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February 2017 ♦ Volume 93 ♦ Number 02 ♦ £4.95



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**KX2 £859.95**

### KX2 ACCESSORIES

- Small compact carry case for KX2, and small accessories (CS40) **£38.95**
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- 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**



### 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**

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- External VFO knob with essential controls for faster access (K-POD) **£299.95**
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Longest element: ..... 11.9m  
Weight: ..... 23kg  
Power: ..... 3kW

**£2174.95**



## 2 ELEMENT YAGI

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Boom: ..... 1.44m  
Longest element: ..... 10.97m  
Weight: ..... 13.6kg  
Power: ..... 3kW

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Vertical 40-2m base kit with 16ft telescopic pole and travel bag. (STIR-00301)

**£429.95**

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The DB42 Monstir Pro is currently the largest of the Dream Beam series of Yagi antennas, with 5 elements on 20m-6m and 3 elements on 40/30. The DB42 has a 49ft looped driven element. Call for Best Price

Boom: 13.0m  
Longest Element: 14.9 m  
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Power: 3 kW

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## KENWOOD DEALS

KENWOOD DEALER OF THE YEAR 2016

### TH-D74

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**£599**

### KENWOOD ACCESSORIES

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

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

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

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### IC-9100

Complete HF - UHF in one box. It offers 100 Watts output on all bands up to 2m, whilst on 70cms you get a healthy 75 Watts. An internal auto ATU is included which covers HF plus 50MHz. Only UK Dealer where you can fully demonstrate the IC-9100

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### FT-891

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

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### 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.

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### FT-857

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

**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.

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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.

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### 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!

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### YAESU ACCESSORIES

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

External ATU for FT-897 and FT-857 (FC-30) **£263.95**

### OTHER PRODUCTS

Internet repeater enhancement system (HRI-200) **£119.95**

Mobile transceiver with System Fusion (FTM-100DE) **£324.95**

Handheld transceiver with System Fusion (FT-1XDE) **£319.95**



### FTM-3200DE

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Cover image:  
The International Space Station.  
Photo courtesy of NASA.

## 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 March edition of *RadCom* is expected to arrive with most Members by 24 February, although this can take up to a week longer in some cases; international deliveries can take longer still.

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## Pat Hawker G3VA trophy awarded to Sam Jewell, G4DDK

RSGB General Manager Steve Thomas, M1ACB presented the Pat Hawker G3VA trophy to Sam Jewell, G4DDK in November. Sam (right) was awarded the trophy as the overall winner of the RSGB's annual Construction Competition at the RSGB Convention for his 28-144MHz transverter design, the Anglian 3.

The annual RSGB Construction Competition is to encourage home construction, experimentation, design and innovation. Any Member of the RSGB, or group of Members, is eligible to enter. It's not too soon to start thinking about an entry in one of the various categories. If you are entering a project into your local club competition, it could be a worthy entry for the 2017 RSGB Construction Competition.



## New Examinations Group Chairman sought

The RSGB Examinations Standards Committee (ESC) is looking for a new Chair for the Examination Group (EG). This appointment will be for an initial term of three years. This important group carries the main responsibility for managing and developing the syllabus, exam content and processes for each of the Foundation, Intermediate and Advanced level examinations. At the moment, its major focus is the complete review of all three syllabuses. The current Chair of the EG, Alan Betts, G0HIQ, has decided to step down after very many years in this role and the RSGB Board would like to record their thanks. This volunteer role is vital to the future of access to the hobby in the UK, and the new Chair will report formally to the ESC annually, although a greater degree of routine interaction is anticipated. Interworking regularly with other RSGB committees and sub-groups is required, especially as a part of the Syllabus Review project.

For more details on the role and responsibilities of the EG Chair please see <http://rsgb.org/main/about-us/committees/examination-standards-committee/exams-group/> and the environment within which the EG and ESC function is explained in <https://thersgb.org/publications/exams/schedule-of-terms-between-ofcom-and-rsgb-conduct-amateur-radio-examinations.pdf> (or [tinyurl.com/hrv97pj](http://tinyurl.com/hrv97pj) and [tinyurl.com/zegbpx9](http://tinyurl.com/zegbpx9) respectively).

The EG meets face-to-face regularly, but increased use of available technology to reduce the travel needs will be a focus of the new Chair.

This role would suit, but is not limited to, an experienced educational professional eg current or ex-teacher or college/university lecturer, who has first-hand experience of working with exam boards, setting and managing assessment tasks, and has experience of working on committees and leading teams.

Candidates must hold a Full UK licence, and are expected to be active in some aspect of amateur radio. They would also be expected to have current or recent previous experience of the UK Amateur Radio Licence training and examination process at the delivery end, either through working within their club's training programme or as an independent trainer.

If you have some knowledge of the RSGB Committee structure it would be an advantage, and you will need good interpersonal and written skills to fulfil the role effectively.

Applications should include a brief, relevant CV and a statement of what you believe you could bring to this role. Please contact Dave Powis, G4HUP, Chair of the ESC, via [esc.chair@rsgb.org.uk](mailto:esc.chair@rsgb.org.uk) to apply or to discuss any aspect of the role. Applications should be submitted by 28 February 2017.

## National Club of the Year 2016

The theme of the competition is Promoting Amateur Radio, and the judges want to learn about the special events that your club has run and details of other outreach activity and initiatives that you have undertaken to promote our hobby.

As last year, the RSGB will be judging entries in two categories: clubs with fewer than 25 members and clubs with 25 or more members during 2016 and there will be separate prizes for each category.

Please use the entry form at <http://rsgb.org/main/clubs/national-club-of-the-year/> which must be sent to your Regional Manager by 28 February 2017.

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

In order to determine regional winners, entries will be judged and ranked by a Regional Manager (from outside of the region to ensure impartiality). These winners will be announced at the RSGB AGM on 22 April in Cardiff.

The RSGB Board will judge the national winners, which will be announced at the National Hamfest in September.



## Ten-year Chairmanship comes to an end

The RSGB Board would like to recognise the excellent work carried out by Professor Simon Watts, G3XXH, who stands down from his position of RSGB Examination Standards Committee Chairman at the end of December. Simon has held that post, initially under the Radio Communications Foundation, and more recently under the RSGB, for a full ten years. During that time he has seen many changes in the examinations but his Chairmanship has ensured the continued probity and quality of the exams whilst improving flexibility and accessibility. Simon has been sent a valedictory letter from the President together with a certificate of recognition.



## YOTA 2017



### Huge interest from overseas and two new super supporters

YOTA 2017, which is the international youth event that the RSGB will be hosting at Gilwell Park in August, is now starting to attract a lot of attention both in the UK and Internationally. We are pleased to announce that two new super supporters have joined us in supporting this prestigious event.

The **G-QRP Club** has become the first club to offer their support to YOTA 2017. The club is now over 40 years old and has in excess of 4000 members from around the world. Dedicated to Low Power operation, the G-QRP club will be providing support for our Buildathon activities and see the importance in supporting amateur radio activity amongst the young.

We are also pleased to welcome **Yaesu UK** as the first manufacturer to become a super supporter of YOTA 2017. Yaesu not only will be helping the event financially but have also promised equipment to be used at the event. Yaesu are pleased to be part of the group that are supporting the event and are hoping others will join them in the near future.

We have had a number of individual donors to the event and we would like to thank them for their support to. Unfortunately we can't name them all here but we do thank them at our website [www.rsgb.org/yota](http://www.rsgb.org/yota) If you haven't done so yet, don't forget that you or your club can help the RSGB in the staging of the event by donating at [www.rsgb.org/yotasupporter](http://www.rsgb.org/yotasupporter)

The international amateur radio community is really taking an interest in coming to the UK this summer and we have received applications from 29 member societies for a total of 105 participants. The team are working out how to allocate places to ensure as many countries as possible can be represented. We have also had enquiries about hosting delegations for Japan and the US on fact finding missions. We firmly hope that the numbers involved will really foster international amateur links in the years to come. There is still time to apply for UK places, see the website for details.

## YOTA month

The idea for YOTA month is to show the amateur radio hobby to youth and to encourage youngsters to be active on the amateur radio waves. Sandringham School was the first to operate GB16YOTA on 1 December 2016. The students made a total of 97 contacts with 24 countries during the school day despite the poor conditions. Copy was difficult in many cases, but they enjoyed themselves. Approximately 100 students spent time learning some Morse code, looking at posters and listening to QSOs and about 25 passed greetings messages. They even managed to work some of the other YOTA stations in IARU Region 1. The school would like to thanks Verulam ARC who have been working with the club both on training and practical assistance.



On the 30th, the callsign was operated at the National Radio Centre where three young people had the opportunity to get on the air. George, 2E0UKK, Joseph (Joe), M6XEW and Lauren, M6HLR showed great maturity and skill when dealing with the pileup and only needed occasional help with picking callsigns out of the noise. Working SSB, "CQ CQ CQ, this is the special event station Golf Bravo 16 Yankee Oscar Tango Alpha, GN16YOTA, over" went out over the air, mainly on 20m, with stations such as EA5SY, YU7BCD, 4O6GAS, DL1KRW and RW3XZ just a small example of the stations who called in. Later in the afternoon, Joe tried his hand at 40 and worked the pile up with Steve M1ACB's help with logging. Joe managed to add over 15 stations to the log in under 20 minutes and this was his first time operating HF.



**Get a YOTA 2017 pin by becoming  
a supporter today **Today!**  
[www.rsgb.org/yotasupporter](http://www.rsgb.org/yotasupporter)**





## Summary of the new RSGB Awards Programme



**Foundation:** 40, 70 or 100 contacts on SSB, CW or FM in 1st year across 40m, 20m, 17m & 2m.

**Intermediate:** 100 contacts on SSB, CW and Data in first year across 80m, 40m, 30m and 17m.

**IARU R1:** 40, 60 or all 95 R1 Countries. (Europe, Africa and near Asia)

**Commonwealth:** 100 out of 138 Commonwealth Areas. Worldwide with some only available via DXpeditions.

**Century:** There will be a special plaque available for working all 138 Commonwealth Areas.

**Further new awards will be added in time.**

## New EMC Regulations

The Department for Business, Energy and Industrial Strategy (BEIS) has made new EMC Regulations to bring the revised EU EMC Directive no 2014/30 into UK law. Statutory Instrument 2016/1091 came into force on 8 December. The revised EMC Directive reflects the requirement for greater market surveillance and places new obligations on importers and distributors for ensuring compliance as well as manufacturers. The technical requirements concerning emissions and immunity of electrical equipment at the point of first placing on the market or taking into service are essentially unchanged. The aims of the Directive still include the protection of the amateur service. Ofcom remain an enforcement authority. BEIS say they expect to transpose the new Radio Equipment Directive into UK law by June 2017.

## 5MHz JT65 and JT9 transmissions

It has been brought to the attention of the Amateur Radio Observation Service (AROS) that software commonly used by UK licensees for the production of signals in both JT65 and JT9 modes uses a default 5MHz band preset frequency of 5.357MHz (JT65) or 5.359MHz (JT9).

UK licensees are reminded that, after applying the audio offset to the AFSK signal in JT65 mode, using these presets will, in the majority of cases, cause the transmission to fall outside of the upper band edge of the UK allocation of 5.354MHz to 5.358MHz.

In the case of JT9, if the default of 5.359MHz is used, *all* transmissions will be outside of the UK allocation.

Many examples of this have been noted and it is imperative that these out of band transmissions cease in order that UK licensees remain within the terms of their Amateur Radio Licence.

## Contesting vacancies

The Contest Support Committee is responsible for the adjudication of all RSGB contests and for maintaining the RSGB Contesting Committee's website. Currently, a number of volunteer adjudicator vacancies exist on the Contest Support 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) 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](mailto:csc.chair@rsgb.org.uk) for further information.

## RSGB Awards Manager

The Board has appointed Chris Burbanks, G3SJJ to the position of RSGB Awards Manager ([awards@rsgb.org.uk](mailto:awards@rsgb.org.uk)). He will be working with a small team to review the RSGB Awards Programme and making recommendations to improve the processes for claiming and fulfilment of the awards.

The traditional method of collecting QSL cards will be retained but where possible self-certification using Logbook of the World (LOTW) will be utilised. Retrospective claims will be encouraged, ie looking back through your log rather than starting from scratch: this is particularly relevant to LOTW confirmations. The intention of this is to generate immediate participation to provide impetus for the revised programme.

## Product Recall:

### RSGB Yearbook 2017 & 2017 Callseeker Plus

As you may have read elsewhere Ofcom has supplied some callsign information to the RSGB for the Yearbook & Callseeker that was incorrect. This year a small minority of users' main station addresses were provided to the RSGB instead of their mailing addresses. As a result, Ofcom has asked the RSGB to destroy all the unsold copies of the RSGB Yearbook 2017 and replace those that have already been issued with a corrected edition. Costs for this are being met by Ofcom.

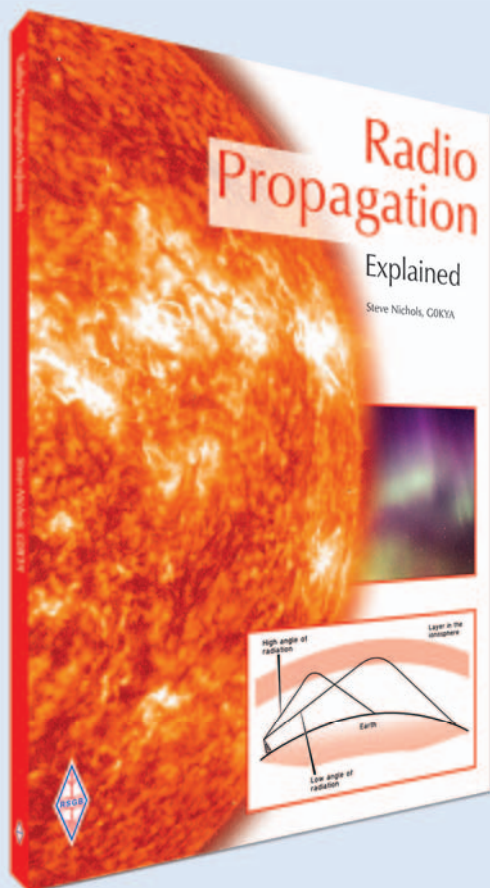
This product recall only applies to products purchased BEFORE 27 October 2016 and does not apply to any products shipped after that date.

What action should I take? If you have purchased a copy of the RSGB Yearbook 2017 or the 2017 Callseeker Plus CD and we hold a record of purchase, then you will already have received your replacement or been contacted about a return.

If you purchased your copy at a rally, amateur radio event or another source you will need to complete the special Yearbook Return form. Returns will not be accepted without using this form so it is very important you follow the instructions on the form. The instructions, the returns form and a special pre-paid postage label can be found at [www.rsgb.org/yearbookreturn](http://www.rsgb.org/yearbookreturn)



**NEW  
TITLES**



## 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



## RadCom 2016 Archive

*RadCom* is for many an invaluable archive that is looked back over many times. So why not have all this information in a searchable format by purchasing the *RadCom 2016 Archive*. Every page of the very best amateur radio information that *RadCom* produced in 2016 is included and that is over 1200 pages. Presented in the easy to use and fully searchable PDF format this is the easy way look back over this mass of information from the twelve *RadCom* editions produced in 2016.

In 2016 *RadCom* published over 80 Construction & Technical Features along with 35 Antenna Articles, 24 Equipment Reviews and over 75 other Feature articles. The equipment reviews covered major equipment releases such as the Icom 7300, Yaesu FT-991, the Flexradio Maestro console, Elecraft K3S and much else besides. You will also find all the host of regular columns that *RadCom* features, from Antennas to VHF/UHF. Simply everything printed in *RadCom* in 2016 is included, even the adverts are provided.

The *RadCom 2016 Archive* also contains a copy of the latest Acrobat Reader DC and additional bonus material including samples from other Archive CDs and even a copy of the RSGB Tim Peake video. If you want to every page from *RadCom* in 2016 and much more besides, the *RadCom 2016 Archive* is great way to store and look back on a bumper year.

### CD & USB Options

The *RadCom Archive 2016* is available as either the traditional CD version or in the USB Memory Stick version. Both versions are easy to use and contain the mass of material *RadCom* produced in 2016 along with all the bonus material provided.

Non Members' Price: £14.99

**RSGB Members' Price: £12.74**



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



## Multiple line checks for VDSL EMC

The RSGB's Electromagnetic Compatibility Committee (EMCC) has worked with BT Technology Services and Operations and also Openreach to design a new process to improve the way multiple line checks are done. This can only be used where the EMCC has received reports from amateurs that it checks and believes are caused by VDSL RFI. In these cases, lines in the near vicinity of the complainant can be checked remotely to see if they exhibit line faults that may increase VDSL RFI problems. If metallic line faults are identified, Openreach will then take steps to fix them.

If you want to follow this route please request a form from [emc.chairman@rsgb.org.uk](mailto:emc.chairman@rsgb.org.uk) The EMCC will review the case and, if appropriate, will pass it to Openreach for remote testing of your line and nearby lines. This process can take several months to complete especially if there are many lines to check.

In the trials to date, around 20% of amateurs who have had this check done have reported much reduced RFI after fault correction, another 20% have seen some improvement and about 60% of problems were identified as possible issues in home wiring that Openreach is not in a position to address.

The RSGB is grateful to Openreach for providing this service to help amateurs reduce the RFI caused by line faults.

## QSL Matters

Whilst we don't yet have final figures for 2016, we do know that the RSGB bureau continues to process more than a million cards a year. The trend is changing, with more cards in the M series, as you would expect. More cards were shipped within the UK than in 2015. We have noted a small decline in cards arriving from overseas, but our Members' outgoings remains strong as ever. Cards arriving for non-Members, non-affiliated groups and uncollected cards returned from overseas, is a concern and on the increase. We will be looking at this more closely in the coming year. The good news is that we continue to place all incoming cards from Members, in-work within the same month that they arrive and there was not a single un-opened package or letter waiting, when we closed for Christmas – a first!

We received several enquiries for the G3M-P sub manager vacancy listed last month, thank you everyone. Quick off the mark was Graham, GONBI. Initially, he is covering the existing group but this will become slightly enlarged to G3M-S as part of on-going consolidation of QSL groupings that reflect changing needs, in early 2017.

### Congratulations

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

<b>70 Years</b>		<b>Mr R W Fisher</b>		<b>G3PWJ</b>
Mr J Cairns	GW3ITT	Mr G H Price		GW3LXI
		Mr W Clinton		G8KZN
<b>60 Years</b>		<b>50 Years</b>		
Mr E Pickering	G3LPS	Weston-Super-Mare RS		G4WSM
Mr D Thom	G3NKS			

## Propagation predictions

The RSGB Propagation Studies Committee has completed the work on a new web HF propagation prediction service. It features both area coverage predictions as well as point-to-point on-demand predictions. See [www.predtest.uk](http://www.predtest.uk)

Comments and suggestions are invited by Gwyn Williams, G4FKH via email to [g4fkh@sky.com](mailto:g4fkh@sky.com)

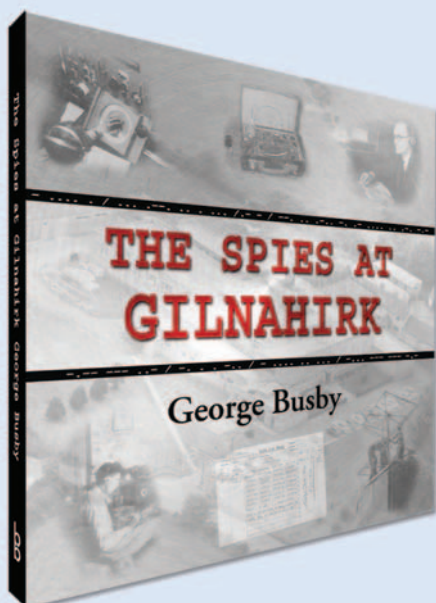
**The RSGB would like to welcome to the RSGB family the following new Members who have joined their voice to ours and are helping to keep the RSGB strong.**

Mr V Luccock, 2E0EDN	Mr T D Raymond, M6HVV	Mr J Simpson, MM6IBQ	Mr M Clapham, RS310943	Mr J Blackburn, RS311306
Mr A Lawrence, 2E0OJR	Mr J Daws, M6HZC	Mr S McCorkell, MM6TZX	Mr R Potter, RS311057	Mr C Reilly, RS311307
Mr J Deacon, 2E0XAZ	Mr P Brereton, M6HZY	Mr D Smith, N9BGW	Mr M Cragg, RS311067	Mr N Isherwood, RS311316
Mr M Ward, G1LDJ	Mr A B Lorentsen, M6ICJ	Mr K Radioharrastajaty, OH2ET	Mr W Clough, RS311090	Mr E Struzynski, RS311334
Mr P McGoldrick, G6AAC	Mr A Hathaway, M6IGG	Mr B Van Beers, PA1BT	Mr D Holbrook, RS311093	Mr N Green, RS311335
Mr P Williams, G8INS	Mr K Harcombe, M6IHE	Mr M Dirksen, PA5M	Mr D Daso, RS311133	Mr T Hjelmvik, SM0ZBF
Mr J Walker, G8JAQ	Mr C Plant, M6LZT	Mr C Farlow, PA5Y	Mr T Brady, RS311134	Mr A Lofman, SM3TDV
Mr V C Angell, KCOEM	Mr J Swann, M6MYL	Miss R Smyckova, RS307439	Mr T Lineberry, RS311135	Mr L Kihlstrom, SM6YPC
Mr G Hill, KH6HU	Mr S Burton, M6SQC	Mr T O'Gorman, RS309006	Mr S J Bunting, RS311169	Mr W Langmair, VK5WF
Mr A Crosland, MOHXA	Mr R Willis, M6TGK	Mr K Murray, RS310654	Mr I Stephens, RS311188	Mr R Mikulski, W3OFD
Mr M Ferreira, MOKYW	Mr D Mills, M6TVX	Mr G Brownlow, RS310689	Mr M Thorpe, RS311208	Mr R Dildine, W6SFH
Mr S Leech, M3SVL	Mr J Thomson, M6TZG		Mr I Marshall, RS311226	Mr A Buta, YO6XK
Mr E K Beckett, M6GQK	Mr J Brookfield, M6XSQ		Mr A Bragg, RS311232	
Mr K Cross, M6HUO	Mr R Cook, M6YBD			

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

Mr P O'Brien, EI4CI	Mr D N Ansell, G3ZWW	Mr R H Benton, G4WKW	Mr J Cairns, G1ONNK	Mr P Wright, M3PWJ
Mr R Williams, EI7AF	Mr G P Home, G4KRM	Mr S E Jeffcoate, G7IMB	Mr J Kelly, GW2HFR	Mr C Doherty, RS308864
Mr A Hay, GOEHG	Mr A S Jones, G4NHF	Mr B D Courtenay, G7UFI	Mr P Glover, MOCNL	
Mr N M Rogers, GOGGG	Mr D K Mc Cartney, G4TXA	Mr N B Kearey, G8EYM	Mr D Houbart, M1DNJ	

**NEW  
TITLES**



## 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 Gilnahirk 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**



## Launch Pad UK

*Britain and the Cuban Missile Crisis*

by Jim Wilson

For most British people the weekend of 27/28 October 1962 could so very easily have been their last weekend on earth. Yet, astonishingly, the fact that Britain's nuclear deterrent forces were set to such an unprecedented level of readiness was kept secret from the public. *Thor* nuclear-tipped ballistic missiles stood on a round-the-clock wartime state of alert ready to be fired; these were the 'other' missiles of the Cuban Missile Crisis, which made Britain, in effect, America's launch pad. There is evidence to suggest that, had the US needed to launch an air strike against Russian missiles in Cuba, President Kennedy might have been willing to absorb a Soviet nuclear assault on a NATO ally without retaliation, if it would have avoided escalation to World War Three.

It is sobering to those who lived through that period that the British Ambassador to Cuba commented: 'If it was a nuclear war we were headed for, Cuba was perhaps a better place to be than Britain!'

*Launch Pad UK* throws light on not only the crisis but the brief and little known period that Britain had land based nuclear missiles. Covering from the first reasoning behind basing *Thor* missiles in the UK through their installation and deployment, to their withdrawal only 5 years later, this book provides real insight into this crisis and the UK's involvement. These missiles were under joint US and UK control and, in theory, they could not be fired without joint approval of both countries. *Launch Pad UK* provides details of how the RAF missile squadrons were organised, their war ready status and much besides. This book is thoroughly recommended reading for anyone interested in the Cold War period in general or this little known story.

Size: 155 x 234mm, 208 pages

ISBN: 9781 4738 8665 0

**Non Members' Price £14.99**

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## RSGB 60th Commonwealth Contest

The Commonwealth Contest (formerly known as the British Empire Radio Union – BERU – Contest) is one of the longest-running contests in the HF contesting world. It promotes contacts between stations in the UK and Crown Dependencies, Commonwealth and Mandated Territories. The 80th Commonwealth Contest will take place from 1000UTC on 11 March to 1000UTC on 12 March. To celebrate the 80th contest there is a prize draw sponsored by Kent Engineering, Martin Lynch & Sons and the RSGB (details in December *RadCom* page 10).

A special 80th certificate will be available for all entrants who make 80 QSOs or more. This will be available to download from the results pages. To be sure that you work enough stations, try to work a few more than 80!

There will be a prize for each member of the highest scoring UK or NI Team in the Team competition. This will be a suitable engraved tankard for each member. Any number of Teams per call area can enter with 5 entrants per Team, although entrants can only be members of one team. So check out the full rules at [www.rsgbcc.org/hf/rules/2017/beru2017.shtml](http://www.rsgbcc.org/hf/rules/2017/beru2017.shtml) and get your team organised right now.

Keep up to date with all the news at <https://berucontest.wordpress.com/category/news/>

## The Wireless Schoolmaster

BBC Radio Northampton is to tell the story of 'The Wireless Schoolmaster' in early February. In the early years of the 20th century a woman travelled from Salt Lake City in Utah to the tiny Northamptonshire village of Bugbrooke. She came to see for herself a very special wireless radio that she'd read about in two American newspapers. It was a set cobbled together from odds and ends by the village schoolmaster. His name was Frank Wright – and Tom Percival has been learning all about him for BBC Radio Northampton.

Most people – including radio historians and experts – have never even heard of Frank Wright. He was an isolated rural schoolmaster, but his radio made his village – Bugbrooke – famous all over the world. People in Canada, mainland Europe and further afield knew the name – and once his radio was operational, Frank used it to bring an incalculable benefit for the children in his tiny village school.

At a time when rural children were expected to leave school barely literate and to toil in the fields for the rest of their lives, the 'Wireless Schoolmaster' taught boys – and even more remarkably for the era, girls – to send and receive Morse messages. Consequently, business houses, shipping companies and the military were actively seeking out young people from Bugbrooke to staff their wireless cabins and run their communications.

You can hear his story on BBC Radio Northampton on Sunday 5 February at 11am, repeated on Monday the 6th at 6pm, and then available on the BBC iPlayer.



## Bouvet team thanks DXpedition Fund

The Bouvet Island DXpedition, scheduled for 2018, has thanked the RSGB for its donation from the DXpedition Fund. The Bouvet DXpedition could be the most expensive DXpedition ever attempted. Without donations, such DXpeditions would not take place. One of the goals of the Bouvet Island DXpedition 2018 is to provide at least one QSO to every DXer who needs this #2 ranked DXCC entity for an all-time new one (ATNO). They also want to provide as many band/mode contacts needed by DXers as they possibly can. More details will be published nearer the start date.

## New premises for LAMCO

LAMCO has officially moved premises, with their new showroom just a 2 minute walk from the Alhambra Shopping Centre in Barnsley. LAMCO invites customers old and new to call in and see them at 5 Doncaster Road, Barnsley, South Yorkshire S70 1TH. There's an onsite car park and Blue Badge holders can park right outside the shop. [www.hamradio-shop.co.uk/](http://www.hamradio-shop.co.uk/)



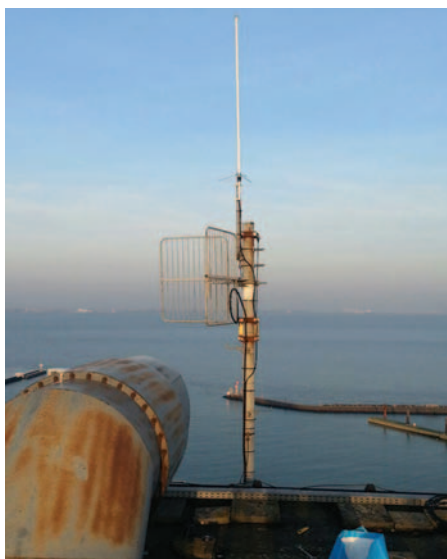
## Royal Signals Amateur Radio Society

On 1 May 1952, the 1st Army Wireless Reserve Squadron was formed and on 23 June 1961 the Royal Signals Amateur Radio Society (RSARS) was formally established. G3CIO became the first HQ station callsign in 1947 and this honour was transferred to G4RS in 1967. G4RS is now located in Blandford Camp and held on behalf of the RSARS by Alan, MOGKD.

At the 1966 RSARS AGM it was agreed to extend membership to more than members of Royal Signals. This made it possible to accept and welcome applications from current and ex members of the ACF/University OTC; current and ex members of the T&AVR; current and ex members of the Regular Army (any Corps or Regiment) and civilians working with, or having worked with Army units worldwide. Applications are also welcomed by persons overseas fitting into the above criteria. One of their most recently joined member is currently serving with the Royal Malaysian Signals, and they have members on most continents around the world. The RSARS membership secretary is George, G3VBE who can be contacted via email, or by writing to his address as shown on QRZ.com. His email address is memsec@tesco.net and for further information please visit the RSARS website, <https://rsars.org.uk>

## PI2NOS repeater

The repeater PI2NOS in the Netherlands operates on 430.125MHz. Unfortunately, the input frequency is on 431.725 and the UK licence conditions prohibit activity on 431MHz within 100km of Charing Cross in London. Following emails between Selim, MOXTA and Micha, PA1OKZ they were able to find an alternative input frequency on 438.625MHz (no CTCSS). In December they installed a receiver that is listening on 438.625MHz and a directional antenna pointing towards the UK from Breskens in the Netherlands. It has been a success! From 28 to 30 December there was a big Tropo opening on VHF and UHF and 30+ individual stations accessed the PI2NOS repeater from the South East of the UK. Some stations from near Sheffield and Liverpool also accessed the repeater on the normal input frequency of 431.725MHz.



## RAIBC seeks volunteer readers

Ian Spencer is the Audio Manger for the Radio Amateurs Invalid and Blind Club (RAIBC), the charity working for radio amateurs with disabilities. They record, in MP3, licence documents, user manuals and monthly magazines for those with a sight impairment and make them available for download or on CD sent free of charge to members of the RAIBC and the RSGB. *RadCom* is one of the magazines that is read each month by a dedicated team of volunteers, however they really need some extra volunteers prepared to read manuals or step into the breach with reading one of the magazines when necessary. The volunteers don't have to be super computer or audio literate as they are offered as much help as is necessary in the form of video tutorials, free software, online and personal help to get any volunteer up to speed. They just need enthusiasm! Anyone interested in volunteering should contact Ian Spencer via email to [audioman@raibc.org.uk](mailto:audioman@raibc.org.uk).

## Germany gets 5MHz WRC-15 allocation

German telecoms regulator BNetzA has enabled access to the new WRC-15 60m amateur allocation to all German Class 'A' licensees as of 20 December 2016.

The allocation is from 5351.5 to 5366.5kHz on a Secondary basis with a maximum power of 15W EIRP and a maximum bandwidth of 2.7kHz. All modes are permitted and the German national amateur radio society, DARC, recommends the use of USB and the IARU Region 1 provisional band plan for 60m.

## Amateur radio and railways

The International federation of Railway Radio Amateurs (FIRAC) is open to all interested in amateur radio and railways. They have around 1800 members located in 18 countries worldwide. The Firac net is held on Sunday from 0830UTC on 14.320MHz. The new Firac Award is now available to all amateurs and SWLs and details can be found at [www.firac.org.uk](http://www.firac.org.uk)

## GB0HCC

Ofcom has granted a special event callsign to be used through 2017 from various sites in the Hull area to celebrate Hull as City of Culture 2017. GB0HCC will be activated by Humber Fortress DX Amateur Radio Club during January. On 1 February the NoV will pass to Hull and District Amateur Radio Society for 28 days.

## Transatlantic WSJT-X Fast Mode QSOs

After a year of testing the new WSJT-X fast mode, VE1SKY shared the first JT9H Atlantic crossing on 8 August 2016 in a QSO with Mark, EI3KD (IO51). EI4KD and VE1SKY completed the QSO at 2054UTC on 50.285MHz USB within just a few minutes. Callsigns, reports, rogers and 73s were exchanged: EI3KD +08dB and VE1SKY -07dB. The Sporadic-E propagation was very uneven and characterised by strong QSB. For the next 39 minutes, four more transatlantic QSOs were organised on the ON4KST reflector and completed on 50.285MHz with VE1SKY: Tom, EI4DQ (2100UTC); Dick, GOLFF (2121); Dick, G1CWP (2124) and David, GOCER (2133).

## WACRAL 2017 Conference

The World Association of Christian Radio Amateurs and listeners (WACRAL) has now confirmed the 2017 WACRAL Conference and Fellowship weekend. It will be at the Elim International Conference Centre, West Malvern, Worcestershire WR14 4DF from 22 to 24 September. RSGB President Nick Henwood, G3RWF will speak on 'Where is amateur radio going?'

This is a special year for WACRAL – they celebrate their diamond anniversary.



## More equipment in stock

ML&S Ltd are pleased to announce that they will now be stocking the full range of Apache Labs SDR transceivers, Microset linear amplifiers and accessories as well as the full Bonito range of software and antennas (see New Products, right). To see the full range of equipment in stock, go to [www.hamradio.co.uk](http://www.hamradio.co.uk) or call the sales team on 0345 2300 599.

## Buying used equipment

RCQ Comms Ltd is offering a Buy Back scheme for used equipment. When customers purchase qualifying used equipment from RCQ Comms Ltd, a Buy Back sum (BB) is agreed at the time of sale. Any time up to 6 months after the purchase, RCQ Comms Ltd will BB the equipment at the agreed sum providing its in the same condition as when sold. RCQ Comms Ltd also arranges and pays for collection. For full details go to [www.g3rcq.com](http://www.g3rcq.com)

## OZ, Kingdom of Denmark

OZ100DVI will be on the air from 1 January until 31 of December 2017 operated by members of EDR HAM Radio Club of Skanderborg. This Special Event Station is commemorating the 100th Anniversary of the Treaty of the Danish West Indies sold to the USA – thereafter named United States Virgin Islands. See [QRZ.com](http://QRZ.com) for further information.

## International Ham Stores Group

Waters & Stanton, InnovAntennas and Nevada Radio have come together to form International Ham Stores Group, which will operate out of a combined showroom and distribution centre at Portsmouth from 1 April 2017. A 'soft start' migration to Portsmouth commenced in January for both Waters & Stanton and InnovAntennas. The three companies will continue to trade under their own names.

## 5MHz Newsletter published

The latest edition of *The 5MHz Newsletter* is now available for free PDF download from the RSGB 5MHz page (<http://rsgb.org/main/operating/band-plans/hf/5mhz/>) or directly from <http://tinyurl.com/jqh2y5l>

This edition features 5MHz news from Portugal, Finland, Luxembourg, Latvia, Belarus, Andorra and South Africa, Exercise 'Blue Ham' and two important reminders for UK 5MHz operators.

## Bake4Rory

The annual 'Bake4Rory' cake sale took place at the BBC's New Broadcasting House in London, on 8 November 2016, and raised a record breaking £4,000. BBC Radio 4 presenter Rory Morrison died tragically young in 2013 from lymphoma at just 49 years. The annual event, organised by BBC Newsreader/Announcer Susan Rae, sees Rory's former colleagues in BBC News take to their kitchens to produce cakes and biscuits for sale in aid of the lymphoma charity WMUK. The photo shows BBC Radio 4 announcers Jim Lee, G4AEH, Kathy Clugston, and Susan Rae behind the counter at the 2016 'Bake4Rory' cake sale at BBC New Broadcasting House.



## Historic transatlantic contact

In the December *RadCom* we mentioned the special event to commemorate the 95th anniversary of the first transatlantic contact between Greenwich, Connecticut, and Ardrossen, Scotland on 11 December. The commemorative contact between Greenwich and Ardrossen took place with US operator Dave Patton, NN1M and Scotland operator Jason O'Neill, GM7VSB. The original 1921 message was exchanged successfully. SSB was incredibly difficult, with the N1BCG signal pretty much in the noise; CW was much easier to work with and all was copied without problems. The event was widely reported in Scotland on both radio and television as well as in a number of newspapers. Congratulations to all involved. The exchange was as follows:

```
N1BCG: CQ CQ N1BCG
GB2ZE: GB2ZE
N1BCG: FB GB2ZE GB2ZE N1BCG Jason 5NN GREENWICH Bk
GB2ZE: FB N1BCG de GB2ZE 5NN BIG SIGNAL WISH PHONE WAS AS GOOD
CONGRATS PSE CABLE SIZE OF HAT N1BCG de GB2ZE
N1BCG: HI FB JASON YES WE HEARD U BETTER THAN YOU HEARD US HI
== PSE QRX FER MSG MSG
== HEARTY CONGRATULATIONS FM BURGHARD
== INMAN
== GRINAN
== ARMSTRONG
== AMY
== CRONKITE
== THE ORIGINAL OPS AT 1BCG
== HW CPI? GB2ZE N1BCG BK
GB2ZE: N1BCG DE GB2ZE ALL CPY FB BIG SIG 5NN GREAT TO WORK YOU AT
LAST N1BCG DE GB2ZE
N1BCG: RR FB JASON PSE HV FUN RUNNING PILE DWN THE BAND HI 73 ES
TU FER HISTORY GB2ZE N1BCG 73
GB2ZE: N1BCG DE GB2ZE NEED TO FINISH WITH BBC NEWS CREW THEN WORK
THAT PILEUP THANKS FOR HISTORIC QSO 73 DE GB2ZE..
N1BCG: FB PSE QSP TNX TO BBC FM ARRL 73 N1BCG..
GB2ZE:..
N1BCG: QRZ N1BCG
```

## Brede Steam ARS

Brede Steam ARS are holding their second Foundation course over the weekend of 4 and 5 February. The first weekend course was successful and it is hoped that future courses will be undertaken on a regular basis. First Brede Scout group are providing the Scout Hut for the training and the BSARS club is providing the VHF and HF stations necessary for the practical assessment at their shack. The courses starts at 10am each day with the exam taking place at 4pm on Sunday. If you wish to take part then please contact, in the first instance, Steve, MOSSR by email to [m0ssr@aol.com](mailto:m0ssr@aol.com) or phone 01424 720 815.

# New Products

## Apache Labs Anan 8000DLE

Waters & Stanton now has the new ANAN-8000DLE HF & 6m 200W SDR transceiver available. It is based on the work of the OpenHPSDR community and uses a redesigned transmit chain with predistortion, resulting in "astounding" IMD performance. An internal four phase low noise boost supply is used to convert 13.8V to 50V for the finals, this enables the user to have the flexibility of using industry standard 13.8V DC as well as battery power whilst at the same time the radio provides all the advantages of the 50V LDMOS amplifier. The front panel display is microprocessor driven and displays all critical parameters such as Forward and Reflected Power, SWR, Current, Voltage, and Temperature. The microprocessor also provides real time protection for all these parameters. Priced at £4199.95, it is available from Waters and Stanton.

<http://hamradiostore.co.uk/an-an-8000dle.html>



## Wireless Headset

If hearing loss means your TV is too loud for everyone else in the room, a TV Listener will help you to hear without annoying anyone, including the neighbours! The same can be said for the volume on your amateur radio set too. The new amplicomms TV200 wireless headset system allows you to choose your preferred volume, even if the television (or other device such as radio, MP3 player, mobile phone or CD) sound is turned off. The volume on the new TV200 from amplicomms can be amplified to 112dB, that's as loud as a rock concert, whilst tweaking the tone and balance controls enhance speech and clarity. The lightweight headset has a built-in microphone option, so conversations in the room can be picked up and the sound source turned off, so you'll never miss out on the offer of a cuppa. Simple to set up, the base unit plugs directly into the sound source, wirelessly transmitting the sound to the rechargeable headset. Using advanced infrared technology, the sound won't be interrupted if you leave the room or someone walks in front of you. Priced at £59.99, the TV200 is available from 0800 032 1301.

[www.hearingdirect.com](http://www.hearingdirect.com)



## New active antenna

ML&S now stock the BONI-WHIP active antenna that replaces the Mini-Whip antenna. Despite its size from only approximately 17cm, it renders excellent reception results on long wave, medium wave and short wave and additionally the VHF area up to 300MHz. It can be ideal for monitoring beacons and WSPR transmissions. Available from Martin Lynch & Sons, from stock for £99.95 + shipping. Further details can be found at [www.hamradio.co.uk](http://www.hamradio.co.uk) or by calling the sales team on 0345 2300 599.

## New mobile transceiver

A new 2/70 FM base/mobile transceiver is available from QYT Electronics. Covering 136-174MHz and 400-480MHz yet measuring only 98mm x 43mm x 126mm, it has 200 memory channels and 25/20W RF output. Other features include full simplex, repeater CTCSS, DCS etc, a built in speaker capable of 2W audio out, separate audio out connector and a cooling fan. Additionally there is an FM radio facility built in. It has a dual band quad multi colour display allowing four frequencies to be displayed at any one time and it's fully programmable via a PC or from the front panel and DTMF microphone. The radio is priced at £89.95 and is available from Mirfield Electronics, see [www.mirfield-electronics.co.uk](http://www.mirfield-electronics.co.uk)





# Homebrew



**PHOTO 1:** A simple 4W peak reading power meter that works from LF to VHF.

**C**ontinuing our series of test instrument and calibration projects, we look at RF power measurement.

An accurate power meter is a very useful addition to any radio shack. A simple watt meter capable of measuring from a few watts to a few hundred watts (a range of about 20dB) will be quite adequate for monitoring the output from a typical amateur radio transmitter.

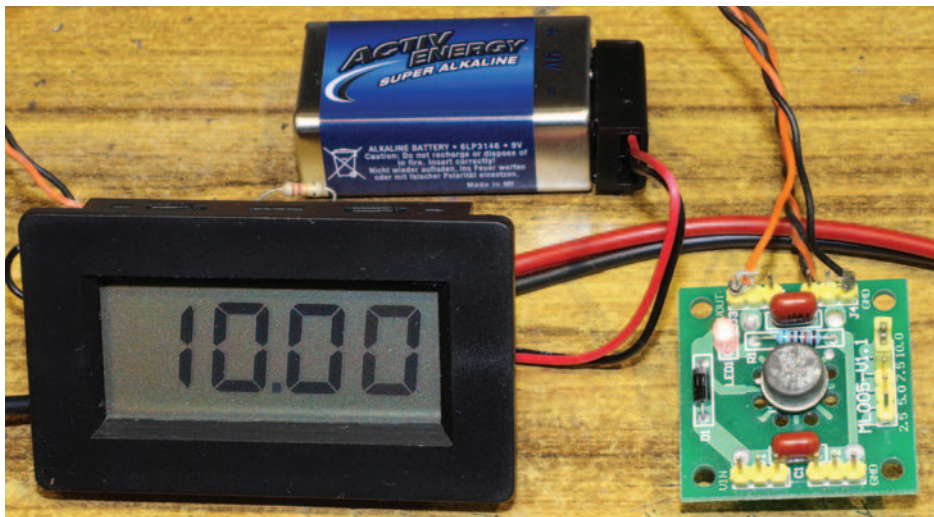
Most RF power meters are designed for use at a specific line impedance, usually 50Ω. Such meters will *only* give an accurate indication when they are installed in a well matched 50Ω system.

A directional power meter can be used to measure forward power, reflected power and/or SWR. Some of the more sophisticated units use a microcontroller and LCD display to give a real-time indication of forward and reflected power, SWR, return loss, impedance etc.

The home constructor may need to measure signals at extremely low or high power levels, ranging from microwatts to kilowatts, at frequencies from LF to microwaves. It would not be easy to meet all of these requirements using a single instrument. One approach that has been particularly successful is to use a single meter unit for power indication and a range of separate coupler/detector head units for the required frequency and power ranges.

## Methods

There are several ways of measuring RF power. The most common method is to apply the RF signal to an accurate, non-inductive 50Ω resistance and use an AC instrument to take an



**PHOTO 2:** Checking the calibration of my meter.

accurate measurement of voltage or current. The alternative method is to measure the temperature increase as power is applied to the resistor. For relatively low power levels, the measurement can be performed directly at the load resistance. At higher power levels, it may be more convenient to measure power at the coupled port (P3) of an RF coupler. This approach is particularly useful for in-line types of meter that allow power monitoring while the transmitter is in normal use.

RF power may be measured using a 50Ω resistive load and a simple RF voltmeter.  $P=V^2/R$  where V is the RMS voltage. The AC ranges of a typical multimeter are only designed for use at low frequencies, generally up to about 1kHz. In most cases, RF voltage will be measured using a diode detector/rectifier which indicates peak rather than RMS voltage. Assuming that the measured signal is a pure, undistorted sine wave, the RMS voltage will be  $V_{peak} \times 0.7071$ .

The simple diode detector is not a perfect rectifier. When measuring low voltages, it may be necessary to allow for the forward voltage drop (VF) across the diode. In some cases, sufficient accuracy may be obtained by adding a pre-determined offset like 0.6V for a standard silicon diode or 0.26V for some Schottky types. Diode voltage drop will tend to vary with current and temperature. For more critical applications, it may be necessary to compensate for these effects.

**Figure 1** shows a simple RF probe. This can be used with a standard digital voltmeter to measure peak RF voltage. The value of the resistors is chosen so that the voltage reading will be approximately the RMS value when read on the DC ranges of a typical digital multimeter with input resistance of 10MΩ.

**Figure 2** shows a 50Ω load with a peak-reading diode detector. The 50Ω load resistor is made from a parallel pair of 100Ω, 2W, 1% metal-film resistors (Maplin D100R or similar). Note that some 2W resistors are wire-wound types that are unsuitable for use in an RF load. Make sure you use low inductance carbon or metal-film resistors. The circuit is very simple. The diode is a 1N5711 Schottky type. This device has a measured VF of about 0.26V at 1mA and even less at very low current levels. Output voltage is measured using the DC ranges of a digital multimeter. Voltage output is fed via a low pass filter (LPF) to prevent any RF signals reaching the voltmeter. The inductor (RFC) can be any convenient value from about 22μH to 100μH. If a suitable component is not readily available, you can use 8-10 turns of wire (enamel or plastic insulated) on an FT37-43 ferrite toroid. The circuit was built on a strip of PCB laminate. I used a standard single hole BNC socket for the RF connector. As expected, DC resistance is accurate to well within 1%. Input SWR is very low from LF to VHF. The assembled unit is shown in **Photo 1**.

## Digital panel meter

As an alternative to using a digital multimeter, you can use a standard LCD panel meter as the RF voltage display. Most of the commonly available 200mV generic panel meters are based on the ICL7106 IC or a compatible device. The ICL7106 is a 3½ digit (1999) display with ADC, voltage reference, LCD display driver and most of the hardware to make a digital voltmeter. I used a PM-438/428 meter module for this project. To make a complete 0-199.9mV meter, all that



**PHOTO 3:** 50Ω 250W dummy load and peak detector, usable up to UHF.

is required is a 9V battery. Claimed accuracy is  $\pm 0.5\%$  (at  $23 \pm 5^\circ\text{C}$ ) and the current drawn from the 9V battery supply is just 0.3mA. A typical application is shown in **Figure 3**.

