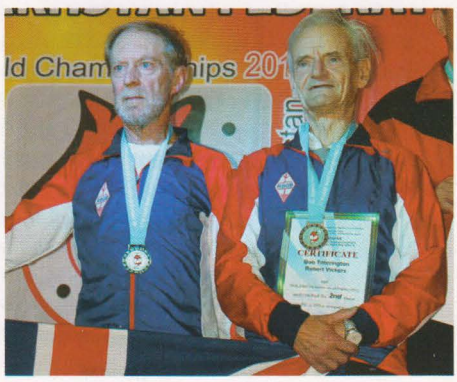
Elsewhere, Andrew, G4KWQ did well in his last year as an M40 (men aged 40-49) to come in 10th in the 80m race. Also on 80m Vlad, 2E0VLB was 9th in M60 and Bob, G3ORY 6th in M70. Team-wise, the M40 squad were a creditable 5th in the 80m classic race.

Moving to the Sprint and Foxoring races (where there is no team competition) the best results were a 4th place for Robert, G3ORI in the M70 sprint race and another 4th place in the Foxoring, this time for Bob, G3ORY.

Our two individual medals put us 8th in the individual medal table and the two team medals saw us in 7th. Top of the medal tables were Russia way out in front with the Ukraine, Czech Republic and Lithuania following up behind. For full details the best source of information is the DARC site at http://ardf.darc.de/

Some of the course planning was, with the benefit of hindsight, less than optimum with some very short winning times in the classic races, most notably on day 2. A seriously hard climb in the Foxoring race for W60 and M70 was not the best either.

LOOKING TO THE FUTURE. Andrew, G4KWQ will move up to the M50 category on 1 January 2015 to join David, M3WDD. They make a powerful duo who might do well at the Region 1 ARDF Championships next year in the Czech Republic. The M70 pairing of G3ORI and G3ORY will be a year older and if either the Russians or the Ukrainians can find a second talented runner in the category to make a team, the western European whitewash here is likely to be ended.


G3ORI (left) and G3ORY receiving their silver medals for the 80m Classic race.

ARDF event programme

Saturday 18 October: Whippendell Woods, Watford
Sunday 16 November: Leicestershire (provisional)
Saturday 6 December: Frith Hill, Camberley

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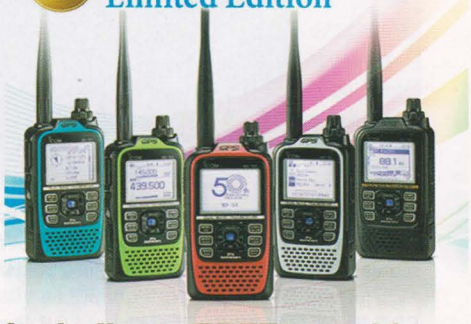

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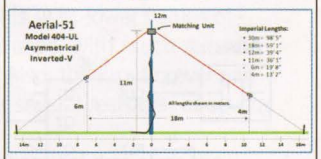

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Design Notes

A new wide band SDR with many applications, plus more spread spectrum

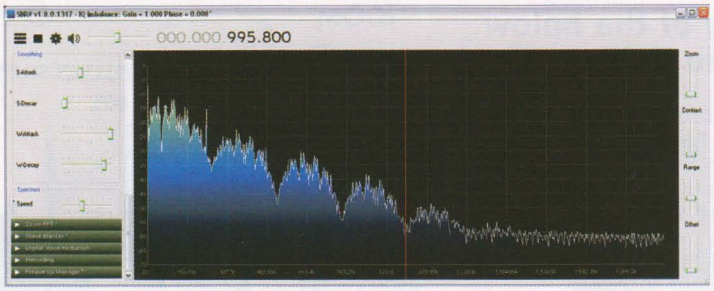

PHOTO 1: The SDR-Play module used with the *SDR#* software as a spectrum analyser. Here is it showing the spectrum of the spread spectrum source of Figure 1, with a chip rate of 250kHz.

SDR-PLAY MODULE. The folks at SDR-Play [1] have come up with a new SDR receiver module based around a chipset that functions in a similar manner to that of the RTL dongle, but offers a wider tuning range and increased sampling resolution. Using a Mirics MSi3101 chip, the module covers the band 100kHz to 2GHz, with a small gap around the 380 to 410MHz region. It has a 10 bit A/D converter sampling at up to 10MHz and this sample rate means that up to 8MHz of instantaneous bandwidth is available for spectrum display or receiving / decoding wide band modes. The 10 bit A/D resolution means a higher dynamic range can be achieved than the RTL dongles offer. It delivers I/Q samples via USB to the host PC running off the shelf SDR software. As supplied, the module uses the *SDR#* (SDR-Sharp) software – the same as the RTL dongles. An installation disc is supplied with the hardware that includes an interface driver so when *SDR#* is subsequently started, the SDR-Play module is offered as a source option.

The designers have supplied all the necessary drivers on the CD-ROM, but please note that you need to install the drivers first before plugging in the module. Software 'hooks' and interfacing data is also supplied on the CD-ROM, so it should be straightforward for software authors to incorporate this wide band receiver module into their own SDR or test equipment software.

IN USE. The *SDR#* software should be familiar to users of the RTL dongle and once the SDR-Play module is installed, the result will look similar to that, except for the much wider frequency band on offer. With a lower tuning limit of 100kHz, all the LF through to UHF amateur bands are covered. Of these, HF reception is usually the most taxing due to the wide dynamic range of signals within a few MHz anywhere in the HF spectrum. On my active whip antenna it happily received SSB and data signals on the HF bands – although some juggling of the module gain setting (accessible via the configuration menu) was needed when moving from band to band. Stability was sufficient to be able to wrap audio round for demodulation of PSK31 and WSPR signals.

The installation disc also comes with Mirics software for DAB and wideband FM broadcast radio. Having never before listened to DAB side by side with the same station transmitted on Band 2 FM, by switching between the two I could definitely hear the subtle differences in the digital broadcast audio quality.

With up to 8MHz bandwidth, the 10 bit sampling means that around 50 to 60dB of dynamic range is available as a spectrum analyser. **Photo 1** shows a screenshot of the SDR-Play module displaying the partially filtered spread spectrum signal of the generator described below.

SPREAD SPECTRUM GENERATOR. In the Data column last month, I described an outline spread spectrum (S/S) scheme that could be used as a starting point for experiments in the new 146 to 147MHz allocation that we will hopefully be able to use before too long. With 1MHz of bandwidth available for 'high speed digital type signals' a 500kHz or 250kHz chip rate spread spectrum waveform seems to fit the

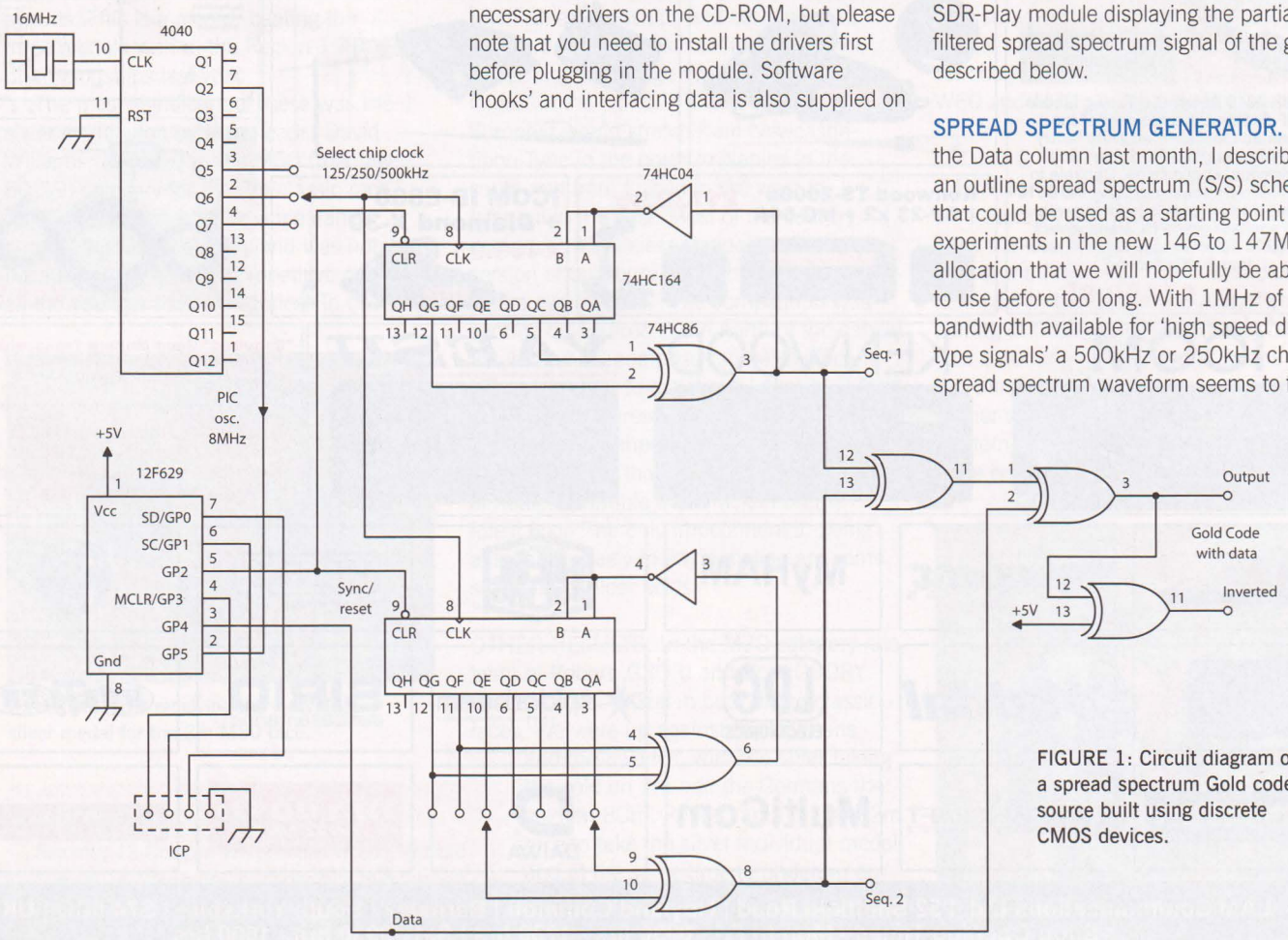

FIGURE 1: Circuit diagram of a spread spectrum Gold code source built using discrete CMOS devices.

bill. The circuit of **Figure 1** is a complete code generator with a source of user data, built using old fashioned CMOS devices to illustrate the basics of the coding.

The spread spectrum source generates a set of 21 different selectable 127 chip Gold codes using a technique similar to that of the GPS satellites. (For more details of the rationale behind this choice, see last month's Data column). Two 74HC164 eight bit shift registers with exclusive-or gates produce the two starting maximum length sequences. The simplistic form of Maximal Length (ML) sequence generator shown last month, with feedback from the XOR gates feed directly back to the shift register input, is the normal way of generating ML sequences. But this suffers from the disadvantage that the all-zeros state is not permitted, so to initialise the system, some other value has to be preset. If the seven shift register stages were to contain all zeros, the XOR gate would output a '0' output, which would be fed back and the sequence would lock up. By adding an inverter after the XOR, the all zeros state is now permitted: the all '1' state is now the illegal condition. The only difference having the inverter in place makes is that the generated sequence is the complement of its original. The all-zeros state is a very convenient place to start the two sequences in synchronism as the 74HC164 chips have a reset pin making preload at the start straightforward and meaning the correct Gold code starts properly. The chip clock comes from a 16MHz TTL oscillator module divided down in a binary divider chip.

To complete the S/S source, a PIC microcontroller is included to generate user data that modulates the final spread spectrum code. The PIC is clocked by the same source as that driving the shift registers, so by including a divide by 127 routine inside the PIC code and resetting the shift registers in synchronism with this at switch on, the binary modulation can be applied synchronously to the fast sequence, inverting it at sub-multiples of the 127 bit chip repeat rate in the same way as the GPS satellites transmit their user data.

The use of old discrete logic chips may seem a bit archaic nowadays when a fast processor or gate array would do the job just as well. But they are still readily available,

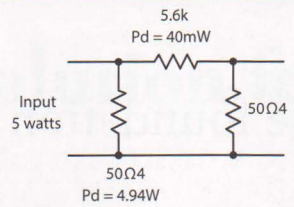

FIGURE 2: Theoretical values of a 47dB 5W attenuator, with power dissipations, designed without taking practicalities of construction into account – so don't build this!

cheap, and are probably lying unwanted in junk boxes; and it's really not that complicated to build up! More details of the source, including PIC code, can be found online at **[2]**.

A 16F family PIC controller running with a 20MHz crystal is capable of generating the S/S signal at a chip rate of up to about 125kHz for slower systems; the faster 18F family running at 40MHz will allow up to 250kHz chip rate. In a software implementation, the easiest – and fastest – way to generate the code is simply to store the complete sequence pattern in memory. 127 bits only takes up 32 bytes, so even the basic 16F PIC devices can hold all 21 sequences in a table, selected by external switches. A version using a field programmable gate array (FPGA) will, of course, allow very fast operation to tens or even hundreds of MHz and could incorporate the controller / data source as well all in one chip. *If* you have the design tools for such devices, that is!

OUTPUT FILTERING. Before using the generated S/S sequence for modulating an RF source, it needs to be low-pass filtered to remove the components at harmonics of the chip rate that would lead to out of band emissions. Filters for such digital signals have to preserve the pulse shape, and special filter types such as Bessel, Linear phase or Gaussian are needed. The spectrum shown in Photo 1 is that of the waveform having passed though a 5th order linear phase filter with a cutoff of 500kHz. I haven't included any details of this filter as the one tested wasn't very good in terms of pulse shape at 500kHz chip rate, so a better design is needed. Reference [2] gives more details and shows the pulse with some distortion after passing through that filter.

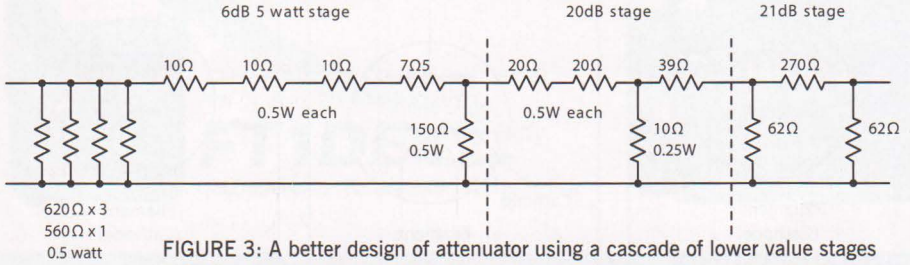

FIGURE 3: A better design of attenuator using a cascade of lower value stages designed to apportion power dissipation between several resistors and reduce the effects of stray capacitance.

