Radio Society of Great Britain
Advancing amateur radio since 1913

# RadCom

## Season's Greetings from the RSGB

1216

December 2016 ◆ Volume 92 ◆ Number 12 ◆ £4.95

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Waters & Stanton, Europe's HAM STORE remains the only ham radio store in the UK where you can experience all of the world's top-end traditional HF transceivers from the incredible Elecraft K3S through to the Icom IC-7851. Additionally, we remain the only company which can give you all of the world's best SDR transceivers to experience and compare with one another too, Apache Labs through to the mighty Expert Electronics MB1.

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We have some exciting new products coming along soon too, including the soon-to-be-released Apache Labs Anan-8000DXLE which takes receiver performance to a new level.

If you truly want to try out and compare radios, new and old, there remains only one place in the UK to do it, Europe's Ham Store.

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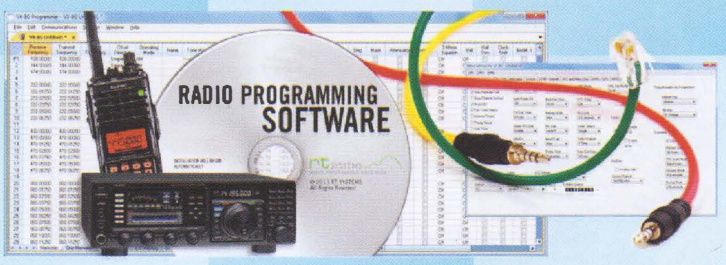


For Icom ID-5100E with USB-29A cable kit (WCS-D5100-USB)..... **£46.95**
For Icom IC-7100 with USB-RT501 cable kit (WCS-7100-USB) ..... **£46.95**
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For Yaesu FT-817 with USB-62B cable (ADMS-4AU-USB)..... **£46.95**
For Yaesu FT-857/897 with USB-62B cable (ADMS-4BU-USB) ..... **£46.95**
For Yaesu FT-991 with USB-42B cable (ADMS-991-USB) ..... **£34.95**
For Yaesu FT-DX1200 with USB-63 cable (ADMS-DX1200-USB) .... **£46.95**
For Yaesu FT-450 with USB-63 cable (ADMS-450-USB)..... **£46.95**
For Yaesu FT-DX3000 with USB-63 USB cable (ADMS-DX3000-USB)..... **£46.95**
For Baofeng UV-5R with USB-K4Y USB cable (BAO-5R-USB) ..... **£46.95**
For Yaesu FT-991 software only (ADMS-991-U)..... **£26.95**

CAN'T FIND THE CABLE FOR YOUR RIG? CALL US TO GET YOURS WITH FULL RANGE STOCKED

## FLEX RADIO

CALL ABOUT FLEX TRADE UP PROGRAM


### FLEX-6300

The FLEX-6300 provides an entry point into multi-dimensional amateur radio operations from CW to the latest digital modes.
**£2199.95**

### Flex-6500

he FLEX-6500™ is for the advanced operator who desires extended performance across four slice receivers.
**£3949.95**

### Flex Maestro

The FlexRadio Maestro™ is an intuitive, plug-and-play control console that directs operation of any FLEX-6000 Signature Series transceiver without the need of a traditional PC.
**£1299.95**

### Flex-6700

Capable of displaying up to 8 slice receivers on two antennas at any one time from HF through to 2m
**£6599.95**

### Flex-6700R

An SDR receiver for the most demanding of Amateur's needs on HF/ VHF wideband receiver.
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### Flex-Control

A FlexControl is the ultimate VFO and radio control accessory for all FlexRadio Systems' software defined radios.
**£120.95**

### Maestro Accessories

**Tilt** - Stand for Maestro gives variable tilt.
**£98.95**

**Battery** - Make the Maestro more portable with this battery.
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We are the UK's only dealer where you can test and compare Flex, Apache & Expert Electronics all under one roof.
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# 25th NOVEMBER 2016

**StepplR Sole UK Importer, European Distributor and Service Centre Call for best prices.**

### BUYING STEPPIR

There has always been a wait for getting your SteppIR antenna from the USA. Things are changing and we now aim to carry stock of the more popular items.

3 Element 20-6m Yagi weighs 26.3kg and boom length of 16ft (STIR-00203) ..... **£2174.95**

2 Element 20-6m Yagi weighs 13.6kg and boom length of 4.7ft (STIR-00202) ..... **£1549.95**

CrankIR Vertical 40-2m base kit with 16ft telescopic pole and travel bag (STIR-00301 ..... **£429.95**

SmallIR Vertical 20-6m weighs 5.4kg and length of 18ft (STIR-00218)..... **£999.95**

BigIR Vertical 40-6m weighs 6.8kg and length of 33ft (STIR-00417)..... **£1249.95**

## ELECRAFT - ONLY UK OFFICIAL DEALER

### KX2

"Smallest full featured HF, 80-10m, radio on the planet" operating at 10W. Measures only 5.8" x 2.8" x 1.5" and weighs only 368 grams.

**KX2 £859.95**


#### KX2 ACCESSORIES

- Small compact carry case for KX2, small accessories (CS40) **£38.95**
- Large compact carry case for KX2 and MH3 mic plus more accessories (CS60) **£54.95**
- Internal ATU to tune even non-resonant "random" wire antenna (KXAT2) **£219.95**
- INternal battery gives up to 8 hours operation from a single charge (KXBT2) **£69.95**

### KX3

160m-6m small all mode transceiver with DSP features only usually found in larger radios. Available in kit or ready built.

**Kit: £999.95**
**Full: £1079.95**

#### KX3 ACCESSORIES

- 100W power amplifier (KXPA100) **Kit: £899.95 Built: £949.95**
- External panadapter for waterfall display (PX3) **Kit: £569.95 Built: £629.95**
- Internal 20W automatic antenna tuner (KXAT3) **£249.95**
- Dual passband roofing filter for improved dynamic range (KXFL3) **£184.95**

### K3S

The new K3S transceiver features a number of improvements and additions. These include: New synth board for lower Tx/Rx phase noise; IF interface board; 12m-6m low noise pre-amp; USB interface that carries data and audio; New 10W driver board; New motherboard layout for reduced noise; 100W PA upgrade; New Rx Speaker Amplifier.

**K3S/100-F £2999.95** **K3S/100-K £2849.95**
**K3S/10-F £2449.95** **K3S/10-K £2299.95**

#### K3S ACCESSORIES

- High performance matching speaker with two switchable inputs (SP3) **£219.95**
- Internal 100W ATU with a second antenna jack (KAT3A) **£449.95**
- Digital voice recorder (KDVR3) **£179.95**
  Internal 2m 10 Watt option (K144XV) **£449.95**
- External VFO knob with essential controls for faster access (K-POD) **£299.95**
- A range of roofing filters with different frequencies and poles (KFL3A)

## ADDITIONAL ACCESSORIES - UK'S OFFICIAL DEALER

### P3 PANADAPTER

Panadapter display adds a visual element to signal hunting with fast real time spectrum and waterfall! Perfect for K3 and K3S with fast set up.

**Kit: £819.95**
**Full: £859.95**

### T1A

The only 20W automatic antenna tuner that is sized to match today's small QRP rigs. T1 can be used with any 0.5-W to 20-W transceiver covering bands in the 160-6 m range

**£194.95**

### MH3

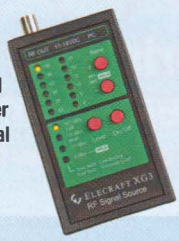
Hand mic with up/down buttons for added control for KX2 and KX3

**£79.95**

### XG3

Programmable, 160-2 m RF signal source with four calibrated output levels. It's ideal for receiver calibration, sensitivity tests, signal tracing, and as a VFO for home-brew projects

**£219.95**



### KPA500

160-6m 500+ Watts Solid State Auto Band Switching Linear Amplifier in a compact package the size of the K3

**Kit: £2449.95**
**Ready Built: £2649.95**

### KAT500

High power auto tuner and smart antenna switch which can be used with K3, K3S, KPA500 and other HF transceivers.

**Kit: £799.95 Ready Built: £839.95**

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# KENWOOD DEALS

KENWOOD DEALER OF THE YEAR 2016

NEW LICENCE DEAL CALL FOR DETAILS

## TS-480HX/TS-480SAT

Perfect for base station use with a separate control panel available with 200W (HX) or ATU (SAT

**Call for best prices**

## TS-590SG

Be witness to the evolution of KENWOOD's pride and joy - the TS-590SG HF transceiver - pushing performance and technology to its utmost limit, with the receiver configured to capitalise on roofing filter performance and IF AGC controlled through advanced DSP technology.

**Call for best prices**

### KENWOOD ACCESSORIES

Dynamic hand mic with up/down control (MC-43S) **£20.95**

Popular desktop mic with PTT (MC-60A) **£127.95**

Desk mic for DSP transceivers (MC-90) **£204.95**

Speaker with high/low filters & two inputs (SP-990M) **£219.95**

High quality deluxe headphones (HS-5W) **£56.95**

## TH-D74

NEW

New 144/430 MHz handheld featuring Kenwood's APRS, Automatic Packet Reporting System, and the popular D-Star. Kenwood has made it possible to use this handheld in a wide range of radio applications with wideband reception function allowing the user to receive HF SSB and CW.

**£599**

# ICOM DEALS

OFFICIAL RE-SELLER

NEW

NEW STOCK ARRIVED

## IC-7300

HF-4m transceiver with integrated SDR and built-in wide frequency automatic antenna tuner, ideal for field operation. Operate with 100W on HF/50MHz and 50W on 70MHz.

**£1049.95**

## SP-38

Matching speaker designed specifically for the IC-7300 improving sound quality and experience

**£129.95**

### ICOM ACCESSORIES

Gooseneck desktop mic with PTT switch (SM-30) **£114.95**

Deluxe desk mic with built in pre-amp (SM-50) **£228.95**

Base station speaker with audio filters (SP-34) **£259.95**

Switch mode power supply (PS-126) **£399.95**

Silicone jacket for ID-51/E (SJ-1) **£18.95**

## ID-51E-PLUS2

2m/70cm handheld with the same features as its previous iteration plus new 'Terminal mode' and 'Access mode' for connecting to D-star through the internet and places where no D-Star repeater is usually accessible

**Call to Pre-Order yours now**

# YAESU DEALS

OFFICIAL RE-SELLER

NEW

## FTM-3200DE

Rugged yet compact System Fusion/ FM 65W mobile transceiver. Loud and Crystal Clear Front Panel Speaker with 3W of Audio Output. Instantly recognises digital or analogue transmission and adjusts automatically for flawless co existence of both digital and analogue users.

**Call for best price**

NEW

## FT-991A

Successor to the FT-991 this all band HF to UHF transceiver which includes Yaesu's System Fusion as well as traditional modes. The FT-991A packs the same features as the FT-991 plus an added real time spectrum display and multi-colour waterfall display

**Call for best price**

## FT-891

NEW

100W HF + 6m mobile transceiver with AM, USB, LSB and CW modes featuring triple conversion, noise blanker and attenuator.

**Call for best price**

## FT-2DE

2m/70cm dual band handheld transceiver designed with ease of use in mind such as its 1.7 inch full back-lit touch panel display. Includes FM and System Fusion modes.

**Call for best price**

## FT-857

World's smallest HF/VHF/UHF 100W mobile transceiver including DSP

**Call for best price**

## FT-DX1200

HF + 6m transceiver provides up to 100 Watts on SSB, CW, FM and AM (25 Watts carrier) and a rugged state of the art highly balanced receiver circuit configuration for top performance on today's crowded bands.

**Call for best price**

## FT-450D

Compact yet superb HF/50MHz radio with state-of-the-art IF DSP technology configured to provide worldclass performance in an easy to operate package.

**Call for best price**

## FT-817ND

The Yaesu FT-817ND is the world's first self-contained, battery-powered, Multi-mode, Portable Transceiver covering the HF, VHF and UHF bands!

**Call for best price**

### YAESU ACCESSORIES

Desk mic with PTT (MD-100A8X) **£99.95**

Studio quality base mic (MD-200A8X) **£189.95**

CAT communications via USB (SCU-17) **£109.95**

High performance external speaker (MLS-100) **£28.95**

Base speaker with audio filtering (SP-8) **£119.95**

Internet repeater enhancement system (HRI-200) **£99.95**

External ATU for FT-897 & FT-857 (FC-30) **£249.95**

BUY NOW PAY LATER FINANCE AVAILABLE! CONTACT US FOR MORE DETAILS

**Get on air from GOPEP this Christmas from 160m to 70cm on a range of top end transceivers**

Visit us on 10th December where we will have local clubs, food and the chance to use your dream radio


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December 2016

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## Regulars



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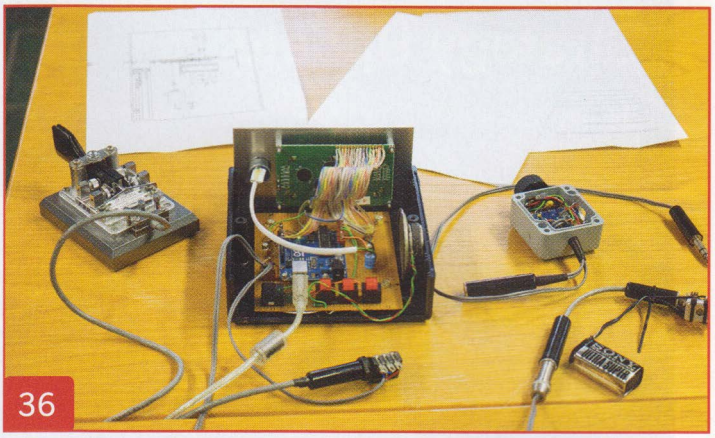


## Technical Features



## Features




Cover image: LEDs photographed at the National Hamfest.
Original photo by Giles Read, G1MFG.
Design by Kevin Williams, M6CYB.


RadCom THE RADIO SOCIETY OF GREAT BRITAIN'S MEMBERS' MAGAZINE

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*RadCom* is published by the Radio Society of Great Britain as its official journal and is sent free and post paid to all Members of the Society. **The January edition of *RadCom* is expected to arrive with most Members by 19 December, although this can take up to a week longer in some cases; international deliveries can take longer still.**





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*RadCom Basics* for Members new to the hobby can be found at www.rsgb.org/radcom-basics/

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# Strategy Update

The Society's review of the future strategies and priorities was broadened to include a wide-ranging discussion at the RSGB Leadership Team meeting in September. The initial work undertaken by the Board was expanded and developed further with key input from the Committees, Staff and Regional team present at the meeting. The work continues under the guidance of Chris Deacon, G4IFX, who is kindly giving us his professional expertise as a volunteer, and is expected to be completed by April 2017.

# Contest Support Committee vacancies

The Contest Support Committee is responsible for the adjudication of all RSGB contests and for maintaining the RSGB Contesting Committees' website. Currently, a number of volunteer adjudicator vacancies exist on that committee.

Typical duties include: adjudication of contests, preparing reports on contest for publication on the Committee website, answering contest related queries from entrants and assisting in the administration of the trophies awarded to the contest winners. All volunteers are expected to have access to a PC (Windows 7 or later operating system) in order to use the bespoke software that is used to adjudicate all RSGB contests. Most committee business is conducted by email and by Skype. Volunteers must be willing to abide by the RSGB's Code of Conduct.

If you are interested in joining the Contest Support Committee, please contact csc.chair@rsgb.org.uk for further information.

# Volunteer vacancy


A vacancy has arisen for a volunteer Awards Manager to manage the Society's award programmes. The Society administers a number of award programmes for HF, VHF and special awards for Foundation and Intermediate licence holders. The Awards Manager receives and checks claims for the various levels of award then passes the information electronically to HQ for it to be validated and the appropriate award issued. To carry out this role you will need good administration and computer skills. Most of the communications will be by email. The workload is not usually high and can be managed flexibly.

If you are interested in applying or would like to find out more, contact Steve Thomas, M1ACB, General Manager via email gm.dept@rsgb.org.uk before 22 December 2016.

# Silver anniversary of 2 series calls


Thanks to Ian Brothwell, G4EAN, who drew our attention to the fact that we have now had '2' series callsigns in the UK for twenty five years! The introduction of the Novice Licence and the '2' series callsigns in 1991 was the biggest change in UK amateur radio since the introduction of the 'B' licence in 1964. The first Novice Licences were issued on 25 July 1991.

The driver for the new licence was to make amateur radio more attractive and accessible to young people and it did have some success (see photo) but the licence limitations prevented a massive uptake; a maximum of 3 watts on 6m, 70cm, 23cm and 3cm and was not a great incentive and a 5 words per minute Morse test for 3 watts on a few bits of a few HF bands meant there were even fewer 'A' class Novice Licence holders.

Over the years, additional privilege were added (more power and more bands) and when the Foundation Licence arrived the Novice Licence became the Intermediate level with up to 50 watts and many more bands. The final change turned the three licence levels into a sequential progression path making the Intermediate exam a must for anyone heading for a Full Licence and then the Morse test was dropped for all.

Ofcom tell us there are currently 9147 Intermediate Licences in circulation and we have seen around 600 to 700 exam passes every year for the last decade.

We have recently revised the RSGB Intermediate Award and look forward to more '2' series members being active on the bands.

# New EMC leaflets

Two new EMC leaflets on RF earthing have been uploaded to the RSGB website. One is aimed at the beginner and one for the full licensee or the more experienced amateur. They can be downloaded and printed as necessary from the RSGB website.

http://rsgb.org/main/files/2012/11/EMC07-v3-Earthing-and-the-Radio-Amateur-Basic.pdf

http://rsgb.org/main/files/2012/11/UK-Earthing-Systems-And-RF-Earthing_Rev1.3a-.pdf

## RSGB 2017 AGM

The 2017 RSGB AGM will be held on 22 April 2017 in Cardiff. Details of the venue will appear in the January 2017 issue of *RadCom*.

## Congratulations

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

70 years
Mr P Zeid OBE Fisp VK6PZ

60 years
Mr D H Plumridge G3KMG

50 years
Mr J Purfield EI2CI
Mr J E Pitt G3VRY
Mr G O Jones G3VSB
Mr R Wilkinson G3VVT
Mr D R Lax G4AHN
Mr D R Birchall G4MAU
Ayr ARG MOAYR
Mr R J Baker GW3OVD
Mr C Inman RS29943

# December is International YOTA Month

Every December, the IARU organise YOTA month, which is a month long activity specifically aimed at getting Youngsters On The Air. It is not a contest but there is an Award to chase. The UK has participated since the RSGB Youth Committee was formed in 2014. This year we expect to have the callsign GB16YOTA active for at least twenty days of December with activations in England, Scotland, Wales, Northern Ireland and the Isle of Man; our best ever turn out. The provisional list (subject to NoV confirmation) is as follows:

2 December: Sidmouth ARS
3 December: Durham & District ARS
4 December: Worcester RAA
5-8 December: Aberystwyth & District ARS
9 December: Hilderstone AR&EC
10 December: Silcoates School ARC
11 December: CDXC (operating from Ludlow)
12 December: FISTS (operating from Bilstone School)
13 December: Otley ARS
14-16 December: Castle Rushen School
17 December: Mid-Ulster ARC
18 December: Stirling District ARS
20 December: Durham & District ARS
21 December Chertsey RC
22 December: Aberystwyth & District ARS
28-29 December: Leicester RC
30 December RSGB National Radio Centre (TBC)

If young amateurs (under 26) cannot get to these stations they can still join in by working as many YOTA stations as they can during December. Last year about thirty countries took part and there is an IARU Award for working the YOTA special event stations. Further details are available at www.ham-yota.com/december-yota-month/ or by contacting Will, 2WOWOD, the Youth Committee lead, via yota.month@rsgb.org.uk

# YOTA 2017 – The RSGB Convention helps

As many will know the RSGB is seeking support for the International Youth event – YOTA 2017 that is being held at Gilwell Park in August 2017. We are pleased to say that delegates to the RSGB Convention in October were very generous in donating hundreds of pounds to the appeal. Members of the RSGB Youth Committee spent the Saturday of the event waving the donation box, handing out flyers about the event and were very grateful for the positive response they got from the delegates. We would like to thank everyone who gave – your support is much appreciated.

Members have also started making personal donations to support the event and we would like to thank Martin Atherton, G3ZAY as the first person to become an individual donor to the event – thank you Martin. Others have also taken the opportunity to donate and anyone donating £15 or more is automatically sent one of the attractive new YOTA supporters pin, so why not get yourself one by donating today?

The YOTA 2017 appeal still has a long way to go, so if you can help the event by donating a few pounds (or even a many) you can do so today by visiting **www.rsgb.org/yotasupporter**.

**Help amateur radio youth activity by becoming a YOTA 2017 Supporter Today!**

**www.rsgb.org/yotasupporter**

# Examinations Standards Committee

The Examinations Standards Committee (ESC), oversees all aspects of the Amateur Radio Examinations. Dave Powis, G4HUP has been appointed to take over the role when Professor Simon Watts, retires at the end of this year. The ESC develops and publishes all procedures and policies for the administration of examinations and is tasked with the development of the syllabus and question banks by the Examinations Group (EG) in conjunction with the Training and Education Committee (TEC).

Dave has been interested in amateur radio from the age of 9, and took his RAE in 1964. From 1968 he held the callsign G8BPJ, converting this to G4HUP in 1979. Running his first RAE course whilst at University in 1971, he has also had a long interest in training and exams. In the 1990s he was the project leader for BTs Living Science and Technology programme, coordinating the teaching by volunteers of the Novice exam across 8 secondary schools in Suffolk, and taking on the role of Senior Novice Instructor for the county.

On return from working abroad, where he held the call DL4MUP, he resumed teaching the new Foundation/Intermediate/Advanced structure through the Leiston ARC, and also to engineering students at West Suffolk College where he lectured for 7 years. Dave has also held the US Extra Class call ND8P since 2005.

He has been a member of the Examination Standard Committee from 2007 to 2015, and for the past year has been working with the Exam Group on the revisions of the Licence Syllabuses.

# Train the Trainers

This year has seen even more successful Train the Trainers course taking place around the UK. The team has visited eight of the thirteen Regions; Region 4 (Sunderland), Region 5 (Tamworth), Region 7 (Merthyr Tydfil), Region 8 (Antrim), Region 10 (MLS in Staines), Region 11 (Torquay), Region 12 (Norwich) and Region 13 (Leicester on 19 November). For 2017 there are already two preliminary bookings on 21 January in Region 10 and 4 March in Region 5. The Train the Trainers team would like to thank all the host clubs for their hospitality and organisation and would especially welcome invitations from clubs willing to host Train the Trainers in any of the Regions they haven't already visited. For more information, please contact Paul, G4DCV by email to paul@g4dcv.co.uk.

# QSL Matters

M0M-Z manager Stu, M0TNG has now stepped down due to other commitments. We're pleased to welcome Val, G6MML, supported by Glenn, G6HFF to manage this most active group. Cards and envelopes have been transferred. Changes to some G3 groups are in progress, thanks to Paul, G4RRA who will now cover G3A-F and to new volunteer Lindsay, G8PMA, taking up responsibility for all G3G-L cards. The short call Contest group still requires a QSL volunteer.

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 T Crooke, 2E0AAM
Mr D Mcbride, 2E0DXS
Mr A Askam, 2E0GEN
Mr T Stack, 2E0KKO
Mr L Francis, 2E0LFV
Mr M Greensmith, 2E0MGA
Mr R Harlow, 2E0PKS
Mr I Roberts, 2E0VTV
Mr F Klop, DH4FR
Mr P Magnin, F6HYE
Mr J Gulliver, G0TIY
Mr G Clarke, G1DNZ
Mr J Hopkins, G3EFU
Mr S Bradshaw, G3WEJ
Mr B Carpenter, G4BAH
Mr F J Bryden, G4HNQ
Mr W Holmes , G6SPQ
Mrs C Sheridan, G6URY
Mr G Cowan, G7LMF
Mr D Samuels, G7NTC
Mr R Ainley, G7WIZ
Mr B King, G8CHC
Mr R Morris, GW7EXQ
Mr T Yarish, KJ6MKI
Mr J Mathewson, M0HXH
Mr D Morrow, M0HZP
Prof C Mitchell, M0IBG
Mr M Harrison, M0ROK
Mr R Miranda, M0RVI
Mr M Michalowski, M0WQX
Mrs K Ingham, M3NSJ
Mr A Mullinder, M6AAD
Mr V Walsh, M6BFB
Mr I Szabo, M6HET
Mr H Thomas, M6HIH
Miss N A Whitehall, M6HLH
Mrs H Melhuish, M6HMK
Mr I Lawton-Hale, M6HPI
Mr R Shulver, M6HQM
Mr W Hamlet, M6HQN
Dr C Poole, M6HQX
Mr A Robeson, M6KFO
Mr P Petersen, M6LPP
Mr S Dale, M6NGF
Mrs J Fletcher, M6RNH
Dr R Tempo, M6RTQ
Mr W Stobbs, M6RWB
Mr M J McDonald, M6SOV
Mr R Banks, M6UJM
Mr I Brodie, M6VGR
Mr S Whittaker, M6WTR
Mr M Whatling, M6WYW
Mr M Hoult, M6XMH
Mr A Whatling, M6XYS
Taff Vale ARC, MC0IBI
Mr T Kawala, MI6HQA
Mr C Magee, MI6RVC
Mr C Harper, MI6UNC
Mr R Aird, MM0RFA
Mr T Fletcher, MW6HNW
Mr T Morris, MW6NKF
Mr P Lewis, MW6PRL
Mr W Webb, MW6WFF
Mr T Foy, N4HAI
Mr V Myllykangas, OH6MJM
Mr J Vink, PE1POI
Mr H Klein, PH4CK
Mr G McCallum, RS306495
Mr G Urban, RS308120
Mr P Wood, RS309566
Miss F Farrer, RS309724
Mr G Belcher, RS309926
Mr D Crooks, RS310180
Dr S Brown, RS310195
Mr D Abbott, RS310231
Mrs S Cook, RS310241
Mr S Carr, RS310255
Mr M Elkins, RS310281
Mr A Powell, RS310302
Mrs K E Michael, RS310303
Mr I Smallshire, RS310306
Mr C Whatling, RS310321
Mr W Stevenson, RS310322
Mr M Ewing, RS310331
Mr J Fitzgerald, RS310332
Mr L Pruitt, RS310333
Mr S Nelson, RS310334
Mr D Rolland, RS310336
Mr P May, RS310351
Mr P Geary, RS310352
Mr C J Loosemore, RS310354
Mr B Kay, RS310389
Mr S Cansick, RS310390
Mr R P Ellis, RS310391
Mr J Blake, RS310417
Mr P Hauk, RS310418
Mr P Hill, RS310487
Mr R Mckennan, RS310518
Mr R Forrest, RS310519
Mr S Alexander, RS310538
Mr A Spencer, RS310548
Mr H Morris, RS310549
Mr C Lowe, VK4CL
Mr M Clark, WA7MC

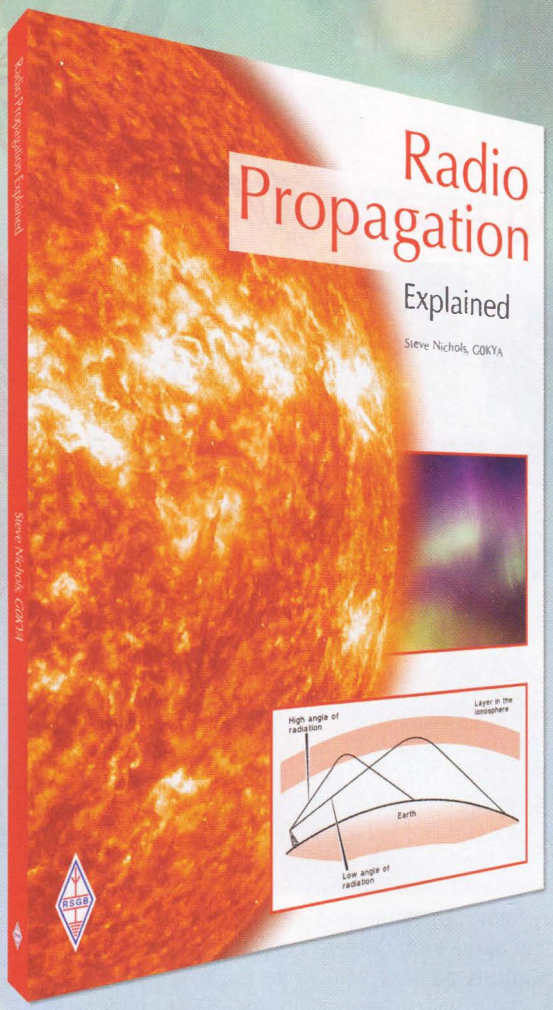
The RSGB would like to welcome back the following Members who have rejoined the Society.

Mr M Bennett-Blacklock, 2E0ESC
Mrs J Gilmour, 2W0OTK
Mr O Muehlenbrock, DH7OM
Mr G Trant, EI8IO
Mr C L Joly Mrcvs, G0BGD
Mr A R Timms, G0FKW
Mr B J Bryant, G0FMK
Darenth Valley RS, G0KDV
Mr M R Watkins, G0NBB
Mr P Jackson, G0PPQ
Mr K J Eaton, G0RTX
Mr B Burdis, G0WZB
Mr N D Snowden, G1XJO
Mr E Smith, G1XNS
Mr A Kaye, G1YIL
Mr A R Nesbitt, G3SGY
Mr M K Roberts, G4AWK
Mr D J Green, G4CJF
Mr J L Nowell, G4FUO
Mr B D Cooper, G4RKO
Mr D Sharp, G4TCJ
Mr P Johnson, G4TMI
Mr F C Seddon, G4WFK
Mr A J Crickett , G4WIP
Mr R Satterthwaite, G6BMY
Mr K Thompson, G6FLW
Mr R White, G6LTT
Mr J W Arnold, G7SOO
Mr C J Davis, G7VQM
Mr NMK Matthews, G8GTZ
Mr D P Storrs, G8GXP
Mr D B Clarke, G8TEB
Mr K R Lunn, GI6ENG
Mr J K Loveday, GM0APN
Mr G Haddock, KE9H
Mr J W Bartlett, KF7RO
Mr C J Darlington, M0DOL
Mr M Michalak, M0KOX
Mr L S Knott, M0LSK
Mr M W Smith, M0MWS
Mr G Lloyd, M0PVG
Mr P N Rainer, M0RNP
Mr A W Evans, M1VIP
Mr P Aston, M6PKG
Mr P D Gaskin, MM1FEO
Mr J Webster, MM6WEB
Mr S C Biczak, N7ITE
Mr R J Cutting, RS107224
Mr DPB Moore, V51DM
Mr C D Ferree, WA6PPG
Mr M A Nicolau, YO3VU

NEW

FROM P&P FREE
(Over £30 See Page 78 For Details)

RSGB Members' Price ONLY £11.04




# Radio Propagation Explained

Steve Nichols, G0KYA

Understanding radio propagation is essential for anyone with an interest in radio communications who wants to know how signals travel from A to B. Written by acknowledged expert Steve Nichols, G0KYA, *Radio Propagation Explained* provides everything you need to know about this fascinating topic.

Looking at HF to VHF, UHF and beyond, *Radio Propagation Explained* provides a practical understanding of radio propagation. It looks at the Sun, sunspots, ionospheric propagation, ionospheric storms and aurora, tropospheric propagation, meteor scatter and space communications, including satellites and Earth-Moon-Earth signals. The book also includes information on computerised HF propagation predictions, greyline propagation, low frequency (LF) propagation, Sporadic-E, amateur radio modes like WSPR, PSK and JT, web resources and much more. There are descriptions of the properties of the amateur radio bands and how to get the best performance when using them.

*Radio Propagation Explained* draws on material from the hugely popular *Radio Propagation Principles & Practice* book previously published by the RSGB and enhances it with the latest advances in the field of propagation. Steve shows how radio amateurs can, by studying propagation, gain a more rewarding experience and increase their chances of making the on-air contacts they want.

*Radio Propagation Explained* is thoroughly recommended reading for everyone who wants to understand radio propagation and make the most of their radio activities.

Size 240x174mm, 128 pages,
ISBN 9781 9101 9328 0
**Non Members' Price: £12.99**
**RSGB Members' Price: £11.04**

Also available on amazonkindle

RSGB SHOP

**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

E&OE (All prices shown plus p&p)

# WACRAL meeting and AGM

WACRAL (World Association of Christian Radio Amateurs and Listeners) held their annual fellowship weekend and AGM in September at the Elim Conference Centre, West Malvern.

Members were treated to a variety of guest speakers with Anita Edgar speaking on her work with the El Shaddai trust in Goa, India with responsibility for 4000 children in a number of homes; Don Field, G3XTT speaking on his various experiences working with and organising numerous DXpeditions around the world and Brad Turkington, 2I0WBF speaking on MegaVoice, an organisation producing audio devices that have the ability to store the whole Bible in over 4300 languages and dialects, which are robust and solar powered.

A club station was on air over the weekend using the callsign MX1CRA, the station comprised a FT-897D, LDG Autotuner with an off centre fed dipole.

# Commonwealth Contest 2017 Prize Draws

Martin Lynch & Sons and Kent Engineers have agreed to sponsor a special prize draw for entrants to the 80th Commonwealth Contest on 11/12 March 2017. The prize is a replica of a historically significant Morse key. The original key was used by Morse in his 1844 demonstration that became the reference for key designs over many years and has changed little to this day. The Kent replica is based on the original key displayed in the Smithsonian Institute and Vail's own documentation. Polished brass, steel and wood make this a real showpiece. In addition, the RSGB have agreed to sponsor two further prizes, namely an RSGB Millenium Key and an RSGB Vibroplex Centenary key.

Three draws will take place for Commonwealth entrants from each of the three IARU regions: 1 (Europe and Africa), 2 (North and South America) and 3 (Australia, Asia, New Zealand and Pacific). The sponsors of the three prizes are Martin Lynch and Sons (Region 1), Kent Engineering (Region 1) and the RSGB (Regions 2 and 3).

For each region the call of every entrant making 10 or more valid QSOs will be entered into the prize draw the number of times they make a valid QSO, up to a maximum of 80 entries. For example an entrant making 5 QSOs would be not be entered in the draw, an entrant making 15 QSOs would be awarded 15 entries, an entrant making 80 QSOs would be awarded 80 entries, and any entrant making 81 or more valid QSOs would also be awarded 80 entries in the draw. The three regions will be drawn separately. The draws will take place at the RSGB Convention 2017.

Further details and news can be found at https://berucontest.wordpress.com/

# Yeovil ARC's 70 years

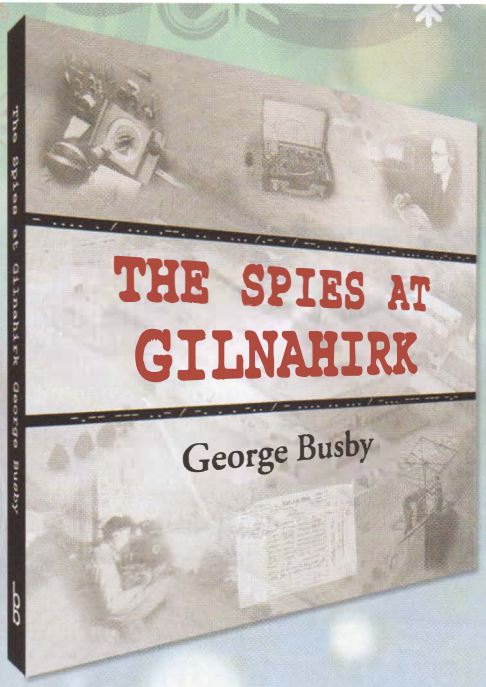
On 17 October, Yeovil ARC celebrated 70 years of weekly meetings. This was marked a few days earlier with an open day in Yeovil town centre, showing off a variety working amateur radios, military radios, teaching and sending Morse. The chairman of BYLARA and the local RSGB Regional Manager were also in attendance with displays from the recent convention, self-build projects and amateur radio books. The Mayor and Lady Mayoress opened the day.

The club was founded in 1946 as the result of a letter in the Western Gazette sent by W Kirkland. The first meeting took place in the skittle alley, Wellington Inn, Huish, Yeovil. Over its 70 years history, the club has set up its own amateur radio station, G3CMH, and has made radio contact with thousands of radio amateurs all over the world, including public events at The Royal Bath and West show, Air Day, the Mid Somerset Show and Yeovil Festival of Transport. More recently, the club has working demonstrations of World War II radio equipment to mark significant anniversaries; such as the 70th anniversary of VJ Day.

The first long distance radio contact made using a transistor transmitter took place in February 1954 with a distance of 85 miles, from Yeovil in Somerset to Haslemere in Surrey. With this contact, Yeovil ARC made radio history, as 85 miles was a quantum leap in distance for a transistor transmitter at that time.

Today Yeovil ARC meets on Thursdays at 7.30pm on the top floor of Abbey Manor Community Centre, Abbey Manor, Yeovil. Visitors and new members are always welcome.

NEW




RSGB Members' Price ONLY £11.04

FROM P&P FREE (Over £30 See Page 78 For Details)

## The Spies at Gilnahirk

By George Busby

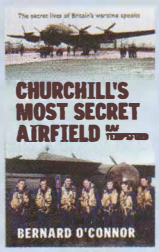
Whilst many know about Bletchley Park's role in WWII breaking the Enigma codes, fewer know the hugely important role of the Y service and the many radio amateurs involved in the collection of signals in WWII. This book focuses on the Y service station in Gilnahirk in Northern Ireland and sets out the story of those radio amateurs involved and why Gilnahirk was such an important centre in the Y service operations.

Many who know about the Y Service will know that in WWII many RSGB Members became 'Voluntary Interceptors' who collected German signals at home and posted these logs to the mysterious PO Box 25, Barnet, London. For those in Northern Ireland, Gilnahirk was the final destination of PO Box 25 that collated the amateur logs along with the logs from the larger military 'Y' listening station, before they were telexed to the codebreakers at Bletchley Park. Operations carried out here were of the upmost secrecy and its work carried on well beyond WWII, despite the closure of Bletchley Park. The unpretentious buildings largely attracted little attention despite a burst of press attention in 1951 when the Ministry of Finance tendered for the construction of a radio station but refused to comment on who it was for. Working in utter secrecy until its eventual closure in 1978, the Gilanhirk site was heavily involved in collecting signals during the Cold War.

*The Spies at Gilnahirk* provides a fascinating insight into the activities of the Radio Security Service and this little known site at the core of the Enigma story. Recommended reading for anyone interested in WWII codebreaking and the Enigma story.

Size: 215 x 205mm, 144 pages, ISBN: 9781 9106 5708 9
**Non Members' Price: £12.99, RSGB Members' Price: £11.04**

## Churchill's Most Secret Airfield



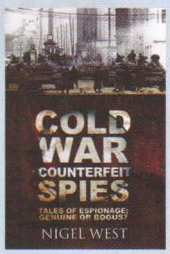

By Bernard O'Connor

Designed by illusionist Jasper Maskelyne, RAF Tempsford was constructed to give overflying enemy aircraft the impression it was disused. Nothing could be further from the truth - just after dusk on moonlit nights either side of the full moon, planes from the 138 and 161 Squadrons would take off on top secret missions to the heart of the war-torn Continent. They had to fly low and without lights in order to identify drop zones and deliver the supplies and secret agents that would help the resistance forces liberate Europe. But despite the attention of Churchill and George VI, the airfield's secrets have long remained an untold chapter in the story of the war. *Churchill's Most Secret Airfield: RAF Tempsford* is based on over a decade's research, filled with intrigue, suspense, heartbreak and the fascinating account of this extraordinary airfield.

256 pages, 197 x 124mm,
ISBN 9781 4456 0690 3
**Non-Members' Price: £ 12.99**
**Members' Price: £9.74**

25% OFF

## Cold War Counterfeit Spies




*Tales of Espionage - Genuine or Bogus?*

By Nigel West

Throughout the Cold War and beyond, publishers have produced countless stories of espionage, treachery and deception. What Nigel West has discovered is that many were in fact the stories themselves. In this remarkable investigation into the claims of many who portrayed themselves as key players in clandestine operations, the author has exposed a catalogue of misrepresentations and falsehoods. Did Greville Wynne really exfiltrate a GRU defector from Odessa? Was the frogman Buster Crabb abducted during a mission in Portsmouth Harbour? Did the KGB run a close-guarded training facility, as described by J. Bernard Hutton in *School for Spies*, which was modelled on a typical town in the American mid-west, so agents could be acclimatised to a non-Soviet environment? This book is filled with fascinating insights into the exaggerations and outright fabrications that some have published as fact in recent times.

256 pages, 157 x 236 mm, Hardback,
ISBN 9781 4738 7955 3
**Non-Members' Price: £25.00**
**Members' Price: £18.75**

25% OFF

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# Successful SOTA Summit to Summit EU-VK event

October saw the Summits On The Air, Australia to Europe Summit to Summit event. Fifty one summits across Europe, Australia, New Zealand and Japan were registered by their activators as intending to take part in the two hour 'super-activation'.
When 0630UTC arrived with weather varying from freezing cold to pouring with rain in Europe and not a lot better in Australia, the SOTA activators started their calls. Between 0630 and 0830UTC seventy three summits were activated – twenty two more than expected.
Mother nature and propagation were 'variable' to say the least but contacts were made between continents as well as within each of the regions.At times the number of active summits made it difficult to find a free frequency on 20m to call CQ on!
The organisers Andrew,VK1AD and Mike, 2E0YYY declared the event a success and planning is under way for future Australia to Europe SOTA events, most likely twice a year around the dates that we change the clocks in Spring and Autumn.
A similar event is being discussed between European and North American SOTA activators.

## VHF UHF at the National Hamfest


The VHF/UHF Muster has grown considerably over the past few years – and this year's must be the biggest gathering by far with some very well known contesters and DXers meeting for the usual eyeball and chat. Newcomers this year included Paul, G3YDY, Bob, G8HGN, David, G4RQI, Dave, M5DWI, Andrew, G8BYB, John, G4LKD, Graham, M0CGL, Charlie, GI4FUE and several others. So many turned up this year that it's hard to identify all the all callsigns! Those attending are already looking forward to the 2017 National Hamfest, so try and pencil in the Friday at 1pm to join in. Thanks to Dick, GM4PPT for arranging this 'sked' and also Robbie, GM0SEI at the helm of Dick's camera, a Nikon D5100.

## ML&S Hog Roast


Martin Lynch's Annual Hog Roast and Open Day will take place on Saturday 3 December. Sponsored by Yaesu, Icom and Kenwood, the ML&S store will have its usual bargains as well as lecture streams and the main manufacturers on site. Bacon butties will be available for the early birds and there will be the usual 'pig in a bun' for lunch. Doors open between 8am and 4pm. For more details, see hamradio.co.uk/hogroast

## RSARS presentation

Bryan, M0OIC is the Royal Signals Amateur Radio Society (RSARS) QSL Bureau Manager and has the pleasure of liaising with overseas members and sorting out QSL cards being sent to and fro. Rick, AI5P is one of those overseas RSARS members and he visited the RSARS stand at the National Hamfest after travelling from Albuquerque via Poland, Lithuania, Latvia, Estonia and Biggleswade where he stayed with Dave, G4ETG. As Rick does so much for the RSARS, it was decided that he should have an award in appreciation, which was presented at the National Hamfest. Rick, AI5P also met fellow RSARS member Nick, G3RWF at the RSGB Convention. Nick, G3RWF is also the current RSGB President.

## Commemorating Cervantes


The Spanish national society (URE) held a special event where 14 Special Event Stations with the prefix AN400 were on the air to commemorate the 400th anniversary of the death of Cervantes, the author of Don Quixote. It was held between 19 September and 9 October. Chris, G8APB was just one of the UK radio amateurs that took part. Amongst the UK entrants, Chris came 12th overall with 201 confirmed slots and made the 14 required from 3 bands to get the silver, gold and platinum certificates.

# Celebrating 75 years of the Air Training Corps

During September, 1132 Stalham Sqn Norfolk obtained GB75ACO (Air Cadet Organisation). On the whole, the station 'enjoyed' poor propagation on 40m and 80m most of the time, so GI, GM, GW and GK stations were 5/9 and G stations were not be heard very often. The total number of contacts made was 401, with 211 of them from the UK. Best DX was a WX3B in Maryland, USA. One outstanding QSO was with Laurie, G2BUP who is 100 years old, which put GB75 down a peg or so. Also worked were 14 Railways on the Air stations on the 24th.


Cadet stations worked included 1 ATC Sqn (callsign MRO44) and OACF MZV72 on 5MHz, and the total number of ATC staff worked under their own callsign was 9.

The photo shows Terry, G4PSH in the station using (left) an IC M700UK (Navy) to a dipole 5MHz with ATU, (middle) a TS-570D to an inverted V trap dipole for 80, 40 and 20m at 100W. QSL cards were sent out to 226 stations. Thanks to RSGB, RSGB QSL bureau, HQAC and Ofcom who made it all possible.

# Skype distance learning

A big thank you was given by Philip Willis, RSGB Training & Education Committee Chair to the speakers at this year's Convention TEC Forum, who included David Stansfield, GOEVV, reporting an experiment with Skype Tutorials. Six intermediate licensees who are half way through their Bath-based Advanced Examination Distance Leaning training took part in a tutorial. In what is believed to be a first, the six candidates were in Antrim Northern Ireland whilst their tutor, David Stansfield, GOEVV, a member of the Angel of the North Amateur Radio Club and the Five Bridges Cluster in Region 4 was in Morpeth Northumberland. The tutorial was delivered via Skype and was supported with PowerPoint presentations. Practical work included using an oscilloscope to measure SSB PEP, impedance transformation and measuring the resonant frequency of an aerial trap. The tutorial was seen by the candidates as a great success and a second session is planned for delivery just before their Advanced Examination in December.

# LAMCO on the move

After a couple of years of searching, LAMCO is moving. The LAMCO premises are still in Barnsley town centre, only 200m away from the Barnsley Alhambra shopping centre and half a mile away from the train and bus station. located near to the motorway with a quick and easy access to junction 37 on the M1. The new address is LAMCO, 5 Doncaster Road, Barnsley, South Yorkshire, S70 1TH.

# Fire at SAQ

The Alexander alternator LF transmitter at Grimeton in Sweden - callsign SAQ - won't be back on 17.2kHz for a month or so due to a fire breaking out in the aerial system in October. Their press release seems to indicate that it was a flash-over. Assessment and repairs could take a while, and at the time of writing it's uncertain that the usual Christmas transmissions will take place. Check their website at alexander.n.se for the latest news.

# Tynelink Fusion

Tynelink repeaters have all moved over to Fusion operation:

GB3NT 70cm Gateshead: receive 433.000MHz, transmit 434.600MHz, CTCSS 118.8Hz analogue + digital

GB3TJ 70cm Corbridge: receive 433.300MHz, transmit 434.900MHz, CTCSS 118.8Hz analogue + digital

GB3TW 2m Gateshead: receive 145.725MHz, transmit 145.125MHz, CTCSS 118.8Hz analogue + digital

GB3HA 2m Corbridge: receive 145.750MHz, transmit 145.150MHz, CTCSS 118.8Hz analogue + digital

GB3NT was the latest repeater to go Fusion thanks to a kind donation by Chris Herring, G7AQY to Nancy Bone, G7UUR, the NoV holder. He is seen here presenting the repeater to her at the Fog on the Tyne Rally with young amateurs looking on. Lee Marsh of LAM Communications supplied the repeater.

radcom@rsgb.org.uk

# New Products

## New external speaker for the IC-7300

Icom are introducing a new external speaker for its IC-7300 Software Defined Radio. The new SP-38 complements the appearance of the IC-7300 as well as improving the listening experience from its large diameter speaker. It has a rated input power of 5W (maximum 7W), with an impedance of 8Ω. Measuring 100 x 105 x 240.6mm it weighs 1150g. It comes with an audio cable of 1.8m.