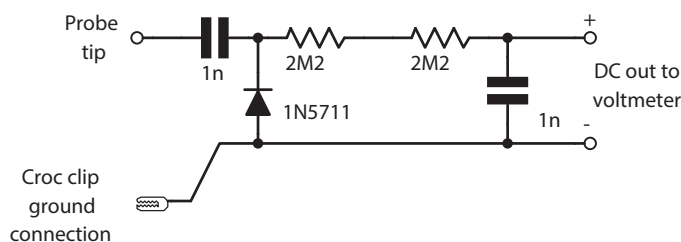
The standard input circuit of these modules consists of a pair of resistors RA and RB. The voltage range of the meter can be adjusted by changing the value of these resistors. As supplied, RA is a zero-ohm link and RB is 10M. This gives a full scale reading at 199.9mV. The position of the decimal point can be shifted by soldering bridges on the back of the meter's PCB. Details are shown on the supplied datasheet. Rather than mess about with the on-board resistors, I used external 0.25W resistors for the input voltage divider. The datasheet suggests RA=9.9M and RB=100k to cover a range of 0-20V. I used readily available values of 1M and 10K instead. This gives a division ratio of 101, an error of just 1%. This is easily adjusted out using the reference adjustment pot on the PCB, or ignored. Use stable metal-film resistors. 1% types are ideal, but 5% tolerance may be more useful if you are trying to achieve the exact 100:1 ratio with hand-picked resistors – eg 10k and 990k (1MΩ–1%).

**Figure 4** shows the arrangement of my meter. **Photo 2** shows calibration checking against an accurate 10V voltage reference. The 1M series resistor should protect the IC from accidental overload.

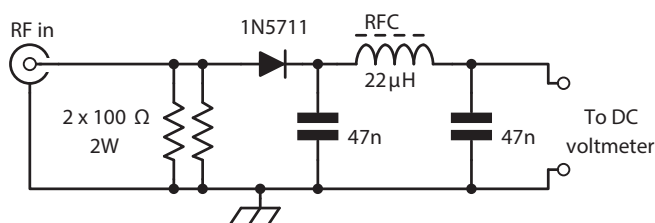
### The oscilloscope

Another method of measuring RF power is to use a 50Ω load and a suitable oscilloscope. This method is quite reliable provided that the scope and its probes are well calibrated, although there is a certain amount of measurement uncertainty, particularly on analogue scopes. With a 10x probe, it is possible to measure relatively high power levels. Be aware that the maximum voltage rating for oscilloscope probes is for low frequency use. The specifications for your probes should show a voltage/frequency derating curve. My 600V probes are only good for about 50V at 100MHz.

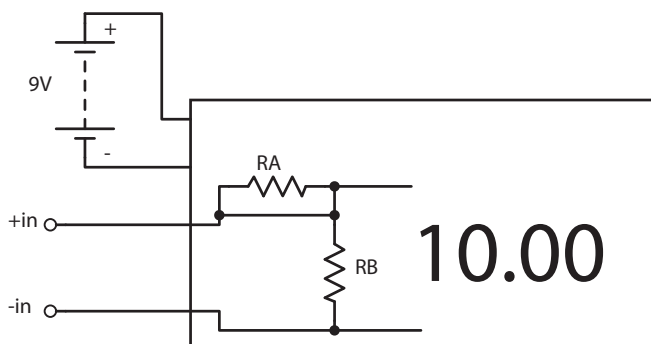
Remember that scope bandwidth is usually



**FIGURE 1:** A simple RF probe.



**FIGURE 2:** A 50Ω load with a peak-reading diode detector.



**FIGURE 3:** Application circuit for a simple digital panel meter.

specified for the -3dB point. For measurements at RF, the scope bandwidth should be several times the measured frequency value. As well as showing reasonably accurate peak-to-peak values, the scope display gives a lot of potentially useful information about the measured signals. Peak to RMS conversion is usually calculated based on the assumption of a perfect sine wave with no distortion, noise or other signals present. Using a scope gives a reasonably clear picture of the nature of the input signal. Any distortion or unexpected signals will probably be easy to spot. **Figure 5** shows how useful a digital storage scope can be for RF measurements. The test circuit is a broadband push-pull power amplifier. The red and yellow traces were measured at the collectors of the two transistors. The green trace shows the voltage from the final output transformer. Voltage is set for 10V/div. Peak output voltage is half the peak-to-peak value or 33V. This is 10.89W into a 50Ω load. A simplified formula for calculating power from peak values is  $V_{\text{peak}}^2/2R = 33^2/100$ .

(Note that there can be a considerable

amount of measurement uncertainty with many oscilloscopes – for instance mine, when new, was specified with  $\pm 5\%$  accuracy on some ranges and it's hard to estimate a measurement to better than 1/10 of a division, so 'about 2½ divisions at 10V/div' could be anywhere from about 22.8V to 27.3V. Digital oscilloscopes are somewhat better in this regard, but do watch the overall accuracy – G1MFG).

### Higher power levels

We can use a precision attenuator to measure high power levels using our low power measuring equipment. A 20dB attenuator would allow measurement of up to 400W using a 4W load and meter as described earlier. Commercially made,

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



high power attenuators are available, but they are hideously expensive. A homebrew alternative based on high power metal film resistors would make a more affordable alternative. 50Ω and 100Ω RF power resistors are available at very reasonable prices on internet auction sites. **Photo 3** shows a 50Ω, 250W, DC-2GHz dummy load resistor bought for just a few pounds on eBay.

It is also possible to measure high power levels using simple resistive networks like the -40dB tap (see October 2014).

RF couplers provide another easy way of sampling high power RF in a predictable manner. **Figure 6** shows a simple non-directional 50Ω coupler.

The circuit takes the form of a transformer where the through-line acts as a single-turn primary winding. The transformer secondary is a multi-turn winding on a ferrite toroid core. The coupling factor is simply  $-20\log(\text{turns ratio})$ . For example: a single turn primary and 10 turn secondary would result in a -20dB coupler. Power at the coupled port (P3) will be 20dB less than power on the main through line. Other common ratios: 20T = -26dB, 32T = -30dB.

In the most common configuration, the 1T primary is a short length of 50Ω coax cable passed straight through the centre of a toroid core. One end of the screen/shield is connected to ground, the other end is left open circuit so that the screen acts as an electrostatic shield between windings. The configuration is shown in **Figure 7**. I used an FT50-43 ferrite toroid as the core. The through line is a short length of RG58 coaxial cable. The secondary (coupled) winding is made from 0.375mm (not critical) enamelled wire. I have found this coupler works very reliably from 1.8MHz into the low VHF region. Accuracy is good enough for use from 160m to 6m.

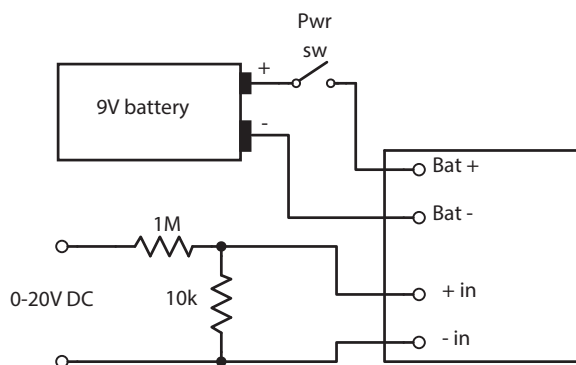
### Very low power measurements

Modern high-speed switching and detector diodes have almost ideal characteristics as RF rectifiers, provided that the input voltage is significantly greater than the diode forward voltage drop. At low RF levels, where voltage may be below 1V peak (+10dBm in a 50Ω system), diode behaviour is more difficult to

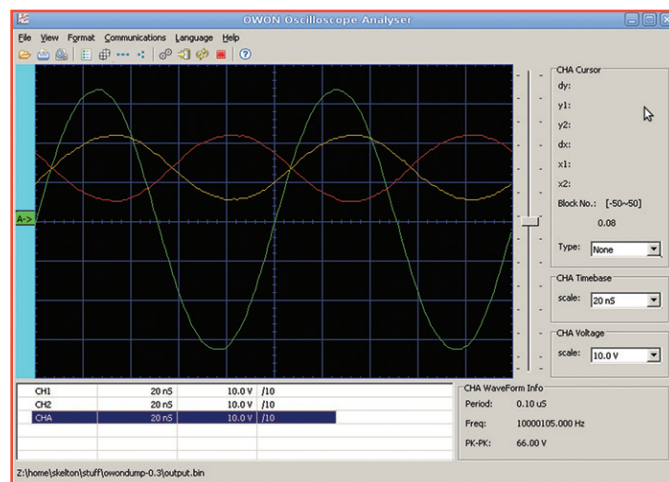
predict. A peak detector will tend to show non-linear behaviour so that the DC output is not linearly proportional to the RF input level.

There are two ways of correcting this error. You can add the necessary offset voltage to the measured value before calculating the RF power level. Rather than using a fixed offset like 0.25V, it is better to draw up a calibration curve or table showing true output vs measured output. This will increase the accuracy of your measurements without adding any additional hardware.

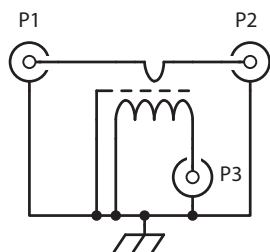
Another option is to use a second diode as a reference and an opamp to automatically apply the required offset. This is still not a perfect solution because the reference diode has a DC bias current instead of the RF current in the detector/rectifier diode. However, this method can substantially improve the accuracy of a diode rectifier so that almost perfect results are achieved at all power levels. The configuration is shown in **Figure 8**. The circuit poses a few design problems, particularly when the opamp requires a single-ended rather than a split supply. We will look at these issues in detail next time.



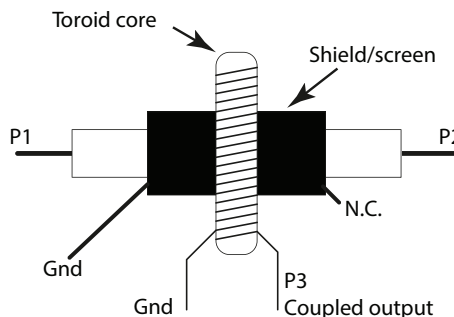
**FIGURE 4:** The setup I used to make my digital panel meter read 0-20V (see text and Photo 2).



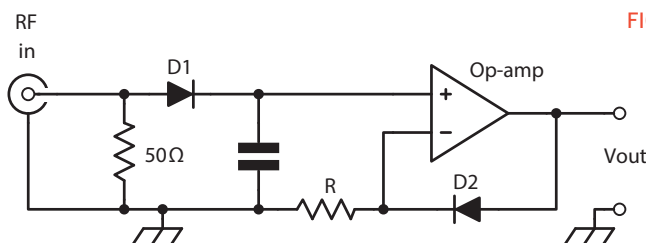
**FIGURE 5:** Using a digital oscilloscope for RF voltage measurements.



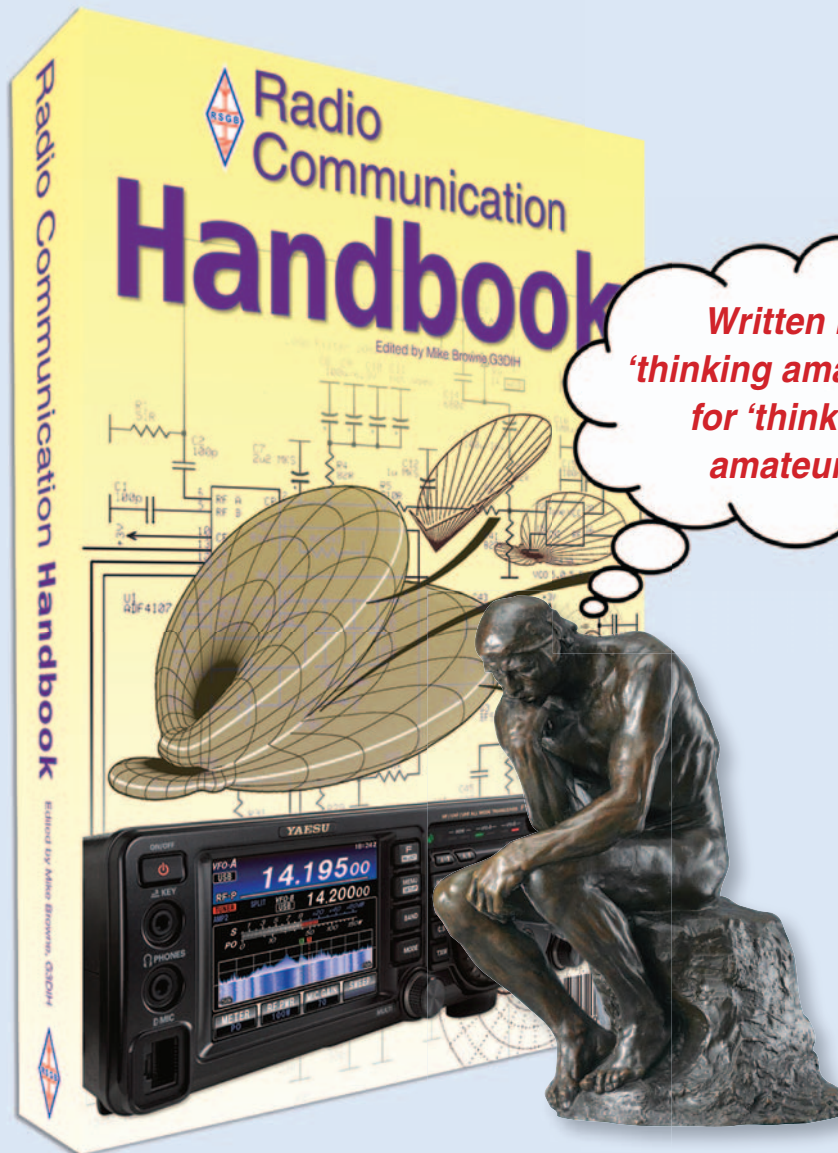
**FIGURE 6:** Circuit of a non directional coupler.



**FIGURE 7:** Practical configuration of a non directional coupler.



**FIGURE 8:** Precision rectifier.



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Edited by Mike Browne, G3DIH

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# EMC Committee

## reply to Ofcom article

**The RSGB appreciates the time spent by Mark Walls of Ofcom in producing the article in the January edition of *RadCom*. That article is revealing but also alarming. We need to look at it on two levels, the general enforcement principles adopted by Ofcom and the specific issue of VDSL interference.**

### Interference cases – the Ofcom position

At a time when spectrum usage is growing and man-made noise increasing, having only 30 staff (down from 100 in Radiocommunications Agency (RA) days) makes proper interference management untenable. Realistically Ofcom is only able to deal with safety of life cases and then only if they are acute rather than long standing. Where does this leave the Amateur Service (and many other spectrum users)?

The reasons offered in the past by Ofcom for refusing to act include that they do not meet the criteria for Harmful Interference (HI), that alternative spectrum is available, that they must be proportionate, that no-one can expect clean spectrum, that they do not have powers to act and sometimes even that their arbitrary dates (when asking for more information) have not been met. We have never actually sought clean spectrum, always understanding, particularly at HF, that some interference is to be expected. Nor do we expect priority, as we accept that safety of life and business radio will take priority. What we do expect however is the basic right of citizens (in any walk of life) to be able to go about our lawful business without hindrance from the unlawful acts of others. We also expect that complaints are dealt with in a consistent manner.

There are three means by which Ofcom can tackle interference from electrical equipment. One is through the EMC Regulations, which implement the EU EMC Directive. These apply at the point of placing on the market (when it is first sold) or taking into service (when it is installed and operated). The requirement in relation to emissions is that the equipment does not stop other equipment, including radio equipment, from operating as intended. We should note that the aims of the

EU Directive clearly include protection of the Amateur Service. In several cases, which have been put to Ofcom, we are unaware that they have ever taken action for non-compliance.

Ofcom also has powers to enforce the TV licence non-interference condition. The licence says that people must not let their TV receiving equipment cause unreasonable interference to any radio or TV reception. Interference from ageing plasma screen TVs is, of course, well known.

The other main means however, are the Regulations under section 54 of the Wireless Telegraphy Act. These can apply to apparatus already in use. Where there is Harmful Interference, Ofcom can serve a closure notice on the user of the apparatus, giving 28 days to cure the interference (or immediate closure in safety of life cases). After much urging by the RSGB, Ofcom has recently updated these Regulations. While this is welcome, we feel they still remain inadequate. Ofcom refuses to address the RSGB's legitimate concerns, which have been expressed to them.

Harmful Interference is defined in WTA as Interference that "degrades, obstructs or repeatedly interrupts anything which is being broadcast or otherwise transmitted" lawfully by wireless telegraphy (which encompasses all forms of radio transmission).

We have seen several well documented cases, some of which have been supported by "before and after" recordings and where there could be little doubt that received signals were being constantly obstructed and degraded. Ofcom commonly refuses these cases on the grounds that amateurs have alternative spectrum available. The definition of Harmful Interference however, refers to "anything" being transmitted, so can mean an individual signal, not a generality and Ofcom seem not to realise that it might well not be possible to make the same communication on a different band.

As for changing bands, one Member has commented that the fact that many senior managers in Ofcom are licensed radio amateurs hopefully means that they can explain to the field engineers that it is often not appropriate for an amateur to change frequency or band. Many amateurs have a preferred mode and band and telling them to move to another band when a newly installed VDSL line causes interference is not an obvious response.

### VDSL interference

Moving on to the specific issue of VDSL, Ofcom has said it is not proportionate to take action in these cases since there have been only 100 or so reports versus 6.5 million VDSL installations. That, however, is a completely erroneous way of looking at it. It would be true if we were seeking to have the whole VDSL network closed down. We are not. What we want is those problem installations rectified. Ofcom also says it may not have the necessary powers. If the faults lie within the scope of the EMC Regulations, then they certainly do. If the faults fall within the WTA Regulations' scope, then indeed Ofcom do not have the powers. They have deliberately excluded VDSL and similar wireline broadband systems from their interference Regulations, even though we have pointed to a clear precedent that allows them to be included.

On a more positive note the EMC Committee has been trialling a process for dealing with potential VDSL interference and have very recently agreed with Openreach a procedure for checking for this. See page 10 for more information on this topic.

Since the Ofcom article in the last *RadCom*, many have written and expressed often quite strong opinions on the issues Ofcom raised. These comments have been collated in the EMC Matters forum on the RSGB website, see [www.tinyurl.com/RSGB-EMC-response](http://www.tinyurl.com/RSGB-EMC-response). We encourage you to read those posts and, if you feel it appropriate, to add your own opinions. This provides useful guidance to the RSGB in pursuing the matter further. Many of those who posted there have suffered Harmful Interference themselves largely from VDSL2. We can only defeat the Ofcom contention that this is a problem for only a few amateurs by reporting all of your cases.

Further articles soon will cover how to record and report RFI problems and a summary of the report submitted to BT and Ofcom describing work carried out by the VDSL subcommittee of the EMCC on investigations into VDSL2 RFI and recommendations to reduce its impact on HF.

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# Antennas

**T**his month we look at using a computer model to design an antenna based on the construction of a 6m band Yagi beam. The intention is to continue with this theme in a future Antennas column examining how a model can be used to predict an antenna's performance.

## Antenna modelling with computers

The essential mathematical equations describing the performance of antennas were devised during the early development of radio systems. However, using a model to predict the performance of an antenna was a lengthy and specialised process. Consequently, early mathematical antenna models tended to be only used in limited situations and for special cases.

The advent of computers has transformed this situation because they provide an efficient means to model and assess an antenna's performance quickly compared to the previous manual techniques. The computer model can be re-run as often as is necessary and this is a distinct advantage when examining how various design changes could affect the performance and characteristics of the antenna.

Most antenna modelling applications are based on vector analysis techniques and use samples taken at points along the antenna to predict its performance. The majority of computer models use an iterative approach using quantitative methods and this allows the antenna to be assessed across a range of possibilities that might be encountered in reality. The concept of the sampling method used by models is shown in **Figure 1**. Basically, the more samples used by the model, the more accurate the prediction is for the antenna's performance. Most computer models use a pseudo-random number as a starting point to run a model. This starting number can vary between computers and can lead to slightly differing results being predicted between them.

Commonly used antenna analysis applications are those derived from work by US government laboratories and is known as NEC (Numerical Electromagnetics Code) [1]. NEC uses methods-of-moments (MOM) algorithms to calculate values at sampled points. The first NEC-based program designed for use with a personal computer was MININEC [2].



**PHOTO 1:** The 6m antenna built from the model's predictions

## Antenna modelling using MMANA-GAL

MMANA-GAL [3] is an antenna analysis and design package aimed at radio amateurs. MMANA-GAL is freeware that is often included on the CD that accompanies many of the publications available from the RSGB. Antenna analysis using MMANA-GAL is based on the method-of-moments technique that was introduced with MININEC.

## An overview of using MMANA-GAL

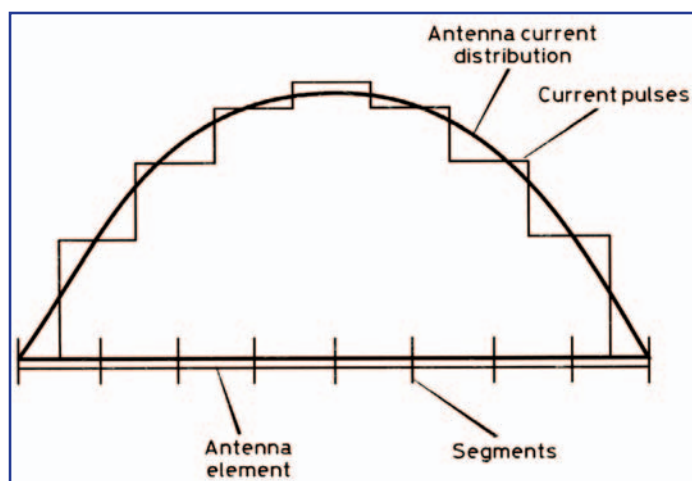
To help with an understanding of how to use MMANA-GAL, the examples to follow are based on a model of a three element Yagi beam for the 6m band. A full users' manual for MMANA-GAL is outside the scope of the Antennas column but the following should give an indication of the power and flexibility of the software. Guidance on the functionality of MMANA-GAL can be found in

the application's **Help** facility. The examples used in the following were modelled using the MMANA-GAL basic V3.0.0.31 application.

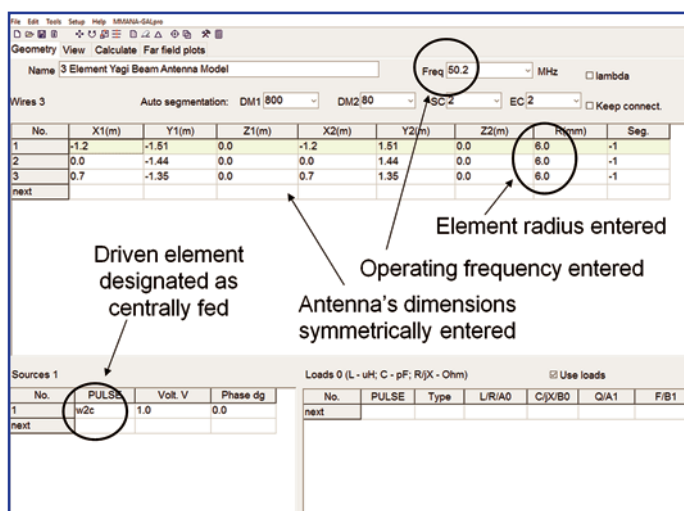
## Getting started

To model an antenna requires a reasonable approximation of the antenna's dimensions to be entered as a good starting point for the model to work from. For a three element Yagi beam, the design guidance suggests the following, to obtain dimensions in metres, where  $f$  is frequency in MHz:

- (A) Half wavelength ( $\lambda/2$ ) driven element  
=  $(150/f) \times (0.96)$
- (B) Reflector element = (A)  $\times$  (1.05)
- (C) Director element = (A)  $\times$  (0.94)
- (D) Spacing between driven element and reflector: approximately  $(300/f) \times (0.2)$
- (E) Spacing between driven element and director: approximately  $(300/f) \times (0.12)$



**FIGURE 1:** Concept of how the real and modelled current distribution over a half-wave dipole are sampled by a computer model.



**FIGURE 2:** The Geometry view with the three element Yagi beam's dimensions symmetrically entered.

For the three element beam and using an operating frequency of 50.2MHz, the dimensions calculated using (A) to (E) above gave the initial series of element lengths and spacing as shown in **Table 1** column A.

## Geometry view: entering the antenna's dimensions

MMANA-GAL uses the X, Y and Z co-ordinate system to model antennas. If the X and Y axes are used then the antenna is modelled in the horizontal plane. Using the Z and either the X or Y axis allows an antenna to be modelled in the vertical plane. The three element beam's dimensions were entered using the X and Y axes to allow the results to be viewed in the horizontal plane when the model was run.

With the MMANA-GAL application running, click on the **Geometry** tab to display this view. The driven element's dimensions were entered symmetrically into the model using only the Y axis fields. This allows graphical results to be viewed for the antenna referred to the driven element when the model is run. The reflector was similarly entered and placed behind the driven element using negative values of the X axis fields. Then the director was entered forward of the driven element using positive X axis fields. A radius of 6mm was entered for the diameter of the tubing used for the elements.

In MMANA-GAL, the antenna's elements are termed 'Wires', with (in this case) the reflector as Wire 1, driven element as Wire 2 and director as Wire 3. The driven element was assigned as Wire 2 by entering 'W2C' (ie Wire 2 fed Centrally) in the Sources field and an operating frequency of 50.2MHz was entered in the Freq field. **Figure 2** shows how the antenna's dimensions and other parameters were entered.

It is a good practice to save the model before moving on to the next stage. If a mistake is made, this can be difficult to correct and the model can always be reloaded to clear the problem. The model can be saved from the **File** button using the **Save As** function by entering a name for model and selecting a suitable storage folder on the computer. The **File** button also contains the functions to **Open** a model to reload it or to start a **New** model. This is shown as **Figure 3**.

## View: antenna diagram overview

Clicking on the **View** tab displays an image of the antenna entered from the **Geometry** view. Using the mouse, the image can be rotated and there is a zoom facility. Clicking on a specific element displays its details within the panel on the lower right-side of the display. **Figure 4** shows the antenna when displayed from the **View** tab.

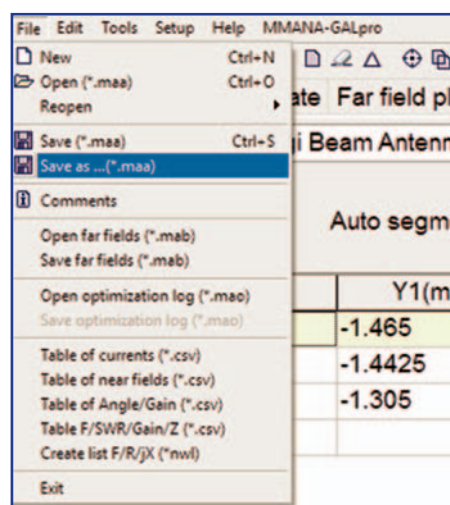
## Calculate view: running the model

Clicking on the **Calculate** tab displays the view where the model is run from. Before running the model, select the material from which the antenna is to be made using the drop-down list (shown arrowed in **Figure 5**). For the first run of the antenna model, make sure that the **Free-Space** radio button is chosen by clicking on it (also arrowed in **Figure 5**). Then run the model by clicking on the **Start** button. It will take a few seconds to finish before displaying the results. The antenna's predicted results include the:

- Impedance (in the form  $R \pm jX$ ),
- SWR at the feed point (referred to 50Ω),
- Gain (in dBd and dBi) and
- Front-to-back (F/B) ratio values.

These results are also arrowed in **Figure 5**.

The predicted results displayed are based on the dimensions entered for the antenna and, as can be seen in **Figure 5**, the SWR prediction is 1.68:1. The dimensions for the antenna could be manually changed in the **Geometry** view and the model could then be re-run from the **Calculate** view to assess the effect of the changes. However, the **Calculate** view also has a facility to optimize the antenna's dimensions automatically. This allows the application to iteratively change the model and re-run itself with the objective of predicting the optimum dimensions for the antenna.



**FIGURE 3:** Saving the model from the 'Save as' facility.

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Current gain $h_{FE}=67$	Current gain $h_{FE}=117$	Diode protection between C-E	Gate Threshold $V_{GS}=3.47V$	RED GREEN BLUE Anod Cath
Test current $I_C=2.50mA$	Test current $I_C=2.50mA$	Current gain $h_{FE}=9124$	Test current $I_D=2.50mA$	Forward voltage D1 $V_F=1.983V$
Base-Emitter V $V_{BE}=0.293V$	Base-Emitter V $V_{BE}=0.711V$	Test current $I_C=2.50mA$	Diode or diode junction(s)	Test current D1 $I_F=3.223mA$
Test current $I_B=4.981mA$	Test current $I_B=4.583mA$	Base-Emitter V $V_{BE}=1.321V$	RED GREEN BLUE Anod Cath	Pinout for D2
Leakage current $I_C=0.027mA$	Leakage current $I_C=0.000mA$	Test current $I_B=3.720mA$	Forward voltage $V_F=0.694V$	RED GREEN BLUE Anod Cath
		Leakage current $I_C=0.000mA$	Test current $I_F=4.663mA$	Forward voltage D2 $V_F=1.927V$
				Test current D2 $I_F=3.281V$

Just a few example  
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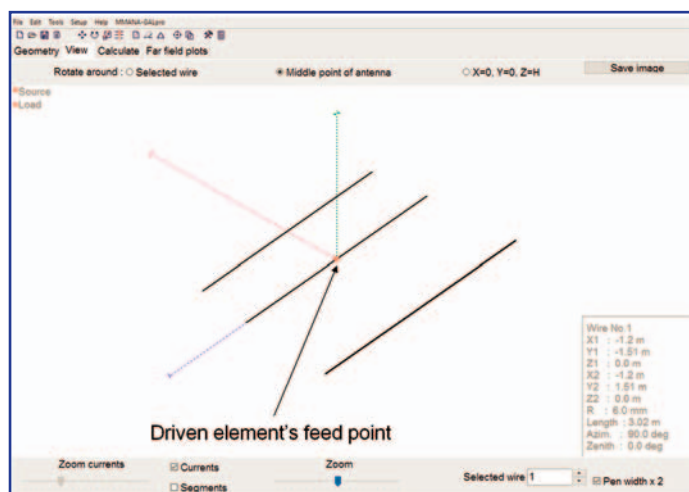


FIGURE 4: Viewing the antenna being modelled.

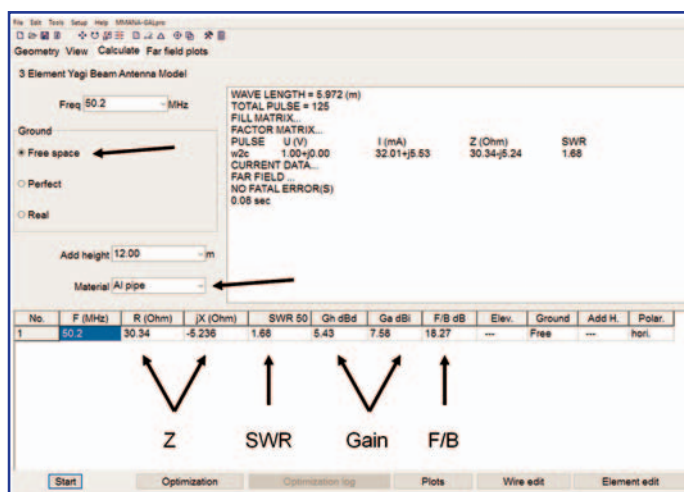


FIGURE 5: Running the model and viewing the results.

## Optimising the antenna

In the **Calculate** view, clicking on the **Optimization** button displays the Optimization sub-panel (see Figure 6), which has the facilities to vary a number of parameters used by the model. For example, if the SWR is to be minimised, then move the mouse over the **SWR** slider control and move the pointer to the desired position. Then use the **Start** button to re-run the model. As usual the model takes a few seconds to run and then displays the results within the **Calculate** view.

The results from the latest re-run of the model are displayed above the results previously obtained and this enables a direct comparison to be made from running the Optimization facility. Figure 7 shows the results predicted from three re-runs of the model and the optimised results show the SWR has improved from 1.68:1 to 1.55:1 (see second cell up in the SWR results column, arrowed). However, to improve the results still further, the antenna's dimensions were then changed manually from within the **Geometry** view. Each time a dimension was changed the model was re-run, eventually giving a predicted SWR of 1:1 in free-space as shown in Figure 7 (see the upper cell in the SWR column). The final manually entered element lengths and spacing are shown in Table 1 column B.

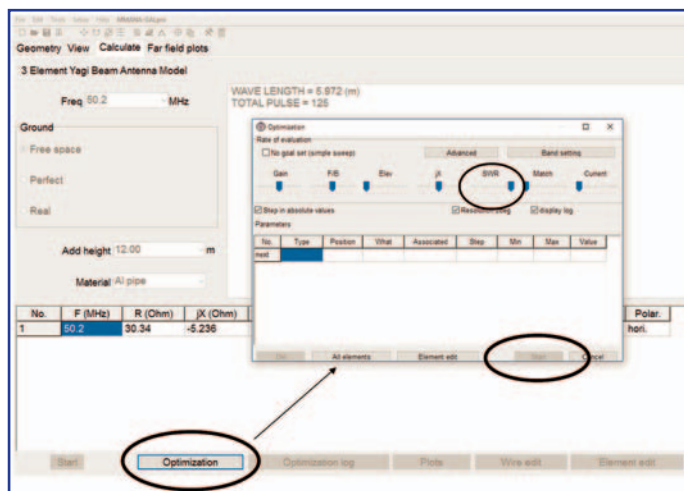


FIGURE 6: Optimising the model's dimensions.

## Summary

Using the dimensions and spacing determined using the MMANA-GAL model, the 6m three element beam was built and tested [4] – see Photo 1. Next month we'll examine this antenna in further detail and look at other features of MMANA-GAL, including polar plots and three dimensional radiation pattern predictions.

## References

- [1] *Field Computation by Moment Methods*, RF Harrington, Macmillan Company, New York, 1968
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- [3] MMANA-GAL basic V3.0.0.31, freeware antenna analysing application. Original code by Makoto Mori, JE3HHT. MMANA-GAL basic and MMANA-GAL Pro by Alex Schewelew, DL1PBD and Igor Gontcharenko, DL2KQ. Available from 1999 onwards.
- [4] *RadCom* June 2016, 'Antennas' pages 40 to 42, Mike Parkin, G0JMI

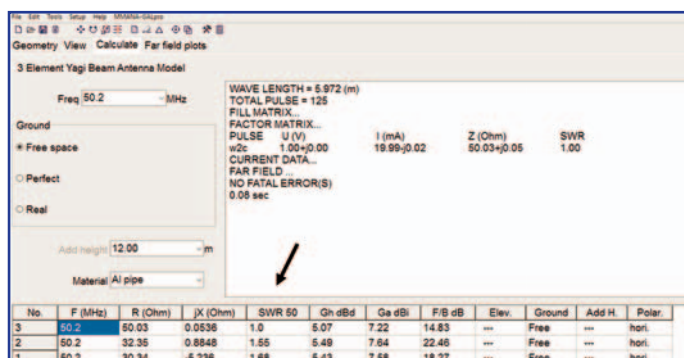


FIGURE 7: Manually entered dimensions that allowed the model to predict an SWR of 1:1.

TABLE 1: Comparison of the initial and modelled dimensions for the 6m Yagi beam. Design frequency is 50.2MHz.

	(A) Initial model dimensions	(B) Final predicted dimensions
<b>Element lengths</b>		
Reflector	3.02m	2.93m
Driven element	2.88m	2.885m
Director	2.7m	2.61m
<b>Spacing between elements</b>		
Reflector to driven element	1.2m	1.09m
Driven element to director	0.7m	0.68m



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Mr G Munden, G3NIL  
Mr H White, G3NKW  
Mr H E Perkins, G3NMH  
Mr E H Matthews, G3NPL  
Mr E S Collin, G3NQV  
Mr J W Heavside, G3NYX  
Mr R J Powell, G3OGP  
Mr I Jackson, G3OHX  
Dr R A Simpson, G3OMS  
Mr J Denman, G3OND  
Mr R Burns, G3OOU  
Mr D Evans, G3OUF  
Mr J G Wilcox, G3OYF  
Mr G J Petrie, G3PDG  
Mr B D Simpson, G3PEK  
Mr A W Tomalin, G3PTB  
Mr A L Gray, G3RBB  
Mr R G Dobbins, G3RGD  
Mr J A Strutt, G3SAS  
Mr A P Hewitt, G3SVD  
Lt Col J G Barber, G3TTJ  
Mr H M Davison, G3TVW  
Mr M D Davidson, G3UKM  
Mr L S Margolis, G3UML  
Mr M A Hall, G3USC  
Mr M Foster, G3VOF  
Mr P Beecroft, G3WVY  
Mr R H Edmondson, G3YEC  
Mr P L A Burton, G3ZPB  
Mr H R Perrin, G4AFY  
Dr B Chambers, G8AGN  
Mr M J Bonner, G8ALB  
Mr M Hearnsey, G8ATK  
Mr M Wallace, G8AXA  
Mr R H Chambers, G8BCA  
Mr T Harrison, GM3NHQ  
Mr A E Gwynne, GW3LNR  
Dr B G Taylor, HB9ANY  
Mr E J Kelly, G86XF  
Mr G G Gemmill, RS22502  
Mr H J Randall, RS25603  
Mr D M Willoughby,  
RS27261

## 56 Years

Mr A Prichard, G0CPA  
Mr J Crerar, G3BYV  
Mr G D Lively, G3KII  
Mr G Jenner, G3KIW  
Mr R E Hardman, G3LGV  
Mr S J W Freeman, G3LQR  
Dr A E Wilson, G3MAE  
Mr B C Gibbs, G3MBN  
Mr R Wheeler, G3MGW  
Mr E K Tunstall, G3MSO  
Mr C R Bell, G3NIE  
Mr K A Morgan, G3NWX  
Mr A J Taylor, G3NVE  
Mr T Haydu Jones, G3OAD  
Mr W A Jeffs, G3OAF  
Mr C Bowden, G3OCB  
Mr D A G Martin, G3ODC  
Mr M S Beer, G3OGZ  
Mr G Badger, G3OHC  
Mr J C G Parker, G3OLX  
Mr P E Judkins, G3OMJ  
Mr D S Moffatt, G3RAU  
Mr D C Sylvester, G3RED  
Mr D R Mullins, G3RGM  
Dr A J Shepherd, G3RKK  
Mr M J T Smith, G3RMN  
Mr A Notschild, G3RSF  
Mr A T James, G3RUV  
Mr R W L Limebear, G3RWL  
Mr P J Cort-Wright, G3SEM  
Mr P J Hart, G3SIX  
Mr L P J Lethbridge, G3SXE  
Mr R Mason, G3TDM  
P W Myers, G3UWT  
Mr J Greaves, G3UXM  
Mr W McClintock, G3VPK  
Mr P Barville, G3XJS  
Mr M Duce, G4BQF  
Mr D H Squires, G4DAC  
Mr N J L Lockett, G4EMB  
Mr G P Gaunt, G4IJO  
Mr L Arnold, G8AHE  
Mr R A Fuller, G8CEZ  
Mr J Pink, G8MM  
Mr F C Thorogood, G8ORV  
Mr G Hodgkinson, G17TPO  
Mr L D Woolf, G3J3RA  
Dr A J Masson, GM3PSP  
Mr J F Kelly, GM3TCW  
Mr R Andrew, GM3WFJ  
Mr G R Kelly, GM8MST  
Mr A E Pritchard, GW3ODB  
Mr K Robbins, GW3PFV  
Mr R Howe, GW3PLB  
Mr A Richards, GW3SFC  
Mr D W Bowers, GW4AVC  
Mr A J Richards, GW4RYK  
Mr G A S Lander, HB9AJU  
Mr D Gray, MODLL  
Mr M A Hoare, RS22800  
Mr M J J Dawe, RS23071  
Mr M T Bland, RS24640  
Dr D J Harvey, RS25435  
Mr J Kasser, VK5WU

## 66 Years

H Hensler, DL6DZ  
Mr P O'Kane, EI5DI  
Mr A Martin, F5VAI  
Mr D G Dawkes, G0ICJ  
Mr E J Masters, G0KRT  
Mr W J Purser, G2AXO  
Mr D Beattie, G3BJ  
Mr J W Swift, G3CTP  
Mr J France, G3KAF  
Mr A M Pomfret, G3LZZ  
Mr C D Stephens, G3MGS  
Mr B S Collins, G3MXA  
Mr J R Vickers, G3ORI  
Mr A G Rumbold, G3ORX  
Mr R G Titterton, G3ORY  
Mr D Westbury, G3OXL  
Mr D Swainson, G3OXN  
Mr B Davies, G3OYU  
Mr J Holstead, G3OZC  
Mr R E A German, G3OZT  
Mr J J Davies, G3PAG  
Mr J Rabson, G3PAI  
Mr A J Baker, G3PFM  
Mr H A Buckenham, G3PGN

Mr J J Morris, G3PHA  
Mr P Day, G3PHO  
Mr P Chandler, G3PID  
Mr J E Hoare, G3PJL  
Dr B Whelan, G3PJT  
Mr R Cox, G3PLP  
Dr R G Fenby, G3PLS  
Mr J P Martinez, G3PLX  
Mr A J Feist, G3PMV  
Mr A Floyd, G3PNQ  
Rev I S Partridge, G3PRR  
Mr J L Green, G3PYF  
Mr R J Parsons, G3RBP  
Mr D C Griffiths, G3RDQ  
Mr A Pampling, G3RSP  
Mr R V Southern, G3RST  
Dr J S Craig, G3SGR  
Mr R G Pett, G3SHK  
Dr J R Whittington, G3SHZ  
Mr R L Turner, G3SMD  
Mr W M Furness, G3SMM  
Mr K F Jessop, G3TAA  
Mr M J G Dawson, G3TCL  
Mr E H Ingram, G3TDX  
Mr W B Bickham, G3TJH  
Mr M J Nicholas, G3TOI  
Mr G Grimshaw, G3TOX  
Mr R T Collins, G3TRC  
Mr A C L Coates, G3TVV  
Prof M Harrison, G3USF  
Mr J L Delves, G3VHH  
Mr A Davis, G3VTR  
Mr G Oakes, G3WRK  
Mr C J Langley, G3XGK  
Mr R G Davy, G3XVF  
Mr R Cutbush, G4ADK  
Mr R J Taylor, G4BEL  
Mr R Wells, G8BNR  
Mr H Skelhorn, G8BPU  
Mr G F Wilks, G8DVJ  
Mr M T Bowen, G8DWA  
Mr D L Edmonds, G8EWN  
Mr N E Brown, G8NCK  
Mr A Foster, GM30XA  
Mr J Carson, GM30XK  
Mr C S Penna, GM3POI  
Mr J G Walford, GM3POT  
Prof I A Macpherson,  
GM3RXU  
Mr G A Hunter, GM3ULP  
Mr N J Gudman, GW8GGW  
Mr P W Whipples, MOPWW  
Mr D S Kendall, N6HEQ  
Mr M E Kensdale, RS23278  
Mr T G B Hobbs, RS24754  
Mr H Redington, RS309220  
Mr T P Flinn, RS30993  
Mr J A Fuge, VP9FI

#### 54 Years

Mr D K McDermott, EI4DW  
Mr B W N Harris, G3GTF  
Mr B J Newman, G3MMN  
Mr R Harris, G3OTK  
Mr C J W Thomson, G3PEM  
Mr L G Sear, G3PPT  
Mr D L Rooks, G3PUO  
Mr J B W Braithwaite,  
G3PWK  
Rev A Speight, G3PYW  
Mr E D Hodgson, G3RAR  
Mr A F Stagles, G3RBY  
Mr A W Kendrick, G3RDW  
Mr H Neale, G3REH  
Mr K J Randall, G3RFH  
Mr D J Thomson, G3RGS  
Mr D Carden, G3RIK  
Mr N Ackerley, G3RIR  
Mr C M Garland, G3RJT  
Mr M Vann, G3RLV  
Mr R Collins, G3ROC  
Mr J Pennington, G3RTP  
Mr M A Sanders, G3RWV  
Mr A A Lawrence, G3RZV  
Mr G D Aram, G3SET  
Mr P J Casemore, G3SGF  
Mr B Naylor, G3SHF  
Mr I B Hamill, G3SMF  
Mr P Torry, G3SMT  
Mr R H Jennings, G3SOE  
Mr R P Smith, G3SVW  
Mr P Whitchurch, G3SWH  
Mr A Trundle, G3TCG  
Mr O S Tillet, G3TPJ  
Mr R Farrance, G3TRH  
Mr N Cawthorne, G3TXF  
Mr R J Constantine, G3UGF  
Mr M I Vincent, G3UKV  
Mr P B Johnson, G3UMV  
Mr M Farmer, G3VAO  
Mr B Clark, G3VCL  
Mr C W Westwood, G3VFD  
Mr R Bailey, G3WCQ  
Mr R Laphorn, G3XBM

Mr F Bourne, G3YJQ  
Mr M J Quee, G3ZWW  
Mr D J Jarvis, G4CEU  
Mr B J Payne, G4CJY  
Rev J A Wardle, G4CVA  
Mr D Berry, G4DFB  
Mr M J Cooke, G4DYC  
Dr J C Axe, G4EHN  
Mr R Singleton, G7OXP  
Mr R S Boardall, G8AJZ  
Mr M R Perry, G8AKX  
Mr C Towns, G8BKE  
Mr J P Abbott, G8CWJ  
Mr W S Steer, G8CYG  
Mr H Parker, G8GUN  
Mr R J C Davey, G8MRI  
Mr C G Bristow, G13PSQ  
Mr G Burt, GM30XX  
Mr G Henderson, GM3RTJ  
Mr D H Guest, GM3TFY  
Dr R D Harkess, OBE,  
GM3THI  
Mr R H G Weaver,  
GW3KXX  
Mr J Jones, GW3TMP  
Dr C G Potter, MODDT  
Mr C R Tyreman, G23BHT  
Mr J Kaplan, W9QKE