BUILDING MATCHED ATTENUATORS.

Discussions on an internet group recently suggest there is still some confusion over how to construct an attenuator for attenuating the output of a transmitter to drive the low level input of a transverter. One contributor wanted to attenuate his 10MHz 5W output (+37dBm) to 0.1mW (-10dBm) and therefore needed a 47dB attenuator rated at 5W dissipation. There are numerous online tools that will calculate values for π or T attenuators, (try typing 'attenuator design' into you favourite search engine), but they don't give the full story. For example, the contributor stated that he had a design needing one 5.6kΩ and two 47Ω resistors, as shown in **Figure 2**. There are several reasons why a simple three resistor attenuator is not a good choice for such a high value of attenuation. First, the single input resistor has to dissipate nearly all the input power, so just one resistor has to have a high power rating. Second, and most significantly, the 5.6kΩ resistor is quite a high value at this frequency and it will be difficult to avoid stray capacitance across it from changing or degrading the wanted attenuator performance if all the loss has to generated in, basically, one component.

A better solution is to cascade several lower value attenuator stages to make up a total of 47dB. This way, lower values of series resistors are used, with much reduced effect from strays. Also, the input power can be shared out over several resistors, or several attenuator stages.

First, use an online tool that gives the dissipation in each resistor – such as my spreadsheet in **[3]**. Note in particular that when an attenuation of 6dB is chosen, the dissipations in the first two resistors are equal, each dissipating one third of the input power. The same applies if π or T designs are chosen. So a suitable cascade could consist of, say, a 6dB first stage, designed to dissipate the bulk of the power, 20dB in the second stage, with only the input resistor dissipating much power and topped of with a third stage of 21dB.

An elegant touch is to cascade alternate π and T stages for a ladder design like the complete 5W 47dB three stage attenuator of **Figure 3**. By using multiple resistors to make up the input high dissipation arms, no more than 0.5W-rated resistors are needed. Series or parallel connection is used as appropriate to minimise the effect of stray capacitance or residual inductance in each resistor.

WEBSEARCH

[1] SDR-Play module: www.sdrplay.com
[2] Spread spectrum source material: www.g4jnt.com/SSstuff.zip
[3] Attenuator design spreadsheet: www.g4jnt.com/DownLoad/ATTEN.XLS

November 2014 • RadCom
John Welsh, G0NVZ • e-mail: johnwelsh_1@yahoo.co.uk

Moving On

The thermionic diode - the foundation of modern electronics

PHOTO 1: Miniature rectifier diode rated at 50V RMS input, 5mA, which uses a 6.3V 150mA heater.

INTRODUCTION. As its name implies, a diode is any active two (di-) electrode device used in electronics. When the word diode is unprefixed by any other adjective, it usually refers to a rectifier. There are two main categories of diode: thermionic and semiconductor. This article deals only with the thermionic diode. Next month we'll look at semiconductor diodes.

HISTORY. The very earliest diodes were produced by the electric light industry. They consisted of an incandescent filament and a metal plate (these being the two electrodes), enclosed in an evacuated glass envelope and were usually used as a detector of radio signals or, later, as AC mains rectifiers in valve receivers. They marked the introduction of 'electronics' into the otherwise 'all mechanical' science of wireless. Mechanical systems usually consisted of rotary spark or induction coil transmitters (of Morse code, of course) and coherer or moving magnetic wire based receivers. As a detector, the thermionic diode acted as a rectifier of weak RF signals. As the transmitted signal consisted of an audio frequency train of RF pulses, the rectified received signal consisted of a train of unipolar or DC pulses that were audible in headphones.

HOW IT WORKS. The mechanism of rectification in the thermionic diode is that as a DC current is passed through the thin filament, heating it to incandescence (glowing brightly), some of the electrons comprising the filament current are given sufficient thermal energy to 'boil off' into the vacuum of the lamp bulb. (Heat is, after all, just the internal energy of motion of atoms and electrons. At a high enough temperature, electrons and eventually atoms reach their 'escape velocity' and escape from their parent materials).

These escaped electrons form a cloud-like 'space charge' around the filament. In the absence of anything else, they are collected up near the positive connection to the filament and were unnoticed by early lamp makers. Edison found that if a metal plate is placed near the filament and connected through the glass envelope, a small current may be drawn from it and returned to the positive connection of the filament. A much greater current could be obtained from the plate (now re-named the 'anode'), if it were made positive relative to the filament by a separate battery. However, no current would flow if the plate were made negative relative to the filament, ie current would only flow one way through the device. In other words, it could be used as a 'rectifier' of alternating current and, in particular, of RF alternating current. The circuit symbol, which is also a very good representation of how it works, is shown in **Figure 1**. Indirectly heated versions, where the filament heated a separate electron-emitting cathode, were also produced and had a slightly modified circuit symbol, as shown in **Figure 2**.

Thermionic diodes were produced in various sizes. The tiniest diodes were formed inside an existing amplifying valve by a metal strip a few mm long by about 2mm wide close to the existing hot cathode, and used to perform the signal detection in a radio receiver (the so called diode triode or double diode triode). Bigger thermionic diodes were commonly used for rectification of the mains for the high tension (HT) supply of both small transmitters and radio receivers, supplying up to about 250mA at 1000V. Two such devices were frequently included in the same envelope for 'full wave rectification'. **Photo 1** shows a small standalone diode, from the collection of the late Dennis, G8VRO, used by him in a homebrew TV in 1949.

A derivative of the vacuum thermionic rectifier was the mercury vapour rectifier, designed for higher current applications. This was similar to the vacuum version but was always directly heated and contained a few drops of liquid mercury that quickly became vaporised in use. The circuit symbol for a mercury vapour rectifier is shown in **Figure 3**.

The action is that initially it behaves like the vacuum version but the electrons streaming from the cathode (filament) to the anode ionise the mercury vapour. This releases more electrons and an avalanche process ensues, greatly reducing the internal resistance of the device. Whereas in a power rectification circuit the voltage drop across a vacuum rectifier is in the order of 100V at full current, that across a mercury vapour rectifier is about 15V. These devices were fussy, however. The filament had to be allowed to reach its full operating temperature before the voltage to be rectified was applied, for fear of damaging the high emission coating on the filament. They were limited to about 1000V peak inverse voltage for similar reasons due to the bombardment of the filament by the heavy mercury positive ions.

The largest rectifiers, called mercury arc rectifiers, were used for converting vast amounts of power, for example three-phase 600V at about 1000A for London tube trains or high voltage DC transmission lines. There were glass and (for higher power) steel tank versions that relied on a pool of hot liquid mercury as the cathode and ionised mercury vapour for conduction from the cathode to each of several anodes. Mercury arc rectifiers handling 250 megawatts or more were developed. These have all been superseded now by various other types of semiconductor rectifier.

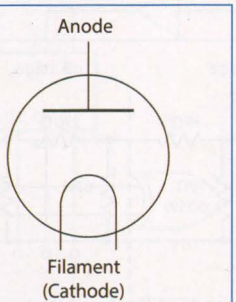

FIGURE 1: Thermionic diode circuit symbol.

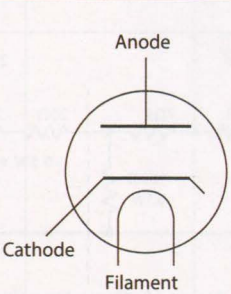

FIGURE 2: Indirectly-heated cathode version.

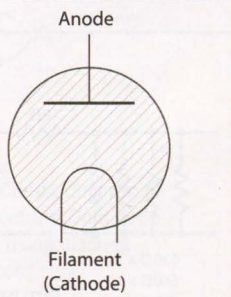

FIGURE 3: Mercury vapour rectifier. Shading implies gas.

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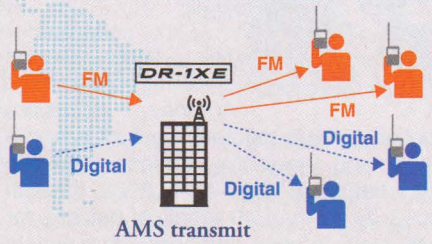

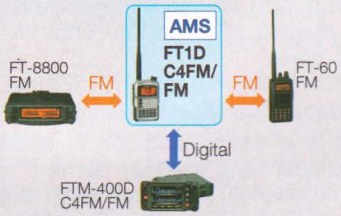

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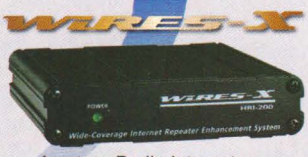
50W DIGITAL/FM TRANSCEIVER
FTM-400DE



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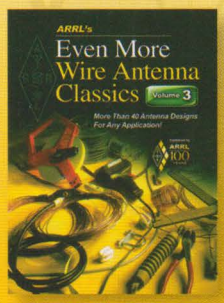

Even More Wire Antenna Classics (Vol3)

Even More Antennas to Build - Even More Ideas to Experiment With

This third volume of the popular *Wire Antenna Classics* collection gathers together the best antenna projects and innovative designs from the ARRL magazine QST from 2002 through to 2013. More than 40 practical designs for a wide range of wire antennas, from simple projects to more complex.

Even More Wire Antenna Classics has a wide range of content and you will find details of portable antennas that are both inexpensive and easily constructed. There are directional antennas that maximise and focus your signal along with multiband antennas that provide new ways to explore a variety of bands with a single antenna.

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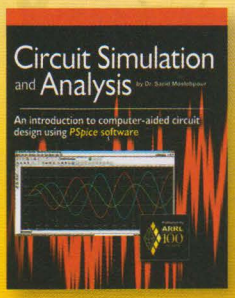

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ARRL Circuit Simulation and Analysis provides a great introduction to the PSpice and is the ideal companion for anyone who constructs their own circuits.

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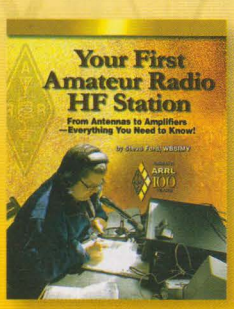

ARRL Your First Amateur Radio HF Station

By Steve Ford, WB8IMY

Setting up your first HF Amateur Radio station can be a complicated task. From selecting your first radio to putting up your first antenna, there are a number of important choices you'll need to make.

The *ARRL Your First Amateur Radio HF Station* is a complete guide to setting up your station and getting started in HF communications. It's filled with practical advice you can put to use right away. Whether you're new to Amateur Radio or HF operating, live on acres of open property or in a tiny apartment, this book will show you how to get on the air and enjoy all that Amateur Radio has to offer.

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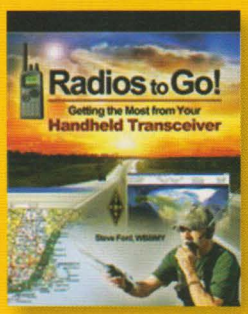

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Getting the Most from your Handheld Transceiver

by Steve Ford, WB8IMY

Modern technology now allowes manufacturers to pack a wealth of features into handheld transceivers. With so many features, however, it isn't always easy to get the full benefit from your investment. *'Radios to Go!'* sets out to show you how to get at the features and use them day to day.

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If you own a handheld transceiver and want to get more out of it, or if you're trying to decide which transceiver to buy, *'Radios to Go!'* is the essential guide.

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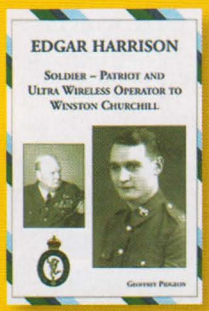

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Soldier, Patriot and Ultra Wireless Operator to Winston Churchill

By Geoffrey Pidgeon

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After the war Edgar became the Principal Signals Officer of the Foreign Office.

This biography has been written by an acknowledged expert on Britain's clandestine activities Geoffrey Pidgeon. This book provides a glimpse of one of the great WWII stories and is recommended to everyone interested in MI6 the work carried out by its signals operators.

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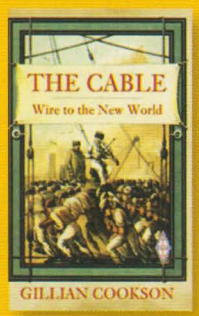

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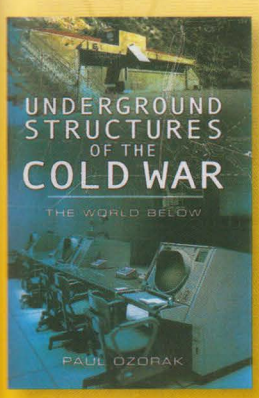

Underground Structures of the Cold War

The World Below

By Paul Ozorak

Books on the history of fortifications are plentiful. Medieval castles, the defensive systems of the seventeenth, eighteenth and nineteenth centuries, the trenches and bunkers of the First World War, - all these have been described in depth. But the fortifications of the Cold War - the hidden forts of the nuclear age - have not been catalogued and studied in the same way.

Paul Ozorak's *Underground Structures of the Cold War: The World Below* fills this gap. He describes when and where these bunkers were built and records what has become of them. He also explains how they would have been used if a nuclear war had broken out and how weapons would have been deployed. His account covers every sort of facility - public shelters, missile sites, command and communication centres, storage depots and hospitals. This book is a catalogue of facilities from Afghanistan to Vietnam. There are details of facilities from 65 countries around the world including the UK, USA and Russia with China North Korea and Warsaw Pact countries not forgotten. At 384 pages and with over 170 photographs illustrating the text , *Underground Structures of the Cold War* provides a hugely informative guide to this fascinating subject.

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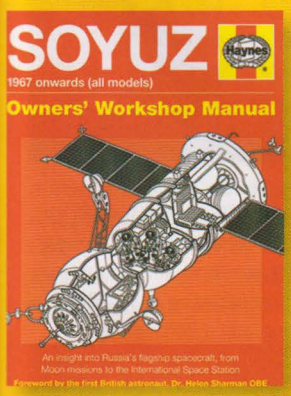

Haynes Soyuz Owners' Workshop Manual

By Dr David Baker

Written in the usual Haynes Manual way the hardback Haynes Soyuz Owners' Workshop Manual provides the definitive guide to the very first days of Soviet space programme through to today.

With a foreword by Helen Sharman who used the Soyuz to get to the MIR space station where she operated as GB1MIR in 1991 this book provides a fascinating insight into the Russian spaceflight. Originally designed in the 1960s the Soyuz has been the mainstay of Russia's space programme for nearly 50 years.