It will be available in the autumn with a suggested retail price of £156 from all Icom authorised amateur radio dealers.

www.icomuk.co.uk



## E-Field Probe Active Antenna

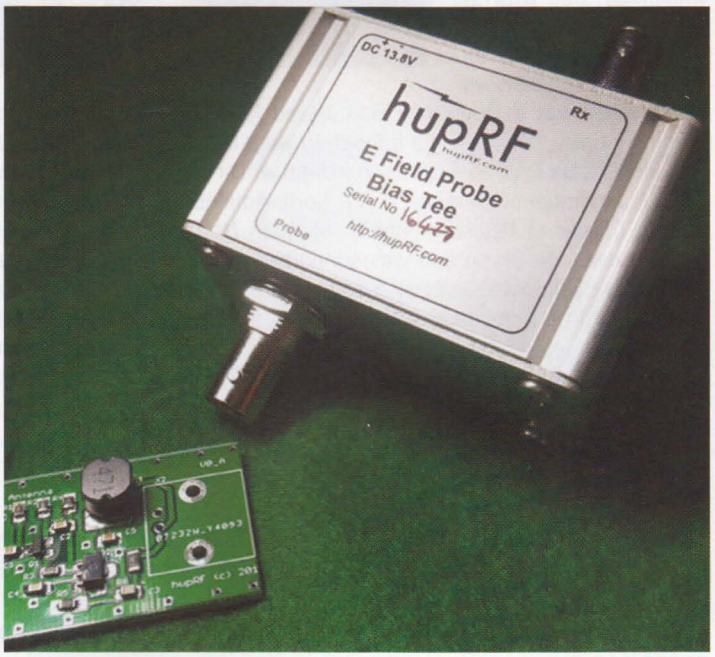
As a new introductory project to surface mount assembly, hupRF is now offering the E-Field Probe Active Antenna. The project is in two parts – the probe electronics and the power feeding Bias Tee.

The E-Field Probe itself needs to be mounted above ground (the higher the better) and connected by coaxial cable to the Bias Tee. The Bias Tee allows DC to fed up the coax to power the probe, whilst separating out the RF to be passed to the receiver. The unit requires a 13.8V DC supply – powering from a USB port is not an option.

The E-Field Probe is available as a component level kit, an assembly kit and there is an optional hardware kit. The component level kit contains all components and the PCB, but does not have the connectors or enclosure hardware. This is all in the Hardware kit, although many users may prefer to make their own arrangements. In the Assembly kit, all of the SMD assembly work is completed and you just need to make the connections. Kit prices range from £8 to £19.

The photo shows the Bias Tee in the optional hardware enclosure, and the prototype Assembly kit version of the probe electronics. Please note that an active antenna such as this is a 'receive only' device.

http://hupRF.com




## Klingenfuss publications

Several new products and annual updated ones are due from Klingenfuss in December. If you enjoy listening outside the traditional amateur bands, you may be interested to know that the 2017/2018 Guide to Utility Radio Stations, 2017 Shortwave Frequency Guide, 2017 Super Frequency List on CD and 2017 Frequency Database for the Perseus LF-HF Software-Defined Receiver have all been updated and will by available on the 10th.

www.klingenfuss.org

## Yaesu M1 reference microphone

For a one-time special, Yaesu are offering a 60th anniversary version of the M-1, embellished with an elegant gold ring. Only limited quantities of the special version are being produced, priced at £595. It features combined condenser and dynamic microphone elements. The condenser element produces a greater frequency response suitable for being heard on crowded bands and in big pile-ups, while the dynamic element delivers the mid tonalities for local QSOs. The response of each microphone element may be adjusted independently using the internal nine band graphic equaliser (63Hz, 125Hz, 250Hz, 500Hz, 1kHz, 2kHz, 4kHz, 8kHz, 16kHz). Two frequency response memories and a 'through' mode are provided for each element, and are easily switchable by one-touch buttons on the microphone base.

http://www.hamradio.co.uk/m1mic

## Scrolling message badges

bhi has updated its range of programmable LED message badges to include software for Microsoft Win10, as well as XP, Vista, Win 7, Win 8. You can display your callsign, name, brand or logo using one of these LED scrolling message badges. Messages are easily loaded into the badge using the software and USB adapter provided, or by means of the on board buttons on the back of the badge.

The badges can store 20 text messages, has ten animation icons such as a smile, five characters show on screen when the message is scrolling and there are five different scrolling speeds. Power supplied by an CR2032 (3V) button battery, there's a magnetic clip on the back for easy attachment to clothing.

The package includes 1 x LED message badge, spare CR2032 battery, instructions, USB cable and CD software. LED message badges are available in two colours, red priced at £12.95 and blue priced at £14.95. www.bhi-ltd.com

## Secure equipment boxes

Sentribox manufactures secure equipment boxes for sites and vehicles in a range of sizes. The XLOCK VANBOX measures 930mm L x 450mm H x 440mm and is prices at £135 plus VAT and the XLOCK 622 is 1800mm L x 630mm H x 580mm W costing £459 plus VAT. The boxes are made from sheet steel, in varying thicknesses, with deadlocks working in the horizontal plane and hooklocks working in opposing directions in the vertical plane providing a 4 point locking system. There are also anti-jemmy bars all round.

www.sentribox.co.uk

## Programmable GPS reference oscillator


After extensive testing, SDR-Kits has selected the Precision GPS Disciplined Reference Oscillator manufactured by Leo Bodnar Ltd as the recommended external frequency source for their popular DG8SAQ Vector Network Analyser. With a stability of 1Hz at 1000MHz, this programmable GPSDO Reference also serves as a Universal Frequency Standard in the lab for other test equipment or microwave generation. The Precision GPS Disciplined Reference Oscillator extends the use of the VNWA3 Vector Network Analyser to measuring frequencies and frequency differences with an accuracy of better than 1Hz at 1GHz. The VWNA Application software allows direct measurements of Allen Deviation and frequency as well as frequency differences in mHz or μHz and ppb values from frequency sources under test.

SDR-Kits has been appointed as an authorised distributor for the Precision GPSDO product.

It is priced at £125 + VAT and shipping.

http://sdr-kits.net/

# Homebrew

**Frequency is a measure of the number of events that occur in a given time period. Our local bus service departs every 20 minutes, or three times per hour. Less frequent events like the solar cycle will only occur once every several years. In the world of radio and electronics, frequency usually refers to the number of complete alternating current cycles in a period of one second, often happening millions of times a second.**

Frequency is easily measured using a simple counter. To measure the high frequencies used in radio circuits, several digits will be required. A typical counter will display 6-8 digits. To accommodate the large numbers involved, a cascade of several counters is needed. Historically, the count would have been recorded on a chain of BCD (binary coded decimal) counter ICs. Most modern designs keep count in binary using a set of registers (memory) in a microcontroller to store the count. The counter must be controlled or gated by an accurate timebase. See Homebrew for Jan-March 2008 for an in-depth look at frequency counters.

## Time

In the past, time was measured relative to the rotation of the earth, the orbit of the moon and the orbit of the earth around the sun. In the last few centuries, mechanical clocks have been the standard instrument for measuring time.

Today, the standard unit of time is the second. This unit is very precisely defined by properties of the Caesium atom as "the duration of 9,192,631,770 periods of the radiation corresponding to the transition between the two hyperfine levels of the ground state of the caesium-133 atom". For this reason, caesium clocks are regarded as the primary standard.

Accurate timekeeping is very important for science, navigation and for legal purposes. In several countries, accurate time and frequency standards are maintained by government organisations. Information from these standards is transmitted by radio. The radio-controlled clock in your kitchen is probably synchronised with the 60kHz MSF [1] signals from Cumbria or DCF77 near Frankfurt.

For the recent experiments with voltage references, I had to depend on a couple of local voltage standards and a couple of borrowed meters to check the accuracy of my measurements. Time and frequency calibration is much easier because very accurate time and frequency information is readily available from several independent sources. My first precise frequency reference was a 10MHz oscillator that was compared to a signal derived from the sync-pulses from a local UHF TV station. Since the change to digital TV, this reference is no longer available.

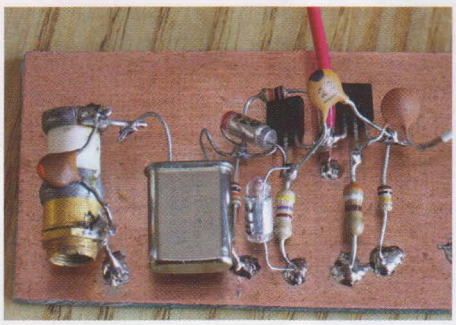


PHOTO 1: My prototype crystal oscillator.

Currently available time and frequency standards include MSF (60kHz), DCF77 (77.5kHz), BBC long-wave (198kHz), RWM from Russia (4.996 and 9.996MHz) and WWV from the USA (2.5, 10, 15 and 20MHz).

The GPS network and other satellite navigation systems also provide a reference with excellent long-term stability.

## 10MHz or 9.996MHz crystal oscillator

**Figure 1** shows the schematic of a crystal oscillator and buffer amplifier. Once this unit is calibrated against an off-air standard, it can be used as a short-to-medium term reference. After a few minutes of warm-up, stability is around 1 ppm (parts per million) or about 10Hz per hour. Even greater stability is possible if the unit is well insulated from sudden temperature changes. The oscillator uses an MPSH10 transistor in the common-collector configuration. Positive feedback is via a capacitive tap from emitter to base. The buffer amplifier is an MPF102 JFET in the common-drain mode (comparable to an emitter follower). The 5V DC supply is provided by a 7805 or similar voltage regulator. Power for all of this month's projects is provided by standard three-pin voltage regulators. To avoid unnecessary duplication, only one example will be shown, later.

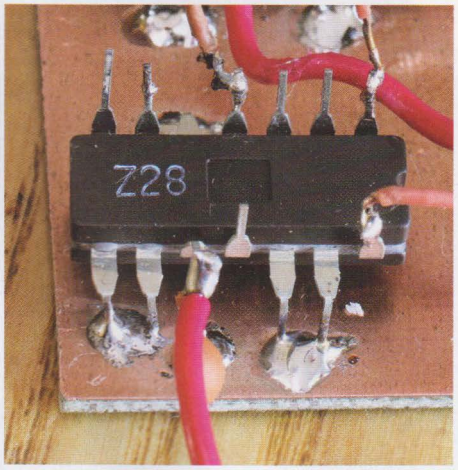
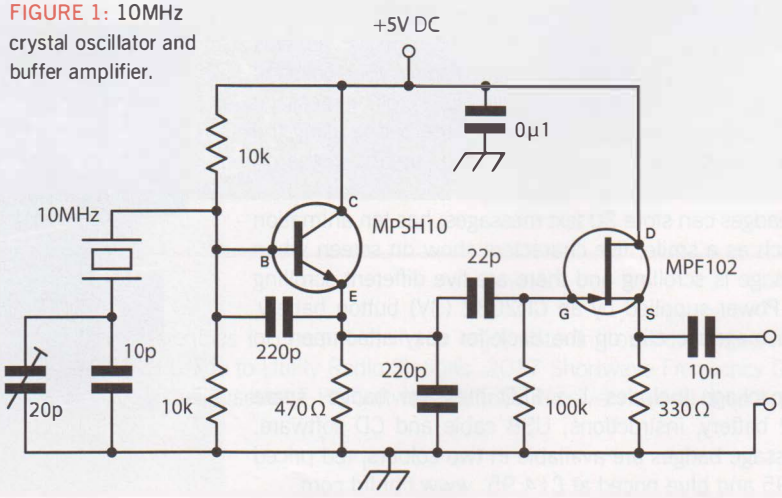



PHOTO 2: Connecting ground pins to the copper foil when building dead-bug style.

The prototype circuit was built using point-to-point wiring on a strip of PCB laminate. If possible, the 220pF feedback capacitors and any capacitors in the crystal circuit should be

FIGURE 1: 10MHz crystal oscillator and buffer amplifier.



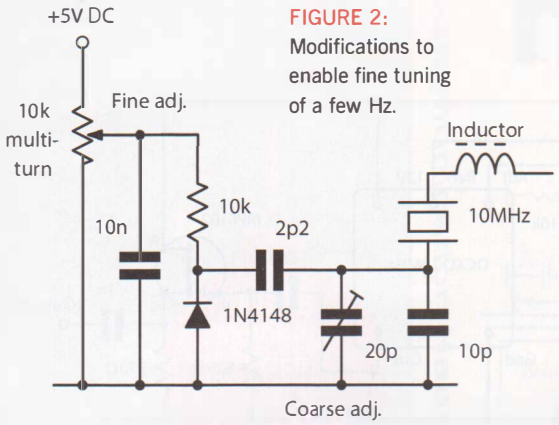



FIGURE 2: Modifications to enable fine tuning of a few Hz.

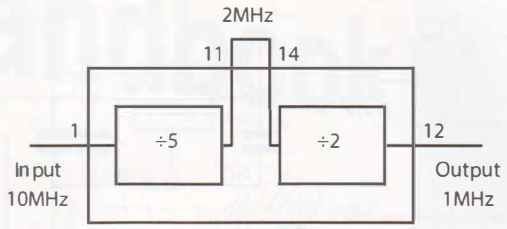



FIGURE 3: Simplified block diagram of how to set up the 7490 as a divide-by-10 counter.

high stability types. Polystyrene, silvered-mica or NPO ceramic types will be much more stable than standard ceramic capacitors.

## Testing

Oscillator frequency is adjusted by a 20pF trimmer capacitor. The values shown allowed tuning to precisely 10.000MHz using my current batch of 10MHz crystals. If your crystals have different characteristics, it may be necessary to make small changes to the value of the 10pF fixed capacitor. Frequency will be inversely proportional to capacitance. I set the oscillator to 10MHz using my bench frequency counter and then checked the value against off-air 10MHz time signals and my GPS disciplined, oven-controlled crystal oscillator (OCXO) (March 2008). The unit was then powered down and left for one hour. At next switch-on, frequency shifted +4Hz in the first ten minutes and then remained stable to within 1Hz/hour for several hours.

The use of a standard trimmer capacitor will make fine tuning extremely difficult. I used a multi-turn, piston trimmer for tuning. This allows for relatively easy tuning to within 1Hz. I find it quite hard to get an identifiable zero-beat on the relatively weak time and frequency signals on 10MHz. I find the signal from RWM on 9.996MHz is a better reference. There is usually a lot less interference on this frequency and RWM often provides a very strong signal. The frequency is 4kHz away from the usual standard. 9.996MHz crystals are not so readily available, but it will often be possible to 'pull' a 10MHz crystal down to the required frequency by placing a small inductance in series with the crystal.

**Figure 2** shows a couple of modifications to the oscillator. An inductor is placed in series with the crystal. The inductance value is very small compared to the motional inductance of the crystal. A value in the low $\mu$H range should be adequate. 20 turns on a T50-2 toroid is a good starting point for experimentation. Excessive inductance may have an adverse impact on stability or might even prevent oscillation. If you can't achieve the required frequency, try using a different crystal. Some crystals will shift more easily than others, even when they are from the same manufacturing batch. Figure 2 also shows a simple electronic fine-tuning control. This will allow very fine-tuning of plus or minus a few Hz. The assembled oscillator is shown in **Photo 1**.

## Frequency dividers

A frequency divider will allow an oscillator to be used at sub-multiples of its frequency of oscillation. Dividers based on digital and logic devices like counter ICs will produce a square-wave output that is rich in harmonics. Such a signal can be very useful for calibrating receivers or test equipment. The most common types of counter are binary and BCD (binary coded decimal). The binary types give a division ratio of two for each bit in the count – 2, 4, 8, 16 and so on. The decade types are particularly useful for division ratios that are multiples of ten – 10, 100, 1000...

My usual first choice for a simple decade counter is the 74LS390 and similar devices from other logic families (74HC etc). The 390 is a dual counter, which will save on space and cost when several stages are needed. As the 390 was not available, I had to use a few 7490 devices from the local shop. The *90 is a four bit counter. The standard configuration has a divide by 5 stage and a divide by two stage. This provides a very easy way to achieve division ratios of 2, 5 or 10. **Figure 3** shows a very simplified diagram of a 7490 configured to divide by 10. This particular arrangement gives a symmetrical square-wave output with approximately 50% duty cycle.

A 10MHz oscillator as previously described can be used with a chain of dividers to produce multiple outputs at lower frequencies. This makes a very useful 'frequency marker' for testing and calibrating receivers or test equipment such as spectrum analysers. **Figure 4** shows a divider that will produce outputs at 1MHz and 100kHz when clocked by a 10MHz oscillator. This can be used with a simple crystal oscillator, or with a more stable reference like an OCXO, rubidium frequency standard or GPS disciplined oscillator. Suitable frequency standards are often available at reasonable prices on internet auction sites.

The circuit was built dead-bug style on a strip of PCB laminate. **Photo 2** shows close up details of how the grounded pins are soldered directly to the copper foil. As well as providing the shortest possible path to ground, this arrangement anchors the IC to the board to make a mechanically stable and reliable circuit.

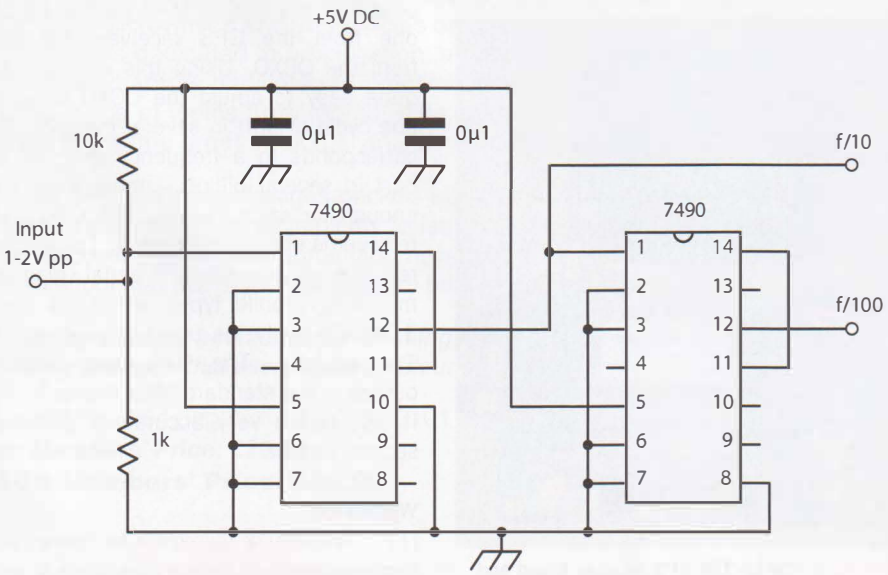



FIGURE 4: Practical divide by 10 and 100 circuit.

**Eamon Skelton, EI9GQ**
hbradio@eircom.net

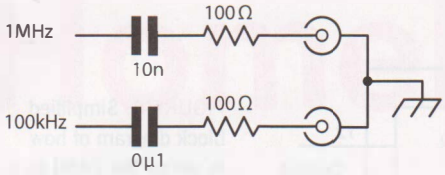



FIGURE 5: A capacitor and resistor between the divider outputs and front panel sockets affords a measure of protection.

If required, the circuit can be extended to produce additional outputs. Adding another decade counter would produce a 10kHz output from a 10MHz input. Using the divide by 2 stage alone would allow outputs at 5MHz, 500kHz or 50kHz. The outputs can be taken to separate output sockets or to a switch so that the selected output can be taken to a single output socket. Note that the outputs are completely unbuffered. If this unit is to be used as a frequency marker, it would be a good idea to place capacitors and resistors in series with the outputs, as shown in **Figure 5**. The capacitors will protect against accidental application of DC to the output terminals. The resistors will limit current in and out of the pins. Higher values would offer greater protection, but would result in significantly lower output.

## Testing

The simple crystal oscillator was connected to the input of the first divider. The 5V supply for the oscillator/buffer and the divider was provided by a 1A voltage regulator. The unit was powered up and I noticed the ICs and the regulator were running a bit warmer than expected. A quick check with a voltmeter revealed a supply voltage of 8V. I'd managed to install a 7808 instead of the intended 7805!

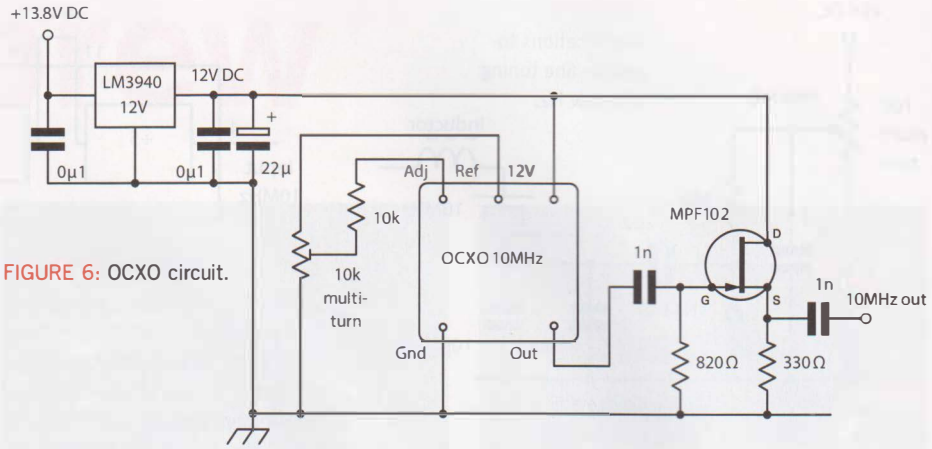



FIGURE 6: OCXO circuit.

As this is well above the absolute maximum voltage limit for the 5V logic ICs, the unit was powered down immediately and the regulator replaced with the correct item. Happily, the ICs seem to be undamaged and the outputs produce nice clean square waves at 1MHz and 100kHz. The harmonics are easily heard at HF and at least up to 144MHz.

## OCXO

**Figure 6** shows a 10MHz oscillator based on a packaged oven controlled crystal oscillator (OCXO). I used a CQE unit in this project. I have also seen similar units under the Temex and Isotemp brands. Surplus OCXOs are easily found on eBay and occasionally at rallies.

The 12V supply voltage and package pinout shown is correct for this device. Don't assume it will also be correct for yours. Check carefully before applying power to an unknown unit.

Power is supplied by a 12V, 1A regulator. A low-dropout (LVD) type like the LM3940 is recommended in cases where the unit will be powered by a lead-acid battery or a 12.5-13.8VDC bench supply. This type of oscillator offers stability measured in parts per billion. A typical spec would be ±5ppb per day over the full temperature range of the device and typically better than 1ppb per day at normal room temperature. The output frequency can be trimmed by a couple of Hz using a multi-turn cermet pot. The output buffer is a JFET source-follower. The circuit was built on Veroboard and the finished unit is shown in **Photo 3.**

## GPS disciplined oscillators

The trouble with having such an extremely stable oscillator is that you need a very accurate standard to calibrate it against. I use a Navsync CW12-TIM timing GPS as my long-term frequency stability reference. The 10MHz output from this receiver has extremely good long stability, comparable to the atomic clocks on the GPS satellites, when averaged over a fairly long period.

There is no direct connection between the GPS receiver and the OCXO. I use a dual beam oscilloscope to compare the *phase* of the two 10MHz output signals: one from the GPS receiver, the other from the OCXO. Using this method, it is quite easy to adjust the OCXO to within one cycle of drift in several minutes. This corresponds to a frequency error of one part in several billion – more than good enough for my purposes. The CW12-TIM receiver is shown in **Photo 4.** The receiver requires an external GPS aerial (magnetic mounting mobile types are ideal) and a 3.3VDC supply. As usual, I used a 3.3V 1A regulator. The GPS unit produces output in the standard NMEA data format. It also has a very accurate 1 pulse per second output.

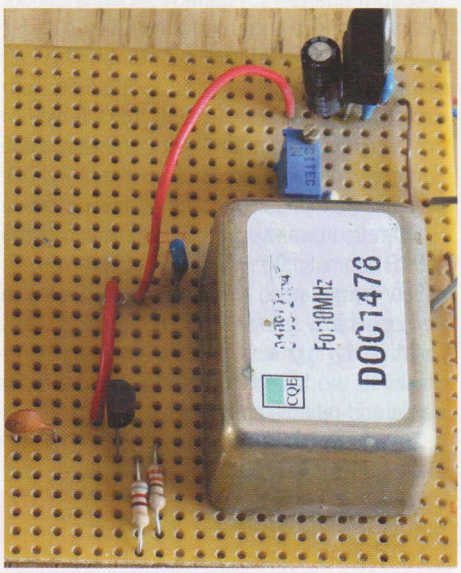



PHOTO 3: OCXO prototype.


PHOTO 4: CW12-TIM GPS receiver board and antenna.

**Websearch**

[1] www.npl.co.uk/science-technology/time-frequency/products-and-services/time/msf-radio-time-signal

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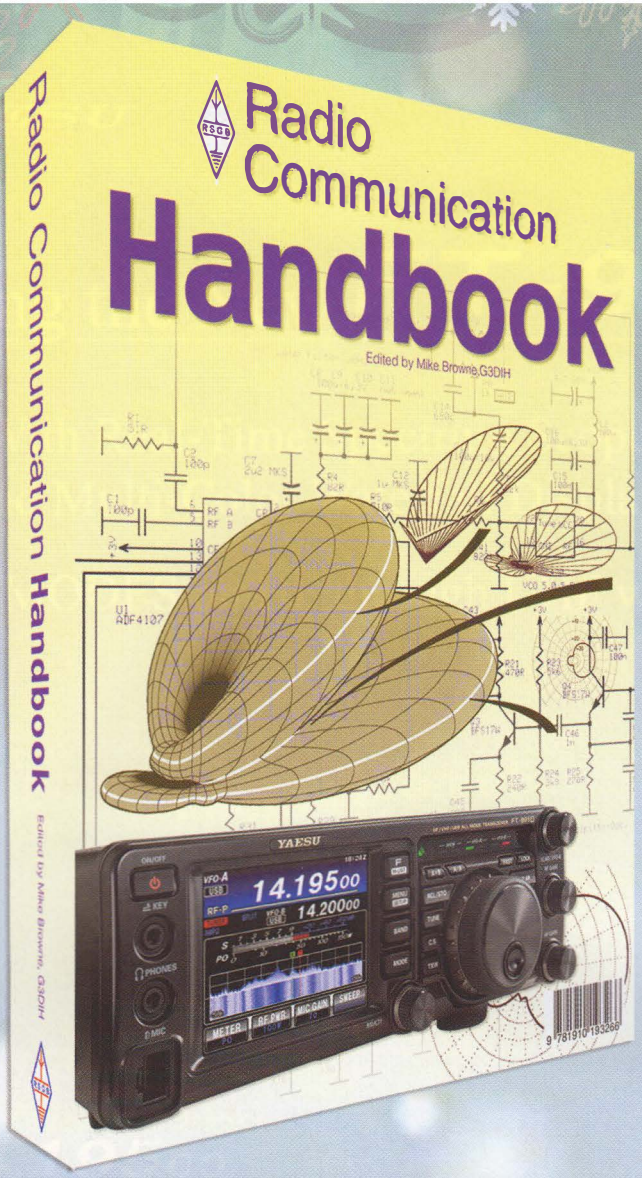


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# HF F-Layer Propagation Predictions for December 2016

Compiled by Gwyn Williams, G4FKH

## HF F-Layer, Propagation Predictions for December 2016

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 | 6661...26666 | 636432356346 | 1.2544451.12 | ...55552.... | ...3654..... | ...2662..... | ....331..... | ....22..... |
| *** Asia | | | | | | | | |
| Yakutsk | 321....23334 | 1..31..32... | ...1..... | ..... | ..... | ..... | ..... | ..... |
| Tokyo | .....122212. | ...33233111. | ...22.11.... | ..... | ..... | ..... | ..... | ..... |
| Singapore | .......22221 | ......442222 | .....243.... | .....33..... | ....121..... | .....1..... | ..... | ..... |
| Hyderabad | 2......12332 | 31....133331 | ......23.... | .....131.... | ...1122..... | ....22..... | ..... | ..... |
| Tel Aviv | 552.....5555 | 5551...35555 | 1.53212421.2 | ...54342.... | ...5443..... | ...2321..... | ....1..... | ..... |
| *** Oceania | | | | | | | | |
| Wellington | ....1222.... | ...145541... | ....4552.... | ....343..... | .....21..... | .....1..... | ..... | ..... |
| Well (ZL) (LP) | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Perth | .......1111. | ......34222. | ......431... | .....231.... | .....22..... | .....11..... | ..... | ..... |
| Sydney | ......1111.. | ....144311.. | ....3442.... | ....343..... | ....231..... | ....12..... | ..... | ..... |
| Melbourne (LP) | ..... | ...12..... | ...23..... | ....3..... | ....2..... | ....1..... | ..... | ..... |
| Honolulu | ...11.12.... | ...12223.... | .....1.1.... | ..... | ..... | ..... | ..... | ..... |
| Honolulu (LP) | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| W. Samoa | ....2.11.... | ....4443.... | ....3432.... | .....32..... | .....1..... | ..... | ..... | ..... |
| *** Africa | | | | | | | | |
| Mauritius | 2.......2222 | 3......33323 | 1......311.1 | ......12.... | ......1..... | ..... | ..... | ..... |
| Johanesburg | 32.......233 | 43......3433 | 21.....23322 | .......21... | ...11112.... | ....1111.... | ..... | ..... |
| Ibadan | 4442....2444 | 55531..14555 | 5.1421125522 | ...532232... | ...54334.... | ...24442.... | ....222..... | ....11..... |
| Nairobi | 33......3333 | 432.....4444 | 2..1...241.1 | ...2..13.... | ...32121.... | ......3..... | ..... | ..... |
| Canary Isles | 6665....1566 | 66652..14666 | 45164323563 3 | 11.654445211 | ...323322... | ...211111... | ...1..... | ..... |
| *** S. America | | | | | | | | |
| Buenos Aires | 2222.......1 | 3314......12 | .1.3..... | ...1..... | ..... | ..... | ..... | ..... |
| Rio de Janeiro | 3323......13 | 3325.....133 | 12.4.....111 | ...2..... | ....1..... | ....1..... | ..... | ..... |
| Lima | 2222.......1 | 22.31......1 | ...1..... | ..... | ..... | ..... | ..... | ..... |
| Caracas | 3333......13 | 33.42....123 | ...13..... | .....21..... | .....221.... | .....22..... | ..... | ..... |
| *** N. America | | | | | | | | |
| Guatemala | 22222......1 | 22.33......1 | ....21..... | .....1..... | ......1..... | ..... | ..... | ..... |
| New Orleans | 33321......2 | 23.32......1 | .....1..... | ......21.... | ......2..... | ......1..... | ..... | ..... |
| Washington | 44432.....24 | 44.43....212 | .....1.11... | ......22.... | ......33.... | ......11.... | ..... | ..... |
| Quebec | 44431.....33 | 24.12...12.1 | .....2112... | ......33.... | ......32.... | ......4..... | ..... | ..... |
| Anchorage | 121.....2... | ........3... | ..... | ..... | ..... | ..... | ..... | ..... |
| Vancouver | 2222..... | 1..11..1.... | .....21... | ..... | ..... | ..... | ..... | ..... |
| San Francisco | 22222..... | 21.1311....1 | ....1..1.... | .....1.... | ..... | ..... | ..... | ..... |
| San Fran (LP) | ..... | ..... | ..... | .....1.... | .....1.... | .....1.... | ..... | ..... |

**Key:** The figures represent approximate S-meter readings, whilst the colours represent expected circuit reliability. **Black** equals low to very low probability, **Blue** equals good probability and **Red** equals a strong probability. No signal is expected when a '.' is shown. The RSGB Propagation Studies Committee provides propagation predictions on the internet at **www.rsgb.org.uk/propagation/index.php**. An input power of 100W and a dipole aerial has been used in the preparation of these predictions; therefore a better equipped station should expect better results. The predicted smoothed sunspot numbers for January, February & March 2017 are respectively (SIDC classical method – Waldmeier's standard) 28, 27 & 26 and (combined method) 43, 41 & 41. The provisional mean sunspot number for October was 33.6. The daily maximum / minimum numbers were 69 on 9 October and 0 on 1 October.

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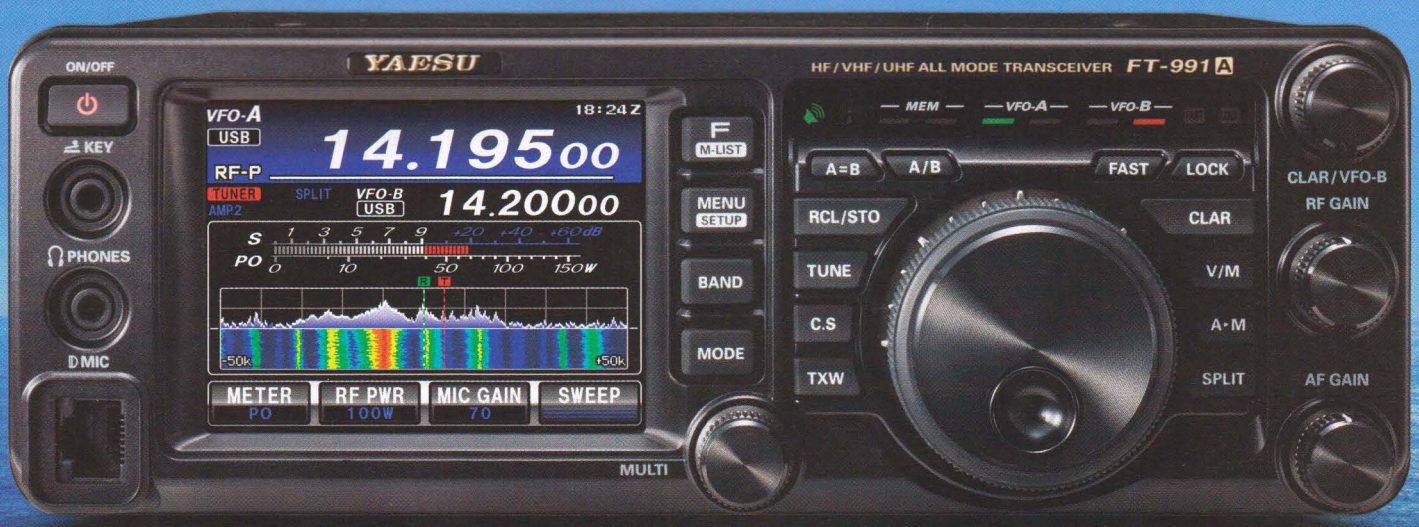


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# Antennas

**We continue with the theme of compact antennas with an overview of the discone antenna followed by summaries of the discone antennas provided by Martin, G4ZMR and Bob, M0RHE.**

## The discone antenna

Armig G Kandoian, of the US Federal Telephone and Radio Corporation, filed his invention with the US Patents Office for a broad-band aerial and Patent number 2368663 was granted in 1945 [1]. This broad-band aerial has become known as the 'discone' antenna and its original use was intended for the aviation industry. However, with its capability to operate over a wide frequency bandwidth, the discone antenna was soon adopted by many users including the US military, commercial organisations and amateur radio enthusiasts. A detailed summary of the discone antenna's history and use within amateur radio has been published by the ARRL [2].

PHOTO 1: G4ZMR's discone antenna.

## An overview of the discone antenna

The discone is a wide-band antenna that theoretically has the capability to operate over a 10:1 frequency range. This makes the discone appealing because a single antenna could be used to cover the bands on the VHF and UHF range of frequencies.

The discone antenna is a vertically polarised aerial and is used where omnidirectional coverage is required. The wide operating frequency band means that a single antenna can be built covering, for example, the 70, 144 and 432MHz bands or the 144, 432 and 1296MHz bands. Although popular as a receiving antenna and with scanning enthusiasts, the discone antenna has tended not to be favoured as a transmitting antenna with radio amateurs because its wide band-width properties could result in the possibility of radiating unwanted harmonics and other spurious emissions from the transmitter. This tended to be a problem when most VHF and UHF transmitters were homebrewed. However, modern commercially-made transceivers tend to have a cleaner output transmit performance where undesirable harmonics and spurious emissions are minimised. Nevertheless, to be on the safe side, it would be good practice to use a suitable band-pass filter that is cable of handling the transmitter's output power if a discone antenna is to be used for transmission.

The discone antenna is a derivative of the broad-band biconical antenna [3]. The biconical antenna consists of two conductive cones, arranged on the same axis with their apex points nearly touching. The space in between the cones' apex points is the feed point for the antenna. Essentially, biconical antennas can be considered as broad-band dipoles, typically with bandwidths of three octaves or more. The discone antenna replaces one of the cones with a disk that is mounted above the cone.

The original patent described an antenna comprising a sheet metal disk and cone for use in aircraft, protected from the slipstream by a separate 'blister' in the fuselage. Using rods for the cone and disk, rather than sheet metal, is preferable in unshielded stationary use (eg on a chimney) because this reduces the physical forces that the antennas have to withstand when the weather conditions are windy. Particularly for frequencies of amateur interest, the disk and cone are often both made from aluminium elements of around 8mm diameter, as illustrated in **Figure 1**. Typically at least eight rods, or preferably a few more, are required for each of the disk and cone to give a reasonable performance. The antenna is usually fed using a coaxial cable with the inner conductor connected to the disk and the outer conductor connected to the apex of the cone.

The cone is the antenna's primary radiator of the RF signal, while radiation from the disk is minimal. This is because the RF currents flowing in the cone all tend to travel in the same direction, while the RF currents in the disk oppose each other and so tend to cancel. The maximum RF current area is near to the top of the antenna, allowing the antenna to radiate away from ground objects and helping to further improve its performance. Careful design allows the discone antenna to present an impedance of close to 50Ω across its operational frequency, range making the antenna suitable for use with coaxial cable feeders. The spacing between the disk and cone determines the antenna's impedance and this space is also one of the factors determining the upper operational frequency limit.

When the physical length of the cone's elements become long compared to the RF signal's wavelength, then the cone's elements can be thought of as a series of individual long wire antennas. As the frequency is increased, the cone elements' cumulative radiated RF signal tends to be forced upwards towards the

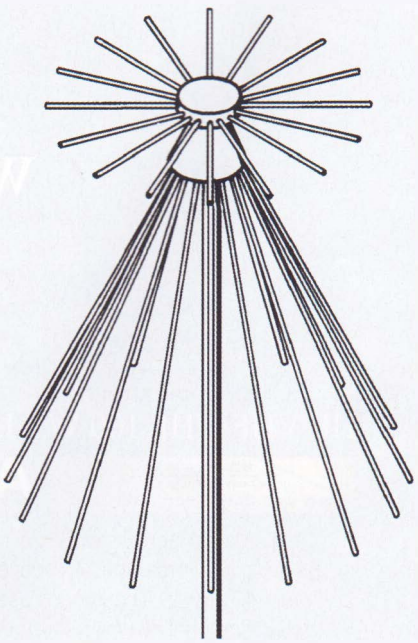

FIGURE 1: Concept of the discone antenna.

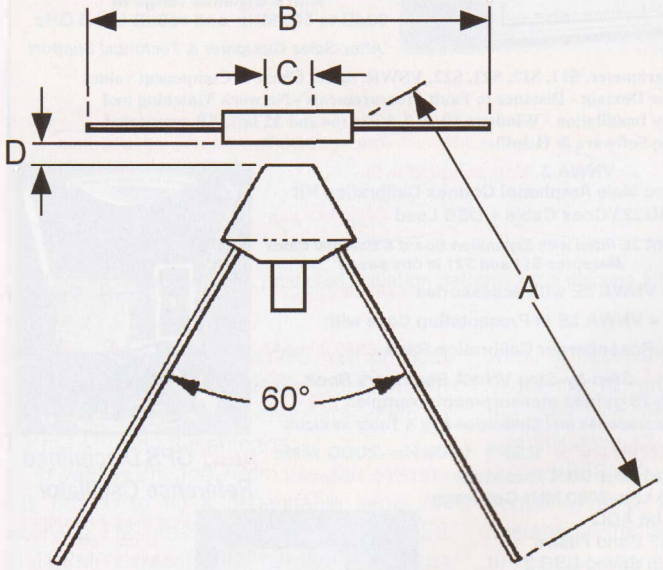


FIGURE 2: Key design dimensions of the discone antenna.

PHOTO 2: M0RHE's novel discone antenna unfolded.

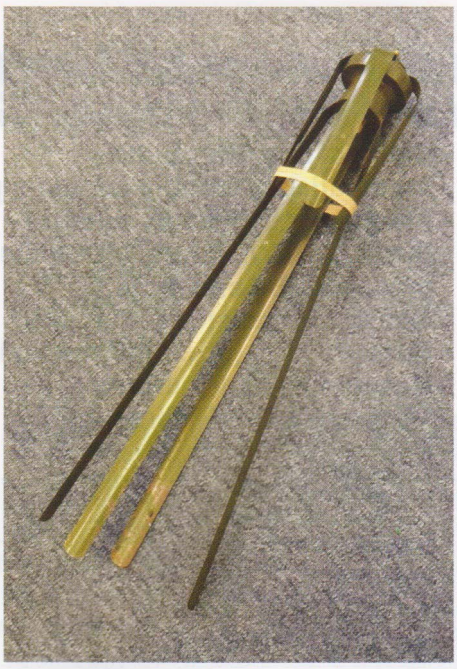

PHOTO 3: M0RHE's novel discone antenna folded.

disk. This rising effect of the radiation pattern causes the antenna to become increasingly inefficient as an omnidirectional aerial at lower radiation angles.

## Summary of construction

Referring to **Figure 2**, the elements used to form the cone (A) should be λ/4 long at the lowest frequency of operation, so length (A) in mm = 75000/lowest frequency (MHz).

The angle between opposite elements is typically 60°. The disk's diameter (B) should be 70% of (A) at the lowest operating frequency, so (B) in mm = 52500/lowest frequency (MHz).

The cone's upper diameter (C) is typically 12mm, allowing sufficient room for most coaxial cable feeders to be passed through a suitable hole drilled centrally. The feeder's outer conductor is then connected to the top of the cone and the inner conductor to the centre of the disk. The separation between the lower surface of the disk and top of the cone (D) should be about 20% of (C) to give a match close to 50Ω (ie about 2.4mm for (C)=12mm). A flat plastic insulator is often used to maintain the separation between the disk and the cone. Both cone and disk are secured to this insulator, so providing mechanical strength for the antenna.

## Predicted radiation patterns

Using the *MANNA-GAL* antenna analysis application, a discone antenna designed for use from 62MHz upwards was modelled at 70, 145 and 432MHz. The model used 10mm diameter elements, with 8 elements used for both for the disk and the cone. The disk's diameter was 0.84m, while cone's radials were 1.2m in length each. The antenna was modelled at a height of 5m above the ground. **Figure 3** shows the results of the model in terms of the predicted radiation patterns. It can be seen, as expected, that as the frequency is increased, so the radiation angle tends to rise. This rising effect of the radiation pattern influences the antenna's practical frequency range.

If carefully constructed, an SWR of better than 2:1 can be achieved across the antenna's operational band. It is possible to extend the lower frequency coverage by using a vertical element fitted to the top of the disc. This enables the antenna to operate like a λ/4 vertical antenna with the ground-plane provided by the disk/cone below. The vertical element's length is suitably adjusted to resonate the antenna to give a low SWR on the band required.

The *Radio Communication Handbook* [4] provides detailed guidance on the discone antenna; the summary here is provided as an overview.

## G4ZMR's discone antenna

Martin Reynolds, G4ZMR has passed to me details of the discone antenna he has used for several years as both a VHF receiving and transmitting aerial. The antenna should be capable of operating from 25-1300MHz, however he has tended to use the antenna on VHF only. **Photo 1** shows the discone mounted at Martin's QTH, where it has about 15m of 50Ω coax to the transceiver.

Martin regularly uses the discone antenna for 2m FM contacts running around 25W. Recently, he decided to see how the antenna operated on 2m and 70cm. He made a series of SWR tests with 25W on 2m and 5W on 70cm to see how the antenna performed.

**Mike Parkin, G0JMI**
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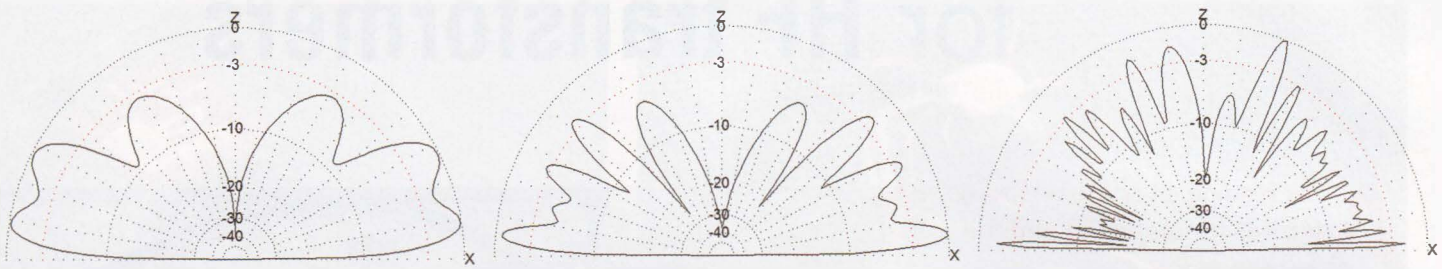


FIGURE 3: *MMANNA-GAL* predicted radiation patterns for a discone antenna at various frequencies. (left) 70MHz, (centre) 145MHz, (right) 432MHz.

He found the antenna worked well on both bands, with SWRs of typically 1.3:1. Martin now says he intends to operate more often on 70cm FM using the antenna.

As well as 2m and 70cm use, the antenna has proved to be a dependable aerial for receiving FM broadcast stations on the 88 to 108MHz band, with numerous stations reliably received.

## A novel discone antenna

Bob Head, MORHE, found a novel folding discone antenna recently at a local radio rally and has sent some pictures to me of this antenna as shown in **Photo 2** and **Photo 3**. It seems likely that this antenna may be of military surplus origin.

Bob was interested to know if the operational frequency range could be determined for this antenna. The antenna had a disk of diameter of 330mm, so working backwards from this gave a lower frequency of around 160MHz. However, the antenna's cone radials are 375mm long and this gave a lower operating frequency of around 200MHz. Assuming a 10:1 working frequency range, this indicated that the upper operational frequency is around 2GHz. This upper operational frequency seems rather high judging by the antenna's construction. It would also seem that the antenna has rather too few elements and this is likely to affect its performance.

However, to answer Bob's question, this antenna could probably be made to cover 70cm. The addition of a 2m λ/4 vertical to the top of the antenna might enable the antenna to operate on 2m.

## Conclusion

The discone antenna provides a compact broad-band solution for operating on several VHF and UHF frequencies using only a single antenna fed with one feeder cable.

### References

[1] www.google.com/patents/US2368663 – US Patent 2368663, Broad Band Antenna, granted on 6th February 1945 to Armig G Kandoian, US Federal Telephone and Radio Corporation

[2] *The ARRL Antenna Handbook for Radio Communication*, 23rd edition edited by H Ward Silver, NOAX: section 10, Multiband HF Antennas, p 10.35-10.38, and section 15, VHF and UHF Antenna Systems, p 15.50-15.52

[3] *Antennas*, 2nd edition, John D Kraus, Chapter 8, The Biconal Antenna and its Impedance, p 340 - 358, also – separately – https://en.wikipedia.org/wiki/Biconical_antenna

[4] *RSGB Radio Communication Handbook*, 12th edition edited by Mike Dennison, G3XDV, and Mike Browne, G3DIH: Section 16, Practical VHF/UHF Antennas, Pages 16.30 to 16.31.

**Report**

# Construction Competition

Although there weren't many entries to this year's competition, those we had were all interesting projects and presented with enthusiasm. The projects ranged from a simple Morse keyer through to a state of the art transverter.

Judging this type of competition, with such a diverse range of projects, is never easy. After much deliberation, it was the combination of excellent RF performance and high quality construction that made the Anglian transverter from Sam Jewel, G4DDK, the overall winner. He was awarded the Pat Hawker, G3VA trophy. The other winner was Dave Powis, G4HUP with his E-Field Probe Active Antenna.

Prizes were provided by RSGB Convention sponsor Martin Lynch & Sons and the presentations were made during the Convention at the ML&S Stand. ML&S Sales Manager, Richard, G1GRD, made the presentations with the RSGB President Nick Henwood, G3RWF.


Dave Powis, G4HUP winner of the Construction category.


Sam Jewell, G4DDK winner of the Innovation category and the Pat Hawker, G3VA trophy.