#### 53 Years

Mr L P Purcell, EI6D  
Mr B J Young, G0SCI  
Mr B J Giddings, G1JLG  
Mr G Moser, G3HMR  
Mr R G Heslop, G3KMQ  
Mr R W Nolan, G3KWK  
A R Preedy, G3LNP  
Mr P W F Darragh, G3MNV  
Mr J H Moxey, G3MOE  
Mr S Kay, G3OMA  
Mr D Beakhurst, G3OSQ  
Mr J Garrett, G3RHP  
Mr B Turner, G3RLE  
Mr W H Hall, G3RMX  
Mr T J Venn, G3RPV  
Mr P Lewis, G3RQX  
Mr P M Madagan, G3RQZ  
Mr R H Crowe, G3RVA  
Mr J M Walch, G3RVI  
Mr C I B Tusson, G3RVM  
Mr P N Henwood, G3RWF  
Mr P Chadwick, G3RZP  
Mr R C Marshall, G3SBA  
Rev G A Stanton, G3SCV  
Mr R Brown, G3SCZ  
Mr J J Bottom, G3SDG  
Dr B R H King, G3SGK  
Mr R Cottrell, G3SHY  
Mr J C Burbanks, G3SJJ  
Mr G M Smith, G3SNO  
Mr E Taylor, G3SQX  
Mr P H McPherson, G3TEL  
Mr P J Walters, G3THW  
Mr E Ross, G3TJC  
Mr G C Wynnes, G3TLV  
Mr M Smith, G3TRV  
Dr R J Butcher, G3UDI  
Mr D M Browning, G3UEY  
Mr D G Mason, G3USD  
Mr R A J Smith, G3VKT  
Mr I Walker, G3VNY  
Mr D Aslin, G3WGN  
Mr J Hartley, G3WQG  
Mr Z Skrobanski, G3XZD  
Mr R G Harris, G3ZFR  
Mr P D Hall, G4AQA  
Mr T Giles, G4C4Y  
Mr P Spelman, G4EKD  
Mr P Unwin, G4HDS  
Mr J A Cobley, G4RMD  
Mr D Turner, G4TKR  
Mr J N Houldridge, G6KYD  
Mr T Eyre, G7ONM  
Mr M Bues, G8AAI  
Mr D Mann, G8ADM  
Mr G Smith, G8AOJ  
Mr G Swan, G8ASJ  
Dr R Gayton, G8ATC  
Mr N D Fisher, G8ATO  
Mr J D Bosworth, G8BAV  
Mr D Pedley, G8EMA  
Mr R B Harbison, G13PDN  
Mr J A Finnegan, G14FFL  
Mr H A Sinclair, G14GOS  
Mr B B Nelson, G14KBM  
Dr H Brash, GM3RVL  
Mr I M G Miller, GM4JAE  
Mr A R B Gordon, GM6RXQ  
Mr D M Thomas,  
GW3RWX  
Mr R Alban, GW3SPA  
Mr S Hulme, GW3SRM  
Mr B Carter, GW8AAG  
Mr F R Hopwood, GW8BIA

Mr J H Tait, GW8MGF  
Mr I Beltrami, I4JBJ  
Mr J Tamminen, OH3AD  
Mr John Devoldere, ON4UUN  
Mr J Willerton, RS19211  
Mr S B Harrison, RS20102  
Mr C A Cooper, RS25672  
Mr P V Lingham, RS38098  
Mr D Dunn, VK3DBD

#### 52 Years

Mr P Stepponat, DL7BAT  
Mr R A Ball, G0INZ  
Mr T H Gonsalves, G0OYJ  
Mr S Revell, G3PMJ  
Mr D M Gresswell, G3PWY  
Mr I Walker, G3RJF  
Mr S M Cherry, G3SJK  
Mr P D Lee, G3SPL  
Mr J J Jarvis, G3SUG  
Mr D R Coltart, G3SYM  
Mr B C Ward, G3SZV  
Mr C J Lambert, G3TA  
Mr W Eaton, G3TAO  
Mr J C Boydell, G3TAX  
Mr J D Cree, G3TBK  
Mr A S Bye, G3TCI  
Mr G F Kimbell, G3TCT  
Mr C R Bonner, G3TOF  
Mr D R Stimson, G3THC  
Mr B F Greenaway, G3THQ  
Mr D R French, G3TIK  
Mr P S Duncan, G3TKA  
Mr G Parkhurst, G3TOZ  
Mr R A W Stevens, G3TVI  
Mr I D Brown, G3TVU  
Mr D Fill, G3UBB  
Mr J P H Burden, G3UBX  
Mr D Houghton, G3UPY  
Mr P Carey, G3UXH  
Mr C Pedder, G3VBL  
Mr R G Luckock, G3VDX  
Mr D N Davison, G3VFX  
B R G Hutchinson, G3VGH  
Mr D J Aldridge, G3VGR  
Mr E J Harland, G3VPF  
Mr D T M Clemens, G3VXM  
Mr I Peterkin, G3WDU  
Mr K Griffiths, G3WIC  
Mr J W Hall, G3WLD  
Mr P Smith, G3WPB  
Mr S W Powell, G3WRA  
Mr P G Brooker, G3WXC  
Mr A Strong, G3WXI  
Mr J K Gibson, G3WYN  
Mr R M Walker, G3XYJ  
Mr G J Bedwell, G3XYX  
Mr P A Ellis, G3YAS  
Mr F Wilson, G3YQA  
Mr H Tabberer, G3YVK  
Mr P J Marcham, G3YXZ  
Mr J Yu, G3ZQT  
Mr J P Billingham, G4AGQ  
Mr D J Butler, G4ASR  
Mr G E Austin, G4DPA  
Mr T Jewell, G4ELM  
Mr J M Butcher, G4GWJ  
Mr B Coleman, G4NNS  
Mr P Herman-Cranmer,  
G4TFP  
Mr J O Haile, G8ADC  
Mr P Helm, G8AEN  
Mr C G Partridge, G8AUU  
Mr K Rothwell, G8EAP  
Mr G D Drinkwater, G8GCU  
Mr E S Campbell, G8PHS  
Mr A K Sinclair, GD3TNS  
Mr M J W Hamilton,  
GM3TAL  
Mr V T Budas, GM3VTB  
Dr B W Flynn, GM8BJF  
Mr P A Miles, GW3KDB  
Mr R Volck, GW3RKV  
Mr K J Winnard, GW3TKH  
Mr C S Carver, GW4EYO  
Mr P J W Rowell, RS12236  
Mr G Ferguson, RS26003  
Mr W Inglis, RS26642  
E D Moustakas, SV1AN  
Mr M G Potgieter, ZS5NK

#### 51 Years

Mr A Cobb, G0WJK  
Mr G F Brown, G2BJK  
Mr J H Halman, G3JNP  
Mr R E McHenry, G3NSM  
Mr T Boucher, G3OLB  
Mr A Ash, G3PZB  
Mr F L Curtis, G3SVK  
Mr R W Thompson, G3TKF  
A Robinson, G3TQA  
Mr R D Allan, G3TQZ  
Mr K M Orchard, G3TTC  
J E Harknett, G3TVH

Mr M H Roach, G3TWJ  
Mr B Tiffany, G3TXX  
Mr T Morgan, G3UAS  
Mr R Stansfield, G3UAX  
Mr E A Sweetman, G3UAZ  
Mr W T Guilfoyle, G3UBC  
Mr D I Gould, G3UEG  
Mr M P Taylor, G3UFG  
S V Knowles, G3UFY  
Mr C E Houlty, G3UHS  
Mr B T Davis, G3UJB  
Mr R M M Heath, G3UJV  
Mr P A Hopwood, G3UKH  
Mr M Newton, G3UKW  
Mr M Hibbitt, G3ULN  
Mr J F Wilson, G3UUT  
Mr M R G Simpson, G3UVM  
Mr J S Curry, G3UVU  
Mr P Kemble, G3UYK  
Mr R Hemmings, G3VCT  
Mr T Chipperfield, G3VFC  
Mr M E Deutsch, G3VJG  
Mr J E Longhurst, G3VLH  
Mr M G Pritchard, G3VNQ  
Mr J S Wright, G3VPW  
Mr P R Lamb, G3VRW  
Mr B E Ellis, G3VXF  
Mr J Doswell, G3VYE  
Mr R G Chamberlain,  
G3VYU  
Mr J Crabbe, G3WFM  
Mr D C Holland, G3WFT  
Mr S Williamson, G3WGU  
Dr G Bulger, G3WIP  
Mr G Macnaught, G3WOV  
Mr D Minett, G3WPP  
Mr D F Chalmers, G3WQG  
Mr K A M Fisher, G3WSN  
Mr K M Taylor, G3WTA  
Mr J P Smith, G3WTS  
Mr J M Teed, G3WWT  
Mr D Dade, G3XCT  
Mr G Everest, G3XUP  
Mr P W Crust, G3XYC  
Mr D Woodhall, G3ZGZ  
Mr P Rodmell, G3ZRS  
Mr R Dunham, G3ZSQ  
Mr G Dover, G4AFJ  
Mr D P Warner, G4AFQ  
Mr K R Punshon, G4APJ  
Mr P Bradshaw, G4CTE  
Mr R A Harris, G4FFA  
Mr C R Caine, G4IWS  
Mr P Senior, G4JNL  
Mr K G Pollard, G4KGP  
Mr K Hancock, G4KIY  
Mr D Ross, G4LOO  
Mr S L Berry, G4LRT  
Mr P Collett, G4LYC  
Mr D Earnshaw, G4MZF  
Mr C Trayner, G4OKW  
Mr T E J Toth, G4ORF  
Mr D Fillingham, G4OVR  
Mr B T Collins, G4ULA  
Mr S Birkill, G8AKQ  
Mr H Bate, G8AMD  
Mr C D Plummer, G8APB  
Mr I R G Gorton, G8ASP  
Mr A J Whittaker, G8BFM  
Mr A Marshall, G8BUR  
Mr C D Jameson, G8CDJ  
Mr M E Baxter, G8DHU  
Dr J G Davies, G8EBJ  
Mr G R Diacon, G8EWT  
Mr T G Lambert, G8EZL  
Mr J P Argyle, G8FED  
Mr S Camm, G8HED  
Mr M R Thompson, GD3JIU  
Mr V I Gracey, G13WEM  
Mr E K Dons, GMOAXY  
Mr J McCall, GM3HGA  
Mr C B Rattray, GM3HYX  
Mr W G Cecil, GM3KHH  
Mr I G Drysdale, GM3TYS  
Mr W P Wright, GM3UCH  
Mr C Weston, GM3VAP  
Mr D Cossar, GM3WIL  
Mr M D Collar, GM8AGM  
Mr J M Briscoe, GM8A0B  
Mr DJ Ozanne, GU3UMX  
Mr P P Le Boutillier MBE,  
GU3UOQ  
Mr A E Peake, GW3SRG  
Mr I Jones, GW3TLP  
Mr K E Godfrey, GW3VEW  
Mr M A Shelley, GW3XJQ  
Mr R J Gregory, GW8FNO  
G Modia, IFSWX  
Dr D A Nicole, MOCYJ  
Mr D D Kaye, RS26890  
Mr H Pitchford, RS27350  
Mr C R Baker, VK3GMR  
Mr B Pope, VK4BAP  
Mr M J Rogers, ZS1RZ

#### 50 Years

Mr J Purfield, EI2CI  
Mr A Wickham, G3IAZ  
Mr R H Medcraft, G3JVM  
Mr R Balister, G3KMA  
Mr G F Firth, G3MFF  
Mr R Sykes, G3NFF  
Mr R M Jones, G3NKL  
Mr G Suggate, G3NPI  
Mr C Draper, G3TSK  
Mr R B Heaton, G3UGX  
Mr M J Peake, G3UIJ  
Mr F Bilke, G3UZD  
Mr C P Haddock, G3UZM  
S T E Boyce, G3VBV  
Mr R L Pickles, G3VCA  
Mr P A Kalas, G3VCN  
Mr D Prout, G3VCV  
Fit Lt R Evans, G3VHE  
Mr H Buttress, G3VHL  
Mr G Wood, G3VIP  
Mr F Turner-Smith, G3VKI  
Mr G H S Jones, G3VKV  
Mr T W Beamond, G3VLF  
Mr C Linnell, G3VLT  
Mr C Davis, G3VMU  
Mr E Searle, G3VMY  
Mr D A Lane, G3VOM  
Mr R B Cottrell, G3VOS  
Mr M J Fereday, G3VOW  
Mr H S Pinchin, G3VPE  
Mr P J Lennard, G3VPS  
Mr P Burgess, G3VPT  
Mr J E Pitt, G3VRY  
Mr G O Jones, G3VSB  
Mr J A Arcscott, G3VSL  
Mr R S West, G3VSQ  
Mr M P Coombs, G3VTO  
Mr R Wilkinson, G3VTV  
Mr A R Clemmetsen, G3VZJ  
Mr J Elliott, G3WFK  
Mr F J P Connor, G3WMR  
Mr I R Cutler, G3XFV  
Mr R Hutchinson, G3XHF  
Mr D Powell, G3XLW  
Mr C J Marsden, G3XSO  
Dr M George, G3XYG  
Mr D B Gething, G3XZK  
Mr R Vale, G3YHI  
Mr R Yaxley, G3YHO  
Mr D M Kirkwood, G3YQO  
Mr M Baker, G3ZBP  
Mr D R Lax, G4AHN  
Mr P Bolton, G4CXE  
Mr D W Cannings, G4DWC  
Mr A Mallows, G4FUZ  
Mr I R Butson, G4HKC  
Mr R D Sexton, G4IZS  
Mr D Featherstone, G4JFD  
Mr E Bailey, G4LUE  
Mr D R Birchall, G4MAU  
Mr G L Fitton, G4MDT  
Mr R C Whattam, G8ACQ  
Mr D L Woolley, G8AMJ  
Mr S R Lucas, G8APZ  
Mr J A Jones, G8BAZ  
Mr D Gardiner, G8BAS  
Mr J Owen, G8BFT  
Mr A Grove, G8BJG  
Mr C G Clark, G8BKQ  
Mr P Shield, G8BXM  
Mr R Gape, G8DQX  
Mr S Haseldine, G8EBM  
Mr J Hunt, G8JPA  
Mr J P Reeve, G8ROD  
Mr R T Sherrard, G13VAW  
Mr M H McFadden, G13VCI  
Mr W R Magee, G13XLK  
Mr A MacFarlane,  
GMOMAC  
Mr F Baxter, GM3VEY  
Mr C W Tran, GM3WOJ  
Mr M A Hall, GM8IEM  
Mr A A C Richmond,  
GU3ONJ  
Mr C Jenner, GWOPPO  
Mr R J Baker, GW3OVD  
Mr B Cushing, MODJQ  
Mr D Bowers, MODKV  
Mr S A Spencer, RS28095  
Mr C Inman, RS29943  
Mr R Luther, VK7GN  
Mr R Solfer, W2RS  
Mr S Cammies, ZS1XG

#### Clubs & Organisations

**80 Years**  
Royal Air Force Amateur  
Radio Society, G8FC

**70 Years**  
S Hampshire ITS, G3DIT

**69 Years**  
Sutton & Cheam RS, G2XP  
Yeovil ARC, G3CMH  
Manchester Wireless Society,  
G5MS

**68 Years**  
Derby & District ARS, G2DJ  
Stoke-on-Trent ARS, G3GBU  
Wirral ARS, G3NWR  
Isle of Man ARS, GT1IOM

**67 Years**  
Spenn Valley ARS, G3SVC

**66 Years**  
Dorking & DRS, G3CZU  
West Kent ARS, G3WKS

**65 Years**  
Cambridge & DARC, G2XV  
Sheffield & District DARS,  
G3FJE

**64 Years**  
York Amateur Radio Society,  
G3HWW  
Stockport Radio Society,  
G6UQ

**60 Years**  
Bury RS, G3BRS  
Medway ARTS, G5MW

**59 Years**  
Crystal Palace Radio, G2LW  
Newbury & DARS, G5XV

**58 Years**  
Southport & DARC, G2OA  
Preston ARS, G3KUE  
Scarborough ARS, G4BP

**57 Years**  
RS of Harrow, G3EFX  
Reigate ATS, G5LK  
Guildford & DRS, G6GS  
Conwy Valley ARC, GW6TM  
Radio Soc. of Zambia, R.S.Z.

**56 Years**  
South Birmingham Radio  
Society, G3OHM  
RNARS, GB3RN

**55 Years**  
Royal Signals Amateur Radio  
Society, G4RS

**54 Years**  
Basingstoke ARC, G3TCR  
Loughton & Epping Forest  
ARS, G4ONP

**53 Years**  
Mansfield ARS, G3GQC  
Northampton RC, G3GWB  
Mid Warwickshire ARS,  
G3UDN  
RAIBC, G4IBC  
Harlow & District ARS, G6UT  
Kuwait ARS, KARS  
Liechtenstein ARA, LARA  
Belfast RSGB Group,  
RS101022  
BATC, RS38114  
VERON, VERON

**52 Years**  
Chester & DRS, G3GIZ  
Echelford ARS, G3UES  
Guernsey ARS, GU3HFN

**51 Years**  
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Stevenage & DARS, G3SAD  
Salop ARS, G3SRT  
Government Comm ARC,  
G3SSO  
Fareham & District ARC,  
G3VEF  
Otley ARS, G3XNO  
Great Yarmouth Radio Club,  
G3YRC  
Saltash District ARC,  
RS126476

**50 Years**  
Chelmsford ARS, G0MWT  
Southgate ARC, G3SFG  
Maidenhead & DARC,  
G3WKX  
Ayr ARG, GMOAYR  
Barry ARS, GW3VKL





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<b>KG-UV950PL</b> 6/4/2/70cm transceiver.....	<b>£249.95</b>
<b>WO/PCO-003</b> software for mobile.....	<b>£19.95</b>

#### Handhelds

<b>KG-UV9D</b> 2/70cm Handie.....	<b>£109.95</b>
<b>KG-UV9D</b> 2/70 Handie ProPack.....	<b>£149.95</b>
<b>WO/PSO-110</b> software for handhelds.....	<b>£20.50</b>



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#### Base

<b>TS-990</b> All mode flagship HF transceiver.....	<b>£5099.95</b>
<b>TS-2000X</b> All mode HF transceiver upto 23cm.....	<b>£1469.00</b>
<b>TS-2000E</b> All mode HF transceiver upto 70cm.....	<b>£1270.00</b>
<b>TS-590SG</b> All mode HF transceiver.....	<b>£1199.00</b>
<b>TS-480HX</b> inc ATU HF to 6M HF transceiver.....	<b>£719.00</b>
<b>TS-480SAT</b> HF to 6M HF transceiver.....	<b>£659.00</b>

#### Mobile

<b>TM-D710GE</b> Dual band transceiver with APRS.....	<b>£479.00</b>
<b>TM-V71E</b> Dual band transceiver with Ecolink.....	<b>£299.95</b>
<b>TM-281E</b> 65W 2M Transceiver.....	<b>£169.95</b>

#### Handheld

<b>TH-D74E</b> Dual band with APRS & D-star transceiver.....	<b>£599.00</b>
<b>TH-D72E</b> Dual band with GPS transceiver.....	<b>£379.95</b>
<b>TH-K20E</b> 2m 5.5w FM transceiver.....	<b>£119.95</b>
<b>TH-K40E</b> 70cm 5w FM Transceiver.....	<b>£119.95</b>



#### Accessories

<b>MC-90</b> Desk microphone.....	<b>£189.95</b>
<b>MC-60A</b> Desk microphone.....	<b>£129.95</b>
<b>HS-5</b> Deluxe headphones.....	<b>£56.95</b>
<b>HS-6</b> Lightweight headphones.....	<b>£37.95</b>
<b>SP-23M</b> Mid size external speaker.....	<b>£74.95</b>
<b>KES-3</b> Mobile speaker.....	<b>£29.95</b>



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<b>IC-7851</b> HF/50MHz transceiver.....	<b>£9999.95</b>
<b>IC-7700</b> HF/50MHz with PSU & ATU.....	<b>£4999.95</b>
<b>IC-9100</b> HF/VHF/UHF SSB, CW, AM & FM.....	<b>£2799.95</b>
<b>IC-7600</b> HF/50MHz transceiver.....	<b>£2399.95</b>
<b>IC-7410</b> HF/50MHz transceiver.....	<b>£1499.95</b>
<b>IC-7300</b> New HF/50/70MHz Transceiver.....	<b>£1199.95</b>
<b>IC-7200</b> HF/50 rugged transceiver.....	<b>£829.95</b>
<b>IC-718</b> Entry level HF.....	<b>£589.95</b>

#### Mobile/Portable

<b>IC-7100</b> HF/6/4/2/70cm transceiver.....	<b>£1099.95</b>
<b>ID-5100E</b> Dual band with D-star.....	<b>£575.00</b>
<b>ID-5100E</b> Deluxe inc accessory pack.....	<b>£729.95</b>
<b>IC-2730</b> Dual band transceiver.....	<b>£299.95</b>

#### Handhelds

<b>ID-51E</b> Plus 2 Dual band D-STAR.....	<b>£449.95</b>
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#### Accessories

<b>AH-4</b> Automatic antenna tuner.....	<b>£339.00</b>
<b>SP-23</b> Base speaker with filters.....	<b>£279.00</b>
<b>SP-38</b> Base speaker for IC-7300.....	<b>£149.95</b>
<b>SP-33</b> Base speaker.....	<b>£129.95</b>
<b>SM-50</b> Desktop microphone.....	<b>£249.95</b>
<b>SM-30</b> Desktop microphone.....	<b>£129.95</b>



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<b>FT-DX9000MP</b> HF/50MHz 400W Elite Transceiver.....	<b>£9599.99</b>
<b>FT-DX9000D</b> HF/50MHz 200W Elite Transceiver.....	<b>£8799.95</b>
<b>FT-DX5000MP</b> HF/50MHz 200W (inc SM-5000.....	<b>£3799.00</b>
<b>FT-DX5000MP</b> LTD HF/50MHz 200W (without SM-5000).....	<b>£3499.00</b>
<b>FT-DX3000</b> HF/50MHz 100W Transceiver.....	<b>£1429.95</b>
<b>FT-DX1200</b> HF/50MHz 100W Transceiver.....	<b>£999.95</b>
<b>FT-991A</b> HF/50/144/430 MHz All mode field transceiver.....	<b>£1299.00</b>
<b>FT-991</b> HF/50/144/430 MHz All mode field transceiver.....	<b>£899.00</b>
<b>FT-450D</b> HF/50MHz entry level transceiver.....	<b>£549.00</b>

#### Mobile/Portable

<b>FT-857D</b> HF/VHF/UHF 100W portable transceiver.....	<b>£699.00</b>
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<b>FT-817ND</b> HF/VHF/UHF 5W backpack transceiver.....	<b>£529.00</b>
<b>FTM-400XDE</b> Dual band digital transceiver.....	<b>£499.00</b>
<b>FTM-100DE</b> Dual band digital transceiver.....	<b>£299.00</b>
<b>FT-8900</b> Quad band 10/6/2/70cm transceiver.....	<b>£249.00</b>
<b>FT-8800</b> Dual band 2/70 transceiver.....	<b>£249.00</b>
<b>FT-7900</b> Dual band 2/70 transceiver.....	<b>£229.00</b>
<b>FTM-3200DE</b> 2m digital transceiver.....	<b>£189.00</b>
<b>FTM-3100DE</b> 2m digital transceiver.....	<b>£129.00</b>

#### Handheld

<b>FT-2DE</b> Dual band digital transceiver.....	<b>£349.00</b>
<b>FT-1XDE</b> Dual band digital transceiver.....	<b>£289.00</b>
<b>VX-8DE</b> Triband 6/2/70 transceiver.....	<b>£229.00</b>
<b>VX-6E</b> Dual band transceiver.....	<b>£149.00</b>
<b>VX-3E</b> Dual band mini transceiver.....	<b>£139.00</b>
<b>FT-60</b> Dual band entry level transceiver.....	<b>£119.00</b>

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#### Base

<b>DX-SR9</b> HF 100W Transceiver with SDR.....	<b>£599.95</b>
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#### Mobile

<b>DR-735E</b> Dual band 2/70 transceiver.....	<b>£299.95</b>
<b>DR-638H</b> Dual band 2/70 transceiver.....	<b>£249.95</b>
<b>DR-B185HE</b> 2m 85W transceiver.....	<b>£169.95</b>
<b>DR-138HE</b> 2m 60W transceiver.....	<b>£169.95</b>
<b>DR-135UK</b> 10m 25W transceiver.....	<b>£159.95</b>

#### Handheld

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<b>DJ-MD40</b> UHF 400-480MHz digital transceiver.....	<b>£179.95</b>
<b>DJ-V57E</b> Dual band 2/70 transceiver.....	<b>£129.95</b>
<b>DJ-175EUK</b> 2m 5w transceiver.....	<b>£109.95</b>
<b>DJ-500</b> Dual band 2/70 transceiver.....	<b>£99.95</b>
<b>DJ-A10S</b> 2m 5w transceiver.....	<b>£89.95</b>

#### Accessories

<b>EXD-2</b> Auto long wire antenna tuner.....	<b>£299.95</b>
<b>EMS-14</b> Deluxe desk microphone.....	<b>£69.95</b>
<b>DM-330MW</b> MK2 30 switch mode PSU.....	<b>£129.95</b>
<b>DM-330FXE</b> 30 amp switch mode PSU.....	<b>£119.95</b>

#### Handheld

<b>TYTERA MD-380</b> UHF DMR Handheld Transceiver.....	<b>£129.95</b>
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#### Accessories

<b>MD-SM</b> Speaker microphone.....	<b>£14.95</b>
<b>MD-BE</b> Battery eliminator.....	<b>£14.95</b>
<b>MD-RB</b> Battery replacement.....	<b>£19.95</b>
<b>MD-LC</b> Replacement cradle and charger.....	<b>£24.95</b>
<b>MD-LC</b> Leather case.....	<b>£14.95</b>



#### Mobile

<b>MT-270</b> 25W Dual band 2/70 transceiver.....	<b>£79.95</b>
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#### Accessories

<b>MT-RM</b> Spare microphone for MT-270.....	<b>£12.95</b>
<b>MT-SC</b> Programming cable for MT-270.....	<b>£9.95</b>



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What a great entry level dual band rig, with only 10 Watts it is ideal for the new foundation pass holders. Comes complete with radio bracket and keypad microphone - all for a price you just won't believe

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<b>UV-5RC</b> 136-174/400-480MHz transceiver.....	<b>£29.95</b>
<b>BF-888S</b> 400-470MHz transceiver.....	<b>£14.95</b>

#### Accessories

<b>Speaker microphone</b> .....	<b>£9.95</b>
<b>Software cable</b> .....	<b>£9.95</b>



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

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YG4-2C 2 metre 4 Element (Boom 48") (Gain 7dBd)	£29.95
YG5-2 2 metre 5 Element (Boom 63") (Gain 10dBd)	£69.95
YG8-2 2 metre 8 Element (Boom 125") (Gain 12dBd)	£99.95
YG3-4 4 metre 3 Element (Boom 45") (Gain 8dBd)	£79.95
YG5-4 4 metre 5 Element (Boom 104") (Gain 10dBd)	£99.95
YG3-6 6 metre 3 Element (Boom 72") (Gain 7.5dBd)	£99.95
YG5-6 6 metre 5 Element (Boom 142") (Gain 9.5dBd)	£119.95



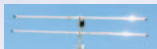
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The ZL special gives you a massive gain for the smallest boom length ... no wonder they are our best selling Yagis!

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



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This is a wideband mobile whip that is manually tuned by sliding the telescopic coil at the base. The telescopic whip may also be adjusted for fine tuning and optimizing the VHF/UHF performance. Maximum length of the antenna is 1.77m and maximum power handling is 130W

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DX-774 10-40m 8.8m 1500W	£579.95
AV-18HT 10-80m 16.13m 1500W	£1399.95

**hy-gain**



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**MR700** 2/70cm, Gain 0/3.0dBd, Length 50cm, 3/8 fitting...**£9.95**  
**MR777** 2/70cm, Gain 2.8/4.8dBd, Length 150cm, 3/8 fitting...**£19.95**  
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**MRQ500** 2/70cm, Gain 3.2/5.8dBd, Length 95cm, PL259 fitting (high quality)...**£26.95**  
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Tarheel 40A-HP 7-32MHz 1500W	£399.95
Tarheel 75A 3.3-30MHz 250W	£469.95
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Tarheel M300A 1.7-28MHz 250W	£499.95
Tarheel M400A 1.6-26MHz 250W	£509.95

## Accessories

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**MDHF-20** 14MHz balun matched mono dipole, length 10m...**£39.95**  
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**OSHF-40** 7.0-30MHz balun matched off set dipole, length 22m...**£44.95**  
**OSHF-20** 14-30MHz balun matched off set dipole, length 11m...**£39.95**  
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**LWHF-40** 7.0-50MHz unun match end fed antenna, length 10m...**£39.95**



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## HF Mobiles

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**AMPRO-11** Slim line design 27MHz 2m approx. 3/8th fitting...**£22.95**  
**AMPRO-12** Slim line design 24MHz 2m approx. 3/8th fitting...**£22.95**  
**AMPRO-15** Slim line design 21MHz 2m approx. 3/8th fitting...**£22.95**  
**AMPRO-17** Slim line design 18MHz 2m approx. 3/8th fitting...**£22.95**  
**AMPRO-20** Slim line design 14MHz 2m approx. 3/8th fitting...**£22.95**  
**AMPRO-30** Slim line design 10MHz 2m approx. 3/8th fitting...**£22.95**  
**AMPRO-40** Slim line design 7MHz 2m approx. 3/8th fitting...**£22.95**  
**AMPRO-60** Slim line design 5MHz 2m approx. 3/8th fitting...**£24.95**  
**AMPRO-80** Slim line design 3.5MHz 2m approx. 3/8th fitting...**£27.95**  
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# Amateur radio on the International Space Station

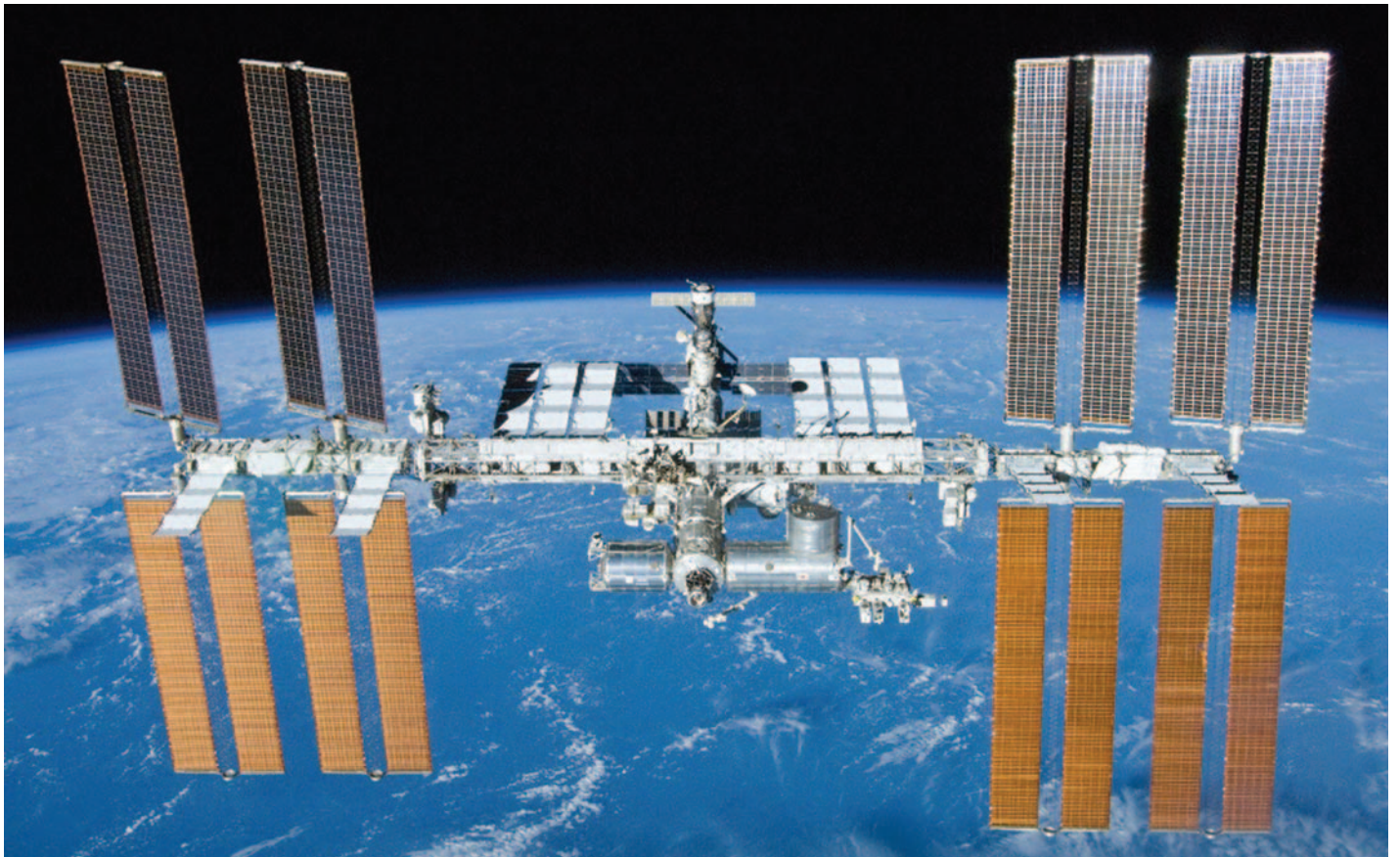


PHOTO 1: The International Space Station, seen on 1 June 2015 (image courtesy of NASA).

**T**he International Space Station (ISS) is a joint project between five space agencies: NASA, Roscosmos (the Russian Federal Space Agency), JAXA (the Japan Aerospace Exploration Agency), ESA (the European Space Agency) and CSA (the Canadian Space Agency).

The ISS is modular in structure, with the first module launched into orbit in 1998. As further modules have been added, the ISS has become the largest artificial body in orbit around the Earth. It is 72.8 metres in length, 108.5 metres wide, approximately 20 metres high and weighs almost 420,000kg. The ISS orbits at a mean altitude of approximately 250 miles, with an orbital period of just under 93 minutes. Thus, the ISS completes just under fifteen and a half orbits of the Earth each day.

Because of the low altitude of its orbit, each pass of the ISS during which signals are audible lasts no more than ten minutes. To accurately predict when the ISS is going to be within range, web resources such as Heavens-Above may be consulted (see Websearch). This website gives times for acquisition

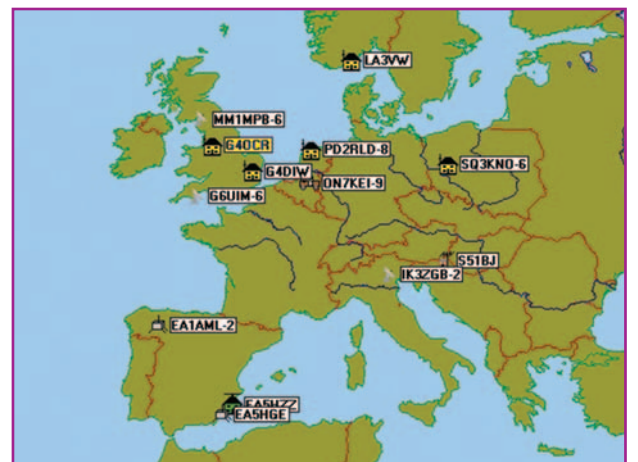


FIGURE 1: Image capture from *UI-view32*, 14 December 2011 during a typical pass of the ISS over Europe showing stations from several western and central European countries.

and loss of signal, maximum elevation above the horizon, and compass directions for the beginning, middle and end of each pass. Another useful feature of the Heavens-Above site is that it identifies passes of the ISS that will be visible from the ground due to reflected sunlight. The more serious enthusiast may prefer to use satellite tracking software, which may automate the process of steering a beam antenna. Several satellite tracking programs, both proprietary and freeware, are detailed on the AMSAT website.

## ARISS

ARISS (Amateur Radio on the International Space Station) was conceived in 1996 by delegates from major national amateur radio organisations, including the RSGB, ARRL, JARL (Japan Amateur Radio League), DARC (Deutsche Amateur Radio Club) and SRR (the Russian Amateur Radio Union) and amateur radio satellite organisations, including AMSAT-NA, JAMSAT and AMSAT-UK. Its purpose is to design, build and operate amateur radio equipment in space for educational purposes. Expedition 1 to the ISS launched on 31 October 2000, and the first contact between the ISS and a school followed on 19 November. To date, there have been fifty expeditions to the ISS, and members of each expedition have participated in the ARISS project.

The highest profile aspect of ARISS is the live contacts with schools and colleges, and we say more about this later. However, all radio amateurs may participate in the ARISS project via activities such as using the onboard packet radio digipeater and receiving ISS slow-scan television transmissions.

## Packet Radio

Most of the time whilst school contacts are not in progress, a transceiver on the ISS operates unattended as a digital repeater, or digipeater, for packet radio using the callsign RSOISS. Packets heard by the ISS from ground stations are retransmitted. The signal is frequency modulated, with a data rate of 1200 Baud. In recent years, the ISS digipeater has used a single frequency of 145.825MHz for both uplink and downlink. In November 2016, the Ericsson handheld VHF radio that had been in service for the digipeater developed a fault and became unusable. A second Ericsson handheld UHF radio has been put into service and at the time of writing (January 2017) the digipeater is operating on 437.550MHz.

No special equipment is needed to use the digipeater. Any single-band FM radio for 2m or 70cm (depending which band is in use) capable of producing 25 watts or more will suffice. As with terrestrial packet radio,

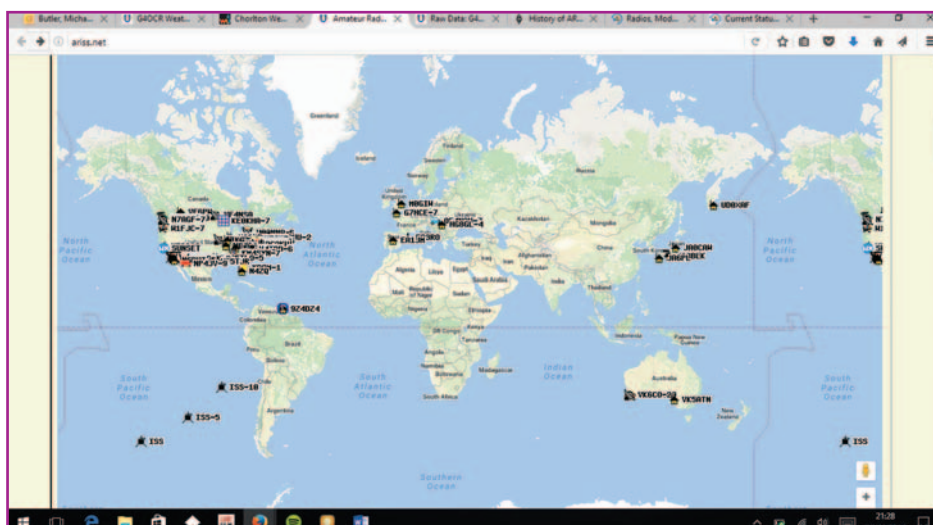


FIGURE 2: Map appearing on <http://ariss.net>, 30 November 2016, showing positions of stations heard via the ISS digipeater in the preceding days. The position of the ISS at the time, and its predicted positions 5 and 10 minutes later, appear in the South Pacific.



FIGURE 3: ARISS school contacts per year, by area (from <https://reports.zoho.com>).

a terminal node controller (TNC) is required to interface between the radio and a PC or laptop. I use a Yaesu FT-726R transceiver and an AEA PAKRATT PK232MBX TNC. The PK232MBX dates from circa 1990, and so has a serial port for which a serial/USB converter was needed. Care should be taken when choosing a serial/USB converter, as some of the cheaper models do not implement the pins for data flow control.

A vertical antenna may be used for operation in the 2m band, although the signal from the ISS will be subject to fading during the pass. For operation in the 70cm band a beam antenna is necessary. The ideal setup is a crossed Yagi antenna for circular polarisation with a rotator that can control both azimuth and elevation. At 145MHz Doppler shift only amounts to around  $\pm 3\text{kHz}$ , which is within the passband of narrow band FM. However, at 437MHz

the Doppler shift is more significant and is around  $\pm 10\text{kHz}$ . To allow compensation for Doppler shift, it is helpful if the radio can be tuned in increments of 1kHz or less, and use separate VFOs for transmit and receive. At the beginning of the pass, as the ISS approaches, the receive frequency should be 10kHz above the nominal frequency, and the transmit frequency should be 10kHz below. As the pass progresses, the receive frequency should be adjusted downwards and the transmit frequency upwards until, at the end of the pass, the receive frequency is 10kHz below the nominal frequency and the transmit frequency is 10kHz above.

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**PHOTO 2:** The author's QSL card image, 2008. The author is a Senior Lecturer in Mathematics in the School of Engineering, University of Bolton.



**FIGURE 4:** SSTV image received from ISS by Claudio, LU7FQP, on 14 April 2016, commemorating the first ARISS contact on 13 November 2000.

In packet radio, individual packets of data are encapsulated into frames using the AX.25 protocol. Each frame includes callsigns as identifiers of the source and destination. Information frames are numbered consecutively. In many applications of packet radio, a virtual connection between sender and recipient is established, whereby the recipient station sends an acknowledgement frame to confirm that each information frame in the sequence has been successfully received, or requests that the frame be sent again. For operation via the ISS digipeater, it is strongly recommended to use AX.25 in connectionless mode. In this mode, unnumbered information frames are sent, without any check as to whether these have successfully reached their destination. Whilst

is now more commonly held to stand for Automatic *Packet* Reporting System. To use the system, APRS client software is required. I use UI-View32, written by Roger Barker, G4IDE (SK). This is available free of charge, although a charitable donation is requested. I have found that UI-View32 performs flawlessly and has more than sufficient features to support packet radio via the ISS. UI-view32 requires software to configure virtual COM ports within the PC. The N8VBvCOM software has worked well for me, and is also available free of charge. When using APRS via the ISS digipeater, the unproto destination address should be set to 'APRS via RSOISS'. Note that many APRS client programs replace the destination 'APRS' with a string of the form APxxxx to

indicate the software in use. For example, UI-view32 is identified by 'APU25N'.

APRS packets may contain position reports, weather reports, status reports, or messages to specific stations. For a position report, the precise position of the sending station is given by the latitude and longitude in degrees and decimal minutes. For example, the position of my home station is given by 5326.20N / 00216.80W, corresponding to 53 degrees and 26.2 minutes north, 2 degrees and 16.8 minutes west. A position report with greeting addressed via the ISS digipeater will look like this:

```
G4OCR>APU25N,RSOISS
=5326.20N/00216.80W>Hello from
Manchester!
```

For a fixed home station, the position may be set manually. For mobile stations the position may be set and periodically updated automatically using GPS. UI-view32 will plot the position reports received from other stations on a map. **Figure 1** shows a screen capture from UI-view32 during a typical pass of the ISS at my location, featuring stations from several western and central European countries.

Weather reporting using APRS is a topic in itself, and will be addressed in another article.

An APRS message addressed via the ISS digipeater to a specific station has the callsign of the recipient between two colons, and will look like this:

```
G4OCR>APU25N,RSOISS
:G2XYZ :Greetings via ISS
```

Note that there must be exactly nine characters between the two colons, padding the callsign field with spaces if necessary.

As well as via radio, APRS packets may travel via the internet. The APRS Internet System (APRS-IS) comprises nine core servers and around ninety tier 2 servers distributed worldwide. The servers all carry a unified stream of global APRS traffic. Stations known as Igates transfer packets between radio and the APRS-IS. By connecting to an APRS server, a client program such as UI-view32 may feed packets into the APRS-IS. Traffic received from the APRS-IS may be filtered according to geographic location, type of station, and so on. Packets entering the APRS-IS are also stored in a database which may be accessed using various web-based resources, such as FindU.com and aprs.fi.

The ariss.net webpage shows all traffic that has passed through the ISS digipeater and been transferred to the APRS-IS by an Igate during the previous few days. **Figure 2**

The ten school contacts with Tim Peake on the ISS inspired thousands of young people, introducing them to STEM skills and amateur radio in a new and exciting way. The RSGB was involved from the beginning and worked closely with schools, clubs, the Regional Team, the media and, of course, the UK Space Agency, ESA and ARISS. We created a video to celebrate these historic events and the range of linked STEM activities the schools enjoyed as part of their preparation for the contacts. If you haven't seen it, do take a look at [www.rsgb.org.uk/gb1ss-schools](http://www.rsgb.org.uk/gb1ss-schools).

Our Training and Education Committee (TEC) is leading the Schools Link Project (SLP) which is building on the success of the ISS contacts with schools. It aims to develop classroom activities and resources in collaboration with teachers, which integrate amateur radio themes into their everyday teaching of the UK's national curricula, including STEM.

The Schools Link team led our representation at the recent UKSA schools conferences and outreach days in Plymouth and York where we were able to meet a wide range of school pupils and teachers. TEC Chair, Philip Willis, MOPHI will be doing a presentation with Sandringham School pupils and teachers at the Association for Science Education conference in January where will be able to show science educators from all over the country how amateur radio can be used in an exciting way within the current curriculum.

Working initially with the ten schools in the ARISS Principia mission, the SLP will ultimately produce 'tried and tested' classroom activities, which will then be offered to other schools. However, if you have experience in education and would like to offer ideas for activities or suggest schools to be contacted in the future, please get in touch with Derek Hughes, G7LFC, who is the TEC lead for the project: email him via [schools.link@rsgb.org.uk](mailto:schools.link@rsgb.org.uk).

shows a world map of APRS activity via the ISS taken from the page.

Short messages in the APRS format may be forwarded via the APRS-IS to an email address. The callsign between the two colons is replaced by the word EMAIL. The email address follows immediately after the second colon, followed by the text of the email. In an experiment with forwarding an APRS greeting to email via the ISS, a single packet from my station was transferred to the APRS-IS by Igates in the Republic of Ireland and Sardinia. The packets viewed on FindU.com looked like this:

```
G4OCR-2>APU25N,RS0ISS*,qAR,IS0AML-6:
:EMAIL :michael@bolton.ac.uk Via ISS
G4OCR-2>APU25N,RS0ISS*,qAR,EI7IG-10:
:EMAIL :michael@bolton.ac.uk Via ISS
```

One of the email messages received was:

```
Via ISS
-----
Date       : 2014-04-01 00:11:23 UTC
From       : G4OCR-2
To         : michael@bolton.ac.uk
IGATE     : IS0AML-6
-----
```

OpenAPRS.Net Message to Email Gateway

## Contacts with schools

Since Expedition 1 to the ISS back in 2000, crew members have actively sought and enjoyed radio contacts with schools and colleges. The inspiration of young people generated by these events is the highest fulfilment of the educational mission of ARISS. Usually these contacts take the form of a question and answer session, with school pupils preparing questions for crew members of the ISS to respond to.

The most frequently used callsign for schools contacts is NA1SS, although several other callsigns have been used, including OR4ISS, GB1SS for UK contacts, IROISS for contacts with Italy and RSOISS for contacts with Russia.

On 10 March 2016, the one-thousandth

school contact took place, with the University of North Dakota. Of the contacts made over the last sixteen years, around a third (34%) have been with the USA and around a third (32.6%) with European countries. The remaining third have been with schools in Japan (16.4%), Canada (8.6%) and Russia (8.4%). **Figure 3** shows the number of contacts with schools completed in each year, broken down by region. The most prolific ISS operators have been Sunita Williams, KD5PLB (55 contacts), E Michael Fincke, KE5AIT (54 contacts), Paolo Nespali, IZ0JPA (48 contacts), and William McArthur, KC5ACR (37 contacts). Between January and June of 2016, the British astronaut Tim Peake, KG5BVI completed 23 contacts with schools, including ten in the UK. A detailed account of these contacts was featured in the July 2016 edition of *RadCom*.

As might be expected, there is a high demand for school contacts. It is important to appreciate that a great deal of planning is required to maximise the chance of success, and that the requirements for a suitable station are quite exacting. However, there is no reason why any school should not be successful, particularly if a local radio club is able to give advice and support. Contact Ciaran Morgan, MOXTD, the RSGB Lead for ARISS and ARISS Operations in the UK, for advice on applying for a schools contact (email [ciaran.morgan@rsgb.org.uk](mailto:ciaran.morgan@rsgb.org.uk)).

For contacts with schools, 145.800MHz is used worldwide for the downlink. For the uplink, in Region 1 (Europe, Russia and Africa) 145.200MHz is used, whilst in other parts of the world 144.490MHz is used. **Table 1** summarises the frequencies in common use.