The Haynes Soyuz Owners' Workshop Manual is packed with all the usual features you would expect including colour cut-away drawings of the various elements. You will even find details of the rendezvous and docking procedures and the famous "handshake in space" when the US Apollo spacecraft docked with Soyuz. There is much else besides and this lavishly illustrated this book provides as it says on the cover "An insight into Russia's flagship spacecraft, from Moon missions to the International Space Station"

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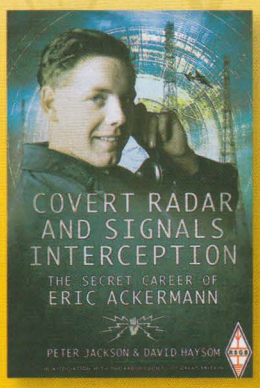

Covert Radar and Signals Interception

The Secret Career of Eric Ackermann

By Peter Jackson and David Haysom

Eric Ackermann became a leading figure in the world of signals and electronic intelligence during WWII. This book seeks to explain his activities during the war and the subsequent cold war activity.

Covert Radar and Signals Interception explores the various highs and lows of Eric's role at the vanguard of tactical intelligence operations. Winner of the George Medal for conspicuous gallantry Eric had an extraordinary wartime career that included over 40 bomber flights assessing the enemy's radar capabilities data. Searching for, monitoring and destroying of Germany's Wuerzburg, Knickebein and X Band radar systems. A host of secret missions carried out in North Africa, Gibraltar and Italy. His research was passed to the highest levels of wartime government, and was highly prized. The end of the war did not signal the end of Ackermann's role. He was to play a major part in the setting up and implementation of a string of listening stations built along the borders of Soviet Bloc countries. Further work in aeronautics and satellite construction in the United States followed. This book seeks to provide new insights into intelligence practices and their often far-reaching consequences.

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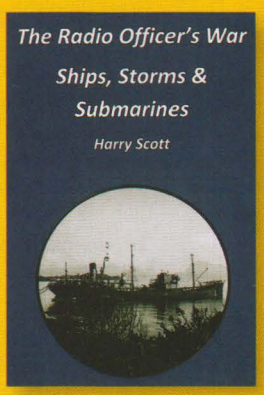

The Radio Officer's War

Ships, Storms & Submarines

By Harry Scott

The Radio Officer's War - Ships, Storms & Submarines is an exciting first-hand account of the dangers faced by the sailors of the British Merchant Navy during WWII. From the perspective Ian Robert Hendry Waddell, who joined the Merchant Navy in 1940 after qualifying as a Seagoing Radio Officer.

Ian made 14 crossings of the North Atlantic Ocean at a time when German U-boats were sinking a huge amount of Allied shipping. He wrote a series of journals, and wonderfully descriptive and amusing letters, about his life and work at sea. He also captured on film the dramatic events as his ship was bombed during the Allied landings in Norway. Ian also describes the harrowing scenes he and his shipmates witnessed, and the danger they faced, as they became involved in the dramatic rescue of the crew of a Royal Navy ship sunk by a U-boat. Harry Scott has woven this fascinating story into an extraordinary book by reproducing Ian's journals, letters and photographs along with explanations of context and historical detail.

The Radio Officer's War - Ships, Storms & Submarines is a fascinating glimpse of WWII from the perspective of a Radio Officer giving a real sense of the story, timing and history of the Atlantic War.

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Please send news reports to radcom@rsgb.org.uk. To get future events listed here and put on GB2RS, **e-mail details of your meetings as early as possible to 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 Society, Region 9, Graham, G0NBI, 01234 832 700, 29 October, On the Air. It's that simple. Please note that we don't normally print 'closed', 'TBA' or 'every Tuesday'-type submissions. The deadline for the December edition is 23 October and for the January 2015 issue it's 20 November. For GB2RS, the deadline is 10am on the Thursday for the week of broadcast.

INTERNATIONAL

Pafos Radio Club, Cyprus,
Richard, 5B4AJG, 00 357 97 857 891,
5B4AJG@cyprusliving.org

NATIONAL

AMSAT-UK
http://amsat-uk.org/
Weekly net every Sunday 10am, 3.780MHz
Civil Service Amateur Radio Society,
Weekly net every Tuesday, 8pm, 3.763MHz

REGION 1: SCOTLAND SOUTH & WESTERN ISLES

REGIONAL MANAGER: JASON, O'NEILL, GM7VSB, RM1@RSGB.ORG.UK

Ayr ARG
John, GM0EPO, aargsec2014@gmail.com
12 Linux basics for radio amateurs, Tom, GM4DOZ
26 FUNcube dongle, Bill, GM3PMB
Border ARS
Alex, GM8BDX, 01890 830 607
14 Club meeting
Cockenzie & Port Seton ARC
Bob, GM4UYZ, 01875 811 723
7 Club night
19 On-air activity night
21 Mobile phone networks, Gavin, GM0GAV
Kilmarnock & Loudoun ARC
Graham, MM3GDC,
mm3gdc@btinternet.com
2, 9, 16, 23, 30 Sunday club 9am-1pm
4, 18 Construction/education night
6, 13, 20, 27 Construction
11, 25 Club night
Lothians RS
Alan, GM3PSP, 0131 623 4580
12 The GPO Tower – its role from the 1960s to 1980s, Mike, MM0MLB
26 Dipoles to Hexbeams in African locations, Nick, G3RWF
Stirling & DARS
John McGowan, gm0fsv@gm6nx.com
2, 9, 16, 23, 30 10.30am till late afternoon for construction, RCE training, projects as well as operating
West of Scotland (Glasgow) ARS
info@wosars.org.uk
5, 12, 19, 26 Construction night & licence preparation
7, 14, 21, 28 Club night with talks, quiz & raffle

REGION 2: SCOTLAND NORTH & NORTHERN ISLES

REGIONAL MANAGER: BERNIE MACINTOSH, GM4WZG, RM2@RSGB.ORG.UK

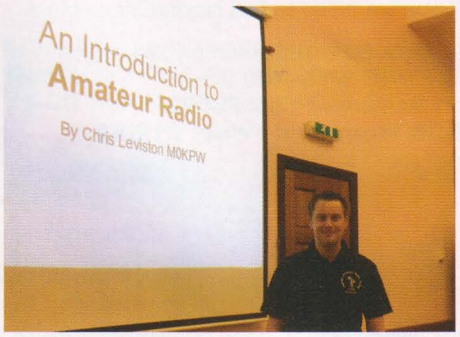
Aberdeen ARS
Fred, MM0ODL, 01975 651 365
6 Junk Sale
13 Why not try Worked All Britain?, Fred, GM3ALZ
20 Ham radio team quiz
27 Construction & on the air

REGION 3: NORTH WEST

REGIONAL MANAGER: KATH WILSON, M1CNY, RM3@RSGB.ORG.UK

Bolton Wireless Club
boltonwireless@gmail.com
10 Antarctica to Sahara – A life on HF, Ron, G3SVW
24 Show & Tell – 5 minute presentations
Chorley & DARS
Mark, G1PIE, procter_family@sky.com
26 MX0ISN, Lancashire Day
Mid-Cheshire ARS
Peter, G8HAV, 01606 553 401
5 Fireworks night
12 Junk sale
19 Committee meeting
26 Digital communications talk
South Manchester R&CC
Ron, G3SVW, 01619 693 999
6 What have you worked this month?, Club members
12, 19, 26 Intermediate classes
13, 20 Club night
24 Technical forum
27 *HR Deluxe* as a user, Peter, G0BHP
Thornton Cleveleys ARS
John, G4FRK, 01253 862 810
3 Natter night & on the air
10 Do you need scaffolding?, Phil, 2E0UHJ
17 Construction
24 The Lizard, Dave, G8KBH
Wirral & DARC
Simon, G6XHF, 0151 601 3269
4 UK Activity Contest 2m
5 Social, Hooton Hotel
11 UK Activity Contest 70cm
12 The Arduino microprocessor, by Paul and Dennis, G6YBC of Kanga Products
18 UK Activity Contest 23cm
19 Social, The Ship
25 UK Activity Contest 6m
26 The impact of digital electronics on music, Edward Peak

Furness ARS member Chris, M0KPW, was guest speaker at the Ulverston Ladies Club September meeting to do a talk and demonstration on An Introduction to Amateur Radio. Much to his surprise a total of 35 ladies attended, helped by an announcement of the event in the local newspaper. The talk, which lasted for just under an hour, consisted of a brief introduction to the hobby, along with a history of amateur radio in the UK and the history of his time in the hobby. Following the talk was a demonstration of HF using a TS-570D and a long wire antenna. HF conditions were not favourable that evening and there was a lot of local QRM, but the assembled group were intrigued to hear the brief DL, EA and GM QSOs.
The talk and demonstration was well received with many questions asked afterwards, which was encouraging considering amateur radio is not your usual subject for a group of senior ladies. His favourite moment of the evening was the lady took a handful of leaflets and was later heard saying to a friend 'this might get my husband from under my feet'!



In late September, **Furness ARS** held an outdoor on air evening on Birkrigg Common (IO84KD) near Ulverston. Members met from 6pm and brought along their own equipment including an IC-706 Mk IIG and FT-857 along with a 20m fishing pole vertical and 40m inverted V. For VHF, various handhelds were used. Reasonably pleasant weather and band conditions were enjoyed and the club's callsign, GX4ARF, was used. 20m QSOs into Europe with the Far East were heard but, unfortunately, not worked. Whilst on 40m, 50 watts into the inverted V resulted in a good crop of inter G stations, including MX0LTC at the Sidmouth Observatory. Before heading home a few members used some of the club's 80m ARDF receivers to successfully test out the beacon that had been built by Ken, M0KOH. The ARDF kit is now ready to be used at their JOTA event.

REGION 4: NORTH EAST

REGIONAL MANAGER: NIGEL FERGUSON, G0BPK, RM4@RSGB.ORG.UK

Angel of the North ARC
Nancy Bone, G7UUR, 01914 770 036
3, 10 On the air + Foundation and Intermediate classes
17 Why does amateur radio continue to endure and attract in an age of Twitter, Facebook and Smart Phones?, Warren, G7MWB
24 On the Air

Denby Dale RC
Richard, M0RBG, 07976 220 126
5 RSGB news update, DRM Gerald, G3SDY
12, 26 Night on the air ±145.575MHz, 7.30pm
19 Round Britain sponsored flight in aid of Cancer Research, Trevor, M0RTC

Halifax & DARS
Martin, M0GQB, 01422 341 317
4 Pie and pea supper. Pre-ordering of pies is essential to ensure sufficient are available.

Hornsea ARC
Gordon, G3WOV, 01377 240 573
5 G2LR and The Dambusters, John, G3XYF
12 RSGB Archives part 2
19 AGM
26 New committee meeting

Sheffield & District Wireless Society
Krystyna, 2E0KSH, 07884 065 375
5 Design and construction of a 600W MOSFET linear amp, Bob, G4APV
19 Worked All Britain, Krystyna, 2E0KSH

A new radio club, **Colburn and Richmondshire ARS**, meets at Colburn Village Hall, Colburn Lane, North Yorkshire DL9 4LZ. Meeting times are fortnightly from 2 October at 7.30pm. Contact Colin by e-mail to colinslyne@btinternet.com

REGION 5: WEST MIDLANDS

REGIONAL MANAGER: MARTYN VINCENT, G3UKV, RM5@RSGB.ORG.UK

Aldridge & Barr Beacon ARC
Albert, G0KFS, 01922 614 169
3 General discussion
17 Programme for 2015

Bromsgrove & DARC
Dave, M6DKT, 07584 025 156
5, 12, 19, 26 Data night
7, 14, 21, 28 Club night

Central Radio Amateur Circle
Martin, G1TYV, 07906 905 071
1 Foundation course
4 144 UK Activity Contest (dry run) Clent Hills
6 Group meeting
8 Foundation exam
15 Saturday meeting

Cheltenham ARA
Derek, G3NKS, 01242 241 099
4, 11, 18, 25 Slow CW, 8-9pm, 3540-3550kHz
18 Lunch at Brockworth
20 EGM followed by Something old, something new from your shack

Coventry ARS
John, G8SEQ, 07958 777 363
3, 19, 17, 24 Club net at 8pm 145.375MHz & 7.16MHz
7 Bangers & mash
14 Skittles night
21 Committee forum & project discussion
28 Radio workshop + bring your rig

Dudley and District ARS
Carl, M0ZCR, m0zcr@live.co.uk
4 UK Activity Contest 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 Talk by Steve Knibbs from BBC Points West
10 HF operating from the shack
17 Workshop, construction, general discussion
24 Informal evening

Malvern Hills RAC
Dave, G4IDF, 01905 351 568
11 Vintage and military radio evening

Midland ARS
Norman, G8BHE, 07808 078 003
5 Bonfire night BBQ outside and training classes
9 West London Radio Show at Kempton Park, TW16 5AQ
12 Committee meeting and training classes
19 Shack on the air, ragchew and training classes
26 Christmas party arrangements and training classes

Rugby ATS
Steve, G8LYB, 01788 578 940
1 General radio activities in the Radio Room
4 UK Activity Contest 2m, on the air and projects
8 PIC/Arduino/PC problem solving, C programming and general assistance, Steve, G8LYB
11 UK Activity Contest 70cm, radio operation and projects
15 BBQ – Free to members!
18 UK Activity Contest 23cm, radio operation and projects
22 USB type C an introduction, Ian, M0IJS
25 UK Activity Contest 6m, radio operation and projects
29 Multimeter calibration check session, Steve, G8LYB

Salop ARS
salopamateurradio@gmail.com
5, 12, 19, 26 Club CW net 4.30pm 144.070MHz; Club net 8.30pm GB3LH
6 Natter night / committee meeting
13, 27 Natter night
20 Chairman's forum

South Birmingham RS
Gemma, M6GKG, gemmagordon.m6gkg@gmail.com
4, 11, 18, 25 Coffee morning 11am to 1pm all welcome
5 AGM 8pm
6, 13, 20, 27 Training classes, Dave, G8OWL
9 West London Radio and Electronics Show
10 Committee meeting
14, 21 Work in the shack
24 Final arrangements for Christmas party

Stratford Upon Avon DRS
Clive, G0CHO, 01608 664 488
10 Keeping the lights on – The Electricity Distribution Network, Clive, G0CHO
24 Informal / practical evening in shack – bring your own projects to discuss or work on

Sutton Coldfield ARS
Robert Bird, spirit.guide@hotmail.co.uk
3, 17 Net 145.250MHz from 7.30pm all welcome
10, 24 Club meeting. Visitors welcome
11 Net 70.475MHz. All welcome