# Recycled ferrites for HF transformers

**After reading an article on using ferrites for matching end-fed antennas by Guy, ON5FM [1] I built some experimental HF transformers with ferrite cores salvaged from old VGA cables that went between a computer and a CRT screen.**

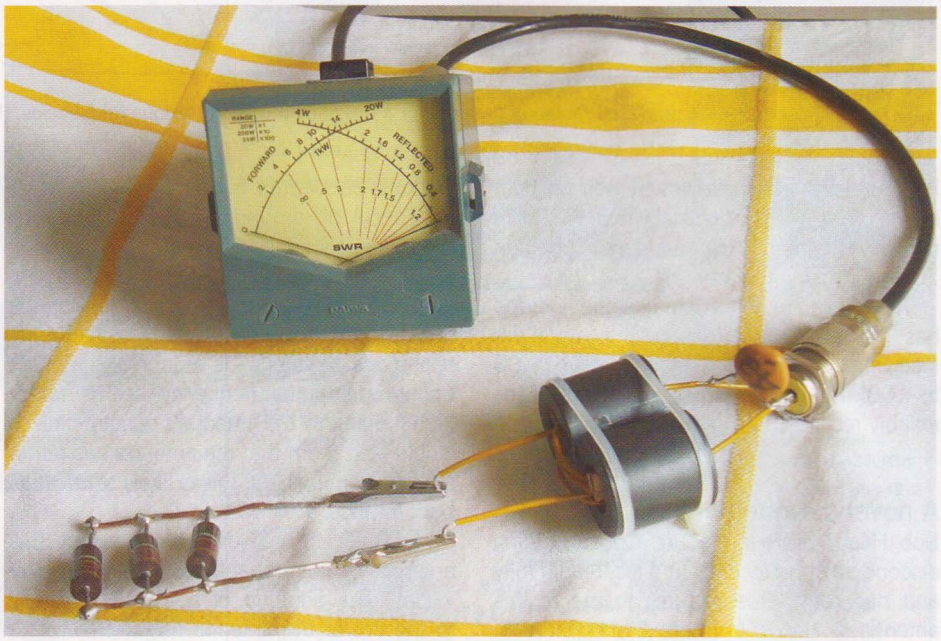


PHOTO 1: Basic test setup.

All I knew about the cores were that they were made of ferrite (which I determined because a file did not scratch them); discussion with Martin, G8JNJ suggested they were probably Type 43 material.

Later, I obtained a range of ferrites of unknown properties from various sources including rallies. I decided to try to get some feel for their properties, initially using the trial-and-error method but evolving to include a bit of clinical sense and simple measuring devices, an approach commonly used in famous research institutes the word over.

Three different sizes were tested. They seemed to have been manufactured in imperial sizes so I'll use those measurements first, followed by the metric equivalents. All have the same length of 1¼ inches (28.5mm). Small ones (here called S) have an external diameter of ½" (12.5mm), a bore of ¼" (6.35 mm) and a surface section of 28.5 x 3.9 ≈ 110 mm². Medium ones (M) have an external diameter of ⅜" (18.2mm), a bore of ⅜" (9mm) and a surface section of ≈130mm². Fat cores (F) had an external diameter of 1¼" (28.5mm), a bore of just over ½" (13.6mm) and a section of 208 mm².

## Testing method

The basic test method was to use an RF source and an SWR meter to drive an RF transformer constructed on the cores under test, which were connected to different load impedances.

I used an IC-706 Mark II, a cross-needle Daïwa CN 101 L SWR/wattmeter and a 150W-rated 50Ω coaxial dummy load as the base equipment. Some huge carbon 25W resistors, properly connected, made the 200, 300 and 450 ohm dummy loads for testing at different impedances. As the test progressed a Mk 1 fingertip classified the core temperature as cool, lukewarm, hot or burning.

The transmitter was set to FM (for constant power) in the middle of each of nine amateur bands and the power at each frequency was increased by 10W steps up to 100W. (One test used 300W). Each test applied the power for one minute at time; at each increment the reflected power was noted and the temperature was gauged. (Particularly on the meter I used, reflected power is a better measure than SWR because the Reflected scale is more sensitive than the Forward scale and much easier to read accurately than the SWR curves.)

During the tests I found that a capacitor could tune some of the transformers for better performance. Initially I used a ceramic variable capacitor, which was later replaced with a mica fixed capacitor or a piece of Teflon-insulated RG 174A/U coax to give the same capacitance.

## Test one – 1:1 and 4:1 balun with two S cores

Two small (S) ferrites were glued together side by side with two-part epoxy, binocular fashion. Two cable ties kept the cores together whilst the glue hardened. For the 1:1 test the primary and secondary windings had 2 turns of 1.4mm diameter Teflon isolated cable, (17 SWG / 15 AWG – the exact diameter isn't important). A piece of cork was used to keep the windings firmly in place.

Reflected power was unmeasurably low from 160m to 20m but increased on 15m and 10m. Following in the footsteps of the late Les Moxon, G6XN, I added a small mica capacitor on the primary, which flattened the SWR curve at the higher frequencies. I determined the value by using a variable capacitor to minimise the SWR at the highest frequency and then replacing it with an equivalent fixed value. Photo 1 shows the general test setup.

I then changed the secondary to 4 turns (for a 4:1 impedance ratio), altered the load to 200Ω and repeated the test. Table 1 shows a summary of the results. The balun worked fine and didn't seem to be lossy: it was barely tepid after 5 minutes at maximum power. Although I still don't know the exact properties of the cores, I proved to my satisfaction that they are OK for use on the HF amateur bands at up to 100W.

## Test two – 1:1 and 9:1 transformer with four M cores

More power? Two medium cores (M) were glued end to end and side to side. Using the same kind of wire as before I wound a single-turn primary and (at various times) four different secondaries for different ratios. 1 secondary turn gave 1:1, 2 turns gave 4:1, 3 turns gave 9:1 and I also made an experimental 6:1 transformer with 2½ turns, the last half-turn running *outside* the cores to be at the same side as the other output lead. (I could also have made a 2:1 ratio with 1½ turns made in

TABLE 1: Results with 1:1 and 4:1 baluns made with two S cores. Tested with 100W input power on 1.8-28.5MHz, 50W at 51MHz.

| Frequency (MHz) | 1.8 | 3.6 | 7.1 | 10 | 14.2 | 21.2 | 28.5 | 51 | Capacitor |
|---|---|---|---|---|---|---|---|---|---|
| Reflected power, W (1:1) | <1 | <1 | <1 | <1 | <1 | <1 | 3 | 12 | 39pF |
| Reflected power, W (4:1) | 3 | 2 | <1 | <1 | <1 | <1 | 3 | 7 | 30pF |

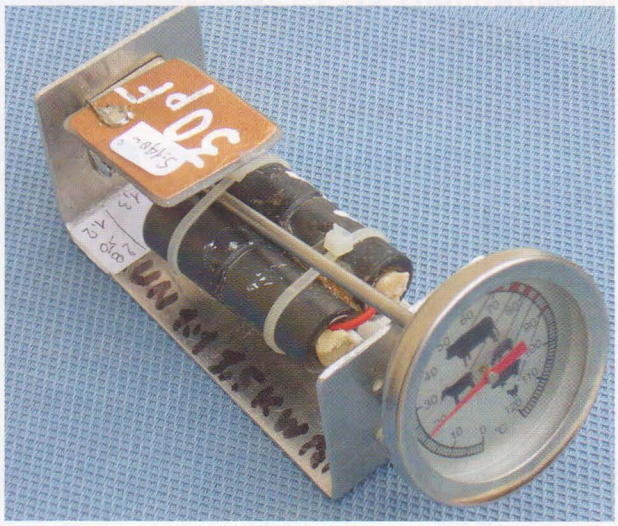


PHOTO 2: A four-core 1:1 transformer with 'tweaker' capacitor fabricated from a scrap of PCB and a thermometer temporarily attached for test purposes.

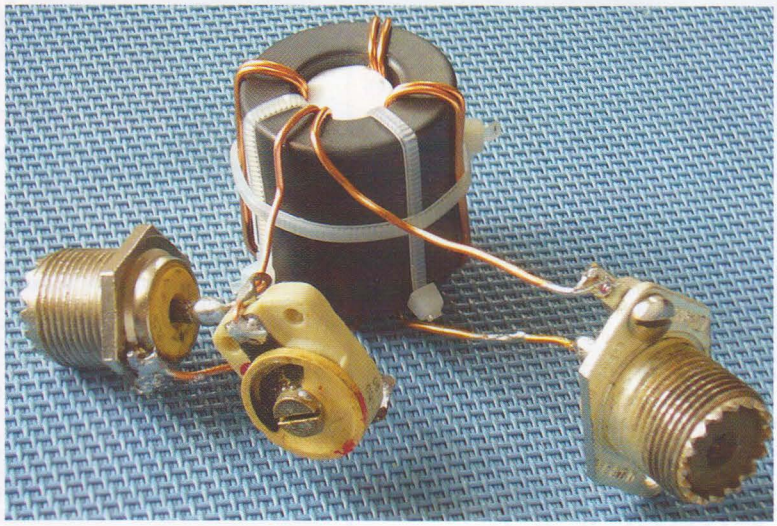

PHOTO 3: One 'fat' core under test.

a similar way, but I didn't test that). The total core section is 4 x 128mm² = 512mm².

**Photo 2** shows the 1:1 version of the transformer, mounted in an aluminium chassis for easier re-use and with a homebrew 30pF capacitor made from a scrap of double sided PCB material. I used a cooking thermometer borrowed from my XYL to measure the core temperature when I temporarily operated the 1:1 version at 300W on 10.1MHz. After five minutes continuous the temperature had risen to 93°C – a bit warm! But at 100W for five minutes the temperature didn't go above 40°C, a 15° rise above the 25° ambient. Much more comfortable. Even if we don't know anything about the ferrite mixture it's useful to know the basic usable frequency range and temperature rise. **Table 2** shows my test results for the 1:1 version with and without a 47pF capacitor (not the 30pF PCB capacitor shown in the photo).

## Test three – 1:1 balun with one F core

My final test was a 1:1 balun made using one 'Fat' core. I used four turns of 1mm (19 SWG/18 AWG) wire for both the primary and secondary, as shown in **Photo 3**. I ran tests both with and without the capacitor, as shown in **Table 3**; the best results were obtained with a value around 47pF.

## Notes on power handling

Power handling of a core depends mainly on its cooling ability to dissipate losses caused by Joule heating [2]. Power loss causes heating, moderated by the Tx duty cycle; the rate of cooling is related to the total surface area of the core, airflow and so on.

If the temperature rises too quickly a ferrite core can shatter. If it rises too high – above the Curie temperature [3], which can be as low as about 120°C – the ferrite's magnetic properties change abruptly and all bets are off.

Happily, the losses reduce as you increase the number of cores – halving with two cores, a quarter with four, and so on. As RF power handling relies on total core cross section and SSB/CW ham duty cycle is 25% of FM, I figure my DIY 2 x 2 medium cores transformer is probably able to handle 1kW PEP. By comparison, the 'magic black box' at the bottom of my vertical Cushcraft R7 antenna contains a coaxial choke wound upon two big ferrite cores with a total surface section of about 144mm² that, according the manufacturer, handles 800W RTTY or 1.9kW PEP.

## Closing remarks

During my experiments I found that the resistance value of 8 common, 400Ω 5W radio resistors in parallel varies very quickly with the *smallest* temperature increment. Only expensive, big carbon or (toxic) beryllium-containing resistors keep their nominal value (±10%) when heated.

I tested some commercially available 1:1 and 4:1 80-10m baluns made in several different countries. All of them exhibited worse characteristics than mine at the higher frequencies...

Clip-on ferrites of the sort used as chokes upon RG-8 coaxial cable could also be used. They come in a white, hinged plastic box around 30 x 30 x 30mm (1⅜"), containing a ferrite of 28.5mm long, 6.5mm wall thickness and surface section 185mm². If someone tries them in a 'fat' core as described here, please let me know.

The value of reflected power or SWR curve does vary in the same balun according the power applied. A low power curve gives only one idea about the ability of the core to handle HF & helps to find the proper number of wire turns needed. Without specs of permeability or mixture, your ferrites may differ somewhat of mine, and so will the results.

Whilst my experiments have not really revealed any specific information about the ferrite material type, I have found this to be a useful method of establishing whether a particular ferrite bead or ring is suitable for amateur use on a particular range of frequencies. Basically, if the return loss looks right and it doesn't get hot it's probably OK!

TABLE 2: 1:1 balun with four M cores, tested at 100W input.

| Frequency (MHz) | 1.8 | 3.6 | 7.1 | 10 | 14.2 | 18.1 | 21.2 | 24.9 | 28.5 |
|---|---|---|---|---|---|---|---|---|---|
| Reflected power, W (no cap) | 0.4 | 0.2 | 0.3 | 0.4 | 0.6 | 0.6 | 1 | 1.1 | 1.2 |
| Reflected power, W (47pF cap) | 0.2 | 0.1 | 0 | 0 | 0 | 0.1 | 0.2 | 0.5 | 0.7 |

TABLE 3: 1:1 balun with one F core, tested at 100W input.

| Frequency (MHz) | 1.8 | 3.6 | 7.1 | 10 | 14.2 | 18.1 | 21.2 | 24.9 | 28.5 |
|---|---|---|---|---|---|---|---|---|---|
| Reflected power, W (no cap) | 0.4 | 0.2 | 0.3 | 0.4 | 0.6 | 0.8 | 1 | 1.1 | 6 |
| Reflected power, W (47pF cap) | 0.2 | 0.1 | 0 | 0 | 0 | 0.1 | 0.2 | 0.5 | 0.7 |

Websearch

[1] 'Une antenne end-fed réellement multibande', Guy, ON5FM, *QSP* No 41, Juin 2014
[2] https://en.wikipedia.org/wiki/Joule_heating
[3] https://en.wikipedia.org/wiki/Curie_temperature

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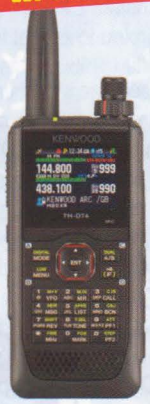

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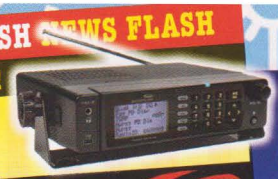

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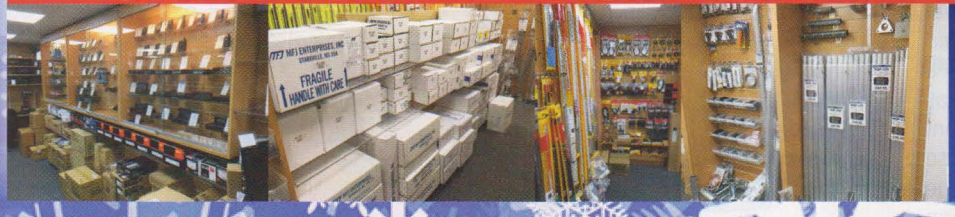


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# Fitting SMA connectors

**SMA connectors are becoming increasingly common on radio and test equipment but ready-made leads can be very expensive. In this article I will provide some background information on these connectors and show you how to make your own low-cost leads.**

## Origins of the SMA connector

The SMA connector series was developed during the 1960s and the name was derived from its original description which was Sub Miniature type A. Although its popularity in the amateur radio community has enjoyed a recent boom, the SMA connector has been used extensively in the microwave world and is probably the most common connector in that arena. The SMA connector is rated for use up to 18GHz and has a 50Ω characteristic impedance.

In addition to being a very compact coaxial connector, the screw thread provides a secure and vibration resistant connection that also has excellent environmental protection. A copy of the detailed European specifications for SMA connectors can be found at [1].

In addition to the standard SMA connectors there is a reverse polarity variant that you need to be aware of. These connectors are marked RP (ie SMA-RP) and were originally developed to satisfy a US regulatory requirement for a unique connector for removable Wi-Fi antennas. This was intended to prevent users from connecting high-gain Wi-Fi antennas in place of standard low-gain types on routers etc. I've shown photographs of standard and RP SMAs in **Photo 1**.

## Using SMA connectors

For many amateurs, their first encounter with SMA connectors was probably something like the FUNcube Dongle SDR receiver. The convenience of the small, precision connector rapidly found favour with many SDR designs and other small signal devices. I know that many amateurs, like myself, initially opted to use an adapter to convert the SMA to a more common amateur connector such as BNC, PL-259 or N-Types. Whilst decent quality adapters can be very good, the use of adapters with equipment such as the FUNcube dongle can put excessive strain on the PCB mounted socket. This particularly true for UHF and N-Type adapters as they are likely to connect to a large diameter cable. An alternative to the adapter is to use a short coaxial pigtail lead with an SMA on one end and the target connector on the other. These leads provide the required conversion and largely overcome the problem of stressing the PCB mounted connector. The downside, of course, is that every connector adds losses to the link and become potential failure points. The better solution is to use a custom lead to make the connection between devices with dissimilar connectors, thus avoiding the use of adapters and pigtails and minimising the number of connectors. For this reason, I have now changed over from BNC to SMA connectors for all the low level signal routing in my shack. The initial snag with this approach is that ready-made SMA leads tend to be very expensive. This is because the leads are usually specified to work over the entire 18GHz frequency range, so high quality connectors and cable are essential – thus driving up the price. However, in many amateur radio scenarios, SMA cables are being used to carry HF or VHF signals so the microwave capabilities of the connector series are not necessary. The simple solution is to make your own SMA leads and it turns out this is surprisingly easy and cost effective.

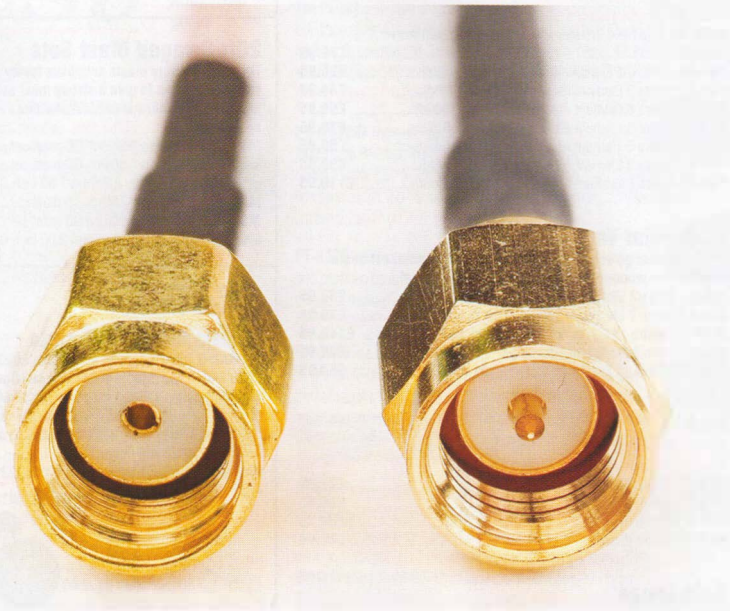


PHOTO 1: Comparison of SMA-RP (reverse polarity) on the left and standard SMA on the right.

## DIY SMA leads

When I made the decision to swap to SMA for low-level connections it started me on a search to find the best value in SMA connectors and cable. There are a number of possible cable solutions. As all my leads were going to be used to patch signals around the shack, most would be very short at around 1m or less and flexibility was more important than the lowest possible loss. As a result, I decided to opt for one of the 2.5-3mm diameter cables, of which the most common are RG-316 and RG-174. Of these two, RG-316 offers the better quality and ease of use as it uses PTFE insulation that doesn't creep when you approach it with a soldering iron! The downside is that RG-316 is normally less flexible than RG-174 and the cheapest decent quality RG-316 is nearly twice the price of RG-174. The end result is that I'm now using RG-174 from RS Components for most of my general, low-level, shack leads but I still use RG-316 or better for some critical connections such as my vector network analyser (VNA). For a typical lead length of 1m the difference in loss between RG-316 and RG-174 is minimal, as you can see in **Table 1**.

TABLE 1: RG-174 vs RG-316 losses for a 1m length.

| Frequency | RG-174 | RG-316 | Difference |
|---|---|---|---|
| 200MHz | 0.42dB | 0.37dB | 0.05dB |
| 400MHz | 0.6dB | 0.52dB | 0.08dB |
| 3GHz | 2.2dB | 1.63dB | 0.57dB |

## Sourcing connectors

SMA connectors are very easy to find and you will soon notice a huge range of prices. Let me start with a word of warning about super-cheap connectors from eBay. Whilst there are some examples of good products at a good price, you stand higher chance of buying sub-standard connectors if you shop purely on price via eBay and similar sources, especially if the goods are supplied direct from the Far East. There are two main problems associated with poor quality SMA connectors. The first concerns the gold plating, which may be extremely thin (and liable to flake off). As you can imagine, bits of highly conductive gold dust floating around inside a connector is not good news. The second problem comes from poor quality control of the connector dimensions. If your cheap SMA plug has an oversize centre pin it could stretch and permanently damage the connector on your receiver or test gear, leaving you with a poor connection when you use a correctly sized connector – and a possibly expensive repair.

## Tooling up

When I starting looking through the suppliers list of SMA connectors, it soon became apparent that I was going to have to use a crimp connection system as I couldn't find any solder-only SMA flexible cable connectors (unlike those for semi-rigid cable – Ed). The vast majority of the connectors use a solder connection for the centre pin but a crimp for the screen. Now you can pay an awful lot of money for a crimp tool but most of the commercial stuff is intended for daily production use so has to be both very accurate and robust, hence the relatively high cost. For hobby use, a lower spec crimp system will suffice and UK supplier, Wi-Fi Antennas [2], have a very useful set of RG-174/316 crimp pliers for just £15.26 including VAT, see **Photo 2**. I've been using this tool for about a year now and it does the job very well for me.

The other problem area with such small coaxial cables is stripping the cable and cutting the exposed sheath and insulation to precisely the correct dimensions. Having used rotary cable strippers in the past, I knew that they provided an excellent solution so I set about finding a suitable unit for 2.5mm diameter cables. Wi-Fi Antennas came to the rescue again with a neat rotary stripper at just £5.74 inclusive of VAT, seen in **Photo 3**. This has two adjustable cutting blades and can be used with both RG174 and RG316 cables. A more sophisticated alternative is the

**Mike Richards, G4WNC**
mike@photobyte.org

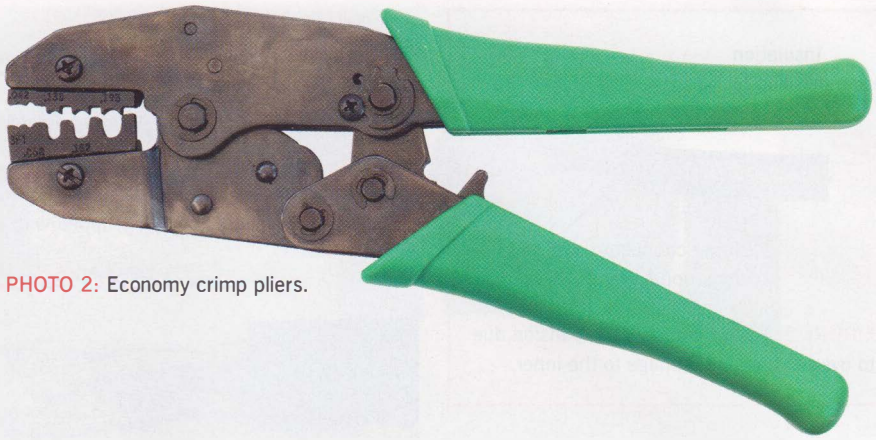


PHOTO 2: Economy crimp pliers.

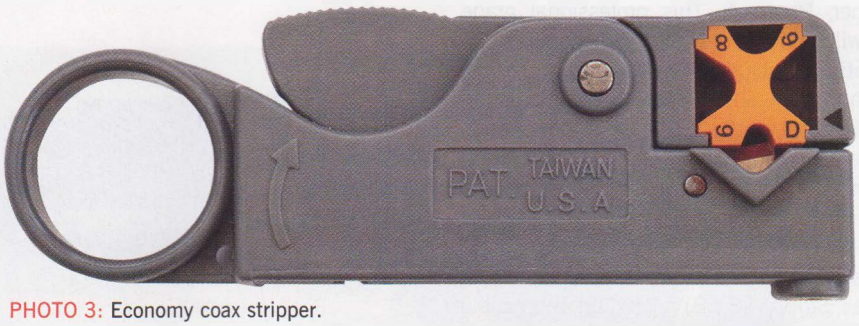



PHOTO 3: Economy coax stripper.

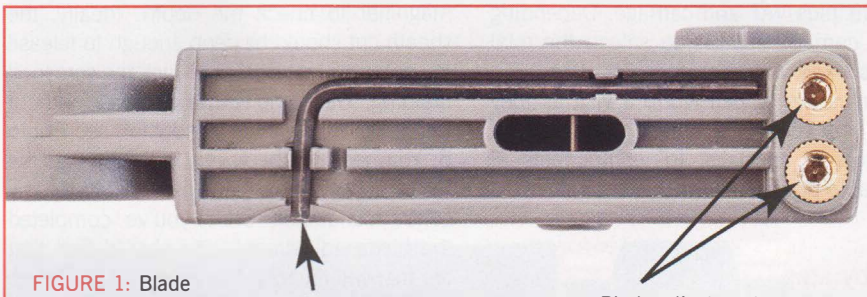


FIGURE 1: Blade adjustment for the economy stripper.

Adjustment Allen key

Blade adjustment screws


PHOTO 4: Pressmaster Corex stripper.

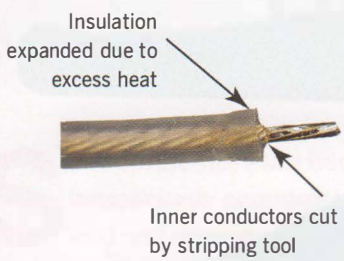



FIGURE 2: Example showing expansion due to overheating and damage to the inner.

PHOTO 5: Example of RG-174 stripped with 2-blade stripper.

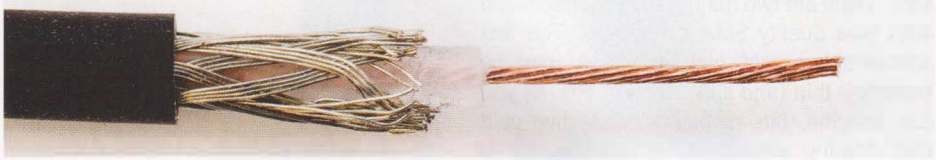


PHOTO 6: Braid trimmed back by 2.5mm with cutters.

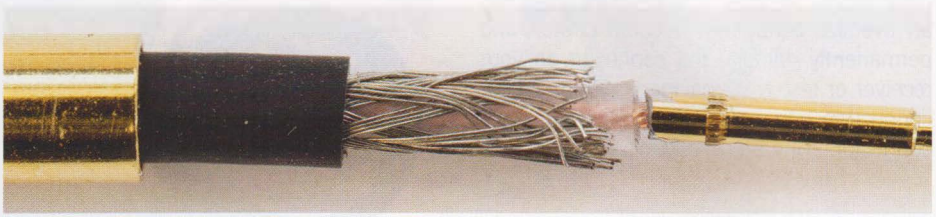


PHOTO 7: Centre pin soldered in place.

Pressmaster Corex 3xx series Coaxial Wire stripper, **Photo 4**. This professional grade tool will strip a variety of coaxial cables up to RG-58 and includes the facility for a 3-stage cut to trim the sheath, screen and insulation to separate lengths. The Corex stripper is available in the UK but is quite expensive at around £50 for the basic tool plus up to £20 each for the different cutter inserts. However, Italian electronics retailer RF-Electronics **[3]** are selling the Pressmaster Corex as a kit (Corex Strip 316-58) including four cable spacers covering RG316/714 through to RG-58 and a three blade cutter cassette for just €39 plus VAT and carriage. Depending on the carriage option you select, the total price is likely to be around £50. The RF-Electronics site is well worth a visit as they have a very good service back to the UK and stock lots of specialist RF components at reasonable prices.

## Step by step

For those that are new to crimp tools and coax cable strippers I'll run through the process I use. If you have any suggestions for doing a better job, please feel free to contact me, as I'm always looking for improvements.

**Stripper adjustment:** the first task is to adjust the stripping tool to match the cable you are using. Assuming you are using a rotary stripper, you will find adjustment screws for the blade heights on the underside of the tool, see **Figure 1**. Here's how to test the cutting:

1 Make sure that you have the tool insert set correctly so that the groove in the bottom matches the cable diameter, see Photo 3.
2 Open the tool, lay the cable in the groove and close the tool with the cable-end flush with the edge of the tool.
3 Hold the cable in one hand and spin the tool in the direction of the arrow for about 5 turns.
4 Without releasing the tool, pull it away towards the cut end. This should pull the sheath and the inner insulation away.

Examine the cuts carefully with a magnifier to check the depth. Ideally, the sheath cut should be deep enough to release the outer but not disturb or nick the screened braiding. The same is true of the second cut that exposes the inner conductor, see **Photo 5**. You need to check very carefully that the blade doesn't nick the twisted wires of the centre conductor. Once you've completed the blade adjustment, you should find that the tool will reliably strip many cables before any further adjustment is necessary. If you are using the Pressmaster Corex stripper, you will find a useful instructional video from Pressmaster at **[4]**. The major difference with the Pressmaster is that it can make three cuts as opposed to two with the simpler stripper.

## Terminating a straight, male, SMA connector:

1 Slide a 40mm length of heatshrink tubing and the crimp ferrule onto the cable.
2 Lay the cable in the stripper with the end of the cable flush with the edge of the stripper.
3 Close and rotate the stripper about 5 or 6 times in the direction of the arrow on the tool.
4 Without releasing the stripper, pull it sideways to remove the sheath and inner insulation.
5 If all your adjustments are correct, your cable should look like Photo 5.
6 For the next step, you need to use a pair of small but sharp side-cutters to cut the braid back by about 2.5mm, as in **Photo 6**. Those using the Pressmaster should find this trim has already been completed.
7 With a hot iron and small diameter solder, *very lightly* tin the centre conductor. To avoid burning and expanding the centre core insulation, apply the iron near the far end of the inner and let the solder run down towards the insulation.
8 Trim the inner to about 3mm long and use a small pair of pliers to reshape the inner to a circular profile. This is necessary because the inner is a close fit inside the centre pin and the shape damage from a pair of wire cutters will prevent insertion.
9 Hold the centre pin *gently* in a small vice and lightly tin the cable end of the pin.
10 With the centre pin still in the vice, present the inner conductor and apply heat to the pin to melt the tinning and allow the inner to fully enter the pin, see **Photo 7**. Be careful not to leave any solder on the outside edges of the centre pin as this could prevent the pin from seating properly.
11 Next, insert the cable and pin assembly into the body of the plug. NB: the inner insulation is a close fit into the body. If the insulation has expanded during the tinning process you can trim it carefully with a sharp knife, see **Figure 2**. Be careful to avoid any wisps of the braiding entering the housing.

12 With the centre pin properly seated, see **Photo 8**, you can slide the crimp ferrule over the rear section of the plug and make the crimp. If you are using the SMA plugs I suggested, you can use the 0.133" section of the crimp pliers to make the crimp, see **Photo 9**.
13 The final step is to slide the heat-shrink tubing up to the rear of the connector and use a heat-gun to complete the job, as seen in **Photo 10**.

## Terminating a right-angle SMA plug:

Follow the same procedure as the straight SMA up to and including step 8, then continue as follows:

9 Insert the coax inner into the plug body so that the inner conductor sits in the slot at the top of the centre pin, as seen in **Photo 11**.
10 Using a small soldering iron bit, solder the centre conductor in place.
11 Slide the crimp ferrule up to the rear of the connector and use the crimp pliers set to 0.133" or similar to complete the crimp.
12 The top cap is a press fit so squeeze the connector gently in a small vice until the top is securely in place.
13 The final step is to slide the heat-shrink tubing up to the rear of the connector and shrink with a heat gun.

## BNC to RG174

One of the common conversions you will need to make is from an SMA plug to a BNC plug. We can use the same technique as for the straight male SMA except you can skip the braid trim in step 6. This is because the BNC plug I suggest you use, works with the inner cut that's flush with the screen. Here's the step by step process for the BNC plug:

1 Strip the cable as described in steps 1-5 of the straight SMA instructions.
2 Tin the centre conductor and trim to 3mm.
3 Place the supplied clear sleeve over the inner insulation. This keeps the inner evenly spaced within the body to help maintain a constant impedance, see Photo 12.
4 With the centre pin held gently in a vice, tin the entry hole and solder the centre pin. Ensure that the clear spacer butts up against the pin.
5 Insert the inner assembly into the plug body.
6 Slide the crimp ferrule up to the plug body and crimp in place.
7 Finish by sliding the heatshrink into place and apply the heat gun.

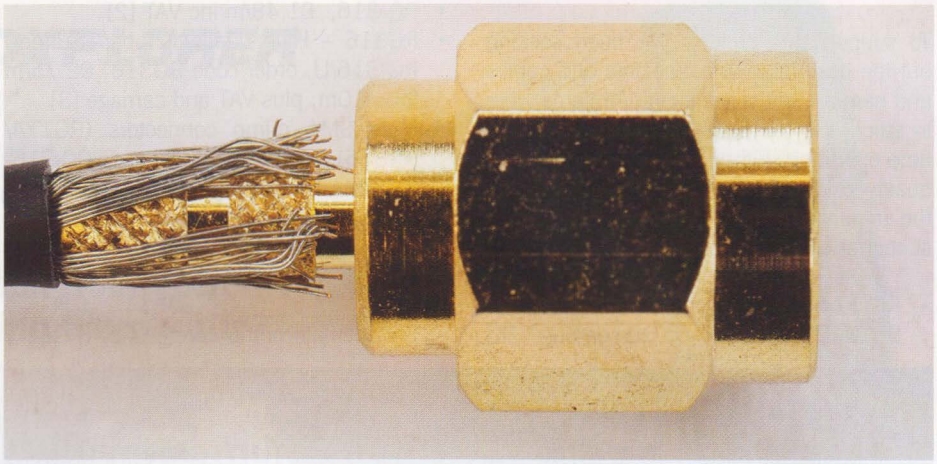


PHOTO 8: Inner seated and screen positioned ready for crimping

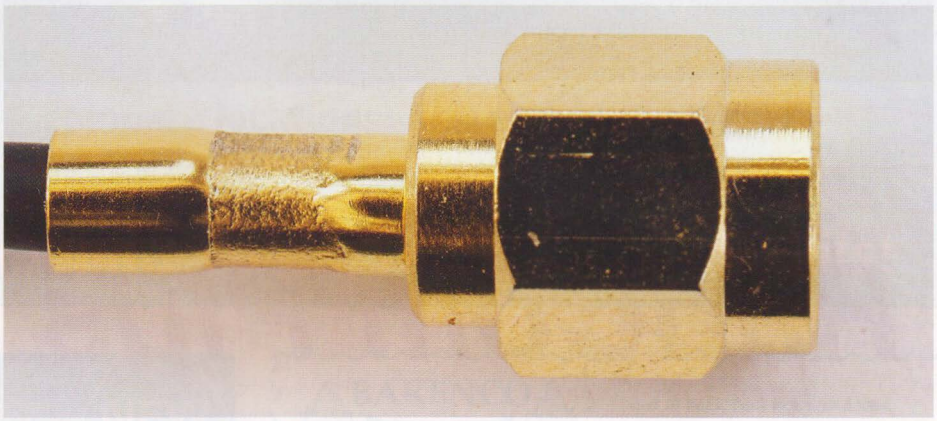


PHOTO 9: Crimp complete.

PHOTO 10: The completed termination.

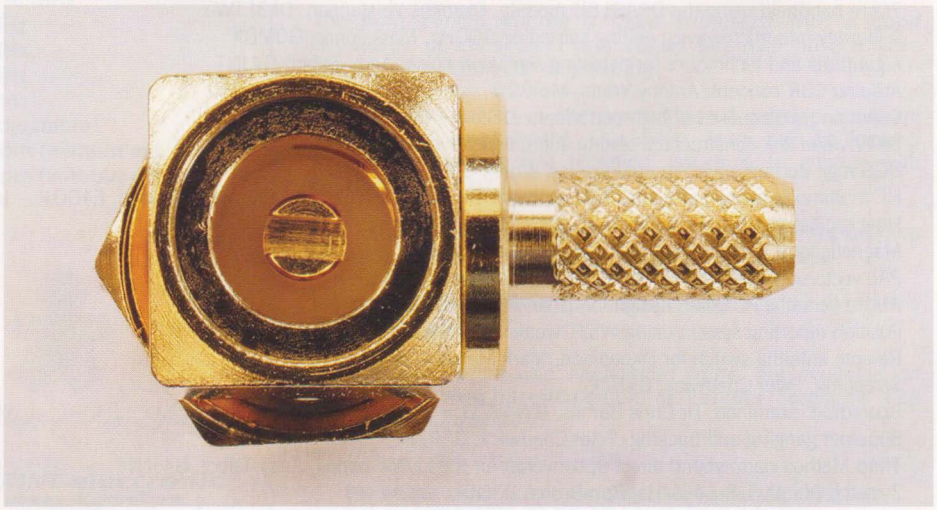


PHOTO 11: Close-up showing the slot in the inner connector.

## Suggested connectors and cables

To support this project, I've been seeking out the best value in connectors and cables and here are my suggestions. All items were in stock and the prices were correct at the time of writing. Although RG-316 is a better quality cable, RG-174 is more flexible and the dimensions of the RS cable are better suited for use with these connectors.

- RG-174A/U 20m reel, stock no 222-8610, £14.02 plus VAT and carriage [5]
- RG-316, £1.48/m inc VAT [2]
- RG316 – High quality (Huber+Suhner) RG-316/U, order code RG316, €2.75/m for >10m, plus VAT and carriage [3]
- Male SMA crimp connectors (RG174/RG316), pack of 10, order code CC-316-SMA-MA-PK10, £10.18 inc VAT [2]
- SMA Right-angle crimp connectors (RG316/RG174), pack of 10, order code CC-316-MA-RA-PK10, £18.34 inc VAT [2]
- SMA female crimp connectors, (RG316/RG174), ideal for wiring from PCB to project panel, pack of 10, order code CC-316-SMA-FE-PK10, £10.18 inc VAT [2]
- BNC Male connector (RG316/RG174/RG188), order code 170 4335, £1.61 each plus VAT and carriage [6]
- 2 blade coaxial stripper for RG174/316, part no CC-CT-COAX-RG174, £5.40 inc VAT [2]
- Ratchet crimp tool, part no CC-CT-RG316-58, £15.26 inc VAT [2]
- Corex Coaxial Stripper, part no STRIP-316-58, €39.00 plus VAT and carriage [3]

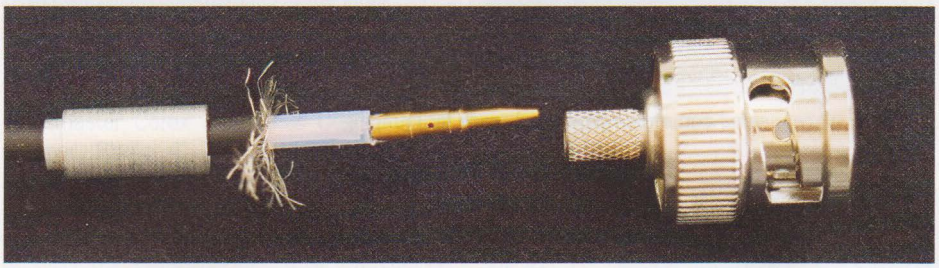


PHOTO 12: BNC termination with clear sleeve in place.

**Websearch**

[1] https://escies.org/webdocument/showArticle?id=576&groupid=6
[2] www.wifi-antennas.co.uk
[3] www.rf-microwave.com
[4] www.youtube.com/watch?v=RnJ7z4eUywA
[5] uk.rs-online.com
[6] uk.farnell.com

# *RadCom Plus* index

*RadCom Plus* is a technical suplement available free of charge to Members and can be found at www.rsgb.org/radcom-plus. It contains articles that are generally longer and at a more demanding technical level than those in *RadCom*, intended for the more technically inclined and experienced amateur.

*RadCom Plus* is always looking for original technical articles, both constructional projects and tutorials. We are also looking for volunteers who would like to be more involved inthe production of *RadCom Plus*. Please contact radcom@rsgb.org.uk.

## Cover dates

Vol 1 No 1 – May 2015
Vol 1 No 2 – September 2015
Vol 2 no 1 – January 2016
Vol 2 no 2 – July 2016

## Complete index

# The 2016 RSGB Convention



**The RSGB would like to thank all those who made the 2016 RSGB Convention a success – the sponsor, Martin Lynch and Sons, the record numbers of delegates who attended, the lecturers who give so freely of their time and experience, the volunteers without whom the Convention just would not run (particularly the Camb-Hams and Regional team), the representatives from the main manufacturers and, finally, the staff at the venue.**

Delegates had the chance to try soldering surface mount compents in the G4HUP SMD workshop.

Visitor numbers were significantly up on 2015. We had 542 people through the door, which is around 90 people or 20% more than last year. This included more international lecturers and visitors than ever before, including those who came from the International YL Convention, held in Milton Keynes. Of those who completed the online survey, 97% rated the Convention either excellent or good – thank you.

We were pleased to welcome stands from BYLARA, the UK 6m Group, ARDF, UK Microwave Group, ARRL, RSGB Youth Committee and CDXC.

## Social scene

It was an even busier social scene this year. Delegates told us that they enjoyed the cheap real ale in the bar on Friday and Saturday evening! Our regular entertaiment of Friday evening prior the the ML&S Buffet, close up magician Steve Dean, was a popular as ever! Visitors had plenty of time to chat over coffee and over dinner too. This year many told us how much they enjoyed the food both Friday and Saturday evening. Our thanks to Susan Buckle for speaking to delegates after dinner after having given a lecture earlier in the day.

## Lectures and workshops

A number of this year's lectures were filmed, thanks to Noel, G8GTZ, Phil, MODNY, Lawrence, MOLCM and Rob, MOVFC. These will be made available to RSGB Members over the next few months. Hopefully it will help with those lectures that delegates had to miss during a scheduling clash!

As always a huge thank you to the lecturers, especially those from overseas, who travelled to the Convention. There's not enough space here to describe each and every lecture, but here are a few details from various delegates about the lectures they enjoyed the most.

DX fun without spending loads of money. Nick, G3RWF, RSGB President, talked on the rather challenging title of "DX fun without spending loads of money". He has been to Africa over 20 times in recent years, mainly as 5X1NH and 9X0NH. He described his approach to enjoying being the DX – but on a shoestring. The audience heard about the challenges of getting to interesting places, carrying all your kit and overcoming possible obstacles like airline luggage limits, licensing authorities and demanding immigration and customs teams. He gave his views and prejudices on equipment and how to make lightweight, effective and cheap masts and antennas (such as water bottles for insulators that seems to work – he has worked over 200,000 QSOs from Africa in the past 8 years). It was a light hearted and fun presentation with thought provoking content.

The story of SDR and Flex Systems. It was good to hear directly from FlexSystems founder, Gerald Youngblood, some of the background to his entry into the world of SDR radio design. Gerald went back to first principles and built his Flex system from scratch, sharing his discoveries as he went. Gerald also showed how the same SDR equipment has helped them win government contracts for very sophisticated SDR systems. He also explained the rationale behind Flex using an open API (Application Programming Interface) for its radios and encouraged amateurs to find new ways to use amateur radio via the API.

Inspiring the next STEM generation. The team gave a very complete account of the ARISS project and illustrated some of the challenges they faced in making this major project a success. By building confidence in the capabilities of the ARISS team, they were able to secure contacts with Tim Peake for 10 schools across the UK. Susan Buckle from UK Space Agency explained their role in the process and illustrated how important the project was for the schools.

Advances in Amateur Television. Noel Mathews, G8GTZ provided an interesting summary of amateur television today with a particular focus on the new experimental allocations. In addition to covering the move to digital TV, Noel also showed the type of equipment in common use and encouraged others to participate. One delegate said how well-prepared and well-delivered it was - "I have subsequently started experimenting with DATV on 23cm".

One of our overseas lecturers, Gerald Youngblood, K5SDR from FlexRadio Systems.


Overseas visitors Peter, VK3RV, Jenny, VK3WQ with Steve, M1ACB.

VP8SGI & VP8STI DXpeditions. Mike McGirr, K9AJ took us on a trip to the South Atlantic with tales of adventure on South Sandwich and South Georgia; this was a BIG budget DXpedition with the final bill running to hundreds of thousands of dollars. The Intrepid DX Group demonstrated some amazing skills in activating these sought after islands; landing the equipment, setting up stations, surviving hurricane force winds, escaping an incoming ice flow and rescuing some holiday makers whose boat was holed in the storm. The Elecraft rigs and the small antenna farms seemed to do just fine, so long as propagation was favourable. Seeing photos and video clips from the DXpedition and hearing first hand about the trip was truly inspirational. The video clips were particularly awe inspiring. They made a total of around 140,000 QSOs from the two locations. If you did not catch the presentation, make sure to watch the video when it hits the members' website!

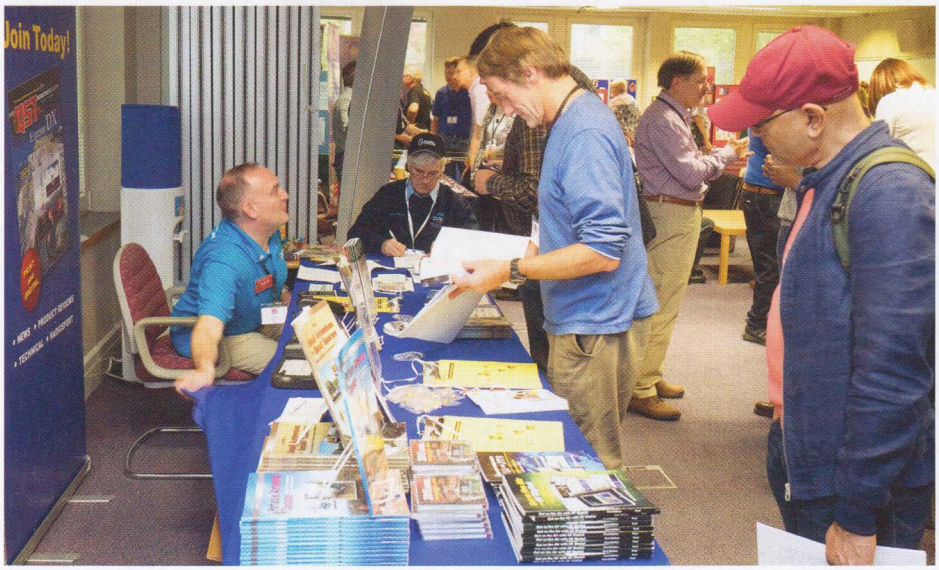
Space Weather. Prof Cathryn Mitchell from The University of Bath gave us a fascinating insight into the causes and effects of solar activity, or Space Weather. Starting off with an explanation of how high energy X-rays act on our atmosphere, and solar particles ejected from the sun becoming directed and concentrated by the Earth's magnetic field. All causing disturbances to the ionosphere that we use for HF communications, affecting GPS signals and sometimes leading to visible auroras. Then followed a description of possible effects a major solar storm could cause such as satellites failing in orbit. Currents of hundreds of amps flowing in grid lines leading to transformer failure. GPS signal timing lost and people slowing down and causing gridlock on motorways when errors in sat-nav positioning leads to junctions being missed. One comment that Andy, G4JNT came away with was "In the South of England, unless the Solar Activity index is eight or higher, it's not worth getting out of bed to look for a visible Aurora"!

Jacques Saget, F6BEE flew in from Paris to show some great pictures and video about the 2016 FT4JA DXpedition to Juan de Nova. This is an isolated island between Africa and Madagascar that is accessible only by boat or long range aircraft and where strict adherence to environmental rules is required. The team found accommodation with the military garrison and was able to set up antennas on the western beach to give great propagation to Europe and North America. They made over 105,000 QSOs and pushed the island at least 20 places down the wanted lists.

The IOTA Challenge. Cezar Trifu, VE3LYC is one of the Directors of the newly formed company, IOTA Ltd, who now run the IOTA award scheme, so it was most appropriate that he gave a presentation on some of his exploits in putting some rare Islands On The Air. His excellent presentation covered one trip to the Sub-Antarctic and one to the high Arctic, each with its own challenges and both requiring lots of time and dedication to make them successful. Some beautiful locations and some unexpected finds made for a very interesting 45 minute talk.

Results of RSGB Amateur Radio Survey. Around 3000 amateurs responded to the RSGB survey and John Gould, G3WKL gave an overview of the findings, some of which had been presented in RadCom. Some if the key findings were that the average age has only increased 2.9 years in the last 5 years and that young amateurs enjoy contesting. Steve Hartley, G0FUW answered questions on what was to be done with the results and he explained how they would inform the Society's strategic review. There were lots of good ideas from the audience and one attendee explained how having an amateur radio licence is still useful in securing employment where the recruiters know about the hobby. John's presentation is now available for Clubs to show at their meetings and arrangements can be made to have a Board member on Skype for a Q&A session afterwards. If there is a Board member living locally they may even be able to attend in person!