## Other modes

The ISS is equipped to operate as a voice repeater with downlink frequency 145.800MHz and uplink frequency 437.800MHz, although this is seldom activated. Crew members sometimes make spontaneous contacts with radio amateurs,

**TABLE 1: ARISS frequencies.**

VHF digipeater	145.825MHz
UHF digipeater	437.550MHz
Schools Contacts downlink	145.800MHz
Region 1 uplink	145.200MHz
Region 2 & 3 uplink	144.490MHz
SSTV	145.800MHz
DATV	2395MHz
FM voice repeater downlink	145.800MHz
uplink	437.800MHz

using the same frequencies that are used for contacts with schools.

There have been over one hundred sporadic sessions of transmission of slow scan television (SSTV) from the ISS on 145.800MHz. These are part of the MAI-75 experiment by the Moscow Aviation Institute. **Figure 4** shows an SSTV image received by LU7FQP on 14 April 2016 commemorating the very first ARISS contact of November 2000. For news of forthcoming SSTV experiments and galleries of SSTV images received from the ISS, see Websearch.

Experiments have begun with digital amateur television (DATV) from the ISS in the 2.4GHz band, using a format similar to DVB-S. To date, the transmitter has mostly operated in 'blank transmission' mode for testing purposes. However, on 11 February 2016 Tim Peake activated the video transmitter on board the ISS for a contact with Royal Masonic School for Girls, Rickmansworth. The DATV transmitter usually operates on 2395MHz with a symbol rate of 2.0Ms/sec, although operation on 2369MHz, 2422MHz or 2437MHz is also possible.

## The future

In January 2014, the Obama Administration announced the United States was committed to extending operation of the ISS until at least 2024. Over the following year, Russia, Japan and Canada made similar commitments.

Continued on page 38



# AROS –

## The subject of repeater abuse

**T**he Amateur Radio Observation Service is an advisory and reporting service of the RSGB that is intended to assist radio amateurs and others who may be affected by problems that occur within the amateur bands or that develop on other frequencies as a result of amateur transmissions.



AROS has a team of over 100 observers who can be tasked with specific monitoring activities.

AROS investigates reports of licence infringements, or instances of poor operating practice that might bring the Amateur Service into disrepute. Reports, complaints and associated supplementary information are accepted from any source and the contents of each communication are regarded as confidential material. AROS has a team of over 100 observers who can be tasked with specific monitoring activities and these volunteers help collate supporting information in cases that are passed to Ofcom.

AROS works closely with the RSGB's Emerging Technology Coordination Committee (ETCC) that has responsibility for the licensing of the repeater network and is formally recognised by Ofcom as the preferred interface from the amateur community. The RSGB AROS Coordinator is responsible for the monitoring activities of the AROS Observers across the country and managing the interface with Ofcom for which a formal process has been defined and agreed between all parties. This process clearly defines the scope of activities and interfaces between AROS and Ofcom.

### Repeater abuse

Repeater abuse appears to be a long-standing problem within the UK network. When I was a young G1 in the 1980s, my local repeater was renowned for persistent and ongoing problems. My experience with AROS over the last few years shows that the abusers generally fall into one of three broad categories:

- 1 The inter amateur personal feud; a falling-out at a local club or other issues leads to abuse targeted at an individual or individuals
- 2 The alcohol- or other substance-fuelled abuser; often random anger and general ranting takes place
- 3 The dedicated abuser determined to wreak havoc wherever they can.

Individual abusers who fall into category 1 or 2 can often be quickly identified as they do little to hide their identity; often they will use their callsigns as they see no fault in their conduct. This kind of abuse is usually short lived and tends to disappear as quickly as it starts.

Individuals in category 3 are more concerning and probably need professional help; they are more often than not very intelligent individuals who lack social acceptance and have become anti-establishment. We often find they also have very strong legal knowledge. They tend to get as much pleasure out of using the legal system to their advantage as they do out of the act of abuse they are undertaking. Their acts of abuse are their 'safe place' and they are as good at defending it as they are acting within it.

Individuals in this category feed off any response to their behaviour; discussing the abuse on the air or in any form of social media in the public domain is exactly what they are looking for. Ignoring the abuse completely often disarms the individual and may, on a very good day, even lead to self-reflection.

AROS has always strongly advised against any form of recognition of this kind of behaviour as it always fuels the situation and never helps.

In a recent legal case, an abuser successfully argued as his defence that individuals responding to his behaviour were antagonising and enticing his actions. It is therefore *imperative* that we do not respond to on-air abuse in any way whatsoever; including off-air discussions on social media.

It is also worthy of note that bringing prosecution against individuals of this nature can be very costly and recent examples have led to magistrates handing down very disproportionate penalties when compared to the cost of the action itself.

There will be a number of technological changes in the new year that will improve the possibility of monitoring in a more agile fashion. We are currently collating information in a number of persistent abuse cases and hope for successful resolution in due course; we will work with Ofcom as necessary on these.

It is important to emphasise that the onus is on the repeater keeper, as the repeater NoV holder, to manage the traffic being carried and to deal with issues at a local level wherever possible. Ofcom will expect the repeater keeper to have tried a number of actions prior to any formal investigation being started, these may include, but are not limited to:

- Ensuring any regular users are informed of the need to ignore the problem completely;
- Implementing a 'cooling off period' whereby the repeater is switched off for a prolonged period – this would typically be 2-3 weeks;
- Adding time controls on the repeater and only making the service available at peak times;
- Nulling antenna patterns in the direction of problematic transmissions;
- Use of digital technology to remove access to specific individuals;
- Anything else relevant in the individual circumstance.

Whilst the above suggestions may be seen as onerous and not immediately in the interests of genuine repeater users, it is the approach that Ofcom will recognise as a serious attempt to address the situation.

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aros@rsgb.org.uk



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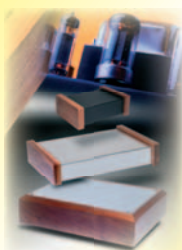
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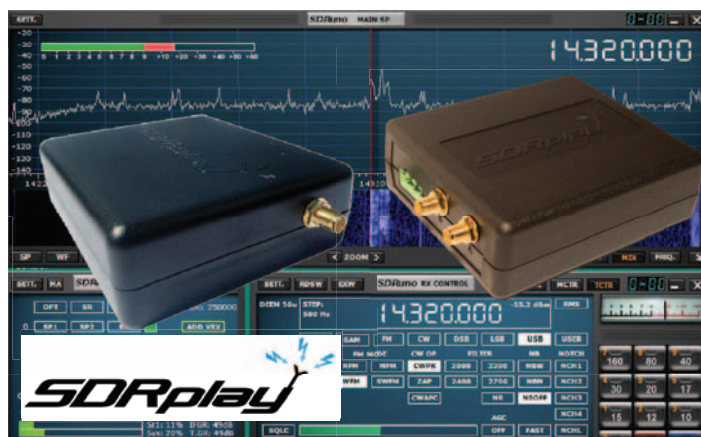
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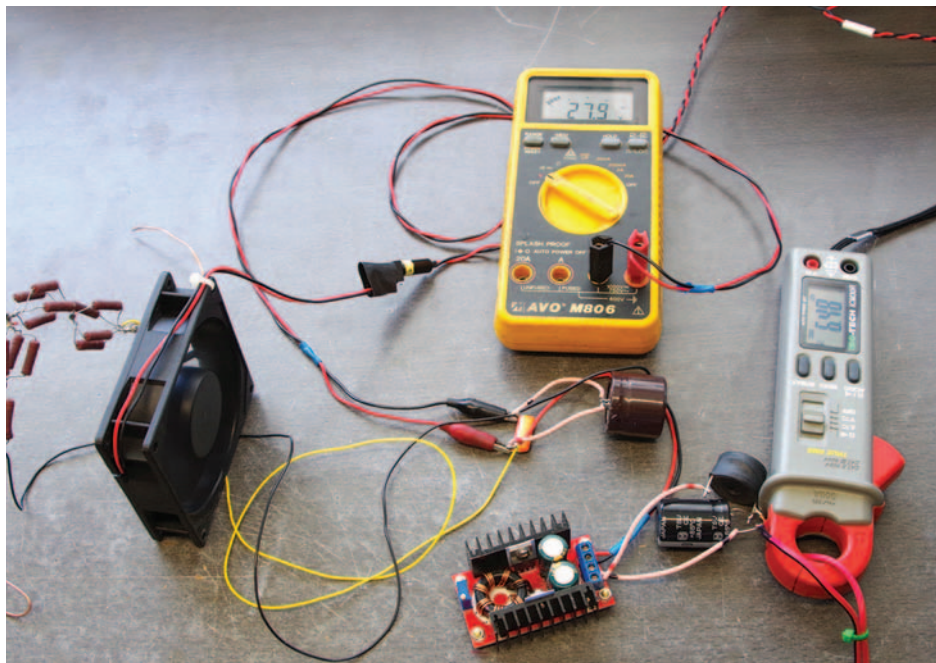
# Design Notes

## SMPSU filtering and EMC

Last time we looked at SMPSUs, how they chop up a DC input voltage with a variable duty cycle switch then use an inductor to store and transfer energy to the output, which is then cleaned up with a capacitor. A transformer can be included if isolation is required, or it may come from separate windings on the inductor. The switching is typically performed somewhere in the region 50kHz to several hundred kilohertz and for maximum efficiency the switch has to transition rapidly. Any time wasted in the crossover will end up with energy being dissipated in the switch, with lower efficiency and high device dissipation. The switching is almost invariably done nowadays with a power MOSFET, allowing switching times of a few hundreds or even tens of nanoseconds. Such fast switching is bound to lead to the possibility of high frequency interference at harmonics of the PWM rate. [See the EMC column on page 40 for more on this subject – Ed].

In designing the SMPSU module, all paths around the switching device, inductor and input source need to be made as short as possible and of thick, low inductance conductors. **Photo 1** shows a test setup used for the eBay 150W module described last time, with additional input and output filter components that we'll now discuss. The output power is dissipated in the fan-cooled wirewound resistors on the left hand side.

There are two main paths by which the switching transients can be conducted to the outside world: via the input circuitry and via the output circuitry. The input voltage is being chopped so the input

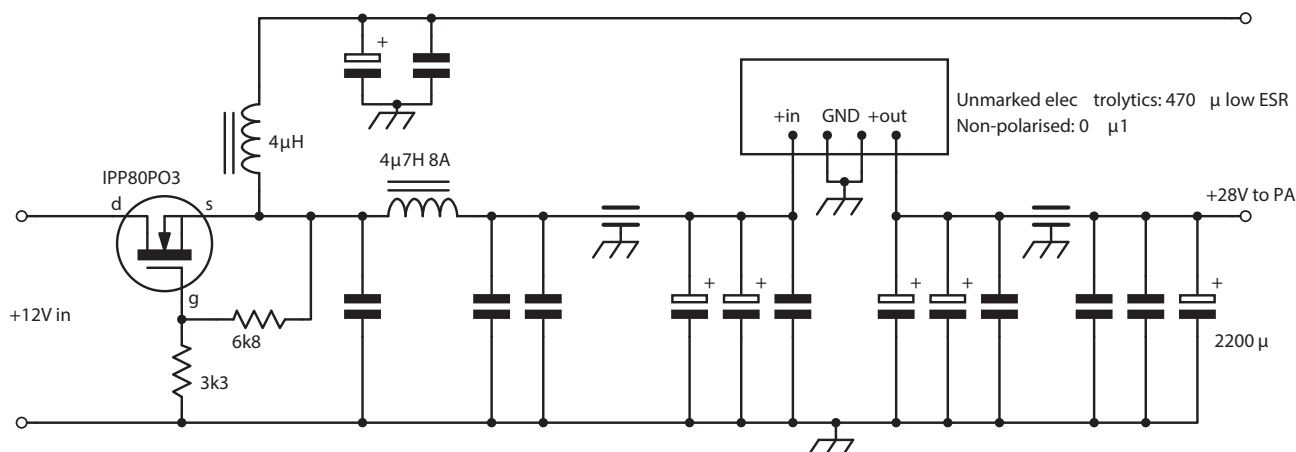


**PHOTO 1:** Breadboard setup for testing the 12-28V converter, and determining additional filter components needed.

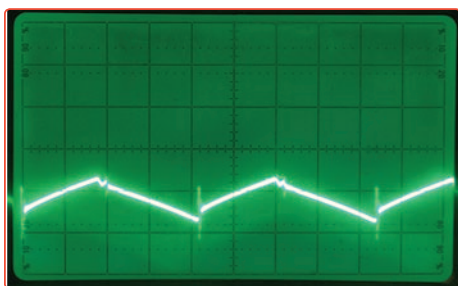
current is alternating between some high value and zero. The diagrams last month deliberately showed the switch operating directly on the input voltage supply to emphasise its operation. In practice that supply cannot be a perfect zero-impedance voltage source and will also quite likely be delivered along some lengths of conductor with their own (hopefully small) resistance. So those pulses of current will always have to be augmented by an input capacitor. The capacitor will always be there on the module and form part of the short, low

inductance loop just described. But this alone is not sufficient. Electrolytic capacitors cannot be perfect and there will always be some residual series resistance and inductance, so they can never completely smooth out the input.

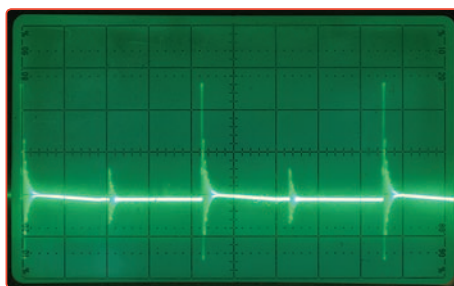
**Photo 2** shows an oscilloscope trace at the input to the 12 to 28V boost mode converter when delivering about 70W to a load with none of the external filter components of Photo 1 present, ie a direct connection. The 12V supply comes via about 2m of cable with 6mm<sup>2</sup> conductors



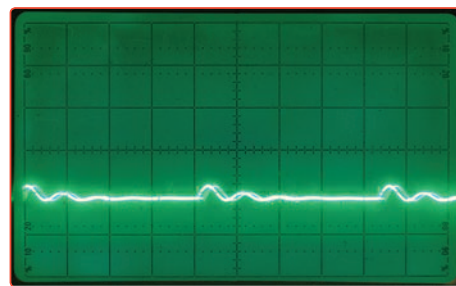
**FIGURE 1:** Circuit diagram of SMPSU input and output filtering and power conditioning for a 12 to 28V converter used in a 1296MHz transverter.



**PHOTO 2:** Input voltage at the terminals of SMPSU module with no extra filtering. Scale  $5\mu\text{s} / 200\text{mV}$  per division.



**PHOTO 3:** Output waveform with no additional filtering components. Scale  $5\mu\text{s} / 2\text{V}$  per div.



**PHOTO 4:** Output waveform with 330nF capacitor added. Scale  $5\mu\text{s} / 2\text{V}$  per div.

from a bench PSU. The triangular waveform of about 200mV peak-peak is measured directly on the input terminals and is a direct result of the imperfect single input electrolytic on the module passing some of the pulsed current back to the input supply.

Note the high frequency ringing on the edges of the switching waveform. It is these that cause the RF interference, the bane of SMPSUs in radio applications. The triangular voltage variation causes less interference in its own right, unless it gets into low power stages elsewhere. To clean it up, two additional components can be added to the input circuitry, shown on the lower right of Photo 1, adjacent to the clamp ammeter. Adding extra high value electrolytic capacitors directly across the input terminals on its own effects only a minor improvement and does not solve the high frequency ringing passing out to the supply wires, from where it can be radiated. The best way to solve that is to first insert a choke. That is the black cylindrical unit, a  $4\mu\text{H}$  10A rated inductor taken from a scrap computer type PSU. Another 2200 $\mu\text{F}$  electrolytic is then added on the input to complete the filtering. Connecting the scope across the input now showed the ripple had reduced to a level that couldn't be seen on the scope. Some high frequency transients of a few tens of millivolts were still visible, but as they were also showing up when the scope probe wasn't even connected to the circuitry under test – I just had to accept they were being conducted in via common loops elsewhere in the test setup. No-one said this test layout was good!

Now we turn to the output. **Photo 3** shows the output waveform with no additional filtering. While there is less output ripple, a few tens of millivolts, the switching transients are horrible – they're many volts in amplitude. The main reason for this is that the switching FET on a boost SMPSU is directly connected to the output via the diode – the inductor is not there to smooth transients like it does at the input.

Just adding a 330nF capacitor across the output (the 'Liquorice Allsort' type seen in Photo 1) reduced the transient, shown in **Photo 4**, to about 400mV amplitude, with its high frequency components removed completely. Adding another 1000 $\mu\text{F}$  electrolytic across the output reduced this to just a few tens of mV residual ringing which, again, I couldn't be certain wasn't stray pickup onto the oscilloscope through common grounding paths.

### A practical solution

Depending on the SMPSU topology, the switching device has a more direct connection to one side or the other without the SMPSU inductor itself helping to smooth out HF transients. On boost mode converters – step up or low power mains ones – this is the output port so high frequency transients are more likely to appear there. On buck mode converters – step down or high power mains – the switching FETs are closer to the input and filtering should be concentrated here first. On large mains SMPSUs, this means good quality mains filter components.

The breadboard layout shown in Photo 1 is by no means an optimum setup, with long wires between decoupling components and no real attempt made to decouple high frequencies. **Photo 5** shows this same module integrated into a 'proper' filtering system, ready to be built into a 1296MHz transverter and 45W power amplifier. The circuit is shown in **Figure 1**. The input and output filtering components already discussed are included, along with many 100nF SMT capacitors sprinkled throughout and a couple of filtercons [1] added to clean up any VHF conducted interference.

Separate filtering is included for a 12V output to low level stages, preventing the input ripple from passing through to them. No residual ripple could be seen on this filtered line. The P-channel MOSFET on the input is for reverse polarity protection, as described in March 2016 *Design Notes*. The two resistors on the gate are used to

keep the gate voltage down to about 9V in normal operation since the data sheet specifies a maximum value for this very low  $R_{\text{DS(on)}}$  device of only 15V.

### More on MOSFETs used for power switching

Robin Washington, M1REW sent in this note after reading the December 2016 *Design Notes*.

"I recently designed a ground power unit for my light aircraft and needed a very low turn-on resistance with a rating of 13.5V at 30A. I also needed to be able to turn it off, so after a lot of thought and reading my old MOSFET notes I realised that the drain to source junction is not a diode [as in a bipolar]. The diode is, as you say, parasitic and the power FETs will conduct in reverse. I tested this and obtained 0.016 $\Omega$  across the two devices wired as you have them in [December 2016] Figure 4. They will conduct in either direction and will turn off. The parasitic diode is not conducting, as evidenced by the millivolt drop at 30A."

So the AC switch is even better than I thought!

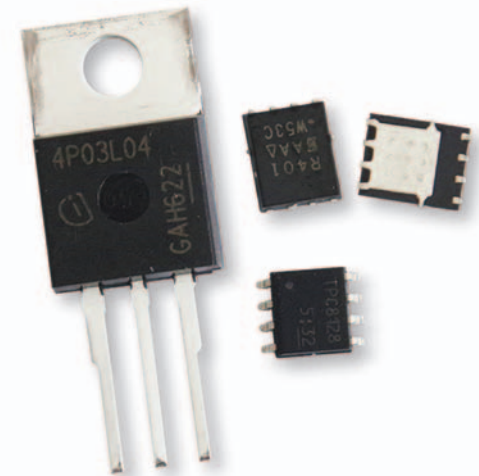
All power FETs are *not* created equal. Look at the three P-Channel devices shown in **Photo 6**. Although made by different manufacturers, they all have roughly the same channel characteristics, a voltage rating of 20-30V and an on-resistance of 3.5 to 4 milli-ohms. But that is where similarity ends. The TO220 mounting of the first device allows a great deal of heat to be removed into a heatsink and high power operation is possible. But the internal bond wires, necessary in this rather large package type, add to the on resistance and give it the highest of the three. However, at such a high power rating and this  $R_{\text{DS(on)}}$  it could happily carry its rated 80A maximum with only about 30W dissipation.

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





**PHOTO 5:** 12-28V SMPSU module with additional filtering components integrated onto a PCB. There is also a low power 12V output with extra filtering and P-channel MOSFET input polarity protection.



**PHOTO 6:** Three power MOSFETs, all with similar channel characteristics but very different packaging. Left to right, ICP80P03 – TO-220 package, 30V 80A,  $R_{DS(ON)}$  4.1m $\Omega$ , 137W dissipation; TPC8128 – SOIC-8 package, 30V 16A,  $R_{DS(ON)}$  3.9m $\Omega$ , 1.9W and SiR401DP – SO8 package (seen from top and bottom), 20V 50A,  $R_{DS(ON)}$  3.5m $\Omega$ , 39W dissipation.

The tiny 8 pin SOIC package has no heatsinking capability worth speaking of, hence its 1.9W rating. This device is mainly designed for sitting inside lithium batteries, providing overload and discharge protection in conjunction with supervisory circuitry. Again, bonds to the 8 tabs add slightly to the channel resistance. At this low power rating its maximum current of around 16A gives a dissipation not far from its rating.

The most interesting of the three is the even smaller SO8 packaged device. This has a 'Pin 0', a tab on the underside for direct soldering to a copper PCB plane (then through to a heatsink). With this construction there would be no internal bond wires, the internal tracks coming direct to the external tab, so it has the

lowest  $R_{DS(ON)}$  of them all and a decent power dissipation capability due to the heatsinking possibilities. Assuming the channel resistance is maintained, at the maximum current rating of 50A continuous it is dissipating a mere 9W – well below its rated maximum.

The one thing to be wary of for all these is the gate voltage, which is lowest for the SiR (SO8 package) device at 12V. However, the switching threshold is a lot lower so a couple of resistors to keep it to a safe value as shown in Figure 1 can be used with 13.8V supplies that could go to, perhaps, as high as 15V.

All the P-channel FETs shown and many similar, as well as ones suitable for 28 and 50V supply switching, are available from Farnell and other catalogue suppliers.

## Log power detectors

After seeing the May 2015 issue on log power detector chips Chris, G8BKE, sent in details of the AD8318 device, which is rated for operation up to 6GHz. See [2] for more details of a power meter module using this device.

## Websearch

[1] 'Filtercons' are a feedthrough-like device that have a ferrite-loaded middle as well as capacitance, so they form a low pass filter. A small black and silver coloured one can just be glimpsed in Photo 5 to the bottom right of the inductor. The device in the foreground is a standard ferrite device with no integral capacitance.

[2] AD8318 Log Detector Module – [www.sv1afn.com/ad8318.html](http://www.sv1afn.com/ad8318.html)

## Amateur radio on the International Space Station continued from page 33

Finally, at a meeting in Lucerne, Switzerland, on 2 December 2016, ESA's twenty-two member states approved a commitment to extend European participation in the ISS programme to 2024. The ARISS adventure is far from over, and that we can look forward to at least seven more years of experimentation and educational contacts with schools.

## Websearch

NASA ISS pages: [www.nasa.gov/mission\\_pages/station/main/index.html](http://www.nasa.gov/mission_pages/station/main/index.html)

Online tracking of the ISS and amateur satellites: <http://heavens-above.com>

ARISS main website: <http://ariss.org>

Satellite tracking software:

[www.amsat.org/amsat-new/tools/software.php](http://www.amsat.org/amsat-new/tools/software.php)

APRS information page: <http://aprs.org>

Recent APRS traffic via the ISS digipeater: <http://ariss.net>

Web access to the APRS database: <http://findu.com> and <http://aprs.fi>

Recent APRS packets from RSOISS: [www.findu.com/cgi-bin/raw.cgi?call=RSOISS](http://www.findu.com/cgi-bin/raw.cgi?call=RSOISS)

Schools contacts statistics on Zoho Reports: <https://reports.zoho.com/ZDBPublicDBView.cc?DBID=412218000000020415>

Latest information on ARISS contacts for schools for Europe: [www.ariss-eu.org/school-contacts](http://www.ariss-eu.org/school-contacts)

ISS Fan Club: [www.issfanclub.com/](http://www.issfanclub.com/)

UI-View32 APRS software by Roger Barker,

G4IDE: [www.ui-view.net/](http://www.ui-view.net/)

Download of N8VB Virtual COM Port software: [http://download.cnet.com/N8VB-vCOM-Virtual-Serial-Port-Driver/3000-2098\\_4-91665.html](http://download.cnet.com/N8VB-vCOM-Virtual-Serial-Port-Driver/3000-2098_4-91665.html)

SSTV News: <http://ariss-sstv.blogspot.co.uk/>

SSTV Gallery: [www.spaceflightsoftware.com/ARISS\\_SSTV/index.php](http://www.spaceflightsoftware.com/ARISS_SSTV/index.php)

DATV details: [www.ariss-eu.org/columbus](http://www.ariss-eu.org/columbus)

DATV News: [www.issfanclub.com/video-reports](http://www.issfanclub.com/video-reports)

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# EMC

## IEEE EMC Society event

The United Kingdom and Ireland chapter of the IEEE Electromagnetic Compatibility Society held a technical seminar in London on 7 December 2016. Two of the presentations were of interest to radio amateurs.

Richard Harris, Assistant Director at the Department for Business, Energy and Industrial Strategy (DBEIS) gave a presentation on UK implementation of the new EMC Directive (EMCD) 2014/30/EU, the Radio Equipment Directive (RED) 2014/53/EU and new Low Voltage Directive (LVD) 2014/35/EU. Further details are included in the RSGB Matters section of this edition of *RadCom*.

The presentation was followed by a question and answer session, including some questions about what DBEIS considers to be a Fixed Installation.

Another presentation was by Tim Williams of the EMC Consultancy company Elmac Services. The title was 'Use and Abuse of Screened Cables' and the presentation was intended for electronics design engineers. It analyses how screened cables work and shows how they form part of the total EMC design of a system. It also shows why a screened cable only provides screening at radio frequencies if *both* ends of the cable screen are grounded. As mentioned later, this point is relevant to installation of some types of air-source heat pumps.

A copy of Tim's presentation can be downloaded from the Papers page of the Elmac Services website [1].

## Air source heat pumps

Alan, G3MGU reports that he has just had an air-source heat pump installed. Having read the item in December 2016 EMC Column, Alan asked the installer about the earthing arrangements. The installer assured him that the mains power feed to the pump would be via twin and earth cable.

There is also a multi-wire control cable from the indoor control unit to the outdoor unit. It is a screened cable but when Alan asked the electrician where the screen is earthed, he was told that they didn't earth it. Alan reports that when the pump is actually running, the 1.8MHz, 3.5MHz and 7MHz bands are affected by a 'data warble' type of interference that peaks at intervals of 8kHz. Bands from 14MHz and above are unaffected.



**PHOTO 1:** Mains-powered GU10 type 5W LED spotlight.

Air source heat pump installations have several potential sources of RF interference. There are conducted emissions from the outdoor unit into the mains supply, which would need to meet applicable EMC standards. There is also a control cable from the outdoor unit to the indoor unit that could potentially radiate and may or may not be screened. The outdoor unit is also connected to a copper pipe, which is likely to be earthed and/or bonded separately. This introduces the possibility of RF currents circulating via earth loops.

As with any electronic product, an air source heat pump needs to be installed in accordance with the manufacturer's recommendations in order to achieve its designed EMC performance. This raises the question of whether the installation instructions are sufficiently specific about factors that may affect EMC performance such as earthing configuration and the use of screened cables (if any).

## GU10 mains LED spotlights

**Photo 1** shows a typical mains-powered GU10 type 5W LED spotlight dismantled. The LEDs are mounted on a thin flexible PCB that is bonded to an aluminium disc for cooling, which in turn is bonded to the finned metal heat sink. The LED driver consists of a miniature switching power supply with an isolating transformer and a

rectifier to produce a DC output to drive the LEDs. The 24 LEDs are connected in series-parallel and require about 9V. The forward voltage of the LEDs varies with temperature so the LED driver is normally designed for constant current output rather than constant voltage.

From an EMC point of view, there is quite a lot of capacitance between the metal heat sink and the LEDs themselves, so the heat sink can act as a small antenna. This can radiate VHF RFI from the switching circuitry with the mains input wiring acting as an RF 'earth'. At HF, RFI is also injected into the mains between live and neutral and there is only a single surface-mounted RF inductor to reduce this.

Some non-CE marked LED lights that may be available from online auction sites use a simple 'reactive dropper' comprising a series capacitor and a bridge rectifier. This produces no RF interference, which might appear to be an advantage, but there is also no isolating transformer and therefore no isolation from the mains. Concerns have been expressed about electrical safety of some types, for example search YouTube for 'Dangerous GU10 LED spotlight'.

## 12 volt LED spotlights

**Photo 2** shows a typical 12V MR16 type LED spotlight dismantled. These can be used as low energy replacements for 12V

halogen spotlights or in new installations. A separate transformer or 'electronic transformer' is required to provide the 12V supply. The 12V spotlights can run on AC or DC because they contain a bridge rectifier. This is followed by a miniature switching regulator to step down the voltage and to drive the LEDs. There is not much sign of any RF interference suppression and some types may be noisy on the 144MHz amateur band or on the 175 – 230MHz DAB band.

There is room in the spotlight body for a larger PCB and it would be a simple matter for the manufacturer to reduce RFI by including some surface-mounted capacitors of about 10nF to RF-ground the two input pins to the metal heat sink and to RF-ground the two LED output wires from the heat sink. As these spotlights operate from a 12V supply, expensive capacitors with a high voltage rating would not be required.

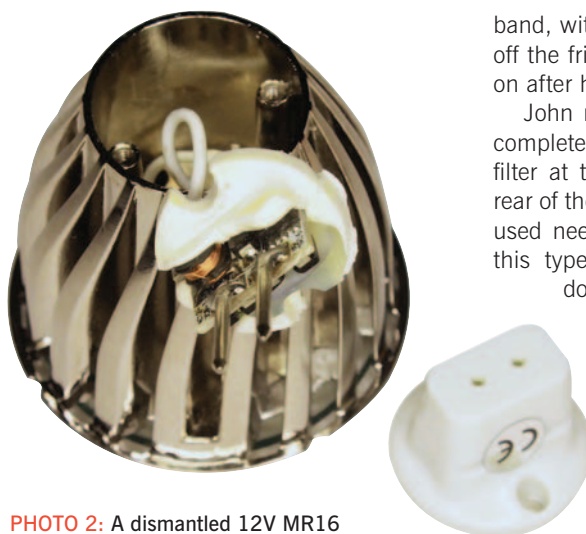
Nevertheless, there is another way to stop this type of 12 volt MR16 type LED spotlights from generating RFI. Power it from a variable voltage DC power supply unit and adjust the voltage so that it is just high enough to give full brightness but too low to allow the switching regulator to start switching. This typically occurs at about 11V.

## Water pumps

A Member in Cornwall has a delta loop strung round his small garden at about 4 – 5m height. There is a public footpath outside one boundary wall and the local water company intends to run an underground three-phase cable along the footpath, parallel with one leg of the amateur radio antenna and directly under it. This is to feed a pump that will be digitally controlled.

The Member is concerned about possible interference from the mains supply or the control circuitry. This would depend on the type and size of pump and whether it will be underground or above ground in a cabinet. Most pumps have variable speed AC motor drive circuitry that uses switching techniques. If it is a small underground pump fed by an underground cable then that should help to reduce RFI but may not eliminate it as it both the cable and the pump are close to the amateur radio aerial.

On the other hand, some large water pumps are housed in a green cabinet the size of a small garden shed. There was a case in South Wales some years ago with a high power variable speed AC motor drive that was driving a large pump. This radiated interference on 3.5MHz hundreds of metres away so it is not the sort of thing that a radio amateur would like to have at the bottom of the garden!



**PHOTO 2:** A dismantled 12V MR16 type LED spotlight.

If a water company installs a pump that is linked to a separate control unit via a cable then this appears to fall within the definition of a 'fixed installation' (FI). It needs to be installed applying 'good engineering practices' and respecting the information on the intended use of its components, which would include manufacturer's installation instructions. This is with a view to meeting the 'Essential Requirements' as defined in the EMC Regulations 2016. These include ensuring that the electromagnetic disturbance generated does not exceed the level above which radio and telecommunications equipment or other equipment cannot operate as intended.

## Digital inverter fridge freezers

Following the item in December 2016 EMC Column, William, M6W1Q reports that he recently purchased a fridge freezer with a digital inverter and soon discovered that the 3.5MHz and 7MHz bands were wiped out with S9 noise. It isn't any particular type of signal or 'hum', rather an increased noise floor overall for operation.

William tried improving his earthing, which hasn't solved it. As the fridge is an essential item in the household, he cannot unplug it to use the radio for a while. He reports that he can still operate his radio on the 7MHz band although it is hard as he can only really hear very strong stations.

John, G3SZG/5B4AHK reports that he has a 'side by side' American style fridge in his shack that is 18 months old and which he assumes that it is an inverter type. John uses an inverted V antenna with the apex/feed point 12m above ground level and at least 40m from the fridge. John describes the interference on the 1.8, 3.5, 5, 7 and 10MHz bands as 'chronic' and the only way he could operate on the 5MHz

band, with an S9 noise level, was to power off the fridge and remember to turn it back on after his session on the air!

John reports that he cured the problem completely by fitting a mains RF interference filter at the mains lead entry point to the rear of the fridge. The type of filter that John used needs to be fitted inside a case and this type of modification should only be done by a suitably qualified person so further details are not given here. Nevertheless, cased plug-in type portable mains RFI filters with IEC mains appliance connectors are available (although expensive) and we intend to publish further details in future.

The EMC Committee is in contact with a manufacturer of fridge/freezers and we would be interested to receive any other reports of RFI from these appliances.

## Power over Ethernet injectors

Power over Ethernet (PoE) is a way of passing low voltage DC power as well as data via twisted pair cables used for Ethernet local area networks. PoE can be used for remote powering of devices such as IP cameras, wireless access points or optical fibre modems used for Fibre to the Premises.

If RF interference appears to be radiated by Ethernet cables then the source could be the data itself in which case the RFI is likely to be irregular, corresponding to data being transmitted on the network. If RFI is continuous then it could be something that is connected to the cables including a PoE injector. A PoE injector may be built into some types of network equipment or it may be a small stand-alone unit with two RJ45 Ethernet connectors and a separate plug-in DC power supply unit or 'wall wart'.

If dealing with RF interference from any system that uses PoE, the switching power supply unit that powers the PoE injector is a possible source, especially if it is continuous and has a 100Hz buzz when received with AM detection. If one of these is used to power a PoE injector then the levels of RFI on the HF bands can be increased by the Ethernet cable acting as a radiating antenna tens or even hundreds of metres long.

## Websearch

[1] [www.elmac.co.uk](http://www.elmac.co.uk)

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# Using the Cambridge Community Remote Station

**T**he Cambridge Community Remote Station project was described in January 2016 *RadCom*. A Remote Station is one where the functions of an amateur radio station can be controlled remotely over the internet.

In the January article and at the RSGB Convention 2016 (Photo 1) we described the technical detail and demonstrated how the remote club station worked. Here, in this follow up article, we will elaborate on the way it has been used and what we have found.

Our objectives in this part of the project were to try to explore some of the operational aspects of club based remote operations, namely

- Can access to a remote station stimulate on the air activity associated with club activities such as training, operating, demonstrations, club evenings? Does it feel 'real'?
- How can it be assembled for a community to use?
- Can we take an amateur radio station to a location when normal antennas etc just are not available or won't work?

## Internet connectivity

As explained in the previous article the operation of this remote station depends on the quality of the broadband available, often at public Wi-Fi hotspots. To assess this we visited over 20 different public sites like pubs, schools, halls, hotels and museums. We measured the broadband speed, latency and stability at these locations. To say that the results were variable would be an understatement: some sites showed latency for the two way data trip of as low as 20ms but others were as high at 2000ms (two seconds), though at that level connection stability was problematic. Upload and download speeds varied widely too. In general though we found we could operate the remote station with latency of up to 200ms and with speeds of anything better than 2Mb/s down and 0.5Mb/s up, rather typical low-end domestic performance. The main issue was, as was noted in our



PHOTO 1: The remote station in use at the RSGB Convention, October 2016.

earlier article, stability. Although the system could remain connected through blips in latency, the choppiness of the audio was disconcerting – especially to lay ears.

In the light of these findings we decided to investigate the use of 3G/4G as a substitute for public Wi-Fi. This approach was based on the creation of a local Wi-Fi hotspot using a 3G/4G smart phone. The phone was set to create a local private hotspot to which the Linux laptop could connect. Provided the 3G/4G signal was better than 2 'bars' then this worked rather well – better than many a public Wi-Fi, anyway! It should be said at this point that a *good* Wi-Fi or a wired connection is probably the best of all.

The current 3G/4G set up uses a TP Link portable battery powered wireless router that can create a hotspot either from a 3G/4G USB dongle or from a wired network. The dongle carries a mobile phone SIM card. We have tried Vodafone, 3 and EE. Around Cambridge EE seems to have the best coverage, but of course this will vary area by area. The dongle is a Huawei E3372, which has the useful facility to accept an external antenna such as an eSYNiC, which can be stuck onto a convenient window



PHOTO 2: Wireless hotspot arrangement. Top to bottom: the eSYNiC antenna, connected to the Huawei 3G/4G dongle that is plugged into the TP Link portable Wi-Fi router.



**PHOTO 3:** G4BWP (L) and G3RWF (R) discussing the remote station at the FOC AGM.

or hung from a hook on a wall (see **Photo 2**). The antenna sockets on the dongle are pretty flimsy and the antenna leads are best taped onto the dongle body. This setup has proven to be a very effective way to get into the 3G/4G networks even when a normal phone shows little or no usable signal. It has the other enormous advantage of bypassing the logon and fair usage restrictions of many public Wi-Fi setups. If we have any doubts about available Wi-Fi for demonstrations we just buy a 30 day data SIM with a suitable data allowance – it often works out cheaper than a day worth of flaky hotel Wi-Fi, and can be much more reliable.

### Demo stations

One of the first demonstration stations was to support Cambridge and District Amateur Radio Club (CDARC) at the Cambridge Museum of Technology for Museums on the Air weekend. On a one-day public demonstration one doesn't often have a great deal of time or resources to set up very effective HF antennas and it is in this respect that the remote approach showed its great advantage. Although the Museum site has space for conventional antennas, it is located in the central city area. As such it is extremely radio noisy. Although it does have Wi-Fi throughout we elected to use the 3G/4G approach since the phone network signals were so strong and steady.

Station setup took all of 15 minutes. Later we realised we could have set up the station in almost any area of the museum: we were no longer restricted to rooms with outside access for antenna cables. We could have sited the station in the best area for public interaction. It is this flexibility that is one of the major advantages for the remote approach.

The same sort of situation occurred when setting up the JOTA station in Haverhill Scouts hut, where there was no Wi-Fi at all. The remote station was up and running quickly and during the day provided a stream of other JOTA stations for the Scouts to exchange greetings with.

For the First Class CW Operators' Club (FOC) AGM at Jury's Inn in Milton Keynes we had access to a good quality Wi-Fi (latency <20ms) and members were able to experience remote operation for the first time. This sparked off a detailed discussion of the technology used (**Photo 3**).

### Youngsters at Bottisham Village College

One of the most important trials we ran in 2016 was with Bottisham Village College.

Peter, M0DCV runs an Extended School activity at Bottisham Village College (near Cambridge) every Thursday afternoon, see **Photo 4**. To date six students have qualified for their Foundation Licence with another planning to take the exam this year. Eric, M6FPQ and Luke, M6LUB are currently studying for their Intermediate exam. Extended School only runs for one hour after school. Using the remote station under Peter's supervision and under the club call G2XV means that in the limited time available the station can be on the air and practising very quickly – using an excellent station. This has given a good experience and guaranteed on the air success. However, we still regularly rig a temporary antenna across the car park and set up a traditional, portable station too. As well as having to connect up and match such a system it gives the students experience of operating under poor conditions – they have to listen more carefully! Using the remote station has thus

given the best of both worlds.

An additional bonus is the possibility of using the remote station as an in-house case study for the Internet of Things for Year 10 and 11 computer studies. This project featured in the college's end of year magazine under the title 'Field Trialling New technology', together with a picture of students using the station. The station will also feature at the school's Parent Evening in Spring 2017.

The success of this trial suggests the possibility of a new type of school amateur radio station that does not rely on getting permission to mount external antennas or hoping for a reasonably quiet noise background, yet which gives all of the appearances and performance of a modern amateur radio installation.

### Weekend Foundation training

A further use of the remote station is in amateur radio courses. Several times a year CDARC runs weekend Foundation courses in a local village hall. These courses require that students make live QSOs, so advantage was taken of one of these courses to use the remote station. The village hall used has no Wi-Fi, little room for antennas etc and is a poor radio site. There is a reasonable 3G/4G signal from EE, which was used for the event. It was easy to make the customary prearranged HF QSOs with the remote station – even to the extent of experiencing QRM from Italian stations who seemed to want to help!

During any off time students were encouraged to listen on the remote station to signals on HF and thus gain further familiarity with HF propagation. It gave the whole day a live on the air feel. Interestingly, the students had an IT background and the integration of HF radio with IT networks made the whole learning experience relevant and more interesting.

### Circumventing accommodation issues

In the Cambridge area there are a number of amateurs who do not have the possibility of establishing an amateur station, perhaps because they live in University or rented accommodation where there is no chance of erecting external antennas. Several of these amateurs have been using the remote station on a regular basis to work DX, enter contests or have an evening on the air.

One recent user is moving house and is using the remote station to have a presence

**Peter, M0DCV, Michael G7VJR  
and Bob, G3PJT**





**PHOTO 4:** Delia (Foundation candidate), Luke, M6LUB and Eric, M6FPQ using the remote station at Bottisham Village College.



**PHOTO 5:** Camb Hams members in the White Horse – where the project was first conceived (over the proverbial pint or two).

on the air until he can establish himself in his new QTH. And finally we can use it to liven up Camb Hams meetings (**Photo 5**) in the White Horse!

One application that was foreseen originally was for those amateurs in sheltered housing etc. This is clearly possible. So far we have not been able to try this due to lack of a suitable situation but we hope to do so in the not too distant future.

### Conclusion

The flexibility in terms of location and time-to-get-active of the remote station approach offers a number of quite new ways of looking

at demonstrating amateur radio. It introduces more opportunities to get on the air in training, in club meetings and demonstration events, which has to be good for amateur radio.

In the next few years (and if funds and other resources permit) we intend to improve the monitoring of transmitter output power and control of the antenna rotator. With a steady increase in the number of users we have implemented an access control and booking procedure. We have a booking system based on Google Calendar and we propose to link this to a system which authorises users and control their logged on times.

Most of the resources, software, IT, amateur radio station maintenance, power etc are provided on a daily basis by the project team. Our view now is that new users will have to offer skills or user applications to help the project advance, and this is the approach we intend to take as people ask to be connected.

### Acknowledgements

This project was part funded by the RSGB Legacy Fund. G7VJR, MOVFC and G3PJT donated equipment and provide ongoing financial support to cover running costs and other equipment purchases.

## Feature

# The Marconi Amateur Radio Circle, Malta

The Marconi Amateur Radio Circle was formed out of the Mellieha Amateur Radio Club and is in Mtarfa near Rabat in Malta. After three years of extremely hard work, involving lots of manual labour by club members, free loans of diggers, road rollers and other heavy plant and machinery, donations by local businesses of paving slabs, concrete and other construction materials, the site has been transformed into a building housing the shack, a kitchen area, a meeting room and shower and toilet facilities. Recently, they received a donation of a three-section tower from one local amateur, a



three element HF beam from another and a fifteen element two metre beam also so the club, 9H1MRC, RNARS 4937, is now fully kitted out.

Late in 2015 the RNARS Committee kindly donated a Kenwood TS-570D radio. The presentation was carried out on behalf of the Society by Bill, 9H1BX/G3TQM, RNARS 328 on a morning of glorious sunshine. Bill donated a Samlex 25A power

supply for the Kenwood from his own shack and this was handed over at the same time. After the handover, some very successful contacts were made with RNARS members in UK using the Kenwood and the HF beam.

Bill has also donated a large amount of UR67/RG213 coax, some aluminium poles and joiners and an amount of other aerials and equipment, including a 12V generator that should help the club to flourish. These items are being 'piggy-backed' out to Malta later in a container with some non-radio equipment at no cost to the club. For this and other involvement in the club, Bill was made an honorary member.

Arrangements are being made for MARC to appear more regularly on the bands now that they are equipped for it, so look out for 9H1MRC. You can also keep updated by visiting their Facebook page <https://www.facebook.com/marcm1t/> or by email to [marc\\_malta@yahoo.com](mailto:marc_malta@yahoo.com)

**Bill, G3TQM, 9H1BX, RNARS 328**  
**Steve, 9H1SF RNARS 4898**  
[marc\\_malta@yahoo.com](mailto:marc_malta@yahoo.com)

**NEW  
TITLE**



## The RSGB Vintage Rig Guide

Edited by Steve White, G3ZVW

Amateur radio equipment saw great changes from the 1960s onwards with the arrival of solid state designs and there is plenty of superb equipment from the latter decades of the 20th century available in the second-hand market. This brand new publication focuses on the amateur radio equipment from these decades in the same format as the popular *RSGB Rig Guide*, describing the basic information about the equipment along with when it was first made and what it may be worth.

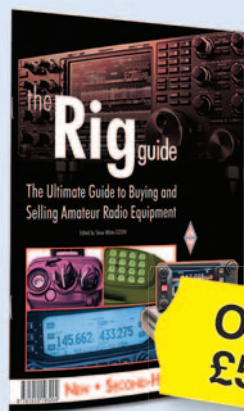
Covering the mid-1960s to 1990s, the *RSGB Vintage Rig Guide* covers the equipment from manufacturers that were never in the standard *RSGB Rig Guide*, along with the items that have been discontinued from the listings in early editions of that publication. Therefore manufacturers such as Drake, Heathkit and KW are now included for the first time. There are brief synopses of all the manufacturers and a useful guide on what to smell, feel and 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.

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# A simple USB CW interface

**W**hen needing to send accurate CW for long periods of time, for example during contests, then it can be wise to do so by the use of a PC with appropriate software. Lots of software is available online, some of which is free, including Wintest, Logger 32, Winlog 32 or Mix W to name just a few. But how do you physically connect your radio to the PC for doing Morse code?

Well, a simple interface can be made that will allow your PC to send CW to your radio via a COM port using the DTR and GND connections of that COM port. This interface is easy to make and can be put together for under £5!

## Parts required

What you will need to make the interface is the following:

- 1 x CP2012 UART converter. These are available from online sources such as eBay, Amazon, Aliexpress etc, often for under £1. **Photo 1** shows an example.
- 1 x USB enclosure – again, these are available online for under £1.
- 1 x 1.8m shielded cable, with 3.5mm or ¼" stereo plug already fitted, usually about £1.50 online. Buy whichever type suits your radio's KEY socket.
- You will probably also need a diode (1N4148 or equivalent) or a simple optoisolator, as discussed later.
- A soldering iron with solder and hot glue gun with some hot glue – but every amateur is likely to have these!

## Construction

The type of USB to UART converter you purchased and the size of the USB enclosure will decide if any work will need done. In order for me to fit my UART converter into the enclosure I used a rotary multi tool to take small shavings off the inside of the USB enclosure and also a small shaving off the UART converter itself.