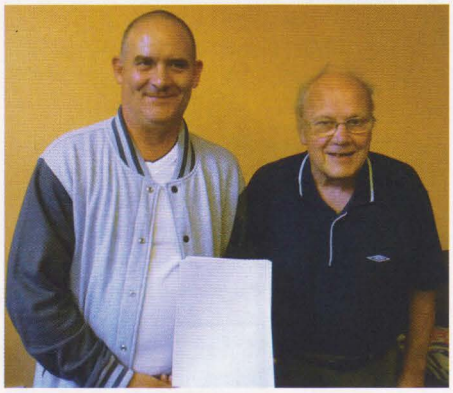
Telford & DARS
John, M0JZH, 07824 737 716
5 Committee/GX3ZME OTA HF
12 Aspects of telecommunications during the Great War, Dr John Moyle, G1AWJ
19 Equipment sale
26 Club project – story so far – getting specifics together with project leaders

Wythall Radio Club
Chris, G0EYO, 07710 412 819
1 Bonfire night at Wythall House
2, 9, 16, 23, 30 club net 145.225MHz 8pm
3, 10, 17, 24 Advanced course 8pm
4 Morse class 7.45pm, preparation for Club Calls and 2m UKAC
7, 14, 21, 28 nibbles night in the shack
8 RSGB Club Calls contest, 1.8MHz
11 Morse class 7.45pm, committee meeting 8.30pm
12 80m Club Sprint SSB Contest
15 D-Star practical workshop 11am-2pm
18 7.45 Morse class, 8.30 Free 'n Easy evening
24 Curry night at the Monsoon, 6.30pm
25 7.45 Morse Class + PSK 31 and beyond, Callum M0MCX
29, 30 CQWW CW contest

Deadline for your entry in the 2014 Club of the Year competition is 31 January 2015, see the RSGB website at www.rsgb.org/coty

Bromsgrove and District ARC have had a busy few months with the special callsigns, GB1WWO and GB2WWT. The response from amateur around the world was unbelievable, they are still getting requests for QSL information. The club has also been running Foundation and Intermediate courses. We will be taking part in the Jamboree On The Air (JOTA) weekend, they will have a special callsign for the event, with plenty of Scouts and Cubs taking part in arranged activities! More details are available at www.radioclubs.net/bdarc

Midland ARS celebrated its most recent exam pass when Steve Vicars obtained the callsign M0SSV. He's seen here with trainer Ron, M0WSN.



REGION 6: NORTH WALES

REGIONAL MANAGER: LIZ CABBAN, GW0ETU, RM6@RSGB.ORG.UK

Dragon ARC
Stewart, GW0ETF, 07833 620 733
3 The Cobwebb, 1/4 wave stubs and folded dipoles, GW0ETF
17 AGM

North Wales Radio Society
Liz Cabban,
lizcabban@vodafoneemail.co.uk
6 General meeting
13 Technical topics
20 Visit by Graham Coomber, GM of RSGB
27 Natter Night

The BBC WW1 roadshow visited the Rhyl airshow in August. The Regional Manager was approached by BBC Learning to provide some help & support for the Comms zone with the Royal Signals. A team of 6 attended over the 2 days – Liz, GW0ETU, Gordon, MW0GBR, Tony, MW0BXJ, Dave, M0OBW, Kath, M1CNY and Mark, MW1MDH. They were kept busy all day, despite a slow start due to inclement weather, with enthusiastic youngsters and adults alike creating, sending & receiving messages in CW. The Zone included other forms of comms including semaphore, field telephones and other radio activities. The whole event was very well organised by the BBC teams and those involved were very well looked after. It was a busy but very enjoyable weekend and they even managed to see the Battle of Britain Memorial Flight (minus the Lancaster) and the Red Arrows.

REGION 7: SOUTH WALES

REGIONAL MANAGER: JIMMY SNEDDON, MW0EQL, RM7@RSGB.ORG.UK

Aberystwyth & DARS
Ray, GW7AGG, 01970 611 853
13 Communications on wind farms and hydro systems, Ray, GW7AGG

Carmarthen ARS
Lloyd, 2W0LLT, 01239 711 297
4 Working satellites, Elgan, 2W0ZZU
18 Antenna for portable operation/practical, Allan, GW4VPX

Llanelli ARS
Craig, MW0MXT, 01269 845 773
3 On air night
10 Club raffle
17 Social evening
24 Junk sale & club raffle

Laugharne ARS has announced a new 100 award for 1296MHz contacts. Contacts must be non digital (ie CW, SSB, FM, AM), the aerial must be handheld and the output power must not exceed 100mW at aerial. A total of 3 contacts over 100km is required for the award, which is free and intended to promote activity on 23cm, particularly portable / SOTA activity. The award consists of a certificate and eggcup. More from the Award Manager, Matthew, GW6KOA by e-mail to matthew.twyman63@btinternet.com

REGION 8: NORTHERN IRELAND

REGIONAL MANAGER: PHILIP HOSEY, MI0MSO, RM8@RSGB.ORG.UK

Ian, GI0AZB and Bobby, MI0RYL gave an interview on BBC Radio Ulster from the BBC World War One at Home event that was held in Northern Ireland.

The photograph below shows Bill, GI4AAM, Gary, GI6ATD, Peter, 2I0ETW and Stephen, GI0HHV struggling with what appears to be a new type of aerial but is, in fact, their temporary home at the beginning of September's SSB field day at Drumawhey, Co. Down.

The next meeting of **Bangor & District Amateur Radio Society** is the annual surplus equipment sale on 6 November, one of the most popular events of the season.

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 Net 8pm 145.375MHz
12 Aspects of the BBC, Tony, G0OVO

Burnham Beeches RC
Dave, G4XDU, 01628 625 720
3 Club project constuction 2
17 Broken equipment evening, Jeremy, G8MLK

Echelford ARS
John, G4GSC, 01784 451 898
13 Radar, Magnetron developments, Nimrod, UAV's + video, Prof Simon Watts, G3XXH
27 On-Air evening/CW practice/Bring & Buy/ natter night

Edgware & DRS
Mike, G4RNW, 02089 500 658
13 The History of the saxophone and 'other things', Mike, G4RNW
27 A talk by Dr Jamie Barras

Newbury & DARS
Rob, G4LMW, 01635 862 737
26 An introduction to digital television, Ray, G4FON

Southgate ARC
Mr K Mendum, G8RPA, g8rpa@arrl.net
12 Autumn junk/surplus sale

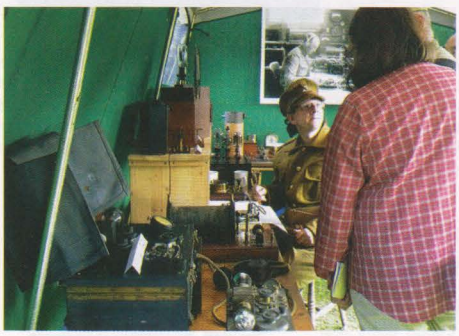
Verulam ARC
Peter, G4HSO, 01438 833 066
13 Social with Repeater Group 7.30pm, Rose and Crown Pub
18 EMC, John, G8MM

A new amateur radio club at the Royal Hospital Chelsea (Home of the Chelsea Pensioners) has been set up with the assistance of the Royal Air Force Amateur Radio Society (RAFARS) and the Radio Society of Harrow (RSH). A chance meeting in Cheltenham with Flt/Lt Richie Judson, G0RHJ, Chairman of RAFARS, led In-Pensioner (I/P) David Lyall to enquire of his fellow ex-Royal Signals friend I/P Ray Petrie whether there were any radio amateurs in the Royal Hospital, which bore immediate fruit when Ray replied "I'm one – GOSLL!" Meetings followed with Richie Judson and later with Brian, G3YKB of RSH, resulting in offers of equipment from RAFARS and a course of instruction by RSH for aspiring amateurs to take the Foundation exam for a licence.

In the late 1940s David had been an SWL and to his surprise nearly 50 years later he acquired

his callsign M6YDG. They now have the use of a small hobby room, with a 10-160 metre band transceiver, another for the 2 metre band and a couple of discreet antennas (the Royal Hospital is a Grade I listed building).
The photograph shows Richie Judson (centre) with I/Ps David & Tom Lyall, Ray Petrie and Brian Hodgson (Richie and Brian displaying RHC plaques presented to them by the Club in gratitude for their help and encouragement).

On National Heritage Day, 13 September, **Dorking and District Radio Society** provided an important attraction at National Trust, Polesden Lacey near Leatherhead in Surrey. There was a special exhibition entitled Communications in the Trenches that included a replica radio station, complete with a soldier in uniform. It attracted great interest from the visitors and gave an excellent impression of the equipment used during WW1.
In contrast, there was a modern radio exhibit using the special event callsign GB0NT. A 2m station was particularly busy throughout the day. Another station was devoted to CW on 21MHz using a 4-square antenna with stations worked in Saudi Arabia and the USA. A phone station on 40m and 80m was less busy but a number of contacts with other commemorative stations were made. A *WSPR* station with a real time visual display demonstrated the reach of their 0.5W signal on 10m. The coverage was mainly throughout Africa and included a report from Melbourne, Australia.
The activity at this site high on the North Downs was well supported by members, producing interesting and wide ranging discussions with visitors. It was the club's third collaboration with the National Trust and with Fetcham Scouts who supplied and erected a marquee.



On 31 August at Crossness Museum's steaming day and local history fair, three former KW Electronics employees (pictured L-R, Chris, G8GKC, John, G8JAD and John, G4MGY) visited the **Cray Valley Radio Society** exhibit that included a feature on the amateur radio equipment manufacturer that used to be based in nearby Dartford, Kent.
Rather than just put on a traditional special event station (as previously done with GB2CM at the museum) CVRS developed an exhibition stand linking modern day amateur radio with local 'radio' history (to fit the theme of the day) featuring displays about local companies with radio connections. The approach worked very well with CVRS members able to concentrate on talking to the public about the displays and provide information and answer questions about present day amateur radio. Emphasis was placed on the current route into the hobby via the three-tier licence system and the central role played by local clubs like CVRS providing training courses and helping newcomers get on the air.

REGION 10: SOUTH & SOUTH EAST

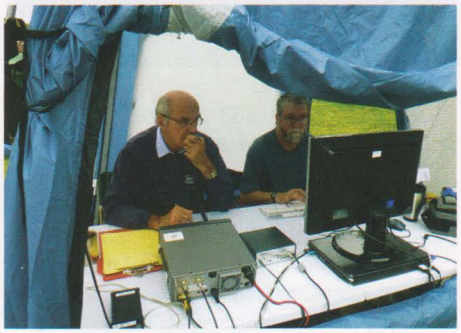
REGIONAL MANAGER: MICHAEL SENIOR, G4EFO, RM10@RSGB.ORG.UK

Brede Steam ARS
Dan, M0HOW, 01424 882 008
4, 11, 18, 25 At the shack operating GB1FBS
Bromley & DARS
Andy, G4WGZ, 01689 878 089
18 Members' short talks
Crystal Palace R&EC
Bob, G3OOU, 01737 552 170
7 Talk by Guide Dogs for the Blind
Dorking & DRS
Garth, G3NPC, 01737 359 472
25 3-dimensional measurement and mapping of an antenna radiation pattern + AGM, Garth, G3NPC and Alan, M6NNB
Hilderstone R&EC
Chrissie Turner,
hilderstoneclub@gmail.com, http://g0hrs.org/
13 Natter night
15 Buildathon construction day
27 AGM
Horndean & DARC
Stuart, G0FYX, 02392 472 846
6 Natter night and social activities evening
20 House wiring/electrics to the home, Bob Button
Horsham ARC
Adrian, G4LRP, 07714 664 957,
drm103@rsgb.org.uk
6 Trams and electric traction, Ian Geldhill from the Volks Railway
13 Social 8pm, The Limeburners
16 Fox hunt
Itchen Valley ARC
Quintin, M1ENU, 023 8078 7799
14 Auction
28 Multi-club quiz, Quintin M1ENU
Mid-Sussex ARS
Sue Davis, G6YPY, 01273 845 103,
7 Radio night
21 Radio night and table top sale
28 Grand winter used equipment sale 7pm
Southdown ARS
John, G3DQY, 01424 424 319
3 Clansman field test equipment, Barry, G8DUX
5 Operating at the Hailsham shack and at Beachy Head afternoons
17 Christmas at the Toby
Sutton & Cheam RS
John, G0BWV, 020 8644 9945
20 How valves work, David, M0SXD
Swindon & DARC
Jonathan, M0ZGB, m0zgb@btinternet.com
6 The latest Somerset range of kits, Tim Walford, G3PCJ
13, 27 Activity night
20 The tour (of Swindon in old photos), R Townsend
Trowbridge & DARC
Ian, G0GRI, 01225 864 698, E/W
5 G2BQY & G4UNU Constructor's cup entry judging
19 Natter night
West Kent ARS
Keith, G4JED, info@wkars.org.uk
10 Club meeting
Wimbledon & DARS
Kim, G6JXA, 07812 735 507
28 Surplus sale, Jim, G4WYJ
Worthing & DARC
Gordon, 2E0GTG, 07801 599 470
2 Sunday breakfast 9am
12 Discussion evening
19 bhi, new advancements in noise cancelation, Graham, M3ZGS
26 G3WOR on the air

21 August will be remembered as the day all his friends at Worthing and District ARC lost their President and fellow club member of many years, John Slater, G8FMJ. John was licensed as G8FMJ in 1971 a few years after starting work in the family business Slaters Television run by his late father Al Slater, G3FXB. This was a job for

life and having taken over running the business when Al retired he had sold the shop this year in the process of going into retirement. All the plans were made, but he never managed to achieve the goal of having time for himself and family, together with spending more 'radio time'.
The early years of G8FMJ were spent on VHF and, with the licence changes in 2003, John was then to be heard on the HF bands. 80m became a passion and he was always to be heard taking part in the 80m Club Championships plus sprints and other contests. This year he was looking forward to attending the RSGB Convention to collect his trophies. John had been working with the club to achieve a better performance in the SSB Field Day and last year the result of the work came to fulfilment with 1st place in the restricted section for G3WOR/P. His personal efforts were to be rewarded for winning the SSB ROPOCO contest using the G4DAA Channel Contest Group club call, plus he was to receive the Verulam Silver Jubilee Trophy for the highest placed error-free log.
Our thoughts are with his family and friends.