Being the DX and QRP. Dominic Baines, M0KTA gave a most enjoyable and informative talk in his own slightly manic style. He had some of his QRP kit with him and showed how his DXpeditions are run from the contents of a single rucksack. The Elecraft KX3 is his rig of choice and he has found the Buddipole




Bob, NQ1R (ARRL) attended the Convention and Martin, G3ZAY working on DCCC card checking.

**Elaine Richards, G4LFM**
radcom@rsgb.org.uk


Neil Underwood, G4LDR, who bought his RSGB DXpedition Fund raffle ticket just 30 minutes before the raffle and won star prize of the Icom IC-7300.

dipole an excellent travelling companion. He has operated from some quite rare places and had to improvise with power sources, buying or renting batteries in country. He showed how you can run pile ups with minimalist gear and have a great time meeting other amateurs in the process. Lots of questions from the audience allowed him to go off script to share his experience and knowledge and judging by the hearty round of applause at the end it was very well received.

There were three workshops held over the weekend, a Buildathon, soldering surface mount components and using the Raspberry Pi and Red Pitaya.

Buildathon. Steve Hartley, GOFUW, is well known for his team's buildathons in Bath, the GQRP Convention and at a number of the schools involved with the ARISS contacts with Tim Peake. At the Convention he worked with Dennis Anderson, G6YBC, from Kanga UK, to provide a kit building workshop using a modified Foxx 3 40m CW transceiver; it included a K16 keyer that could be programmed for QRSS beacon use, or as a normal keyer for CW operation. All the kits were completed and all worked as intended. Donald Lamb, GOACK, said he had always wanted to build his own transceiver and he had now done it!

The Surface Mount workshop, once again run by Dave Powis, G4HUP was well received. Each stage of the process was covered in some detail during his talk first thing on Saturday morning, this was followed by the practical workshop. This gave visitors the opportunity to try their hand at an surface mount device project using Dave's tools and equipment.

For those that had their appetite for Pi whetted following Mike, G4WNC's Saturday presentation, he ran a drop-in workshop on Sunday afternoon. This was an informal session where he had Raspberry Pi's and a Red Pitaya running some of the projects from his talk. Mike also answered a variety of questions from the audience and ran a live demonstration of building software from source on the Raspberry Pi. A variety of display screens and cases were also on show.

## Construction Competition

Congratulations to the winners, you can read more about this one page 25. Prizes were donated by the sponsor, ML&S, to whom the RSGB offer their thanks. Please think about entering the 2017 competition when taking part in your own local club competition. There are several categories you can enter ranging from building a kit to designing your own equipment.

## Exams and card checking

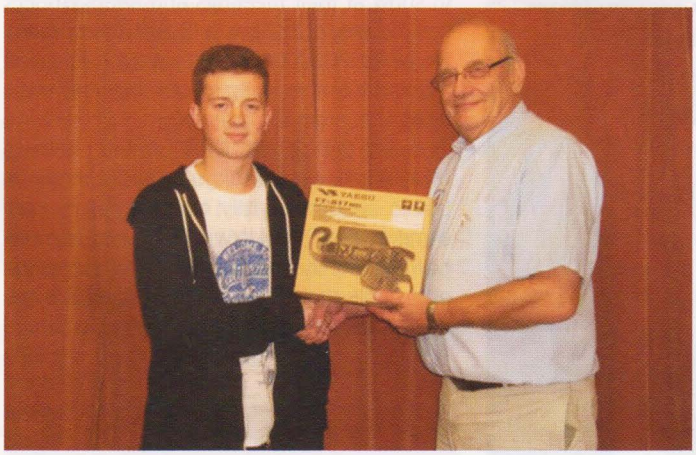
Both UK and US exams were available over the weekend. We are pleased to say that there was a 100% success rate in the Foundation exam and a 78% pass rate in the Advanced exam. Congratulations to those who passed. In the US exams, we had two passes at Extra Class, three at General, and three at Technician. Well done.

We'd also like to thank Martin, G3ZAY for his DXCC card checking activities and to Bob, NQ1R from the ARRL who took the paperwork back to the US with him.

## Prize Draw

The annual raffle is in support of the RSGB DX Fund. This fund makes donations to DXpeditions to the rarer countries with a good chance of working a significant number of stations in the British Isles. Well over £2000 was raised over the weekend – largely thanks to the sales efforts of Linda, GOTPX with help from Geoff, GODDX.

Our thanks to Icom UK, Kenwood and Yaesu UK who generously donated the main prizes – an Icom IC-7300, a Kenwood TH-F7E and Yaesu FT-817 respectively. Only one of the winners was there when the raffle was drawn but RSGB Board Chair Steve Hartley, GOFUW and former President Dave Wilson, MOOBW were able to present the remaining prizes to the lucky winners in the following weeks.



Kieran Clarke, M6RZR won the Yaesu FT-817, presented by Dave Wilson, MOOBW.


Thomas Foy, N4HAI was the only winner present at the draw, he won the Kenwood TH-F7E.

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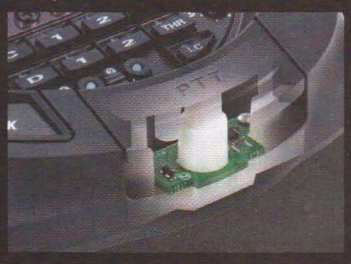

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# EMC

**In a wide-ranging column this month we look at EMC compliance, past, present and future (post 'Brexit').**

## EMC compliance – past

The EMC Committee reported a product for suspected non-compliance with the EMC Regulations 15 years ago, in 2001. The product was a Wireless Phone Socket System that allowed voice telephone extensions to be connected via plug-in devices that used mains wiring to transmit two HF carriers.

The June 2001 EMC Column suggested that although these devices did not operate in amateur bands, the fact that they were CE marked and on sale in the UK represented the 'thin end of a wedge'. If this were allowed to continue, it could lead to a 'free for all' for products such as home networking to use the HF bands for broad band data communication via mains wiring.

Our laboratory tests with pre-compliance test equipment showed that the HF carriers at 3.339MHz and 8.247MHz exceeded the EN55022 Class B limit by 47dB and 54dB respectively. It would appear that this product would need to be CE marked using the Technical Construction File route (TCF, now called an EMC Assessment). This would need to include a justification for permitting intentional conducted emissions far in excess of the existing EN 55022 'B' conducted emission limit and this could be difficult to justify.

In the UK, EMC compliance is enforced by local authority Trading Standards departments or Ofcom (formerly RA). I reported the matter to my local Trading Standards department enclosing a copy of my test results. I subsequently received a telephone call stating that this Trading Standards department only had enough budget to have three products a year tested by a test lab and that the priority was testing products for safety. The difficulty in this case and similar cases is that if the TCF/EMC Assessment route has been used then it is difficult to challenge its validity and this is not something that Trading Standards have resources or expertise to do.

## EMC compliance – present

Members sometimes ask which EMC standard a particular CE-marked product should meet. The answer is that it's not compulsory to test to any standard in order to declare compliance with the EMC Directive, it's voluntary. A manufacturer may choose to provide an EMC Assessment for compliance as an alternative. This is a record of the technical analysis to justify a claim of compliance.

PHOTO 1: Non-standard earth wiring (green/yellow coil of wire) associated with an air source heat pump (ASHP).

If however there is an appropriate product standard and if the EC Declaration of Conformity (DoC) says that the product has been tested to this standard then it is difficult to question the compliance. If there is reason to suspect that it does not actually meet the standard it has been declared to, then we need to have test results that show this. These could be presented to support an interference complaint to Ofcom.

## EMC compliance – future

Several Members have asked what is likely to happen to the UK legislation that implements the EMC Directive (EMCD) and Radio and Telecommunications Terminal Equipment Directive (R&TTED) / Radio Equipment Directive (RED) after 'Brexit'. First of all, existing regulations will remain in force for at least two years after the UK invokes Article 50 (commencing the EU exit process), so there can be no changes until 2019. What may happen after that is not known at time of writing (October 2016) but a well-informed source has offered the following opinion. If the UK is to continue to have free market access to the EU then this could mean we have to continue to meet these Directives in UK as well as for goods that are exported to the EU. This is what happens in other countries in the European Economic Area (EEA).

Conversely, if the legislation that implemented these Directives in the UK is repealed, then the old Wireless Telegraphy Act, before the EMCD, had provision to apply regulations to products at the point of sale. Such regulations could be invoked again and this would need Primary legislation by Department of Culture, Media and Sport (DCMS), rather than Ofcom. Also before the R&TTED/RED, the UK used to have its own UK type approval regulations for radio equipment and these could also be invoked again.

## Fridge freezer inverters

Some models of fridge-freezer made since 2015 use a new type of 'digital inverter compressor'. This allows the compressor to operate continuously at variable speeds, unlike a conventional single-speed compressor, which either runs at full speed or is switched off. Variable speed operation is claimed to offer various advantages including improved efficiency and reduced 'carbon footprint'.

Although this technology may offer many advantages, it appears that low RF interference is not one of them. A conventional compressor uses an AC induction motor where the motor itself does not generate any RFI and the only RFI from the fridge is a brief click when the thermostat switches on or off. The 'digital inverter compressor' is a switching variable speed AC motor drive and we have received a couple of reports that these can generate RFI in amateur bands and elsewhere.

Although there is no reason to suppose that the product in question exceeds the EN55014 conducted emission limits below 30MHz, the limits in this standard do not protect weak signal communication in HF bands and the conducted emission test method does not directly measure radiation from the wiring in the fridge/freezer, which could be a factor.

If you are buying a new fridge/freezer, it is worth checking whether it uses an inverter. We would also be interested to receive any other reports of RFI from fridge/freezers.

## LED lighting standards

Several Members have asked how to find LED lights with low RFI. The first thing to look for is whether they have been tested to an EMC standard and if so, which version.

The world-wide Standard for Lighting is CISPR 15 and this is adopted into the EC and thence into the UK as BS EN 55015.

The 2006 version of the Standard, BS EN 55015:2006 does not state that it covers LED lights and it appears that in some cases, this may be interpreted as a loophole in the Standard that allows unlimited emission from LED lights. The 2006 version of the Standard has a date of withdrawal (dow) of 2018-05-01. This means that LED lights that quote the 2006 edition of the Standard and therefore might not have had any emission limits applied can still be sold until 1 May 2018. In such cases, the only line of objection to excessive emission would be to say that it "fails to meet the Essential Requirement of the EMC Directive."

The 2013 version of the standard, BS EN 55015:2013 includes EMC requirements that specifically refer to LED Lamps and Luminaires for the first time. If you are buying any LED lighting product then it would be advisable to make sure that it complies with the 2013 version of the standard, BS EN 55015:2013. To find this out, you need to see the EC Declaration of Conformity (DoC) but as a customer, you don't have a right to see this document. The EMC Directive only gives Trading Standards officers the right to demand the DoC although many vendors voluntarily make the EC DoC available to the public. It may be included in the instruction booklet or it may be available online or on request.

## Air source heat pumps

Air Source Heat Pumps (ASHP) are becoming popular for 'Eco houses'. An ASHP is a bit like an air conditioning system in reverse. It has an outdoor unit that cools down the outside air and the heat extracted from the air (plus the energy used by the compressor) is available indoors to heat water or for space heating. For every kilowatt of electrical input power to run the ASHP, up to 3kW of heat output can be produced.

ASHPs for domestic use have a typical electrical input power rating between 4kW and 14kW and use a switching type variable speed AC motor drive. The outdoor unit normally meets applicable EMC standards but we have had one isolated report of RFI in HF bands from a newly installed ASHP. The radio amateur reported significant wideband RF noise at 18MHz up to at least 28MHz on a cycle of approximately 15 minutes on and 5 minutes off. The amateur's antenna was a horizontal loop antenna up at 55ft on a pole that it was 30ft away from the ASHP. The matter was reported to Ofcom who visited and said that the amateur's antenna was far too close to the ASHP unit.

The manufacturer of the ASHP was contacted and they were asked if the product met the Essential Requirements of the EMC Regulations as the RFI started as soon as this equipment was put into service. They responded that they were confident that globally all their products meet legal requirements in respect of any country they are sold in, as this was their duty as a manufacturer. They stated that they do not install the products and how they are used or maintained is the responsibility of the purchasers. They said that if we wished to take this matter any further then they suggested that we should communicate with their legal department.

Although Ofcom and the manufacturer had been unable to help, the Ofcom engineer noticed something unusual about the mains earthing of the ASHP, so the radio amateur took **Photo 1**. Normally, the Phase, Neutral and Earth conductors would all run in the same 3-core cable from the apparatus to the mains supply. Common-mode interference currents on phase and neutral return via the earth wire. Alternative configurations of earth wiring are possible but an adequate and safe earthing configuration at 50Hz could affect the EMC performance of the installed equipment. For example, if the earth wire splits off from phase and neutral and takes a different route, then this could create a loop that radiates RFI. It could be argued that in such a case, the ASHP is not correctly installed although the installation instructions are not very specific and they don't say that you *can't* do it this way.

Then, further extension building work took place and the RFI is no longer significant. It appears that the configuration of the mains wiring has been changed to a configuration that causes much less RFI.

As ASHPs are becoming increasingly popular for 'Eco houses', we would be interested to hear of any other reports of RFI from such devices.

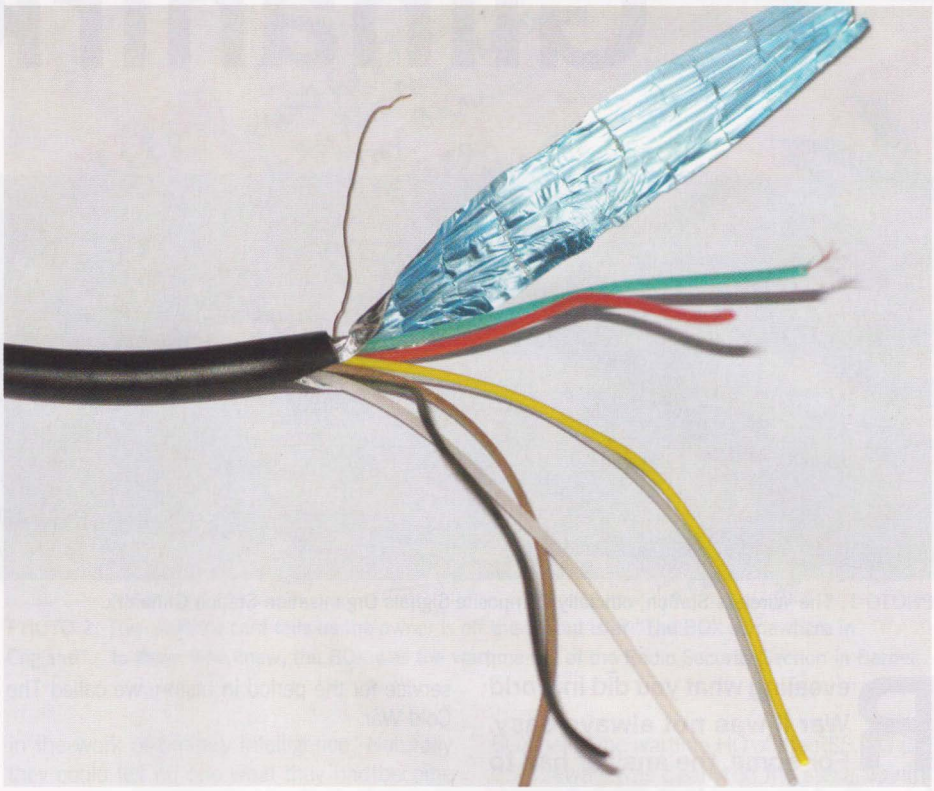


PHOTO 2: Poorly screened VGA cable that radiates RFI on 14MHz and 18MHz amateur bands.

## VGA cables

Steve, G3OAG reports that while experimenting with different VGA monitor leads to check for QRM he first tried a cheap type, which obliterated the 14MHz and 18MHz bands with PC noises. He dissected the cable, which is shown in **Photo 2**. This shows that there are no separate coaxial cables for the R, G and B video signals, just plain wires together, with an overall aluminised plastic foil screen and a 'drain wire', which was connected to the ground pins on the plug.

He then exchanged this for a 'proper' VGA lead of around twice the thickness and weight with separately screened coaxial cables for R, G and B. This produced no observable QRM. Steve's advice is to be very cautious and only buy a thick and heavy VGA cable, which should be properly screened.

**Dr David Lauder, G0SNO**
emc.radcom@rsgb.org.uk

# Station Gilnahirk

PHOTO 1: The Wireless Station, officially Composite Signals Organisation Station Gilnahirk.

**Revealing what you did in World War II was not always easy. For some, the answer had to be crafted in a way that did not reveal the true nature of their activities.**

The wearing of a Royal Signals uniform is naturally associated with the work of military communications, but for one group of individuals this uniform was also the cover for the work associated with Bletchley Park, home of MI6 code breaking.

I have spent over ten years recovering the history and purpose of a former government building on the outskirts of east Belfast. As my research evolved over the years, I have discovered that many who worked there said nothing to their families, but instead took all their WWII secrets to the grave.

Photo 1, taken in 2004, is of what was once known locally as the Wireless Station. It was place of absolute secrecy; questions were never asked because answers would not be forth coming. Officially this had been Composite Signals Organisation Station Gilnahirk, one of a number of GCHQ listening stations both in the UK and overseas. Switched off in 1978, this building remained empty, neglected and heavy vandalised until it was finally demolished in 2010. For twenty-six years the men and women who had worked at this location had been listening for any indication of a surprise nuclear attack on the west.

Prior to 1952, the work of GCHQ had been in operation on this site since 1947 using the former World War Two accommodation – a collection of wooden huts and brick buildings. They too had enjoyed a period of retirement, lasting just seventeen months before being dusted down and brought back into government service for the period in history we called The Cold War.

## World War Two

My story begins in 1938 with a threat to our national security. It came to the attention of MI5 that Hitler's equivalent of our MI6 was keen to know more about us. This German organisation was known as the Abwehr and, before the outbreak of war, it began a recruitment campaign within the ranks of Welsh Nationalism and Irish Republicanism. These spies, or agents, would be required to keep Berlin informed of our wartime preparations. They would communicate using various methods, one being wireless telegraphy.

On 13 December 1938, a secret War Office meeting took place to discuss the creation of an organisation within the UK to detect illicit wireless transmissions as soon as possible.

The chairman, Colonel KW Martin DSO, brought to the attention of those present a directive from the Committee of Imperial Defence (issued in 1933) that the following would apply in a time of national emergency;

*"The War Office should be responsible in peace and war for the direction and finance of an organisation for the detection of illicit wireless transmissions.*

*"The Post Office to act as agents for the War Office and to provide material and personnel for this purpose."*

So the General Post Office (Wireless Telegraphy) department acted as agents for the War Office and oversaw the work. Military intelligence brought together a group of army officers from within the ranks of military intelligence and Royal Signals. They were known as the RSS or Radio Security Section. In time, the word Section was replaced by the word Service. With their HQ in Wormwood Scrubs prison, nine regional offices were also established across the UK; Thurso and Stirling in Scotland, Belfast in Northern Ireland. Preston, Leicester, Cambridge, Leatherhead and Exeter in England and Cardiff in Wales.

Working alongside the GPO were a specially selected (vetted) group of radio amateurs (known as VIs), many drawn from within the ranks of the RSGB. They were individuals who were licenced, up to the task in hand and, most importantly, had their own equipment and a capability of listening to an incoming Morse coded transmission at a speed of twenty words per minute or higher. Working from within their own homes they too were under the direction and control of the RSS. They were doing the same work as their fulltime counterparts in the GPO but there was one major difference.

Quoting from the final sentence of a letter dated July 1940, sent to Arthur Irwin, GI5TK inviting him to become a Voluntary Interceptor.

*"The whole thing is entirely voluntary and no pay is attached."*

Time and space prevent me from providing a full account but what took place next is key to understanding the purpose of this article.

## Voluntary Interceptors

This is part of what Colonel Wollredge, officer in charge of the RSS wrote on the 12 February 1941. The document, marked Secret, is two pages in length.

*"As you have been for some long-time well aware I consider that the present organisation of RSS is unsound. I am responsible for the*

**George Busby**
george.busby@btinternet.com

*work done but I have no control over the personnel who carry that work out, other than the small military staff. We are dependant up a part time service from the Post Office for the supply of all equipment, construction of stations and maintenance, and supply of personnel. The personnel are subject to their peace time terms of employment and the rules and regulations, both Post Office and Trade Union, which are based upon peace conditions, is utterly unsuitable for war. The result is a state of incompetence and inefficiency which would not be tolerated for one moment in any fighting service. So long as the present organisation continues it will be impossible for RSS ever to become properly efficient as an active war organisation.*

The letter continues:

*"There is a very acute shortage of wireless operators in the country.*

*"Exact figures are not yet available but at a rough guess it seems likely that we could select possibly as many as two hundred GPO operators from the present staff of approximately three hundred as suitable for continuance in the work.*

*"It would probably be necessary therefore to recruit a further two hundred to two hundred and fifty efficient operators if they can be found. There is only one source which can supply operators who already possess the necessary qualifications and experience in this work, namely, those civilians, ex amateurs principally, who are now and have been for many months employed at Voluntary Interceptors by the RSS and who at the present time number about one thousand one hundred."*

Just to explain the term used, ex amateurs. Having been vetted the amateur who accepted the call to serve King and Country was required to sign the Official Secrets Act and once the ink was dry they were officially no longer radio amateurs, but Voluntary Interceptors in the eyes of the state and more importantly were engaged in the work of Military Intelligence. Naturally they could tell no one what they had become involved with and that included their families.

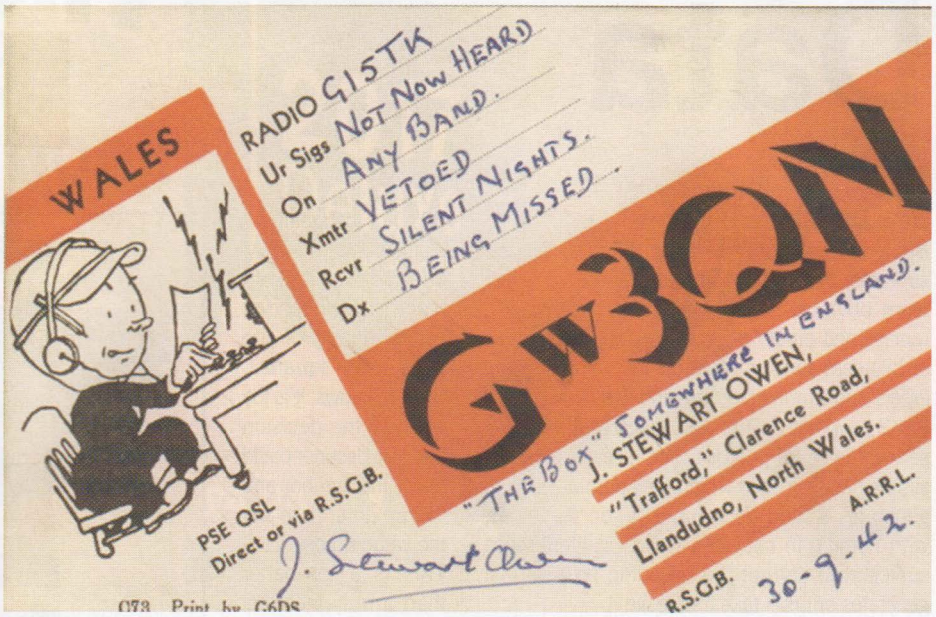



**PHOTO 2:** This wartime card tells us the owner is off the air but is at "The BOX somewhere in England" – to those who knew, the BOX was the wartime HQ of the Radio Security Section in Barnet..

During my research I was approached by George Browne, GIOMXT who had known the late Arthur Irwin, GI5TK. Arthur had been a VI from 1940 to 1942 and was then recruited as a fulltime operator at Gilnahirk up until 1945. During those three years, Arthur had exchanged QSL cards with his fellow operators at Barnet, PO Box 25 (during training Sept / Oct 1942) but more importantly at Gilnahirk. Those cards were placed into an autograph book and when Arthur passed away the autograph book was saved. **Photo 2** is an example of the many cards. Dated 30 September 1942 this card tells us the owner is off the air, he has been vetoed, but is at the BOX somewhere in England – the BOX being the wartime HQ of the RSS, PO Box 25. Stewart was clearly on the same training course as GI5TK.

For the families of the men who served with the RSS there is little or no evidence of their vital wartime work. Many VIs / operators said nothing to their families and took their secrets to the grave. On the other side of the coin, families who have tried to find out more have found the information difficult to obtain.

So let me conclude this very brief account of my research by revealing the names of those radio amateurs from the mainland who I can confirm were engaged in the work of the RSS, **Table 1**. I have recorded all these names on the veteran's register at Bletchely Park.

*"Almost everything that BP did depended on radio interception (*Signals Intelligence*) without which there would have been no cyphered Italian, German or Japanese messages to 'break'; and while it is only recently that interceptors, many of them volunteers, have been given the tribute they deserve, I admire Gordon Welchman, a mathematician for laying emphasis at the time, and in his book* The Hut Six Story, *on the importance of what they were doing." – Asa Brigg*

'They' being the radio amateurs, the Voluntary Interceptors.

**TABLE 1: WWII RSS VIs.**

Harold Wilkinson, G4NW
Norman H Sedgwick, G8WV
CA Bradbury, BRS1066
JH Tickle, GW5TC
Frank Hooson, G3YF
W Wilkinson, G3VR
Bert Lingard, G3IR
George H Woolner, G4BC
CR Ponting, G6ZR
David A V Williams, G3COO
E H Staves, G8TV
J Stewart Owen, GW3QN
Harold Beardwood, G5ZB
G H Ramsden, G6BR
E F Mecke
Lu Bright
Robert Cowden, GI2BZV / PA2
R Ussher Cree
J C Macphail
Clifton Fisher
George Cooper of Liverpool
Bob Loote
J H Faulkner
J D MacDonald of Thurso
C W Thomas
Stan Ince, G6LC
Bob Gilchrist of Scotland
Sydney J Biggs, G2FWZ
Les H Baker
P T Innes of Erthwhile
Adam Pritchard
F J McCormick
Cyril Hartley of Liverpool
N A Deeble
Peter Dobson
F S Robinson
R L Varney, G5RV
Stan Wickham
J G French
J A Clarke
W Ken Miller, G6QF
Adam N Little of Galashiels
R S Beddie of Scotland
C Cathcart
J Nicol of North Shields
Jimmy R Adams, GM5KF
A J Matthews, G6QM
C T Fairchild, G3YY
John V Parsons, G5QP
H Leonard Wise, G6XF
Jack M Miller, GM4MM
R G Smith
S Tollermon
J S Owen, GW3QN
A Stuart Clacy, G6CY
Gordon W Parkes, G3NL
R R Smith, G6TQ
Les Drakeford, G2DWB
W G Taylor, 2AGX
John C Imrie, GM4GK
Tommy Woodcock, G6OO
T C Karling, BRS3047
W F Mudford, G6BK
Peter Modridge, G6PM
also two cards from
Captain Joe Banham and
Major EA Sabine.

George Busby has written a book on Station Gilnahirk that contains a vast amount of detail about its wartime and other operations, and particularly the Voluntary Interceptors. For more information see the Book Review on page 46.

# Data

## How Digital is a DigiMode?

Back in days of yore when RTTY reigned supreme, the contents of a 'digital' transmission were obvious. Two tones, mark and space, represented binary digits '1' and '0'. Sequences of bits sent serially made up the values for the letters and numbers of the alphabet. Later came PSK31, where a 0 or 180 degree phase shift served the same purpose. The receiver makes a simple decision as to which tone dominates then generates a hard decision, a '1' or '0' output, with nothing in between. Noise or interference sufficient to corrupt the decoding process just generates errors – take it or leave it.

Other modes, rarely, if ever, seen in amateur circles back then were in use that did not even pretend to be binary related. One of the earliest was Piccolo, invented by the UK Foreign office in the 1950's. 32 individual tones were used, each tone representing a letter of the alphabet or a space or a shift symbol that allowed numbers and punctuation to be sent instead; just like the RTTY alphabet. The original decoder used 32 resonant reeds, or tuned circuits. Not a binary digit in sight – is this a 'digital transmission'?

The first WSJT mode to appear, JT44, used a similar technique with separate tones to represent characters taken from an alphabet of 43 letters, numbers and punctuation symbols. A 44th tone was used for synchronisation. By now digital computers were used for decoding but if you were masochistic enough it could have been received with an analogue decoder. A more complex waveform is quadrature amplitude modulation, QAM, where a carrier is modulated in amplitude and phase, settling into a number of defined states. A simulated 64-QAM signal with added noise for a mean 25dB signal to noise ratio is shown graphically in **Figure 1**. No one would doubt that these are probably *digi-modes*, but the over air waveform takes on many different values – it is a quantised analogue waveform where each symbol represents a number or value. Is this an analogue waveform, or a digital one, and do we even care? Multilevel signalling offers us a trade-off between bandwidth, data rate and S/N.

## Soft decisions

All data transmissions can benefit from soft decision decoding where the distance from any decision threshold is measured. The lines between the blobs in **Figure 1** show thresholds and a simple decoder would just choose which 'square' to place the received sample into. But what happens if a sample falls very close to, or on, a line? A hard decision decoder on a RTTY or PSK31 signal would have a high probability (up to 50%) of just getting it plain wrong. In a QAM transmission it could place the decoded value in any of the adjacent 'squares'. But if it 'knows' it is too close to the decision line, the decoder could reject the symbol and flag up an error to say the value is corrupted. This is a lot better than a truly incorrect decision resulting in, say, the wrong letter or number appearing and may be adequate; but it is still not ideal.

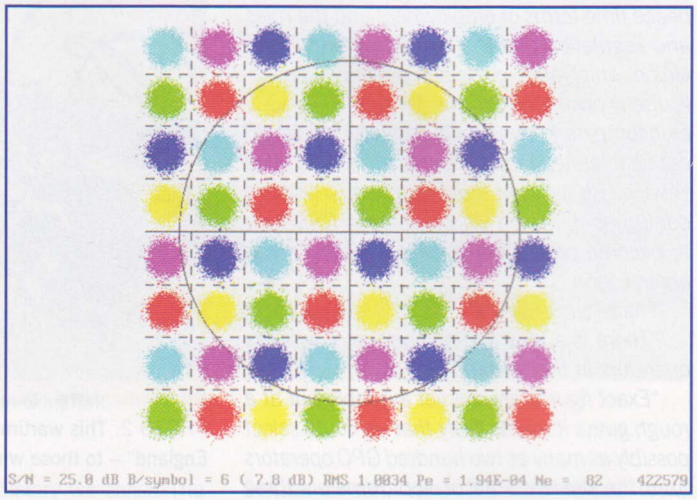



**FIGURE 1: Simulated 64-QAM signal at 25dB signal to noise ratio.**

## Error correction

Soft decision is the perfect partner for error correction coding. By adding extra transmitted symbols in a controlled way it is possible to make the decoder have a pretty good idea of what, more or less, is going to come next. But it must know what was level actually received, not having passed though a decision slicer. It obviously shouldn't know *exactly* what to expect, otherwise there would be no point in sending the next symbol. Having a 'good idea of what it might be' works well enough. So, when the next symbol comes along corrupted by noise or interference, the decoder can decide if it is close enough to what was expected to be valid. Symbols that would be rejected by a hard decision decoder can now be mostly pointed in the right direction, with many of them correctable.

Back in 1967 Andrew Viterbi came up with a generalised concept for fast and efficient error correction based on searching back through an encoded sequence, looking for the most-likely, or most-probable next symbol. This is compared with that actually received, using all possible scenarios to get to the current place, with the most unlikely routes discarded each time. Then the sequence goes onto the next symbol and continues using knowledge of the last decoded one if it was good, or marking with a low weight if bad. So each decoded symbol is sent to the output based on a weighted average of several before it, with the weighting depending on how close they were to the correct values. The Viterbi algorithm, or process, was first used with convolutional coding as used in WSPR, JT4, JT9 and QPSK31 amongst other amateur datamodes. It is applicable to many different types of waveforms: binary, multilevel, frequency, phase or amplitude modulated. Viterbi is a *decoding* process and not, as often incorrectly stated, a modulation or coding in its own right.

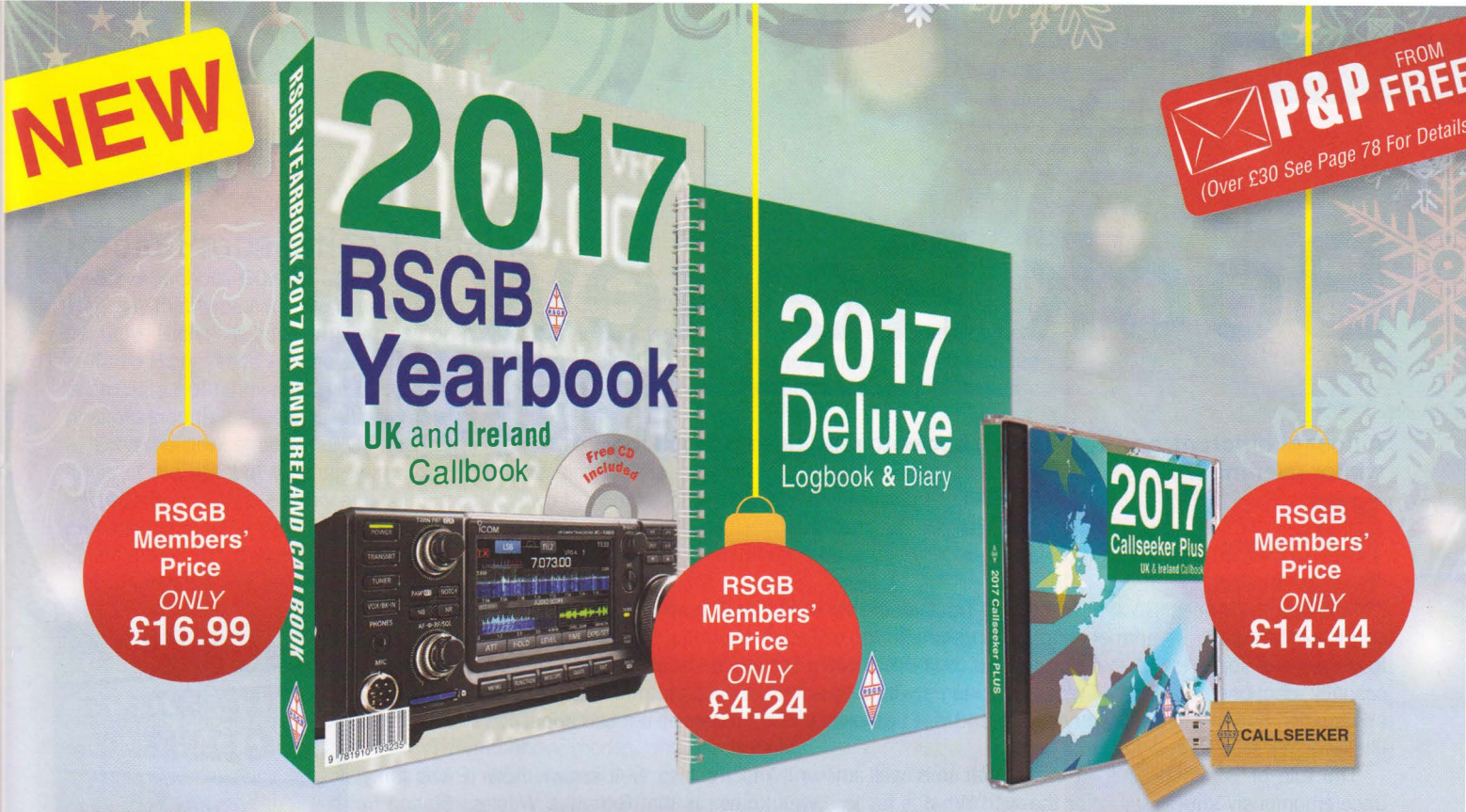
## Reed-Solomon error correction

Another type of error correction works on blocks of symbols / values in a system akin to that of adding parity bits to a binary waveform. Additional symbols are generated from groups of input multi-level ones. The maths is complicated, but is loosely connected with modulo or clock arithmetic [1]. At the receiving end, all values coming out of the demodulator are passed through a reverse process using the added parity symbol values to repair the corrupted information ones. As the values are all just numbers there is now no need for deciding how close they lie to a decision threshold. The actual demodulated numbers, however corrupted, can be used directly in the calculation with decision thresholds applied only to the final output values.

## Reference

[1] Take as an example arithmetic Modulo 10: (2 + 3) MOD 10 = 5, as we'd expect, but (6 + 7) MOD 10 = 3, as 13 MOD 10 = 3. This applies to multiplication too, (4 * 5) MOD 10 = 0 and (9 * 9) MOD 10 = 1. Reed-Solomon encoding uses more complex techniques than plain modulo arithmetic to generate the parity symbols, but the idea is the same.

**Andy Talbot, G4JNT**
andy.g4jnt@gmail.com




## RSGB Yearbook 2017

Edited by Mike Browne, G3DIH

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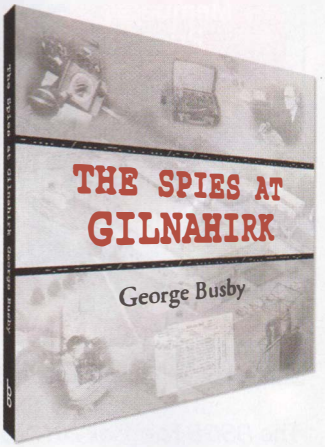
# Book Review

**A host of different, and interesting, books to read during those long winter evenings.**

## The Spies At Gilnahirk




by George Busby

It's funny how life goes. George Busby sent in his article about Station Gilnahirk (see page 42) some time ago and it went through the normal editorial process with the intention of putting it in the November edition. Due to pressure of space it had to be postponed until this month, but when I sent him the proof for checking he casually mentioned that he had recently written a whole *book* on the subject, imminently due for publication. I persuaded him to send an advance copy and was completely bowled over by it. I can honestly say that if you like George's article you'll love this book.

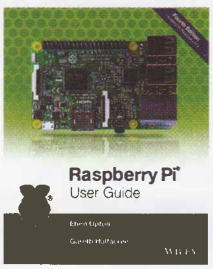
The role of Bletchley Park in World War II is well known. And it's also well known how it was fairly unceremoniously shut down after the war. What is far less well known is that Gilnahirk Wireless Station in Northern Ireland was also involved in similar work but *didn't* get shut down after the War. Indeed, it quietly carried on doing similar work well through the Cold War. The author really only hints at the latter activity, reproducing a letter of commendation from 1965 that clearly indicates that 'stuff' was going on, but he declares he was advised that research into the Cold War activities and duties of Gilnahirk was a door he should leave firmly closed. So although the station was operational for about 36 years he confined his research to the first five – which are fascinating. (I can't help wondering if someone, someday will write a sequel…).

Many of the operators at Gilnahirk were Voluntary Interceptors and this book reads like a who's who of amateur radio in Northern Ireland. The RSGB was secretly involved in the wartime recruitment and some of the names mentioned in the book will be very familiar to many amateurs today. I leave it to you to spot them!

There are many fascinating historical documents reproduced or referenced in the book including, near the end, a complete transcript of "Notes on the Detection of Illicit Wireless" from 1940, which described how "… to intercept, locate and close down, illicit wireless stations operated either by enemy agents [or by persons] without being licensed to do so". And they were good at it. Some of the achievements mentioned in the book include interception and direction finding connected with the sinking of the *Bismark* and many other important battles, campaigns, deceptions and detections.

You'll probably already know if you like this sort of book. If you have an interest in Voluntary Interceptors, cloak-and-dagger radio work and similar topics then this is definitely one to add to your bookshelf. It's good.

**ISBN 9781 9106 5708 9**
**144 pages, 215 x 205mm**
**Non-Members' price £12.99**
**Members' price £11.04**




## Raspberry Pi User Guide

### 4th edition

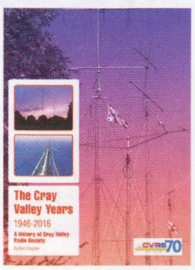
**Eben Upton and Gareth Halfacree**

If ever there was a book 'from the horse's mouth' then this is it: Eben Upton is the man behind the Raspberry Pi. After he "accidentally" promised everybody in the world a $25 computer, he turned his early rough prototypes into the Raspberry Pi – now in its third generation, with over ten million sold.

But what if 'sudo apt-get install' is Martian to you? That's where this book comes in. It contains the distilled wisdom necessary to get up and running, program and hack the hardware, and generally do all the messing about that the Raspberry Pi bandwagon promises. This 4th edition will help you get to grips with Linux, Python, Scratch and more, including driving the Pi camera, connecting 'stuff' to the GPIO bus and even hacking Minecraft.

If you – or someone you know – has a Raspberry Pi or is thinking of getting one, this book should definitely be on your must-have list.

**ISBN 9781 1192 6436 1, 312 pages, 235 x 188mm**
**Non-Members' price £16.99**
**Members' price £12.74 (25% Off)**




## The Cray Valley Years 1946-2016

### A history of the Cray Valley Radio Society

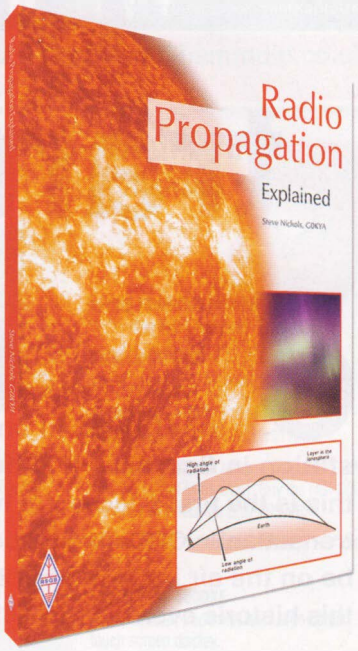
**by Bob Treacher, MOMCV**

Cray Valley RS is well known in the amateur radio community. From its inception just after WWII to date it has had its share of ups and downs – heady times in the 1970s, doldrums in the 90s, and back up to a healthy membership with a successful training programme, the club has seen a wide range of fortunes. It even became a Limited Company at one time. Now, on a roll, long-time member Bob Treacher, MOMCV has written an authoritative history of the club's 70 years. This detailed book has wider interest than just members of CVRS, as it contains some very interesting lessons that many other clubs could learn from. Readers will also discover some of the history behind a number of very well-known callsigns and personalities.

**ISBN 9781 9101 9329 7**
**220 pages, 240 x 174mm**
**Non-Members' price £14.99**
**Members' price £12.74**

## Radio Propagation Explained

by Steve Nichols, GOKYA




They say that two heads are better than one and this book is a fine example of exactly how true that can be. Steve Nichols is a renowned expert on propagation in his own right, and this book is his development of *Radio Propagation – Principles and Practice* by Ian Poole, G3YWX, published some 12 years ago. Ian is an author of renown; Steve has extended the work and the whole is a tremendously good look at a phenomenon that affects us all as amateurs.

Even the newest beginner will realise there must be a reason why some bands are 'dead' at certain times of the day but bustling with activity at other times. That reason is propagation – signals being reflected from high in the sky and coming back down hundreds or thousands of miles away. The different propagation mechanisms come into play on different frequencies: the characteristics of MF, HF, VHF and above are all different and fascinating in their own ways. This book explains what's going on in terms that are very understandable.

It's impossible to summarise a book with this breadth of coverage but if I tell you it starts off with a basic explanation of how electromagnetic waves work and by chapter 12 it's telling you about the effect of the ionosphere on space communications, you get some idea of how much it covers. We get to learn about the fundamentals, about the atmosphere, the sun, propagation near the ground; the basics of ionospheric propagation (including the effect of various storms, disturbances and aurora); LF, MF and HF band characteristics, Tropo and other VHF and above modes, and much more.

One very interesting section is Chapter 9, HF Propagation Prediction Software. This is an area that has seen significant development and can take a lot of guesswork out of radio, particularly if you don't have the experience that tells you that afternoon or early evening is the best time to try contacting the east cost of the USA from the UK in October. Here you'll find an overview of the most popular (and best) propagation tools, both free and paid-for, that can really give you the edge when you're planning your operating.

Everyone will have learned something about propagation in the course of obtaining their licence but, as this book demonstrates, there is so much more you can discover. It's incredibly rewarding and, unlike many books, understanding propagation can have a direct effect on your mastery of amateur radio and your enjoyment of our hobby. It's not an expensive book, yet it is worth its weight in gold for the amount of truly useful knowledge it contains. Any amateur, no matter how new or how experienced, is guaranteed to learn from this book. Highly recommended.

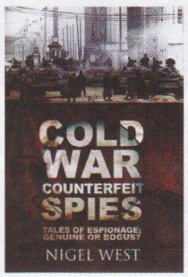
ISBN 9781 9101 9328 0
128 pages, 240 x 174mm
Non-Members' price £12.99
Members' price £11.04


## Churchill's Most Secret Airfield RAF Tempsford

by Bernard O'Connor

I have flown over the remains of RAF Tempsford in a microlight from the flight school near Moggerhanger, not far from Bedford, and my tutor told me a few facts about it that whetted my appetite. So I was very pleased to come across this book, whose 256 densely-packed pages reveal a marvellous account of the history, ranging from how the bushes were uprooted to clear the land for construction, through some truly fascinating operational details, to post-war decommissioning. There are details of the aircraft, the air crews, lots of information on the secret agents taken from Tempsford and dropped into occupied territory (details I found fascinating). A large amount of the book is about agents' experience, some of which doesn't make for easy reading. There were some very brave people who met very unpleasant ends – but also many who came through impossible situations thanks to luck or deception. I can't possibly do justice to this book in so few words but I can promise it offers a fascinating insight into the very secret wartime goings-on that came via Tempsford but affected the whole world.

256 pages, 197 x 124mm
ISBN 9781 4456 0690 3
Non-Members' price £ 12.99
Members' price £9.74 (25% Off)




## Cold War Counterfeit Spies

### Tales of espionage; genuine or bogus?

By Nigel West

I for one had no idea that there was so much that has been published about military activity, spying, etc since WWII that has *simply been made up* or hugely embellished by the author. *Cold War Counterfeit Spies* contains 17 chapters covering a wide range of topics from the latter half of the 20th century and beyond. Not all are about the Cold War and you will find Northern Ireland, Vietnam, Afghanistan and others all covered, as are well-known embellishing authors such as Sir Ranulph Fiennes and Andy McNab. This book is full of fascinating snippets including published authors who were actually psychiatric patients purporting to members of the SAS to improbable stories of spies who had never even been to the countries in question. This is a fascinating read that covers a huge amount and leaves you wondering how some authors ever got published. It's a truly fascinating read and shows that some of those stories in print that "surely couldn't have happened" actually didn't.

ISBN 9781 4738 7955 3, Hardback
256 pages, 157 x 236 mm
Non-Members' price £25.00
Members' price £18.75 (25% Off)

**Giles Read, G1MFG**
giles.read@rsgb.org.uk

# Commemorating the first UK-US transatlantic QSO

**On 21 December 1921, a two-way QSO took place between 1BCG in the US and an unnamed station in Scotland. It is believed this is the first successful two-way transatlantic QSO. Two stations will be on the air in December to mark this historic event.**

GB2ZE will be on the air from Ardrossan in Scotland and N1BCG in Greenwich, Connecticut to celebrate this 95th anniversary.

Paul Godley, 2ZE on his UK visit in 1921 with equipment and aerials never seen here before.

## History

The first logged signals across the Atlantic took place in early December. Exact dates and time are a little difficult to prove as logs have been lost over the years and we have to reply on reports of the time and other anecdotal evidence.

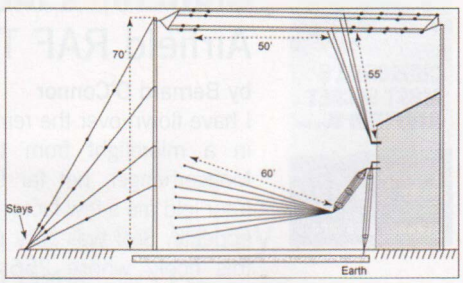
During the ARRL Convention held in Chicago in 1921, it was announced that a second series of transatlantic tests would take place in December of that year. The ARRL, decided to send the well-known American amateur Paul Godley, 2ZE to Europe to take part, bringing with him the latest American equipment. He addressed a meeting of the RSGB in London, bringing details of a station in Georgia that had been heard at a distance of 2540 miles using a three valve set. Whilst in London, Godley met with Marconi, Campbell Swinton, Sir Henry Jackson and other distinguished members of the RSGB.