**PHOTO 1:** A typical CP2012 UART converter.



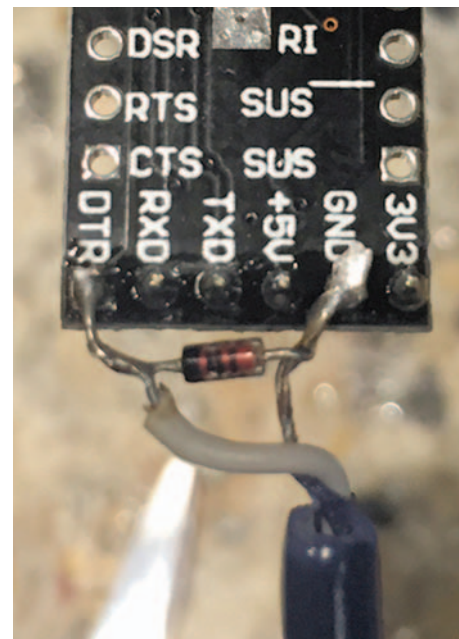
**PHOTO 2:** The RS-232 pin functions are clearly labelled. The red wire is connected to DTR (on the other side of the board).

The first step is to strip and tin the cable with your 3.5mm or ¼" stereo plug attached, ready for soldering. The connection from the tip of your stereo plug will be soldered onto the DTR pin of the USB / UART converter and the sleeve connection of the stereo plug will be soldered to the GND pin of the USB / UART converter, as may be seen in **Photo 2**.

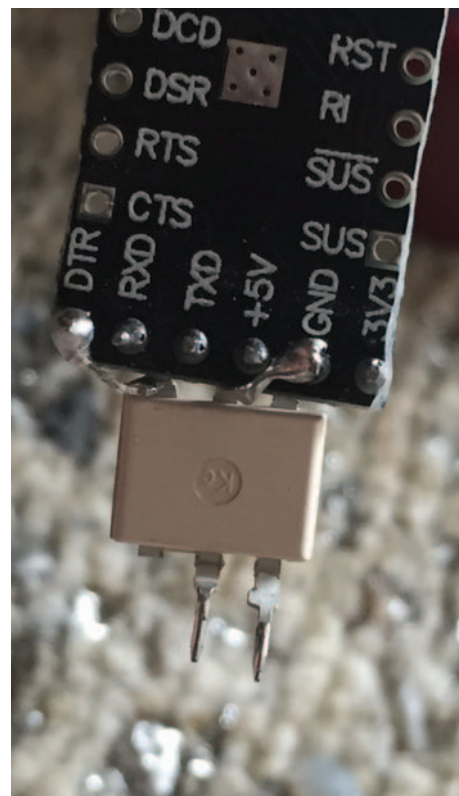
Essentially these are all the connections that are needed, however in order to protect the devices a diode or 4N33 optocoupler can be fitted. See **Figure 1** and **Figure 2** for details. These show a DB9 connector instead of the USB interface I've suggested: as long as you get the pin identities correct (GND and DTR) you'll be fine.

The diode will fit easily within the USB housing, as can be seen in **Photo 3**. I just used a diode that I had lying around but anything similar to a 1N4148 would do.

The optocoupler is relatively easy to graft onto the end of the converter, as shown in **Photo 4**. However, the resulting assembly is not so easy to fit inside the USB housing.



**PHOTO 3:** A diode fitted between DTR and GND, as per Figure 1.



**PHOTO 4:** Fitting an optoisolator to the UART converter board.

## Finishing off

Put the USB/UART converter into its housing and use some hot glue to hold the wires and connections in place, as shown in **Photo 5**. Once the glue has solidified, simply glue the two half of the USB enclosures together. **Photo 6** shows the finished article.

Once you have made up your interface, plug it into the PC and check the COM port number. **Figure 3** shows how this should look in Device Manager, although the appearance will be slightly different in the various versions of Windows.

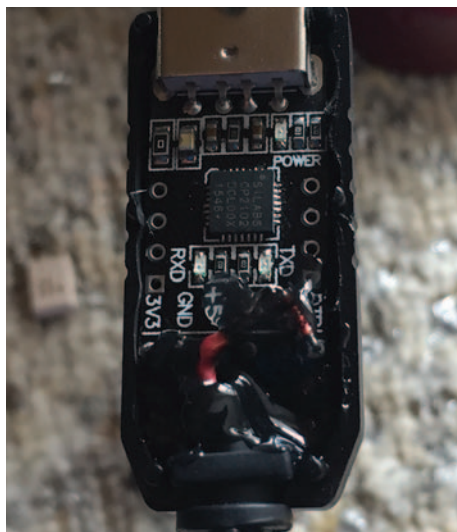
Once you have found out which COM port number your CW interface is allocated to, set up your software to show DTR as CW and, if RTS must be selected to satisfy your software, set that to PTT (although that's not relevant for this device). **Figure 4** and **Figure 5** show the key settings (in this case when my interface was on COM 7 – yours may well differ).

## Setting to use

Make sure you plug the stereo plug into your straight key socket on your rig if it has

sockets both types (ie for paddle as well as straight key); this way you can still use your paddle and PC software depending what needs sending at the time. If you only have one CW key socket on your rig, make sure the settings on the rig are correct for a straight key.

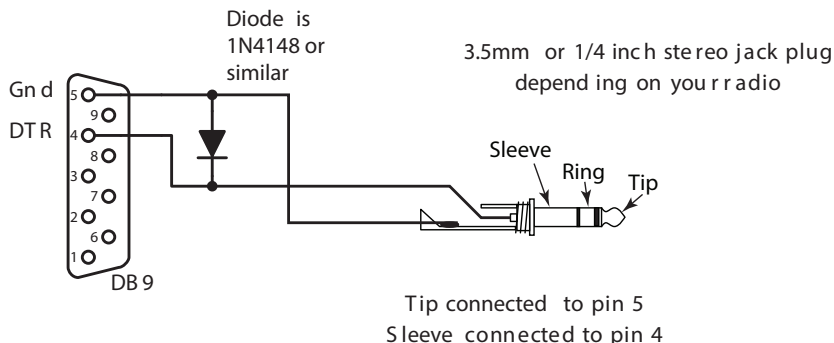
**Billy McFarland, GM0OBX**  
gm0obx@yahoo.co.uk



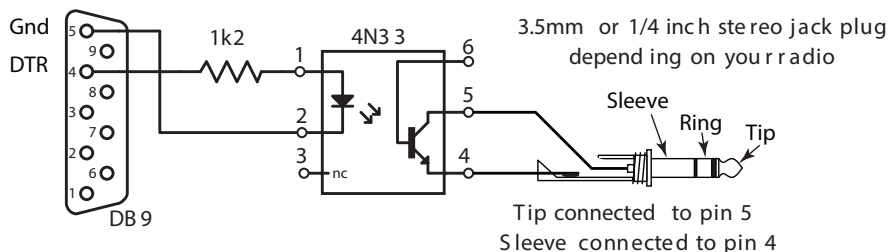
**PHOTO 5:** Hot melt glue keeps everything nice and tight.



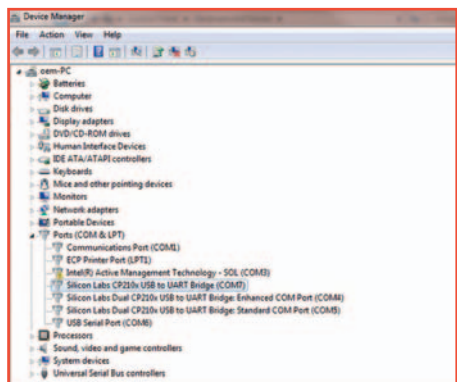
**PHOTO 6:** The finished, re-wired converter.



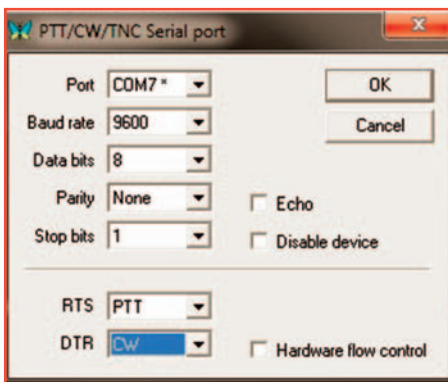
**FIGURE 1:** Basic connections between an RS-232 port (or USB UART converter) and radio.



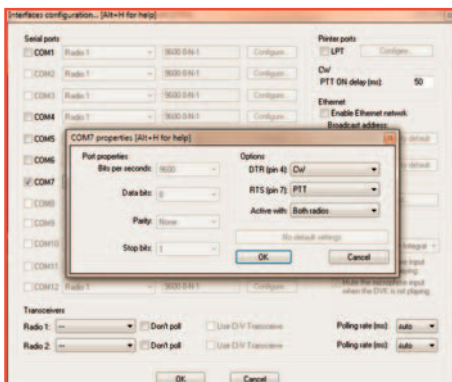
**FIGURE 2:** Better arrangement using an optoisolator to ensure electrical separation between the computer and radio.



**FIGURE 3:** Typical way an USB to UART adapter shows up in a Windows Device Manager list (the exact appearance depends on the version of Windows you're using but the principle is similar).



**FIGURE 4:** Typical settings for a PTT/CW/TNC serial port. The important bits are the COM port number, which must match your adapter, and the DTR = CW setting.



**FIGURE 5:** Typical configuration screen for Morse software configuration. As with Figure 4 it's the COM port number and DTR = CW settings that are important.



# Data

## MSK144

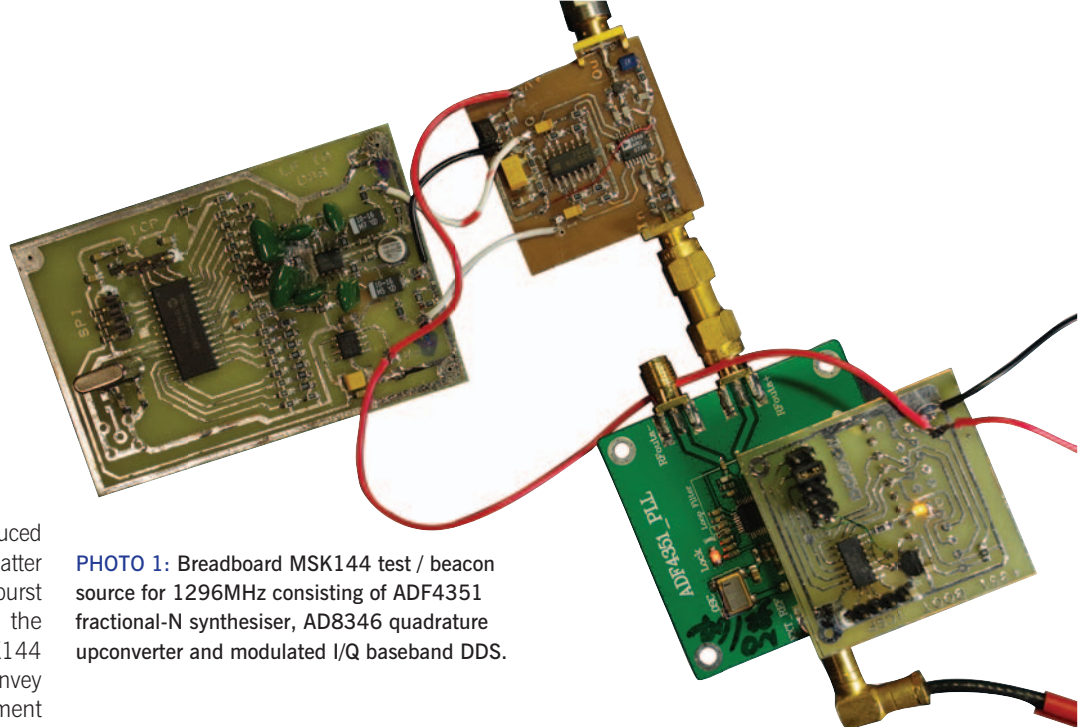
This new high speed data mode was introduced in WSJT-X to replace FSK441 for meteor scatter (MS) and other paths where short term burst openings are likely to occur. Unlike all the other modes within the WSJT suite, MSK144 does not rely upon frequency shifting to convey information symbols (actually, this statement isn't strictly true, as we'll see shortly) but on a more efficient coherent modulation type called minimum shift keying (MSK). We've mentioned MSK before in this column, see for example Data in December 2006 and December 2015, but this time we'll look in more detail at its implementation in MSK144 and show how the mode can also be generated using a DDS, or just a PIC and quadrature upconverter.

First of all, messages sent using MSK144 utilise the same compressed format as most of the other WSJT-type messages, ie two callsigns and a report or locator; callsign plus CQ or other messages, or 13 characters of plain text. WSJT-X also introduces one or two other message types. The message is compressed down to 72 source bits to which an 8 bit checksum is appended to (virtually) eliminate false decodes. The 80 resulting source bits are then expanded using a low density parity code (LDPC) to 144 1-bit channel symbols before modulating an audio tone at 2000 baud for upconversion in an SSB transmitter. 144 symbols at 2000 baud means the entire message is sent in a burst just 72 milliseconds long. Bursts are repeated end-to-end for fixed Tx/Rx durations of 5, 10, 15 or 30 seconds each. For reception, just one complete burst (which can have a number of symbols in error) is all that is necessary for a complete decode.

## Modulation format

MSK, when properly implemented [1] is a coherent mode like PSK with all the attendant advantages in S/N performance coherency offers, but which can be transmitted with a constant envelope through non linear transmitters without frequency spreading.

There are two ways of viewing an MSK signal, both giving the same answer. One view is as offset quadrature phase shift keying (OQPSK). Here, odd numbered symbols are applied as binary phase shift keying to an in-phase carrier, and even numbered symbols are applied to a quadrature carrier half a period later. One period consists of an odd and an even pair of bits, modulated  $500\mu\text{s}$  apart onto the I and Q components; two bits per symbol at



**PHOTO 1:** Breadboard MSK144 test / beacon source for 1296MHz consisting of ADF4351 fractional-N synthesiser, AD8346 quadrature upconverter and modulated I/Q baseband DDS.

1000 symbols per second. To avoid bandwidth spreading, each I and Q element is amplitude shaped to half a sinewave. When the I and Q signals are added the result has a constant envelope.

That sounds a complicated way of doing it, although is often done this way in real DSP, especially when demodulating. As an alternative view, MSK can also be looked at as frequency shift keying where the shift is *exactly* half the symbol or baud rate. Note the emphasis on *exactly*; close to it, or nearly the same, is not enough. Shift *must* be coherently related to symbols.

If we use a numerically controlled oscillator (NCO) to generate our audio tone or RF carrier, this shift can be applied directly to the increment added to the accumulator term. (For more details on NCOs see the August 2005 Data column). One way to do this is to alternately program the NCO with the wanted tone frequency plus or minus a quarter of the baud rate, which is  $\pm 500\text{Hz}$  for MSK144. Within the WSJT suite this method is applied to an audio tone of 1500Hz. The modulated waveform then covers the frequency range roughly 300Hz to 2.7kHz and is designed to fit through an SSB filter.

## Alternative MSK144 generation

Alternatively, if the '0' and '1' channel symbols (or bits) can be generated separately and stored, these can be used in a stand-alone controller to reprogram a DDS chip in real time, sending codes for  $F_{\text{RF}} + 500\text{Hz}$  and  $F_{\text{RF}} - 500\text{Hz}$  2000 times per second based on the pre-stored message symbols. The PIC code in [2] does just this for the AD9852 DDS chip, which can generate RF up to about 70MHz. Suitable changes to the PIC code would allow it to work with the ever-popular AD9850 DDS, albeit at lower RF.

Another solution is to implement an audio DDS inside the PIC that generates I/Q quadrature audio streams (as shown in the June 2016 Data column). This showed how, if negative frequencies were requested (ie, twos complement values are sent to the frequency register) the I/Q polarity would swap, giving the opposite sideband. By reprogramming

the NCO to generate plus or minus 500Hz then sending the resulting tone to a direct quadrature upconverter, the MSK modulation at RF can be generated on any frequency the converter will work at. **Photo 1** shows the breadboard of just such a source, generating an MSK144 test signal at 1296MHz. The larger PCB carries a 16F870 PIC that contains a quadrature DDS driving dual R-2R ladder D/A converters. It also replays prestored MSK144 symbols to generate the modulation.

The block of 144 symbols for any given message can be formed from the utility *MSK144CODE.EXE* contained within the WSJT-X suite (look for it in the .BIN folder of the installation). The utility *GENMSK144* provides a 'wrapper' for this software that stores the symbols in a form for direct import to PIC assembly files. All the firmware and utilities described can also be found in [2].

## Online signals database

Miles, GOODS sent in details of a signals database [3]. It includes spectral plots of the signals, audio clips and information on the transmitters, messages and modulation. Being Wiki based means you can update and add to the site as new signals appear.

## Websearch

[1] MSK can also be transmitted 'improperly', where frequency 'shift' and symbols are not truly coherent, but 'close enough'. See December 2015 Data for more details.

[2] PIC code and utilities for generating MSK144 messages using discrete hardware – [www.g4jnt.com/MFSK144\\_PIC.zip](http://www.g4jnt.com/MFSK144_PIC.zip)

[3] Signals database – [www.sigidwiki.com/wiki/Signal\\_Identification\\_Guide](http://www.sigidwiki.com/wiki/Signal_Identification_Guide)

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new Icom IC-7610?  
See our web site for more  
details!

## ICOM IC-7600 NOW ONLY £2399.95 LIMITED TIME OFFER

Large enough to feel like a proper base station format but won't take up an entire desk top, the IC-7600 is one of our most popular and reliable HF/6m transceivers. Call today to discuss your package with the very best in trade-in offers.



This Mid-range HF base station from Icom has arguably the best screen for user interface in the business.

**ICOM IC-7851 IN STOCK NOW!**



See [HamRadio.co.uk/ic7851](http://HamRadio.co.uk/ic7851)

Built to order like its predecessor, the new IC-7851 is set to be a master-class transceiver of the highest order. Based on the Limited production run and very exclusive IC-7850, the IC-7851 is available today to order. Top prices paid on all trade-ins. For more information call today.

**ICOM IC-9100  
ML&S NOW ONLY £2799.95**  
HF through to 23cms Base Transceiver.

Or Plus 4 Pack with all 4 options. Only £3649.95  
UX-9100 23cm Module.....£623.99  
UT-121 D-Star Board.....£180.00

**NEW! NIFTY DESK-TOP STAND HOLDER FOR  
ICOM ID-5100. ONLY £29.95**



### NEW ICOM ID-51plus 2

The new third generation ID-51A PLUS 2 versions adds two exciting new D-STAR modes of operation:

- Terminal Mode
- Access Point Mode



Available in 5 colours. For more details and price see [hamradio.co.uk/id51plus2](http://hamradio.co.uk/id51plus2)

Includes pre-programmed SD Card for D-Star repeaters.

### ICOM IC-7100

RRP £1249.95  
ML&S NOW ONLY £1099.95  
WITH FREE SD CARD & HM-151 MIC.



**ICOM ID-5100  
ML&S ONLY £474.95**

Latest 2/70 D-Star Touch Screen Transceiver from Icom. Bluetooth connectivity and second station control through an Android device.



**ICOM IC-2730 DUAL BAND  
MOBILE ML&S £269.95**

A practical easy to use Dual Band with remote head.

**Wouxun**

**WOUXUN HANDIE, KG-UV9D  
PROPACK ONLY £149.99**

- KG-UV9D Transceiver
- Two batteries
- Two belt-clips
- Software and transfer data cable
- Fast charger dock and power supply
- Hand speaker mic
- Battery eliminator
- Manual
- Wrist strap
- Leather case
- In-car charger
- SMA-PL259 adaptor
- Hands-free kit



**WOUXUN KG-UV950PL NOW  
WITH 4M! ONLY £249.99**



Up to a full 50W output on 4m, this unique QuadBand mobile/base from Wouxun exclusive to ML&S. Bands covered are 4m / 6m / 2m / 70cm.

**WOUXUN KG-UV950P  
ONLY £239.99**

**Quad band  
heaven!**



**KG-UV950PL: £249.99**

### MS-5 HANDS FREE MIC

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

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



**ONLY £39.95**



**CG-PK4 Pocket Keyer**  
CG Antenna introduce the new pocket Electronic Memory Keyer.

- Extremely small size
- Very low power consumption (160MicroAmps)
- Four memories with Auto Repeat function
- Selectable Keying Weight
- Built-in side tone ideal for training
- Keying speed 8-50WPM
- Advanced Paddle Mode
- Straight Keyer Mode

**Only £44.95**

### POCKET OSCILLOSCOPE

**ONLY £125.00** DSO-Quad

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



### KENT MORSE KEYS

See web for full range and specifications



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

ML&S HAS SOLD MORE KENWOOD HAM RADIO THAN ANY OTHER DEALER OVER THE LAST 10 YEARS

## NEW LOW PRICES ON KENWOOD



### TH-D74E

Dual Band Handie with unique APRS, D-Star & HF SSB receive coverage.  
**£599.95**

See [hamradio.co.uk/thd74e](http://hamradio.co.uk/thd74e)

### KENWOOD TS-590SG HF/6M TRANSCEIVER



**160-6M BASE WITH  
ATU ONLY £1159.95**

Add an MC-60A DESK MIC worth £119.95 for only £110!

Upgraded version HF & 6M FULL DSP Base Transceiver  
The best-selling HF transceiver just got even better.

### KENWOOD TS-990S HF+6M FLAGSHIP



**200W HF/50MHz Base Station  
Transceiver with Dual TFT  
Display and Dual Receiver.**

See [HamRadio.co.uk/ts990](http://HamRadio.co.uk/ts990)

**SEE OUR WEBSITE FOR OUR FULL RANGE OF KENWOOD PRODUCTS**



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Order before 3pm as late as Friday of each  
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## ACCESSORIES AND ANTENNAS ON SHOW AT THE NEW SUPERSTORE!

### Wonderwand Wonderloop Antennas

#### WonderWand Widebender

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!**



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](http://www.HamRadio.co.uk/wonderloop)

### HighEndFed Antennas



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

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

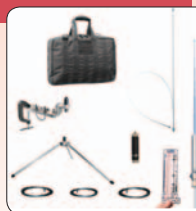
For the full range see [www.HamRadio.co.uk/hyendfed](http://www.HamRadio.co.uk/hyendfed)

### 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
- Antenna Weight: < 2 pounds (1kg)
- 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

**NEW IMPROVED VERSION**

**All for only £259.95**

Plus £10.95 post & packing

For the complete range of Super Antenna products see [www.HamRadio.co.uk/Superantenna](http://www.HamRadio.co.uk/Superantenna)

**Fed up with paying over the odds for Diamond Antennas? So were we. Even lower prices for 2016! Huge selection always available,**

#### Base Antennas

CP-VU8	80m-70cm 200W Compact HF Base, only 2.7m Long!	.....
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) 8.3dB (144MHz), 11.7dB (430MHz), 13.7dB (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		.....

#### Duplexers/Triplicers

MX-72N	1.6-150/400-460MHz Duplexer	.....
MX-62M	1.6-56/140-470MHz Duplexer	.....
MX-610	HF/6+2+70 (for FT-900)	.....
MX-2000	6/2/70 Triplicer	.....
MX-3000N	2/70/23 Triplicer	.....

#### Switches

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	.....

### Hustler Antennas



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



See web for full listing!

#### Base Station Range

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

4-BTV 40/20/15/10m.....£189.95

5-BTV 80/40/20/15/10m.....£229.95

6-BTV 80/40/30/20/15/10m.....£269.95

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

### COAX CABLE STRIPPERS

#### DXE-UT-8213

**ONLY £44.95!**

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

#### DXE-15035 ONLY £23.95

Great for everything from RG-58 up to Ultraflex 10! Designed for stripping RG-8, RG-213, 400MAX, and similar size cable. Simple to operate, they are preset.



### Messi & Paoloni

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

#### NEW PRODUCT!

#### M&P ULTRAFLEX 13 "MOON INTERCEPTOR" COAX CABLE



Straight from their factory in Italy comes the new very high grade low

loss coaxial-cable specifically designed for HF/VU high power amplifiers and moon-bounce operation. New improved dielectric design with low attenuation even at 10GHz. Full copper 19-wire strand construction means you can use around the rotator without risk of fracture.

Further information see: [www.hamradio.co.uk/ultraflex13](http://www.hamradio.co.uk/ultraflex13)

#### M&P ULTRAFLEX 7

7.3 LowLoss cable, 50 Ohm, double shielded.

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

#### M&P BroadPro50 double jacket

12.4mm LowLoss cable, 50 Ohm, double jacket.

Further prices and full details see web: [www.hamradio.co.uk](http://www.hamradio.co.uk)

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

### mRS MiniVNA Antenna Analysers

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

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

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

#### NEW MODEL! MiniVNA Tiny

Huge coverage, 1MHz-3GHz, Android controllable. .... ONLY £379.95



### MyDel-Sark110 Vector Impedance Antenna

The SARK-110 Antenna Analyser is a pocket size instrument providing fast and accurate measurement of the vector impedance, VSWR, vector reflection coefficient, return loss, and R-L-C (as series or parallel equivalent circuits). Typical applications include checking and tuning antennas, impedance matching, component test, cable fault location, measuring coaxial cable losses, and cutting coaxial cables to precise electrical lengths. The SARK-110 has full vector measurement capability and accurately resolves the resistive, capacitive and inductive components of a load. The measurement reference plane is automatic adjusted via the Open/Short/Load calibration standard to enable the accurate impedance measurements at the end of an intermediate coaxial cable. **ONLY £359.95**



### MFJ Products - Lots more MFJ stocked!



MFJ-939	Plug & Play 200W ATU, you won't even know it's there!	.....
MFJ-974HB	Manual ATU for balanced line antennas, 160-10m	.....
MFJ-974	as above but without 160m	.....
MFJ-16010	Random Wire ATU 160-10m	.....
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	Auto ATU 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

### DX Accessories are available at ML&S



### Array Solutions

#### PowerMaster II



VSWR & RF Power Meters.

#### AIM 4300DX



Lab & Field Grade Impedance Analyser.

- StackMatch 3/5/10kW Stack Match & Power Splitter Antenna
- SixPack RatPak Range of Remote Antenna Switches
- Vertical Phased Array Controllers
- Baluns & Un-Un Transformers
- K9AY Loop, Beverages, Shared Apex Arrays & Low Band Antenna Products

### microHAM

RF Vector Signal Meter  
Station Master & Station  
Master Deluxe Network  
Controller



#### USB micro KEYS II

All-in-one USB Interface



Station Master & Station Master  
Deluxe Network Controller



For more information, prices & technical information email [MicroHam@HamRadio.co.uk](mailto:MicroHam@HamRadio.co.uk)

### Daiwa Meters

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



CN-101L	1.8-200MHz. 15/150/1.5kW	.....£87.95
CN-102L	1.8-200MHz. 20/200/2kW	.....£97.95
CN-103LN	140-525MHz. 20/200W. N-Type	.....£97.95
CN-801HP	1.8-200MHz. 20/200/2kW. PEP Reading. Large display	.....£119.95
CN-801HP3	1.8-200MHz. 30/300/3kW. PEP Reading. Large display	.....£139.95
CN-801VN	140-525MHz. 20/200W. N-Type	.....£104.95





As the largest UK dealer of Flex SDR Products, ML&S always carry stocks of each model and have demonstrators available.

**FACTORY  
APPOINTED DEALER**

## FLEX 6300

1.8-60MHz, 2 Slice RX  
100W SDR TCVR.



**ML&S Price: £2499.95  
ON DEMO & IN STOCK  
NOW!**

Flex-Maestro Self-contained remote controller for the 6000 series .....	£1199.95
Flex-6300 1.8-60MHz, 2 Slice RX 100W SDR TCVR.....	£2499.95
Flex-6500 1.8-60MHz, 4 Slice RX SDR 100W Transceiver .....	£4049.95
Flex-6700 1.8-60MHz, (+RX 135-165MHz) 8 Slice RX SDR 100W Transceiver .....	£7199.95
Flex-6700R as above, Receiver only .....	£6599.95
Flex 1500 SDR Low cost SDR Transceiver, connect via USB & you have 5W 160-6m.....	£749.95

There is so much to detail so check out our web page [HamRadio.co.uk/maestro](http://HamRadio.co.uk/maestro) for more information.

## RF EXPLORER 3G COMBO HAND HELD SPECTRUM ANALYSER



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

**NOW ONLY £209.95**

## SUNSDR2PRO TRANSCEIVER

- 10KHz-65MHz RX
- 95-148MHz RX
- 1.8-54MHz + 144MHz TX
- Separate independent RX path based on Direct Down Conversion principle (DDC)
- Separate independent TX, based on the Direct Up Conversion principle (DUC)
- 20W output (ideal to drive Amp)
- LAN-cable for connecting to local network
- OS Windows XP/7/8 x32 or x64, OS Linux Ubuntu x64



In stock & on demo.

**£1699.95**

See [HamRadio.co.uk/sunsdr](http://HamRadio.co.uk/sunsdr)



## NEW EXPERT ELECTRONICS MB-1



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.

**Limited quantity available NOW!**

**With Auto ATU £4699.95, without £4299.95**

see [HamRadio.co.uk/MB1](http://HamRadio.co.uk/MB1)

*"For a New Direction  
in Ham Radio"*

## ELAD FDM-S2



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

**£449.95**

## ELAD FDM-DUO MULTI-USE 5W SDR TRANSCEIVER



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

**BLACK £949.95 RED LIMITED EDITION £949.95**

## TIGERTRONICS SL-USB

**ONLY  
£119.95**



ALL sound card Digital and voice modes are supported by the SignalLink™ 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 SWLs and users who wanted RX only. The price is cheaper at only £639.95.

**ML&S PRICE: £679.95**

**NEW! CLOUD IQ  
ONLY £579.95**



Available HF/6m SDR with IQ Streaming & built-in Internet Server.

See [HamRadio.co.uk/cloudiq](http://HamRadio.co.uk/cloudiq)

## SDRplay



**RSP1: £114.95**

**RSP2: £154.95**

**RSP2PRO: £189.95**

- Robust and strong plastic case
- Continuous coverage from 10kHz to 2GHz
- 12-bit ADC silicon technology (not another 8 bit dongle!)
- Built-in High-Performance front-end filters • Up to 10 MHz bandwidth
- Good sensitivity and selectivity
- Low noise floor
- Simple USB interface (type B socket)
- SMA antenna socket
- Powers over the USB cable
- SDRuno - World class SDR software

For more info see [HamRadio.co.uk/SDRPLAY](http://HamRadio.co.uk/SDRPLAY)

## MYDEL COAX SWITCHES

MYDEL CO-201 COAXIAL SWITCH 2-WAY COAX SWITCH SO-239. 500W MAX .....	<b>SPECIAL OFFER £19.95</b>
MYDEL CO-201N 2-WAY COAX SWITCH. N-TYPE SOCKETS. 500W MAX .....	<b>SPECIAL OFFER £21.95</b>
MYDEL CO-201AM 2-WAY DELUXE HEAVY DUTY COAX SWITCH SO-239 1KW .....	<b>SPECIAL OFFER £32.95</b>
MYDEL CO-201AN 2-WAY DELUXE HEAVY DUTY COAX SWITCH N-TYPE 1KW .....	<b>SPECIAL OFFER £33.95</b>
MYDEL CO-301M 2-WAY DELUXE HEAVY DUTY COAX SWITCH 1KW .....	<b>SPECIAL OFFER £39.95</b>
MYDEL CO-301N 2-WAY DELUXE HEAVY DUTY COAX SWITCH N-TYPE 1KW .....	<b>SPECIAL OFFER £40.95</b>

## FUNCUBE DONGLE PRO+ £149.99



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

## bhi Hear those weak signals with a bhi DSP noise cancelling product!

**NES10-2 MK3**  
Amplified DSP  
Noise Cancelling  
Speaker

- 5W input & 2.7W audio
- Headphone socket



- 8 filter levels
- Rotary filter select knob

**DSPKR - 10W**  
DSP Speaker

- Easy to use - Sleep mode
- Filter level select & store
- Separate volume control



- Input overload LED

**Dual In-Line**  
Dual Channel DSP noise eliminating module



- Suitable for all radios, receivers and SDR
- Mono or stereo input & output options
- 7 watt mono audio output, line out and headphone out
- Ideal for DXing, special event stations and field day events
- New improved noise cancelling!

## DESKTOP



- Separate volume and filter level controls - 8 DSP filter levels
- Speaker level and line level input - Sleep mode
- Easy to use
- Size 200(h)x150(d)x160(w)mm
- Supplied with manual, audio lead and fused DC power lead



## NEIM1031 MKII

Fully featured Amplified Noise Eliminating In-Line module

- 2.8 W audio - Audio & line level inputs/outputs
- 50Hz to 4.5KHz bandwidth
- 12 to 24V DC, 500mA
- Headphone socket

Please see web for price.

## New Compact In-Line

- Compact DSP noise cancelling module with new improved DSP algorithm giving even better noise elimination
- Easy to use with mono/stereo inputs
- Use mobile or in the shack
- Over 40 hours battery life from 2 x AA batteries or use 12V DC input
- Size: 121x70x33mm

Please see web for price.



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## LDG AUTO TUNER RANGE

**Factory appointed distributor**

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



**Now Available! RT-600**

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

<b>RT-100</b>	100W Weather proof remote Auto ATU.....	<b>£249.95</b>
<b>RC-100</b>	Remote control for RC-100, + DC power over coax .....	<b>£249.95</b>
<b>AT-1000pro11</b>	1kw Flagship Auto ATU. Separate external head-up large format meter .....	<b>£519.95</b>
<b>M-1000</b>	Large Analogue meter for the new AT-1000Pro11 .....	<b>£139.95</b>
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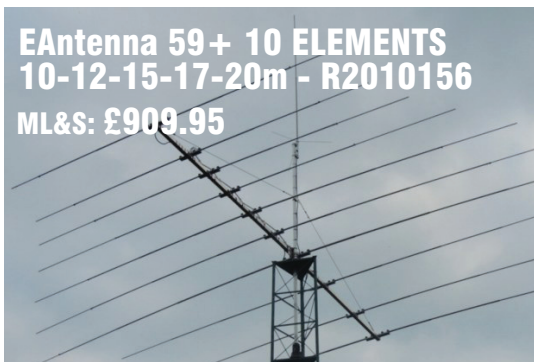


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# Sport Radio

**F**ebruary marks the start of this year's 80m Club Championship series and the WPX series of contests.

The first HF contest of the month is the first of the new 80m Club Championship series; SSB on Monday 6th. Last year Horsham ARC won the Local Club category (see **Photo 1**) and Norfolk ARC won the General Club category. The RSGB Contest Club made its debut in this series last year. Essentially it's a home for RSGB Members who don't have a club to bat for. Last year eight people who might not otherwise have taken part in the series became members, so if you're an RSGB Member but not a member of a radio club or you're from a club that doesn't take part in this series you can join in and make your QSOs count for something by becoming a member of the RSGB Contest Club. The First 1.8MHz Contest runs for four hours on the evening of Saturday the 11th. Then it's back to the 80m Club Championships, with datamodes on Wednesday 15th and CW on Thursday 23rd.

The first VHF contest of the month is the final event in the 2016/17 Super League series, 70cm AFS on Sunday 5th. Once again we have new FM contests to look forward to



**PHOTO 1:** The Horace Freeman Trophy, awarded to the winning team in the Local Club category of the 80m Club Championships.

this month. The Low Power 2m FM Contest on Tuesday 7th is followed immediately by the 2m UKAC. On Thursday 9th we have the 6m UKAC in its new timeslot. On Tuesday 14th the 70cm Low Power FM Contest is followed immediately by the 70cm UKAC. The new monthly 4m Low Power FM Contest is on Thursday 16th, followed immediately by the 4m UKAC. The 23cm UKAC takes place in its familiar timeslot on Tuesday 21st. The first of this year's series of five 70MHz Cumulatives takes place on the morning of Sunday 26th. Finally, the SHF UKAC is on Tuesday 28th.

The UKEICC 80m series continues with an SSB session on Wednesday 1st. The first of this year's WPX series of contests is RTTY, which runs for the whole weekend of 11th/12th. The PACC (Dutch) Contest runs for 24 hours over the same weekend on CW and SSB. For the full 48 hours of the weekend 18/19th the CW leg of the ARRL International DX Contest takes place. Work Americans (in the 48 contiguous States) plus Canadians only, sending a signal report plus your transmit power. Americans and Canadians send a signal report plus their State/Province code. The IRTS (Irish) 80m Counties Contest takes place on the evening of Tuesday 21st. Work EI and GI stations only. There are SSB-only and CW/SSB sections, with CW QSOs attracting twice as many points as SSB QSOs. There's a CW session in the UKEICC 80m series on Wednesday 22nd. With HF conditions now so poor, the CQWW 160m DX CW Contest that commences 22:00 on Friday 24th might be even livelier than usual. The REF (French) Contest runs for 36 hours over the same weekend on SSB.

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

## RSGB HF Events

Date	Event	Times (UTC)	Mode(s)	Band(s)	Exchange
Mon 6 Feb	80m Club Championships	2000-2130	SSB	3.5	RS + SN
Sat 11 Feb	1st 1.8MHz *	1900-2300	CW	1.8	RST + SN + District
Wed 15 Feb	80m Club Championships	2000-2130	Data	3.5	RST + SN
Thu 23 Feb	80m Club Championships	2000-2130	CW	3.5	RST + SN

## RSGB VHF Events

Date	Event	Times (UTC)	Mode(s)	Band(s)	Exchange
Sun 5 Feb	432MHz AFS §	0900-1300	All	432	RS(T) + SN + Locator
Tue 7 Feb	Low Power 144MHz FM	1900-2000	FM	144	RS(T) + SN + Locator
Tue 7 Feb	144MHz UKAC	2000-2230	All	144	RS(T) + SN + Locator
Thu 9 Feb	50MHz UKAC	2000-2230	All	50	RS(T) + SN + Locator
Tue 14 Feb	Low Power 432MHz FM	1900-2000	FM	432	RS(T) + SN + Locator
Tue 14 Feb	432MHz UKAC	2000-2230	All	432	RS(T) + SN + Locator
Thu 16 Feb	Low Power 70MHz FM	1900-2000	FM	70	RS(T) + SN + Locator
Thu 16 Feb	70MHz UKAC	2000-2230	All	70	RS(T) + SN + Locator
Tue 21 Feb	1.3GHz UKAC	2000-2230	All	1.3G	RS(T) + SN + Locator
Sun 26 Feb	70MHz Cumulative #1	1000-1200	All	70	RS(T) + SN + Locator
Tue 28 Feb	SHF UKAC	2000-2230 ~	All	2.3-10G	RS(T) + SN + Locator

## Best of the Rest Events

Date	Event	Times (UTC)	Mode(s)	Band(s)	Exchange (info)
Wed 1 Feb	UKEICC 80m	2000-2100	SSB	3.5	4-character Locator
Sat/Sun 11/12 Feb	CQ WW WPX RTTY	0000-2359	RTTY	3.5-28	RST + SN
Sat/Sun 11/12 Feb	PACC Contest	1200-1200	CW, SSB	1.8-28	RS(T) + SN (PAs send Province)
Sat/Sun 18/19 Feb	ARRL International DX	0000-2359	CW	1.8-28	RST + tx power (Ws send State, VEs Province)
Tue 21 Feb	IRTS 80m Evening Counties	2000-2100	CW, SSB	3.5	RS + SN (EIs and GIs also send county)
Wed 22 Feb	UKEICC 80m	2000-2100	CW	3.5	4-character Locator
Fri-Sun 24-26 Feb	CQ WW 160m DX	2200-2200	SSB	1.8	RS + CQ Zone (Ws send State, VEs Province)
Sat/Sun 25/26 Feb	REF Contest	0600-1800	SSB	3.5-28	RS + SN (Fs send Dept No or overseas prefix)

\* HF Championship event. § Super League event. ~ Different bands at different times. For all the latest RSGB contest information and results, visit [www.rsgbcc.org](http://www.rsgbcc.org)



# Operating a 24V coaxial relay from a 12V supply

**I have a mast mounted aerial changeover relay to switch between vertical and horizontal polarisation, which enables me to use one (rather than two) expensive low loss coaxial downloads. The relay is mounted in a watertight box.**

I needed to upgrade my VHF aerial system to handle more power and the original SMA relay, although very good in itself, could not safely handle the increase.

There are quite a few surplus coaxial relays available with nominal 24V coils and I had a couple of ex Air Ministry Londex N-connector relays with 500Ω coils. The power handling capability suited my requirement, but the 24V coil was a problem because I didn't want to have yet another PSU on the shelf beside my radio.

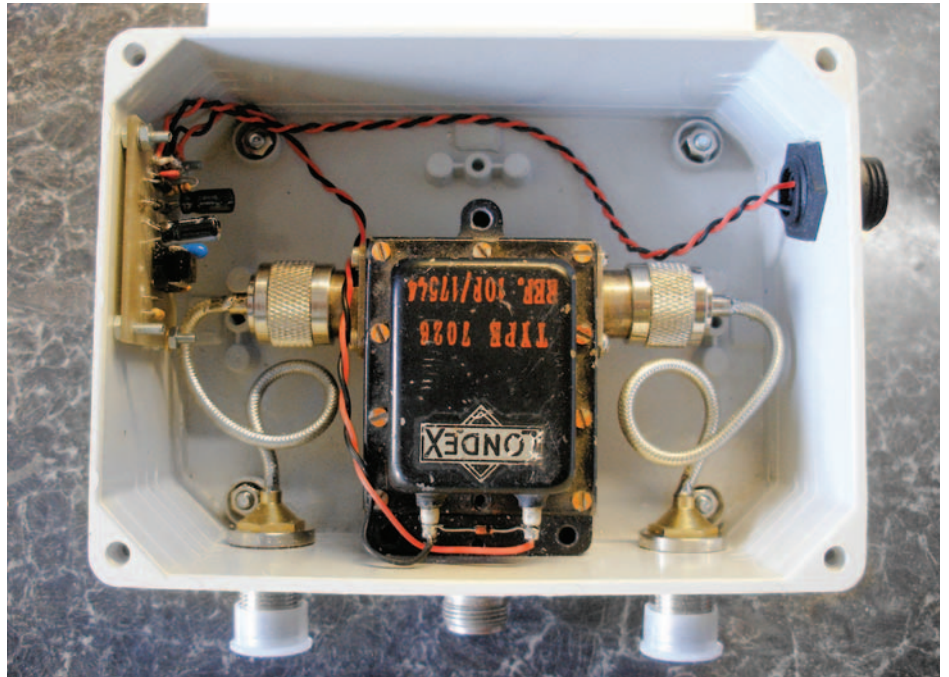
## Research

Before building a circuit I tested my Londex relay. It has a 500Ω coil and required only 16 volts to pull in. It would drop out at 7 volts. The current needed at 16V was a mere 30mA but at 24V the required current increased to 50mA.

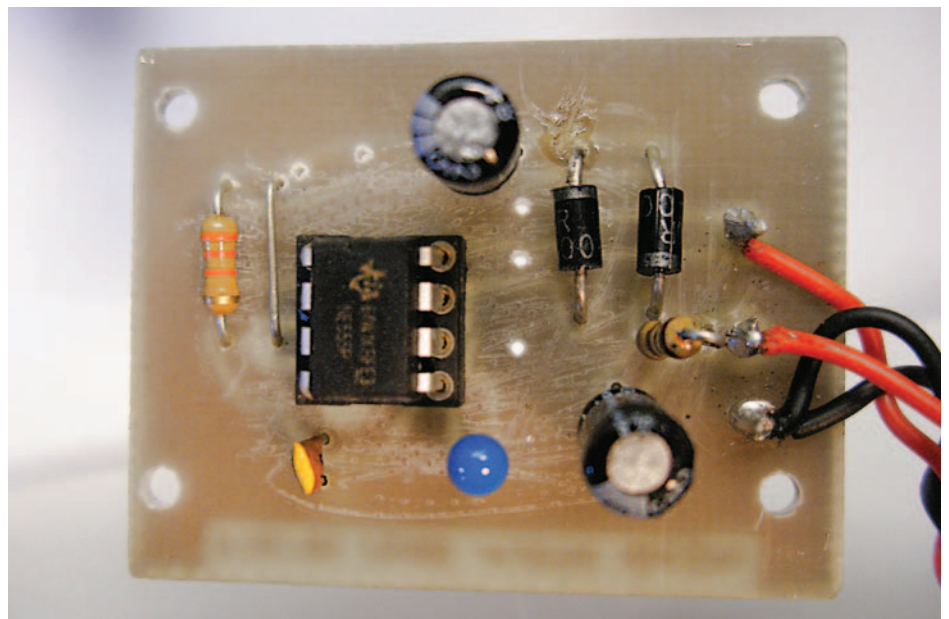
I checked the return loss to ensure that the contacts were properly engaged on a 16 volt supply, and indeed they were. A partially-engaged relay might just short the two outputs (if it's a make-before-break type) or go open circuit (if it's break-before-make) at low drive voltage so at the very least you need to test all the contact permutations with a resistance meter or, preferably, more advanced equipment up to and including a network analyser, particularly if you intend to use the relay at high power.

Some – often American-made – 24V coaxial 'N' relays have a much lower coil resistance and thus have high coil current demand (80-250mA). When this was queried with one manufacturer, it was stated that it had always been the case and they did not see any point in changing it!

A search on the internet uncovered a neat little circuit to convert from 12 to 24V using an IC voltage doubler. I drew up the circuit on my schematic-PCB software and produced a small board to fit within the masthead housing alongside the relay. Now all I have to



**PHOTO 1:** The completed masthead unit, with the voltage booster to the left of the central relay.



**PHOTO 2:** The prototype PCB, before the Zener protection diode and extra decoupling capacitors were added.

do is use the existing 12V changeover supply to operate the new relay and if needed I can quickly revert to the old box. **Photo 1** shows the completed unit.

## Circuit description

Refer to **Figure 1**. A NE555 timer forms an oscillator, the output of which is doubled in the well-known diode doubler circuit

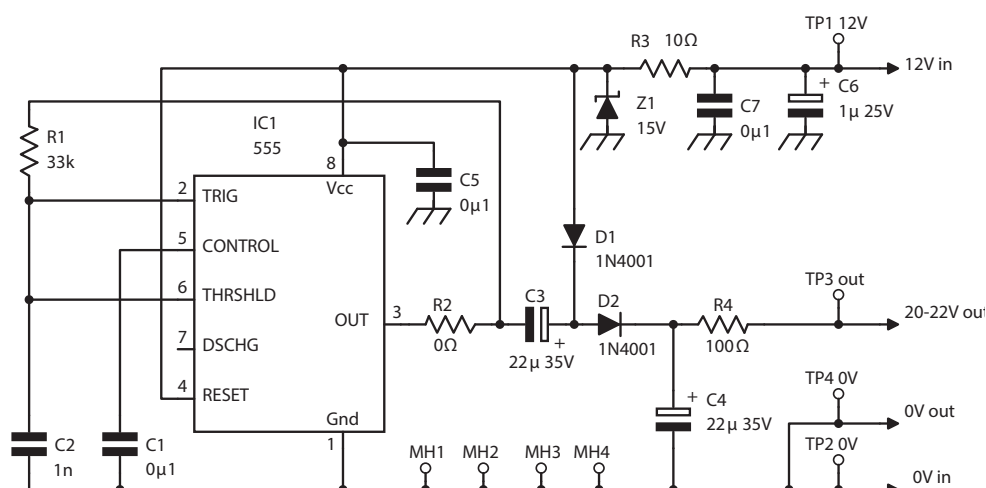


FIGURE 1: Circuit diagram of the voltage booster.

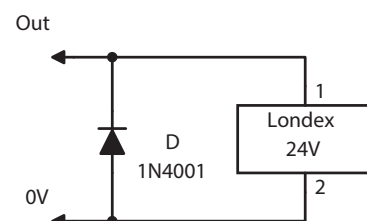


FIGURE 2: The relay must have an inverse parallel diode fitted, as shown here.