Field Day isn't just about winning. For **Itchen Valley ARC** it's far more about improving the station, honing operating skills and hopefully, beating previous scores. This year IVARC broke the 500 QSO barrier for the first time ever. Add to that getting an Intermediate licensee on air for his first real HF contacts (apart from training) and also having a Foundation trainee volunteer to take some logging sessions and immediately find himself having to learn N1MM in front of a pile-up – and coping admirably – all concerned would consider it a success. The team consisted of operators Paul, G6MCX, Richard, G3OTK, Ray, G3HRH, Liz, M0ACL, Brian, G0UKB and newcomer Dave, 2E0JHD who also shared logging along with yet to be licenced Ray.
The station used a Tennamast portable trailer mast, using the rotator cage and a scaffold pole they were able to get our fan-dipole to nearly 13m high. The fan dipole consisted of 3 dipoles for 80, 40 and 20m with a separate dipole for 10m. 15m was catered for by being 3λ/2 on the 40m dipole. All were connected into a Kenwood TS-570 running 100W barefoot and powered by a linear PSU running off their newly acquired (2nd-hand) Honda generator. Despite the antenna wires sometimes resembling maypole dancing they were soon staked out by the ground crew and the operators, joined by Graham, G3XSD and Mike, G3NKR. Long lengths of cheap Poundland string staked the dipole ends to the ground, sufficiently far from the mast that even the 80m ones were 3m above the ground.
The club still have lots to learn; they persisted on a dying 20m band for far too long and didn't make the best use of 80m overnight but all in all it was a great effort. Over half the 532 QSOs were on 40m and a third of those were with German stations. In contrast they only made 6 contacts on 15m and 2 on 10m with the best DX either being JA on 15m or PY on 10.
So, if you've not contested as a club before – why not give SSB FD 2015 a go? All you need is tent, rig, antenna and generator – oh, and operators, of course. A computer for logging is also pretty much essential these days. It's a great way to get club members involved, both old hams and those newly licenced ones that haven't yet had much opportunity to get on air.



West Kent ARS were pleased to see several hundred visitors to their recent Fair in Tunbridge Wells, having sold out all available space for traders and having to decline some late booking requests. The overall feedback was very positive, with many traders wanting to book again for next year, the plans for which are at an early stage with the date to be confirmed soon. The club last ran such an event in the 80s and were, on this occasion, pleased to have visitors from around Kent and neighbouring counties. Thank you to everyone who came along, and they look forward to seeing you and many more again in 2015.

Maidstone YMCA ARS entered the 144MHz Trophy contest in September and posted a claimed score of 100 QSOs with some nice contacts into France and Germany. They hoped for a much higher QSO score than achieved but the main amplifier failed on the Saturday. The club intended to post a entry in the HF SSB contest, but Murphy got in the way. For some strange reason they could not get either of the HF beams to load properly. Much time was spent, bashing heads! It was a great shame as the callsign G3TRF has not been heard on the air for some time. With thanks to Nick, G4ZXI, Ray, M0RAY, Trev, G6ALJ, Ian, 2E0IJH, and JB, G0XJB.

REGION 11: SOUTH WEST & CHANNEL ISLANDS

REGIONAL MANAGER: PAM HELLIWELL, G7SME, RM11@RSGB.ORG.UK

Appledore & DARC
Alan, M6CCH, 01237 422 833
17 Light-hearted radio quiz, John, G3JKL
Bristol RSGB Group
Robin Thompson, G3TKF, robin@g3tkf.co.uk
24 My latest DXpedition, Phil, G3SWH
Callington ARS
John, G4PBN, 01822 835 834
5 The magnetic loop revisited, Ray, G8AWB
Cornish RAC
Steve, G7VOH, 01209 844 939
5 Committee meeting
6 Main meeting
20 Activities evening
Exeter ARS
Nick, M0NRJ, 01363 775 756
3, 17 Net on 3.675kHz at 7:45
4, 11, 18, 25 Net on 145.575MHz at 7:45
10 CW practice and amateur radio videos
24 Bring in something interesting
Exmouth ARC
Mike, G1GZG, 01395 274 172
5 Clock/watch repairing
18 Auction night
Plymouth Radio Club
David, 2E0DTC, d.beck123@btinternet.com
11 Natter night
Poldhu ARC
Keith, G0WYS, g0wys@yahoo.co.uk
11 An introduction to SDR radio, Simon, G4ELI
Saltash & DARC
Mark Chanter, 2E0MGC, 01752 215 546
6 Annual General Meeting
20 Operating night
South Bristol ARC
Andrew, G7KNA, 07838 695 471
6 Start of the Christmas raffle
13 Valve technology, Cyril, G3XED
20 Annual General Meeting
27 Open house and on the air night
Torbay ARS
Dave, G6FSP, g6fsp@tars.org.uk
28 Transport in the area from years gone by, Image Bank at Totnes
Yeovil ARC
Rodney, M0RGE, 01935 825 791,
6 Demonstrations: bring along your crystal set
13 Talk by G3PCJ
20 Morse practice, G3MYM
27 On the air

Deadline for your entry in the 2014 Club of the Year competition is 31 January 2015, see the RSGB website at www.rsgb.org/coty

Exeter RAYNET Group have built and installed their new 70cm repeater, GB3EX, north of Exeter in Devon. With hardware donated by Alec, G0BCO, club members Pete, G3ZVI, John, G8XQQ and Skip, 2E0TGT, they built the repeater from scratch. Ultimately, powered by both solar and wind power it will provide excellent coverage for East Devon for RAYNET activities. The photo shows chairman Keith, G7NBU affixing the antenna mast to a barn with the solar panel already in place.

In July, seven members of the **Exeter RAYNET Group** provided key communications and timekeeping for the Clinton Estates Endurance Ride around Bicton in East Devon. RAYNET members, at five check points, correlated the movements of 120 horses and riders on seven routes up to 80km in length. They were at full stretch providing up to the minute statistics and emergency messages for over eight hours. The event organisers thanked the RAYNET team for the faultless continuous coverage that enabled them to instantly know the location of every rider. The photo shows some of the members outside the Hub. From left are John, G8XQQ, Keith, G7NBU, Tony, M0THJ, Phil, 2E0PCJ and Pete, G3ZVI.

DEADLINES

The next deadlines for entries in *RadCom* Around Your Region are 23 October for the December edition and 20 November for January 2015.

REGION 12: EAST & EAST ANGLIA

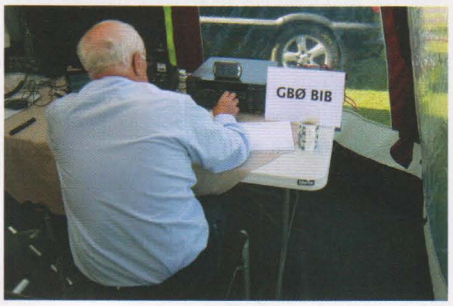
REGIONAL MANAGER: STEVE THOMAS, M1ACB, RM12@RSGB.ORG.UK

Braintree & DARS
John, M5AJB, 01787 460 947
3 The use of scopes, G0DEC
17 Making up patch leads – bring your own cable and plugs
Cambridge & DARC
David, M0ZEB, 01353 778 093
14 RSGB update and discussion, Steve, M1ACB
28 Spectrum analysers – design and use, Andre, G6ALB
Chelmsford ARS
secretary@g0mwt.org.uk
4 Essex RAYNET, Roland, M0BDB
17 Skills workshop
Felixstowe & DARS
Paul, G4YQC, pjw@btinternet.com
11 A trip down RSGB memory lane, Paul, G4YQC
24 Junk sale
Harwich ARIG
Michael, 2E0GUI, michael.2e0gui@gmail.com
12 Club night
Norfolk ARC
Chris, G0DWV, 01603 898 678
5 Informal
12 Getting started in amateur television, Noel, G8GTZ
19 Changes in the weather, Jim, G3YLA
26 Informal and Bright Sparks
South Essex ARS
Terry, G1FBW, 07986 070 040
11 AGM (members only)
Thames ARG
Mark, M0IEO, 07940 579116
7 AGM
15 Foundation course

The **Braintree & District ARS** annual surplus equipment sale took place with its usual auction format. All items for auction are either donated, with all monies to the club, or commission sales with a percentage to the club. This year's auction included some very good meters, antenna tuners, leads and test gear. As a result, the club funds were given a great boost. Some items, that were not sold, will be taken to the Canvey Rally next year.

Two members of the club traveled to Lincolnshire to run GB0BIB from the village of Baston for an 1940s themed event called Baston in The Blitz. Tony, G0IAG and Edwin, G0LPO set up the station on Baston playing field, surrounded by militaria, stalls, re-enactors and living history displays. Apart from operating the station, Tony and Edwin spent a lot of the time talking to the public about wartime radio communication and the children were encouraged to send Tony their name in Morse code for a proficiency certificate. A small display of wartime military radio was on show with a selection of WW2 Morse keys.

Tony and Edwin, who are also members of Duxford Radio Society (DRS), would like to thank DRS for the loan of a Wireless Set 19 for their display. On the day a good numbers of stations were worked in eight countries.

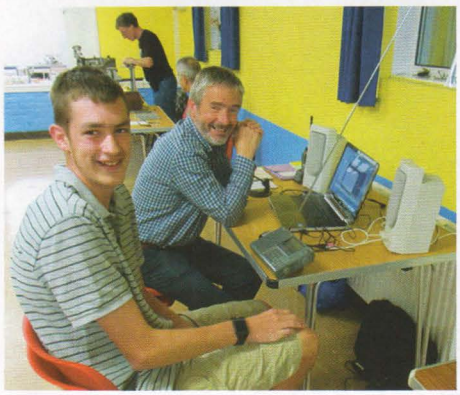


The Ideas Festival runs from 20 October until 2 November and celebrates the creativity of Chelmsford's people, past and present. Amongst the highlights is a talk by Professor Marconi, the grandson of Guglielmo Marconi. This will be complemented by an account of the extraordinary space technology that the company e2v produces today. Amateur radio features on two days. Members of **Chelmsford ARS**, Jim, 2E0RMI and Pete, M0PSX will be giving presentations in the Ideas Hub on The World of Amateur Radio from 10am-4pm on Friday 31 October and Sunday 2 November. They will explain how to get started in the hobby, practical uses, applications, including the fun and zany aspects. Join them for demonstrations with short introductory talks at 10am, 12pm and 2pm. It's a free drop in session, no need to book. Further details at www.changingchelmsford.org/if2014/

A Friday evening net was launched in the Norwich area on 3 October for newer licensed members of the local amateur community to get on the air and discuss topics important for them. The net will be run by Nigel, 2E0NLK using the repeater GB3NB and will commence at 7.30pm for one hour. Everyone will be welcome to join but the main intention is to encourage younger members who are perhaps tied up with school work on other evenings. Initially, this will be on a trial basis for the whole of October. If there is sufficient support Nigel will continue and encourage a rota of operators to become controllers and establish the net as an on-going event. Nigel's initiative arose from a discussion at the **Norfolk Amateur Radio Club's** annual forum and has the club's full support.

There was another busy Skills Night for the Chelmsford ARS in September. Almost

50 attendees gathered for a good mix of demonstrations, show-and-tell, chat and tea. On the agenda for the September evening was a demonstration of a Raspberry Pi being used to show the signal spectrum of the 40m band, patch lead soldering sessions, a session for those just joining the hobby, a demo of the Flex 1500 SDR, a live CW station, satellites, data modes and callsign badges while-you-wait. More details on the free Skills Nights are at www.hamskills.co.uk The photo shows Jim, 2E0RMI talking to a possible new Foundation candidate.

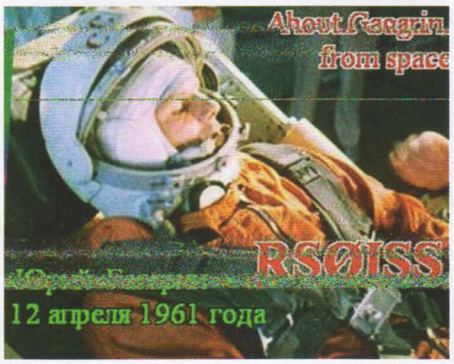


In October, Cathy Colless, M0RTW will travel to Antarctica to take up the post of Radio Communications Officer at the Rothera Research Station. In 2013 Cathy, then a Senior Systems Architect at Anglia Ruskin University, took and passed, all three amateur radio licence levels in just 57 days with no prior amateur radio experience. She did the Foundation course and exam with the **Chelmsford ARS** in October 2013, and whilst attending the CARS Advanced course in November, took her Intermediate exam with the **Bromley and District Amateur Radio Society**. With the Intermediate successfully under her belt, she was able to sit the Advanced exam session with CARS on 6 December 2013 and became the holder of M0RTW. She leaves the UK to travel to Antarctica via Punta Arenas in Chile on 19 October. Cathy has started a blog that will detail her experiences in this opportunity of a lifetime: follow it at http://passyourmessage.com/ The photo shows Peter, M0PSX teaching Cathy, M0RTW at the CARS Foundation course.

Special event station GB2HB was activated in August to commemorate the 70th anniversary of Heavenly Body II, the B17 aircraft that crashed at Canvey Point in 1944.

They also operated at the Island Yacht Club on four weekdays during August when good weather and great conditions (and lots of aircraft activity overhead, including a wartime DC3, two spitfires and twice the only two Lancasters still flying passed overhead) meant 422 contacts in 41 countries was worked. Highlights were USA/Canada and Indonesia. There was lots of feedback from stations received by email and social media. The video and information on the club website and QRZ.com about the crash.

As part of the Essex Ham field day in September, images celebrating Russian astronaut Yuri Gagarin were captured in two passes of the International Space Station. The image show here was captured at 1500 local time using the MMSSTV application and a home-made Slim Jim antenna which was being used for the event's 2m station. The Essex Ham field day at Galleywood Common was an opportunity for some technical experimentation, including testing of antennas and hardware in preparation for an upcoming Essex RAYNET event. Receiving live images from the ISS was the icing on the cake of a useful, and fun, Essex Ham event.



REGION 13: EAST MIDLANDS

REGIONAL MANAGER: STEVE BODEN, G4XCK, RM13@RSGB.ORG.UK

Derby & DARS
Richard Buckby, radio@dadars.org.uk
4 Junk Sale
11 Committee Meeting
18 The Claymills pumping engines restoration project, Andrew Parsons
25 Night on the Air

Grantham ARC
Kevin, G6SSN, 07793 142 483
4 AGM
18 Construction evening

Melton Mowbray ARS
Brian, M0YBX, 07772 659 622
21 Developing data

Northampton Radio Club
John, G4CZB, 01604 832 584
3, 10, 17, 24 Net on 145.4625MHz 8pm, all welcome
6, 13, 20, 27 Club night

Nunsfield House ARG
Ken, G3OCA, 01332 720 976
7 Railway signalling
14 GM & EI Island operation
21 Club night
28 Committee meeting

RAF Waddington ARC
Bob, G3VCA, 07971 166 250
3, 10, 17, 24 Net 145.325MHz 8pm
13 Committee meeting

South Kesteven ARS
Nigel, M0CVO, 01476 402 550
5, 19 Net on 145.525MHz 8pm
12, 26 Informal

Welland Valley ARS
Peter, G4XEX, 01858 432 105
3 Net on 145.275MHz + data evening
17 Build a bug key and connecting cables

Brian, M0YBX was elected as secretary for Melton Mowbray ARS at their AGM in September. Other news from the club is that Pete, G3XYC and Pete, M0LBM took part in the 80m Club Championship and finished in ninth position in the local league.