Godley first set up his receiving equipment consisting of a Paragon regenerative receiver and an Armstrong superhet in the home of Frank Philips (he was the designer of a range of Burndept receivers) in Middlesex. After listening for two days, Godley decided that atmospheric noise and harmonics from single circuit valve transmitters local factories would make it difficult for him to hear weak signals from across the Atlantic. So he decided to move his station to Ardrossan in Scotland. The aerial was a Beverage type some 850ft long supported on poles 12 feet high, considerably bigger than any UK amateur could erect. At that time the UK regulations was for a maximum length of 100 feet of wire.

A phosphor-bronze wire was then run the entire length of the line and was earthed through a non-inductive resistance, the earth plates taking the form of several short lengths of iron piping buried about 4 feet in the ground. The aerial was the first Beverage array erected in the UK.

According to notes made after the event, it was probably at 0133GMT on 8 December 1921, that Godley thought he heard 1AEP but the atmospheric noise made identification a little uncertain. On 11 December he positively identified 1BCG, a station set up in Connecticut by six members of the Radio Club of America.

British radio amateurs had been listening for American signals too. Almost certainly W F Burne, 2KW of Sale was probably the first to pick up these signals a day before Godley heard his first confirmed signal. 2KW's equipment was very different to that being used in Scotland. It had just three HF amplifier stages with tuned transformer couplings, followed by a detector and one low frequency amplifier and a separate heterodyne oscillator. It was made up of war surplus components. His aerial was an inverted L type 45 feet in length with two wires spaced 10ft 6 inches apart with a 50ft lead in.




The antenna at the home of W F Burne, 2KW.

## December's stations

Jason, GM7VSB grew up only a few feet away from the location of 2ZE's station in Ardrossen and will put GB2ZE on the air during December. N1BCG will be on the air close to the original station site too. More news will appear in GB2RS and on the RSGB website as details of times and frequencies for these stations. QSL cards will be available for those who collect them.

**Elaine Richards, G4LFM**
radcom@rsgb.org.uk

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**See ML&S video review HamRadio.co.uk/ftdx1200video**

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| G-1000DXC | SEE WEB |
| G-5500 | |
| G-2800DXC | |
| GS-065 Mast bearing | |
| GC-038 Lower clamps | |
| Rotator cable 25m | SEE WEB |
| Rotator cable 40m | SEE WEB |
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# ACCESSORIES AND ANTENNAS ON SHOW AT THE NEW SUPERSTORE!

## Wonderwand Wonderloop Antennas

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

Wonder Wand Antennas U.K.

The UK's favourite rig-mounted antenna system!

### New! WonderLoop 4010. 40m -10m

If you are an avid FT-817 or KX-3 operator and enjoy nothing more than heading for the hills on a weekend to active those rare WAB squares. Take a look at the all new WonderWand WonderLoop Antenna. Incorporating their easy to use tuning circuit, which offers frequency coverage from 40m-10m and handling 10W of RF power, you can be on the air in seconds. The tuning unit is enclosed within a lightweight ABS case, no larger than a pack of cards. This means you will no longer need to carry around all those additional extras needed to string up a wire in the field. There is also no need to worry about running a counterpoise with this efficient loop design. So how does it perform? As we had sunshine this afternoon, we popped out into the car park here at ML&S and attached the loop to our demo FT-817. Within minutes we had tuned to the 20m band worked into EA, I and 9A. Not bad for 5W and the 'shack' in our hand.

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

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

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

**For the full range see www.HamRadio.co.uk/hyendfed**

## Super Antenna MP1DLR Package

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

**MP1DLR Package includes:**

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

**Super Antenna Features:**

- Ham bands: 40m-30m-20m-17m-15m-12m-10m-6m-4m-2m-70cm
- Frequency Range: HF 7MHz~30MHz continuous
- Frequency Range: VHF 48 to 144MHz continuous
- SWR: 1.5 : 1 or better
- Rated Power: 500W SSB; 300W CW / DIGITAL
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- Also configurable for up to 450MHz
- Standard 3/8"-24 male thread for mounting
- TM2 SuperPod tripod included with carry bag
- MC80 80m coil included for 80m band
- Optional MR series radial sets available
- Optional MC60 60m coil for 60m band

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**All for only £259.95**
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| X-30 | 2/70, 3/5.5dB, 1.3m Long |
| X-50N | 2/70, 4.5/7.2dB, 1.7m Long |
| X-300N | 2/70, 6.5/9dB, 3.1m Long |
| VX-1000 | 6/2/70 2.15/6.2/8.4DB 1.42M Long |
| X-510N | 2/70 Fibre glass 8.3/11.7dB gain. 5.2m long "N" |
| V-2000 | 6/2/70, 2.15/6.2/8.4dB, 2.5m Long |
| X-7000 | 144/430/1200MHz (2m/70cm/23cm) 8.3dBi (144MHz), 11.7dBi (430MHz), 13.7dBi (1200MHz) 5M Long |

**Mobile Antennas**

| | |
|---|---|
| NR-770RSP | 100W, 2/70, 3/5.5dB, .98m Long, spring loaded |
| NR-7900 | 2/70, 3.2/6.4dB, 1.46m Long |
| AZ-504FXH | Extremely compact dual band antenna for 144 & 430MHz. 15.5" long |
| MR-77 | Magnet mount/antenna combination. Includes 13' RG58 coaxial cable with BNC or SMA connector |
| SG-7500 | 2m/70cm, GAIN 3.5/6.0, 41" long |
| SG-7700 | 1/2wave C-Load radialless(144MHz), 2x5/8wave radialless(430MHz), 3.5dB(144MHz),6.0dB(430MHz) 1.06m long |
| SG-7900 | |

See Web for prices

**Duplexers/Triplexers**

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

See Web for prices

**Switches**

| | |
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| CX-210A | 2-way, SO-239 Die Cast |
| CX-210N | 2-way, N-Type, Die Cast |
| CX-310A | 3-way, SO-239, Die Cast |
| CX-310N | 3-way, N-Type, Die Cast |

See Web for prices

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HUSTLER

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**See web for full listing!**

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**Free standing, max 7.3m tall, 1kW**

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Further prices and full details see web:
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| MFJ-949E | Manual ATU metered, Dummy Load, 1.8-30MHz, 300W | |
| MFJ-901B | Manual Mini ATU 1.8-30MHz, 200W | |
| MFJ-971 | Manual ATU metered, 1.8-30MHz, 200W | |
| MFJ-904H | Manual ATU, metered, inc balanced, 1.8-30MHz 150W | |
| MFJ-969 | Manual Roller ATU Metered 1.8-54MHz, 300W | |
| MFJ-993B | AutoATU Metered 1.8-30MHz, 300W | |
| MFJ-1786X | Magnetic Loop 10-30MHz, 150W re-built & re-aligned by ML&S | |
| MFJ-1788X | Magnetic Loop 7-22MHz, 150W re-built & re-aligned by ML&S | |
| MFJ-259C | Antenna Analyser 530kHz-230MHz | |
| MFJ-266 | V/U Portable Antenna Analyser 1.5-185MHz + 300-490MHz | |
| MFJ-269C | 530KHz-230MHz, 415-470MHz Analyser | |
| MFJ-260C | Dummy Load 300W SO-239 | |

See Web for prices

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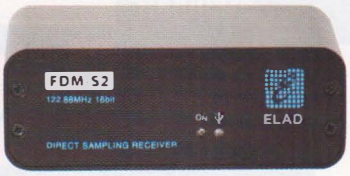
There is so much to detail so check out our web page **HamRadio.co.uk/maestro** for more information.

## ELAD FDM-S2

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Tigertronics


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.

**Cable included - see web.**

## ELAD FDM-DUO"R"


Receive only version of the popular FDM-Duo 5W SDR Transceiver. Coverage is 9KHz-54MHz, direct sampling. Identical to the TX variant but introduced because of many requests from SWL's and users who wanted RX only. The price is cheaper at only £639.95.

**ML&S PRICE: £679.95**

## NEW EXPERT ELECTRONICS MB-1

*"For a New Direction in Ham Radio"*

This 100W DDS SDR base station transceiver is powered by an internal core i5 3GHz processor running W10. It has so many advanced and leading edge features its technical specification sheet would fill 3 pages of this magazine.

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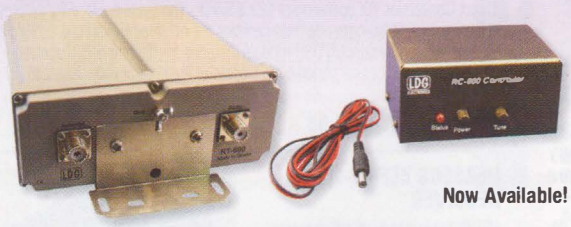

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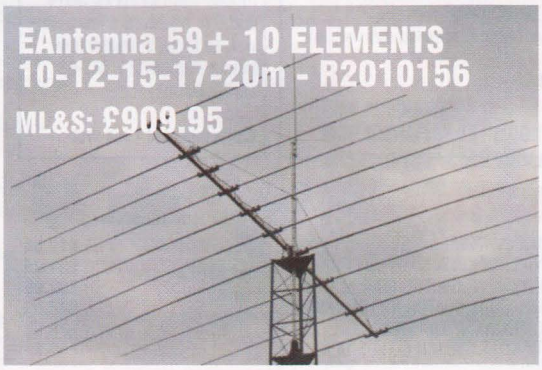


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# Sport Radio

**December is the month when there are no RSGB HF contests and, because of the festive break, there are less VHF contests than other months.**

2m AFS is the first VHF contest of the month, on the 4th. It's the third contest in the 2016/7 Super League series, and it's the Super League that has been responsible for a big increase in participation. 2014 was a record year, but last year – to quote the adjudicator – Storm Desmond came along with "torrential rain and high strength winds until the storm died away during the contest". It resulted in a 9% drop in participation, which shows just what a disincentive bad weather can be to an event that has a significant percentage of portable stations operating in it. Let's hope for calm weather this year. We then move into the final UKACs of the year; 2m on Tuesday 6th, 70cm on Tuesday 13th and 23cm on Tuesday 20th. There are no 6m or SHF UKACs because they would be in the Christmas break, but for those who want to take part in contests over the festive period there are the Christmas Cumulatives on the 26th to the 29th. All four bands (6m-70cm) and two hours each day, so lots of band hopping will be necessary if you want to do well.

Now that the 2016 UKAC series is drawing to a close it seems appropriate to review it and take a look at the changing fortunes of the major players in it over the past five years. Although it's too soon to declare the winners, notwithstanding any disasters the Yorkshire-based Ossett ARO team should come out on top, see **Table 1**. They came into the Top 3 for the first time last year and thanks to a solid performance across all the bands – especially SHF – will make it to the top this year.

TABLE 1: Top five teams in the UKACs. Italics indicate current positions; 2016 series not yet finished.

| | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
|---|---|---|---|---|---|---|
| 1st | Bolton | Bolton | Travelling Wave | Travelling Wave | Bolton | *Ossett* |
| 2nd | Harwell | Spalding | Bolton | Bolton | Travelling Wave | *Travelling Wave* |
| 3rd | Trowbridge | Travelling Wave | Spalding | Spalding | Ossett | *Drowned Rats* |
| 4th | Camb Hams | Trowbridge | Camb Hams | Sheffield | Spalding | *GMDX* |
| 5th | Macclesfield | Harwell | Trowbridge | Trowbridge | Drowned Rats | *93 CG* |

At this stage of the series Travelling Wave CG are the only team who could beat them, but TWCG have hardly participated in the SHF sessions all year. Everyone had better watch out if TWCG have been quietly developing SHF plans for 2017. But who's this in third place? The Drowned Rats CG is a relatively new group. Based in the South East, it's easy to make lots of QSOs in the UKACs, but not easy to get lots of points for each one, because distances tend to be shorter. Mind you, members of Ossett suffer for the same reason, although the area of the country is different.

The UK Six Metre Group's Winter Marathon starts this month and continues until the end of January. There are no specific operating periods; just work as many Locator squares as you can. Next we have two ARRL contests. The ARRL 160m runs for 42 hours, starting 22:00 on Friday 2nd. Because you need to work the USA, US Territories and Canada only, the only time there is going to be a path is when its dark at both ends of the QSO. This means you can expect to hear the better equipped East Coast stations from about 22:00 each night. Propagation will spread West as darkness falls across North America, but the band will close around dawn in the UK (when the D Region forms). I know from experience that you don't need a mega-station to work some of the Americans. 100 watts and a dipole should do the trick. Higher power and a vertical antenna should get you more QSOs though. The ARRL 10m Contest runs for the whole weekend of 10-11th. Work the USA, Canada and Mexico... if you can. Conditions are going to be marginal – at best! The Stew Perry Topband Challenge runs for 24 hours, starting Saturday 17th. Entrants are limited to 14 hours operating which, considering the band is closed during daylight hours, seems about right for Middle America. In the UK the band is open for 16-18 hours, depending on how far North you live. This is a contest where distance is King, so an antenna with a low takeoff angle is needed to do well on transmit, and a receive antennae to pick the weak ones out of the noise is desirable. The WAB Christmas Party runs for twelve days, starting on Boxing Day. It's basically an exercise in collecting the callsigns of as many WAB book holders as possible. There are two categories, HF/mixed and VHF. The DARC (German) Christmas Contest takes place on Boxing Day morning. 40m will account for most of the QSOs for UK-based stations.

**Steve White, G3ZVW**
steve.g3zvw@gmail.com

### RSGB VHF Events

| Date | Event | Times (UTC) | Mode(s) | Band(s) | Exchange |
|---|---|---|---|---|---|
| Dec 4 | 144MHz AFS § | 1000-1600 | All | 144 | RS(T) + SN + Locator |
| Dec 6 | 144MHz UKAC | 2000-2230 | All | 144 | RS(T) + SN + Locator |
| Dec 13 | 432MHz UKAC | 2000-2230 | All | 432 | RS(T) + SN + Locator |
| Dec 20 | 1.3GHz UKAC | 2000-2230 | All | 1.3 | RS(T) + SN + Locator |
| Dec 26-29 | Christmas Cumulatives | 1400-1600 | All | 50-432 | RS(T) + SN + Locator |

### Best of the Rest Events

| Date | Event | Times (UTC) | Mode(s) | Band(s) | Exchange/info |
|---|---|---|---|---|---|
| Dec 1-31 | UKSMG Winter Marathon | All | All | 50 | RS(T) + Locator |
| Dec 2-4 | ARRL 160m | 2200-1600 | CW | 1.8 | RST (Ws & VEs also send ARRL/RAC section) |
| Dec 10-11 | ARRL 10m | 0000-2359 | CW, phone | 28 | RS(T) + SN (Ws, VEs & XEs send State/Province code) |
| Dec 17-18 | Stew Perry Topband Challenge | 1500-1500 | CW | 1.8 | 4-character Locator (Grid) square |
| Dec 26-31 | WAB Christmas Party | All | All | All | WAB Book number |
| Dec 26 | DARC Christmas Contest | 0830-1100 | CW, SSB | 3.5-7 | RS(T) + SN (DLs send DOK or 'NM') |

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

# Design Notes

## Zero bias detector diodes

After reading October's issue about RF detectors, Matthew, G6KOA wrote in to say "I have just received some samples from a Russian company, Micran. They manufacture a zero bias beam lead diode with quoted tangential sensitivity of -60dB. The device code is ZB-28 and I hope to investigate further. I've found Micran very amenable and helpful."

## Gain stages

We often need amplifiers or gain stages in a design and there are thousands of solutions and bits of circuitry to do the job. So here we're going to look at three circuits that offer known and stable operation, are usable across a wide frequency band with minimal changes and, most importantly, have controlled and known gain characteristics. Many designs using single transistors in simple arrangements fail in this respect, with the gain sometimes being a bit of an unknown – especially over frequency – and varying with supply voltage.

**Figure 1** shows the simplest; an off the shelf modamp. Modamps have been around for a few decades now and were covered in detail in this column back in May 2008. They are drop-in three terminal devices with 50Ω input and output terminations. DC bias is normally supplied via a resistor / choke combination to the output terminal. Internal feedback ensures the gain is flat from DC to several GHz and that the input/ output match is maintained. Most importantly, the device is inherently stable (won't oscillate) whatever load or source impedance is presented to it. Modamps are available with a range of RF power and gain capabilities, each requiring a different DC bias. Different families offer differing frequency capabilities. The old bipolar MAR series, for example, are not useable much above 1GHz. The later GaAs ERA family offer operation to 4 or 6GHz and now the latest GAN and GALI families are useable to 10GHz with higher gains. There are too many to describe here, but the Minicircuits website [1] gives more details and full data sheets.

Although normally biassed using a simple dropper resistor, a varying supply voltage causes device current to vary, resulting in gain and impedances changes. Figure 1 shows how a PNP transistor and a handful of other components can be used as a constant current source to force a fixed current though the modamp. A Zener diode impresses a constant voltage across the resistor in the emitter of the PNP device, forcing it to pass a constant current out of its collector. The emitter resistor is selected so the Zener voltage across it (minus the $V_{BE}$ drop) gives the desired modamp operating current. Modamps typically operate at somewhere between 3 to 5V on their output terminal, so zener voltage and supply voltage choices need to take this into account. A 2.7V Zener (about 2V across $R_E$) with a 5V modamp can just about run from an 8V rail.

## Conventional common emitter amplifier

**Figure 2** shows probably one of the most popular amplifier stages to appear in the amateur literature. It is adaptable for low power operation, right up to broadband transmitter output stages delivering a few hundred milliwatts. We'll look at its operation from a circuit design point of view, using simplified calculations that will get us near-enough to what we want.

Output matching, shown as a broadband transformer in the diagram, presents a known load resistance to the collector of the transistor. If operation for high output power is wanted, then this resistance has to be sufficient for the supply voltage and the device DC current to deliver the peak power.

$$R_L <= V_{CC}^2 / 2.P_{OUT}$$
AND
$$R_L >= P_{OUT} / (2.I_{DC}^2)$$

For low power operation, $R_L$ = 100 to a few kΩ is sufficient, depending on wanted gain, frequency, and stray capacitance.

The DC conditions are set by the total resistance in the emitter and the voltage applied to the base (minus the $V_{BE}$ drop) that subsequently appears across that to define the quiescent current, $I_{DC}$. Allow about 10% to 20% of the supply voltage to appear across the total emitter resistance, then choose the two resistors making up the base bias divider to give this voltage plus about 0.7V.

If the emitter were to be decoupled directly, ie the bypass capacitor connected directly to it, quite a high gain amplifier would result. But that gain is frequency dependent and near impossible to estimate properly. Furthermore, the input impedance of the amplifier is another unknown and probably a bit too much on the low side for comfort. We overcome this by adding feedback in the form of a series resistance $R_E$ in the emitter. The net result is to give an overall voltage gain of the amplifier (at the collector) that is equal roughly to the load resistance divided by this emitter degeneration resistor, or $R_E$ / $R_L$. The overall input to output voltage gain has to then be divided by the voltage ratio of the output matching network – for a transformer this is simply the turns ratio. So for $R_L$ = 450Ω from a 3:1 transformer driving a 50Ω load, an emitter degeneration resistor of 10Ω gives a total voltage gain from input to load of 450 / 10 / 3 or about 15 times.

The input resistance to the base is roughly equal to the transistor's $H_{FE}$ times this emitter degeneration resistor, all in parallel with the two base bias resistors. $H_{FE}$ of modern high frequency devices is in the region of 50 to 200, so here it will be, perhaps, in the region of 1kΩ. For a controlled gain stage, it is best to swamp this unknown by choosing suitable base bias resistors. Making their parallel combination around perhaps 300Ω should suffice. The total input resistance of the amplifier is then around 200Ω.

## Two stage bipolar amplifier with feedback

**Figure 3** is an interesting configuration that I originally came across in audio amplifier design. By using high frequency transistors it can provide a flat frequency response from DC to tens of MHz, a high input impedance and low output impedance (meaning 50Ω drive capability). Two bipolar transistors are cascaded; the collector of the first driving the base of the second with no attempt at impedance matching or worrying about gain at this point. The cascade of two devices provides a LOT of open loop gain, several hundreds probably. For convenience in biassing, NPN and PNP devices are used. For the overall operation this is not essential, but does make for simpler circuitry. The first device actually has two input ports. The obvious one is its base, where the normal input signal is applied, but its emitter is also an input, where it then acts as a common base amplifier whose output (at the collector, and hence the base of the second device) is in phase with this input at the emitter. The second stage introduces a voltage inversion and significant gain at its collector, which forms the amplifier output. This means negative feedback can be used to completely define the gain of the

amplifier. By adding a potential divider from the output back to the first stage emitter, the gain of the combination is set very close to that defined by the potential divider. The diagram shows a capacitor in series with the second resistor forming the divider to make DC biassing easier, but ignore that for now and the gain becomes (680 + 220) / 220 = 4.1 times. The feedback also stabilises the DC bias conditions.

A voltage gain of four times may not sound much, but the input resistance is quite high as the first stage is, roughly, an emitter follower with a high(ish) emitter load. The output from the emitter of the second stage is capable of driving a low resistance load so there is considerable overall current gain. Hence power gain can be quite high. 20dB is quite feasible.

This amplifier design is particularly useful where a high impedance generator needs to be buffered and amplified to drive a 50Ω output. For example a DDS frequency source that needs to operate at frequencies too low for transformer operation. An absolutely flat gain from near DC to many MHz is possible.

If the capacitor in series with the 220Ω is removed and replaced with a short circuit, the amplifier will even operate down to real DC – this is how it was used in the Hi-Fi audio world. But you do now need to be very careful about DC bias stabilisation and take care to get it right. For RF, it's best to use capacitors to separate the DC conditions from the AC ones.

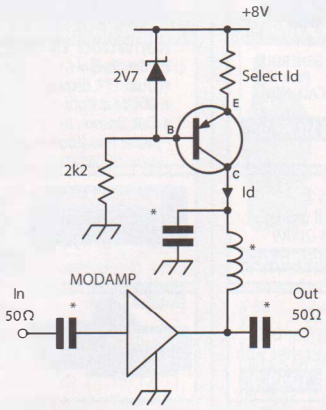


FIGURE 1: Constant current biassing a modamp to preserve gain over varying supply voltage.

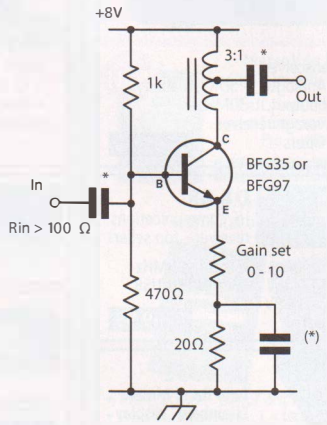


FIGURE 2: Conventional broadband common emitter amplifier with transformer output and emitter generative feedback.

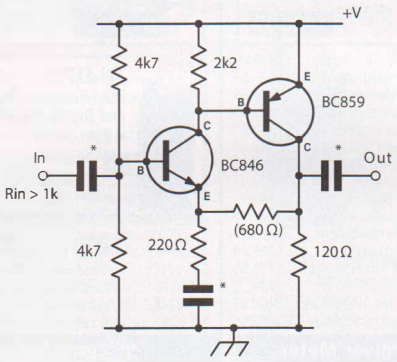


FIGURE 3: Feedback gain controlled amplifier with high input and low output impedance.

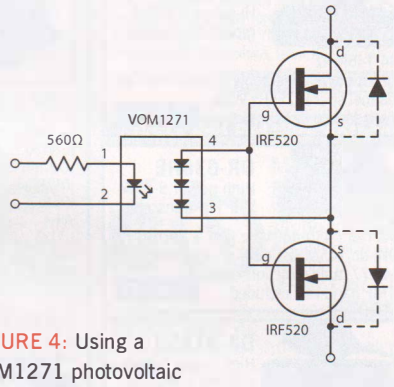


FIGURE 4: Using a VOM1271 photovoltaic isolator to switch two MOSFETS used as an AC switch. The MOSFETs' internal parasitic diodes complete the circuit for opposite half cycles but external diodes may also be added, as shown dotted.

## Photovoltaic isolators

After several years of faultless operation my digital rotator controller [2] suddenly died. I discovered that I had connected the switching TRIACs incorrectly – having swapped over the gate and MT1 terminals. That it worked at all is impressive and shows just how robust TRIAC devices can be (even if they do ultimately fail). Replacing with correctly connected ones restored proper operation, but looking at that design again made me wonder if power MOSETs might do a better job of switching low voltage AC than TRIACs offer. TRIACs always have a diode drop's worth of voltage across them, which becomes significant when controlling low voltages. They are also not very nice to control, needing low voltage high current drive and they are susceptible to spurious triggering from sharp edges and transients.

MOSFETs have a low on-resistance that can offer a lower voltage drop than that of a TRIAC. They are DC devices but two used as opposing switches work at AC. There is a parasitic diode in inverse parallel across the drain-source terminals so two FETs in inverse-series allow this diode to conduct in the device that is currently the wrong-way-round for that half-cycle. An external diode can be added to reinforce the internal one and for low voltage high current operation, the low drop of a Schottky diode can be beneficial in this position. Controlling the FETs is a problem as each of the series connected devices needs a positive voltage on its gate with respect to the source to turn it on. The gates can be paralleled as a negative voltage on the unused one is permissible, but as the devices are switching AC waveforms, this DC has to be supplied 'floating'.

There just happens to be a suitable driver for this situation: the photovoltaic isolator. Internally this consists of an LED driving a chain of photodiodes. When current is passed though the LED, the photodiodes generate several volts of DC at a few microamps. This may not be much power, but is more than enough to switch on a MOSFET in less than a millisecond, so a pair of MOSFETs can now switch an AC signal. **Figure 4** shows the connections. The optional diodes for enhancing the FETs' own parasitic ones are shown dotted. The FETs shown are suitable for AC supplies up to at least 24V. The VOM1271 device, available from Farnell [3], is specified for 10mA LED drive, which gives an open circuit voltage of 8.4V and a 15μA short circuit current. It offers 4.5kV isolation. With 2000pF MOSFET gate capacitance and a 3V threshold it will switch a MOSFET in less than 1ms. Integrated turn off circuitry inside the VOM1271 clamps the output to 0V when LED drive stops, to discharge the gate capacitance and ensure rapid turn off.

**References**

[1] MiniCircuits Modamp – www.MiniCircuits.com/products/Amplifiers_what_is_new.shtml

[2] Digital Rotator Controller – *RadCom* Short Circuits, Jan 2009. Details can also be found at http://www.g4jnt.com/RotatorController.zip

[3] www.farnell.com – search for VOM1271

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HF communications receiver - top seller!
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- Modes: AM/FM/LW /MW/CW/LSB/USB
- Power 11.7 - 15.8V DC (not supplied)

**£469.95**

**DR-735E**
Twin Band Mobile "Rainbow" display
Full featured VHF/UHF transceiver
- Extended RX 108-174MHz, 400-479MHz
- Power 50/20/5w output
- Computer programmable

**£299.95**

**DR-138HE**
Hi-power VHF/FM mobile transceiver
- 144-146MHz
- Output power selectable: 60W/25W/10W
- Channel space: 25kHz Wide 20kHz Middle 12.5kHz Narrow

**£169.95**

**DR-638HE**
High power 5-85W VHF FM transceiver
- 144-146 / 430-440MHz (2m + 70cms)
- 50W on 145MHz / 40W on 433MHz
- EMS-77 multi-function DTMF hand mic included

**£249.95**

**DR-B185H**
High power 5-85W VHF FM transceiver
- Frequency coverage: 136-174MHz
- CTCSS, DCS encode/decode, DTMF
- Channel steps: 5, 8.33, 10, 12.5, 15, 20, 25, 30, 50kHz

**£169.95**

**DR-135UK**
28MHz (10m) all mode mobile transceiver
- Frequency range: 28.000 - 29.700MHz
- 1-12W FM/FM/CW 0-25 Watts USB/LSB
- AM/CW/FM/LSB/USB

**£159.95**

**DJ-MD40 NEW!**
DMR Digital/FM Analogue Handheld Transceiver
- UHF: 400-480MHz

**£179.95**

**DJ-A10**
Tough, Rugged Mil Spec VHF Handheld plus FM radio receiver

**£89.95**

**DJ-500**
VHF/UHF handy + Li-Ion battery
Built-in vox & FM radio coverage

**£99.95**

**DJ-G7E**
Triple Band Handheld 2m,70cms, 23cms Full Duplex
Fully featured

**£299.95**

**DM-330MW MkII**
Lightweight deluxe 25-30A switch mode power supply
- Extra filtering

**£129.95**

DM-330FXE ..9-15V 30A power supply .....£119.95

## ICOM

IN STOCK!

**IC-7300**
100W HF+6m+4m
- RF direct sampling
- Touch screen control
- Great reviews!

GENEROUS Part X CALL NOW!

**£1099.95**

**IC-7851**
HF/6m all modes Output:5-200W

GENEROUS Part X CALL NOW! **£8999.95**

**IC-7410**
100W HF/6m DSP base transceiver with ATU

**£1449.95**

**IC-7600**
popular HF/50MHz TX with great display

SPECIAL OFFER ~~£3387~~ £2399

**IC-7100**
Touch screen all band HF/VHF/UHF with 4m (70MHz)

**£999.95**

| | | |
|---|---|---|
| IC-7600 | HF+6m twin DSP base transceiver | £2399.00 |
| IC718 | 100w 160-10m base/portable | £589.95 |
| IC-7200 | HF+6m rugged style transceiver | £829.95 |
| IC-9100 | HF+VHF+UHF transceiver | £2699.00 |
| IC-2730E | 145/433MHz large screen | £269.95 |
| ID51 EPlus | Dual Band Handheld D-Star | £299.00 |
| ID5100E | Standard version Dual Band D-Star | £499.95 |
| AH-4 | Automatic antenna tuner 120W | £333.95 |
| UT123 | Digital/GPS unit E2820 etc | £249.95 |
| SM50 | Top of the range desktop microphone | £249.95 |
| SM30 | New compact style microphone | £119.95 |
| SP23 | Deluxe extension speaker | £249.00 |
| SP33 | New style speaker "sounds great" | £129.95 |
| SP34 | Filtered speaker 7800/7700 etc | £239.95 |
| IC-R6 | 1300 ch H/H scanner 1-1300MHz | £179.95 |
| HM151 | Multi-function hand microphone | £49.95 |

### COMET Power Meters

**CMX-200 SWR Meter**
- Cross needle/AVG/PEP
- Frequency range: 1-200MHz
- Power: 3/300/3kW

**£79.95**

CMX-400 ....140-525 MHz 200W ..... £89.95
CMX-2300T..Two in one unit HF, VHF, UHF ...£179.95

### DAIWA Products

**CN-801HP**
Top of the range meter
- 1.8-200MHz
- 20/200/2kW

~~£129.95~~ **£109.95**

| | | |
|---|---|---|
| CN101L | 1.8-150MHz | ~~£99.99~~ £74.99 |
| CN801-SII | 900-2500MHz 200mW/2/20W N type | £199 |
| CN801VN | SWR/PWR 140-525MHz..N Type | £119.95 |

**CS201A** 2 Way Antenna Switch, SO239 Type..... £24.95

CS201G11...2 Way Ant Switch N Type..... £29.95

### LDG

**Z11-Pro2**
(160-6m) 125W **£167.95**

| | | |
|---|---|---|
| AL-100 | NEW Auto Tuner for Alinco | £139.95 |
| AT100 Pro II | (160-6m) 125W | £209.95 |
| AT897 Plus | for Yaesu FT897 | £187.95 |
| YT1200 | for FT450/FTDX1200 | £209.95 |
| IT100 | for Icom Models 125W | £155.00 |
| RC/RT100 Kit | 100W remote w/proof auto ATU | £209.95 |
| YT 100 | Yaesu Models 125W | £186.95 |
| Z817 | QRP for FT817 160 - 6m | £124.95 |

**DM-30E**
20A(30APeak) switch mode power supply
- Adjustable 9-15 volts
- Accurate Digital Volt/Amp meter
- Noise offset circuit

**£89.95**

## KENWOOD

**Kenwood TS-990S**
HF/6m Radio
- Dual TFT display
- 200W output
- Our Demo - just a few hours use!

ONE ONLY DEMO MODEL Generous Part X 2 Year Warranty

**£4795.00**

**TS-590SGE**
100W HF/6m all mode transceiver

now **£1159.95**

**TS-480SAT**
100W mobile/base HF/6m, ATU/DSP

**£659.95**

**TS-2000E**
HF/50/144/430 MHz transceiver

**£1279.00**

**TMD710GE**
Twinband VHF/UHF APRS/TNC/GPS

**£479.95**

**TH-D74E**
Dual Band Handheld with APRS and Digital (D-STAR) capability
- Built in GPS
- Wide band receive HF, VHF, UHF
- IF filtering / DSP

**£599**

| | | |
|---|---|---|
| TS-2000X | Allbander classic includes 23cms | £1469.00 |
| TS480HXE | 200W DSP mobile/base HF/6m | £719.95 |
| TM-V71E | Twinband 145/433MHz with APRS | £299.95 |
| TH-D72E | VHF/UHF handheld GPS/TNC/APRS | £399.95 |
| TM-281E | High power 2m 145MHz mobile | £169.95 |
| MC60A | Classic style desktop microphone | £122.95 |

### spiderbeam

**Antennas, Telescopic Poles, Aluminium Masts**

**UL-404L Ultra-lite Dxpedition antenna**
Dipole covers: 40, 20, 17, 15, 12, 10.6m ..... £99.95

**Fibreglass Telescopic Poles**

| | |
|---|---|
| 12mtr Heavy Duty | £89.95 |
| 18mtr Standard | £199.95 |
| 22m 'Long John' NEW | £399.95 |
| 26mtr Standard | £499.95 |
| Base Plate for Fibreglass Poles | £28.95 |

**Aluminium Telescopic masts**

| | |
|---|---|
| 10.metre Standard | £279.95 |
| 10 metre Heavy Duty | £299.95 |
| 12.5 metre | £319.95 |
| 14.5 metre Heavy Duty | £399.95 |

### MFJ

**MFJ-1835**
NEW 5 Band Cobweb Antenna

**£209.95**

| | | |
|---|---|---|
| 225 | 1-180MHz graphic analyser | ~~£299.95~~ £269 |
| 226 | Graphic analyser (1-230) MHz | £359.95 |
| 259C | HF/VHF portable antenna analyser | £279.00 |
| 266 | New style HF/VHF/UHF analyser | £349.95 |
| 269C | HF/VHF Digital Analyser | £369.95 |
| 550 | Popular Morse code practice key | £19.95 |
| 557 | Morse code key with oscillator | £46.95 |
| 901B | Versa Tuner 200W HF | £119.95 |
| 912 | Remote 4:1 balun box | £84.95 |
| 931 | Artificial ground unit | £114.95 |
| 934 | 300W Tuner + artificial ground | £209.95 |
| 941E | 300 Watts max Versa Tuner II | £149.95 |
| 945E | 1.8-60MHz 300W manual tuner | £139.95 |
| 948 | 300W PEP reading antenna tuner | £159.95 |
| 949E | 300W tuner + Dummy load | £189.95 |
| 959C | Receive antenna tuner + pre-amp | £145.95 |
| 969 | 300W tuner 160-6m | £229.95 |
| 971 | Portable Ant. tuner 1.8-30MHz | £122.95 |
| 986 | 1.5kW HF tuner | £369.95 |
| 989D | 1.5kW HF tuner | £399.95 |
| 998 | 1.5kW Auto Tuner 1.8-30MHz | £719.95 |
| 998RT | 1.5kW remote Auto ATU | £779.95 |
| 1025 | Noise canceller/signal enhancer | £209.95 |
| 1026 | QRM eliminator + active antenna | £214.95 |
| 1701 | 6 Way coax switch 2kW (SO239) | £89.95 |
| 1704 (P) | 4 way coax switch 2.5kW (SO239) | £84.95 |
| 1704 (N) | 4 way coax switch 2.5kW (N type) | £95.00 |
| 4416B | Super battery booster | £174.95 |

## YAESU

NEW

**FT-891**
HF/6m mobile/base transceiver
- 3kHz roofing filter fitted
- All mode operation
- Large DOT Matrix display

**£689.95**

FC-50 .....NEW! Matching HF/6m autotuner .. £249.95

**FTDX3000D**
100W HF/6m all mode transceiver

**£170 CASHBACK from Yaesu UK**

**FTDX1200**
100W HF/6m all mode transceiver

**£85 CASHBACK from YAESU UK**

**FTM-400XDE**
VHF/UHF digital mobile, 5/25/50W output

**£459.95**

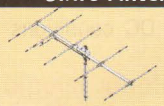
NEW

**FT-991A**
HF/VHF/UHF with touch screen!
UPGRADED FIRMWARE

FREE UK MAINLAND DELIVERY **£1279.95**

| | | |
|---|---|---|
| FT857D | Multiband HF/VHF/UHF mobile | £629.95 |
| FT817ND | All mode multiband portable | £459.95 |
| FT450D | 100W all mode HF/6m+ATU | £499.99 |
| FT7900E | Twinband 145/433MHz mobile | £199.95 |
| FT2900 | Powerful 75W 145MHz mobile | £129.95 |
| FT1DE | Ipx5 digital handy | £215.95 |
| FT2DE | FREE SNAPSHOT MIC | £329.95 |
| FTM400XDE | FREE SNAPSHOT MIC | £459.95 |
| FTM100DE | New C4FM 50W Dual Band Mobile | £289.99 |
| VX6E | Submersible 145/433MHz handy | £159.95 |
| G2800DXC | Extra heavy duty rotator | £799.95 |
| G1000DXC | Varispeed heavy duty rotator | £479.95 |
| G450C | Rotator + 25m cable kit | £399.95 |
| 40m-WP | 40m rotator cable w/plugs | £114.95 |
| 25m-WP | 25m rotator cable w/plugs | £65.95 |
| GS-065 | Medium stay bearing | £55.95 |

### SIRIO Antennas



**SY50-5**
5 element 50MHz 10.5 dBi

**£129.95**

**HF/VHF/UHF Beams**

| | | |
|---|---|---|
| SY50-3 | 3 el 50MHz 8.5dBi | £99.95 |
| SY68-3 | 3 el 70MHz 7dB | £69.95 |
| SY27-3 | 3 el (26-28)MHz 10.65 dBi | £84.95 |
| SY27-4 | 3 el (26-28)MHz 13.15 dBi | £99.95 |
| SY-400 | 6 el 70cms (wide band) 11.0 dBi | £79.95 |
| WY-140 | 3 el 144MHz (wide band) 10.5 dBi | £89.95 |

**Base Antennas**

| | | |
|---|---|---|
| CX4-68 | 70MHz 4.15 dBi (wideband) | £69.95 |
| SA-270SN | Dual Band 3.15/4.15 dBi 1.325m | £59.95 |
| SA-270LN | Dual Band 5.35/7.95 dBi 2.79m | £99.95 |

**Mobiles**

| | | |
|---|---|---|
| HP2070 | Dual Band 0.445m | £29.95 |
| HP-2070R | Dual Band 1.00m | £34.95 |
| HP-2070H | Dual Band 1.08m | £36.95 |

### MASTRANT

Quality guy ropes and accessories Full range in stock

**P type** Ideal for general guying polyester braided rope with twisted cores

| | | |
|---|---|---|
| P2 | 2mm 100kg B/s | £14.95 |
| P3 | 3mm 200kg B/s | £21.95 |
| P4 | 4mm 400kg B/s | £29.95 |
| P5 | 5mm 500kg B/s | £46.95 |
| P6 | 6mm 850kg B/s | £79.95 |
| P8 | 8mm 1,300kg B/s | £89.95 |

**M type** Thinner higher performance with Dyneema (Kevlar style) centre core

| | | |
|---|---|---|
| M2 | 2mm 240kg B/s | £31.95 |
| M3 | 3mm 100m 390kg | £49.95 |
| M4 | 4mm 900kg B/s | £119.95 |
| M5 | 5mm 1150kg B/s | £189.95 |
| M6 | 6mm 1850kg B/s | £237.95 |
| M8 | 8mm 2600kg B/s | £336.95 |

**Guy Rope** 31m (100ft) drums

| | | |
|---|---|---|
| M2 | 2mm 240kg B/s | £10.00 |
| M3 | 3mm 100m 390kg | £17.00 |
| P4 | 4mm 400kg B/s | £9.95 |

Full range of Pulleys, clamps and fittings in stock

**See our web site for full details**

**MUCH MORE ON OUR WEBSITE 24/7.....SHOWROOM OPENING HOURS: MON - FRI 9AM - 5:30PM CLOSED SATURDAY**

OPEN: Mon to Fri 9.00am - 5.30pm
Unit 1 Fitzherbert Spur Farlington
Portsmouth Hampshire PO6 1TT

# 023 9231 3090

This month I am pleased to introduce two new items from Alinco Japan. A new DMR Digital handheld transceiver the **DJ-MD40** and a quality lightweight 25 Amp power supply the **DM-30**. From MetroVna we have a new Deluxe version of their popular Network Antenna analyser that covers up to 250MHz. I am always looking for new products so if you see something interesting, let me know, it could be worth your while!

**Mike Devereux - G3SED**
Managing Director

# nevada®

## BEST PRICES - EXPERT ADVICE - FAST DELIVERY

### PALSTAR

**HF-Auto** 1.5kW fully auto antenna tuner

Covers 6-160m
Output power: 2-1800W
Display: 4 line large print
**£1499.95**

**AT-2K** 2kW manual antenna tuner

Covers 6-160m
Output: 2000W PEP
Metering: Active cross needle
**£599.95**

**AT-500** 600W manual antenna tuner

Covers 6-160m
Output: 600W PEP
Built in 4:1 balun
**£479.95**

**AT-5K-HP** ..3.5kW manual tuner .....£969.95
**AT-5K** .....3.5kW manual tuner .....£1249.95
**AT-4K** .....2.5kW manual tuner .....£1025.00
**AT-2KD** .....2kW Differential manual tuner ..£599.95
**DL-1500** ...1500W high power dummy load..£199.95
**BK4 C/1:1** ..4kW 1:1 ratio current balun .....£84.95
**BK4C/4:1** ..4kW 4:1 ratio current balun .....£84.95

### nevada® Power supplies

**Quality power supplies with a 2 YEAR WARRANTY!**


**PS-40M** Linear
- 40A (max) with meter
- Voltage: 1.5-15V DC
- Cigar adaptor output

**£129.95**


**PS-30M** Linear
- 30A (max) with meter
- Voltage: 3.0-15V DC
- Cigar adaptor output

**£99.95**


**PS-08** Linear
- 8A (max) with meter
- Voltage: 13.8V DC
- Cigar adaptor output

**£34.95**


**PSW-50** Switch Mode
- 50A (max) with meter
- Voltage: 9.0-15V DC
- Cigar adaptor output

**£129.95**


**PSW-30** Switch Mode
- 30A (max) with meter
- Voltage: 9.0-15V DC
- Cigar adaptor output

**£79.95**


**PSW-30H** Switch Mode
- 30A (max) with meter
- Voltage: 9.0-15V DC
- Cigar adaptor output

**£69.95**


**PS23-SW1** Switch Mode
- 23A (max)
- Voltage: 13.8V DC
- Lightweight: 1.6kg

**£59.95**


**PSW-07** Switch Mode
- Current: 7A (max)
- Voltage: 13.8V DC

**£29.95**


**PSW-04** Switch Mode
- Current: 5A (max)
- Voltage: 13.8V DC

**£24.95**

### PRO-ANTENNAS – British Made!


**Dual Beam Pro**
Covers: 20, 17, 15, 12, 11, 10 plus 6m (with a suitable ATU)
- Power: 1kW (600W 30/40m)
- Turning radius: 2.5m
- Overall span of main element: 5.0m
- Overall span of end elements: 2.5m
- Support Mast required 1.5" to 2" Dia.
- Weight: (inc. bracket & matching unit): 4.0kg

**£249.99**


**I-Pro Home**
Very efficient Vertical covering: 20, 17 ,15, 12, 11, 10 plus 6m (with suitable ATU)
- Height: 5.0m
- Span of end elements: 2.5m
- Weight (inc matching unit): 4.5kg
- Power: 1kW PEP

**£259.99**

### AOR

**AOR AR-DV1**
NEW Analogue/Digital Voice Receiver
Decodes virtually ALL popular digital modes: DMR, D-STAR, Yaesu Fusion & lots more
- 100kHz-1300MHz Wide band reception

4GB SD CARD included
**£1299.95**

### Digital Scanning Receivers


NEW
**WHISTLER TRX-1**
Adaptive digital trunking scanner
- Freq: 25-54, 108-136.99, 137-174, 216-512, 764-781.99, 791-798.99, 806-960, 1240-1300MHz

Receives:
- DMR
- Hytera XPT
- MotoTRBO. Capacity Plus
- MotoTRBO. Connect Plus
- MotoTRBO. Linked Cap Plus systems
- IF/discriminator output

- Plus lots more features!