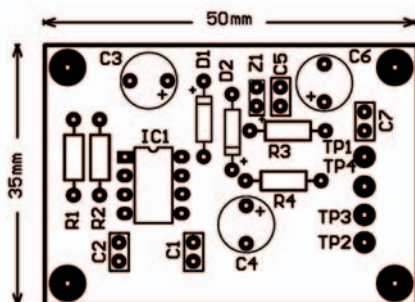


FIGURE 3: PCB overlay.



FIGURE 4: Reversed PCB foil pattern, 1:1 size. The dimension text should 'read right' on the foil pattern on the board.

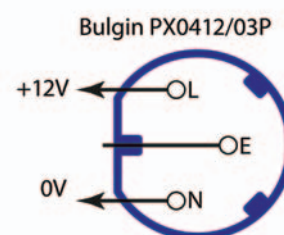


FIGURE 5: Wiring for the Bulgin 402 'Buccaneer' waterproof male connector used in the prototype.

comprising D1, D2, C3 and C4. R2 is a zero ohm link to allow an easier board layout. A reverse diode MUST be paced across the relay coil (see Figure 2).

A Zener diode has been added across the supply to prevent more than 15V being applied to the 555 timer chip. Zeners have a low forward voltage and so should provide some protection against the (unlikely) possibility of supply reversal. There are also a few EMC decoupling capacitors. A series resistor in the output provides a degree of current limiting.

The circuit will produce only 22.8V from a 12V supply but was able to provide the current needed. It can deliver 45mA at 15V into 330Ω and 58mA at 12V output into 220Ω. If higher current is needed a common emitter transistor driver could be used to boost the current but I didn't try this.

I claim no originality for the circuit but have added extra components around the basic circuit to eliminate or reduce possible failure or interference problems. *[It's worth noting that other approaches were described in Design Notes [1], in turn taken from [2] and [3] and there are many other ways of making a higher drive voltage/current available – Tech Ed].*

## Construction

No special precautions are required for constructing this circuit. I recommend using the 50 x 35mm PCB layout I developed, seen in Figure 3 and Figure 4. The design files and a 1:1 PDF print of the PCB may also be downloaded from the RSGB website [4]. I suggest using a socket for IC1.

Originally I used hard wiring to the relay and the supply connector but would consider using Molex KK 254 connectors or similar on any future design to make board removal or repairs easier.

The coaxial relay was mounted in a small ABS box with the common port to the outside. Semi-flexible RG402 cable was used to connect to bulkhead N connectors for the two aerials. The circuit board sits along one side face while a Bulgin 402 'Buccaneer' waterproof male connector was used for the supply, fitted on the opposite face. The wiring is shown in Figure 5. Any other waterproof two pole connector capable of carrying 12V 1A would suit equally well.

Four bolts (their nuts are visible in Photo 1) mount the box to one half of a 10mm thick polythene cutting board that I obtained from a kitchen shop. The board is then fixed to the mast using a U-bolt.

Other than the relay, I obtained most of the components from standard catalogue suppliers. The solderable RG402 N connectors are probably best sourced from a rally or one of the online auction sites.

## Conclusion

My prototype box has been in service now for several months and is switched several times each day. It does what it's supposed to, with the minimum of fuss.

## Websearch

- [1] Design Notes, Andy Talbot, G4JNT, *RadCom*, July 2014
- [2] [www.ko4bb.com/ham\\_radio/Projects/24V\\_Relays/](http://www.ko4bb.com/ham_radio/Projects/24V_Relays/)
- [3] [www.ifwtech.co.uk/g3sek/in-prac/best-of.htm#speedup](http://www.ifwtech.co.uk/g3sek/in-prac/best-of.htm#speedup)
- [4] <http://rsgb.org/main/publications-archives/radcom/supplementary-information/>

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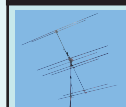
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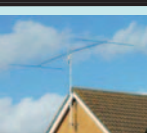
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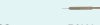
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# VE3LYC/KL7

## from

# Cooper Island, Alaska



Cezar waits to start the journey to Cooper Island with Billy Adams and *Wild Thing*.

**A**fter operating over the last eight years from several remote islands in the Canadian Arctic for the Islands on the Air (IOTA) Programme, Cezar Trifu, VE3LYC wanted to experience a project in Alaska. This is his story.

The North Slope covers the north part of Brooks Range along two marginal seas of the Arctic Ocean, the Chukchi Sea to the west of Point Barrow, and the Beaufort Sea on the east. About 14km southwest of Point Barrow lays the city of Barrow, the northernmost city in Alaska. To the southeast, a chain of barrier islands runs 5-10km from the mainland. The group was discovered and annexed by the British in the summer of 1850 and named

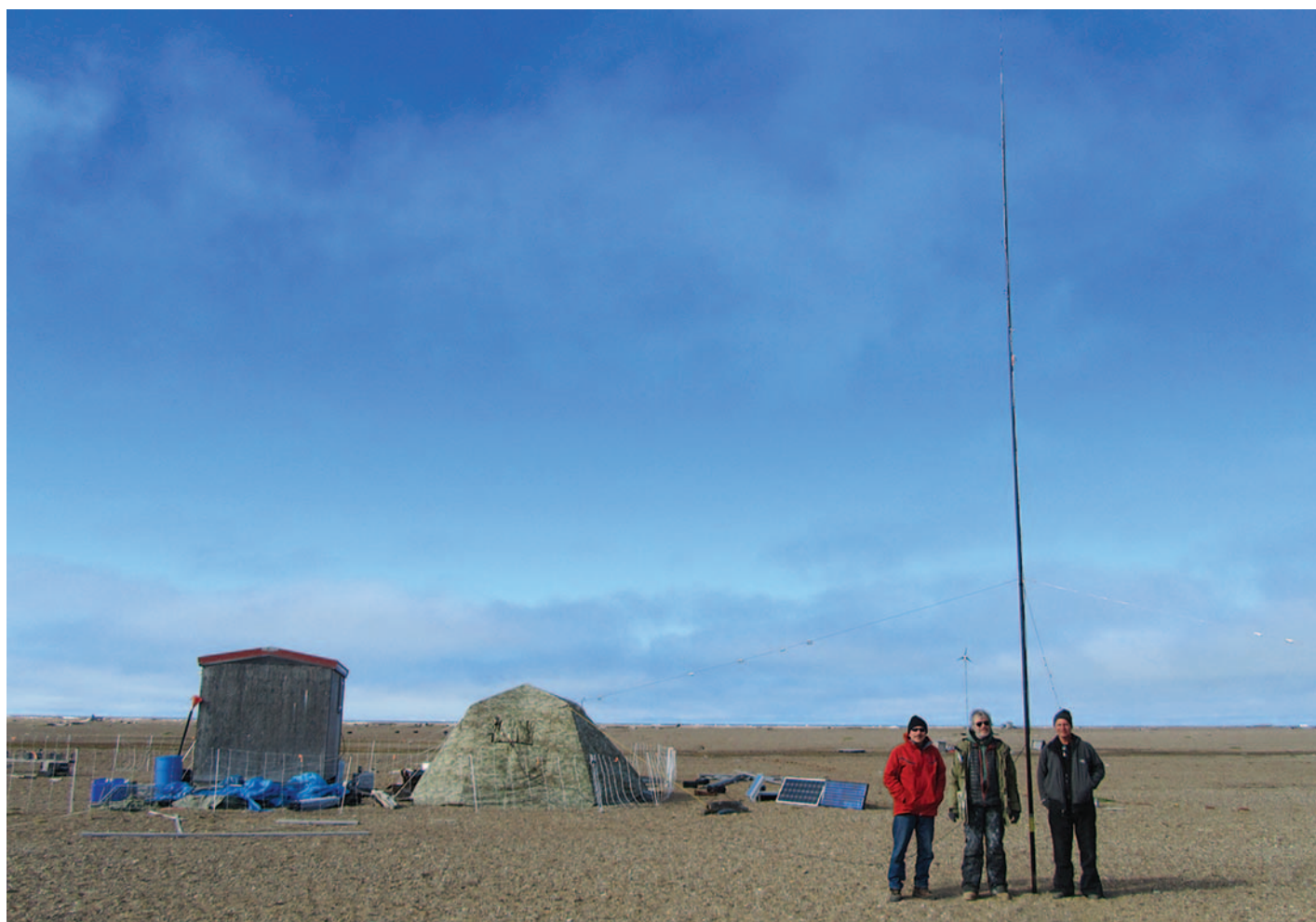
after *HMS Plover* that sailed to the western end of the Northwest Passage in search of Franklin's lost expedition.

Plover Islands are part of NA-172 for IOTA, and in demand by 92.6% of island chasers. It had only been activated once, 24 years ago, and so it seemed an interesting target. In mid-April 2016 I initiated contact with Qaiyaan Harcharek in Barrow, who put me in touch right away with Dr George Divoky, a solitary ornithologist who has a research cabin on Cooper Island. Fate was on my side, as George and I met a week later, when he travelled to Queen's University here in Kingston, Ontario, in relation to this work. George knew a lot about amateur radio and IOTA, since he hosted the first operation from this group back in 1992. He was very supportive of my project and keen to help me with the logistics.

Cooper Island is about 5km long and half a kilometer wide, named by the British after one of their officers on *HMS Plover*, and located 40km east of Barrow. It is the summer breeding ground for a black guillemot colony.

### The journey

I drove from home to Syracuse, NY, from where I flew to Chicago, Anchorage, and then Barrow, with a short stop in Prudhoe Bay. I packed two IC-7000 rigs with accessories, two multi-band wire verticals and one 20m wire vertical. It was cold, rainy and windy in Barrow upon arrival, with flurries at times. It was too windy for an open motor boat to cross the water to Cooper Island. I had to wait a couple of days for the wind to subside. This gave me a chance to visit this vibrant Iñupiat community, which is home to 4,500 people.



Cezar, George, and Jim (L to R) outside the research camp on Cooper Island.

The village of Ukpiagvik on the shores of the Chukchi Sea is an archeological site that contains 2000-year-old remains of semi-underground sod homes whose roofs were supported by the long jaw bones of bowhead whales. The locals continue to proudly hold onto their traditions and bowhead whale skulls and jaw bones are still placed in front of all communal buildings.

George arranged with Billy Adams from the Department of Wildlife to transport me to Cooper Island. Jim Gamache, George's friend and home neighbour, was scheduled to travel along in order to check on the camp's electrical setup and help him with his regular field work. The wind finally decreased by early afternoon of 2 August, when Billy prepared his brother's 250hp open boat *Wild Thing* for the trip. Before heading out, Billy invited us for an early dinner with his family. We started with the traditional muktuk, whale blubber attached to skin, with a rubbery texture compared to lard, but very rich in antioxidants, followed by delicious whale stakes.

The boat ride to Cooper took a little less than one and a half hours. The shallow waters of the Elson Lagoon are tricky, particularly

in windy conditions and, approaching the island, Billy had to carefully lift the engine to avoid hitting the lagoon's bottom and getting stuck. The landing spot was about 600m away from the camp, and we made a couple of trips back and forth to transport all the gear. The camp consisted of a small wood cabin that is George's shack, a tent for his visitors and a storage port, all inside an electric bear fence, with only the solar and wind power generators outside, nearby.

### The station

The radio station was setup quickly, using the power provided by a deep-cycle battery charged through three solar panels. The outside temperature was around 1°C during the day and -3°C at night. Most of the time there blew a 40 km/h wind with gusts up to 56 km/h, creating a windchill of -7°C. The operating tent offered protection from the elements, but wasn't heated and required warm clothing at all times. My landing on the island coincided with the arrival of a moderate emission of charged particles originating from a solar flare. This caused a serious disturbance of the geomagnetic field,

which triggered poor propagation conditions to most regions around the world.

I operated for four and a half days as VE3LYC/KL7. To compensate for the poor propagation, I spent a considerable amount of time on the radio monitoring the bands from 17 to 40m, sleeping only 2-3 hours per night in the first three days. A total of 1890 QSOs were logged with 1651 stations in 55 DXCCs on 6 continents. All contacts were on 20m, of which 96% in CW and 4% in SSB. When 20m was closed, the signal levels on 30 and 40m were very weak and my 100W CQs weren't copied once, while 17m was solidly closed. The continental distribution of stations was EU 55%, NA 23%, AS 21%, and OC, SA, and AF at 1% total. The top five DXCCs by number of stations were K, JA, DL, UA, and I, accounting for 63%.

My barefoot signals to various parts of Europe were very weak under a solar flux in mid-70s. Additionally, the effects of the solar

**Cezar Trifu, VE3LYC**  
 ve3lyc@hotmail.com





The research camp on Cooper Island with its double bear fence!



Dr George Divoky inside his cabin.

flare arrival led to an intense aurora ( $A = 30-40$ ), which often rendered them unintelligible. Nevertheless, some high-power stations kept calling for extensive periods of time, mostly off-sync, creating serious QRM. At times, some would acknowledge my report, but minutes later would start calling again and again, while others would send reports of imaginary QSOs. The very same stations will go through the same process every day, while their neighbours didn't seem to have a similar problem. Chasers need to keep improving their reception, or they will continue to miss some rare ones under poor propagation conditions.

A little over a week prior to our arrival, George had a polar bear visit his camp, and so we kept scouting for them anytime we were outside. At night, however, a bear fence would give us peace of mind. This was until three days into my stay on the island, Jim noticed that the bear fence wasn't properly wired, which rendered it completely useless. He not only fixed it, but we installed a second one, inside the first! Not long after we left the camp, George had a couple of bears in. While fences cannot be relied upon entirely, they definitely offer a first deterrent.

## Thanks

I am deeply grateful to Dr George Divoky and his non-profit, Friends of Cooper Island ([cooperisland.org](http://cooperisland.org)) for allowing me to share his camp. Also, I remain obliged to Billy and Lisa Adams for their warm and generous hospitality. Jim Gamache is graciously acknowledged for his logistical support, particularly with solar power. Maury, IZ1CRR is thanked for website design and George, VE3GHK for his technical assistance. I wish to express my gratitude for the financial support received from the German DX Foundation, DX News, International Radio Expedition Foundation, Icom Canada, Swiss DX Foundation, and Clipperton DX Club. I remain also indebted to Al, W3AWU, Bob, KD1CT and Mike, W5ZPA for their exceptional support, to the top donors AB6QM, DL6DQW, JF4VZT, JM1PXC, K5MT, KO8SCA, PT7WA, VE7DP, VE7QCR, W5PF, WB2YQH, and many others who provided financial help.



Cezar Trifu, VE3LYC operating from Cooper Island.



A black guillemot chick with an egg.

For the past 42 years, Dr George Divoky spent every summer studying the black guillemot habits, from nesting to fledging. The birds used to feed exclusively on arctic cod, which needs cold waters to grow, reproduce and survive. The gradual warming of the Arctic has limited considerably the icepack, and thus the cod supply. In the past 25 years, the colony on Cooper Island has reduced to half, numbering just 100 mating pairs today. His Arctic adventure started with bird studies, but it took him into one of the most critical issues of our times: climate change.

It is the climate change that caused the softening of the permafrost, in turn leading to considerable shore erosion, both on the island and on the mainland. In an effort to mitigate the fast advancing coastal damage west of Barrow, several years ago the Army Corps of Engineers considered mining 1.15 million cubic metres of gravel from Cooper Island. While the British turned the Plover Islands over to Canada in 1880, no record appears to indicate that United States acquired their sovereignty. The mining would have demolished the island, but the Corps abandoned this option following on-site testing, choosing instead an alternative site south of Barrow. I'm not sure that this averted an international mishap, but what a relief for George, who was able to continue his work!

# The IARU HF World Championship

Feature

**In 2016 Mike Ruttenberg, G7TWC took over coordinating the RSGB HQ station in this hard-to-win contest. Here he tells of his experience in the role and what the team looks forward to this year.**

"2016 was always going to be a challenge, given the whoosh towards sunspot minimum. Bringing together dozens of operators, new and old, from around the UK, finding stations willing to host friends and strangers, enhancing existing stations, training operators and much more; it really is a huge administrative undertaking. Special thanks to previous coordinators from years past, especially Chris, GM3WOJ who was coordinator for at least the last five years.

"You cannot fail to have noticed that we are heading towards sunspot minimum, so the upper HF bands were not playing ball at all. That is certainly a challenge when you have a 6-band 2-mode contest where you need to be active on all bands to be even vaguely competitive, and at nearly mid-summer there is minimal night time for 160m and 80m. The draw is that we are a multiplier for other entrants, which keeps things ticking along. 2016 was taxing, as we thought it would be, but probably more so.

"Last year we had some 'big gun' stations from previous years that were unable to host for a variety of reasons; but they will be back in 2017 with new, bigger and better stations. M6T (G0KPW) came on for the first time in ages with a multi-multi station, which is making great strides thanks to the efforts of Dave, G4BUO and friends; a fitting tribute to station owner G4BAH, who went SK not long after the 2016 contest.

"Our youngest operator was Jamie, 2E0SDV (see **Photo 1**), who at 16 was an excellent new addition to the team. Consequently, if you think "I'm too young", that simply isn't true. We have other long-established ops too and there is no age limit so long as you are able to operate a keyboard and a mic (if you want to do SSB, rather than CW).

"Because conditions were challenging the total number of QSOs was well down on previous years. As expected 10m and 15m were seriously down, but they ticked along as best they could with stations in the HQ network swapping bands to pick up multipliers and help each other if one could hear a station that the others could not. We always expected to need more geographical distribution around the UK



**PHOTO 1:** Some of the operators from 2016; Mike, G7TWC; Jamie, 2E0SDV; Simon, G7SOZ; Andy, MONKR.

on those bands and that is certainly an area for improvement.

"What do we need this year? Manpower! Specifically we need operators who are familiar with WinTest, or willing to learn it. Partner mode (for callsign stacking) is especially beneficial and if you don't have it we provide training events. It is a wondrous innovation when used correctly, which I hadn't until I joined the team. It takes working pileups to a whole new level when you work the next call off the stack.

"We also need a number of additional host stations, especially outside of SE England and especially on 160m (Beverage/RX loops are essential please) and 10m. On other bands some of our stations are just too close to Europe for HF. We need at least two stations per band mode, so we can partner and thereby work stations that one may hear but others don't. This is especially important on patchy bands like 15m and 10m, because propagation can be localised. In 2017 we want to have the best chance to hear and work anything that moves.

"If you can't operate or host, you are welcome to be a support station – one who help outs from home (or wherever) as a listener and feeds the network spots for whatever you hear on SSB (RBN takes care of CW).

"Another way is to be a partner station, meaning you listen to a run station and their pileup and post what you hear in the pileup to the partner window. In effect you are stacking callsigns for the run station to work. Technology

permits there to be multiple partners for a run station, indeed the more the merrier. Any band and mode assistance is welcome in partner mode. You may not be working stations (unless you are hearing better than the run station) but you will be providing a valuable service. For example, last year 20m SSB was very noisy and partnering was invaluable in assisting the run station work their pileup. It's a team effort and we move the run station around to where it is most efficient."

"How did the UK HQ team do? As every year, in 2016 we faced stiff opposition. We were up against the established multi-multi superstations of Germany, France and Spain. We haven't beaten them yet and are unlikely to do so this year. We usually come around fifth or sixth. In 2015 it was the surprise entry from Cyprus that took the title. 2016's results aren't out yet and aren't likely to be for some months yet, but it's the learning experience and fun to be had, plus the new friendships forged in the heat of battle.

"This year we hope to have you join us on the team, or at least see you in the log!"

If you're inspired to help, please contact Mike, G7TWC by email to [mjruttenberg@gmail.com](mailto:mjruttenberg@gmail.com)

**Steve White, G3ZVW**  
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- \* Yaesu FT-2000 HF Base Station Transceiver £1,499.00
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- \* Icom IC-775DSP HF Base Transceiver £1,399.00
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- \* Icom IC-756ProIII HF Transceiver DSP Audio £1,299.00
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- \* Icom IC-7410 HF Base Transceiver £949.00
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- \* Yaesu FT-897D HF VHF UHF Transceiver £499.00
- \* Elad FMD77 All Mode SDR Receiver £475.00
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- \* Alinco DX-SR8 HF transceiver HF, 100W all mode £429.00
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**Warranty Policy: 3 Months Warranty on all Used Equipment**  
(this does not include the final output stage)



# LF

## A series of QSO Parties on 472kHz took place in October and December.

The first QSO party took place on the weekend of 29 and 30 October and was to encourage activity in JT9 mode. HF digital fans may be familiar with JT65 but JT9 is a slower, narrow band version designed especially for LF use at poor signal to noise ratios. Written by Joe Taylor, K1JT – the creator of WSPR – it can be found in his WSJT-X package that is free to download and use on all popular operating systems. Like WSPR it uses time slots for receive and transmit cycles but it is a two-way QSO mode, not just for one-way beacons. You can send predetermined messages such as a CQ call or a report, or you can enter short messages on the fly that are then sent in the next transmit period.

Some considered that the activity for this event was a little disappointing considering the number of stations active on WSPR – who were obviously equipped for this mode by virtue of having the software installed! I think the short notice may have played a part, but in the event some good contacts were made. Chris, G3XIZ worked 14 stations and spotted another 3, including Greece and Romania; G3KEV worked YO2IS, DGORG, DL3ZID, DF1VB, LA3EQ and IW4DXW, while DF6NM logged 14 active calls including two Greek stations.

The next event was in QRSS on the weekend of 26 and 27 November. Conditions didn't appear to be as good and only about a dozen stations were active. Despite this, DK1IS worked 6 stations in 4 countries and reported that they were all such good signals that he could have worked them in normal CW!

The CW leg of the event took place the next weekend, 3 and 4 December, and we were able to announce it on the RSGB GB2RS News, which may have sparked a little more activity. I worked quite a few stations including G4GIR, G3XIZ, G7NKS, MOJXM, DJ6CB, DK7FC and G3XGW who was using a vintage Collins ART-13 set. DK7FC was his usual big signal and he worked 14 stations, as many as he had worked in the JT9 and QRSS events put together. His best contacts were with SV8CS and EA5DOM – whose signal was impressively strong in Heidelberg.

### 136kHz QRSS

Whilst all that was happening on the 472kHz band, G3XDV and DF6NM were running QRSS tests overnight on 136kHz. It seemed that 'one-hop' propagation to about 2,500km was good,

but the second hop required to cross the Atlantic was less successful. VO1NA in Newfoundland is the closest and he reported good copy from G3XDV and DF6NM, but signals at W1TAG, who is 40 miles west of Boston, Massachusetts, were less good. Laurence, KL7L in Alaska was also monitoring but didn't identify any signals from Europe.

### The ULF experiments continue

Stefan, DK7FC has been a long time winding his massive 4H loading coil (see photo right) but the results have finally paid off. He has managed to reach his goal of 100mA aerial current on 2.97kHz.

The first objective for the new setup was to be copied at his remote receiving station that is high in a tree 65km away from the transmitter site. Previous tests with smaller coils have given faint traces on the remote, but with the new coil an EbNaut signal to noise ratio of better than 22dB has been recorded. This is a greater than expected improvement and Stefan is optimistic that his ULF transmissions will reach even further this year. The first step will be to set up another remote receiver about 140km away and see if the signal gets that far. Paul Nicholson in Todmorden is also keeping a listening watch on the frequency.

### IC-7300 on MF

There are thousands of IC-7300 owners in the UK now, but I wonder how many have tried theirs out on MF? David, GOMRF has done some tests on his and makes the following observations:

*The receiver is around 17dB less sensitive at 475kHz when compared to 1850kHz. This is consistent with the 18dB difference necessary for indicating S5 on the signal meter. If the apparent 7dB higher background noise is real, then this increases to 24dB down when looking at signal to noise ratio. An IC-756 and many other radios have better MF receive performance than the IC-7300.*

Not brilliant on receive then, but nothing that a tuned preamplifier wouldn't cure. Interestingly, he found that the transmitter, once broad-banded, will work well down to about 700kHz. As he reduced the frequency further:

*At 640kHz the indicated SWR increases to 2:1 and as you continue to reduce the frequency the radio's automatic protection system begins to reduce the output power. At 630m the IC-7300 produces 10W output with a DC input of 7A at*



We love a loading coil picture and this must be the daddy of them all!

*13.8V. The indicated SWR is around 5:1 into a Bird 50Ω load. The RF output does need a dedicated low pass filter as the 3rd harmonic is only 18dB down on the carrier and everything up to the 5th harmonic exceeds FCC limits.*

From David's tests it would seem that with the addition of some low pass filtering, perhaps a pair of MOSFETs as a PA stage and a preamp on receive, you could quite happily use the IC-7300 directly on MF. No need to bother with a transverter if you have an IC-7300, but if you do need one there is a new product available from *Monitor Sensors*. The TVTR1 produces 50W on 472kHz and transverts from the 160m band. More info is at [www.monitorsensors.com](http://www.monitorsensors.com)

### PAOSE silent key

I was sad to hear that Dick Rollema, PAOSE died recently at the age of 86. Dick was a pioneer of the LF scene and always willing to help. I often worked him on 136kHz CW. He was an accomplished engineer and he wrote regular technical articles for the Dutch *Electron* magazine including many on LF. One of his most popular projects was a 136kHz field strength meter that can still be found on the internet.

**Dave Pick, G3YXM**  
daveyxm@gmail.com

Be witness to the evolution of KENWOOD's pride and joy - the TS-590S HF transceiver - pushing performance and technology to its utmost limit, with the receiver configured to capitalize on roofing filter performance and IF AGC controlled through advanced DSP technology. Enter the TS-590SG. A new generation of high performance transceiver, with the type of high level response to meet DX'ers needs.

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**Exceptional receive performance as supported by the Sherwood Engineering data measurements:**

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**Have you thought about remote operating?**

Used with software packages like 'Remote Ham Radio', the TS-590SG is a plug and play transceiver with its LAN port on the rear panel! This feature allows you to power up and use your transceiver over the Internet from anywhere in the world!



### HF/50MHz TRANSCEIVER TS-590SG

#### < Main functions of the TS-590SG >

- An even higher performance receiver with superior adjacent dynamic range.
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- New morse code decoder. Scroll display on 13-segment display unit. Characters shown in dedicated window on ARCP-590G.
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- New Split function (TS-990S-style) enabling quick configuration added in addition to existing Split setting.
- Transceiver equalizer configurable by mode.
- FIL A/B configurable independently with VFO A/B (convenient during Split operation).

\*Alterations may be made without notice to improve the ratings or the design of the transceiver.

\*The photographic and printing processes may cause the coloration of the transceiver to appear different from that of the actual transceiver.

[www.kenwoodcommunications.co.uk](http://www.kenwoodcommunications.co.uk)



# HF

**C**onditions are poor but the good news is it doesn't get much worse!

Conditions continue to be poor on the higher bands (15 and up) but there has been a lot of DX on 17m and down. There were a few days with no sunspots and with the solar flux index just above 70 – it doesn't get much worse than this but there will always be DX around. During the CQWW CW contest at the end of November the best bands seemed to have been 20 and 40 with some stations making more DX QSOs on the latter. M6T managed all 40 CQ Zones on 20m, 39 on 40m and 36 on 80m. They even found 11 Zones on 10!

The end of the year saw the final results of the Chiltern DX Club DX Marathon. It looks like the UK joint leaders are G4PTJ and MONKR with 273 DXCC entities worked during 2016. G5LP was in 3<sup>rd</sup> UK position with 267. Overall winner was PY5EG with 283 and Gary, ZL2IFB managed an excellent 274 from New Zealand. CDXC runs two other annual challenges: the LF Challenge on 160-40m during March that was won by G5LP with 147 entities; and the HF Challenge on 15-6m during September that was won by M0BCT followed by G5LP and G3LDI. Full results are available on Club Log. Why not enter one of these events in 2017?

## QSL cards

An increasing number of DXpedition operators are deciding no longer to pick up cards from the bureau system. They do not need the incoming cards for their collections and would much prefer people to use an Online QSL Request System (OQRS) – like the ones provided by Club Log and various QSL Managers. OQRS works for either bureau or direct cards and the DX operator can set an appropriate fee that will, in almost all cases, be cheaper for applicants than the alternative bureau or postal options.

According to Michael, G7VJR, the founder of Club Log, there have been around 330,000 direct QSL 'checkouts' on the system so if we assume each of these avoided around \$3 in stamps, envelope, outgoing card etc, then the saving from using Club Log for direct cards is somewhere around \$1M. That's quite impressive and ignores any of the extra savings from avoided outgoing bureau cards.

Before sending any QSL card, via the bureau or direct, people should check whether the intended recipient prefers to use an OQRS system. If they do, then under no circumstances should



Lionel, G5LP, winner of the CDXC LF Challenge 2016 (and in top 3 of the DX Marathon and HF Challenge).



Andy, MONKR, joint UK leader of the CDXC Marathon 2016.

they send a bureau card as well. QRZ.com, Club Log itself and the various DX bulletins are a great source of information about QSLing preferences.

The deadline for IOTA submissions for the next Honour Roll and Annual Listing is the end of January.

## IOTAs

Four US operators will be transmitting from Raivavae Island (OC-114) in the Australs from 13 February to 3 March. They will be using K3s and amplifiers with Hexbeams and Spiderpole verticals. Activity will be on CW, SSB and RTTY on 1.8 to 28MHz.

David, ZS1BCE should be on the air by now as ZS8Z from Marion Island (AF-021) and he expects to stay for about 17 months. Let's hope he will be able to put up a decent antenna and reassure the authorities that HF aerials will not kill off the local bird population. There is a very interesting document by Chris Burger, ZS6EZ on this subject at <http://zs6ez.org.za/download/zs8-ant.pdf>

Warwick, E51WL has been active recently on JT65 from Penrhyn Atoll (OC-082) in the North Cook Islands, especially from 1200-1600 and 0000-0800UTC.

Francois, F4HLT/FT3YL is scheduled to be at the Dumont D'Urville French Antarctic base on

Petrel Island (AN-017) about now though his radio gear may not have reached him yet. His blog is at <https://f4hlt.wordpress.com/>.

Oleg, ZS10IN should be active as RI1ANA from the Molodezhnaya Research Station in Antarctica (AN-016) until March.

Yath, JG2MLI will be active as 8J1RL or 8J6QJARE from Showa Base on East Ongul Island (AN-015) in Antarctica until January 2018. Yath will be on CW, SSB and digimodes from 40-10m.

A large German group will be QRV as XX9D from Macao from 13-26 February. Their QTH is apparently on an island counting for AS-075. See <http://xx9d.mydx.de/>.

Stan, K5GO will be active from the Cayman Islands (NA-016) from 22 January to 23 February. He will be active, high power, in the CQWW 160m Contest and will go low power for the ARRL CW DX Contest. Between the two he will also focus on 160.

There may be some ZC4 activity (AS-004) until 24 January by G0SGB (ZC4SB), G4IAQ (ZC4JB) and G4IAR (ZC4DB). Check 20m around 14260 but they may also be QRV on 80/40.

The Puebla DX and AREPAC clubs plan to be active from time to time during 2017 from NA-221, Isla de Lobos, and various NA-224 islands using the call XF2L. The ops are XE1SPM, XE1SGW and XE1SOV.

Atsu, 5W1SA has moved to a new QTH and his first activity from there was in the CQWW CW contest. The new QTH is 700m ASL in the middle of Upolu Island (OC-097). He has inverted V dipoles for 80, 60 and 40m. He says he will put up Yagis soon. He has been heard in the UK on 80 and 60 around 0700-0800UTC.

HI1UD will be active with a large group of ops from Beata Island (NA-122) in the Dominican Republic, from 22 January to 1 February on 160-6m.

Erwin, PY2QI will be QRV /PYOF from Fernando de Noronha (SA-003) from 15-21 February with a 100W K3 and Buddipole for activity on CW only on 40 to 10m.

Sho, JA7HMZ will be QRV from Pohnpei (OC-010) as V63DX from 17-24 February. He'll be V6A during the ARRL International DX CW Contest and will be looking for Europe on 160m outside the contest.

## Other DX

Dave, AB0GC will be QRV for a while on 14-28MHz with an FT-450 using the callsign 9G1SD while working as a teacher in Ghana.

Harald, DF2WO, will be QRV as 9X2AW starting in February 2017.

## Correspondence

Peter, G4XEX has been continuing to work DX with his picnic table antenna and notes that conditions to Africa and the Caribbean have been reasonably good. He found: on 15m CW – HI3CC, ZD8W, ZF2MY, TL8AO; 17m – 7P2Q, VP5/W5CW, FS/N9TK, FS/K9NU, PZ5RA; 20m CW – VP5/VE7ACN, PJ4/KA4BAI, VP5/W5CW, KP2Q, VK6LW, J70BH, 9Y4/VE3EY, 5K3W; 20m SSB – 7TOA, 3DA0TM, 5T5TI, J68GD, HS70A, ST100S; 20m Data – 6W/UA4WHX/P, C50VB.

Ken, CT7AGZ achieved a higher DXCC score in 2016 than 2015 despite poorer conditions, thanks to his new Hexbeam (pictured in *RadCom* a few months ago). He found: on 17m – 9K2MU,



George, G4PTJ, joint UK leader of the CDXC Marathon 2016.



Roger, G3LDI, who took 3rd place in the CDXC HF Challenge 2016.

KP4JRS, UP25KZ, 6W/UA4WHX, VP5/VE7ACN, ZS1EL, HI3TT; 20m – V31MA, KP2Q; 30m – VP5/VE7ACN, C50VB; 40m – 6W/UA4WHX, OY1CT, C50VB; 80m – P4/DL6RAI, PZ5RA, XE3ARV, C31LK, 7X4AN.

Gordon, G3PXT was very busy on 7/14MHz and it would appear the two bands were equally good for DX: on 20m – 9J2HN, FG4PK, HK3W, LU1WI, LU2BN, YV5MBI, 7X2VFK, 7Z1HL, 9Z4JAG, BG8GAM, BV2LA, C5FUD, C5YK, CE4SFG, CX7BBR, DU2UXH, FG4PK, FR40M, FJ/KO8SCA, HC7AE, HK4DAN, HR1LW, J68GD, J73WA, many JAs, KP2Q, PYs, many VEs and Ws, VKs, VP5/W5CW, VP8ALJ, VR2XMT, VU2EKJ, XT2AGI, YBs, YVs; and on 40m – 3B8CW, 3B8IK, 4X1FQ, 3X1KS, 4X1SK, 7X4MW, 7Y9SE, 7Z1HL, 9K2OD, 9M2KDX, A61s, West Coast USA, BG9XX, BV2FB, EA9KB, FK1TS, FR40M, HB0/DK4YJ, HK1F, JAs, JY9FC, KP4RP, LU1MBK, LU8ENU, OY1CT, PYs, TI2EMG, TR8CA, VK2GDF, VK2VCC, VK3VGB, VK4YMB, VK7BO, VU2ABS, VU2WJ, YC1CWK, YC4CHP, YE5TA, YI3WHR, YVs, many ZLs and ZSs, ZP9MCE.

Peter, G3HQT just managed to reach the 200 mark on CW before the gales broke his antenna support but he noted that the ionosphere was nearly worn out by the end of the year. He found: 20m – FJ/KO8SCA, HR2/AJ9C, ZD8W; 30m 5T9VB; 40m – 8Q7DV, HS0ZAR, TI5W, 8R1/AG6UT, C50VB.

Fred, G3SVK focussed on 40m but found life up to 17m: on 17 – ZL1AGY, VP2ESM, VE3DZ/KP4, 9Y4/VE3EY; 20m – VP2ESM, V26K, PJ4/K4BAI, A47RS, KP2Q, PZ5V, CW5W, 9Y4/VE3EY, 8P5A, A4M, P40C, 7Z1HL, ZD8W, VP2VI, FY5KE, KP2M, PJ4/KU8E, 5T5TI, C5GCJ, FS/W9Ily, TZ4AM, 9K2NO; 40m – ZL1ALA, 6V1IS/P, S01WS, CX2AQ, FY5KE, 4J8YL, ZL4YL, ZL2AZ, V26K, SU9JG, ZF9CW, VP2ESM, 5B4AJC, VK6NC, PZ5V, 8Q7DV, KP2Q, HK1NA, PJ2/KB7Q, BG4GOV, 6Y3T, VP5/W5CW, PJ2/NA2U, A61EK, PJ4/W4EF, 6Y9X, PJ4A, 5Z4/DL2RMC, P40C, PJ4Q, 6Y8X, A71EM, KP2M, A65CA, 3V8SS, ZF2MJ, JY9FC, A92GE, CX1AA, PJ2T, 3B9HA, A45XR, XW3DT, YE1AR, YN2SX, J70TO, VU2GSM, HK1X, 5T5TI, J6/KI8R, FS/W9Ily, CE2AWW, FS/K9EL, C50VB, VP5/VE7ACN, C5GCJ, PJ4LS, 6W/UA4WHX/P, OD5NJ, TZ4AM, ZF2WE, EA9HU, RI1AND, 4JRA29, D44VTB.

## Finally

Thanks as always to my correspondents, to DX-World, 425 DX News and Daily DX.

**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
MONKR	179	243	76	273
G4PTJ	221	139		273
G5LP	263	78	206	267
G1XOW		248		248
G4IDL	210		79	213
G3SVK	213			213
G14DOH	208	34	81	211
CT7AGZ	205	3	14	206
G3HQT	200		71	203
G0RPM	131	70	136	202
G4XEX	124	130	103	185
G3PXT	86	109	157	178
G4CCZ	133	70	58	160

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# VHF/UHF



A nighttime view of Western Europe captured by crew members aboard the International Space Station. England is visible in the top right of the frame; Paris is the bright city near the middle of the image and views of Belgium and the Netherlands occupy the middle-right of frame. Photo courtesy of NASA.

## **A**n unusual first contact on VHF via the International Space Station.

Thankfully for most in the UK, the severe storms that swept the country in 2015 didn't materialise in 2016 until just before the Christmas break when storms Barbara and Conor made an unwelcome appearance. All in all stations reported at least some good activity during December 2016, which included the Geminids meteor shower giving fairly reliable reflection rates and the ability to keep antenna systems in the air unlike in 2015. There were two excellent tropo openings during December in the first week of the month and again between Christmas and New Year with an intense wide area of high pressure following in behind storms Barbara and Conor to provide excellent propagation on VHF and UHF. The high pressure area spanned from Spain right across Northern Europe in to the Baltic area including UA2 (Kaliningrad) and Scandinavia. Favouring stations in mid-southern locations of the UK, the RSGB Cumulative contest on 29 December gave the chance to work excellent DX with distances

over 1100km on 2m and 70cm from Sweden and Spain showing the widespread nature of the opening. Some winter Sporadic-E (Es) conditions also developed during December just before the 6m section of the Christmas Cumulative contests began.

### VHF scatter via the ISS

Contacts with the International Space Station have been made for many years. At the RSGB Convention in 2015 many will remember the lecture given by John, G4SWX in which, after the expedition by VC1T to try and make the link across the Atlantic on 2m, it was concluded that the reflections received at G4SWX were actually either fully or in part via the ISS, which with the large array of solar panels provided an excellent passive reflector. Thanks to Tim, G4LOH (IO70) for reporting further developments using this technique as follows: on 15/12/2016 I managed to complete a QSO on 144MHz via ISS scatter completing at 1553UTC with RN6MA in LO06uq at a distance of 3427km. Reports of 'O' & 'RO' were exchanged using 144.175MHz on CW at 15wpm. This was an intentional sked set up to

track the ISS and use it as a reflecting medium. On the RST scale, RN6MA's signals peaked about 529 at G4LOH. My antenna system is 4 x 16 element (IOJXX) and RN6MA was using 2 x 14 elements both running high power. During the QSO, RN6MA was also heard at EI3KD, 3605km, using a single 11-ele Yagi. I had heard signals several times before on the path to VO1FN and in both directions with Alex, RZ6DD (LN04mx) but RN6MA is my first completed QSO. No antenna tracking was available at G4LOH; both stations aimed at the half way point where ISS rises (sets), giving a 'window' of about 2 minutes. Calculations were made using the difference between AOS and LOS for each station to show the window. The best orbits can be identified by finding an ISS orbit that passes high overhead the halfway point between the stations. My plan for 2017 is to add automatic tracking: perhaps at shorter ranges the inverse-square law effect will make signals significantly stronger. The AMSAT-UK website gives further information on the position of the ISS and all current amateur satellites [1] and there's a feature on working packet and other modes via the ISS on page 30 of this edition of *RadCom*.

## Correspondence

Lyn, GW8JLY (IO81) is most certainly one of the most active stations on VHF in the UK, being active most days testing propagation paths via meteor scatter and tropo. Lyn says "I have noticed over recent years that all the forms of propagation available to keen 2m DX hunters has been in slow decline. By far the biggest decline I have seen is in the number and quality of tropo openings. I just don't see the very intense openings that were often seen here in previous years. Those that do occur seem to favour those living on high ground and those living close to the sea. Of course a high QTH and a sea takeoff has always helped but even those living at QTHs such as mine (about 90ft ASL and with no sea nearby) used to see very good openings several times each year, particularly in the autumn. In those openings I could work many stations at very strong signal strengths. In the openings we see now, each opening is nearly always very 'patchy' and although I am sure many stations are QRV, I don't work too many and signal strengths are usually weak.

"Auroral openings are certainly not as good at my latitude either. It's now rare for me to work stations outside the UK. Admittedly I use SSB, which does make working stations much harder but in past years, working long DX using SSB in an aurora was quite easy. Gone are the days when I could work several Spanish stations in these events.

"As far as Es events at 2m are concerned, again these seem less intense and of lesser quantity as those of a few years ago. Most recent events have been comparatively short and very selective. I can remember 2m Es events a few years or more ago lasting for over 3 hours with end stopping signals for hour after hour. What has happened though is that the 'summer' Es season at all frequencies has 'stretched' and begins earlier each year and ends very much later. This year (2016) the 'summer' season went on and on and on, right through October, into and up to the end of November and I even saw a report of someone seeing 6m Es as late as 1 December. That opening does seem to be the final event though and no more Es has been noticed here since.

"Some of this decline could be due to global warming or maybe the lack of sun activity but what I find strangest of all and can't be put down to either of those factors, is the decline in the quantity of random meteors entering the Earth's atmosphere and thereby creating the short trails of intense ionisation that we need to complete meteor scatter QSOs. MS QSOs, outside major showers, usually take much longer now and are more difficult to complete, at least with a small station setup such as mine. Additionally even the major meteor showers are not as good as in previous years.

"I would certainly like to see what other readers think about this – maybe they agree with my view or maybe they disagree.

"On a positive note I worked another new rare

'wet' locator on 1 December in a MS QSO with Martin, GM6VXB/P operating from an oil platform in JO08AI. That was the 4th new 'wet' one in just a few weeks thanks to Martin's efforts. The others were JO07, JO17 and IO98. Unfortunately I failed to work him when he operated from IP60 despite several attempts as that locator is in a very bad direction for me – I am badly shielded by high mountains to the North West."

Peter, G3SMT (IO82) tells me, "In the first tropo opening in December after listening to the usual European beacons that were rather loud I heard the Berlin and Southern Scandinavian beacons so decided to call CQ. I was rewarded with calls from many stations in Northern Europe including PA, PD, ON, DC, DH, DJ, DL, DM, DO, and HF. Locator squares worked were JO21, 22, 31, 32, 40, 42, 50, 51, 60, 64, 73, and JN 49, 59. Stations over 1000km were DK1FG at 1053, DM4EE at 1064, DC1NNN at 1093 DH6bqa at 1156 and ODX was HF1D at 1182km. It was interesting to note that the duct provided strong signals of S9 +20dB and enabled many low power stations using simple antennas to be easily worked. The non UK list was DL1GI (JN49), DK1FG (JN59), PA3EGH, PD1AHM, PE1HNT (JO21), PA3EKE, PD7RF, PE1GUR (JO22), DO5HNL, DL5EBS, DL4APB, DO7JVV, DL6YBF (JO31), PA0DDB, PE1BIW, PD4HDB (JO32), DL8DAU (JO40), DJ7YP (JO42), DH8NAS (JO50), DJ6AG (JO51), DC1NNN (JO60) and DM4EE in JO64KE."

Mike, GM3PPE (IO85) reports, "The Geminids meteor shower on 13/14 December was my first experience of meteor scatter since coming on to six metres. What an experience, with reflections often exceeding +10dB over background noise, and lasting 5 to 10 seconds. Everyone seemed to be using the new MSK144 mode from WSJT-X, with the calling frequency of 50.280MHz constantly occupied with such strong signals that many QSOs were completed away from this frequency. I heard and completed with many stations in the UK and Ireland including GM8OEG (IO86), GI4OWA (IO64) and EI3KD and EI4DQ, both in IO51. Further afield strong reflections were coming through from Germany, France, Belgium and Scandinavia, completing QSOs with DJ9YE (JO43) and LA9NKA (JP20). I sat watching the spectral display on my computer into the wee small hours, fascinated by the strength and duration of signals coming from all over Europe. Roll on the next shower!"

During the extensive opening in late December John, G4SWX (JO02) worked OH1ND (KP00XL) on CW with 529 signals each way at 1552km. John has also noticed the number of UK amateurs giving EME a try, which is really encouraging. It won't be long before there are 10 active stations in JO02 alone. John also worked Keith, G4FUF as XV4F (OJ39ew) in Vietnam a couple of times but failed to work Keith and Ian when they went out to another square. His main array was down due to high winds so was only running one Yagi.

Nick, G4KUX (IO94) was active in the Geminids and made several good contacts best being RA1TL in KO67 at 2178km. "It is getting

difficult finding sked partners now at the right distance but new stations keep popping up in east Europe with decent setups. Noise is the main problem at the QTH these days especially after dark when the street lights are on while turning the antennas from 60 to 240° through south. The two main noise sources are sodium street lights, which Nick is endeavouring to have fixed. Fortunately, having four antennas allows him to put the noise in nulls, which helps somewhat. At least this autumn/early winter Nick has been able to keep the tower upright, unlike last year when it spent a lot of time tilted due to the succession of storms.

Gordon, G3PXT (JO02) has been putting his new Expert 1.3k amplifier to good use on 6m with 50 QSOs in the log for December 2016. Calls worked included GU8FBO, EI4DQ, EI7BMB, SP2HMR, SP3OCC, SP3UR, SP7VTQ, SQ8BGR, 3VWK, I6WJB, GM4KLN, S68J, SA7C, SK0TM, SM5EPO, SM7CAD, HB9FX, HB9RUZ, OE5MBL, EA6VQ, ON3CF, ON4IQ, OZ1DJJ, DF6HT, DK5SO, DL4KUG, DL5DSM F1RHS and F4AZF. Gordon has found the new mode MSK144 very effective making meteor scatter QSOs. All these contacts and more were made with a 2 element Innov Quad antenna fixed to the south east in his willow tree that has, thankfully, shed its leaves for the winter. Gordon is looking forward to 2017 seeing if he can surpass his 2016 results of 56 DXCC entities and 863 QSOs.

Ray, W2RS sends along his congratulations to MOABA, HB9Q and DL7APV on their 70cm EME QSOs with the 2-ele Yagi as reported last month. He would like to put in a claim for what was possibly the smallest-antenna EME QSO on 144MHz. On 25 July 1992, Ray worked Gary, KB8RQ with 150 watts to a 4-ele Yagi, a Cushcraft A124WB with 8dBd gain, EIRP approximately 1.5kW. Gary was using his then EME array of 24 x 19 element Yagis. At the time, Ray was at his New Jersey QTH, and the path geometry was such that both stations benefited from ground-reflection gain. If this was a record for the smallest 144MHz EME antenna, then Ray doesn't expect it to hold up very long as the QSO was made using CW. JT65 hadn't been developed yet! Let's see how long it takes for someone to beat it. Thanks Ray very good to hear from you.