DEADLINES

The next deadlines for entries in *RadCom* Around Your Region are 23 October and 20 November. E-mail your news items and club calendar information to radcom@rsgb.org.uk

Deadline for your entry in the 2014 Club of the Year competition is 31 January 2015, see the RSGB website at www.rsgb.org/coty

Classified Ads

For Sale

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

Equipment

REPAIRS TO RECEIVERS, TRANSMITTERS, etc. 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

AMTECH RADIO.
Professional qualified services and repairs to all amateur radio equipment. We also buy and sell amateur radio equipment. Contact David on 01323 472216 – 07517 445452

Wanted

UNWANTED VALVE AMPLIFIERS, working or not. Known makes only (Kenwood, Yaesu, Drake, Linear Amp, etc), not homebrew. Also 3-500Z/ZG valves. Cash paid. Contact Peter G3ZRS on 01482 862323 or g3zrs@hotmail.co.uk

VINTAGE RADIO & VALVES WANTED - national cash settlement for silent key, shack clearouts 07552678725, vintageradio@btinternet.com

Aerials

M0CVO ANTENNAS for all your amateur radio antenna needs. Full details at: http://www.m0cvoantennas.com

G4TPH PORTABLE MAGLOOPS Remote and manual tune models for 40m through 10 metres Details at www.g4tph.com

SIGMA EURO-COMM LTD HF Vertical, Wire, G5RV & Mobile Antennas, VHF Base Station Antennas Mounting Poles, Magnetic Mounts Tel 0121 766 8146
stores.ebay.co.uk/sigmaeurocommltd

"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 fdes, baluns, windoms, many different antennas, mostly made using kevlar mill spec wire. See Eham reports or www.gwhip.co.uk Tel: 07592 135431

Cards & Design

QSLERS SPECIAL OFFER 1000 full colour both sides qsl cards £40 plus postage. 07720 580968 www.QSLers.co.uk

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QUALITY QSL CARDS 4 colour cards from £34/1000. For samples /enquiries /easy payments contact Charles MØOXO, 60 Church Hill, Royston, Barnsley, Sth Yorks S714NG ; Tel 07900 500775 Email charles@m0oxo.com/
Web www.ux5uoqsl.com/

Miscellaneous

CALL IN ON THE UK 'GOOD NEWS' CHRISTIAN NETS! Every Sunday morning at 8am local on 3747kHz, 2pm on 3747 or 7147KHz (propagation) and 144.205 SSB at 3pm sharing Christian fellowship. Go to www.wacral.org for more information or contact G3XNX at 51 Alma Road, Brixham, South Devon, TQ5 8QR, Tel: 01803 854504 or derekg3xnx@talktalk.net

PAFOS, CYPRUS. Pafos, 2 bed villa. Simple HF station 300m ASL. www.domsvilla.co.uk

Computer Software

PROGRAMMING SOFTWARE FOR YAESU RADIOS Http://www.g4hfq.co.uk bob.freeth@g4hfq.co.uk (01425) 618092

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

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

Adertisers Index

FREE MEMBERS' ADS

Charges are waived for Members' Ads submitted by e-mail to memads@rsgb.org.uk. One ad of no more than 40 words per Member per month; other important terms & conditions apply (see grey box on page 93).

FOR SALE

ALINCO DR-135DX 10m transceiver. As new and boxed, £120 ONO. Wouxun KG-UVP1P dual band handie, with speaker mic and AA battery case. As new and boxed. Offers? Both plus carriage. Ray, G4OWY, 0790 9383 475, g4owy6@gmail.com (Dorset).

COLLINS 75S-3B valve receiver. Working well. Cosmetically very nice but ask me for more pictures and judge for yourself. CW filter and 240/110V autotransformer included. £400 cash. Alan, G3XAQ, 01227 738520, alan@g3xaq.net (Canterbury).

CUBEX QUAD ANTENNA. Two element, five bands (10, 12, 15, 18 & 20m) on 8ft boom, strung with heavy duty stranded copper wire terminating in Cubex matching transformer for single coax feed. Collection only but help with dismantling provided. £325. Tony, G0MDZ, 01636 830 005, tony@east-hall.co.uk (Nottingham).

EX-MILITARY EQUIPMENT: German SEM25 Tx/Rx, 26-69MHz; 15W o/p, baseplate, auto-ATU, handset, manual. Needs 24V PSU. Field vertical antenna set-up (UK-MOD): guyed 30ft mast and 12ft whip antenna in Cu-plated steel. All VGC, top-quality kit. £400 ono + carriage the lot. G4GMZ, 01260 272 649, johnalder1@btinternet.com (Congleton, Cheshire).

FREE *RADCOM* for the years 2001 to 2010. Complete all in good condition, kept inside. Very heavy, about 24kg. To be collected or courier to be arranged. Rod Fry, G3NDI, 01344 774 590, crfry@iee.org (Crowthorne).

FULL SHACK... GETTING MARRIED! Two Yaesu FT-897Ds, Yaesu FT-7800E, Yaesu VR-5000, Yaesu FC-30, MFJ-749E, 4 x Watson PSUs, base and mobile antennas etc etc etc. ALL ITEMS BOXED with original accessories. Quick sale £1,500. Ian, M6GBK, 01942 700 851 (Leigh, Lancashire).

HAMEG HM-203 oscilloscope, Leader LSG-17 signal generator with manuals and Watson W-25AM PSU, all in GWO. Sensible offers please, must be collected. E-mail for details. Patrick, M0ZVB, Patrick-carpenter@hotmail.co.uk (Beckenham).

HRO RECEIVER, early 1940s. Table model 5. In working order, cosmetically excellent. Original unmodified condition. Includes loudspeaker, 2 coil packs covering 20m, 40m and medium wave. Homebrew PSU. Ex Hanslope Park. £125. David, G3ZPA, 01908 501 310 (Bletchley).

ICOM AT-180 auto ATU, little used, in VGC with cable for IC-706 and original packaging – owned since new, £250 or WHY? John, G4LTH 01375 670 078 (Corringham).

ICOM IC-706mk11g, VGC, mic, EMC filter, 2 MB-63 boxed new, 3.5m separation kit, power lead, £390 ONO. Yaesu FT-100d, VGC, MH-42BJS mic, 2 power leads, £275 ONO. MA-600 144/430 dual-band colinear, £65. TET HB-33SP 3-ele beam, 14/21/28MHz, £50 ONO. John, M0OJG 01789 764 889 (Alcester).

JST-100 HF transceiver, £400 plus carriage, ex-silent key, warranty seals still intact. Reason for sale, prefer valve equipment. Frank, G4FGP, 01922 453 680 (West Midlands).

PAIR OF HEAVY DUTY wall brackets. 18" stand-off. Good unused condition. Galvanised and no rust. Complete with 'U' bolts for 2" mast. £18. Buyer must collect please. David, G6KIE, 020 8397 3614 (Chessington, Surrey).

PALSTAR AT500 ATU, 600W PEP, used once from new, £200. Trio TR-751E 144MHz all mode transceiver, 100W amplifier and MFJ VHF ATU, c/w car bracket, £150. Arthur, MW0BLM, 01686 411 369 (Mid Wales).

THREE SECTION 10 METRE ground mounted tiltover mast. Has been stored for ten years and requires a good cleaning and re-painting. Base post has been cut off at ground level and will require extending. £35. Collect only. Nick, G4NKV, 07810 232 891, nick@g4nkv.co.uk (Whitby).

TONNA 11-ELE 144MHz YAGI – only used twice – £65. RN Electronics 6m transverter, 144MHz IF, 50MHz out at 25W, £70. ERA Microreader, RTTY / CW decoder, £35. Collect or post at cost. Dave, G1IDZ, 01684 572 060, golf1idz@gmail.com (Malvern).

TONO THETA 9000E Communications Terminal. Provides complete automatic send/receive of CW, Baudot RTTY and ASCI (RTTY&KCS) No PC required. Google or email for details. Excellent condition, fully working, c/w manuals, light pen, original packing. £100 ONO, Collect or carriage extra. Alastair, GM3NKG, 01698 881 896, gm3nkg@gmail.com (Larkhall)

WIDEBAND FOLDED DIPOLE antenna. New, still in box as delivered, £150 ono. MW0HAP, 01745 354 614, alan.phillips747@talktalk.net (Rhyl).

YAESU FT DX 1200, 5 months old, includes FFT unit. Mint with box etc. Inspection invited. £1,100 incl delivery. Paul, GW4AMZ, 07789 116 295, paulbds@gmail.com (Colwyn Bay).

YAESU FT-817ND HF to 70cm QRP transceiver, all accessories, in original box, excellent condition, plus Maplin 7A PSU and SEM Tranzmatch, £450. Buyer collects or carriage extra at cost. Ian, G4JIU 01375 768 687, evenings preferred (near Basildon).

YAESU FT-817ND with 2 internal batteries, two power cords, spare battery cover, two AA battery trays. 2m, 70cm telescopic antenna, leather case, 12V 7AH SLAB and gopack. I am including a brand new unused LDG Z817 tuner. £400. Mike, M0MMB, Mick_b777@hotmail.com (Essex).

WANTED

HEXBEAM multi bander HF antenna. Jim Durey, M6JEK, 01621 592 042 (Maldon, Essex).

KW201 OR KW202 receiver wanted. Working not essential, but must be complete. Can collect reasonable distance. Brian Tibbert, G3RKZ, briantibbert2011@btinternet.com (Derby).

BT EXTENSION BOOSTER TYPE 870788, working, or a defunct unit incorporating an undamaged IC type TL2627-4, is urgently required. Alternatively, a source of supply of these would be useful. Tony, G3NPF, 01903 746 959, a.wadsworth@tesco.net (Storrington, West Sussex).

ICOM IC-736 in good condition. Tom, G3HGE 01284 728 452 (Bury St Edmunds).

HELPLINES

I am seeking information on the early years of G3HJL (Frederick Richard Bailey – born in South Africa in 1920, died in Harlow, Essex in 1996). He was my mentor when I first started work with STC. John, G3PAI/F5VLF, +33 386 205 050 (58800 Cervon, France).

RALLIES & EVENTS

Members of the RSGB Regional Team will be present with a bookstall at the rallies this month marked with an RSGB diamond

25 OCTOBER
Note: incorrect date in October *RadCom*. **FOG ON THE TYNE RALLY** – Whitehall Road Methodist Church Hall, Bensham, Gateshead NE8 4LH, organised by Angel of the North ARC. £1.50, TS, B&B, C, CP. Nancy Bone, G7UUR, 01914 770 036 (eves), nancybone2001@yahoo.co.uk. [www.anarc.net].

9 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].

22 NOVEMBER – **ROCHDALE & DISTRICT ARS TRADITIONAL RADIO RALLY** – St Vincent de Paul's, Caldershaw Rd, off Edenfield Roadd (A680), Norden, Rochdale OL12 6BU. OT 10.15/10.30, £2.50 (concessions U12 & seniors), TI S22, C. Pitches £5, bring your own table. Dave, G0PUD, dave.shaw1@sky.com, 0161 285 1600. [www.radars.me.uk].

23 NOVEMBER – **CATS RADIO & ELECTRONICS BAZAAR** – 1st Coulsdon Scout HQ, rear of Council Car Park, Lion Green Road, Coulsdon, Surrey. OT 10am-1pm, £1, B&B, C, DIS, free CP. Glenn, G4FVL, bazaar@catsradio.org. Check www.catsradio.org **before setting out** as the site is planned for redevelopment and there may be last-minute changes to access or parking arrangements. [www.catsradio.org].

23 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.

6 DECEMBER – **SOUTH LANCS WINTER RALLY** – Bickershaw Labour Club, Bickershaw Lane, Bickershaw, Wigan WN2 5TE. OT 9am, traders 7.30am. £2, B&B, C, DIS, CP, SIG, DF, TS, LB. Jason, 01942 735 828.

7 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.

2015 RALLIES AND EVENTS

25 JANUARY – **HORNCASTLE WINTER RALLY** – Horncastle Youth Centre, Lincolnshire LN9 6DZ. OT 10.30, £1.50, DF, C, free CP. Tony, G3ZPU, 01507 527 835, tony.nightingale@yahoo.co.uk.

1 FEBRUARY – **30th CANVEY RADIO & ELECTRONICS RALLY** – 'The Paddocks', Long Road, Canvey Island, Essex SS8 0JA (southern end of A130). Free CP, OT 10.30. C, DF, TS. Vic Rogers, G6BHE, 01702 308 562, nvr@blueyonder.co.uk. [www.southessex-ars.co.uk].

15 FEBRUARY – **RADIO-ACTIVE RALLY** – Civic Hall, Nantwich, Cheshire CW5 5DG. OT 10.30, £, TS, B&B, C, DF, WIN. Jayne 07926 078 232, Jayne.ruscoe@yahoo.com. [www.midcars.org].

1 MARCH – **EXETER RADIO & ELECTRONICS RALLY** – America Hall, De La Rue Way, Pinhoe Exeter EX4 8PW. OT 10.15/10.30, £2. TS, B&B, C. Pete, G3ZVI, 07714 198 374, g3zvi@yahoo.co.uk.

29 MARCH – **DEVON & CORNWALL REPEATER GROUP + CALLINGTON ARS RALLY** – Callington Town Hall, Callington, Cornwall PL17 7BD. OT 10am, £2, CP, B&B, Camping site available. Roger, 2e0rph@gmail.com

3 MAY – **SCOTTISH HIGHLAND RADIO RALLY** – Aviemore Primary School and Community Centre, Muirton, Aviemore PH22 1SF. TS, SIG, RSGB bookstall, CP. OT 10.30am-4pm. Free tables for clubs and private sellers. Seating area. Roy, GM4VKI, 01563 850 976, rkavampsev@btinternet.com.