**£419.95**


NEW
**WHISTLER TRX-2**
Base/mobile digital/analogue scanner MOTO/TRBO
**£479.95**

**WS-1088** .Digital/analogue h/held scanner .....£349.95
**WS1098** ...Desktop/mob digital/analogue scanner..£389.95

**See our website for more spec on these exciting new scanners**

### Soldering Irons


NEW
**690D**
**Digital 50W solder station**
**£179.99**

**TCS**
50W digital iron - with temperature control
**£69.99**

**760RWK**.....Complete temp control station ... £249.95
**XS25/S** .....25W w/ burn proof silicone cable..£29.95
**XS25**.....25W with PVC mains cable .....£24.95
**Gascat 75P**..75W gas powered.....£39.99

### Headphones


**Kenwood HS5**
Communications Headphones
**£59.95**


**Yaesu STA77**
Stereo Headphones
**£69.95**

**Kenwood HS6** .....lightweight style.....£35.95

### MIDLAND Amateur Radio


**CT-890**
Dual Band Handheld with colour screen
- UHF-VHF/UHF-UHF/VHF-VHF
- 88-108MHz FM receiver
- Vox function
- Full Duplex
- 999 memories
- 2,600 mAh Li-ion battery

~~£129.95~~ **now £99.95**

**CT-410** .....UHF Handheld.....~~£79.95~~ £59.95

**Base Antennas - Fibreglass**
**X-50** .....Dual Band 200W 1.7m.....£69.95
**X-30** .....Dual Band 150W 1.3m.....£59.95
**F22**.....144MHz 200W 3.2m hi-gain....£89.95

**Mobile Antennas**
**NW-2000** .Dual Band 98 cm fold over .....£39.95
**NR-770S** ..Dual Band 43cm 100W.....£24.95
**NR-770R** ..Dual Band 98cm 200W.....£29.95
**AZ-504**.....Dual Band 46cm 50W.....£26.95
**M-285**.....144MHz 5/8 whip 50W.....£24.95

**SWR Meters**

**KW-520**
(1.8-200), (140-525)MHz
**£84.95**

**KW-505** ...(15-150)MHz 100W .....£22.95

### NEW! TYT - UHF DMR Radio!


**MD380**
- 70cm UHF band
- 1W or 5W output
- 1,700 mAh Li-ion battery
- Large colour display
- Easy to programme
- Includes FREE lead and software

~~£149.95~~ **£129.95**

**NEW! TYT DM-390**
As above but now waterproof and includes
- Software/Lead
- Earphone/Mic
- Mains drop in charger

**£139.95**

### COMET

**HF Antennas**
CWA1000 ...5 band trapped dipole 19.9m long..£124.95
CHA250BX..Wide band vertical (80-6mtrs).....£349.00

**VHF/UHF Antennas**
GP1-M .....145/433MHz length 1.25m .....£59.95
GP3-M .....145/433MHz length 1.78m .....£69.95
GP6-M .....145/433MHz length 3.07m .....£99.95
GP9-M .....145/433MHz length 5.15m .....£149.95
GP15N.....50/145/433MHz length 2.42m .....£119.95
GP93N.....145/433MHz+23cms length 1.78m...£99.95
GP98 .....145/433/1200MHz length 2.94m ..£119.95

**50MHz Antennas**
CA52HB.....2 element Yagi.....£79.95
CA52-HB4...4 element Yagi.....£129.95

**Quad Band Mobile for FT-8900**
UHV-4.....Mobile whip 4-Bands 10/6/2/70cms .£69.95

**Antenna Tuners**
CAT-10.....10W 3.5-50MHz Manual Tuner.....£99.00
CAT-300.....300W 1.8-60MHz Cross Needle.....£199.95

**Accessories**
CBL-2500....Balun 2.5kW (CW) 1.8-56MHz .....£44.95
CBL-1000....Balun 1kW (CW) 1.7-30MHz .....£39.95
CF-30MR ....Low Pass Filter 1.8-30MHz 1kW CW.£59.95
CF-360A .....Duplexer 1.3-30/49-470MHz .....£49.95
CF-41608....Duplexer 1.3-170/350-540MHz .....£39.95
CF-416 A .....Duplexer 1.3-170/350-540MHz .....£39.95
CF-530.....Duplexer 1.3-90/125-174MHz .....£49.95

**LOTS MORE on our WEBSITE!**

### ANYTONE AT-588

70MHz (4m) 50W FM Transceiver

- Covers: 66-88MHz
- Memories: 200
- DTMF Microphone
- CTCSS/DCS/DTMF/ 2 Tone / 5 Tone
- Compander function

**£129.95**

### Network Antenna Analysers

NEW

**MetroVna DELUXE**
with Bluetooth connectivity
- Covers up to 250 MHz
- Same specifications as Pro model below

FREE DELIVERY **£299.95**

**MetroVna Pro model**
with Bluetooth connectivity

Phone not included
- Touch Screen - colour display
- Frequency coverage: 1 - 180 MHz
- Measures: SWR, R, Z, X, phase, filters, Return Loss, Transmission Loss (display as single or simultaneously)
- Link via Bluetooth or USB to your Smartphone, Android, Tablet or computer
- Portable - uses 5,000 mAh Li-Ion Rechargeable batteries
- Fast - refreshes in less than 0.1 sec.
- Export data in easy formats, jpg, csv, pdf, Zplot
- Compatible IG/VNA, VNA/J, BluVNA & more
- Compatible OS: Windows, Linux, Android, MAC OSX

FREE DELIVERY **£269.95**

### 1kW - End Fed Wire Antennas


**MyAnt EFW 80-10**
Resonant on 80/40/30/20/17/15/10m
NO ANTENNA TUNER REQUIRED!
Length: 130ft
**£159.95**

**MyAnt EFW 40-10**
Resonant on 40/20/15/10 + WARC with tuner
Length: 63ft
**£149.95**

### Cables and Wire

**Ecoflex 15**
per metre.....£5.99 price per 102m drum .....£539
PL259 connector (Part: 7350).....£8.95
N type connector (Part: 7395) .....£9.95

**Ecoflex 10**
per metre.....£2.89 price per 102m drum .....£289
PL259 connector (part: 7378).....£5.95
N type connector (part: 7367).....£6.50
BNC type connector (part: 7379) .....£6.50

**Aircell 7**
per metre.....£1.99 price per 102m drum .....£179
PL259 connector (part: 7390).....£2.65
N type connector (part: 7392) .....£5.25
BNC type connector (part: 7391).....£5.25

**Aircell 5**
per metre.....£1.39 price per 102m drum .....£125
PL259 connector (part: 7760).....£2.25
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# Replacement display for the FT-290R

**The Yaesu FT-290R 144MHz portable transceiver was released over 30 years ago, yet still remains popular, particularly for microwave portable operation.**

However, the transceiver (and its 50MHz and 432MHz counterparts the FT-690 and FT-790) can suffer from three age-related faults: the electrolytic capacitors dry out, the printed circuit board becomes conductive in humid atmospheres and the display is gradually obscured by a darkening phenomenon. These faults have been discussed on The Electric Handbag FT-290R Group on Yahoo [1], which is a very useful resource. My particular problem was that the display on my FT-290R was so badly obscured that I could not tell what frequency it was on.

I found some information about a replacement display that had been designed by ZS1KE [2] but could not find a small enough LCD to replace the existing unit. However, ZS1KE's article described the data format used to pass data to the display, so initially I decided to try to build an interface to an external LED display using a PIC. Later, I found an LED display small enough to fit inside the FT-290R and this is described here. As I no longer use the internal battery pack and have removed the battery holder, I was able to fit the PIC and driver electronics inside the battery compartment.

## Software

The PIC code is written in assembler and simply listens for the data to be output by the FT-290R microcontroller before displaying each digit in turn on the display, then listening for the data again. After the CE line goes high the data is output from the microcontroller in twelve 4-bit nibbles (on R40 – R43), which are read on the falling edge of the STD pulses. These nibbles are intended to be put together into six 8-bit words. The first word describes the '100s of Hz', the second the kHz and so on up to the fifth, which describes the MHz. The 10s and 100s of MHz are not output by the microcontroller as they are not intended to be displayed. The sixth word indicates clarifier, memory and/or function selection.

The PIC software uses a look-up table based on the four lower bits of the 8-bit words to look up the 7-segment display segments that need illuminating. As 7 digits were available on my chosen display I decided to show the 10s and 100s of MHz as well, except when clarifier, memory or function were selected. In these cases, a separate look-up table was used to display custom symbols instead of the 100s of MHz.

## Hardware

My PIC of choice is the Microchip PIC16F883, which has up to 24 input/output pins, can be configured to use a 4MHz internal oscillator and is available in a 28 pin DIP package. I mounted the PIC in a socket on strip board with solder pins to connect the display and the data input. I also fitted a header to allow in-circuit programming of the PIC. Apart from the current limiting resistors, the only other components were 7 NPN transistors used to turn on each digit in turn, as the combined current would otherwise exceed the direct sink capability of the PIC. The type of NPN transistor is not critical, but they need to switch up to 100mA with a gain of 50; I used 2N2369s from my junk box, but would recommend the 2N3704 or 2N3904 for new purchases. Although there were a number of options for powering the display from the FT-290R power supply I decided that, rather than introduce noise and possible overload, I would use a 7805 regulator supplied directly from the switched 12 volt supply provided for the panel light in the transceiver.

The circuit diagram is in **Figure 1** with the pin numbering and connections marked.

I found that Kevin Avery of G3AAF Electronics [3] stocked a 7-digit common-cathode LED display that, with some modification, would replace the existing LCD display. It is marked with part number 24R01 and is available by mail order.

## Construction and testing

No special precautions are required for constructing the main board with the voltage regulator, PIC and driver transistors. I used stripboard. Ribbon cables are used to connect this board to the FT-290R Key Board Unit and the new display,

I initially built the driver board and display outside the FT-290R, testing as much as possible before putting the PIC in its socket and making connections to the transceiver. I then connected the PIC board to the FT-290R Key Board Unit connector using a

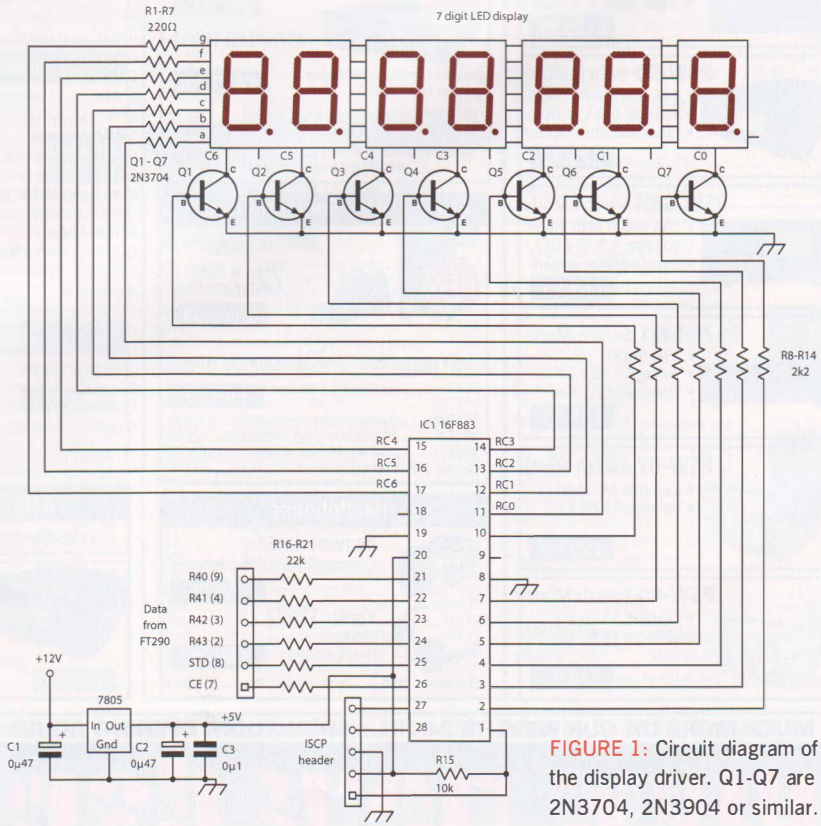


FIGURE 1: Circuit diagram of the display driver. Q1-Q7 are 2N3704, 2N3904 or similar.

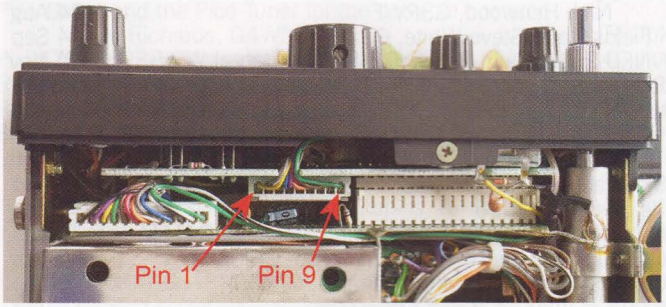


PHOTO 1: Pin number identification on the FT-290R Display Unit.

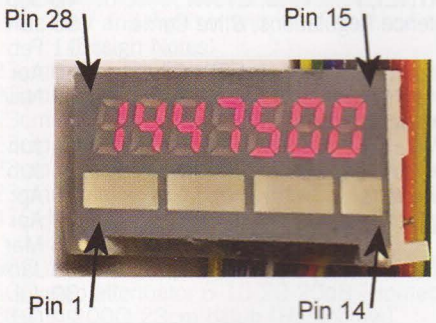


PHOTO 2: LED pin number identification.

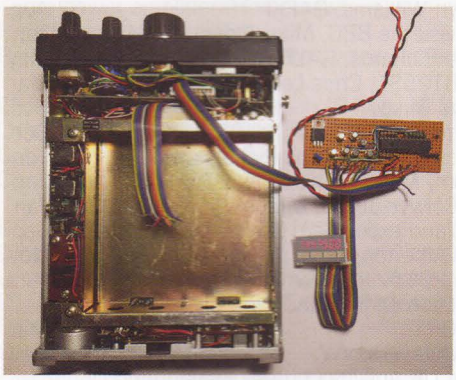

PHOTO 3: Testing the prototype board before final integration. The loose ribbon cable connects to the display buried within the front panel; a test display is temporarily connected here.

ribbon cable and a nine-pin header with the pins slightly bent to fit into the back of the existing connector; see **Photo 1** and **Table 1**. Note that the pins are not in a logical order (details at [2]) and there is no ground connection on the connector. The LED display will not illuminate until the CE and STD pulses from the FT-290R are present. The LED display pinout is shown in **Photo 2** and **Table 2**.

## Fitting the display

All elements of the construction to this point have been relatively simple. However, fitting the display into the FT-290R is difficult and involves some risk of damage as the stack of boards behind the front panel on the FT-290R is tightly packed and interconnected. Some wires need to be unsoldered for disassembly and correctly reattached later. I suggest you take notes (and/or photos) as you progress, for reference on reassembly.

The first step is to dismantle the stack of boards behind the front panel and remove (and unplug) the old LCD PCB and its bezel. Cut some of the bottom of the inside frame of the plastic bezel away so that the new LED display will fit flush to the display window. You may wish to replace the display window with a red filter at this point. Using a piece of stripboard, make a replacement for the old LCD PCB that is the same size and arrange it so it will mount the new display centrally in the window. To make it all fit, cut off the bottom row of pins on the display (not used in our application) and the plastic feet on the back of the display. Solder a ribbon cable to the display pins on the stripboard.

If required, this is also a golden opportunity to replace the small bulb that illuminates the panel meter.

Solder a second ribbon cable to the relevant pins on the back of the display connector on the FT-290R Key Board Unit and take extra wires to ground and +12V. You can then reassemble the PCB stack, routing the ribbon cables to the battery compartment. **Photo 3** shows my prototype under test at this stage. Once the FT-290R has been reassembled, you can trim the ribbon cables to the correct length and solder them to the PIC board. After testing, attach the PIC board to the inside of the battery compartment, and use suitable insulation to prevent any future short circuits.


PHOTO 4: The completed modification looks smart.

## Design issues

The LED display is power-hungry; the FT-290R takes about 100mA on receive and this is increased by 40mA or so by the LED display. The additional consumption can be reduced at the expense of display brightness; or the display can be made brighter at the cost of increased consumption by reducing the LED drive resistors R1-R7.

Resistors have been included in the input data lines from the FT-290R to enable the display to be powered off without placing too much load on the microcontroller. Thus, if monitoring a single channel on battery power, the current consumption can be minimised by switching off the display.

The data updates from the FT-290R microcontroller are not exactly regular; the PIC code (display timing) has been optimised to reduce flicker on the display, but there is a very small amount of residual flicker. This could be eliminated by a more complex design.

The PIC code works best as designed in assembler as it is easy to design the timing for minimum display flicker. The source and assembled code (for programming into the PIC using a PICkit 3 programmer) is at [4].

## Conclusion

This modification can breathe some new life into FT-290R series transceivers, and just goes to prove that they aren't impenetrable black boxes.

**Websearch**

[1] https://groups.yahoo.com/neo/groups/electrichandbag/info
[2] www.retro.co.za/zs1ke/FT-290R/index.html
[3] kevin@avery03.fsnet.co.uk
[4] http://rsgb.org/main/publications-archives/radcom/supplementary-information/radcom-downloads/

**Dave Crump, G8GKQ**
dave.g8gkq@gmail.com

**TABLE 1: Pinout of the Display Unit connector (see also Photo 1).**

| Pin | Signal |
|---|---|
| 1 | Vdd (not used) |
| 2 | R43 |
| 3 | R42 |
| 4 | R41 |
| 5 | Vss (not used) |
| 6 | FC (not used) |
| 7 | CE |
| 8 | STD |
| 9 | R40 |

**TABLE 2: LED pin connections.**

| Pin | Signal |
|---|---|
| 1-14 | Not used |
| 15 | segment d |
| 16 | segment e |
| 17 | K6 |
| 18 | segment f |
| 19 | K5 |
| 20 | segment b |
| 21 | K4 |
| 22 | K3 |
| 23 | K2 |
| 24 | segment a |
| 25 | K1 |
| 26 | segment g |
| 27 | K0 |
| 28 | segment c |

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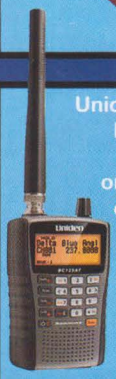

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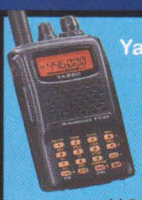

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# LF

**As we passed the autumnal equinox conditions really started to perk up. A few solar flares added to the mix to produce some excellent propagation conditions over the past couple of months.**

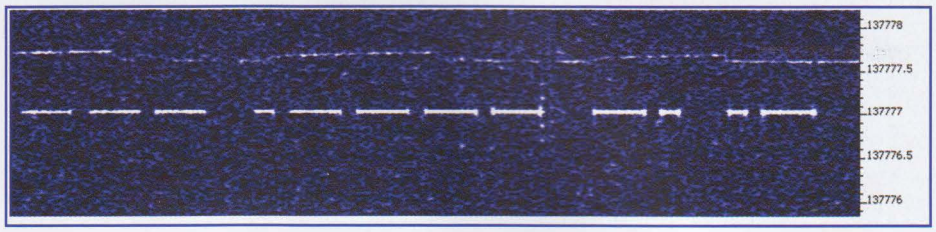
The first signs of life came at the beginning of September with DK7FC and PA3ABK both receiving trans-Atlantic reports on their 472kHz WSPR transmissions from WE2XGR in Portland, Maine. DK7FC's big signal also went almost 1000km further across to WA3TTS near Pittsburgh.

Then, in mid-September, just before the equinox, probably the longest distance 2-way amateur contact on 472kHz took place overnight between Roger, VK4YB and Steve, VE7SL. They used JT9 (the slow LF version of JT65) to cover the 11,802km distance. A week later they made the contact again with slightly improved signals. Just as they were finishing the QSO, Roger reported that Steve's signal strength had increased markedly over the last few minutes and asked if they could try CW. After some frantic re-plugging to get onto CW they continued for 45 minutes transmitting for one minute and then listening for the next, with Steve copying two of Roger's transmissions but Roger only receiving fragments from Steve. A two-way CW contact over that distance would really be something remarkable, and it looks as if it might be possible.

Great conditions on the night of 13 October enabled a couple of record-breaking WSPR spots to be made on 472kHz. Most impressive was JA3TVF's reception of DJ0ABR about half an hour before the sun rose in Japan. The distance, entirely over land, is 9166km. Kurt, DJ0ABR was using his MOSFET transmitter as detailed on his interesting website and a 450m circumference horizontal loop between 10 and 30m high. The loop is fed via a 1:4 balun and brought to resonance with a loading coil. You will find lots of information at www.dj0abr.de

On the same night, Japan and Australia shared the honours as JA1PKG was spotted by VK3ELV and vice versa. That one is over 8000km but with quite a lot of ocean in the path. VK3ELV was also received by JH1INM and 7L1RLL on the same night.

VO1NA's 137.777kHz QRSS transmissions also peaked in strength in early October with excellent reports from 2E0ILY, DF2JP, DF6NM, EW6BN, F1AFJ, RN3AGC, RN3AUS, SQ2BXI and SWL Hartmut Wolff.




Impressive signal from VO1NA as received by 2E0ILY.

## ULF developments

Stefan, DK7FC is still winding his loading coil for 2.97kHz in a bid to radiate a signal over more than a wavelength on this ultra-low frequency (101km). So far he has wound 4kg of 0.4mm wire in four multilayer piles on a large pipe. The layers within the piles are insulated from each other with Kapton tape. The job is hard because the coil must carry a reasonable current and withstand an extremely high voltage whilst having an inductance of about 5 Henries.

Even with that huge amount of wire recent tests showed the system was resonant at far too high a frequency of 3.537kHz. That may only be 567Hz HF, but the extra inductance required to pull it down will be over 1 Henry. He has ordered another couple of kg of wire.

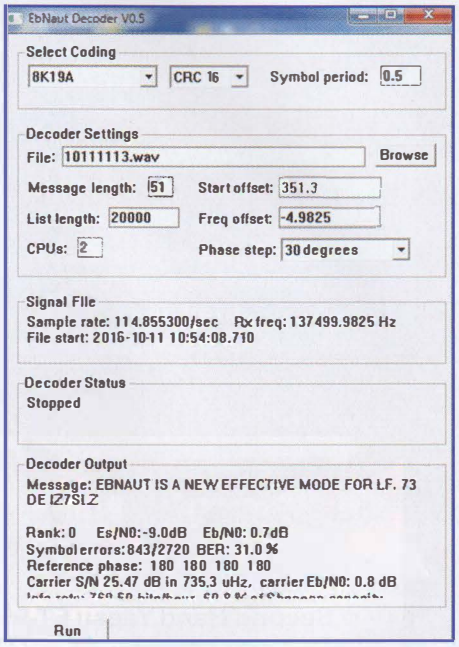
When this coil is finished, he hopes to be able to achieve an aerial current of over 250mA which will increase the ERP by about 13dB. With his present ERP of 250nW he has detected his own signal at a distance of 31.3km.

## EbNaut tests continue

Several 136kHz operators have been radiating EbNaut mode transmissions so that interested parties can test their receiving set ups. This is no easy task; stability must be extremely good at both ends of the link and the received signal has to be recorded and processed afterwards to find out if any message can be recovered.

Many others would like to join in but find the task a little daunting due to the fiddly process involved. Currently the easiest way to do it is to set up DL4YHF's *Spectrum Laboratory* in EbNaut receiver mode and record a wav file that you then process with Paul Nicholson's *ebnaut-rx* program. If your PC isn't very fast this process could take some time.

With all the activity going on there have been a few appeals for an easier way of using EbNaut that would allow less computer savvy users to join in. Maybe someone will soon come up with a 'plug and play' software package? The mode does appear to have a lot of potential and it should be worth the effort.




The end result of EbNaut tests looks like this one from Michel, F5WK when he decoded IZ7SLZ on 137.490kHz.

## LF history

I have been made aware of an interesting article by S.F. Brown who worked at the Criggion LF station near Welshpool for many years. It details the development of the site from its construction in 1940 until the final demolition of the masts in 2003. The LF station was set up as a back-up for GBR Rugby in case that was damaged by wartime enemy action, and there were also HF stations on the site. Good reading for a rainy afternoon, find it at https://goo.gl/L84xXu.

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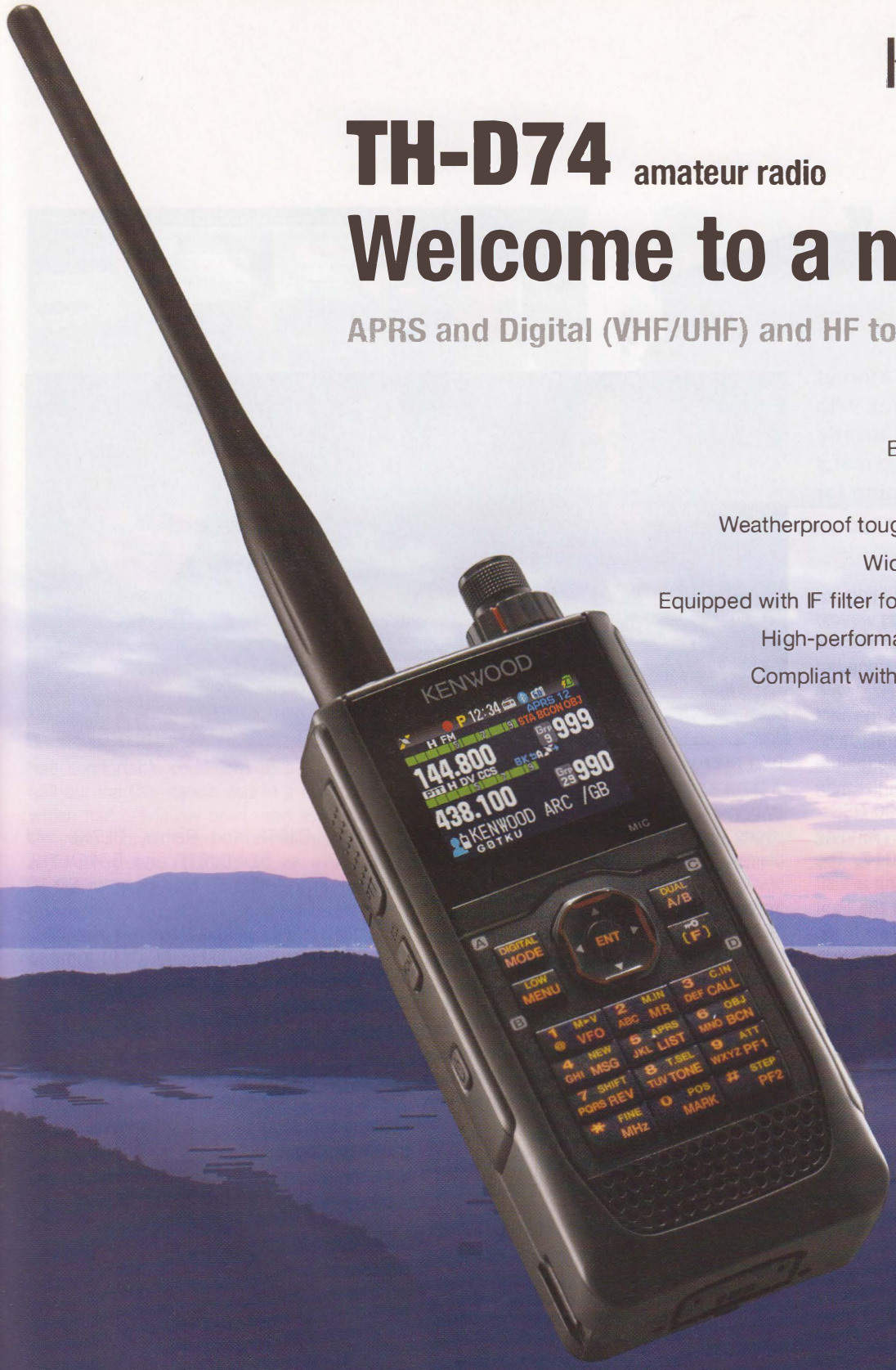


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# HF

**Conditions picked up around the middle of the month with the solar flux index briefly hitting 100 but there were too many days of geomagnetic storming for really good conditions.**


DXer NL8F with G3SWH in Dutch Harbor, Alaska.

The Solomon Islands/Temotu DXpedition put in some reasonable signals and was worked up to 21MHz from the UK. Polar signals from the T31T group were not as strong but they were worked on 10 and 14MHz – with 14MHz signals very good (on a 3 element Yagi) around 1800UTC on several days. Sadly an approaching typhoon meant the T31 group went QRT very much earlier than expected after making about 31,000 QSOs. The good news is that they are planning to go back for 4 weeks in mid-2017. The T31W team that was also planning a visit in 2017 has decided to cancel in the light of the recent and planned T31T activity. Towards the end of the month GM3WOJ and GM4YXI were putting in good signals on 20m from Micronesia as V6Z (especially long path in the morning) and they were heard a few times in the UK on 15m, but not when I was listening.

The CDXC September HF Challenge for working DXCC entities on 21-50MHz was won by Martin, MOBCT with a score of 174. Second place went to Lionel, G5LP with 151 and third place went to Roger, G3LDI with 146. Conditions are clearly on the slide as winning scores in previous years were: in 2015 178, in 2014 212, and in 2013 201. The ongoing annual CDXC Marathon for all bands is currently headed by Oms, PY5EG with 278 DXCCs. The highest UK scorer is Andy, MONKR with 267. Current scores for all the CDXC Challenges are displayed on Club Log and historic results can be found on the CDXC website at cdxc.org.uk.

Winter is when the lower bands come into their own so it is worth remembering that there will be DX around from at least an hour before sunset to an hour after sunrise. Conditions can be particularly good for UK stations just after sunrise on 80 and 40 as propagation to the rest of Europe gets shut down. Look for Caribbean, South America and Pacific stations at this time.

The RSGB DXpedition Fund has recently adjusted its terms of reference to allow assistance to expeditions to rare IOTAs as well as DXCCs. It also envisages assisting young operators to join expeditions to rare places. See http://rsgb.org/main/operating/hf-dxpedition-fund/ for more information. Recent grant recipients include the planned 2018 Bouvet trip, the planned 2017 Pitcairn trip and the 2016 Norfolk Island operation. There is an online form for grant applications.

There was a great deal of HF interest at the RSGB Convention in Milton Keynes last month and this is not the place to review it all – but I would like to draw readers attention to the QSL archive project on Club Log that was described by Marios, 5B4WN. The aim is to develop a huge database of QSL card images linked to QSOs already in Club Log. Step 1 is for Club Log users to scan their cards and upload them in a particular format. Step 2 (which is open to anyone) involves tagging the QSLs by entering the callsign of the sender and selecting the QSOs that are covered by the card. Taggers can now choose which cards to work on – possibly their own. Contact me by email for more information on scanning and uploading the card images. Go to https://secure.clublog.org/qslarchive if you can help with the tagging – it can be quite addictive.

## DX and DXpeditions

Monk Apollo, the only operator on Mount Athos, was hospitalised in late September but seems to be making a good recovery and may have been active on the bands while recuperating from surgery – though there were reports of pirate activity as well.

Maurizio, IK2GZU will be active again as 5H3MB from Tanzania until 2 December, while doing volunteer work.

Tom, DJ6TF and Reiner, DL7KL will be active as 5Z4/DJ6TF and 5Z4/DL7KL from Kenya on 16-30 November on 80-10 metres.

Willi, DJ7RJ will be active again as 3B8/DJ7RJ from Mauritius (AF-049) until 6 December on 160-10 metres with a focus on the low bands.

Neil, N5EIL and Bengt-Erik, K7ADD are planning to operate E51MAF from Manihiki Island (OC-014) in the January-February 2017 time frame. Further details onthe trip should appear at https://e51amf.amateurfoundation.org/

Pierre, HB9AMO will be active holiday style as FH/HB9AMO from Mayotte (AF-027) from 23 November to 4 December. He will operate CW and possibly RTTY on 80-10 metres.

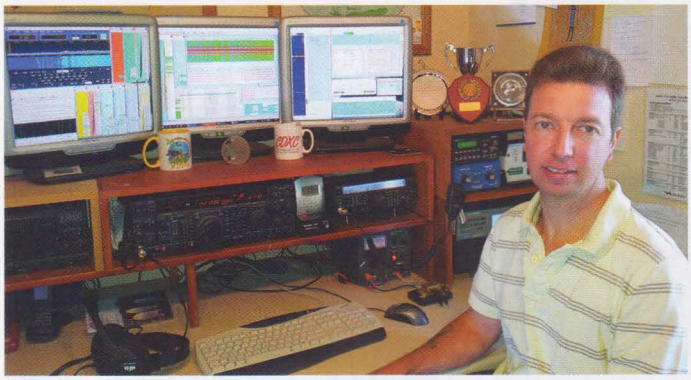
Chris, NOUK/G4JEC and Holly (YL), KOHAC will be back in St Maarten (NA-105) in late November for a week or so. Activity will be on CW and SSB on 7-28MHz. See www.chris.org/PJ7

JA1KJW, JA3MCA, JA8VA and JA1JQY will be operating from Tarawa (OC-017) as T30KJ, T30MA, T30VE and T30JY respectively until 16 November. Activity will be on SSB, CW and RTTY on 1.8-28MHz.

A Polish team will be QRV from the Maldives (AS-013) as 8Q7SP from 20 November to 3 December.

See www.8q7sp.dxing.pl

YL op JQ6FQI will be QRV as T88WM from Republic of Palau (OC-009) on 12-19 January. For low bands she will have dipoles for the low bands and Yagis for the HF bands. Other ops in the group will include T88SM, T88HS and T88UW.



MOBCT, winner of CDXC September HF Challenge.

The picnic table antenna at G4XEX.

## IOTA

An Indian team mounted the first activation of AS-176 during November using the call AT2SL. They were plagued with electricity supply problems and some of their beach mounted antennas came off poorly in collisions with fishing boats coming ashore. The SSB station had comfortable conditions in a community hall but the CW station was in a beach cave which had previously been used as a dump. Congratulations to them all for sticking at it and making over 5300 QSOs.

Rob, K2RWF and Craig, KD2INN plan to operate the club call W2LI for a National Parks activation from the Dry Tortugas (NA-079) from 13-14 November. Activity will be on SSB, PSK and JT65/9 on 80-6m.

Yan, RZ3FW and Sergei, R4WAA will be active as 5H1WW from Zanzibar (AF-032) in Tanzania on 19-28 November. They will operate 160-10m mainly CW, with a bit of SSB and RTTY.

## Correspondence

Ken, CT7AGZ found October was better than September and yielded two All Time New Ones (ATNOs) in the shape of V85TL and VP8LP.

**Table 1: 2016 Worked DXCC Entities (ranked by All). Showing Top 3 from RSGB Members table in Club Log plus submitted scores or Club Log scores of recent correspondents where available.**

| Call | CW | SSB | Data | All |
|---|---|---|---|---|
| M0NKR | 168 | 235 | 72 | 268 |
| G4PTJ | 211 | 137 | | 267 |
| G5LP | 257 | 77 | 196 | 262 |
| G1XOW | | 241 | | 241 |
| G4IDL | 202 | | 79 | 205 |
| GI4DOH | 197 | 32 | 79 | 203 |
| G3SVK | 203 | | | 203 |
| G0RPM | 130 | 57 | 135 | 199 |
| CT7AGZ | 195 | 2 | | 196 |
| G3HQT | 187 | | 71 | 187 |
| G4XEX | 102 | 117 | 101 | 167 |
| G3PXT | 68 | 97 | 138 | 152 |
| G4CCZ | 105 | 59 | 43 | 129 |

His most satisfying contact was with VK9NZ on 80m, using a simple inverted V dipole. He found: 10m – FM5FJ, FY5KE, LU4AT, 5U7RK, CX7CO, VP8LP, 9J2BO, ZS1ANF, S9YY, PJ4DX, CX6DRA, PY2OSD, HI3TEJ, CE2AWW, & ZB2TT; 12m - LU1CX, HK1MW, HH2AA, PY5XH, 3B9FR, NP2X, 5A1AL, 3B9FR, S9YY, FM5FJ, TL0A, ZB2TT; 15m - VP2MLB, S9YY, 7X3WPL, SU1CQN, KG4LA, 7P8EUDXF, ZD8W, T77C, TZ4AM, XT2AW; 17m - 3B8CF, VU2GSM, D44TUL, S9YY, VP9/AA1AC, 9G5AM, TL0A, A61Q; 20m - SU9VB, V85TL, HS3XVP, 7X3WPL, S9AA, CX9AU, TL0A; 30m - D66D, OH0B, T77C, S9YY, TR8CA, TL0A, XT2AW, 9G5AW; 40m - HZ1DG, S9YY; 80m - VK9NZ, 9G5AM.

Peter, G4XEX found it had been a very good month for DX even though his antenna is still just a few feet above a picnic table in the garden. He worked: 10m - ZS6WB, TR8CA, V5/DK1CE, 5A1AL; 12m – ZD7FT, HH2AA, S9YY; 15m – V53DX, 9V1YC, P49X, HK6NVV, V5/DK1CE, D66D, 3B9FR, ZS1ANF, HP3SS, S9YY; 17m – ZS6TVB, ZP6CW, TZ4AM, S79KB, HS3XVP, S9YY, JK3ZXK/5, ZF1DX; 20m – S9WL, VU2VID, ZS6TVB, EP2LMA, D66D, 5Z4FV, 5N/PA3TG, KG4SS, HK1T, 9N7FD.

Peter, G3HQT commented that the Pacific eluded him last month and he failed to hear some of the more exotic DX there. His report was quite brief: 5U7RK on 10, 9G5AM on 12, NH2DX on 15, ZD7BG on 17, 5N/PA3TG on 20, VP2MLB on 30, and S9YY on 40.

Fred, G3SVK, also found conditions very poor and his dipoles failed to pick up much DX at all. He found: 15m HB0AVL; 17m - A47RS; 20m – V5/DK1CE, FK8DD; 30m - V5/DK5CE, A61Q, VK7CW, HB0/DL5YL, OY1CT, OX3XR, JT1CO, 9M2/JE1SCJ; 40m - D66D, ZP6CW, OX3XR, TZ4AM, C31US, DU7ET, OH0B, 9J2BO, HC2AO, S9YY, 8P6BE.

Tom, G4IDL spent the month getting set up for RTTY and took part in the CQWW RTTY contest. On RTTY and CW he found: 12m – S9YY, TZ4AM; 15m - S9YY, 3B8CF, 8P2K, A61DD; 17m - V5/DK1CE, S9YY, ZF1DX; 20m - 9M6XRO, YB0/KU1CW, SV2ASP/A.

Gordon, G3PXT was pleased to come 4th in the UK in the competition to work the Spanish Cervantes stations last month. His DX report included: 10m – S9YY, VP8LP, 3B8FA, XT2AW; 12m - 3B8FA, 4Z5PJ, 7Z1JA, A61FK, CX8ABF, LU7HF, S9YY, TZ4AM, VO1MP, ZD7FT, A71EM; 15m – JAs, CE3CBM, CN8KD, D66D, CT9/DM3B, LU5DT, P49X, PU2NRT, PY5EJ, VU2LBW, VP8LP, N7BLN (AZ), BD0AAI; 17m - 3B8CW, 5H3PM, FR4PG, PJ4/PA3BWK, PY2THO, WP4C, W6s, XT2AW; 20m - JF8EVE, YI3WHR, VR2UPU, YB6QZ; 40m - 4X1UF, A47RS, YC9GWR, BG4DRL, BV2FB, E20WXA, JF3VAX, HS8JKY.

**Finally** – thanks as always to my correspondents, to DX-World, 425 DX News and Daily DX.

**Table 2: Forthcoming DX activity.**

| | |
|---|---|
| Until 25 Nov | VP6AH (OC-044) |
| Until 14 Nov | XU7MDC |
| Until 16 Nov | V63AJ |
| Until 19 Nov | 6V1IS |
| Until 22 Nov | TL8AO |
| Until 6 Dec | 3B8/DJ7RJ |
| Until 2 Dec | 5H3MB |
| 10-16 Nov | T30 by JA ops |
| 13-14 Nov | NA-079 |
| 16-30 Nov | 5Z4 by DL ops |
| 17-20 Nov | KH2/DF8AN |
| 18-20 Nov | MSOINT EU-123 |
| mid Nov | AF-020 by Is |
| 19-28 Nov | 5H1WW |
| 20 Nov – 3 Dec | 8Q7SP |
| 21 Nov – 24 Dec | 9Q0HQ/3 |
| 23 Nov – 4 Dec | FH/HB9AMO |
| 1-11 Dec | FS by US ops |
| 16-18 Dec | 6V1A |
| Jan-Feb 2017 | E51MAF Nth Cooks |
| 12-19 Jan | T88WM |
| 25 Jan – 1 Feb | HI1UD (NA-122) |
| 31 Jan – 1 Feb | VK5CE Gabo I. |
| 18 Feb – early Mar | HK0 by AA4NC |
| Feb – March | Arctic Legend IOTA trip |
| 10-19 March | E51KTA |
| 28-30 July | VA2NDX/VY0 (NA-173) |

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# VHF/UHF

**More excellent conditions to Southern France, Spain and the Canary Islands on 2m and 70cm.**

Bill, VE3CRU with his 'Rover In The Clover'.

No sooner had the last column been finished than another excellent tropospheric opening occurred on 27 September. This time it was more stable and able to support higher frequencies. Whilst I have mentioned in the past that this is a consistent path for stations located on the west coast of the UK, reports suggest that the ducting extended well inland and over to the east coast. Also 70cm conditions were excellent with very strong stations worked from southern France and around the Spanish border.

Auroral propagation conditions were good around 13 October as geomagnetic activity intensified with Earth passing through the tail end of a CME prompting a G2 Class geomagnetic storm. Meteor conditions didn't excel even with the Orionids shower projected to peak around 16/17 October, which came and went without too much enhancement over sporadic meteors.

EME (Moonbounce) conditions were good for the first day of the first leg of the ARRL EME Contest that took place over the weekend of 22/23 October.

Graham, MOCGL (JO03) continues the story on an exciting evening just after the September 50MHz UKAC Contest.

"On 27 September I finished taking part in the 6m UKAC and I was about to close down, but thought I'd just have a look around the bands. I couldn't believe how strong the beacons were in Spain. So I put a call out on 144.300 and nearly fell of my chair when EA8TJ in IL18RJ returned my call. What really amazed me was the signal strength, 20 over 9 and I have no masthead pre-amp using a single 9 element home brewed LFA antenna. After I worked him I was called by F4HBY (JN97), EA1EBJ (IN73), F6FGQ (IN78) EA1IRE & EB1DJ (IN52) and F5TXM in IN98. I then finished of the early hours with EA8TX in IL18QI with another 20 over 9 signal. It was an amazing tropo path between IL18 and JO03 and I was delighted with all the contacts. The following morning, changing bands to 70cm I worked F6GNR (IN97) and F6DFI in IN87 on 432.190MHz."

Mike, GM3PPE (IO85) reports that, "After a very quiet start to October the 6m band 'exploded' into life on the 13th with a big Auroral opening here in the Scottish Borders, IO85. Earlier in the afternoon I had found 10m wide open with very strong signals and a quick check showed some Auroral type signals on 6m. Then at 1600UTC, 6m suddenly came alive, first with big signals from GM4UYE (IO86) and GM4VVX (IO78) and then to my surprise DH6JL (IO31) and PA2M (JO21) with genuine 59A signals. From 1700, the Scandinavians started building – LA9BM (JP40), OZ7KJ (JO46) and LA4LN (JP50) all logged. Between 1730 and 1900UTC, Richard, GI4DOH (IO74) was a very strong signal, as were a number of G and GM stations such as G4ELJ and G3XVR (IO91), GM3SEK (IO74) and G3TCT (IO81), plus another very strong Scandinavian – SM5KWU (JO89). After 1900, signals started to drop but I still managed to work EI3KD (IO51), a fading PA4VHF (JO32) and, finally, a weak GM8OEG (IO86). By 2000UTC the band was pretty much dead. All these were worked on CW. However I did check higher up the band and heard a few weak SSB signals but, as usual, Auroral SSB was difficult to copy. As the current sunspot cycle continues to slide towards its minimum we can expect a few more good Auroral openings. What surprised me this time was the strong signals coming from DL and PA. After all the excitement of the auroral opening there was a good Sporadic-E opening to Europe on 15 October and an appearance of TY2AC (JJ16) who was working a string of Italian stations on 50.102 CW. He was copied at 559 at 1530 with very deep QSB before disappearing completely. Such is the way of 6m!"

## Bill Burgess, VE3CRU

Thanks to Bill for sending in a very interesting report about 'roving' activities from his location in Canada. Bill details his activities as follows: "I enjoy running in the CQ WW VHF contest and have had many successes in it. Most contesting is done within a 200km radius of home in Whitby Ontario. In 2010 I went much further, for an adventure of about 5,000km running in the CQ WW VHF from 4 rare grids at the north-east tip of Maine USA as VE3CRU/W1/R in locator grid squares FN67, FN57 on Saturday and FN56, FN66 on Sunday. The photo shown was taken in FN67, Rover In The Clover! The background, across the hidden valley is VE9 New Brunswick, Canada. The antennas on the roof were in place from the time I left home till the time I returned. No issues with Police or US Customs, in fact it is very much a case of 'Oh it's HIM again'. I also took 432 and 1296MHz along as they are packaged

in the Icom 910H main station rig. My best DX with the Rover mobile setup dates back many years, when I had the F9FT Tonna 5 element for 50MHz at the top of the stack at a local hilltop when I worked Spain, France and California, USA. Operating from Maine USA (FN66) in the CQ WW VHF contest, I worked FJ92 Brazil 5035km, FK52 3815km, FK90 4074km and FK94 3630km all with armchair copy in SSB."

Bill runs all bands up to 3cm from the vehicle and it is common to work east on 23cm to FN31jh from EN93wv at 601km, and to FN32 at 568km in VHF contests. Thanks to Bill and it's amazing to think the whole antenna system is truly mobile!

## RSGB Convention 2016

Once again the VHF/UHF stream at this year's RSGB Convention was a tremendous success. It was clear how much passion all the lecturers have for their chosen subject, all delivered in excellent detail. Both days had something for everyone in the world of VHF/UHF however the overriding feeling from all the lectures and talking to many of the delegates was 'activity' in whatever your niche area is within this wonderful hobby. John, G4SWX pulled together the VHF/UHF streams over many months so big thanks to him and the rest of the team for another very interesting, informative and successful convention. Fortunately most of the lectures were committed to video so many are looking forward to viewing them in due course. Paul. G4DCV not only delivered one of the lectures on Sunday afternoon but also filmed around the convention throughout the weekend as part of a promotion RSGB video. The closing VHF and Up lecture was given by Reg, G8VHI whose Maritime Mobile expedition on board the cruise ship *P&O Britannia* activated very rare wet squares on its round trip to the Norwegian Fjords.

## G8VHI/MM

Reg, G8VHI gave an informative and amusing account of his trip on the *P&O Britannia*, setting up a dual band 2m and 70cm station in the cabin and – more of challenge – mounting the antennas on the balcony. The huge ship provided a perfect RF shield in the reverse direction so Reg was only able to operate to Europe on the outbound leg and UK inbound back to Portsmouth. Nevertheless, Reg managed to work 27 locator squares on 2m and 22 locators on 70cm. Despite the large numbers of European stations wanting to catch Reg in these rare squares his best DX on 2m was in fact Lyn, GW8JLY at 600km+. Reg is keen to present this talk to local clubs around the Nuneaton area.


Reg, G8VHI maritime mobile on the P&O Britannia.

## JT65 activity frequency

Another gem from the Convention was a discussion regarding a central activity or calling frequency to accommodate MGM (Machine Generated Modes) JT65c etc on the higher VHF bands for tropo use. A delegate asked "is there one?" and it seemed as there wasn't so a little debate ensued and a plan came together to cover frequencies from 2m through to 23cm. Fellow *RadCom* columnist on Microwaves John, G4BAO suggested 144.165, 432.165 and 1296.165MHz seems an excellent choice sufficiently far away from EME and other MGM traffic on these bands. 6 and 4m are generally catered for in established frequencies however it was recognised that there needed to be a bolt hole for the higher bands. Also the significant 65 in the frequency has a good memorable ring to it!

Tony, G4NBS (JO02) reports that after the JT65 Convention discussion, he has already heard Paul, G3YDY making QSOs on using JT65c transmissions on 432.165MHz. It appears my comments re 'flex' cables in the last edition have also struck a chord at his QTH with incidents of cable degradation not particularly around the rotator but by general movements / luffing of the tower. Tony's hunt for reliable replacement cable... continues.

The tropo opening to EA8 area on 27 September prompted Tony to have a look at the path profile between his location and EA8 following QSOs with EA8TJ and EA8TX. No wonder he has had to wait 30 years for the right conditions while those further West have managed it fairly often. Only workable for 15 minutes at 55, in the noise at ESP level for a couple of hours previous and inaudible after. It might be a sea path from EA8 to EA but then the signal passes over both Spain and Brittany to get to JO02.

Chris, G3XVL (JO02) is introducing a new idea of a 2m CW activity on Tuesday evening with other local clubs in the JO02 area. All levels of skill are welcome operating on 144.053 – 144.063MHz. The format will be relaxed friendly QSOs with meaningful RST, report, name, QTH/rig/ant details being exchanged. It's not a contest, the aim being to get some local CW activity on the 2m band. Local clubs have been contacted so hopefully there will be a selection of stations of varying experience to work during the evening.

## Season's Greetings and looking forward to 2017

Certainly not a vintage year in 2016 but on all the VHF/UHF bands there have been moments of outstanding propagation. There's been a whole host of DXpeditions with many stations logging new DXCCs and locators and a year tinged with sadness in the passing of some well known VHF/UHF operators. Looking forward to 2017, a new DX year that starts in earnest with the Quadrantids meteor shower in early in January.

Wishing all contributors and readers Season's Greetings and a Happy (and DX-full) New Year.

**Richard Staples, G4HGI**
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# GHz Bands

**As I write this Christmas issue in late October, I'm reflecting that the early part of the month didn't really come up to expectations for GHz tropo propagation.**

Surely, in the past, October was the month where we got long periods of settled weather with good openings to the continent for days?

If we consider 'real DX' on 1.3GHz to be over 800km, a search of the dxmaps.com database [1] of terrestrial spots for 1.3GHz over the first half of October produces just fifteen 'hits' and only one with a UK station. This period included the largest European contest of the year and maybe fewer people spot QSOs, but in the contest, only three UK stations logged QSOs over 800km on 23cm. I came across a copy of the January 1983 *RadCom* where G3WDG's Microwaves column reported "an excellent year for microwave DX, with a good opening at the end of October that resulted in three IARU Region 1 records being made. The lift was fairly widespread and particularly good from the UK." It went on to report plenty of 1.3GHz QSOs over 1000km including one at 1800km. On 2.3GHz there were QSOs over 1000km and over 500km on 3.4GHz. Remember, these were the days when 100W on 23cm was *real* QRO and receiver noise figures were typically 3dB or worse. Much has been discussed about climate change and maybe recent lack of October Tropo is one of the consequences?