## Sign off

Thanks to all the reports this month and the comments and also an actual written letter from Stuart, GW3XYW, which was wonderful thanks.

## Websearch

[1] [www.amsat.org/track/](http://www.amsat.org/track/)

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# GHz Bands

**T**he end of 2016 brought some notable activity on the millimetre and nanowave bands and on GHz EME. These areas of our branch of the hobby seem to be buzzing with interest recently and I invite readers to consider tackling the technical challenge of EME and the bands above 24GHz. You'll find the people already active will welcome and guide you in setting things up.

## Nanowave infrared world record

On 2 November Barry, G8AGN/P and Gordon, GOEWN/P worked Richard, GORPH/P over a 102km path using 850nm infrared (IR) light for what is believed to be a world first over 100km at this wavelength. **Photo 1** shows G8AGN's IR equipment. G8AGN and GOEWN were operating from the car park close to the Holme Moss TV transmitter site near Holmfirth and GORPH was operating from Claxby in Lincolnshire. Signals using 850nm were very much stronger than those received using more powerful Phlatlight red light LEDs at 625nm. The IR signal strength was remarkably high but with evident QSB that was most noticeable when listening to a steady tone, sounding almost 'bell-like'.

## Millimetre-wave activity

On 18 November Chris, GOFDZ and G8CUB made a 122GHz contact over a 1.76km path, improving on their first contact of 120 metres. Signals were S7 / S9, showing a few km should be possible. TX powers were 65µW and 300µW, using a 4" dish and 150mm horn respectively. Procom dishes were used on receive.

## More GHz bands EME 'firsts'

The start of December brought a flurry of GHz bands moonbounce (EME) activity generated around the DXpedition to Palestine by DL2NUD and DF8DX. Using the calls E44HP and E44QX, with just a 1.5m dish, they made over 100 EME QSOs on 1.3, 2.3 and 3.4GHz. They were a fine signal here on 2.3GHz but suffered badly with WLAN interference from a system on the hotel roof, so didn't hear the signal from my 1.9m dish. Some Notable UK-E44 'firsts' were the 1.3GHz JT65 contact with G4CCH and a CW contact with G3LTF, who also made the 3.4GHz 'first' on CW. The day after the DXpedition ended, Peter got another 'first' from the UK on 5.7GHz by working



**PHOTO 1:** G8AGN's world-record breaking infrared equipment (photo: G8AGN).

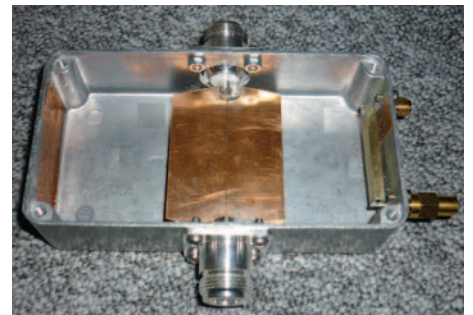
KL6M on CW. G4CCH and G3LTF now hold 51 GHz bands 'firsts' between them, going back to G3LTF's earliest, a 1.3GHz Tropo contact with OZ5AH in 1967!

## 1.3 and 2.3GHz coupler/monitor

I recently to blew up the cheap eBay-sourced 100W directional coupler that I used on the output of my 1.3GHz 400W SSPA. I got away with it until I decided to do some JT mode operation with one-minute overs. My attention was drawn to the always-excellent website of Paul Wade, W1GHZ and an article [1] [2] describing easily-built couplers capable of handling QRO. **Photo 2** shows the one I built. It has less than 0.2dB insertion loss and coupling factors of 45 and 40dB at 1.3 and 2.3GHz respectively, with better than 20dB return loss. Combine this with a pair of simple Schottky diode detectors and the guts of an old dual-meter CB SWR bridge and you have a very nice SWR indicator for 1.3 and 2.3GHz.

## Beacon news

Ofcom has now approved a 1.3GHz beacon to be located alongside the GB3NGI cluster at Slieve Anorra in Northern Ireland. The equipment to be installed will be based on the Next Generation Beacon platform provided by Bo, OZ2M [3]. The series of boards produced by Bo and his



**PHOTO 2:** W1GHZ-designed 23-13cm coupler.

team have successfully been used for a number of other beacons and are versatile enough to be used with both CW and digimodes. I'm looking forward to news of a successful installation in due course. Current plans from beacon keeper GI6ATZ indicate a summer 2017 switch on.

The University of Kiel 10368.025MHz EME beacon DLOSHF [4] is back in operation. Running 40W of CW and JT4F to a 7.2m dish with a vertically polarised Cassegrain feed, it should be receivable on a 1m or smaller dish and a modified LNB. Remember that it uses VERTICAL polarisation, the EME standard for Europe, so you'll need to rotate your terrestrial feed by 90°. Remember also that the Doppler shift on the EME path at 10GHz can be more than  $\pm 22$ kHz, so care will be needed both with pointing and tuning. Use an SDR panadapter to help you. The beacon is operational from Keil moonrise to moonset on all days when the Moon gets above 20° elevation in Kiel. The VK3UM EME planner [5] will enable you to predict the elevation at Kiel and also at your QTH. Tony, G4CBW is already receiving the beacon well, and I hope to report hearing it very soon. I'm currently setting up a system using a 60cm 'Northern' Sky dish and a 432MHz downconverter feeding a FUNcube Dongle Pro Plus and a laptop running SDR# [6] and WSJT-X.

## Websearch

- [1] <http://bit.ly/2gSRkv2>
- [2] Dubus 2/2010
- [3] [www.rudius.net/oz2m/ngnb/](http://www.rudius.net/oz2m/ngnb/)
- [4] <http://sat-sh.lernnetz.de/>
- [5] [www.vk3um.com/eme%20planner.html](http://www.vk3um.com/eme%20planner.html)
- [6] <http://airspace.com/download/>

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 <b>Yaesu FTM-400DE</b> <b>£497.95</b>	 <b>Yaesu FT-857D</b> <b>CALL</b>	 <b>Icom IC-7700</b> <b>CALL</b>	 <b>Icom IC-7851</b> <b>£9999.95</b>	 <b>Kenwood TS-2000e</b> <b>£1279.95</b>	 <b>Kenwood SP-23</b> <b>£74.95</b>
 <b>Yaesu FT-DX-5000 Series</b> <b>CALL</b>	 <b>Icom IC-7300</b> <b>£1199.95</b>	 <b>Kenwood TH D-74E</b> <b>£599.95</b>	 <b>Kenwood TMV-71</b> <b>£299.95</b>		



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E&OE



# International Young Ladies Convention

**B**etween 3 and 10 October 2016, thirty ladies and nineteen gentlemen met for an International Amateur Radio Convention. What a wonderful time we had!

Carol, 2E1RBH, the BYLARA chair, had organised a welcome display in the main reception area of the Novotel Hotel in Milton Keynes. The area was marked with colourful display boards, flowers, confectionery and had ample seating for initial chats and paperwork. Hazel, G7RGI was allocated the job of 'meet and greet'. This she did with aplomb; resplendent in her purple suit, matching hat and BYLARA sash – nobody could miss her!

Name badges were laid out, so that we all had the opportunity to learn each other's names before they became 'second nature'. We were delighted to welcome YLs from Australia, Denmark, England, France, Germany, Iceland, Scotland, Sweden and the USA, pleased that they had made the effort to join us.

At the same time, Jenni, MOHZT was enlisting ladies to sign a 'square'. Jenni loves to quilt, as a hobby and made 'squares' for each of the ladies in colours that reflected their national flag. Maureen, G8GKR distributed special editions of the BYLARA magazine, marking our event.

The convention was billed as 'YL', but there were gentlemen with us, of course. They were mostly husbands, but there was one son.

We had been promised an area in reception that we could use for GB16IYL. Unfortunately, the sealed window units in reception prevented this and an alternative had to be found. We set up a station in a member's motorhome and this was used throughout the Convention when we were in situ.

That evening, we started getting to know one another. The next day was set aside as a 'settle in' day. We were aware that some of us are no longer as young as we used to be and thought this would be a good idea. How wrong we were! We had failed to take into account that this group of people were quite capable of navigating the world with ease and were not so easily restricted to a small hotel in Milton Keynes! So some went to London, some to Oxford, others to Stow, the especially



Feeling the joy of a great day together and excitement about the first talk.



The 'Meet and Greet' experience.

brave navigated their way on foot to the Milton Keynes Shopping Centre – quite a trek!

Wednesday was a more orderly affair. The coach arrived at 10am to take us to Bletchley Park. This was a tremendous hit! The party split into smaller groups, for ease of movement, coming together for a guided tour at 2.30pm. We all were aware of the enormous significance of the place and were extremely grateful for the opportunity to visit it. The weather was glorious and we enjoyed strolls around the beautiful grounds. Each group, in turn, visited GB3RS within the National Radio Centre and were very impressed by the quality of the equipment and the warmth of the welcome. I connected with friends on the Worked All Britain net, a group set up to promote knowledge of Britain's geography and administration.

That evening, we were treated to a demonstration by the Shetland contingent.

Nicky, MM5YLO and Tony, GMOGFL gave an impressive talk, with Peter, MMONQY and Gail, MM6YLO supporting on the side lines. We had a virtual tour of the islands, visited their house and the lighthouse that Nicky cares for and we were encouraged to try 'puffin poo', a local delicacy and a bit of a joke.

The following morning we visited Woburn Abbey. The coach ride was relatively short, giving us longer to enjoy the venue. Again we separated into smaller groups, to wander the house and grounds, coming together to enjoy a 'quintessential cream tea' in the Duchess's Tea Rooms. Much merriment was enjoyed around the table and the food tasted wonderful. The fresh strawberries were the sweetest that I have tasted all season. After that, we moved outside to pose for an assortment of photographs for the archives.

Thursday evening's talk was given by the Icelandic ladies Anna, TF3VB and Vala, TF3VD. Anna is a teacher, and it showed. We



The OM's at Woburn Abbey with Jenni, MOHZT, Judith, G4IAQ and Carol, 2E1RBH.



Judith, G4IAQ checks into the Worked All Britain net using GB3RS at Bletchley Park.

also enjoyed slide shows, made by Dieter, DL7FAT and Hardy, DL3KWF. The theme was the IYL Convention held in Iceland in 2014. Their friends were treated to home-made food sessions, Morse key making, apron signing (by all, for each person), visits to waterfalls, volcanoes, hot mud pools, continental plates, Jacuzzis, emergency service hubs and so much more. Visitors also met the President of Iceland in his official residence, a great honour. Anna and Vala rounded off the evening by distributing personalised bags of gifts to each of us. Thank you ladies!

Friday was another 'free' day. Many decided to stay in Milton Keynes and explore the local museums and parks, but Waddeston Manor, RAF Duxford, London, Oxford and Cambridge were amongst the places also chosen. Four of our Swedish contingent went to Cambridge, seemingly a good choice, but sadly Anita, SM6FXW tripped on a loose piece of pavement and broke her arm. This meant an emergency taxi trip back to Milton Keynes and an overnight hospital stay. We were all horrified.

Friday night (minus Anita) was given over to three separate organisations. Dot, VK2DB gave us all a detailed overview of the upcoming YL meet in Australia in 2017. First class accommodation will be available and wonderful trips booked. A welcome was extended to everyone present. Details will be on

the ARALA website. Dave, G4IAR gave a talk on Worked All Britain (he is the Treasurer and Awards Manager of WAB and my husband). He was asked to do this at very short notice, but coped admirably. Finally, Anne, WB1WAO narrated a slide show on the 75<sup>th</sup> Anniversary Celebrations of YLRL (Young Ladies Radio League), the American Association for Young Ladies. This is a great organisation, who sponsor scholarships for deserving students as well as supporting their established members. We were impressed by the fine gowns, plush surroundings and Anne's remembrance of everybody's name and callsign.

Saturday brought another coach. This time to Kents Hill and the RSGB Convention. Carol, 2E1RBH and her husband Rob, GORYL had already set up a display in the lounge. We had been provided with ample chairs and tables to create a cosy atmosphere and Pete, G4LKW was on hand to assist with any membership queries. The IYL party settled to enjoy a variety of lectures, lots of coffee and a relaxing chat.

Saturday night was our Gala night and we all dressed up to celebrate. The tables were laid with candles and flowers, with rose petals strewn around. Gold napkins and table runners completed the picture.

Tony, GMOGFL would be hitting the grand age of 60 the following day and Carol, 2E1RBH decided that the occasion should not



Elaine 2E1BVS and Judith G4IAQ with the IYL Wall Hanging, representing each YL and their country of origin.



Anita, SM6FXW's autographed cast.

go unmarked. She arranged for a lady and gent 'scarecrow' to appear at the opportune moment and for a comical card to be presented. Later in the evening, candles were lit on a hidden cake (not very well as the candles didn't want to light and I had to stand there with an increasingly poor attempt at a straight face, trying to hide what was happening behind me). The result was more fits of the giggles and smiles all around the room.

Sunday was our last full day and some people decided to take time out from the Convention, so a smaller party headed for Kents Hill. The opportunity came to view more of BYLARA's history, via our laptop, and Kirsten, SM5EUU assisted in the assembly of the wall hanging. We made sure that we supported Carol, 2E1RBH in her lecture on BYLARA. There were many people there and (at Carol's request) suggestions were made for the future.

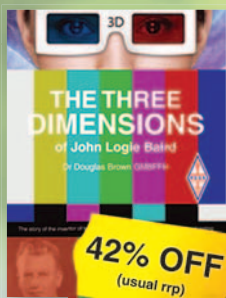
That evening we had our final dinner together and were showered with gifts and kind words.

Monday morning, we kissed and hugged and said goodbye – until the next time.

We made lots of new friends, met some delightful people who were full of smiles and kind comments. Thanks to everyone for making this such a successful IYL Convention – members, visitors, the RSGB, the Novotel and our raffle sponsors.

**Judith Brooks, G4IAQ**  
judith.brooks@ntlworld.com





## The Three Dimensions of John Logie Baird

By Dr Douglas Brown, GM8FFH

John Logie Baird (1888-1946) is remembered as the inventor of television,

but his work in colour, 3D and holographic television is much less well known. As are his contributions to other information sciences and their resulting technologies. *The Three Dimensions of John Logie Baird* sets out this work and adds a perspective not seen before to the story of this great inventor.

*The Three Dimensions of John Logie Baird* details Baird's story from his early years through, to the early development of television. He planted the seed, which has grown into a multinational, trillion dollar video and communications media industry.

*The Three Dimensions of John Logie Baird* is a fascinating read, providing a reference work on his inventions, an insight into the world of television and shows just how much we owe this great inventor.

Size: 174x240mm, 208 pages

ISBN: 9781 9050 8679 5

**Price: £9.99**



## The Birth of British Radar

*The Memoirs of Arnold 'Skip' Wilkins*

Edited by Colin Latham and Anne Stobbs

Arnold "Skip" Wilkins is one of the unsung heroes of the British effort to develop radar. *The Birth of British Radar* book combines the memoirs of Skip with an overview of the historical importance of his work.

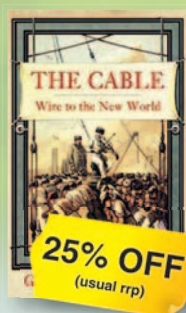
At the core of *The Birth of British Radar* are Skip's memoirs of his involvement in the British radar (or, as it was then known, radio direction finding, RDF) programme from its very inception in 1935. Working under the direction of Robert Watson-Watt, it was he who proposed using radio waves, bounced back from an enemy aircraft, to detect its position.

This book describes the struggles and triumphs from the earliest days of radar, in one of the most important periods in British electronics development, highly recommended.

Size: 174x240mm, 128 pages

ISBN: 9781 9050 8675 7

**Price: £9.99**



## The Cable

*Wire to the New World*

By Gillian Cookson

*The Cable - The Wire to the New World* is an updated special RSGB edition that has been produced in conjunction with History Press. This is the compelling story of how the first transatlantic communication cable was laid, the trials, the successes and the failures involved.

*The Cable - Wire to the New World* tells the story from its earliest beginnings, the technical challenges faced, the disasters and even the technical failures that ensued. Many people who dared, the people who lost, and the people who profited are detailed here in this fascinating story.

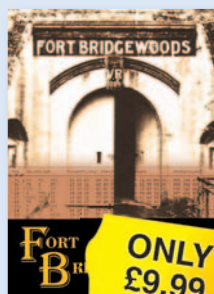
For those interested in the technical challenges that faced the mid nineteenth century communication pioneers *The Cable - Wire to the New World* is a fascinating read and thoroughly recommended.

Size: 125x198mm, 192 pages

ISBN: 9780 7524 8786 1

**Non Members' Price: £9.99**

**RSGB Members' Price: £7.49**



## Fort Bridgewoods

*From Victorian Fort to WWII Y Station*

By Stephen G Small, G4HJE

A Victorian Fort that was obsolete before the last stone was laid, yet became one of the most secret places in the realm. Here the developing science of radio became a vital weapon of espionage and war. Without the work of its civilian intercept operators, Bletchley Park may well have failed to break the Enigma code and the allied intelligence advantage may have been lost.

*Fort Bridgewoods - From Victorian Fort to WWII Y Station* sets out this fascinating story from its building to its final closure in 1968.

*Fort Bridgewoods - From Victorian Fort to WWII Y Station* provides an insight into the operational work of this 'Y' station and its part in WWII. If you are interested in the radio interception technology of WWII and its pioneers this book is a revelation.

Size: 174x240, 144 pages,

ISBN: 9781 9101 9309 9

**Price: £9.99**



## Cold War Counterfeit Spies

*Tales of Espionage - Genuine or Bogus?*

By Nigel West

Throughout the Cold War and beyond, publishers have produced 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.

Size: 157 x 236 mm, 256 pages

ISBN 9781 4738 7955 3

**Non Members' Price: £16.99**

**Members' Price: £12.74**



## The Cray Valley Years

by Bob Treacher, M0MCV

As the Cray Valley Radio Society celebrates its 70th anniversary this lavishly illustrated book captures the highs and lows of one of the United Kingdom's most well-known, and successful, amateur radio societies.

From its modest beginning in 1946 to the successful special event station for the London 2012 Olympic and Paralympic Games this book covers the history of this famous club. Share in the success and disappointment of field days and national and international contests; and obtain first hand appreciation of the Society's expertise in organising special event stations, in the national and international arena.

This fascinating read provides real insight into a club that also had prestigious and highly successful celebrations of the Millennium, HM Queen Elizabeth II Golden Jubilee, the bi-centenary of the Battle of Trafalgar, and more.

Size: 240 x 174mm, 220 pages,

ISBN: 9781 9101 9329 7

**Non Members' Price: £14.99,**

**RSGB Members' Price: £11.24**

# Spring Sale



## Antennas Mastered

By Peter Dodd, G3LDO

Peter Dodd, G3LDO has been the regular antenna columnist of the Radio Society of Great Britain's journal *RadCom*. This book brings together

his work from this regular column and a collection of other antenna articles from over the years.

*Antennas Mastered* is packed with everything imaginable connected with antennas. Readers will find practical solutions that cover all bands and antenna types.

Organised in the order they were written *Antennas Mastered* provides a fascinating look at the practical side of antennas and the comprehensive index provided allows the reader to access any specific subject.

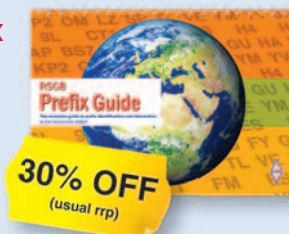
Size: 210x297mm, 288 pages  
ISBN: 9781 9101 9303 7

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## RSGB Prefix Guide

12th Edition

by Fred Handscombe, G4BWP

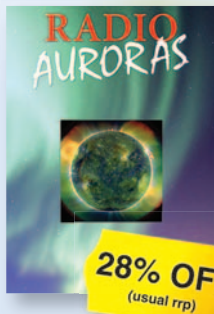


The *RSGB Prefix Guide* is the very latest amateur radio prefix information available. Fully updated with all the very latest changes in the amateur radio world, the *RSGB Prefix Guide* is the best guide to amateur radio prefixes.

This latest edition now uses colour to make listings clearer and easier to use. With a popular lay flat design this is a useful and useable book. Fully updated with the usual series of changes to prefix listings including many detailed items such as the additional K1N prefix for Navassa Island and United Nations call 4U2U. The listings are also provided with a huge range of additional information covering references for continent, CQ Zone, DXCC, IOTA, ITU Zone, Latitude & Longitude and a whole lot more.

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If you are interested in radio propagation *Radio Auroras* is a unique guide to this topic, but for those studying and experimenting, or those keen to work DX on VHF, it is a real 'must have' book.

Size: 174x240mm, 64 Pages  
ISBN: 9781 9050 8681 8

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## Test Equipment for the Radio Amateur

4th Edition

By Clive Smith, GM4FZH

Many of us would like to analyse the performance of

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Size: 174x240mm, 256 pages,  
ISBN: 9781 9050 8672 6

**Price: £9.99**



## RSGB Radio Amateur Operating Manual

8th Edition

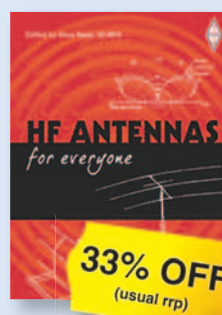
By Mike Dennison G3XDV & Steve Telenius-Lowe, PJ4DX

The *RSGB Amateur Radio Operating Manual* is written and edited by those skilled in their field, so that you can learn the basics and the techniques that lead to success. To get the best out of our hobby, skills must be learned. And no matter how skilled you are in your particular field, there is much to learn when embarking on another activity.

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## HF Antennas for Everyone

Edited by Giles Read, G1MFG

*HF Antennas for Everyone* draws on 90 of *RadCom* and *Radio Communication* articles from the last forty years, providing

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Size: 240x174mm, 336 pages  
ISBN: 9781 9050 8659 7

**Price: £9.99**



# VHF NFD

## 2-3 July 2016

**W**ind, rain, thunder and lightning – that about summed up the weather on the Friday and Saturday of VHF NFD 2016. In contrast, Sunday was much better for some with actual sunshine reported by some entrants.

The majority of entrants commented that conditions on 50MHz were flat with only the occasional appearance of tropospheric propagation and the very infrequent occurrence of Sporadic-E propagation. Conditions on 70MHz were also reported as flat with only the very occasional burst of Sporadic-E to tantalise the stations fortunate enough to catch them. In contrast to 50MHz and 70MHz, conditions on 144MHz were reported by stations in the west of the UK as 'average to good'. Stations in the south, east and north did not fare so well with lots of reports of static rain that made even hearing stations difficult! Poor conditions coupled with low activity was the consensus on 432MHz. On 1.2GHz, several stations reported making contacts by aircraft scatter (AS), which relieved the 'expected slog' on this band.

There was repeated criticism from some entrants in the Sweeper section of a general failure of some portable stations to call CQ regularly. Portable stations please note: if a portable station does not call CQ, it makes it impossible for Sweeper stations to work them!

The full results (available at [www.rsgbcc.org/cgi-bin/vhfresults.pl?Contest=VHF%20NFD&year=2016](http://www.rsgbcc.org/cgi-bin/vhfresults.pl?Contest=VHF%20NFD&year=2016)) enable the eligible entrants to download their certificates and to see their station UBN report. The results also give all of the details of equipment and antennas employed by each station.

### The Contest

The Rules remained unchanged from 2013 and saw the fourth year of the Multi-band, Single Station (MS) section for portable entrants.

A few site inspections were made and nothing untoward was found. A couple of comments of interference/broad signal between portable entrants (on 144MHz and 432MHz) were noted by the adjudication team. The stations involved did try to resolve the issues as best they could and no formal complaints have been received. At least one of the problems appeared to have been caused by poor voltage regulation from the generator – the generator used in previous years was not available and



Winching the 432MHz system up — at the White Cliffs of Dover. Photo courtesy of Gerry, GIORTN.



Alwyn Seeds, G8DOH puts the finishing touches on the 432MHz aerial system. Courtesy Gerry, GIORTN.

its replacement appeared not to be up to the job. Several independent complaints were received about a portable station using the 70MHz Calling Frequency (70.2MHz) during VHF NFD. The rules for all RSGB VHF Contests prohibits the use of any Calling Frequency or Centre of Activity listed in the RSGB Band Plans in contests. In this case, a 10% points penalty was imposed for the use of the Calling Frequency. Another problem – poor audio quality rather than a broad signal – was traced to RF feedback. A judicious rearrangement of the interconnecting cables reduced this problem to manageable proportions. This year, no stations were observed to be operating within the segment of 50MHz reserved for Intercontinental working – thank you!

### Statistics

**Portable numbers.** *Registrations:* 60 Groups, comprising 205 stations registered. This was up 3 from the 202 doing so in 2015 (221 in 2014), [247 in 2013]. *Entries:* Overall, Group entries totalled 60 (but not the same 60 that registered!), with station entries numbering 184 {180 in 2015}, (181 in 2014), [229 in 2013]. *Numbers of Stations entering – by Band:* 50MHz: 42 {41 in 2015}, (46 in 2014), [49 in 2013], 70MHz: 35 {38} (35) [41], 144MHz: 52 {50} (46) [68], 432MHz: 33 {40} (40) [52], 1.2GHz: 22 {11} (21) [19]. *Numbers of Groups entering- by section:* Total 60 {58} (62) [80]. Open: 19 {14} (17) [14], Restricted: 18 {18} (18) [28], Low Power: 10 {12} (10) [12], Mix & Match: 9



This wonderful aerial system is lots of fun to use on 144MHz - 1 x15 plus 6x4 plus 4x11. Along with quite a bit of sunshine, the team had some torrential showers, one lasting about half an hour, arriving just after kickoff, which made receiving almost impossible due to static rain. Courtesy Gerry, GIORTN.



Securing the 6x4 array on 2m before kickoff. Photo courtesy of Gerry, GIORTN.

{10} {10} [14], Multi-Single: 4 {4} {7} [12].

#### Fixed sweeper open (FSO) numbers.

*Entries:* 32 logs were submitted for FSO {23} {24} [34]. *Band Distribution:* 50MHz: 7 {3} {4} [9], 70MHz: 7 {6} {6} [8], 144MHz: 6 {8} {6} [8] [6], 432MHz: 7 {4} {4} [5], 1.2GHz: 5 {2} {4} [4].

#### Fixed sweeper restricted (FSR) numbers.

*Entries:* 108 logs were submitted for FSR {56} {60} [127]. *Band Distribution:* 50MHz: 27 {14} {9} [33], 70MHz: 9 {3} {8} [16], 144MHz: 36 {25} {18} [40], 432MHz: 26 {19} {16} [30], 1.2 GHz: 10 {5} {9} [8].

**Logging accuracy:** As is unfortunately normal for VHF NFD, the standard of logging was again noticeably worse than for other RSGB VHF contests. Most errors were due to incorrectly logged callsigns (sometimes transposed letters or incorrectly recording the prefix eg MO for GO), serial numbers and locators that were wrong or implausible since they were incompatible with the callsign. Some entrants even managed to transpose their Received and Sent reports or mixed them indiscriminately. The usual wet squares appeared, as did IO/JO transpositions. All of these problems are seen in other RSGB VHF contests but the number of errors relative to the number of entrants in VHF NFD is much greater than in other contests.

### Portable results

**Open Section:** (19 Entries): This year's Overall Winner is Colchester and A1 CG (JO01) with an overall normalised score of 3681 points. They win the Surrey Trophy. In the Runners-Up position with 3340 points, lies Reigate ATS and Crawley ARC (JO01). In Open

section results table at # position with 4705 points lies Wexford VHFG (IO62). Readers are reminded that only UK & Crown Dependency-based (UK&CD) entrants are eligible for Awards and all band-scores are normalised against the highest scoring UK&CD station. As a consequence, Wexford VHFG's scores on 50MHz and 70MHz are each greater than 1000. In 3rd place is last year's winners, Blacksheep CG (JO01) with 3056 points. The highest placed Scottish station is Aberdeen VHF Group (IO84), who win the Tartan Trophy as the Leading Resident Scottish group.

**Restricted Section:** (18 Entries): This year's Overall Winner is Lothians RS (IO74) with 3299 points. They win the Martlesham Trophy and Cockenzie Quaich as the highest placed Scottish Group. In the Runners-Up position is last year's winners, the South Birmingham RS (IO92) with 3130 points. In 3rd place lies Bittern DX Group (JO02) with 2445 points.

**Low Power Section:** (10 Entries): This year's Overall Winner is Warrington CG (IO93) with 3000 points (the maximum attainable). They win the Arthur Watts Trophy. Lagan Valley ARS (IO74) are the Runners-Up this year with 2361 points. Loch Fyne Kippers (IO75) are placed 3rd with 1022 points and, as highest placed Scottish station, retain the Scottish Trophy for another year.

**Mix And Match Section:** (9 Entries): This year's Overall Winner is Telford & DARS (IO82) with 3100 points and take over the G5BY Trophy from this year's Runners-Up, Trowbridge & DARC (IO81) with 2688 points. In 3rd place for the second year is Drowned Rats RG (IO91) with a score of 2224 points.

**Multi-Band, Single-Station (MS) Section:** (4 Entries): In the fourth run of this section,

the Overall Winner is Workington & DARC (IO84) with 2937 points (1000 on 50MHz and 1.2 GHz). In the Runners-Up position is Tall Trees CG (IO93) with 2822 points. In 3rd place lies Bolton Wireless Club with 1700 points.

### Fixed sweepers results

Certificates are awarded for top and runner-up best overall normalised score and, for each section, Band Leader and, if appropriate, Gold, Silver and Bronze awards for contacting 90%, 75% and 50%, respectively, of registered and active VHF NFD (Portable) stations. To facilitate this, a list of stations that had registered by the closing date was published on the RSGB CC website in advance of the Contest. The adjudicators have taken account of those registered stations that were not 'active' during VHF NFD.

**Overall** (66 Entries): Overall Leader: G3XDY (JO02) with 3000 points from a three band entry and was the Band Leader on 70MHz (FSO), 432MHz (FSO) and 1.2GHz (FSO)

Overall Runner-up: G0GQT with 2429 points from a five band entry and was the Band Leader on 432MHz (FSR)

Overall 3rd place: G3UVR with 1967 points from a five band entry and was the Band Leader on 1.2GHz (FSR)

**Band Awards.** 50MHz FSO (7 Entrants): Band Leader & Silver Award: G4FJK (IO80); FSO Bronze Award: G4ELJ (IO91), G4FKA (IO81).

Ian Pawson, G0FCT  
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Andy Smyth ready for the off on 50MHz. Photo courtesy of Gerry, GI0RTN



M5DWI operating G5TO/P 144MHz station VHF NFD 2016. Photo courtesy of Peter, G3PHO.

50MHz FSR (27 Entrants): Band Leader & Bronze Award: G3TBK (IO93); FSR Bronze Award: G3RLE (IO83), G0BBB (IO91), G8FMC (IO91), MOOMB (IO83), G4RYV (IO91).

70MHz FSO (7 Entrants): Band Leader & Silver Award: G3XDY (JO02); FSO Silver Award: G4FJK (IO80); FSO Bronze Award: G4FKK (IO91), G3NPI (IO92).

70MHz FSR (9 Entrants): Band Leader and Silver Award: GW8ASD (IO83); FSR Bronze Award: G4RYV (IO91), G8FMC (IO91), G8FMC (IO91), G3UVR (IO83).

144MHz FSO (6 Entrants): Band Leader & Bronze Award: G6DOD (IO90); FSO Bronze Award: GM4JJJ (IO86).

144MHz FSR (35 Entrants): Band Leader & Bronze Award: G0BBB (IO91); FSR Bronze Award: G0GQT (JO01), G1PPA (IO93), MODDT (IO91), G4DBW (JO01), GW3ATZ (IO83), MOOMB (IO83), G4LPD (IO92), G4XPE (IO92), G8XTJ (IO91).

432MHz FSO (4 Entrants): Band Leader & Bronze Award: G3XDY (JO02); FSO Bronze Award: G8EOP (IO93).

432MHz FSR (19 Entrants): Band Leader & Bronze Award: G0GQT (JO01); FSR Bronze Award: G3UBX (IO82), G1HLT (IO93), G1PPA (IO93).

1.2GHz FSO (5 Entrants): Band Leader & Bronze Award: G3XDY (JO02); FSO Bronze Award: G8EOP (IO93).

1.2GHz FSR (10 Entrants): Band Leader & Bronze Award: G3UVR (IO83).

### Check logs

Check logs were gratefully received from:  
50MHz: G8CMU, GW0GEI and GOOLE/P  
70MHz: G0TCD and G8CMU  
144MHz: G3TCR/P, F1CBC, G8CMU, GD1MIP, GW1YBB/P, GW4IDF/P, M1MAJ/M, M3ZCB, MM0GPZ/P and OZ1ALS  
432MHz: GD1MIP and F1CBC  
1.2GHz: None

### Band results

**50MHz Activity:** 432 individual callsigns were worked {435 in 2015} (421 in 2014) [554 in 2013]. These comprised stations in the following countries: DL, EI, F, G, GD, GI, GM, GU, GW, I, LY, ON, PA, S5 and YL.

**50MHz Band Leaders and Scores:** Open: Numerical Leader, Position #: EI9E/P Wexford VHFG (IO62), Score 52282 (1403 Normalised). Open 1st UK & CD: GM4ZUK/P Aberdeen VHF Group (IO86), Score 37266. Restricted: GM3HAM/P Lothians CG (IO74), Score 22388. Low Power: GI4GTYP Lagan Valley (IO74), Score 33321. MS: G4VFL/P Workington & DARC (IO84), Score 9273. FSO: G4FJK (IO80) 31 QSO, Score 8978, Mults 29, Total 260,362. FSR: G3TBK (IO93) 28 QSO, Score 5717, Mults 26, Total 148,642.

**70MHz Activity:** 210 individual callsigns were worked {171} (147) [196]. These comprised stations in the following countries: EI, G, GD, GI, GM, GU, GW, ON, PA and SP

**70MHz Band Leaders and Scores:** Open: Numerical Leader, Position #: EI9E/P Wexford VHFG (IO62), Score 33094 (1448 Normalised). Open 1st UK & CD: GM4ZUK/P Aberdeen VHF Group (IO86), Score 22854. Restricted: GM3HAM/P Lothians RS (IO74), Score 18579. Low Power: GI4GTYP Lagan Valley (IO74), Score 24,539. MS: M1DDD/P Tall Trees CG (IO93), Score 8,254. FSO: G3XDY (JO02) 27 QSO, Score 6911, Mults 26, Total 179,688. FSR: GW8ASD (IO83) 26 QSO, Score 5481, Mults 25, Total 137,025.

**144MHz Activity:** 1500 individual callsigns were worked {1471} (1219 in 2014) [2117 in 2013]. These comprised stations in the following countries: DL, EA, EI, F, G, GD, GI, GJ, GM, GU, GW, HB, LA, LX, LY, OE, OK, ON, OZ, PA, SM, SP and UA.

**144MHz Band Leaders and Scores:** Open: MOBAA/P Blacksheep CG (JO01) Score 189,254. Restricted: G3ZME/P Telford & DARS (IO82) Score 48,369. Low

Power: G3CKR/P Warrington CG (IO93) Score 59,123. MS: MOICK/P Bolton Wireless Club (IO83), Score 13,643. FSO: G6DOD (IO90) 69 QSO, Score 20,800, Mults 35, Total 728,000. FSR: G0BBB (IO91) 56 QSO, Score 15,356, Mults 32, Total 491,392.

**432MHz Activity:** 383 individual callsigns were worked {379} (327) [598]. These comprised stations in the following countries: DL, EA, EI, F, G, GD, GM, GU, GW, HB, OK, ON, OZ, PA, SM, SP.

**432MHz Band Leaders and Scores:** Open: G5LK/P Reigate ATS & Crawley ARC (JO01), Score 49,298. Restricted: MOHRF/P Drowned Rats RG (IO91), Score 19,126. Low Power: G3CKR/P Warrington CG (IO93), Score 15,002. MS: M1DDD/P Tall Trees CG (IO93), Score 1914. FSO: G3XDY (JO02) 32 QSO, Score 10,737, Mults 18, Total 193,266. FSR: G0GQT (JO01) 24 QSO, Score 4463, Mults 21, Total 93,723.

**1.2GHz Activity & Conditions:** 147 individual callsigns were worked {111} (94) [224]. These comprised stations in the following countries: DL, EI, F, G, GU, GM, GW, OK, ON, OZ and PA.

**Band Leaders and Scores:** Open: G0VHF/P Colchester & A1 CG (JO01) Score 17,768. Restricted: G3OHM/P South Birmingham RS ((IO92) Score 16,655. Low Power: G3CKR/P Warrington CG (IO93) Score 12,112. MS: G4VFL/P Workington & DARC (IO84) Score 1837. FSO: G3XDY (JO02) 37 QSO, Score 13,484, Mults 14, Total 188,776. FSR: G3UVR (IO83) 12 QSO, Score 2455, Mults 11, Total 27,005.

### Sign off

Congratulations to all recipients of Trophies and Certificates and thank you to all participants.

73 from the 2016 VHF NFD Adjudication Team: Ian, G0FCT, Mike, G0KAD, Roger, G4BVY and Stephen, G4SHF.

# Book Review

Catch up on the best of last year plus some disturbing news about yesteryear

## Launch Pad UK

by Jim Wilson OBE

It is not often I sit down to read a book and become so absorbed that I read it from cover to cover in one sitting but that was true of *Launch Pad UK*. Not only was I largely unaware of the short and only period where Britain housed land-based nuclear ballistic missiles but the story of them enthralled me.

Despite the subtitle, 'Britain and the Cuban Missile Crisis', this book covers much more than yet another book about the October 1962 crisis. It goes into the why the missiles were placed in the UK in the first place, the secrecy surrounding their delivery to the RAF and their installation, and going right through to their withdrawal only five years later.

Jim Wilson describes the responses made as the Cuban missile crisis developed and the weekend of 27/28 October 1962 that, for most British people, could easily have been their last weekend on earth. *Launch Pad UK* even quotes the British Ambassador to Cuba at that time, who commented: "If it was a nuclear war we were headed for, Cuba was perhaps a better place to be than Britain!"

The level of secrecy surrounding the rockets is astonishing and the huge, unprecedented level of readiness at that time was kept completely secret from the public. The *Thor* nuclear missiles stood at a wartime state of alert, ready to be fired during the crisis and making Britain, in effect, America's launch pad because at this time the USA had no inter-continental missiles capable of reaching the USSR from its own territory. Disturbingly, the book suggests that if President Kennedy had decided to launch air strikes against the Russian missiles in Cuba he may not have retaliated if the USSR had attacked the missiles in the UK, to avoid escalation into World War Three. The *Thor* missiles were dual key controlled at this time and whilst the RAF was in control of launching the missiles, the nuclear *warhead* key was controlled by a US air force officer who took his orders from the USA. The book suggests that RAF personnel claimed to be able to switch on the warheads with a screwdriver or by making an adjustment at the top of the missile – but maybe it is as well the dual key system was never tested in anger.

For me *Launch Pad UK* illuminated an area of our nuclear history I was unaware of. It gave me a great deal of detail on how the RAF squadrons were organised and the political elements involved in their deployment. This book provides an examination of the reasoning behind basing *Thor* missiles in the UK, the US conceptions of the 'missile gap' and much besides. I would thoroughly recommend this book to anyone interested in the Cold War period or those who know little about this fascinating aspect of the UK's nuclear history.

155 x 234mm, 208 pages

ISBN 9781 4738 8665 0

Non Members £14.99

RSGB Members £11.24 (25% off)



## RadCom 2016 CD and USB stick

Shortly before Christmas we gathered together our master disks for the year's editions of *RadCom* and from these were prepared twelve comprehensive PDF files containing every page from every edition. These are now on one compact, easy to use disk or USB memory device that can be browsed at your leisure.

The biggest benefits of having these pages electronically is that they can be read on modern electronic devices including tablets and phones. The documents are also searchable, so you're only ever a few short steps from finding out how many times the word 'aardvark' appeared (hint: we managed to get it in more times in 2016 than we did in 2015). On a more serious note it's easy to search for half-remembered things such as a partial name of a project, or maybe a callsign.

As well as the 1200+ pages of *RadCom* you'll also find a copy of the RSGB Tim Peake video that celebrates the ARISS contacts between British schools and the International Space Station, plus samples of material taken from other RSGB CDs.

Available on CD or USB memory stick

Non Members' price £14.99

Members' price £12.74



**RSGB staff**  
radcom@rsgb.org.uk



# HF F-Layer Propagation Predictions for February 2017

Compiled by Gwyn Williams, G4FKH

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Time (UTC)	3.5MHz	7.0MHz	10.1MHz	14.0MHz	18.1MHz	21.0MHz	24.9MHz	28.0MHz
*** Europe								
Moscow	6651...4666	426422246666	1.4544456211	1.555552...	45553...	24631...	1.1222...	1.121...
*** Asia								
Yakutsk	21...3333	13312	21...					
Tokyo	2222	1.33322	21221	1				
Singapore	2222	143222	342	132	12	11		
Hyderabad	3...3333	3...34333	2331	123	1122	122		
Tel Aviv	552...3555	5551...25555	2.5321245212	3543441...	54442...	3322	1	
*** Oceania								
Wellington	22...	133343...	24442...	3332	121	1		
Well (ZL) (LP)								
Perth	111	13332	3431	331	121	1		
Sydney	111	13432	2342	1232	111			
Melbourne (LP)		21	22	12	1			
Honolulu	12	221.1	11					
Honolulu (LP)								
W. Samoa	1	23222	3331	132	11			
*** Africa								
Mauritius	2...222	3...13333	1...33211	31	12			
Johannesburg	23...33	33...2344	11...3322	231	11.121	111		
Ibadan	5441...455	55531.13555	52342124553	5322343	543343	243341	2212	1
Nairobi	331...2333	443...3444	2.31...14411	2.134	32123	1.21		
Canary Isles	6665...566	666631.13666	662643235666	22.654445621	425552	2155541	1.4342	2221
*** S. America								
Buenos Aires	2222...1	3324...23	11.3...11	1				
Rio de Janeiro	3322...3	4424...133	22.3...222	11.12	1.11	1.1		
Lima	2222...	22.3...	2...					
Caracas	3333...13	33.42...23	23...1	2.1	221	12		
*** N. America								
Guatemala	2222...	22.32...	12	1	1			
New Orleans	33331...2	31.32...12	1	21	22			
Washington	44442...24	44.4321.234	22112	3322	331	22		
Quebec	44431...24	42.2...1232	12122	1333	331	11		
Anchorage	231							
Vancouver	2222...	1.1...						
San Francisco	1222...	21.22						
San Fran (LP)				2	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](http://www.rsgb.org.uk/propagation/index.php). An input power of 100W and a dipole aerial has been used in the preparation of these predictions; therefore a better equipped station should expect better results. The predicted smoothed sunspot numbers for February, March & April are respectively (SIDC classical method - Waldmeier's standard) 26, 25 & 24 and (combined method) 38, 37 & 36. The provisional mean sunspot number for December 2016 was 19.5. The daily maximum / minimum numbers were 62 on 2 December and 0 on 10, 16, 23-25 December.

Please send news reports to radcom@rsgb.org.uk. To get future events listed here and put on GB2RS, email details of your meetings as early as possible to radcom@RSGB.org.uk Include your club name, RSGB Region number, contact name, callsign & phone number, date and details of meeting. Example: Fraser Road Radio Club, Region 9, Steve, M1ACB, 01234 832 700, 29 Oct, On the Air. We normally acknowledge all submissions within 3 working days: if you don't hear from us, please phone. We don't normally include 'closed', 'TBA' or 'every Tuesday'-type entries. The deadline for the March issue is 19 January and for April it's 23 February. For GB2RS, the deadline is 10am on the Thursday of the week of broadcast.

## CLUB EVENTS CALENDAR

### INTERNATIONAL

**Pafos Radio Club, Cyprus**  
Richard, 5B4AJG, 00 357 97 857 891,  
5b4ajg@gmail.com www.cyhams.org  
Meets 3rd Thursday at DT's Bar. Visitors and  
holidaymakers welcome.

### NATIONAL

**Amateur Radio Caravan and Camping Club**  
membership@arcc.org.uk, www.arcc.org.uk  
No rallies in February

**AMSAT-UK**, <http://amsat-uk.org/>  
Open net every Sunday, 10am, 3.780MHz (±)

**British Railways Amateur Radio Society**  
m0zaa@brars.info, www.brars.info  
Net Friday 1600 on 3.685MHz

**Civil Service Amateur Radio Society**  
Weekly net every Tuesday, 8pm, 3.763MHz.

**Radio Amateur Old Timers' Association**  
MemSec@RAOTA.org, www.RAOTA.org  
Nets: Wed 3.763MHz 1000, 1.963MHz 2100,  
Thurs 7.163MHz, 1100, 3.763MHz 1930  
Sun 3.763MHz 1000.