3 MAY – **DAMBUSTERS HAMFEST** – Thorpe Camp Visitor Centre, Coningsby, Lincolnshire LN4 4PE. TI S22, GB3FR. Admission £3, RAF heritage centre on site. Overnight camping by appointment. C, OT 10am. Mainly an outdoor rally but some limited space is available indoors. Contact tony.nightingale@yahoo.co.uk. [www.thorpecamp.org].

31 MAY – **BLACK COUNTRY RADIO RALLY** – Portway Lifestyle Centre, Newbury Lane, Oldbury, West Midlands B69 1HE. OT 9.30am, TI, CP, TS, B&B, SIG, C, DF, WIN, £2, RSGB Book Stall. Contact Martin via radio-circle@live.co.uk

14 JUNE – **14th JUNCTION 28 QRP RALLY** – South Normanton Alfreton and District ARC in association with the G QRP Club. Alfreton Leisure Centre, Church Street, Alfreton, DE55 7BD. 10 mins from M1 J28 and the A38. TI S21, OT 10am. TS, SIG, C, LB. Anya Lawrence, 2E0BQS, 0115 930 7322, adylawri@btinternet.com. [www.snadarc.com].

28 JUNE – **WEST OF ENGLAND RADIO RALLY** – Cheese & Grain, Bridge Street, Frome, Somerset BA11 1BE. CP, OT 10am-2pm, £2.50. TS, RSGB book stall, C, DIS. Details from Shaun, G8VPG, 01225 873 098, rallymanager@westrally.org.uk. [www.westrally.org.uk].

19 JULY – **FINNINGLEY ARS SUMMER RALLY** – The Hurst Radio Comms Centre, Belton Road, Sandtoft, Doncaster DN8 5SX. Easily accessible from M180 Junction 1 / Junction 2. OT 10am, £3, TS, CP, B&B, TI S21, RSGB bookstall. Kevin, G3AAF, 07831 614 640. [www.finningleyradiorally.co.uk].

26 JULY – **HORNCASTLE SUMMER RALLY** – Horncastle Youth Centre, Lincolnshire LN9 6DZ. OT 10.30, £1.50, DF, C, free CP. Tony, G3ZPU, 01507 527 835, tony.nightingale@yahoo.co.uk.

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. If you submit by e-mail (to radcom@rsgb.org.uk) then we suggest you set your e-mail program to request a 'read' receipt so you can be sure we've seen the details. We also recommend you check the details are correct in *RadCom* and **tell us if 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.

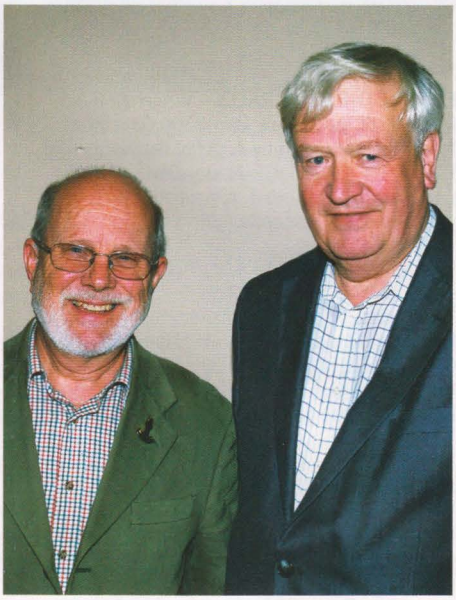
The 'purchase' of goods legally owned by a finance company could result in the 'purchaser' losing both the goods and the money paid.

Members' Ads also appear on the Members Only website at www.rsgb.org/membersonly/membersads.

RSGB President visits Northern Ireland

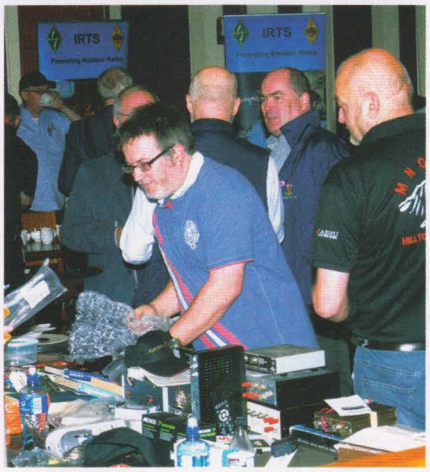
The annual West Tyrone ARC Convention, held this year on Saturday 4 October, was well attended. Along with some trade stands, a full lecture programme included Richard, G4CWI from SOTAbeams talking about energising your radio club, Bobby, MI0RYL on Castles And Stately Homes On The Air, IRTS Secretary and Youth Coordinator Ger, EI0GXB on YOTA in ES, John, G3WKL RSGB President, on Developing and Supporting Amateur Radio and Dave, M0OBW, RCF Interim Quality Manager on the Exam process. IRTS President Séamus, EI8BP closed proceedings pointing out that amateurs should join their national societies and thus support the work of their Society and the IARU on developing and protecting amateur radio.

From left to right IRTS Secretary Ger McNamara, EI4GXB, RSGB Region 8 Manager Philip Hosey, MI0MSO, RSGB President John Gould, G3WKL, IRTS President Seamus McCague, EI8BP, RCF Quality Manager Dave Wilson, M0OBW.



Two Presidents meet: (l) RSGB President John Gould, G3WKL, (r) IRTS President Séamus McCague, EI8BP.

Bobby Wadey, MI0RYL working on the RSGB stand.



It was brisk business for the traders, especially in between the lectures and during the lunch break.

SILENT KEYS

We regret to record the passing of the following Members:

Name	Date
Mr T Hall, G0UTH	
Mr F A Crompton, G1BOO	1/8/2013
Mr E F Steventon, G3JJA	
Mr H P Arnfield, G3LX	10/8/2014
Mr J V Mee, G3PJK	17/2/2014
Dr C R Bayliss, G3WKZ	6/9/2014
Mr E Rigby, G4HCS	2/10/2014
Mr A R Willis, G4JSN	29/5/2014
Mr G F Holtum, G4SLZ	4/9/2014
Mr M B Frampton, G6HWO	
Mr J W Kirman, M1GKZ	31/8/2014

SILENT KEY COLUMN ENTRIES

The Silent Keys column is **separate** from the online obituaries section. 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

We welcome obituaries from clubs or individuals when someone sadly passes away. They 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 Key column.

SPECIAL EVENTS STATIONS

These callsigns are valid for use from the date given, but the period of operation may vary from 1 - 28 days before or after the event date. Operating details are provided in an abbreviated form as follows: T = 160m; L = 80 or 40m; H = HF bands (30 - 10m); V = 6 and/or 4m; 2 = 2m; 7 = 70cm; S = satellite and P = packet. Details published here are kindly provided by Ofcom.

Date	Callsign	Phonetics	Location	Bands	Keeper
01/11/2014	GB4A	Alpha	Northampton	TLHV27	M0DOL
08/11/2014	GB1HTW	Healing The Wounds	Llanelli	LHV2	GW0EZQ
26/11/2014	GB5LD	Lancashire Day	Lancashire	LHV27	G7LFC

HF F-Layer Propagation Predictions for November 2014

Compiled by Gwyn Williams, G4FKH

	3.5MHz	7.0MHz	10.1MHz	14.0MHz	18.1MHz	21.0MHz	24.9MHz	28.0MHz
Time	000011111220	000011111220	000011111220	000011111220	000011111220	000011111220	000011111220	000011111220
(UTC)	246802468020	246802468020	246802468020	246802468020	246802468020	246802468020	246802468020	246802468020
*** Europe								
Moscow	666....56666	666555556666	..6555566...	..4555663...	..2566662.....156664....		...46662....	...36652....
*** Asia								
Yakutsk	.....	4	.....	...31.....	...2.....		.....	.....
Tokyo	.....	.....	.....	...42..1....	...31.....2.....		.....	.....
Singapore	.....	.....	.....5.....	.....54....	.....343.....332....		.....22.....	....111.....
Hyderabad	.....	.....	.....	.....442...	....2.44.....23343....		...23331....	...2333.....
Tel Aviv	..5....55...	555555556666	..6555555566	115555554234	..4555552.12..255553....		..155442....	...33331....
*** Oceania								
Wellington	.....	.....55....	....5566....	...356652...	...25553.....14542....		....343.....	....231.....
Well (ZL) (LP)	.....	.....	.....	.....	.....1.....		...1.....	.....
Perth	.....	.....	.....5...	.....45....	.....233.....232....		.....211....	....11.....
Sydney	.....	.....	.....55....	....3454....	....3453.....3342....		...1223.....	....112.....
Melbourne (LP)	.....	.....	.....	...33.....	...23.....12.....		....1.....	.....
Honolulu	.....	.....5....	.....	...1.1.21...	.....		.....	.....
Honolulu (LP)	.....	.....	.....	.....	.....		.....	.....
W. Samoa	.....	.....	.....	.....	.....		.....	.....
*** Africa								
Mauritius	.....	.....	.....5....	.....53...	.....4.....23....		.....21....	.....1.....
Johanesburg	.....	.....	.....	2.....44322	.....431.....242...		....2.23....	...11122....
Ibadan	.....	.....	..5.....	21353...55.2	1.15444552.....544453...		...554452...	...454451...
Nairobi	.....	.....	.....	..3....44...	..13.2.42.....32334....		...21322....	...11411....
Canary Isles	6666.....	6666555.5666	666655555666	333655556643	21.665566421...66666631.		...5666642..	...4666631..
*** S. America								
Buenos Aires	.....	.....	...5.....	...4.....	...3.....2.....		....1.....	....111.....
Rio de Janeiro	.....	.....	.....	1..3.....32.	...3.....2.....22..22...		...121121...	....2112....
Lima	.....	...5.....	...5.....	...3.....	...1.....		.....1.....	.....
Caracas	.....	.....	.....	....3.....	....13.....3.....		.....333....	.....333....
*** N. America								
Guatemala	.....	.....	.....	...2.....	.....2.....2.....		.....22....	.....2.....
New Orleans	.....	.....	.....	...1.2.....	.....222.....32....		.....22....	.....21....
Washington	.....	.....	.....	.....32232..	.....4333.....3444...		.....1441...	.....1441...
Quebec	.....	.....	.....	.....3233...	.....4344.....2442...		.....1341...	.....33....
Anchorage	.....	.....	.....	.....2...	.....		.....	.....
Vancouver	.....	.....	.....	.....22...	.....		.....	.....
San Francisco	.....	.....	.....	.....2....	.....21.....2....		.....	.....
San Fran (LP)	.....	.....	.....	.....	.....2.....2....		.....2....	.....2....

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 November, December & January 2015 are respectively (SIDC classical method – Waldmeier's standard) 73, 72 & 71 and (combined method) 79, 80 & 80. The provisional mean sunspot number for September was 87.6. The daily maximum / minimum numbers were 130 on 28 September and 53 on 19 September.

RadCom

GETTING INVOLVED

Philip, M0PHI

How did you become involved with amateur radio? I would like to tell you how I did but this is not going to be a nostalgia piece. Stay with me because recruiting younger members is still a challenge for us. I think you will hear a parallel between my experience and our wish to bring in young people today.

At school, I had a physics teacher who was a radio amateur and established a shack in the school. It operated as G3PAW, so you can now tell that I was at school a long time ago. I had already made my first crystal set, based on that modern component the germanium diode. And I was also playing around with cheap transistors, making simple audio amplifiers and other gadgets. There was a school radio club, led by the same teacher, Mr Wallwork, so I joined.

Mr Wallwork decided to offer training after school for the Radio Amateur Examination, with the intention of following that with Morse training for those who wanted the full licence.

Of course I signed up. This was the route to transmitting and the full amateur community. I sat in class for the first lesson, which was about valves and how they work. I was dismayed by this. Everything I knew centred on semiconductors so why were we using this old technology? I wanted to learn about contemporary devices, not these hot dusty bottles that needed high voltages and expensive transformers costing way beyond my pocket money. As a result I pulled out of the class, to the confusion of my physics teacher who clearly knew I could handle it.

I stayed in the radio club as a relatively passive member and then I moved on to university. I always had the feeing of unfinished radio business and still followed hobby electronics though my adult life, including building better broadcast receivers and professionally designing digital logic. Never valves though!

What got me back into the amateur fold was the Bath Buildathon team. I saw an advert to spend a day at Tim Walford's QRP event, soldering up one of his short wave receiver kits. What was there to lose? The price of the kit was all it cost and I had the Buildathon team looking over my shoulder when I got stuck. I built it and guess what? It worked, my first short wave receiver.

Something else much bigger came out of that day. As we were finishing one of the team said to me "Do you realise you have just passed the practical for the Intermediate Exam?" That is where I found that I could join the exam training that Autumn and work my way though the three levels over a year, which I did. So now I have my Advanced licence and I am fully active in the hobby. A happy if postponed ending to my schooldays enthusiasm.

And yet. The syllabus we had to cover largely ignored software defined radio and even digital material got only a passing mention. The syllabus looks old-fashioned even to me. How much more so to a youngster, already using a Raspberry Pi, or writing their own phone apps, or creating an ambitious adventure game? Are there even now youngsters turning away from amateur radio, as I did, because the technology being taught seems remote from their everyday experience?

Yes of course, we still need the fundamentals. Yes we need to understand propagation and a lot of practical matters if we are to design and operate our own transceivers. The laws of physics haven't changed either. But do we need to know about breakthrough on analogue television when we could be teaching how digital encoding lets us receive signals from the *Voyager* spacecraft beyond the edge of the solar system, as well as from *WSPR* beacons and other more earthly sources? Could we explain at least the basics of SDR, alongside the superhet?

I have been delighted to see some lively *RadCom* correspondence on getting youngsters into the hobby but also asking whether the hobby is becoming black box only and, by implication, the effect that would have on exams [John Taylor, Last Word April 2014; Alan Betts, Last Word August 2014]. It is excellent that amateurs are thinking about these matters.

No doubt the exam and syllabus are even now being revised to give them a more contemporary twist and I would be delighted to hear that.. The progression from Foundation, to Intermediate to Advanced is generally well-plotted in giving an evolving and deeper understanding and served me well.

So my plea is a simple one. Let's make sure the syllabus covers and also progressively builds on the contemporary software and digital world from the outset, so that it engages young minds who are already excited by that world. Without that, we might as well offer them the same training about valves that I was offered and with an even more negative result.