## October contest

The 24 hour European 432MHz and up contest attracted some UK operation with G3M leading the 1.3GHz open section with 74 QSOs and an ODX of 863km. G3XDY lead the single op fixed section with 82 QSOs and an ODX of 861km. Both results compared well with Andreas, DJ5AR's personal record score of 82 QSOs [2]. Andreas' QTH is almost at the centre of European activity so for a UK station to match his QSO score is good going. They couldn't match his 12 DXCCs and 41 squares though: that's all about his location in relation to activity! In most of Andreas' QSOs, aircraft scatter was an important factor. Also 35 contacts were done on CW, including his ODX, HG7F at a little over 817km. On the other extreme of European geography, GM8IEM (IO78hf) in the far north west of Scotland focussed on 23cm from 1400-2200 on Saturday and 0630-1130 on Sunday but made no contacts at all, giving up after 1130 on Sunday and moving to 432MHz, where he managed a couple of QSOs. Despite seeing GM4BYF on ON4KST for a while, there appeared to be no activity from GM, GD, or GI, so no tropo contacts were available. He reports quite a bit of 1.3GHz activity from IO83 and IO93, with 11 stations at aircraft scatter ranges from 450-610km, but he was still to be disappointed.


PHOTO 1: The UKuG stand (www.microwavers.org) at the RSGB convention. Photo: G6JYB.

## GHz bands at the RSGB Convention

The UK Microwave Group had a big presence at the RSGB Convention this year, with a number of talks on GHz bands topics. **Photo 1** shows the stand, which had a fine display of member's projects.

## Systems engineering is everything

Getting the best out of your QTH and system will help to work the DX even under poor conditions. You need to get the optimum performance from your receiving system by ensuring that not only does it have a low noise figure but it can also handle the large in- and out-of-band signals.

Large signal handling and your site noise level are increasingly becoming the limiting factor of system sensitivity at 23cm, just like on the lower bands. Try this simple test. Turn off the AGC, tune to a quiet frequency and look at the receiver noise level with something like the WSJT spectrum display. Turn your antenna through 360° and see if there are directional noise peaks. I see a 1dB increase when I beam at my local TV transmitter.

Adding a decent bandpass filter after the preamp helps but if you have overload problems caused by a wideband, high gain preamp it's better to fit a really low loss filter in front of it. Remember though, that any loss in front of your preamp adds directly to your system noise figure, whereas loss after it does not. Next time you have the antennas down, terminate your preamp input with a 50Ω load, measure and compare that 'thermal noise level' to what you get with your antenna connected. Once you have this thermal measurement you can keep track of how your noise level varies with time.

It's possible to work aircraft scatter DX on 23cm at any time if you have a good system and a reasonable takeoff. 30W of CW (or ISCAT JT) and a masthead preamp is good enough to work aircraft scatter with some of the larger stations, whereas it becomes easy with 100W or more.

## Beacon news

The world's oldest beacon cluster, OZ7IGY (JO55wm54) had a major overhaul at the end of October. On 1.3GHz the Big Wheel antenna was replaced by a 9dB slotted waveguide (SW). On 2.3GHz a new SW antenna was fitted, 1m higher than before. The 10GHz beacon has been migrated to the Next Generation Beacons platform and on 24GHz the power has been raised from 300mW to 2W. A great job by Bo, OZ2M and team!

I will be at Heelweg on 14 January [3].

**Websearch**

[1] www.dxmaps.com/spots/map.php
[2] www.dj5ar.de/
[3] www.pamicrowaves.nl/website/

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**Count on us!**

# Ground systems: a fresh look at an old classic

**The 1937 report on ground systems by Brown, Lewis and Epstein [1] has been cited in many amateur radio articles over the years, but very few authors have ever mentioned anything other than their main conclusion, which was that 120 half-wave radials are desirable for a good earth system.**

Until recently, I had come accept that this was probably the only significant conclusion to come out of their experimental work since time after time it was pretty much the only thing that was ever mentioned. However, after downloading a copy of the original report from the internet, I was delighted to discover that there were also several other very useful bits of information for those of us with restricted space buried in the mass of graphs and figures. The most significant of these may well be a very limited ground system that produces exceptional performance for its size, though there are also other interesting results, some of which expose a long-standing myth about the radiation resistance of a quarter-wave vertical always being around 36Ω.

## The first revelation

Brown, Lewis and Epstein (BL&E) conducted all of their experiments at 3MHz using a vertical antenna that could be extended up to 90ft in 10ft increments and the results take up just over a third of their report; the first half covers mainly theory and details of experimental procedure. The experimental results are mostly presented in graphical form and their curves of input resistance and field strength versus length and number of radials are pretty much as you'd expect in the main, but towards the end of the experimental data a couple of graphs display features that don't quite stack up – those interested in looking at the originals should check page 778. Both graphs present curves of field strength and input resistance for a 70ft vertical plotted against the number of radials, one for radials 135ft long (0.411λ) and the other for radials 45ft long (0.137λ). When you compare them, it looks as if the input resistance of the antenna system with shorter radials drops more rapidly than that for the one with longer radials as more and more are added. This isn't an illusion and becomes more obvious if the input resistance curves for both systems are plotted on the same graph, as shown in **Figure 1**. Note how the curves cross at approximately N = 26 and the input resistance for the 135ft radial system is higher than that for the 45ft radial system for fewer radials than this. At first sight this might appear to indicate that the ground losses are lower for shorter radials when N is less than 26, but their field strength curves, presented in **Figure 2**, show otherwise.

So how can this be? Well, looking at the field strength plots it's clear that the ground system with 135ft radials (solid curve) always produces stronger signals than the one with 45ft radials (dashed curve), regardless of the number of radials used, so the ratio of radiated power to input power is always worse for the 45ft radial system despite

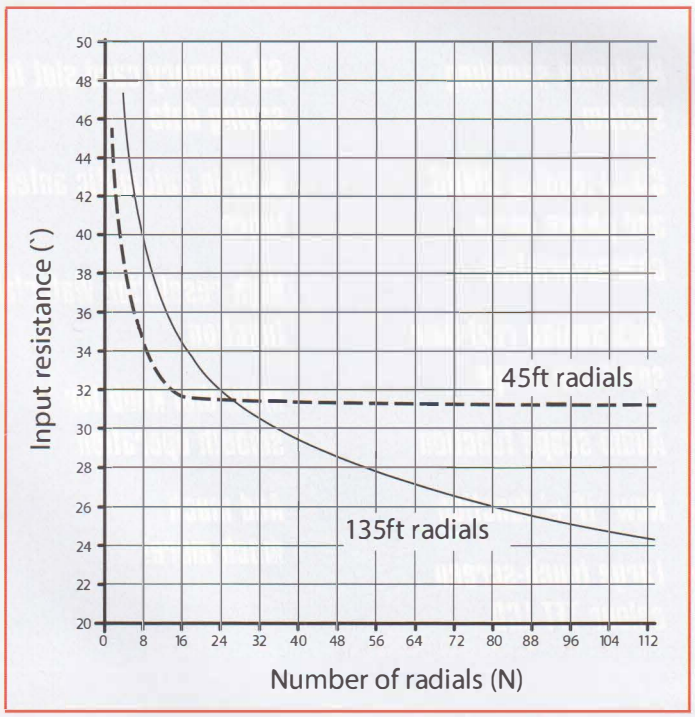



FIGURE 1: Input Resistance vs Number of Radials for a 70ft vertical operating at 3MHz with either 45ft radials (dashed curve) or 135ft radials (solid curve).

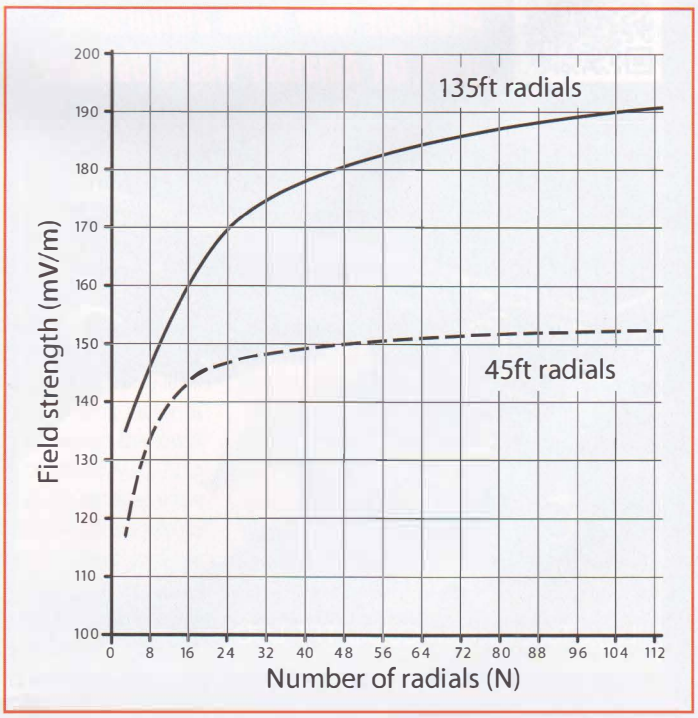



FIGURE 2: Field Strength vs Number of Radials for a 70ft vertical operating at 3MHz with either 45ft radials (dashed curve) or 135ft radials (solid curve).

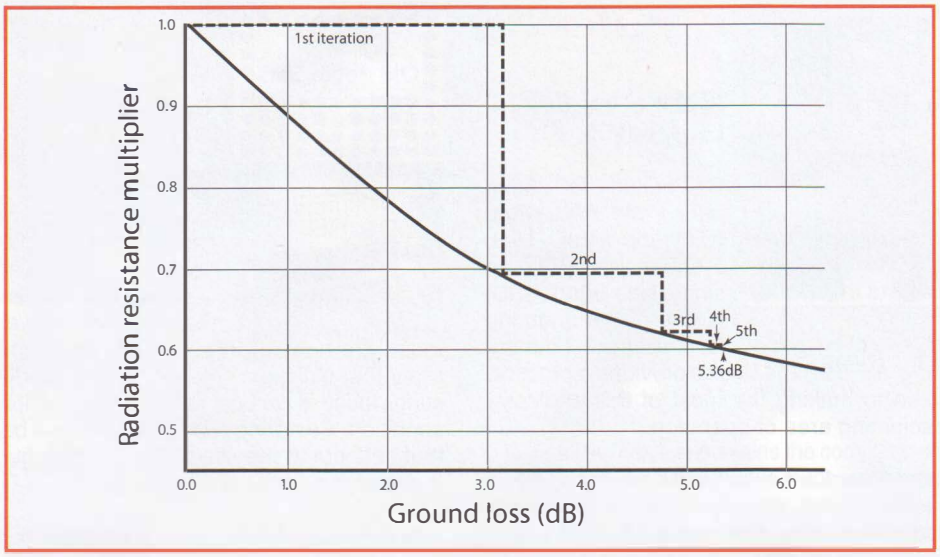



FIGURE 3: Radiation Resistance Correction Factors vs Ground Loss (dashed lines illustrate the iterative process for finding a value closer to the true value – see text for explanation).

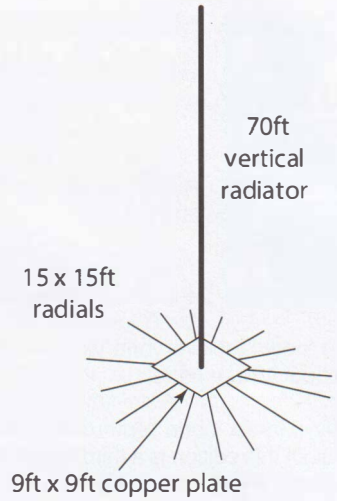



FIGURE 4: A small area ground system reported by Brown *et al* to be only 2dB down on a ground system using 120 half-wave radials at 3MHz.

its lower input resistance. This can mean only one thing – the radiation resistance of the vertical with the shorter radials is less than that with the longer radials, despite the radiator being exactly the same in both cases. This is a bit of a shock if you're used to thinking of the radiation resistance of a vertical being constant, but it's not as incredible as it might seem: a couple of physicists from Stanford University (Hansen and Beckerley) were warning that this might be the case as far back as 1936 [2, 3], but broadcast engineers chose to ignore them. That's not surprising since broadcast stations generally had very good ground systems where the radiation resistance of the vertical would have been practically as high as the theoretical value anyway, so they didn't need to concern themselves with variations due to ground loss. We do though!

## Getting closer to the true value

The field strength and input resistance figures provided by BL&E for the 70ft vertical are extensive enough to be used to estimate the actual value of radiation resistance for various ground systems with different degrees of loss compared to the ideal case, which BL&E state should give 194.5mV/m at 1 mile for 1000W input. A 70ft antenna (0.214λ at 3MHz) over an ideal conducting ground plane has a radiation resistance of about 24.5Ω because it's shorter than a quarter-wave vertical. The theoretical radiation resistance of the latter – 36.6Ω – has long been used to estimate the radiation resistance of short vertical and inverted-L antennas and tables of these figures have been presented in various data books, such as the one by STC [4]. It would appear, though, that these are all overly optimistic for amateur installations where the earthing arrangements are anything but ideal.

Using the actual radiation resistance figures for the 0.214λ vertical calculated from field strength readings for radial systems with a spread of loss values, we can draw up a graph of correction factors (fractional multipliers) versus loss for a limited, but useful range of ground loss. These correction factors are given in **Figure 3** and are intended only as a rough guide since the accuracy of the original readings is unknown and additional errors will have been introduced in deriving these figures from the data given. However, even though this graph *is* only a rough guide, some correction is bound to get you closer than no correction at all, so it's worth doing. Extrapolation is always a dangerous proposition, but it may be worth noting that the trend of this graph points to the radiation resistance halving with 10dB or more ground loss.

## A practical example

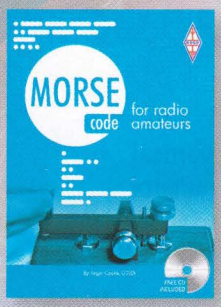
It's usually quite instructive to work backwards from actual measurements after the installation of a new antenna and earth to check whether the actual efficiency is anywhere near what's expected. This is just a matter of using the measured input resistance at resonance and the theoretical radiation resistance as a starting point and seeing where the correction graph takes you. For example, say you've just put up a new quarter-wave inverted-L for 160m at a height of 36ft and its input resistance measures 20Ω at resonance on 1.95MHz. This type of antenna should have a theoretical radiation resistance of 9.7Ω according to [4], so the ground loss would appear on first inspection to be just over half of the input resistance (3.14dB). The correction factor for this amount of ground loss can be found from Figure 3 and is indicated by the dashed line labelled '1st iteration', which illustrates the first step in the iterative process to find the true ground loss. The correction factor for 3.14dB loss is 0.69 and by multiplying this with the theoretical radiation resistance we get a closer estimate of 6.7Ω. Re-calculating the efficiency with this new value of radiation resistance and the measured value of input resistance now gives 6.7/20 or 33.5%, which corresponds to a ground loss of 4.75dB. This gives us the next estimate for the correction factor and we go on like this until two consecutive results are so close that there's no point in continuing. Step 4 indicated in Figure 3 gives 5.33dB ground loss and step 5 only 0.03dB more, so the process has converged well enough to stop at this point. The radiation resistance correction multiplier at this stage is approximately 0.6, so the real radiation resistance is in the region of 60% of the theoretical value, or 5.82Ω, and the corresponding ground loss 5.36dB.

## Is there an optimum radial length or number?

BL&E make no mention of the electrical conductivity of the soil at their test site, but it is believed by some that the conductivity in that part of New Jersey is around 0.004 S/m, which is quite close to what is now considered to be average soil conductivity

**Dave Gordon-Smith, G3UUR**
daveg3uur@gmail.com

# 2016 C




## Morse Code for Radio Amateurs

***12th Edition***

By Roger Cooke, G3LDI

This updated 12th edition of *Morse Code for Radio Amateurs* is simply the 'book' for everyone who wants to learn all about Morse code.

Written by Morse code enthusiast Roger Cooke, G3LDI this edition is a third bigger than its predecessor. As you would expect this book begins with a history of Morse code and moves to what it means to Radio Amateurs. There is advice that explains Morse code keys and how to choose your own. There is information of how to start learning the code, increasing your speed and guides to the software included that teaches you the code. There is even advice that discusses the correct way to use a straight 'pump' as well as modern keys and paddles.

*Morse Code for Radio Amateurs* provides everything you need to get started in Morse code apart from perhaps the Key itself. This remains the 'book' for anyone wanting to add Morse code to their skills.

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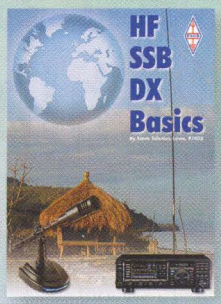


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By Steve Telenius-Lowe, PJ4DX

Contacting far flung parts of the world (DX) on the High Frequencies (HF) on single side-band (SSB) is one of the enduring fascinations of amateur radio. *HF SSB DX Basics* provides a practical guide to making the most of this endlessly fascinating area of operation.

Steve Telenius-Lowe dispels the myths about huge antennas and high power in an easy to understand way. From what HF SSB is and what DX is all about you are lead through to the opportunities they provide and much more. There is a practical guide to what antennas make good choices in your location, choosing your transceiver, the microphones used and even what the myriad of buttons on a modern transceiver do. There is a guide to the HF bands you can operate, their propagation characteristics and what to expect from them. Steve also provides practical advice on how to avoid pitfalls when operating.

*HF SSB DX Basics* is for anyone interested in operating in this hugely satisfying area of amateur radio by providing advice and practical steps to get you started and much more.

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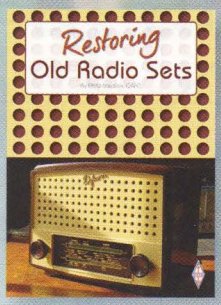


## Restoring Old Radio Sets

By Philip Lawson, G4FCL

For many there is nothing more charming than an old broadcast receiver glowing away in a substantial wooden or Bakelite case. However these are now a rarity and it is much more likely that old radio sets will be non-working curios found at car boot sale in a dusty, unloved condition. *Restoring Old Radio Sets* is a book that sets out to provide a step-by-step guide to bringing an old set back to life.

*Restoring Old Radio Sets* is a practical guide that explains what you need to do, and how to do it. You will find topics that include cleaning methods for electrical and mechanical parts, making typical electrical repairs and the process for performing live tests. There are sections on fault-finding and alignment & calibration of the working set. There are even useful guides to one of the major keys to completing a successful restoration - knowing how to treat the cabinet, be that - wood, Bakelite, or plastic.

Armed with this book, the reader should be able to tackle an old set, get it working safely and finish-up with a really attractive piece of domestic furniture.

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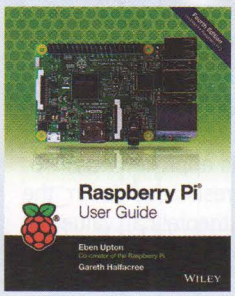


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by Eben Upton & Gareth Halfacree

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by Bob Treacher M0MCV

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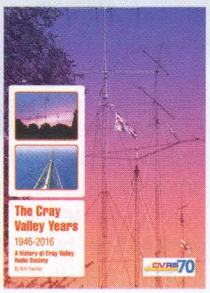


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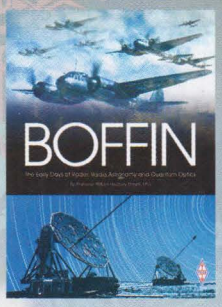


## Boffin

By Prof. Robert Hanbury Brown

Professor Robert Hanbury Brown was one of the most important figures in the development of radar and observational astronomy in the UK. This autobiography provides a unique account of the history of radar in WWII and the development of radio astronomy in the post war years.

*Boffin* traces the evolution of radar from the static Home Chain of the Battle of Britain to the inclusion of the first airborne radars used in aircraft for night-fighting. The book covers his work on the polarisation of radio waves, crucial in determining the optimum configuration of the radar aerials on all the early air-to-surface equipment operated by Coastal Command.

This book is thoroughly recommended reading for anyone interested Radar, Astronomy and much besides.

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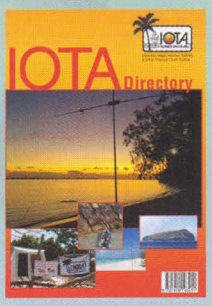


## IOTA Directory

***17th Edition***

Edited by Roger Balister, G3KMA and Steve Telenius-Lowe, 9M6DXX

If you are not aware of the Islands on the Air (IOTA) award programme this book explains this fascinating activity. The book aims to provide the most comprehensive guide to the programme and much more besides.

The *IOTA Directory* contains the complete, official listing of IOTA islands but is much more than just a simple list. There is much more besides with details of the latest IOTA Honour roll, Golden List, etc. The *IOTA Directory* provides everything you need to participate in IOTA, from lists of islands, through to application forms and masses of information and advice for island hunters, award applicants and DXpeditioners alike.

The multitude of islands and the IOTA programme laid out in this book makes it a must have if you are already involved or simply just interested.

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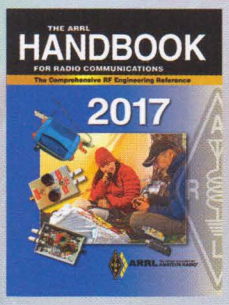


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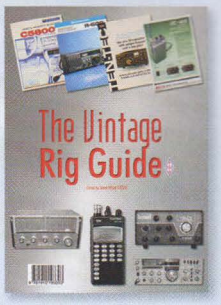


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Covering the mid-1960s to 1990s the *RSGB Vintage Rig Guide* has equipment from manufacturers that were never in the standard *RSGB Rig Guide*, along with the items that have been discontinued from listings in early editions. Manufacturers such as Drake, Heathkit and KW are now included for the first time. There are brief synopses of all the manufacturers and a useful guide on what to look for when buying vintage radio equipment. Details of over 300 receivers, transmitters, transceivers and linear amplifiers are included as are likely trade-in and second-hand prices from dealers.

If you are interested in vintage amateur radio equipment, either because you have some, are interested in restoring something or you want to know its likely value this book provides a valuable insight.

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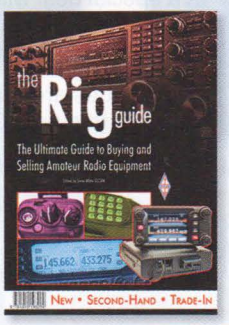


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(0.005 S/m) **[5, 6]**. Most of their tests were done with 0.137λ, 0.274λ, or 0.411λ radials. Analysis of the field strength data for these radial lengths shows quite clearly that the optimum length or number of radials for a fixed total wire length is not as clear cut as *NEC* simulations **[7]** might suggest. When the total length of wire exceeds 4λ, then 10 or more 0.413λ radials provide the highest field strength. Below 4λ it doesn't seem to matter much which radial length is used; all three combinations of length and the corresponding number of radials give pretty much the same results within a fraction of a dB. But, BL&E only give the results for 0.137λ, 0.274λ and 0.411λ radials, and for less than one wavelength (λ) of wire the data is too limited to say whether this trend continues or not. However, for those of you with very restricted space another snippet from BL&E might be of interest – read on!

PHOTO 1: A ground mat of even quite modest dimensions can significantly improve the performance of an amateur vertical antenna. Earthed galvanised wire mesh works well, and it gets hidden by grass growth in a few weeks. Heavier gauges last longer; thin chicken wire may deteriorate quite quickly.

## The second revelation

Another very useful piece of information buried deep in the BL&E report concerns the use of a ground screen placed below the feed point. Apparently, an indifferent ground system with 15 short radials, which I believe to be about 15ft in length, was improved substantially by placing a 9ft x 9ft copper plate below the feed point as shown in **Figure 4**. This reduced the ground loss from 5dB down to 2dB. That's quite an improvement for such a limited area. According to their other results, you'd need about 80 radials an eighth of a wavelength long to achieve the same field strength without the ground screen.

Copper ground screens are expensive and not very convenient to install under an already established garden, but galvanized wire mesh or netting (**Photo 1**) could be used to determine whether this solution to the earthing problem is fruitful or not in a given situation. A 25ft roll of 6ft wide galvanized wire netting can be cut into two equal lengths to create a screen 12 x 12.5ft for 160m. (A 1.2m x 25m roll of 25mm mesh can be had for about £30 delivered). Electrical connections to galvanized wire are best made using pressure joints and these connections need to be well protected against moisture ingress. Even if you don't like the idea of a permanent ground installation using galvanized wire netting because of the long-term effects of corrosion, it can still provide a useful benchmark against which to compare other ground systems.

## Closing comments

Brown, Lewis and Epstein draw a number of conclusions in their report, mostly related to the economics versus the performance of short and full-sized antennas. Their first conclusion, though, is one that is probably highly relevant to most amateurs and states, "These experiments show that, even with a poor ground system, an eighth-wave antenna performs practically as well as a quarter-wave antenna".

However, after discussing the economics of short and large antennas they do go on to stress the importance of a good RF earth. Despite this, it's interesting to note that even the very limited arrangement of fifteen 15ft radials over less than average soil was only 5dB down on an ideal radial system. So, there's absolutely no reason for anyone to give up the idea of operating on 160 or 80 because they can't put up a large antenna or lay out an extensive earth system. Radials don't have to all be the same length, so fit in whatever you can where you can. A very limited area earth system can produce astonishing results with a vertical, but bear in mind that an inverted-L antenna has its voltage point bent over closer to the ground and requires the earthing system to extend underneath the horizontal section to achieve the same sort of efficiency as a vertical.

Where ground screens are impractical, several earth stakes and a modest number (16 to 20) of short radials can work quite well. Remember, improving the earth system doesn't just reduce the ground loss, it also increases the antenna radiation resistance – so you get double the benefit. Also, joining the ends of radials together and forming a grid with earth stakes at the property boundary can help collect RF from neighbouring land and improve the effectiveness of your earth system in a small garden.

An interesting idea for a small area ground system was put forward by Mosley Electronics many years ago and is still included in their booklet about improving vertical installations. Details of this can be found at **[8]** or on page 290 of the 7th edition of *Amateur Radio Techniques* by Pat Hawker, G3VA (Figure 60). This may not be as good as a copper plate or a similar area of galvanized wire netting, but it may be more convenient.

### References


[1] G H Brown, R F Lewis and J Epstein, "Ground Systems as a Factor in Antenna Efficiency," *Proc IRE*, Vol. 25, Number 6, June 1937

[2] W W Hansen and J G Beckerley, "Radiation from an Antenna Over a Plane Earth of Arbitrary Characteristics," *Physics*, Vol. 7, June 1936

[3] W W Hansen and J G Beckerley, "Concerning New Methods of Calculating Radiation Resistance Either with or without Ground," *Proc IRE*, Vol. 24, No. 12, December 1936

[4] *Reference Data for Radio Engineers* compiled by W L McPherson and published by Standard Telephones and Cables Limited, 1942 or later versions

[5] *The bedrock electrical conductivity map of the UK* by David Beamish contains detailed maps of UK conductivity (including, near the end, a zoomable .KMZ Google Maps overlay file) and can be found at www.sciencedirect.com/science/article/pii/S0926985113001183

[6] See also The Ground Beneath Us, R C Hills, G3HRH, *RSGB Bulletin* June, 1966

[7] Al Christman, K3LC, "Maximum-Gain Radial Ground Systems for Vertical Antennas," *NCJ*, March/April 2004

[8] www.mosley-electronics.com/pdf/vertical_installation_tips.pdf

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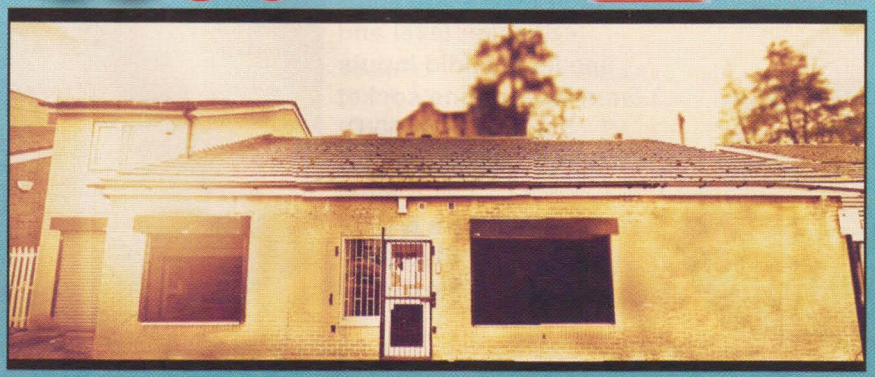

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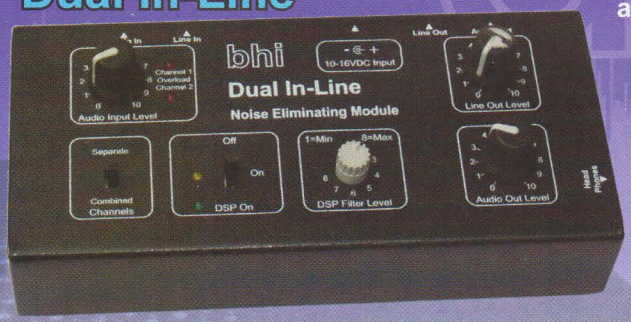


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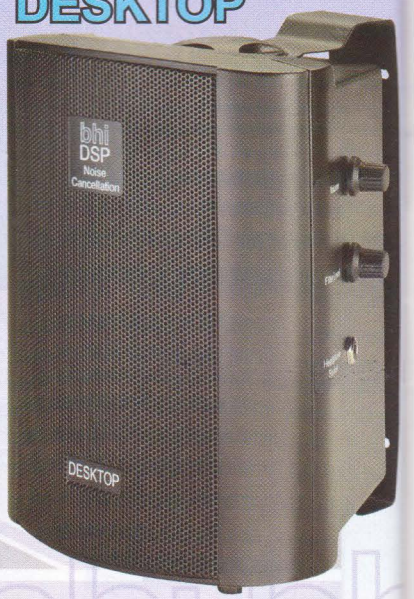


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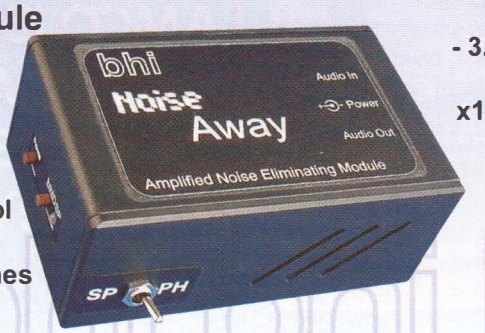


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Regional Manager: Ian Douglas, G7MFN, RM4@rsgb.org.uk

Angel of the North ARC
Nancy, G7UUR, 01914 770 036
4 Bishop Auckland RAC rally
5, 19 On the air
12 Operating from Cape Wrath, David Stansfield
26 Closed

Bishop Auckland RAC
Gail, M3GBB, 0191 372 0473
1, 8 Normal club night and training

Blyth Radio Club
John, 2E0DCV, 0191 237 1729
7 Club night
14, 21 Morse training

Colburn & Richmondshire District ARS
Colin, 01748 876 391
1, 15 Club net, GB3IR, 7.30pm
8 Amateur radio videos, G8PYX and G3XHB
12 Beginners' guide to VHF contests
22 No meeting

Denby Dale RC
Darran, G0BWB, 07974 423 227
4 Noggin and natter night
7 RSGB WWII Radio + comedy video, G4FSQ
11, 14, 15, 28 Night on the air
18 Project night building 40m tcvr, Howard
21 Christmas party

Otley ARS
David, M0HLL, 01423 522 618
6 Christmas quiz and fun night, 2m UKAC
13 Members' Christmas meal
20, 27 No meeting

Ripon & District ARS
David, G3UNA, 01423 860 778
1, 8, 15 Club night
22 Christmas quiz

Scarborough ARS
Jeremy, M0JLP, 0788 905 1696
5 Morse, social and talk
19 Christmas social

Sheffield & District Wireless Society
Krystyna, 2E0KSH, 07884 065 375
7 Stealth technology, Barry, G8AGN
14 Training and social night
21 Christmas meal

Sheffield ARC
David, G6DCT, littlewood20@btinternet.com
5 Electrical wiring regulations, David, G6DCT
12 Club night
19 Shack night operating MORCU
26 Closed

## REGION 5: WEST MIDLANDS

Regional Manager: Martyn Vincent, G3UKV RM5@rsgb.org.uk

Central Radio Amateur Circle
Martin, G1TYV, 07948 027 994
1, 5, 10 Group meeting
3 Group meeting, shack on the air, UKAC
6 UKAC 144MHz
7 Shack on the air, group meeting
17 Christmas party
24, 31 No meeting

Coventry ARS
John, G8SEQ, 07958 777 363
1, 8, 15, 22 Open net, 8pm 50.175MHz SSB
1 G2FDC Trophy 1st round, 11am start
2 Carl, GONZI from Wonder Wand Antennas UK
5, 12, 19, 26 Open net, 8pm, 145.375MHz FM and/or 7.16MHz ± QRM
6 Regular club meeting
9 Video night and introduction of 2017 project
10 Annual dinner
16, 20 Christmas/Charity quiz
23 Open net on 145.375MHz instead of meeting
27 Video night
30 Radio workshop

Glenrothes & District RC
Tam, MM0TGB, 0775 3526 498
18 Discussion on AFS

Gloucester AR&ES
Anne, 2E1GKY, 01242 699 595 daytime
5 Christmas meal
12 Christmas draw
19, 26 No meeting (school closed)

Hereford ARS
Rod, M0JLA, 01432 356 079
2 Mince pies social gathering
6 Curry night

Malvern Hills RAC
Dave, G4IDF, 01905 351 568
10 Digi modes, Roger, G4BVY
13 Remote operation, Dave, G4FRE

Midland ARS
Norman, G8BHE, 07808 078 003
7 Open meeting, training classes and on the air
14 Christmas party
21, 28 No meeting

Mid-Warwickshire ARS
Don, G4CYG, 01926 424 465
13 Christmas meeting
27 No meeting

Salop ARS
salopamateurradio@gmail.com
1 Natter night / committee meeting
6, 13, 20, 27 CW net, 4.30pm, 144.070MHz
7, 14, 21, 28 Club net, 8.30pm, GB3LH
8 A single valve receiver, John, G0GTN
15 Natter night
22 Mince pies evening
29 Closed

Sutton Coldfield ARS
Robert Bird, spirit.guide@hotmail.co.uk
5, 19 Open net, 145.250MHz, 7.30pm
12 Christmas party
13 Open net, 70.475MHz FM, 7.30pm
27 DMR open net, GB7FW slot/local2, 7.30pm

Telford & District ARS
John, M0JZH, 07824 737 716
4, 7 Committee meeting, GX3ZME OTA
11 Update on winter projects
14 Christmas meal
18 Hamfest recording – G8GTZ BATC Chairman
25 Open forum on ideas for 2017
28 Informal 2m net

Worcester RAA
Pete, G0WXJ, 0787 297 0276
13 4th order speech filter for homebrew receivers

Wythall Radio Club
Chris, G0EYO, 07710 412 819
2, 9, 16, 23, 30 Nibbles Night in the Shack
3 Club Trip to Martin Lynch Hog Roast
4, 11, 18, 25 Net 145.225 or GB3WL 8pm
6, 13, 20, 27 Morse class
6, 20, 27 Club meeting
13 Committee meeting
24 Wythall RC Christmas contest starts 8.00pm
27 Christmas fox hunt, 10am

## REGION 6: NORTH WALES

Regional Manager: Ceri Lloyd Jones, 2W0LJC
RM6@rsgb.org.uk

Dragon ARC
Stewart, GW0ETF, 07833 620 733
5 Discussions and planning for 2017
19 Christmas social

North Wales Radio Society
Liz, GW0ETU, 0776 019 0355
1 General meeting
8 Technical topic
15 Christmas party
22, 29 Club closed

Wrexham ARS
Eifion, mw6eyu@gmail.com
6 First Aid for heart attacks and strokes, 2W0DHD
8 Christmas quiz at Marchers ARS, GW0WZZ

## REGION 7: SOUTH WALES

Regional Manager: Glyn Jones, GW0ANA,
RM7@rsgb.org.uk

Aberystwyth & District ARS
Ray, GW7AGG, 01970 611 853
8 Christmas social and a talk on SOTA, GW4VPX
8 Junk or pre-owned sale
14 SDR, James, GW6JWD
26, 29 Net on 145.500 then 145.550MHz

Cleddau ARS
Heinz, MW0ECY, 0774 804 7008
5 Tenby Radio Repeater Group meeting
12 Christmas dinner
19 Christmas 2m net

Llanelli ARS
Craig, MW0MXT, 01269 845 773
2, 23 Social evening
5 Members' Christmas dinner
9 On air night & club raffle
12 Christmas party, club raffle & auction
16 DVD night
19, 26 Closed
30 Junk sale & club raffle

Newport ARS
Margaret, GW4SUE, 01633 665 289
2 JT65 demonstration, GW4OGO & MW0LGE
4, 11, 18 Club net 10am, 3.704MHz
6, 13, 20, 27 Club net, 8pm, 145.425MHz
16 Christmas quiz and fun night

## REGION 8: NORTHERN IRELAND

Regional Manager: Philip Hosey, MI0MSO
RM8@rsgb.org.uk

Bangor & District ARS
Norman, GI3YMY, norman.newell@yahoo.com
1 Demo of satellite communications and PSK31

## REGION 9: LONDON & THAMES VALLEY

Regional Manager: Tom O'Reilly, G0NSY
RM9@rsgb.org.uk

Aylesbury Vale RS
avrs@rakewell.com
11 Annual dinner
14 Christmas party hosted by Roger

Bracknell ARC
Andy, M0HAK, andy@m0hak.co.uk
7, 21, 28 Club net, 8pm, 145.375MHz
14 Shoestring QRP & Top Band antennas, G3YMC

Edgware & District RS
Mike, G4RNW, 02089 500 658
8 Christmas social
12 AGM
27 Natter night

Harwell ARS
John, G6LNU, 01235 223 250
8 AGM
12 Rally preparation quiz by G6LNU

Reading & District ARC
Laurence, G2DD, 0758 470 6625
2 Christmas dinner
8 AGM
26 Life on the Other Side, Jonathan, M0JSX

Southgate ARC
Keith, G8RPA, g8rpa@arrl.net
14 AGM

Verulam ARC
Greg, M0PPG, 01582 413 345
13 Bring and Buy, raffle and festive food

## REGION 10: SOUTH & SOUTH EAST

Regional Manager: Michael Senior, G4EFO
RM10@rsgb.org.uk

Bredhurst Receiving & Transmitting Society
Nigel, G0GDA, 07817 971 833
31 Operating GB4FWW HF SSB, 2m FM & SSB

Coulsdon ATS
Mike, M1CCF, 020 8654 2582
12 AGM

Crawley ARC
John, G3VLH, 01342 714 402
2 Fish and chip supper

Cray Valley RS
Richard, G7GLW, 07831 715 797
1 Technical aspects of the Underground, M0TGV
2 Christmas dinner
15 Christmas Social at the Park Tavern, Eltham
19 Planning meeting

Crystal Palace R&EC
Bob, G3OOU, 01737 552 170
2 Christmas social
6 Digital mode radio, Damien, 2E0EUI

Dorking & District RS
David, M6DJB, djb.abraxas@btinternet.com
2 Christmas dinner

Dover RC
Aaron, 2E0FQR, 0771 465 4267
1 Demonstration of a 3D printer
5 Gadget night
12 RF energy harvesting, M0XBW
19 *Autocad* and its inventor, M0PKH
26 The Icom IC-7300, Chris Ridley (Icom UK)

Hilderstone R&EC
Ian, 2E0DUE, hilderstoneclub@gmail.com
8 Club dinner at Jolly Farmer
9 YOTA at Wellesley House school

Horndean & District ARC
Stuart, G0FYX, 02392 472 846
2 Natter night/social evening
9 Christmas meal at Southwick Park Golf Club

Horsham ARC
Alistair, G3ZBU, 07855 268 666
1 AGM
3 Christmas party at The Countryman
15 Social at The Hare and Hounds, Cowfold

Mid-Sussex ARS
Stella, M6ZRJ, 01273 844 511
2 Christmas quiz
9 Christmas dinner
16 Radio night and table top sale
23, 30 Closed

Surrey Radio Contact Club
John, G3MCX, 020 8688 3322
1, 8, 15, 22, 29 Net, 70.300MHz, 8pm
2, 9, 16, 23, 30 Net, 145.350MHz, 8pm
4, 11, 18, 25 Net, 1905kHz, 9.30am
5 Construction contest
19 Components Bank, G4FDN, Equipment Loan Scheme, G4DDY and pre Christmas get-together

Sutton & Cheam RS
John, G0BWV, 0208 644 9945
8 Christmas Junk Sale
19 Radio quiz of the year

Worthing & DARC
Al, M0OAL, information@wadarc.org.uk
3 Intermediate training (day 2) and exam
4 Sunday breakfast, 9am
7 Test or practical evening
14 Christmas Party

## REGION 11: SOUTH WEST & CHANNEL ISLES

Regional Manager: Pam Helliwell, G7SME
RM11@rsgb.org.uk

**Appledore & District ARC**
**Alan, M6CCH, 01237 422 833**
16 Quiz night, John, G3JKL

**Bristol RSGB Group**
**Robin, G3TKF, robin@g3tkf.co.uk**
28 On the air

**Burnham on Sea ARC**
**Brian, G4RGY, 01278 683 645**
7, 21 Club night

**Callington ARS**
**John, G4PBN, 01822 835 834**
7 Club night
16 Christmas meal

**Cornish Radio Amateur Club**
**Steve, G7VOH, 01209 844 939**
1 Main meeting
7 Committee meeting
15 Club evening

**Exeter ARS**
**Nick, M0NRJ, 01363 775 756**
6 GB3EX net, 7.45pm
13, 20, 27 GB3EW net, 7.45pm
14 Bring in something interesting evening

**Exmouth ARC**
**Mike, G1GZG, 01395 274 172**
4 Computer software talk/demo/downloads
7 Antennas and propagation talk/demo, M0THJ
18 CW night, operating/tutorials/training, M0THJ
21 Christmas party

**Flight Refuelling ARS**
**John, G4POF, g4pof@hotmail.com**
23 DXpedition to the Galapagos Islands, Geoff, G8OFQ

**Mid-Somerset ARC**
**David, G8BFV, 01749 670 085**
13 Christmas buffet, talk on Somerset Coal Canal

**North Bristol ARC**
**Mat, G7FBD, g7fbd@gb3bs.com**
2 Relax and chat evening + operating & training
3, 10, 17, 24, 31 South-west DMR net, 7pm, slot2 talk group 950
4, 11, 18 Open net on GB3BS, 7pm
9 Christmas Party - TBC
16, 23, 20 Relax and chat evening plus operating

**Plymouth Radio Club**
**David, 2E0DTC, d.beck123@btinternet.com**
13 Christmas party

**Riviera ARC**
**rivieraarc@gmail.com**
1 Christmas social night

**South Bristol ARC**
**Andrew, G7KNA, 07838 695 471**
1, 19 DVD: The Secret War
5 Practical evening on RTL dongles
8 Table top sale
12 Committee meeting
15 Christmas social evening
22, 26 Open House and On The Air Night
29 Closed

**Torbay ARS**
**Dave, G6FSP, g6fsp@tars.org.uk**
2 Club night with business meeting
9 Christmas party and quiz
16, 23 Club night
30 Closed

**Weston Super Mare RS**
**Martin, G7UWI, 01934 613 094**
5, 19 Construction, operating & natter night
12 Christmas party

**Yeovil ARC**
**Rodney, M0RGE, 01935 825 791**
1 December 1923 by G3MYM
15 Mince pies evening
22 Shack on the air

The next deadlines for Club Events Calendar and Around Your Region are 17 November and 22 December. Please email your info to radcom@rsgb.org.uk *only* and don't cc any other RSGB editorial address – thanks

## REGION 12: EAST & EAST ANGLIA

Regional Manager: Keith Haynes, G3WRO
RM12@rsgb.org.uk

**Braintree & District ARS**
**Edwin, G0LPO, 01376 324 031**
5 Christmas social
19 Natter night

**Chelmsford ARS**
**secretary@g0mwt.org.uk**
6 Christmas social

**Colchester Radio Amateurs**
**Stefan, M0XLB, 07771 616 676**
15 Christmas party

**Essex Ham**
**Pete, M0PSX, news@essexham.co.uk**
2, 5, 9, 12, 19, 23 Net on GB3DA, 8pm, chatroom & live audio feed www.essexham.net
3, 7 Essex YL net on GB3DA
3 Start of online Foundation course

**Felixstowe & District ARS**
**Paul, G4YQC, pjw@btinternet.com**
5 Members' show & tell
19 Christmas noggin: video & mince pies

**Leiston ARC**
**m0iah2008@gmail.com, 01473 738 593**
4 Christmas meal at The Thorpeness Hotel

**Loughton & Epping Forest ARS**
**Dave, M0MBD, 0798 016 5172**
1, 8, 15, 22, 29 Net, 144.725MHz, 8pm

**Norfolk ARC**
**Chris, G0DWV, 01603 898 308**
7 Reverse Beacon Network to test antennas, Steve, G3PND
14 Christmas party

**Norfolk Coast ARS**
**Steve, G3PND, info@norfolkcoastamateurs.co.uk**
8 JT65 evening
14 Mulled wine and mince pies
22, 29 No meeting

**South Essex ARS**
**Terry, G1FBW, 07986 070 040**
13 Christmas social evening

**Thanet Radio and Electronics Club**
**targradio@outlook.com**
2 Club night
9, 23 Club net on GB3DA
16 Construction evening (members only)

**Thurrock Acorns ARC**
**Gordon, 2E0ELI, acorns@taarc.co.uk**
1, 8, 15, 22, 29 Net, 2m FM simplex, 7.30pm

## REGION 13: EAST MIDLANDS

Regional Manager: Jim Stevenson, G0EJQ
RM13@rsgb.org.uk

**Derby & District ARS**
**Richard Buckby, radio@dadars.org.uk**
3 Special event station for UN International Day of Persons with Disabilities from DE23 6HE
3 Junk sale
10, 13 Committee meeting
20 Fish and chip supper

**Leicester RS**
**Alex, G8FCQ, 07531 201 640,**
5, 12 7pm Morse class, 7.30pm night on the air

**Lincoln Short-Wave Club**
**Pam, G4STO, 01427 788 356**
1, 8 Club net via GB3LM, 8pm
3, 10 Saturday Surgery and G6COL on the air
7, 17 Shack activities and G5FZ on the air
14/15 Christmas party
19 Committee meeting
21 Formal meeting
22 Club net, 145.375MHz, 8pm
24 Closed
28 Natter night
31 Club night

**Loughborough & District ARC**
**Chris, G1ETZ, 01509 504 319**
6 Paper planes evening
13 Vintage equipment night
20 Quiz & mince pies
27 No meeting

**Melton Mowbray ARS**
**Phil, G4LWB, 01664 567 972**
10 Christmas dinner
16 Christmas meeting

**RAF Waddington ARC**
**Bob, G3VCA, 07971 166 250**
5, 12, 19, 26 Club net, 145.325MHz, 8pm

**South Kesteven ARS**
**Andrew, M0NRD, 07969 062 859**
2 Club meeting
6 AGM
16 Fish and chip supper

**South Normanton Alfreton & District ARC**
**A Lawrence, 2E0BQS, 0115 930 7322**
2, 9, 12, 19, 23, 30 Natter night
5 Christmas party

**Welland Valley ARS**
**Peter, G4XEX, 01858 432 105**
5 Christmas pie and pint

**Worksop ARS**
**Paul, M0PJA, 07890 626 684**
1, 8, 15, 22 Technical, construction, radio operation
4, 11 Intermediate course
6, 13, 20 Club night & UKAC
16 100 Years of Cub Scouts
18 Intermediate exam

## REGION 3: NORTH WEST

The Tour de Furness is an annual cycle ride held by the Rotary Club of Furness. There is a choice of four routes from 5 to 50 miles and it's a fun event to raise money for charity. Furness ARS were asked to supply communications support for the route that has unreliable mobile phone coverage, plus a special events station. Members conducted a number of tests to form a link that covered the required route. Race day was an early morning start and communications between all stations proved to be a great success, using 2m and a host of rigs and antennas. The day was eventful, with messages needing to be passed for accidents, bike breakdowns and reports of drawing pins that had been maliciously thrown on parts of the route. The HF station, GB2TDF, was kept busy on 20m with contacts all over Europe, and into Canada and the East Coast USA. It was an enjoyable event that was well supported by Furness ARS members.


## REGION 4: NORTH EAST

**Angel of the North ARC** took part in 3Day with a number of other organisations at the Gateshead Central Library. Despite the library being a Faraday cage with only one opening window in the room the club operated from, they used a long wire held up by balloons. Youngsters were able to transmit and receive messages and learnt about Morse and the phonetic alphabet. Over 300 children with their parents took part.

**Bishop Auckland RAC** Rally will take place at the Spennymoor Leisure Centre, DL16 6DB, on 4 December. The venue has good parking and access to a large ground floor hall. There will be the usual radio, computer, electronics and Bring & Buy stalls as well as catering and bar facilities. There's plenty for all the family within the leisure centre for those not interested in radio. Doors open at 10.30am (10am for disabled visitors). Admission is £2 – under 14s accompanied by an adult are free of charge. Talk in on S22. For any other information contact John, G4LRG 01388 606396.


**Angel of the North ARC held their 7th Fog on the Tyne Rally recently. As well as bacon butties, tea or coffee, there was a Bring & Buy, junk stall, RSGB book stand and many traders. Visitors could enrol for Foundation, Intermediate and Advanced exam courses and Morse classes. A good time was had by all and the RSGB was out in force. The former Regional Manager of Region 4, Nigel, G0BPK, the newest DRM, Tony, MORHJ, met up with the Rally Organiser, Nancy, G7UUR, also a DRM (see photo above, right).**

## REGION 6: NORTH WALES

**Wrexham ARS.** Following an examination, four candidates passed their papers. They are now Andy, 2W0KMV, Dave, 2W0GXI, Simon, 2W0MLG and Paul, MW0IBS.

## REGION 7: SOUTH WALES

**Cleddau ARS** now meets at a new venue, Manshed, Pembroke Dock Dockyard SA72 6TH. Details from Heinz, MW0ECY on 07748 047 008.

(Photo right) Steven, M0SVR is the Advanced instructor at **Risca & District ARS** and has helped the club achieve many exam successes. Steven gained all his examinations at the club with distinctions in all three. Paul, MW0YBZ is now an Advanced instructor too and will become the fourth Advanced, Intermediate and Foundation instructor at Risca.

## REGION 8: NORTHERN IRELAND

Bangor & District ARS will have an open evening on 1 December with two demonstrations on satellite communications and on PSK31. Refreshments will be provided free of charge. www.bdars.com

## REGION 10: SOUTH & SOUTH EAST

Hastings and Rother RAYNET Group provided communications for the Northiam Bonfire to link all the involved parties from one main communication site. The event also marked the first use of their repeater system. This is run under an Ofcom Commercial Licence that enables them to lend fully legal, professional grade mobile and hand held radios to clients so they are able to talk directly to the organisers on the ground. This frees up organisers to do other things while still being in direct contact with everyone via the control. (For more information please use the "contact us" link on https://hrraynet.org.uk/) The evening really went with a bang, so to speak, communications worked very well, including the repeater. With thanks to the organisers, The Northiam Bonfire Society, for asking, Sussex 4×4 Response, for managing the road closures professionally and club members M0SSR, M0MJU, 2E0KES, G7LEL, G4CUS, Linda, G3MGQ, M0OFC, M0EDU, G4SIF, 2E0GHX and 2E0EOE. Photo courtesy of 2E0GHX.

At the New Forest ARS AGM a new committee was elected. It is, Geoff, M0ORE (chairman), Keith, G8MZF (vice chairman), Richard, M0RBF (secretary), Gill, 2E0SEW (treasurer), Andy, M0VTT (events coordinator), Chris, G4CWS, Peter, M0HYT, George, G3GRV. After the formal AGM, Geoff Moore gave a fascinating talk and demonstration of Pulse Echo Testing. This extremely useful technique involves sending a sharp pulse into a feeder and then watching the reflection. Using simple home built equipment to generate the pulse it is possible to test feeders for impedance, length and faults.

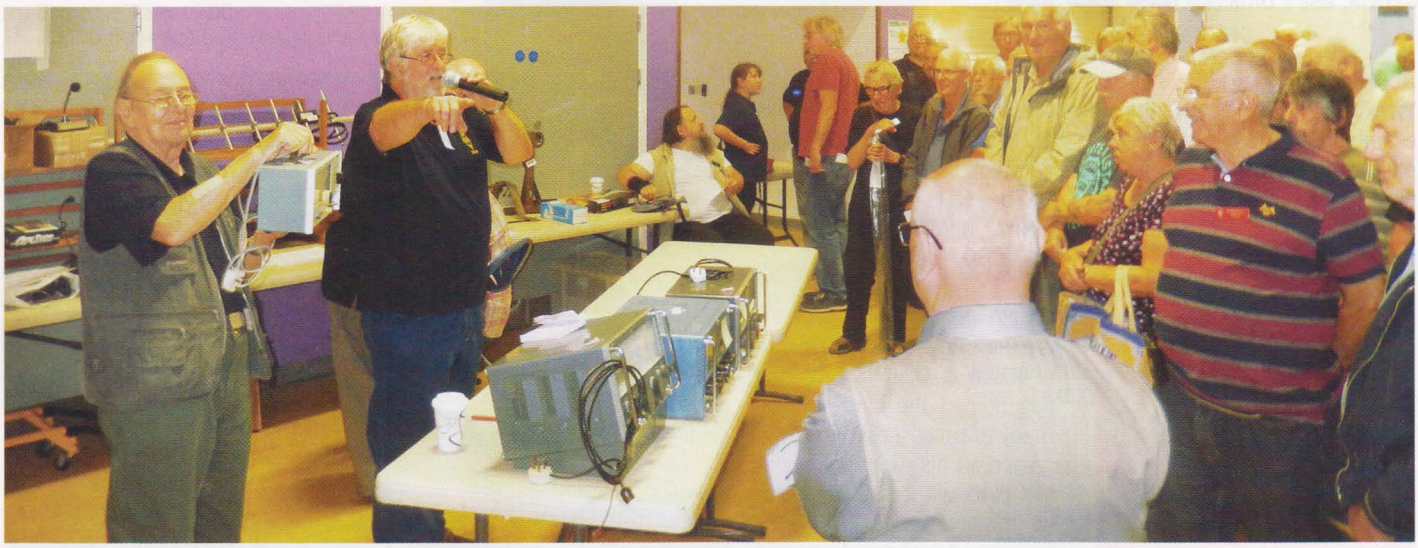
## REGION 11: SOUTH WEST & CHANNEL ISLES

As well as giving a signal report when making a contact, the make and model of the rig is often mentioned together with the aerial type. But many of us might wonder how does the equipment really perform, so **Torbay ARS** had a Show & Tell evening where the members were invited to bring along their normally home-based equipment for others to see, with a chance to operate the various bits of equipment under the owners watchful eye often showing them some of the tricks to use the rig easily. In September they had a talk from the Devon Freewheelers. These are a group of dedicated volunteers who using their own motorcycles provide a courier service to the NHS outside of normal working hours, seven days a week They carry a variety of medical supplies and thousands of miles are covered throughout the year in all weather conditions. TARS wish them every success.

**South Bristol ARC** had a full house from the Foundation exam, all four students have been confirmed as passing and all have successfully negotiated the Ofcom online licensing system to obtain their callsigns. The successful students are Joe, M6HQB; Frank, M6HQF; Michael, M6WWU and Nigel, M6RUU. If you hear these callsigns on air please go out of your way to make them welcome to the bands.

The Newbury Trophy was presented to **Torbay ARS** contest team – G6GLP, G4VUD, G3IHJ and M5ABN at the recent RSGB Convention.





Weston-super-Mare Radio Society's first indoor rally was a great success (above) and had over 200 people through the turnstile. Held in the Campus Community Centre, a local authority venue, facilities were excellent with a large hall, catering facilities and a car park. 20 traders including the RSGB bookstall attended, club funds were boosted with the surplus equipment auction levy and a stall was selling silent key equipment left to the club. The photo shows Steve, 2E0JQF and Dave, G4OKO conducting the auction.

## REGION 12: EAST & EAST ANGLIA

Essex has seen three new nets take to the air within a month. **Thurrock Acorns ARC** has launched a monthly SSTV Net, Selim, MOXTA has started a Wednesday 4m Essex Net, and David, M1ECC has launched a weekly 2m discussion of the state of the amateur radio hobby. These add the Essex CW Club's regular on-air meetups, Essex Ham's Young Ladies Net. The three new nets are already proving popular, showing there is demand for more on-air activity. For a list of all of the nets in the Essex area, go to www.sxham.uk/nets

January 2017 sees the 15th anniversary of the first Foundation training course run by **Chelmsford ARS**. Since then the volunteers have run 67 courses, training over 400 people. CARS typically run two Foundation, one Intermediate and one Advanced course each year. In 2007 CARS were awarded the Kenwood Trophy for Training for making a significant contribution to Training and Development in Amateur Radio within the UK. The training team were pleased to have a visit by the TX Factor Show production crew in 2015. To find out more contact Christopher, G0IPU on 0790 810 7951 or email training2016@g0mwt.org.uk

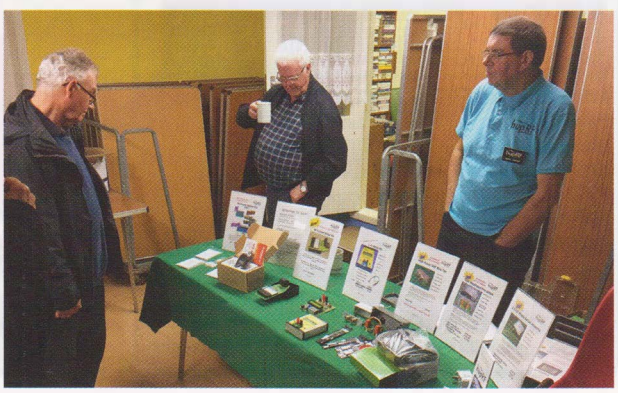
At several meetings throughout the year Norfolk Coast ARS members have listened to satellites – both beacon transmissions and QSOs – but last month they finally made their first satellite contacts, photo above. This was very much a team effort with Eduardo, M0KEK and Miles, G4FCZ steering the 70cm/2m antenna, Peter, G4NTN monitoring the Doppler shift and Phil, G4PQP operating the radio. Phil managed four contacts within a single pass, working two Russian, one Italian and a Belgian station, all with 59 reports.

This photo shows new Foundation licensees and exam team from Felixstowe & District ARS.

November's Essex Skills Night was a busy one. Kits from hupRF.com (photo right), the Icom IC-7300, DMR and D-Star, test equipment, data mode kits, CARS Slim Jim construction and more. A contact with the SO-50 satellite was attempted, the Essex CW club were running a live station, and getting started help was courtesy of Essex Ham. Skills Nights are free, and open to all.

Members of Thurrock Acorns ARC met at the 1st Grays Scout HQ to explore how to run a Fox Hunt. They were shown how to discover a hidden radio station (the Fox) using direction finding equipment by building a directional antenna and connecting the antenna to a receiver. Once this was completed the aerial is turned to get maximum or minimum signal strength from the fox then record the bearing onto a map. This exercise is completed three or four times from different locations and providing the person has been accurate it should indicate where the fox is located. The photo above shows (L to R) Nigel, 2E0NBG and Lewis, M6LGG examining the antenna that Steve, G4HXY (L) built.

Congratulations to William, G8CYK (seen above on the left), who won himself a pre-programmed Baofeng handheld at the Essex Repeater Group AGM in October. Presented by Murray, G6JYB.



# Classified Ads

## For Sale

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High strength tube, square box, rod, and other sections stocked in 6m lengths, can be cut. Engineered Compositions, Chester. Tel: 01244 676000 e. info@engineered-composites.co.uk www.engineered-composites.co.uk

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**CTCSS ENCODER AND DECODER KITS,**
DTMF Kits and Modules, PIC Microcontroller Development Kits. www.cstech.co.uk

**MICROPHONES & ACCESSORIES.**
Replacement microphones for a wide range of transceivers. Cables for Heil and studio microphones, headsets and mixers, PC headset adapters, PTT switches and replacement curly cords. DTMF microphones for echolink. For these and more great items go to www.technofix.co.uk

## Wanted

**VINTAGE RADIO & VALVES WANTED**
national cash settlement for silent key, shack clearouts 07552 678725, vintageradio@btinternet.com

## Equipment

**REPAIRS TO RECEIVERS, TRANSMITTERS**
New/Old, valve/transistor. Call 07903 023437 for details: www.kent-rigs.co.uk

**RADIO REPAIRS BY MONKL**
Icom, Yaesu, Kenwood etc, plus linear amplifiers, please contact Nick on 07770 397668 or email np262@yahoo.com

## Aerials

**M0CVO ANTENNAS**
For all your amateur radio antenna needs. Full details at: www.m0cvoantennas.com

**WESTERN HF 10**
67ft wire dipole 160-6m, full details lookup m0bzi at: www.qrz.com buy direct: m0bzi@outlook.com or 07748331458 reviews at: http://g0kya.blogspot.com/2010_08_01_archive.html **or** http://www.eham.net/reviews/detail/9424

**G4TPH MAGLOOPS BACK IN PRODUCTION.**
Remote tune and manual tune models for 40m through 10m. Details at www.g4tph.com

**QUAD BAND COLINEARS.**
10/6/2/70 Quad band 2.5/2.5/3.5/5.5 dbi gain only 1.2m length £59.95 ea 6/4/2/70 Quad band yes Includes 4m, 2.5/2.5/3.5/5.5 dbi gain 1.2m length £59.95 ea 2/70 Dual band 3.5/5.5 dbi gain 1.1m length only £37.95 ea. UK post £7.95.
Website: mirfield-electronics.co.uk
Email: martin.stokes@hotmail.com or
Tel: 07825549430

**TYT MD380/MD390GPS**
MD380 DMR radio inc. p/lead + s/ware £109.95, NEW MD390GPS waterproof DMR radio inc p/lead+s/ware £149.95
MD380 Li replacement battery £17.95, car adaptor unit £17.95, speaker mic £14.95, ear/mic £12.95. All inc post.
Website: mirfield-electronics.co.uk Email: martin.stokes@hotmail.com or Tel: 07825549430

## Cards & Design

**QSLERS SPECIAL OFFER**
1000 full colour both sides qsl cards £45 plus postage. 07720 580968 www.QSLers.co.uk

**LOW COST AND HIGH QUALITY QSL CARDS**
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## Miscellaneous

**ALL UK STATIONS – CALL IN ON OUR 'M1CRA' CHRISTIAN NETS!**
WACRAL welcomes all amateurs & listeners to our Sunday morning 'GOOD NEWS' nets, now at 07300-0830 on 3.747 MHz +/- QRM and, again, at 14.00-15.00 on 7.147 MHz. Our 2m SSB net at 15.00 is held on 144.205 MHz. Or, do join us on Wednesdays 07.30 3.747 MHz +/- QRM, 10.00 on 7.147 MHz (if no contact established after 5 mins QSY to 3.747 MHz and 21.30 on 3.751 MHz, for nationwide Christian fellowship and relaxed chat. All times UTC. See www.wacral.org for more net info and WACRAL details or just call Ian G4OPP on 01622 746650 or g4opp@wacral.org

**VINTAGE FIREWORK COLLECTOR**
will pay cash and collect from anywhere call Tony - 07956 506300 Licensed explosive storage

## Computer Software

**SD CONTEST LOGGER - EI5DI.COM**
Supports all RSGB, UKEICC HF contests and hundreds more. €20

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

Advertising. All display and classified advertising enquiries (except Members' Ads, which go to memads@rsgb.org.uk) should be sent to: Chris Danby, G0DWV, Danby Advertising, Fir Trees, Hall Rd, Hainford, Norwich, Norfolk NR10 3LX
Tel/Fax 01603 898 678
e-mail adsales@rsgb.org.uk

## Business Cards



## Advertisers Index

**FREE MEMBERS' ADS OF UP TO 40 WORDS**

Email your Members' Ad to memads@rsgb.org.uk. You must include your name, callsign, phone number, email address and location (not counted in the 40 word limit). Optionally, attach your own photo of the item (min res 800 x 600, must be in focus and well lit). Max 1 ad per Member per month; other terms & conditions also apply (see tinyurl.com/MemAdsInfo).

## FOR SALE

**AVO 7 AND AVO 8**, both with handbooks, £15 each. 78 valves, various types, list available, 14 mini screening cans, all for £15. Pye Transistor Ranger 12V crystalled to 130.4MHz glider frequency, £20. Stan Green, G4DNA, 01235 529 739, srcg1@btinternet.com (Abingdon, Oxon).

**BUTTERNUT HF2V** 80/40m coils, Q coil, capacitor & strip, centre insulator rod, instruction sheets, no tubing or hardware. £150 inc p&p. Steve Foster, G4MPK, 01424 893 386, stephen.foster27@btopenworld.com (Bexhill-on-Sea).

**DIGIMESS MO 10** analogue single channel 10MHz oscilloscope, complete with probe and manual. £75, As new. Tony, GOPEH, 01795 872 319, tony@marant.freeserve.co.uk (Sheerness).

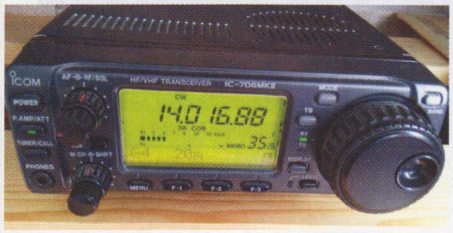
**EKCO PB189** domestic valve radio. About 1938? Working and in good clean condition. Motorised tuning. Nice cabinet with few scratches but honest wear, £65. Dave, G6KIE, 020 8397 3614, david_rb42@hotmail.com (Chessington, Surrey).

**ELAD FDM DUO SDR** transceiver. Boxed as new with all original accessories; used about 1 hour only, £700. FT-221R with muTek front end and original RF board. VGC, with mic, mains lead and original handbook, £185; both ONO. Keith, G4GZS, 0785 991 7317, keith4gzs@hotmail.co.uk (Rugby).

**ELECRAFT K2** 15 watt in excellent condition for sale with K60XV 60m, KAF2 audio filter, K160RX 160m board, K2VCO modification, KNB2 blanker, KSB2 SSB and KAT2 antenna tuner and FDIMP tuning. Beautifully made. £600 plus postage or collect by arrangement. Colin Turner, G3VTT, g3vtt@aol.com (Medway, Kent).

**ESIL HL250 (250W) DUMMY LOAD RESISTORS** for open wire line. 3 x 600Ω 10%, 2 x 300Ω 10%, £20 (or £5 each). All plus postage. Peter Pitts, G3GYE, ninapitts@talktalk.net (Penzance).

**ICOM IC-706 MKII** wideband TX mod by ML&S, UT106 DSP, FL101 250Hz CW filter, OPC639 EMC filter cable, HM103 mic, original manual and box. Fully working and owned since new. £500 plus p&p. Paul, G4ENK, 0778 845 0472 (Wirral).



**ICOM IC-8500** 'DC to daylight' receiver. Immaculate & perfect in all respects. Complete with Icom AD-55 regulated PSU, manuals, boxed. Also included an embroidered dust cover. Prefer collection or will deliver free within 100 miles radius of Durham. £695. Mike Swift, G4MJA, 0191 389 2822, mfswift@hotmail.com (Durham).

**R2ZX** VHF satellite Rx. See DF2FQ webpage. Complete with wall socket PSU & CD-ROM. VGC, as new, £120. Peter Carey, G3UXH, g3uxh@stanage-edge.com (Sheffield).

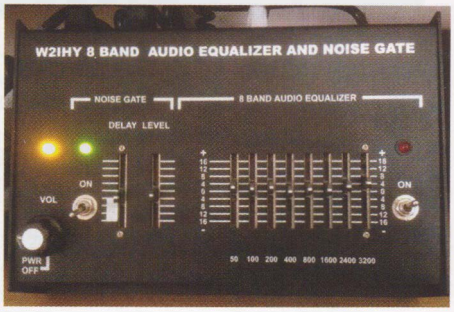

**SILENT KEY SALE obo G4FJB.** PS-30SWII 30A PSU, looks new, £45. MFJ 969 roller coaster ATU, £115. BW VS300A ATU, £60. Nikkai frequency counter RP79, no charger, £25. Maplin 48W Solder station, 3 spare bits, boxed, looks unused, £20. Farnell sine square generator 10Hz-1MHz, £20. Amtech 300 ATU, £30. Hansen DL-20 15W dummy load, £7. Prefer buyer inspect collect but will post at cost. Keith, G4AQJ, 0121 474 2182, tes81@sky.com (Solihull, West Midlands).

**TIMESTEP** weather satellite receiver, 4.1. excellent working order fully crystalled. No manual. £50 plus postage. John Garner, G3KEC, 01752 812 904, Taipan@talktalk.net (Plymouth area).

**TRANSMITTING BALUN**, 0.1 to 50MHz, 300W, bought by mistake, not been used yet, £15. Frederick Sadler, MOCVS, 0784 270 5607 (Matlock, Derbyshire).

**TS-450SAT**, £285. FT-767GX, £275. FT-767GX with 2/70/6, £475. ICR-7000, £275. FT-736R £325. TS-780, £250. FT-840, £290. FT-990AC, as new, £650. IC-9100, fully loaded, as new, £2195. IC-R8500, as new, £625. Discovery 800W VHF amp, £695. GONMP, 0778 546 2445 (Norfolk).

**W2IHY** 8 band audio equalizer and noise gate. As new, cost £280. Asking £170. Scott, M6GCO, 0797 186 3849 (Cambridge).




**YAESU FT-450D** mint condition, in original box, £260 including postage. Alex, MOHCL, 01438 871 387, (Herts) alex_a_cunningham@yahoo.co.uk

**YAESU FT-950** with manuals, GWC, £585. Kenwood TS-480SAT plus matching LDG KT-100 auto tuner, with manuals (purchased for mobile use, but rarely used), VGC, £500. Inspection and collection preferred but not essential. Peter, GOKYX, 01444 244 866. revpnm98@aol.com, (Burgess Hill, W Sx).

**YAESU FT990** (AC) complete with table mic, hand mic and operations manual. Good condition, non smoker, £475. Collect by arrangement or carriage at cost. V S Wallace, 2WOVSW, 01248 852 024, victor.wallace1@btinternet.com (Anglesey).

**YAESU FT-991**, boxed, £650. Icom IC-7600, boxed, £1650. All in mint condition. Colyn Baillie-Searle, GD4EIP, 0762 441 3036, gd4eip@wimanx.net (Isle of Man).

**YAESU G-1000DXC ROTATOR.** Includes Yaesu GC-038 lower mast clamp and 25m Yaesu pre-terminated control cable. SK sale – only 2 years old, hence very clean. List price circa £550, buy this one for £360. Collect or plus shipping. Roger, GOBSU, 0771 258 9163 (Wilmslow, Cheshire).

## WANTED

**2m D-STAR HANDHELD.** Must be in good condition and all ready to use on D-Star. Roy Moss, GW7UVO, 01244 811 311, roymoss1940@gmail.com (Clwyd).

**DENCO IFT 18** 1.6 IF transformer. Free or chassis mounted. Must be the 1.6MHz version. Dave, G4IKK, 01298 212 423, silver1.shadow@btinternet.com (Buxton, Derbys).

**DOES ANYONE HAVE** a teleprinter in the loft/shack they don't want? If so, please contact me. I prefer the smell of oil to a computer screen! Dave Kemplen, G1NSV, 01579 345 740, mail@davekemplen.co.uk (Cornwall).

**EDDYSTONE VHF RECEIVER** model 990-R. Brian, GWOGHF 02920 703 429, b.williams538@gmail.com (Cardiff).

**KENWOOD-TRIO TS-780** for spares or repair. Details misplaced, so please contact again. GOHZE, 0790 364 0189 (Peterborough).

**LDG TW-1 TALKING WATTMETER** (HF). 70cm 12V solid state 100W amplifier – 80sera (Microwave Modules/BNOS/Mirage etc) are all OK. Scorpion SA-680 (not the 'shorty'). Michael Maude, G1UPP, 0790 997 8737, michael.maude@yahoo.co.uk (Bristol area).

**MULLARD HIGH SPEED VALVE TESTER CARDS**, numbers 1094 and 588. If you have cards which are not for sale could you please provide full size photo copies? Frank, M1GFE, 01621 788 229, pat@ferridge.orangehome.co.uk (Maldon, Essex).

**muTek FRONT END** board for Yaesu FT-221 / FT-225. Will also consider a rig with the board already installed, working or non-working. Mark, G6DOD, 0783 154 5838, fastflyer99@yahoo.co.uk (Ryde, Isle of Wight)'

**OPC-581 OR OPC-587** cable, or RMK-706 cable kit to suit Icom IC-706. Sensible price paid. Howard, GM7ESM, 01250 871 018, gm7esm@gmail.com (Perth & Kinross).

**TW MAGPAD KEY.** KW200CA all valve transceiver (not CAT), KW remote VFO 4B. KW160 Top Band TX. Richard, G3UGF, g3ugf@norcomm.co.uk (W Yorkshire).

**TWO ALUMINIUM CONTROL KNOBS** 20mm dia with flute as used on the KW2000 range of transceivers. Reasonable price paid. Jim, G3SPE, 01288 361 573 (Bude, Cornwall).

## UP FOR GRABS

**BOUND VOLUMES OF *RADCOM*** 1948 – 1981. All in good condition, available free to a good home. Recipient collects or pays postage. Gary, G0BKR, 0792 048 9347, gclark@iee.org (south Bucks).

***WIRELESS WORLD*** – Free to a good caring home: 31 quality bound volumes of *Wireless World*, which are in very good condition and complete in every respect. A wonderful history of electronics. It will break my heart if these are thrown out. Collection by arrangement please. Ross, GW3NWS, 0790 977 4255, ross.clare@btinternet.com (Newport Mon).

## RALLIES & EVENTS

Members of the RSGB Regional Team will be present with a bookstall at the rallies this month marked with an RSGB diamond.

If your rally/event is not listed here, please
SEND US FULL INFORMATION
by email to radcom@rsgb.org.uk

3 DECEMBER
**SOUTH LANCS WINTER RALLY**
Bickershaw Labour Club, Bickershaw Lane, Bickershaw, Wigan WN2 5TE.
The venue has disabled facilities and car parking on site. Doors open at 9am with traders gaining access from 7.30am. Admission is £2.50. There will be trade stands, a Bring & Buy and special interest groups. There is a licensed bar and catering on site. Details from Jason, G0IZR on 01942 735 828. [www.slarc.co.uk/rally].

4 DECEMBER
**BISHOP AUCKLAND RAC RALLY**
Spennymoor Leisure Centre, 32 High Street, Spennymoor, Durham DL16 6DB
Venue has good car parking and disabled facilities. There will be the usual radio, computer and electronics as well as a Bring & Buy. Catering and bar will be available on site. Facilities. As you can imagine, there is a lot to do for all the family within the confines of the leisure centre for those of the family not interested in radio. Doors open at 10.30am with disabled visitors gaining access from 10.15am. Admission is £2 with under 14 free of charge with an adult. Talk in will be on S22. More details from John, G4LRG on 01388 606 396 or Brian, G7OCK on 01388 762 678.

## SPECIAL EVENT STATIONS

These callsigns are valid for use from the date given, but the period of operation may vary from 1 – 28 days before or after the event date. Details published here were kindly published by Ofcom on 25 October 2016. Note that Ofcom no longer provides Regional Secondary Locator information for the NoV holder (GM, MW, GI etc), replacing it with a # symbol.

| Date | Callsign | Event phonetics | Location | Parent callsign |
|---|---|---|---|---|
| 09/12/2016 | GB2MOP | Museum of Power | Ceredigion | G#7EUL |
| 26/12/2016 | GB0HNY | Happy New Year | Huddersfield | G#0BFJ |
| 28/12/2016 | GB6HNY | Happy New Year | Huddersfield | M#0GDJ |
| 28/12/2016 | GB5HNY | Happy New Year | Almondsbury | G#4TML |
| 28/12/2016 | GB2HNY | Happy New Year | Huddersfield | M#0RBG |
| 28/12/2016 | GB1HNY | Happy New Year | Huddersfield | G#0BWB |

15 JANUARY – RED ROSE WINTER RALLY

5 FEBRUARY – 32nd CANVEY RADIO AND ELECTRONICS RALLY

12 FEBRUARY – HARWELL AMATEUR RADIO SOCIETY RADIO AND ELECTRONICS RALLY

19 FEBRUARY – RADIOACTIVE FAIR AT NANTWICH

26 FEBRUARY – CENTRAL COAST ARC RALLY, AUSTRALIA

26 FEBRUARY – PENCOED ARC TABLE TOP SALE

26 FEBRUARY – RAINHAM RADIO RALLY

4 MARCH – LAGAN VALLEY ARS RALLY & HAMFEST

5 MARCH – EXETER RADIO & ELECTRONICS RALLY

12 MARCH – DOVER RADIO CLUB RALLY

19 MARCH – 32nd WYTHALL RADIO CLUB RALLY

26 MARCH – CALLINGTON RADIO RALLY

9 APRIL – NARSA EXHIBITION

6 MAY – SERF

19-21 MAY – DAYTON HAMVENTION® (new venue)

11 JUNE – JUNCTION 28 AMATEUR RADIO RALLY

25 JUNE – WEST OF ENGLAND RADIO RALLY

14-16 JULY – HAM RADIO, FRIEDRICHSHAFEN

23 JULY – FINNINGLEY ARS RALLY

13 AUGUST – FLIGHT REFUELLING ARS HAMFEST

## SILENT KEYS

We regret to record the passing of the following Members:

| | |
|---|---|
| Mr L E B Tombe, 2M0BIK | 19/09/2016 |
| Mr D E Wanklyn, 2W1AOD | 24/09/2016 |
| Mr P E Hale, G2HS | 09/2016 |
| Mr B Harris, G3HZR | 14/10/2016 |
| Mr A A Chisholm, G3INL | 2016 |
| Mr G Fare , G30GQ | 02/2016 |
| Mr E D Wilson, G30JQ | 13/09/2016 |
| Mr A L Bagnall, G4CWD/ZL3WD | 2016 |
| Dr J M Townsend, G4ILY | 28/09/2016 |
| Mr R Hill, G40WU | |
| Mr J Rigby, G4RXZ | 15/09/2016 |
| Mr F Williamson, G4VDZ | 06/10/2016 |
| Mr A Ogden, G50D | 27/08/2016 |
| Mr G Evans, G6AUK | 06/2016 |
| Mr N Hendry, GM8CBQ | 07/10/2016 |
| Mr B S Smith, G8DAB | |
| Mr S Nixon, M0HPQ | 15/09/2016 |
| Mr A Keen, M6AKC | 28/08/2016 |
| Mr R G Clement, RS18978 | 26/07/2016 |
| Dr R R Sullivan, WB6SER | 4/10/2016 |

Moonraker's stand at the 2016 National Hamfest

# QSL Bureau questions

At the National Hamfest it was good to meet many bureau users and, particularly, pleasing to meet more of our hard working QSL volunteer sub-managers than ever before. The, QSL Quiz was a great success providing much amusement, discussion, some head scratching and, importantly, it gave us feedback that should help us to focus on what we need to do to help Members help us to move more cards, more quickly.

The 3 correct entry lucky winners, drawn at random from hundreds of entries, will each receive a voucher for 500 custom designed QSL cards to a design of their choice. They are, David, MOOSA, Keith, MODZB and Rob, MOVFC.

For those unable to be at the National Hamfest, why not test yourself (or perhaps your club members) for fun and help us to help you move more cards, more quickly.

**1: What must you include with every outgoing QSL package?**
A: Name, address and callsign
B: Your Membership number & callsign
C: A recent and original *RadCom* address label

**2: What is the maximum acceptable size/weight for a card?**
A: 100 x 150mm (6" x 4") - 4 grams
B: 140 x 90mm (5.5" x 3.5") - 3 grams
C: No size, page or weight limit

**3: How should you send your cards?**
A: Country name order.
B: Callsign pre-fix order
C: Random or logbook order

**4: Should UK destination cards be separate from foreign?**
A: Yes
B: No
C: Optional

**5: Should all USA cards be separated and pre-sorted by?**
A: State
B: Prefix letter and Number
C: Callsign number only, regardless of prefix letter

**6: What can you include with a QSL card?**
A: An envelope.
B: Picture or a gift
C: Nothing.

**7: Can you receive cards for other call holders, UK or foreign?**
A: No.
B: Yes, provided they are Members or pay to receive.
C: Yes.

**8: What is the personal, annual weight limit for sending cards?**
A: 5kg
B: 10kg
C: 15kg

**9: What must a Special Event station include in a package?**
A: Membership number or club Affiliation number.
B: Answer A plus a copy of the NoV with every package.
C: Answer A plus a copy of the NoV - once only.

**10: Where does the RSGB bureau send Members cards?**
A: IARU member bureaus only
B: Every country with active Amateurs or clubs
C: IARU member bureaus & QSL managers overseas

Answers: 1: C, 2: B, 3: B, 4: A, 5: C, 6: C, 7: B, 8: C, 9: B, 10: A.

**RSGB QSL Bureau**
qsl@rsgb.org.uk

**RADIO SOCIETY OF GREAT BRITAIN**
ADVANCING AMATEUR RADIO SINCE 1913
Founded in 1913 incorporated 1926.
RSGB is a trading name of Radio Society of Great Britain, a limited company registered in England and Wales with company number 00216431. Member society of the International Amateur Radio Union.
www.rsgb.org.uk

**HEADQUARTERS AND REGISTERED OFFICE**
3 Abbey Court, Fraser Road, Priory Business Park, Bedford MK44 3WH. Telephone: 01234 832 700

**Patron: HRH Prince Philip, The Duke of Edinburgh, KG, KT**
Membership is open to all those with an active interest in radio experimentation and communication as a hobby. Applications for Membership should be made to the Sales Department from which full details of Society services may also be obtained.

**RSGB MEMBERSHIP**
**Annual rates from 1 January 2011**
Full Membership (by Direct Debit).....£47.00 (individual & club)
Family membership (by Direct Debit).....£56.00
*Paying other than by Direct Debit attracts a £4 premium.*
Student (21-25).....Free
Under 21.....Free
Subscriptions include VAT where applicable.
Special arrangements exist for visually impaired persons. Details and Membership application forms are available from RSGB HQ or see www.rsgb.org/join

**YOUR RSGB**
Members seeking advice and guidance on any aspect of amateur radio or the Society's work are free to contact the relevant person below. Before doing so, please do check the comprehensive FAQs on the RSGB website at www.rsgb.org/faq/ to see if your question is answered there.
For HQ staff, both email addresses and telephone details are provided, including the option to select when dialling through the RSGB switchboard (01234 832 700).

**Chairmen and Honorary Officers:**
These are all volunteers and give their time freely to support the Society. Members should respect the fact that many also have full time day jobs, and so email is the appropriate method of communication.

**THE RSGB BOARD**
Nick Henwood, G3RWF (RSGB President)
email: g3rwf@rsgb.org.uk
Steve Hartley, G0FUW (Board Chairman)
email: g0fuw@rsgb.org.uk
Stewart Bryant, G3YSX, email: g3ysx@rsgb.org.uk
Alan Messenger, G0TLK, email: g0tlk@rsgb.org.uk
Graham Murchie, G4FSG, email: g4fsg@rsgb.org.uk
Len Paget, GM0ONX, email: gm0onx@rsgb.org.uk
Ian Shepherd, G4EVK, email: g4evk@rsgb.org.uk

General Manager: Steve Thomas, M1ACB, email: steve.thomas@rsgb.org.uk
Honorary Treasurer: Richard Horton, G4AOJ, email: g4aoj@rsgb.org.uk
Company Secretary:
Post vacant

Note: The General Manager, Company Secretary and Honorary Treasurer are not Directors, but are in attendance at Board Meetings.

**HEADQUARTERS STAFF**

**Technical Amateur Radio Enquiries**
email: AR.dept@rsgb.org.uk
Telephone: 01234 832 700, Option 4
**Amateur Radio Examinations**
email: exams@rsgb.org.uk
Telephone: 01234 832 700, Option 3
***RadCom* (news items, feature submissions, etc)**
Elaine Richards, G4LFM or Giles Read, G1MFG
email: radcom@rsgb.org.uk
Telephone: 01234 832 700, Option 8
**GB2RS and Club News**
email: radcom@rsgb.org.uk
Telephone: 01234 832 700, Option 8
**Amateur Radio Licensing Enquiries**
email: AR.dept@rsgb.org.uk
Telephone: 01234 832 700, Option 5
**Sales department (Membership, books and other products)**
email: sales@rsgb.org.uk
Telephone: 01234 832 700, Option 1
**Subscription renewals**
Telephone: 01234 832 700, Option 2
**IOTA**
email: IOTA_HQ@rsgb.org.uk
**General Manager**
email: GM.dept@rsgb.org.uk
Telephone: 01234 832 700, Option 9

## BEING A MEMBER

Ian, G4EAN/9H3YI

G7MVN and G3NBY (The Last Word, September & October) both urge amateurs to become Members of the RSGB. I agree with them and would like to go a step further by urging members to attend RSGB AGMs.

I have attended RSGB AGMs since my early days as a new G4. I have never returned home from an AGM feeling that attending it was a waste of time or money (though I shall acknowledge returning home with an empty wallet and a heavy bag of books).

RSGB AGMs are a two-way process. RSGB directors, managers and Members on the floor of the AGM can discuss and exchange ideas so that the RSGB reflects the needs of our hobby and will serve us well in the future. Topics can be discussed in the AGM but may equally satisfactorily be discussed over a cup of coffee before the meeting or in the lunch break or, time permitting, after the meeting.

The 2016 event was an exceptionally good AGM. The venue was comfortable, the meeting was informative and the free lunch was very much appreciated. The Q&A in the informal session had some of the best questions I've heard at an RSGB AGM in the last ten years (including "why is my club not mentioned in the club's section of *RadCom*" and the answer, simply that "your club doesn't *send* us anything for the club's section").

This was not an inexpensive AGM for me to attend. It involved two nights at a hotel and a train journey of around five hours in each direction. The location and date of this AGM was announced well in advance and I was grateful for this because it gave me a good chance to minimise the cost of both hotel and train fare. I had a very pleasant stay in Glasgow, a city that I've been through a lot but never before had time to be a tourist in it, and I was also able to look around the centre of Edinburgh on my way back home. It wasn't only an AGM, it was also a very pleasant weekend break

I wait with interest to see where the 2017 AGM will be held. See you there?

*The 2017 AGM will be held in Cardiff on 22 April 2017; the venue has not yet been finalised but full details will appear in the January 2017* RadCom

***Steve Thomas, M1ACB, RSGB General Manager***

## 2m REPEATERS

**Theresa Cornwell**

Being a Member of the RSGB and a subscriber to *Practical Wireless*, I have followed the discussion on repeaters in both magazines. It seems pretty obvious to me that many of us have rigs that are now incapable on accessing some of the current repeaters. I used to enjoy a mobile trip but no more; I can't get access them with my old 290 and 2m simplex is dead except for contests. It seems that unless we to go back to simple access, things won't improve and I'd really like to rag chew again! It can't be beyond the wit of man to make it available to all instead of only to those with the latest technology. I would love to turn on my 2m rig when mobile and actually be able to have a chat.

*Even back in the early 1980s when the FT-290 was made a CTCSS board was available (FTS-7). In the intervening 35-odd years CTCSS has simply become a standard feature, even on the cheapest (under £20, delivered) Far Eastern dual band handhelds. CTCSS encoder circuits abound on the internet if you want to fit one yourself. The various digital repeaters represent an evolution in the state of the art of amateur radio. Much as the change to SSB required new gear, the digital modes also require new equipment – and also offer new opportunities.*

***Giles Read, G1MFG, RadCom Technical Editor***

## NIGHTMARE NEIGHBOURS

*We have received a great deal of correspondence on this matter, both for The Last Word and in general correspondence. Here is a selection of the comments received.*

I've just watched a most distressing programme on Channel 5 entitled 'Neighbours from Hell'. Not the sort of programme I would normally watch, but flicking through the channels – as you do – I came across what was obviously an amateur radio mast with a, I think, 4 band Yagi perched atop it. So who were these horrible neighbours? Yep, the radio ham. It turned out that he was living in a bungalow complex, mainly for retired people, by the seaside in Kent. And the cause of the upset was his 30' lattice mast which his new next door neighbour was condemning as an eyesore. She mobilised all the other occupants of the complex, organised a petition, and complained to the Council... Then the bombshell: he didn't have planning permission. Apparently he had had it at his previous QTH, in the same county, and had assumed he could take the permission with him when he moved... He applied for retrospective planning permission, which was refused as was the appeal and he was ordered to dismantle the mast... I called this programme distressing, because that's exactly what it was to him. Watching him dismantling the mast we could see how upset he was.

When oh when are the allegations against radio amateurs' and their equipment going to be put to bed for good? Cancer risk from transmissions, unsightly antennas/getting permission to erect even the simplest antenna when the country is covered with satellite dishes and poles set high on houses to support horizontal digital TV antennas... Can the RSGB intervene to clarify?

Following the recent Channel 5 program regarding a radio amateur and his conflict with his neighbours, I hope that the RSGB will undertake a formal and robust approach to the program producers. I understand that the RSGB will not act with regard to planning matters unless directly contacted by a member of the RSGB for help and advice. However there were several statements made during this program regarding the 'potential health effects and hazards' of the radio transmissions. Some of these were very weakly glossed over by the program as having very little medical evidence but this was much later on in the program than the original statements had been raised.

I am not a fan of Channel 5's "Nightmare Neighbour style of programs for me I think to be honest it's difficult to discover the basic facts behind each story no doubt the radio amateur report was very sad and put the hobby in a bad light I am sure that The RSGB will work hard opening a conversation with channel 5 and the production team who made this report – I do feel that the radio amateur in question was 100% in the wrong for putting up the mast and antenna without planning permission... I am concerned about the claims that were made regarding the cancer question. And if this cannot be disproved it could well become a stumbling block to us all.

The worst feature was one of the neighbours repeatedly drawing attention to the fact that 9 people had been diagnosed with cancer since the mast was installed. I must admit the mast was out of all proportion to the bungalows, it dominated the area.

I am a little concerned that the above mentioned program tonight on Channel 5 will give at false view of amateur radio. I, as well as all radio amateurs, are fully aware that mobile phones are radios and let's not to mention the kilowatts put out by TV transmitters. But in some people's minds these do not count! Let's hope that the producers will be sensible.

*Thank you all for contacting us about Channel 5's programme last night. We saw it and have been preparing responses to Channel 5 and to our Members. The following announcement is on the website and went out on social media channels:*

*"We work hard to build relationships with the media and often provide facts and help when programmes and articles featuring amateur radio are being prepared.*

*"Unfortunately, the RSGB was not invited to be part of Channel 5's 'Nightmare Neighbour Next Door" programme or to verify any facts. We have, of course, contacted Channel 5 about our concerns and have highlighted the positive aspects of amateur radio. We have also offered our expertise and*

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*input for future programmes where amateur radio is mentioned.*

*"Our volunteers spend a lot of time helping radio amateurs with planning applications. It is by putting forward facts during those processes that we can help to dispel myths about amateur radio and any impact on the public or environment.*

*"However, one of the best ways to counteract the public's lack of understanding about amateur radio is to offer positive stories to the media. We are actively seeking new opportunities for positive coverage of amateur radio across all media channels. If you have stories to share or media contacts you know well, please let us know. We will also be very happy to help radio amateurs approach their local media – contact comms@rsgb.org.uk*

*"We take the promotion of amateur radio seriously. Just this month RSGB representatives from the Board, TEC, the Regional Team, the Youth Committee and HQ staff have attended four national UK Space Agency school conferences and outreach days to demonstrate this fantastic past time to pupils, teachers and the public. We are delighted to have been invited to present at two other national teacher conferences next year, as it is by educating teachers and the younger generation about the benefits of amateur radio that we will counter the current myths and lack of understanding about it.*

*If we receive a response from Channel 5 we will share it with our Members."*

***Steve Thomas, M1ACB, RSGB General Manager***

*Correspondence to The Last Word on this subject is now closed, thank you- **Ed**.*

## PLASMA BOMB PROPOSAL

**Trevor Surgey, G3ZST**

I was reading the 20 August, 2016 copy of *New Scientist* magazine recently and came across an American plan to deliver by using many satellites, directly into the Ionosphere, large amounts of ionised gas using onboard plasma generators. (https://www.newscientist.com/article/mg23130871-000-us-air-force-wants-to-plasma-bomb-the-sky-using-tiny-satellites/) The USAF has already awarded contracts to three teams tasking them to come up with ideas on the best way to do it.

I find the whole idea a bit worrying and hope that they don't get anywhere but nevertheless I thought it might make a suitable item for discussion in *RadCom*.

## PROBLEMS WITH REVALIDATION OF LICENCES

**R V Angell, G4CCE**

Having been advised to revalidate my licence, I went to 'Spectrum's' site and was instructed to fill in a new account form. This I did and was then informed that a password would be sent to my email box.

Having waited, for a week, with no response, I contacted them by telephone to be told that BT Internet isn't forwarding their emails. The young lady, to whom I spoke, was extremely helpful and very soon sorted it out for me. I am pleased to say that I was able to access Spectrum's site and view my licence details.

I'm not sure if you are aware of this glitch but there must be others, who use BT Internet, who are also wondering what's going on!

*We have heard reports that Members have found these emails in either their local or server Spam folders. This has often solved the problem.*

***Steve Thomas, M1ACB, RSGB General Manager***

## JOTA

**Chris Skelcher, G3YHF**

It was a delight to hear so many Scout JOTA stations active on 15/16 October, and also to hear youngsters without licences exchanging greeting messages. Some of these Scouts sounded very young, but all got their messages across – sometimes with a bit of encouragement and assistance from the operators! And well done to the operators for devoting the time to organising the stations and preparing the Scouts to speak on the air. I was involved in the Scout radio group as a teenage SWL in the 1960s, assisting during the 11th JOTA in 1967 at GB3BSI on Brownsea Island, where an international jamboree celebrated the 60th anniversary of the first Scout camp. It was the encouragement of Les Mitchell, G3BHK (SK), the visionary behind JOTA, and the other licensed operators in the Scout radio group that got me thinking about the RAE and Morse test!

I'm sure the JOTA experience will have the same effect on some of today's young participants and keep our hobby alive and growing.

*We will have a round-up of JOTA reports in the next edition of* RadCom. *If you haven't sent yours in yet, the deadline is 17 November. Please send all reports with photos as seperate jpg files to radcom@rsgb.org.uk – **Ed**.*

## OFCOM EXPERIENCE

**J Howarth Jones, GW3TMP**

Having had an interference problem on 160 and 80m for the past couple of years and read in Last Word the excellent response and results some members had received from Ofcom, I decided to contact them. The noise is a continuous 50μV plus on those bands day and night. I had suspected it was coming from an 11kV overhead line about 50 metres away. In March this year I received a letter from SP Energy telling me they would be cutting the supply on a particular date to do some maintenance work, I rang their office and asked if the 11kV supply would be off and they told me it would.

On the day I connected my transceiver to a 12V battery and waited for the power to be switched off, fully expecting the noise level to drop markedly, how disappointed I was when it made no difference. Later that day I went around the area with a portable receiver and loop antenna and could not get a null anywhere, there was no power to any of the surrounding properties so the noise could not be coming from any of those. That is when I decided to contact Ofcom.

I filled in the online form and received a telephone call a few days later and was asked to keep a log for 5 days and send it in, this I did and I had another call from the DEO and was told it was the wrong type of log and was asked "What are these bands?" I had put in the 80m and 160m bands. The DEO told me he wanted frequencies not bands and told me he would send a blank template and if possible could I send an audio/video clip of the noise. I recorded a video clip ready to send and began to fill in the log and after 3 days received an email telling me the case had been closed. I thought, how can the case be closed when the evidence requested had not been received? At the end of 5 days I still sent the videos and the log along with an email asking why the case was closed prior to receiving the information they had requested. No reply was received.

Two weeks passed and I received another call from the DEO, I should have mentioned I spoke to a different person each time they called me. I was asked about the nature of the noise and told I would be sent a log to keep for 5 days and also if possible could I send and audio/video clip of the noise. I repeated the procedure and submitted the evidence.

I received an email from Ofcom some days later telling me they did not consider the interference to be harmful as I could move frequency within a band (which I can't as the noise covers the whole of the bands) or move to a completely different band all together.

What a fruitless exercise this has been and very disappointing.

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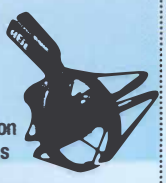

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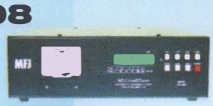

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