First of all, I am glad to know that Tim Walford's Buildathon acted as such a good catalyst to renew your interest in amateur radio. You raise some good points about the syllabus and you will be pleased to know that much of what you highlight has already been addressed or is in the process of being addressed. Although analogue TV breakthrough and ghosting are still shown in the syllabus, the topics were removed from the question database and the textbooks as soon as the digital TV rollout was completed. The next syllabus review is underway and the team has already started to think about how more digital topics can be included. This will be largely guided by the requirements of the HAREC syllabus, which now includes a number of digital topics. Turning the HAREC one-liners into workable syllabus items and allocating them to the three levels is not a trivial task but the review team are on the case. The rough timetable for the syllabus revision, question database refresh, notice of change and textbook rewrites means that exams testing the revised syllabus are unlikely to be seen before Easter 2017. Specific technologies/applications will need to be avoided as WSPR, and the like, may be 'old hat' by the time the exams to the revised syllabus are rolled out. Watch out for futher updates on the syllabus review in RadCom *and on the RSGB Tutors Yahoo Group.*

Steve Hartley, G0FUW, RSGB Training & Education Committee Chair

GRANDCHILDREN AND MORSE

John, G3NUA

G8PJC's letter in October's Last Word recalled an experience with my granddaughter, who was asked by her school in January to take along WWII memorabilia to support their current studies. Having e-mailed some explanatory notes, I posted to her my Key & Plug Assembly No 9 to use with the buzzer/LED device that she and my son, G1YHP, built using an electronics kit I had given her at Christmas.

Not long after, a telephone call told me that she had devised a message for me. Sure enough it came: di-dit, di-dah, dah-dah, dah-dah-di-di-dit – sent very accurately. Actually, I had to ask her to send the last character again, as I had forgotten that I had listed the numerals for her! She has since enjoyed sending the code at two National Trust displays.

At a small display of WWII equipment that I mounted at church recently, it was very interesting to see visitors' responses to hearing and being invited to send their name in Morse.

Yes – let's give our youngsters opportunities to develop this skill and see where they lead.

RADAR

Dr Brian Austin, G0GSF

When paging through the special offers in the RSGB shop, I came across *The Birth of British Radar*, being the memoirs of Arnold Wilkins. I have long had an interest in the development of wartime radar and 'Skip' Wilkins' role in it. Did you know that there is a myth surrounding the term RDF, the British code name for what became radar? The term RDF was first used by Watson Watt himself and, in a note written by him in 1938, and now in the National Archives in Kew under the reference S.40952, AIR 2/4487, he wrote the following: 'RDF is a code name intended to have

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no identification'. But it has, ever since apparently, been taken to mean either radio direction finding or range and direction finding. But neither is what Watson Watt, the father of British radar, intended. He meant only to confuse the Germans into thinking it *was* radio direction finding, a term both well-known and in general use well before the war. But he specifically said it actually had no meaning in order to hide the fact that radar is passive whereas true RDF requires the 'target' to be transmitting, ie it's 'active'. This was the key to the significance of what ultimately became known everywhere as radar after it'd been so named by a US naval officer in 1941.

FIELD DAY 2014

Nigel Auckland, M0NAF

We sat in a field in a worn out tent.
The weather was grey, and lunch was spent.
Even the spoon in my coffee was bent.
There seemed to be nothing to do
Then suddenly the contest began!

Everything surprisingly burst into life.
Lots to do, and lots of strife.
We started a try at our first Field Day.
We did our best, we were on our way.

The start, it felt, was very slow.
There seemed such a very long way to go.
So hard to find a band that's free.
The all of a sudden it's time for tea!

Stay up all night, we must be mad.
I should get a life; I am so sad.
At last it's over, in my eye a tear
And now I can't wait to repeat it - next year!

EXAMS

David Hay, M0TGC

I read Steve Hartley, G0FUW's item entitled Exam Availability in the September *RadCom* with interest. I think that his example of 'pre-qualified people' implies that you have to be very highly qualified before fast-tracking is appropriate. I realise that he was only giving an extreme example but it could be taken the wrong way. I suggest that there are quite a number of potential amateurs who are put off becoming licenced by the requirement to take the Foundation and Intermediate courses and exams before moving on the Advanced, probably far more than the article suggests. In my opinion it is not only rocket scientists who should be fast-tracked but it is certainly true that it is difficult to find exam centres willing to facilitate fast-tracking.

At the beginning of 2013 I decided to try to become a licenced amateur and obtained the Foundation and Intermediate books. My career was in computing, on the technical side of software engineering (MIEE/MBCS) and my recent hobby had been PIC development for automotive add-ons, so I was confident I could deal with the maths and electronics. After trying to find a local club willing to fast-track me I eventually contacted Poole Radio Society, who were extremely helpful. I took and passed the Foundation exam on 1/3/13 followed by the Intermediate on 22/3/13, both on a self study basis, and then joined their already running Advanced course. I passed the latter exam on 1/7/13. I cannot praise PRS enough, they understood that I would not be a long term member of their society as my home is 45 miles away from Poole and they did not charge anything other than the exam fees. Their motivation in helping me was simply for the good of 'the hobby' and I encourage Steve Hartley and the RSGB to try to persuade other clubs to take a similar attitude.

Eighteen months on, I am enjoying being a ham and very glad that I persevered in my search for a cooperative exam centre!

QRZ FLAGS

Harry Oxtoby, GI0JHR

Good to see the letter in *RadCom* from Andy France, G0VUH. I'm pleased that amateurs in England have their flag on their QRZ.com pages. Who can we get to put the pressure on QRZ to recognise the Northern Ireland flag? We are left with NO flag. It is great to see the Scots and Welsh and now the English sorted so let's now get Northern Ireland their flag. If it's good enough for the Commonwealth Games and Rory McIlroy then it's OK by me.

John Wresdell, G3XYF

I have just seen the letter from G0VUH about imposing the England flag on all English stations. I noticed this had happened recently and wondered where my Union Flag had gone. I wanted my Union flag reinstated on my listing as I consider myself British first and English second and so I contacted QRZ.com.

I am pleased to report that following my request to reinstate the Union Flag on my listing was been accepted. How wonderful to have the choice.

GOOD OPERATORS

H Park, G4UME

For the last five years I have been a member of the SANDS Contest group. We do contesting and special events and have operated from the Scottish Islands to the Greek island of Samos and I have enjoyed every second of it. I have found the operating standards whilst I have been working very good. When you give a callsign everyone keeps quiet, everyone is polite and thanked us for putting on the station. We complain about continental stations but we must remember they are listening and talking in a foreign language so they may not understand what we are asking for. When contesting, the 59 tells you that the number following is the number you want for the log so it is not as pointless as some think. So, no more complaining and put out a few calls as there are lots of station out there listening

HELP FOR EXPATS IN SPAIN

Elizabeth Higgins, EA7JTQ/G8AZC

I have a tidbit for you to perhaps put in *RadCom*. In Spain the FEDI is offering help for expats to get reciprocal licences on the web page www.fediea.org/news/?news=20140926

I spent 3 years trying to get a reciprocal but the Spanish bureaucracy made it very dificult and in the end I was ready to give up. Out of desperation I sent e-mails to various organisations asking for help. Only one was of help, which is why I now have the callsign of EA7JTQ.

I'm sure that there are others RSGB Members who would find the FEDIEA of considerable help.

CONTEST DQRM

Phil, G0BVD

I was very disappointed by David, 2E0EDL's letter in September *RadCom* where he states he was under the impression he was joining a more responsible group. YES he is! I started off in amateur radio as a SWL, RS46114, listened and learnt on how to operate and how to become a good operator. I studied hard to become G6UDY and worked even harder to operate on HF when we had to take a Morse exam at 12 words per minute on send and receive to operate on HF. During those years I never heard DQRM! It is only recently got worse!

My personal feelings are that the simple entry licence into amateur radio and direct access to HF ihave brought many bad habits over to the bands. As we know, all commercial amateur radios are 100 watts and in the wrong hands can cause many problems to what is an enjoyable hobby. I am not against the simple start up licence but they should not have access to HF until they prove they really want the licence and upgrade to another level.

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100W HF - 6m

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- Software: PowerSDR mRX
- Ethernet connection
- 13,8v DC - 165 x 63 x 140 (mm)

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KX3 Now 2M & 4 Metres!

In Stock *Optional Transverters*

Elecraft are pleased to announce that they are introducing both 4 metre and 2 metre transverters. Both will be available by September and we are now taking orders. **No deposit is required,** we just need your order and contact details. By the time you read this, Peter G3OJV (W&S) and Justin G0KSC (InnovAntennas), will both be carrying out official field tests using dual band 6m/4m Yagis antennas.

Both transverters (only one can be fitted at a time) will deliver 3W output and are mounted immediately above the area occupied by the optional auto ATU, as shown in the illustration. If no ATU is fitted then the version with daughter mounting board is required.

Transverter Prices:

KX3-2m-AT-K (If you have KAT-3)	£199.95	KX3-4m-AT-K (If you have KAT-3)	£199.95
KX3-2m-AT-F (As above, installed by us)	£249.95	KX3-4m-AT-F (As above, installed by us)	£249.95
KX3-2m-NOATU-K (If you have no KAT-3)	£229.95	KX3-4m-NOATU-K (If you have no KAT-3)	£229.95
KX3-2m-NOATU-F (As above, installed by us)	£279.95	KX3-4m-NOATU-F (As above, installed by us)	£279.95

To Place Order Call 01702 203353

Ultimate Performance - Realisitc Prices

The Amazing KX3 Transceiver

4 Metre Option

10W All Modes 160m - 6m
Internal AA battery Tray

2 Metre Option

KX3 Kit £899.95
KX3 Finished £959.95

KXPA100 100W Amplifier

The KXPA100 is the perfect match for KX-3 or FT-817. Available with or without the ATU ("AT" code)

KXPA-100F Built £749d **KXPA-100K Kit £699d**
KXPA-100AT-F Built £1099d **KXPA-100AT-K £999d**

KX-3 Features

- 160m - 6m SSB CW AM FM PSK31 RTTY
- 100mW to 12W continuous on 13.8v
- 100mW - 5W on internal AA cells
- Internal 8 x AA battery tray
- Variable Selectivity down to 100Hz
- DSP filtering and Noise Reduction
- Same size display as the K3
- CW Keyer with full and silent QSK
- 6 CW Memories
- Stereo CW and Ambient Modes
- VOX operation and Voice Recorder
- Split operation and true dual receive up to 15kHz shift
- I/Q output for direct use with iPad and other tablets
- Audio filter for really sharp passband
- CW spot and auto zero
- Pre-Amp and Attenuator
- Strong adjacent signal protection circuit
- Free software for update and control
- CW PSK31 & RTTY Display decoding
- Send RTTY and PSK 31 via CW key

Key Log To Go

Available October.

Designed for CW and data operation with the KX3. It ccan decode CW and data, store messages, and can also extract call signs for automatic logging and phrase insertion. Can also be used with PCkeyboard. It is ideal for SOTA and similar intense operation. It will log foir you , by extracting call sign, mode and frequency, together with time stamping. All this data can be downloaded at a later date. Price to be announced and delivery estimated August - September. For prices and to order Phone now! **PHONE FOR PRICE**

PX3 Panoramic adaptor.

Kit £449.95 c
Built £559 c

The new PX3 Panoramic adaptor does the same for the KX3 as the P3 does for the K3. Now you can monitor up to 200kHz of band space or narrow down to just a few KHz, It also features several configurations including the popular waterfall display, This unit will be available during August.

KX-3 Accessories From Stock

MH3	Hand Microphone	£64.95 B
KXFL3	Dual Passband Filter	£129.95 C
KXAT3	Automatic Antenna Tuner	£169.95 C
KXPD3	Iambic Keyer Paddle for KX3	£129.95 C
KXBC3	Internal Charger for board	£64.95 B

Ideal for SOTA

The KX3 is the world's most popular QRP HF transceiver. For one man expeditions it is perfect. Fit internal AA cells and the optional ATU, and you can use end fed wire or coax systems. You will get several hours of operation. Pre-programmed messages and voice recorder add to the operating convenience. You can even get a built-in paddle. So why not launch your own One-Man DXpedition?

K3 HF Transceiver HF - 6m

The transceiver that more and more serious hams are turning to. The name of "Elecraft" spells out quality, reliability and performance. What more could you demand? And on the inside are a host of design features that make this radio one of the most satisfying and enjoyable to operate. All the essential controls are accessible from the front panel. No need to go into menus to change those things you need to do quickly, Instead, the comprehensive menu system is the preserve of what you need to change in order to create your own personal performance needs. And if you are worried about it getting out of date - don't. The K3 is probably the most regularly updated radio on the market. And that is why you rarely see them second hand!

K3 Accessories from Stock

KAT3-K	Internal 100W ATU has a much wider matching range than normal	£319.95 C
K144XV-K	Internal 2m 8W transverter. Excellent low noise receive performance	£299.95 C
KPA3-K	Internal 100W used to upgrade from the low power 10W model	£449.95 D
K144RFLK	K144XV Reference Lock	£99.95 C
KXV3A	RX Ant. IF Out and transverter interface. Also needed for use with P3	£129.95 C
KTCX03-1	High Stability Ref Xtal	£109.95 C
KDVR3	Digital Voice Recorder - recommend we fit, as it needs front panel removal	£144.95 C
KBPF3	General Cov. Rx Bandpass filter. Improves GC performance	£169.95 C
MH2	Hand Microphone with Up/Down buttons. Eletret type.	£64.95 b

2m Transverter

Why not add a 2m transverter to your K3. It delivers 8W output from a separate socket. Great as stand alone or as a 2m driver. Another great accessory. See adjacent panel for price.

K3-10W
Kit £1495 Built £1595 d
K3-100W
Kit £1995 Built £2095 d

KPA-500 500W Amplifier

The KPA-500 covers the bands 160m to 6m and delivers 600W with a drive level of around 30W. It can be used with any transceiver and features auto band switching through RF sensing. It has a built in AC supply and is the same size as the K3 transceiver. This is a great solid state design with full protection. No warm up and capable of full QSK switching.

KPA-500F Built £2199 d **KPA-500K Kit £1999 d**

P3 Panoramic Display

The P3 really adds performance to your K3 transceiver. It will display live spectrum up to 200kHz wide with "Average" feature, waterfall display and instant QSY by pressing main control

Built £759 D Kit £709 D

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

KAT-500 Auto 500W

Incredible matching capability. This auto ATU will match just about anything up to 10:1 VSWR on an unbalanced line. (Use external 4:1 balun for balanced line.) It has three antenna outputs and integrates easily with the KPA-500 and K3. It can also be used with other linear amplifiers and handles up to 3:1 at 1kW.

Built and tested £729 c Kit £679 c

Newark HAMFEST 2014

Above. Peter Waters G3OJV is seen on the Eleraft stand at the recent National Hamfest. As usual there were lots of visitors and new Elecraft owners. Peter, a long term user of elecraft , just loves talking about it! Give him a call about your Elecraft needs.