### REGION 1: SCOTLAND SOUTH & WESTERN ISLES

Regional Manager: Marcus Hazel-McGown, MM0ZIF,  
RM1@rsgb.org.uk

**Ayr ARG**  
Charlie, MM0GNS, 01563 551 704  
3 Mohican Radio demo, Andy, MM6AGM  
17 Arctic operating, Andy, GMOXAV

**Livingston & District ARS**  
Cathie, 2MODIB, 01506 433 846  
7, 21, 28 Operating and training  
14 Talk

**Lothians RS**  
Mike, MM0MLB,  
secretary@lothiansradiosociety.com  
8 Club night at Braid Hills Hotel  
22 The Post Office Man, John, GM4XZN

**West of Scotland (Glasgow) ARS**  
wosars@gmail.com  
3, 10, 17, 24 Club night, 8pm

### REGION 3: NORTH WEST

Regional Manager: Kath Wilson, M1CNY,  
RM3@rsgb.org.uk

**Chester & District RS**  
Bruce, MOCVP, 01244 343 825  
7 Club meeting  
14 Committee meeting  
21 Sequencing and memory keyers,  
Phil, G4FVZ  
28 Valves and things, Dave, G4JMF

**Macclesfield & District RS**  
Greg, M0TXX, info@gx4mws.com  
6 Shack on the air  
13 Visit to Canal Community Radio  
20 Film night  
27 Fox hunt around Macclesfield

**South Manchester R&CC**  
Ron, G3SVW, 01619 693 999  
2 The History of Film Projection,  
Ray, G6OCW  
9 Weather, part 3, Peter, G3XGE  
16 Members mini-lectures  
23 Technology for the Blind, Dave, GOBJK

**Stockport Radio Society**  
Heather, M6HNS, 07506 904 422  
5, 12, 20, 27 Intermediate course  
7 Society night  
14 Club net, 51.550MHz FM, 7.30pm  
50.270MHz SSB, 8.15pm  
16 Club net 145.375MHz, 7.30pm  
21 Radio night  
28 Skills night

**Thornton Cleveleys ARS**  
John, G4FRK, 01253 862 810  
6 Natter night, practical on fitting connectors  
13 FT5ZM Amsterdam Island video  
20 Tech talk, Mick, G4EZM  
27 Me & my oscilloscope, Keith, 2EOKMZ

### REGION 4: NORTH EAST

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

**Angel of the North ARC**  
Nancy, G7UUR, 01914 770 036  
6 VHF propagation, David, GOEVV; Advanced  
course continues  
13 HF propagation, David, GOEVV; Advanced  
course continues  
20 On the air  
27 Advanced course continues; on the air

**Bishop Auckland RAC**  
Gail, M3GBB, 0191 372 0473  
2 Normal club night and training

**Blyth Radio Club**  
John, 2E0DCV, 0191 237 1729  
1, 8 Club night  
15, 22 Morse training

**Colburn & Richmondshire District ARS**  
Colin, 01748 876 391  
9 Fusion hands-on, MOTCN & MOWGC  
23 Rig testing night, G4FZN

**Denby Dale RC**  
Darran, G0BWB, 07974 423 227  
1 Activating Flora & Fauna, Richard, MORBG  
8, 22 Club net, 8pm, 145.575MHz FM  
15 Worked All Britain Awards, Brian, G0BFJ

**Durham & District ARS**  
Michael, G7TWX, dadars@dmx.com  
1, 8, 15, 22 Club night

**Sheffield ARC**  
David, G6DCT, littlewood20@btinternet.com  
6, 20 Shack night  
13, 27 Club night

### REGION 5: WEST MIDLANDS

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

**Coventry ARS**  
John, G8SEQ, 07958 777 363  
2, 9, 16, 23 Open net, 8pm, 50.175MHz SSB  
3 Construction competition  
6, 13, 20, 27 Open net, 8pm, 145.375MHz  
FM and/or 7.16MHz SSB ± QRM  
10 Club meeting  
17 Skittles night at Brandon Social Club  
24 Talk by Ian, G7III

**Glenrothes & District RC**  
Tam, MM0TGB, 0775 3526 498  
1 Club night  
8 Field day review/forward planning  
15 AT5 QRP valve talk  
22 Leven – practical (pixies) and operating

**Malvern Hills RAC**  
Dave, G4IDF, 01905 351 568  
14 PCBs, Dave, G4IDF & others

**Midland ARS**  
Norman, G8BHE, 07808 078 003  
1 Open meeting, training classes  
8 Committee meeting and training classes  
15 General meeting, shack on the air and  
training classes  
22 Discussion on rally visits and social events

**Mid-Warwickshire ARS**  
Don, G4CYG, 01926 424 465  
14 Club net on 145.275MHz  
28 Video afternoon with G4CYG and G7RYO

**Salop ARS**  
salopamateurradio@gmail.com  
1, 8, 15, 22 Club net, 8.30pm, GB3LH  
2 Natter night / committee meeting  
7, 14, 21, 28 Club CW net, 4.30pm,  
144.070MHz  
9 Construction techniques, Neil, M0KZP  
16 Natter night  
23 Video night

**South Birmingham RS**  
Gemma, M6GKG,  
gemmagordon.m6gkg@gmail.com  
2, 9, 16, 23 Training classes with G8OWL  
3, 10 Work in the shack  
6, 13 Sorting rally stock for Wythall  
7, 14, 21, 28 Shack coffee morning, 11am to  
1pm, Visitors welcome  
17 Sorting out the trailers  
20, 27 Prep for stand at Wythall Rally

**Stratford upon Avon & District RS**  
Clive, G0CHO, 01608 664 488  
6, 20 Club net, 145.275MHz FM, 8pm  
13 Broadband Hamnet (the microwave  
transceiver I never knew I had), G0CHO  
27 FM deviation experiment, Harri, G1IEX

**Sutton Coldfield ARS**  
Robert Bird, rob2e0zap@gmail.com  
6, 15, 21 Open net, 145.250MHz, 7.30pm  
13, 20 Club meeting  
14 Open net, 70.475MHz FM, 7.30pm  
27 DMR open net, GB7FW SLOT/LOCAL2,  
7.30pm



## Tamworth ARS

Richard, 2EOLLE, 0787 521 7124

1, 8, 15, 22 Club net via GB3TA

2, 9, 16, 23 Club night

## Telford & District ARS

John, MOJZH, 07824 737 716

1 Committee meeting and GX3ZME OTA

8 Under a Fiver competition

15 Raspberry Pi and Arduino for beginners

22 Bowls evening with the LWVH Bowls Club, 7pm

## Wythall Radio Club

Chris, G0EYO, 07710 412 819

3, 10, 17, 24 Nibbles night in the shack

5, 12, 19, 26 Club net 145.225MHz or GB3WL, 8pm

7 Christmas contest results night

14 Committee meeting

21 Overview of the Red Pitaya, John, G3VRF

28 RSGB update evening by DRM52, John, G1JON

## REGION 6: NORTH WALES

Regional Manager: Ceri Lloyd Jones, 2W0LJC

RM6@rsgb.org.uk

### Dragon ARC

Stewart, GW0ETF, 07833 620 733

6 Club business/discussion

20 Antenna analyser, GW0ETF

### North Wales Radio Society

Liz, GW0ETU, 0776 019 0355

2 Planning for spring / summer activities

9 Technical topic

16 Tropospheric propagation, David, GW8NZN

23 Natter night

## REGION 7: SOUTH WALES

Regional Manager: Glyn Jones, GW0ANA,

RM7@rsgb.org.uk

### Aberystwyth & District ARS

Ray, GW7AGG, 01970 611 853

9 EMC Mitigation and dealing with receiver noise, Simon, GW0NVN

23 Net on 145.500MHz then 145.550MHz

### Chepstow & District ARS

Ollie, 2W0ZXX, 07481 821 973

7 Arduino kit build, Nick, G8YJM

21 Arduino projects final building

### Cleddau ARS

Heinz, MW0ECY, 0774 804 7008

13 AGM

20 Quiz night

22 2m net

## REGION 8: NORTHERN ISLAND

Regional Manager: Philip Hosey, M10MSO

RM8@rsgb.org.uk

### Bangor & District ARS

Norman, G13YMY, norman.newell@yahoo.com

2 Connecting equipment to your PC/laptop, G14JTF

18-19 Foundation course

The next deadline is  
19 January

## REGION 9: LONDON & THAMES VALLEY

Regional Manager: Tom O'Reilly, G0NSY

RM9@rsgb.org.uk

### Aylesbury Vale RS

avrs@rakewell.com

8 Discussion evening

### Burnham Beeches RC

Charles, G0SKA, 01753 647 101

6 Use of oscilloscope and spectrum analyser, Jeremy, G8MLK

20 Construction competition judging and show 'n tell

### Harwell ARS

John, G6LNU, 01235 223 250

9 Construction contest

### Radio Society of Harrow

Linda, G7RJL, lcalsey@imperial.ac.uk

3 Club night talk

5, 12, 19, 26 Club net, noon, 1938kHz LSB

6, 13, 20, 27 Club net, 8.15pm,

145.500MHz then 145.350MHz FM

17 Club night activity

### Reading & District ARC

Laurence, G2DD, 0758 470 6625

9 Drones, Adam Juniper

23 Simple satellite operating, Tim Kirby

### Shefford & District ARS

John Burnett, john@hobart-europe.co.uk

2 Luton VHF Group's visit to Holy Island, G4LOO and M0BIK

9 2016 Construction contest winner

23 The Birkenhead U-boat, Owen, G0PHY

### Southgate ARC

Keith, G8RPA, g8rpa@arrl.net

8 History of ballooning, Mike, M0NOE

## REGION 10: SOUTH & SOUTH EAST

Regional Manager: Michael Senior, G4EFO

RM10@rsgb.org.uk

### Bromley & District ARS

Andy, G4WGZ, 01689 878 089

1, 8, 15, 22 Net, 9pm, 145.500MHz (and QSY)

21 Club meeting

### Crawley ARC

John, G3VLH, 01342 714 402

22 Icom IC-7300, Mike, G0KAD and

Alex, M1YAP

### Crystal Palace R&EC

Bob, G30OU, 01737 552 170

3 AGM

### Darenth Valley Radio Society

Mike, G8AXA, 01689 856 935

8 Video night

22 Natter night/on the air

### Dover RC

Aaron, 2E0FQR, 0771 465 4267

2 DMR radio (admittance £2)

### Fareham & District ARC

Chris, G7MFR, chris@jenkins-powell.com

1 Informal meeting + bar

8 AGM

22 Inter-club quiz

### Hastings E&RC

Gordon, 01424 431 909

22 AGM followed by 'bring your mystery thing'

### Horndean & District ARC

Stuart, G0FYX, 02392 472 846

3 Natter night/social evening

17 History of Portsmouth part 2, Andrew Negus

### Horsham ARC

Alistair G3ZBU, 07855 268 666

2 Software defined radio, G3ZBU

16 Social, The Star Inn, Rusper

26 Morning Fox Hunt

### Itchen Valley ARC

Ray, G3HRH, 01962 712 045

3, 17 Club net, 145.525MHz, 8pm

10, 24 Club meeting

### Mid-Sussex ARS

Sue, G6YPY, 01273 845 103

3 Air Ambulance talk

10 On the air

17 Radio night

24 Video evening, Tony Finch

### Southdown ARS

John, G3DQY, 01424 424 319

1 Operating HF at Hailsham shack

1, 8, 15, 22 Net, 8.30am, 145.275 FM; 12.30pm, cafe meet

2, 9, 16, 23 Net 9.50am 145.275 FM, 10am 7.035 CW

4, 11, 18, 25 Net 9.50am 145.275

FM, 10am 7.035 CW, 12.30pm

144.300SSB\145.500FM\51.600FM

6 Remote antenna tuning, Geoff Ellis, G3LFZ

### Surrey Radio Contact Club

John, G3MCX, 020 8688 3322

2, 9, 16, 23 Net 70.300MHz 8pm

3, 10, 17, 24 Net 145.350MHz 8pm

5, 12, 19, 26 Net 1905kHz, 9.30am

6 How not to win NFD, Quin, G3WRR

20 Chat and Fix-it, John, G8MNY

### Sutton & Cheam RS

John, G0BWV, 0208 644 9945

16 Choosing a VHF/UHF radio, Alwyn, G8DOH

## REGION 11: SOUTH WEST & CHANNEL ISLES

Regional Manager: Pam Helliwell, G7SME

RM11@rsgb.org.uk

### Appledore & District ARC

Alan, M6CCH, 01237 422 833

20 Memory lane

### Bristol RSGB Group

Robin, G3TKF, robin@g3tkf.co.uk

27 Big data, Dr Chris Budd, G4NGB

### Callington ARS

John, G4PBN, 01822 835 834

1 Kenwood equipment and contesting

### Exeter ARS

Nick, M0NRJ, 01363 775 756

7, 14, 21, 28 GB3EX net, 7.45pm

8 Buildathon in America Hall at 6.30pm

22 FLDIGI for RAYNET operations in America Hall

### Exmouth ARC

Mike, G1GZG, 01395 274 172

1 AGM

### Plymouth Radio Club

David, 2E0DTC, d.beck123@btinternet.com

14 AGM

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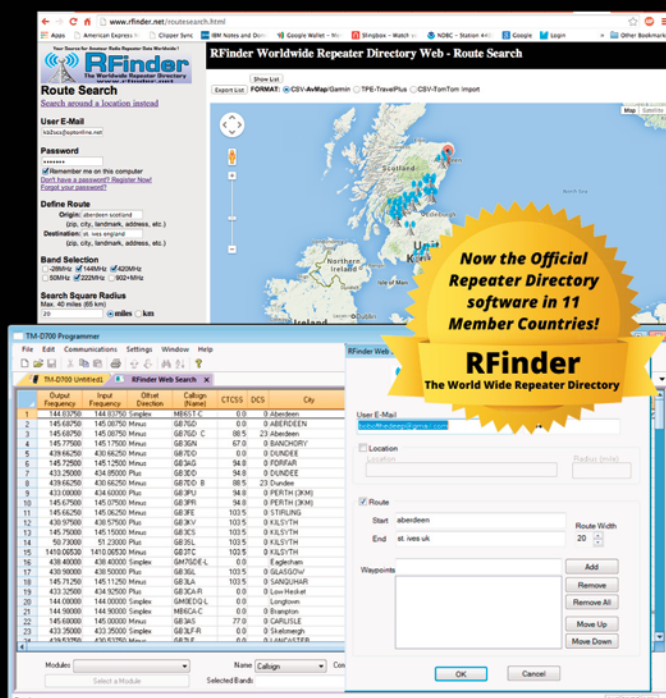
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**Riviera ARC**  
rivieraarc@gmail.com  
2, 16 Club night

**Saltash & DARC**  
Mark, MOWMB, 0781 054 8445  
2, 16 Club night, all welcome

**South Bristol ARC**  
Andrew, G7KNA, 07838 695 471  
2 Talk on direction finding  
9 Radio programming practical evening  
16 Quiz night  
23 Open house and on the air

**Thornbury & South Gloucestershire ARC**  
Mark, 2EORKM, 0777 629 2813  
1 Operating successfully mobile,  
Mark, 2EORKM  
3, 10, 17, 24 VHF net  
8, 22 On the air  
15 On air night / shack training

**Torbay ARS**  
Dave, G6FSP, g6fsp@tars.org.uk  
3, 17 Club night  
10 Club night with Business meeting  
24 AGM

**Weston Super Mare RS**  
Martin, G7UWI, 01934 613 094  
6, 13, 27 Construction, operating  
& natter night  
20 Miniature railway signalling, G4DPH

**Yeovil ARC**  
Rodney, MORGE, 01935 825 791  
2 HF ray tracing, G3MYM  
9 Magnetic loop aerials talk and demo,  
G3ZXX  
16 Morse practice, G3MYM  
23 Committee meeting and OTA

## REGION 12: EAST & EAST ANGLIA

Regional Manager: Keith Haynes, G3WRO  
RM12@rsgb.org.uk

**Braintree & District ARS**  
Edwin, GOLPO, 01376 324 031  
6 QRP evening: sets and antennas  
13, 27 Club net, 8pm, 145.375MHz  
20 Construction kit selection, range, cost and  
availability

**Chelmsford ARS**  
secretary@g0mwt.org.uk  
7 Diplomatic Wireless, Peter, MOHSG  
20 Skills night at Danbury Village Hall

**Colchester Radio Amateurs**  
Peter, G0DZB, 01206 792 950  
16 Modern HF rig controls

**Essex Ham**  
Pete, MOPSX, news@essexham.co.uk  
4 Essex YL net, GB3DA, 8pm  
5 Online Foundation course,  
www.hamtrain.co.uk  
6, 13, 27 Net on GB3DA, 8pm; chatroom & live  
audio feed at www.essexham.net

**Huntingdonshire ARS**  
Phil, G7KJW, 01487 832 937  
9 Hints and tips for portable operation  
23 Club meeting

**Norfolk Coast ARS**  
Steve, G3PND, info@norfolkcoastamateurs.co.uk  
5 The long wire antenna  
12 Meteor scatter  
19 More on EME  
26 Pedestrian mobile on Cromer Pier

**South Essex ARS**  
Terry, G1FBW, 07986 070 040  
5 32nd Canvey Radio & Electronics Rally  
14 Confessions of a radio and TV engineer part  
2, Dave, G4UVJ

## REGION 13: EAST MIDLANDS

Regional Manager: Jim Stevenson, G0EJQ  
RM13@rsgb.org.uk

**Hinckley AR&ES**  
Mark, 2E0SBM, 0778 992 9730  
2 Foundation course and Morse class  
7, 14, 21 UKAC  
9 Morse class, training  
16 Intermediate, Foundation & Morse class,  
6m UKAC  
23 Intermediate, Foundation & Morse class,  
4m contest

**Melton Mowbray ARS**  
Phil, G4LWB, 01664 567 972  
17 Web development using HTML5 and CSS,  
Bill, 2E0OCW

**RAF Waddington ARC**  
Bob, G3VCA, 07971 166 250  
6, 13, 20, 27 Club net, 145.325MHz, 8pm

**South Normanton Alfreton & District ARC**  
A Lawrence, 2E0BQS, 0115 930 7322  
6 Talk  
13, 27 Natter night  
20 Junk sale

**Welland Valley ARS**  
Peter, G4XEX, 01858 432 105  
6 Club net, 8pm, 433.475MHz FM  
20 Handheld re-programming night

The next deadlines are  
19 January, 23 February  
and 23 March

## EVENTS ROUNDUP



### REGION 1: SCOTLAND SOUTH & WESTERN ISLES

Members of Kilmarnock and Loudon ARC recently celebrated the 90th birthday of Eddie Callaghan, GM6WTH, the club's oldest member. Eddie has been an active member of the club from shortly after its inception and has been made an honorary member of the club. Pictured with Eddie, GM6WTH and the club's commemorative plaque to record the event is Davie, 2M0YFR, Chair of Kilmarnock and Loudon ARC.

### REGION2: SCOTLAND NORTH & NORTHERN ISLES

Moray Firth ARS has undergone major changes recently. Having finally found a new permanent home within the Forces Reserve Centre at Edgar Road, Elgin IV30 6YQ, an Extraordinary General Meeting was held in November at which a new committee was elected. They are still looking for a volunteer to accept the role of Secretary. As the new meeting venue is situated within the complex of the Forces Recruitment Centre it is their intention to try and recruit youth members from the Army, Air and Sea Cadet groups who meet there on a regular basis. Foundation course training will be undertaken and, as the Reserve Centre is now an approved examination centre, the first exams will take place on 22 April.

### REGION3: NORTH WEST

Wednesday 11 November saw five further successful examination passes for members of Rochdale & District ARS – four Foundation and one Advanced. Ashley, M6ODS, Dave C, M6HYA and Lee, M6HXL are now studying for their Intermediate.

#### REGION 4: NORTH EAST

At the November club meeting Denby Dale ARS had an update from the RSGB, presented by Gerald, G3SDY. The latest developments at the RSGB along with a short discussion about Radio Fox hunts took place. This has presented several opportunities for future club evenings, with talks possible about DF antenna, rigs and map reading skills required. The final club event of 2016 was a real ale night at The Star Inn at Lockwood. They were joined by some licencees from Finland who trained at Denby Dale and were keen to catch up with the team that offered them tuition.

Humber Fortress DX ARC in Hull has organised a year's multi club activation to celebrate Hull as the UK City of Culture 2017. Ofcom has kindly granted the callsign GBOHCC for the whole year using the standard NoV format of 28 days; each club will apply for the relevant 28 day portion of the year, following on from the previous club. HFDXARC started the year off at Cottingham Road Baptist Church then transferred to the HFDXARC club house for the remaining 27 days. On 29 January Hull & District ARS take over for the next leg of the event.



On 19-20 November, GB5SH was again operated from St Hilda's Church, Hartlepool as part of the annual festival in honour of St Hilda. In the photo, the recently-appointed Priest-in-Charge, Revd Verity Brown, is seen preparing to read a greetings message to MM0CJH in Elgin, with G8DST operating and licence-holder G3NUA looking on. Using a Flex 6500 transceiver mainly on 40m, the station made over 100 contacts, a significant number being well into the Continent.

#### REGION 5: WEST MIDLANDS

Tamworth Repeater Group say that their 70cm repeater GB3TH is in the process of being upgraded to the Yaesu System Fusion digital repeater platform. After a feasibility discussion and pledges of financial support from active Repeater Group members, Tamworth ARS together with the Tamworth Repeater Group decided to go ahead with the upgrade of the old analogue GB3TH 70cm repeater. Working with Radio World, a Yaesu DR-1XE repeater was purchased. The repeater is being commissioned off air by club members, with a planned installation during January 2017. The repeater will operate analogue FM initially, followed later by a full digital and analogue service once the new Notice of Variation is in place. The photograph above shows Bob, G1BCZ of Tamworth ARS receiving the new Yaesu DR-1XE from Sam, M6LBR at Radio World.



Chris, GORDK (left) is seen receiving a certificate acknowledging 30 years service to RAYNET from Dave, G7BPG, the North Staffs Group Controller. The presentation took place at the Group's recent end of year social gathering. Chris is always ready to turn out for whatever and whenever he is asked: his work and experience is much appreciated.

#### REGION 8: NORTHERN IRELAND



Bangor & District ARS will be hosting a Foundation licence course for all interested parties on 18 and 19 February. For any inquiries or further information contact Harry Squance on 02890 422 762 or e-mail: gi4jtf@gmx.com The photo above shows M10KOA, M10OBC and M10OBR with aerial equipment used for satellite communication at the December meeting.



## REGION 11: SOUTH WEST & CHANNEL ISLES

Sidmouth Amateur Radio Society had a candidate at their recent Intermediate exam pass with flying colours. It was Matthew, M6MTI the Foundation licensee who made the initial call to the ISS from the Kings School Ottery St Mary on 9 May 2016. After Christmas they will be starting an Advanced course that Matthew hopes to join. The club has also assisted the Kings School in starting their own radio society (MOKSO) and operated GB16YOTA in December. A Foundation course for 15 pupils is planned for the New Year.

South Bristol ARC prepared and uploaded a 'Directors Cut' of their Railways on the Air event. It is one of the videos that are available on their YouTube channel. Mills on the Air 2016 can be found along with International Lighthouses and Lightships on the Air 2016 and Railways on the Air 2016 on their YouTube channel or at the club website [www.sbarc.co.uk/club-activities/](http://www.sbarc.co.uk/club-activities/)

## REGION 12: EAST & EAST ANGLIA

The South Essex ARS has five new radio amateurs. They all passed the 4th Foundation course that ended recently. Many thanks to the training team led by Steve, 2E0UEH and Pete, MOPSX for all their hard work.



Thurrock Acorns ARC rounded off 2016 in style with a social gathering at their club venue in Grays, with food, drink and the chance to catch up with fellow club members.



Norfolk Coast ARS' most recent and youngest candidate to pass the Foundation exam is fourteen year old George who now has the call M6HYQ. The photo shows George at the club station trying out his call in Morse. He is making good progress in learning CW and hopes to be on the air in this mode before too long.

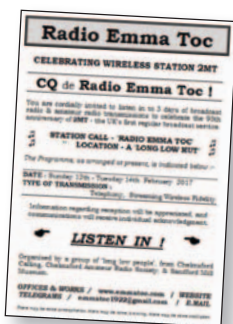


Essex Ham's Monday Night Net continues to be a popular on-air meeting place. In 2016, over 140 callsigns were logged, with a peak of 32 participants. December saw a few firsts, including a live video stream of the entire net, an experimental Virtual Reality chatroom using the new vTime social media platform, and Essex Ham's youngest member Kathryn telling Rachel, G6AMY a couple of Christmas cracker jokes as part of a greetings message. If you're outside the area, find out how to listen to or watch the net at [www.essexham.net](http://www.essexham.net)



## REGION 12 CONTINUED

Jim, 2E0RMI is planning to run a basic internet radio station from 12 to 14 February, with amateur radio transmissions from the Sandford Mill hut on the Sunday & Tuesday, operated by Chelmsford ARS to celebrate the 95th anniversary of the wireless station 2MT. You can read all the details of the event and background information at [www.emmatoc.com/95th-anniversary/4593164029](http://www.emmatoc.com/95th-anniversary/4593164029)



## REGION 13: EAST MIDLANDS

Six candidates passed their exams at Nunsfield House recently. They were (Intermediate exam) Adrian Lawrence, Jonathan Keeling, Michael Lawson and Stefan Latimer; (Foundation exam) Connor Reeve and Nigel Butler. Thanks go to the tutors at Nunsfield House ARC, Dave, G6XOR and Ken, G3OCA for organising the courses in November 2016.



Region 13 had a Regional Team meeting and Christmas meal to make a plan for 2017. The meeting was very successful with a chance to discuss various events and any problems that have occurred. It was enjoyed by all the team present (see photo).

## Feature

# Some simple tips to get the best from RSGB publications

Clubs and other organisations are welcome to publicise their events through the pages of *RadCom*, *GB2RS*, *RSGB* website and social media. But there are some simple tips to getting the best results.

## Club Events Calendar and GB2RS

A single database is used to produce the entries in Club Calendar and Local News for GB2RS broadcasts and online news. All entries should be sent by email to [radcom@rsgb.org.uk](mailto:radcom@rsgb.org.uk) – please DON'T copy or duplicate (CC) the information to other editorial or HQ addresses, because this leads to duplication of effort and, occasionally, entries falling through the cracks.

Your Regional Manager may also like to know what you're planning but is not obliged to pass on the information so *make sure you send it to us*, via [radcom@rsgb.org.uk](mailto:radcom@rsgb.org.uk).

At the start of your email, please put the FULL club name (NOT just initials) and your RSGB Region. Keep your Calendar entries simple and short. Remember to include contact details explicitly: don't just assume we know that you (or Fred) are the club contact. Always include the club contact's name, callsign, email and phone number.

An ideal calendar entry is along these lines:

Fraser Road Radio Club, RSGB Region 9  
Contact: Steve Thomas, M1ACB, 01234 832 700, email [gm.dept@rsgb.org.uk](mailto:gm.dept@rsgb.org.uk)  
February 2017 club programme  
3 Club night in shack  
12 Club net, 145.525MHz, 8pm  
23 My Pet Aardvark, talk by Phil, G9ABC

## Events Roundup

Keep your news item concise, no more than 175 words about each event. If you think you'll need more space for something major please talk to us *well* in advance – by the time you receive your *RadCom* we have already allocated all the pages in the next edition.

Send all submissions for Events Roundup to [radcom@rsgb.org.uk](mailto:radcom@rsgb.org.uk) and, like Club Calendar, please DON'T duplicate (CC) your email to any other editorial or HQ addresses.

## Photographs

Photos submitted for Around Your Region must be *at least* 1024x768 pixels (higher res is better), in sharp focus and must be adequately lit. There are useful hints and tips on taking good photos for publication at <http://tinyurl.com/RadComPix>

When you send a photo, please make sure to attach it to your email as a separate jpg – *never* embedded in a Word document or the email body. Try and avoid lines of people, including those holding certificates. Pictures of people taking part in radio activities are always more interesting to everyone.

We cannot print every photo we receive within the 3 pages available to Around Your Region, so preference is given to high quality, interesting images of club activities.

It is essential that you are either the originator, copyright owner, or have the written permission of the copyright owner for all images that are included in the submission. If your photos include identifiable children you *MUST* make sure you have the parent or legal guardian's permission before submitting their likeness for publication.

## Deadlines

You will always find the deadlines for the next two editions in the red bar at the very start of the Club Events Calendar. If you can send your information well before the deadline, it's much appreciated. The deadline for GB2RS News is normally 10am on the Thursday before broadcast.

## Finally

We're always happy to help any way we can. If you have any questions about material for *RadCom* or GB2RS please don't hesitate to ask us, either by email to [radcom@rsgb.org.uk](mailto:radcom@rsgb.org.uk) or by phone on 01234 832 700, option 8.

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## FREE MEMBERS' ADS OF UP TO 40 WORDS

Email your Members' Ad to [memads@rsgb.org.uk](mailto: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](http://tinyurl.com/MemAdsInfo)).

## FOR SALE

**515 JRC STATION.** NSD Tx. NRD Rx. NBD PSU. Working order but Rx requires attention, £1,300. Speaker, £75. Memory unit, £75. Remote control, £75. JRC 545 with VHF, £1,300. AOR AR-7030 Plus, £425. Yaesu SP-901 speaker, £60. DJ-X7 scanner, £75. Roy, G4VXV, 01759 371 029, [royg4vxv@gmail.com](mailto:royg4vxv@gmail.com) (Yorkshire).

**BENCHER HEX KEY,** £290. bhi NEIM 1031 noise eliminator, £60. Non smoker. Dr Colyn Baillie-Searle, GD4EIP, 0762 441 3036, [gd4eip@wimanx.net](mailto:gd4eip@wimanx.net) (Isle of Man).

**COMMANDER II VHF** (144-148MHz) linear power amplifier. Tested by seller, excellent condition. RF drive power 15-20W, RF output 500W. Weight 27.3kg. £1,700 OVNO, cash only. Collection or will meet for handover. Dave, G4LQT, 0777 562 1139, [g4lqt@yahoo.co.uk](mailto:g4lqt@yahoo.co.uk) (Stafford).

**DOUBLE OO GAUGE LOCO.** Bachmann, 4-6-0 Express (A4!) No 45528. Black, in BR livery. In GWO. £45 ono. Peter Carey, G3UXH, [g3uxh@stanage-edge.com](mailto:g3uxh@stanage-edge.com) (Preston).



**FT-290R,** GWO, complete with YM-47 mic, softie carry case and strap, manual, rubber duck, 7 x C size rechargeables, charger, all in original box. £100 secures the lot, pref buyer collect otherwise add p&p. John Totten, G7LWF, 01380 729 197, [pingledoce@gmail.com](mailto:pingledoce@gmail.com) (Devizes, Wiltshire).



**HI GAIN 18AVQH** 10 / 15 / 20 / 80m vertical. Used for three weeks from new. Cannot use now due to planning problems. Cost £350, sell £195 plus P&P. Stuart, G3WEJ, 0770 784 4031, [bradlys@uwclub.net](mailto:bradlys@uwclub.net) (Devon).

**HP1741A** 100MHz dual beam storage scope, £60. Heathkit HW-101 transceiver with PSU, LS & mic, £120. 1.4MHz crystal filters for AM, USB, LSB & CW, £15 each. Pye 455kHz filter £3. All plus P&P. Bob, G30OU, 01737 552 170, [g3oou@aol.com](mailto:g3oou@aol.com) (Coulsdon).

**ICOM IC-7300,** virtually unused, still has protective cover on screen. Boxed, with Heil Proset 6 ICM (boxed). £900. Prefer buyer collects. Phil, 2E0BBP, 0780 678 0374, [b.alpatch@gmail.com](mailto:b.alpatch@gmail.com) (Stockton on Tees).

**KENWOOD TRIO 9130** 2m all mode transceiver, unmarked, boxed, manual, power pack, cross needle SWR/power meter, 1/4, 1/2 wave whips, mag mount, small 2m beam, £150. Uniden UBC220XLT 200 channel 10 band scanner, charger, £50. Inspect and collect. Maurice, G0AWA, 01661 824 945, [mauricewhall5@yahoo.co.uk](mailto:mauricewhall5@yahoo.co.uk) (Newcastle upon Tyne).

**KENWOOD TS-990 + SP-990 SPEAKER** condition as new. Non smoker's shack. Original boxes. £4,000. Buyer collects or arrange to meet halfway at agreed cost to buyer. Paul, G6MCX, 0783 454 6367, [polarbear2@btopenworld.com](mailto:polarbear2@btopenworld.com) (Chandlers Ford, Hants).

**QY4-250, CV2131 TX VALVES.** Untested, unused, original boxes. £35 ONO + £5 postage any quantity. STC/ITT. 3CX2500F3, untested, offers. 807s – lots! – tested, new, Offers. Phil Moss, MOPBM, 020 8390 6053 (Surbiton).

**SDR IQ** mint condition in original box with lead, guide and disk. Used once or twice then kept in box. £250 including postage. Stuart, G8CYW 0191 413 8400, [stuart.wisher@talktalk.net](mailto:stuart.wisher@talktalk.net) (Tyne & Wear).

**SILENT KEY SALE.** Yaesu MD-100 desk mic, complete with RJ45 lead for Yaesu FT-991 etc, £75. LDG FTL-Meter, external meter for FT-857 and FT-897, £50. RM KL405V broadband linear amplifier, £85. All in good condition and ONO. Andy Dorman, GDOAMD, [Andy@WM.IM](mailto:Andy@WM.IM), 0762 424 1274 (Isle of Man).

**TEN-TEC ORION II,** good condition, upgraded RX366 sub receiver, cooling fan, internal ATU, external speaker, £1,250. P3 Panadapter for use with the Orion II, £150. Buyer collects. Peter, G3XJE, 0797 995 3359 (Huntingdon).

**YAESU FT-450D,** purchased from Lamco on 05/10/16 to be used for digi modes; have now decided not to. The rig was switched on for approx one hour only. Condition is mint and complete as despatched from Lamco. £300. John, G0OID, 01249 890 674, [johngOoid@aol.com](mailto:johngOoid@aol.com) (Nr Chippenham, Wiltshire).

## WANTED

**ALTIMETER Mk29B.** Need not be accurate, will become a museum exhibit. Godfrey, G4GLM, 020 8958 5113, [cgm2@btinternet.com](mailto:cgm2@btinternet.com) (Edgware, Middlesex).

**BIRD 43 THRULINE SLUG.** Either the 500C or even better the 1000C. Any other elements going? Please email me, as I could make use of them. Peter, G4URT, 01323 833 465, [g4urt@btinternet.com](mailto:g4urt@btinternet.com) (Eastbourne)

**BIRD THRULINE ELEMENT 100H** (2MHz to 30MHz, 100W) but also interested in other amateur band elements. Please email me with details about any elements you have and I will respond the same day, thanks. Spencer Tomlinson, MOSTO, [SpencerT@outlook.com](mailto:SpencerT@outlook.com) (Essex).

**CREED TELEPRINTER TYPE 75** (or the Teleprinter Type 12 variant) wanted for a museum exhibit. Does not have to be in working order but needs to look complete. Richard Byford, G4MKR, 0770 874 4380, [g4mkr00@gmail.com](mailto:g4mkr00@gmail.com) (Bedford).

**IC-706 FILTER PCB** and top case for same. Keith D Miles, G6UBP, 0116 210 2340 (Leicester).

**ICOM IC-781** in any condition, working or not. Marcin, MOGLV, 0752 210 0637 (Hull).

**KW2000 TRANSCEIVER** for restoration project so non-working but not too bad general condition preferred. I need a new project to get me interested. Bob Whelan, G3PJT, 01223 263 137, [bob@g3pjt.com](mailto:bob@g3pjt.com) (Cambridge).

**LDG TUNER Z100** or similar model to handle up to 100 watts. John, GW4LPB, 0754 645 1829 (Gwent).

**MAINTENANCE MANUAL OR CIRCUIT DIAGRAM** for Racal 9906 Universal Counter Timer/Frequency Meter. Ken, G3XSJ, 01179 683 003, [G3XSJ@btinternet.com](mailto:G3XSJ@btinternet.com) (Bristol).

**MAXON PM100 U1** UHF mobile 4 channel Tx/Rx; programming software/lead, to enable channels to be added to a NOS unused set for use by Air Cadet unit. Richard, G8ITB, 01689 602 948, [g8itb@yahoo.co.uk](mailto:g8itb@yahoo.co.uk) (Bromley, Kent).

**SCAM 12** mast wanted. Prefer one that is ready to go, otherwise must have straight sections. Collection possible from SE England, otherwise needs to be shipped. Steve, M0BPQ, 0786 650 1288, [steve@m0bpq.com](mailto:steve@m0bpq.com) (NE London).

**TRANSMITTER (VALVE OR HYBRID),** not bothered about WARC, mic etc. Reasonable condx but must be full working order and around 100W. Vic, G4JSS, 0781 010 2479, [g4jss@tiscali.co.uk](mailto:g4jss@tiscali.co.uk) (Wakefield).

## 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 or event is not listed here, PLEASE SEND US FULL INFORMATION**

by email to [radcom@rsgb.org.uk](mailto:radcom@rsgb.org.uk)

That will ensure it gets into *RadCom*, on the RSGB website and read out on GB2RS News

## 5 FEBRUARY

### 32<sup>nd</sup> CANVEY RADIO AND ELECTRONICS RALLY

The Paddocks Community Centre, Long Road, Canvey Island SS8 0JA  
Doors open at 8.30am for traders and 10.30am for the public. There is free parking and the venue has disabled facilities including space outside main doors for disabled visitors. There will be trade stands, special interest groups and an RSGB bookstall. Refreshments, including Mark's famous bacon baguettes on site. Details from Vic Rogers, G6BHE, 0795 746 1694 or Dave Speechley, G4UVJ, 01268 697 978, [g4uvj@btinternet.com](mailto:g4uvj@btinternet.com).

## 11 FEBRUARY

### BALLYMENA RALLY

(no information supplied by organisers)

## 12 FEBRUARY

### HARWELL AMATEUR RADIO SOCIETY RADIO AND ELECTRONICS RALLY

Didcot Leisure Centre, Mereland Road, Didcot OX11 8A  
Talk-in using G3PIA on 145.550. Free parking nearby (disabled parking next to Leisure Centre). Doors open at 10am. Admission £3 (children

under 12 free). There will be radio and electronics stalls, Special Interest Groups and an RSGB Bookstall. Refreshments will be available all day. Details for both traders and visitors from Ann, G8NVI by email to [ann.stevens@btinternet.com](mailto:ann.stevens@btinternet.com) [[www.g3pia.org.uk](http://www.g3pia.org.uk)]

#### 19 FEBRUARY

**RADIOACTIVE FAIR AT NANTWICH**  
Civic Hall, Market Street, Nantwich CW5 5DG  
The venue has free car parking. Doors open at 10am and admission is £4. There will be trade stands and a Bring & Buy. Catering will be available on site. Details by email to [stuart@multimediacontrols.com](mailto:stuart@multimediacontrols.com).

#### 26 FEBRUARY

**BRATS RAINHAM RADIO RALLY**  
Rainham School For Girls, Derwent Way, Rainham, Kent ME8 0BX  
A talk in station, GB4RRR, will operate on 145.550MHz and there is car parking on site. Doors open from 10am to 2pm with disabled visitors gaining access at 9.30am. There will be trade stands, special interest groups and catering on site. Details from Trevor Cannon, on 0771 767 8795, or by email to [Trev@Wig1.co.uk](mailto:Trev@Wig1.co.uk).

#### 26 FEBRUARY

**CENTRAL COAST AMATEUR RADIO CLUB RALLY**  
Wyong Racecourse, Howarth St, Wyong NSW 2259, Australia. Billed as the largest event in Australia. [[www.ccarc.org.au](http://www.ccarc.org.au)]

#### 26 FEBRUARY

**PENCOED AMATEUR RADIO CLUB TABLE TOP SALE**  
Pencoed Rugby Football Club, The Verlands, Felindre Road, Pencoed CF35 5PB  
Doors open at 8am for sellers, tables £10 each (first come first served). Opening time for buyers is 9.30am, admission £2. Hot food will be available in the morning and at lunch time. Hot and cold drinks will be available from the bar (non alcoholic drinks till lunch time). Table bookings via Madeline Roberts, 01639 767 056.

**4 MARCH – LAGAN VALLEY ARS ANNUAL RALLY AND HAMFEST**

**5 MARCH – EXETER RADIO & ELECTRONICS RALLY**

**12 MARCH – DOVER RADIO CLUB RALLY**

**18 MARCH – LAUGHARNE RADIO RALLY**

**19 MARCH – 32nd WYTHALL RADIO CLUB RALLY**

**26 MARCH – CALLINGTON RADIO RALLY**

**9 APRIL – NORTHERN AMATEUR RADIO SOCIETIES ASSOCIATION EXHIBITION**

**30 APRIL – CAMBRIDGE REPEATER GROUP RALLY**

**30 APRIL – WEST LONDON RADIO & ELECTRONICS SHOW (Kempton Rally)**

**1 MAY 2017 (Bank Holiday Monday) – 33rd DARTMOOR RADIO RALLY**

**6 MAY – SOUTHERN ELECTRONICS & RADIO FAIR**

**7 MAY – DAMBUSTERS HAMFEST**

**19-21 MAY – HAMVENTION® (USA)**  
(new venue, see [www.hamvention.org](http://www.hamvention.org))

February 2017

#### 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. Data kindly supplied by Ofcom on 21 December 2016. Note that Ofcom no longer provides Regional Secondary Locator information (GM, MW, GI etc) for the NoV holder, replacing it with a # symbol.

Date	Callsign	Event Phonetics	Location	Parent Callsign
14/02/2017	GB0SMD	St Margaret's Durham	Durham	G#7MBH
17/02/2017	GB2RSC	Radio Scouting Chesterfield	Chesterfield	G#0THF
18/02/2017	GB8MG	Montgomery Guides	Montgomery, Powys	M#5AEO

#### SILENT KEYS

We regret to record the passing of the following Members:

Mr G P McConnell, GWODIB	07/11/2016	Mr K D Brown, G3XQE	28/11/2016
Mr D Burton, G0GKY	18/11/2016	Mr P J Clayton, G4ANQ	07/11/2016
Mr D J Gray, G0LEA	24/10/2016	Mr J T Clegg, G4BIC	2/2016
Mr J Welsh, G0NVZ	5/11/2016	Mr S Cole, GW4BLE	02/12/2016
Mr L A Talkowski, G0SDQ	30/10/2016	Mr W F Turton, G4MSG	24/11/2016
Mr R Endersby, G1AZJ	21/11/2016	Mr W J Young, G4SJT	11/2016
Mr A Harvey, G1XFX	16/11/2016	Mr F Jackson, G6FTB	3/12/2016
Mr T C Bryant, GW3SB (originally 2BXZ)	30/12/2016	Mr B T L Lee, G7FTF	
Mr D A V Williams, G3CCO	10/12/2016	Mr M Saxon, G8HSS	21/11/2016
Mr V D Bullett, G3EAO	24/11/2016	Mr R F Hudson, G8MSM	21/11/2016
Mr M Watson, G3JME	02/12/2016	Mr J F Hicks, G8RYW	09/12/2016
Mr G Brown, G3MZV	15/11/2016	Mr R J Drew, G8URU	30/08/2016
Mr T I Kennedy, GM3OYO	3/11/2016	Mr P Dowthwaite, G8WUY	07/11/2016
Mr W H Fletcher, G3NXT	08/11/2016	Mr D H Clements, RS14170	31/10/2016
		Mr G Frew, RS183879	16/11/2016

**20 MAY – RADARS FLEA MARKET INDOOR SALE**

**28 MAY – DURHAM & DISTRICT ARS RADIO RALLY**

**4 JUNE – SPALDING & DARS ANNUAL RALLY**

**11 JUNE – JUNCTION 28 AMATEUR RADIO RALLY**

**11 JUNE – EAST SUFFOLK WIRELESS REVIVAL**

**18 JUNE – NEWBURY RADIO RALLY**

**25 JUNE – WEST OF ENGLAND RADIO RALLY**

**SAT 8 JULY – STOCKPORT RADIO SOCIETY RALLY**

**9 JULY – CORNISH RADIO AMATEUR CLUB RALLY**

**14-16 JULY – HAM RADIO SHOW, FRIEDRICHSHAFEN**

**23 JULY – FINNINGLEY AMATEUR RADIO SOCIETY RALLY**

**30 JULY – CHIPPENHAM AND DISTRICT AMATEUR RADIO CLUB RALLY**

**13 AUGUST – FLIGHT REFUELLING ARS HAMFEST**

**20 AUGUST – RUGBY ATS ANNUAL RADIO RALLY**

**2-3 SEPTEMBER – TELFORD HAMFEST & G-QRP CONVENTION**

**9 SEPTEMBER – CAISTER LIFEBOAT RADIO RALLY**

**22-24 SEPTEMBER – WACRAL CONFERENCE**

**29-30th SEPTEMBER – NATIONAL HAMFEST**

**13-16 OCTOBER – RSGB CONVENTION**

**15 OCTOBER – HOLSWORTHY ARC RALLY**

**5 NOVEMBER – WEST LONDON RADIO & ELECTRONICS SHOW**

**SAT 18 NOVEMBER – RADARS TRADITIONAL RADIO RALLY**





# RADIO SOCIETY OF GREAT BRITAIN

ADVANCING AMATEUR RADIO SINCE 1913



Founded in 1913 incorporated 1926. RSGB is a trading name of Radio Society of Great Britain, a limited company registered in England and Wales with company number 00216431. Member society of the International Amateur Radio Union.

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

Membership is open to all those with an active interest in radio experimentation and communication as a hobby. Applications for Membership should be made to the 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](http://www.rsgb.org/join)

## YOUR RSGB

This page provides names and contact details for Board Members, Regional Managers, Committee Chairs and Honorary Officers. Members seeking advice and guidance on any aspect of amateur radio or the Society's work are free to contact the relevant person below. Before doing so, please do check the comprehensive FAQs on the RSGB website at [www.rsgb.org/faq/](http://www.rsgb.org/faq/) to see if your question is answered there.

For HQ staff, both e-mail addresses and telephone details are provided, including the option to select when dialling through the RSGB switchboard (01234 832 700).

### Chairmen and Honorary Officers:

These are all volunteers and give their time freely to support the Society. Members should respect the fact that many also have full time day jobs, and so e-mail is the appropriate method of communication.

## THE RSGB BOARD

Nick Henwood, G3RWF (RSGB President)  
email: [g3rwf@rsgb.org.uk](mailto:g3rwf@rsgb.org.uk)

Steve Hartley, G0FUW (Board Chairman)  
email: [g0fuw@rsgb.org.uk](mailto:g0fuw@rsgb.org.uk)

Stewart Bryant, G3YSX, email: [g3ysx@rsgb.org.uk](mailto:g3ysx@rsgb.org.uk)  
Alan Messenger, G0TLK, email: [g0tlk@rsgb.org.uk](mailto:g0tlk@rsgb.org.uk)  
Graham Murchie, G4FSG, email: [g4fsg@rsgb.org.uk](mailto:g4fsg@rsgb.org.uk)  
Len Paget, GM00NX, email: [gm00nx@rsgb.org.uk](mailto:gm00nx@rsgb.org.uk)  
Ian Shepherd, G4EVK, email: [g4evk@rsgb.org.uk](mailto:g4evk@rsgb.org.uk)

**General Manager:**  
Steve Thomas, M1ACB,  
email: [steve.thomas@rsgb.org.uk](mailto:steve.thomas@rsgb.org.uk)

**Honorary Treasurer:**  
Richard Horton, G4AOJ, email: [g4aoj@rsgb.org.uk](mailto:g4aoj@rsgb.org.uk)

**Company Secretary (Acting):**  
Steve Hartley, G0FUW, email: [g0fuw@rsgb.org.uk](mailto:g0fuw@rsgb.org.uk)

**Note:** The General Manager, Company Secretary and Honorary Treasurer are not Directors, but are in attendance at Board Meetings.

## REGIONAL MANAGERS

**Region 1** – M Hazel-McGown, MM0ZIF, [rm1@rsgb.org.uk](mailto:rm1@rsgb.org.uk)  
**Region 2** – Denny Morrison, GM1BAN, [rm2@rsgb.org.uk](mailto:rm2@rsgb.org.uk)  
**Region 3** – K Wilson, M1CNY, [rm3@rsgb.org.uk](mailto:rm3@rsgb.org.uk)  
**Region 4** – Ian Douglas, G7MFM, [rm4@rsgb.org.uk](mailto:rm4@rsgb.org.uk)  
**Region 5** – M Vincent, G3UKV, [rm5@rsgb.org.uk](mailto:rm5@rsgb.org.uk)  
**Region 6** – C Jones, 2W0LJC, [rm6@rsgb.org.uk](mailto:rm6@rsgb.org.uk)  
**Region 7** – Glyn Jones, GW0ANA, [rm7@rsgb.org.uk](mailto:rm7@rsgb.org.uk)  
**Region 8** – P Hosey, M1OMSO, [rm8@rsgb.org.uk](mailto:rm8@rsgb.org.uk)  
**Region 9** – T O'Reilly, G0NSY, [rm9@rsgb.org.uk](mailto:rm9@rsgb.org.uk)  
**Region 10** – M Senior, G4EFO, [rm10@rsgb.org.uk](mailto:rm10@rsgb.org.uk)  
**Region 11** – Pam Helliwell, G7SME, [rm11@rsgb.org.uk](mailto:rm11@rsgb.org.uk)  
**Region 12** – Keith Haynes, G3WRO, [rm12@rsgb.org.uk](mailto:rm12@rsgb.org.uk)  
**Region 13** – Jim Stevenson, G0EJQ, [rm13@rsgb.org.uk](mailto:rm13@rsgb.org.uk)

## SPECIALIST AREAS

### Abuse and Poor Operating

Amateur Radio Observation Service (AROS), Mark Jones, G0MGX, AROS coordinator, email: [aros@rsgb.org.uk](mailto:aros@rsgb.org.uk), [www.rsgb.org/aros/](http://www.rsgb.org/aros/)

### Amateur Radio Direction Finding

Bob Titterington, G3ORY, Chairman, ARDF Committee, email: [ardf.chairman@rsgb.org.uk](mailto:ardf.chairman@rsgb.org.uk), [www.rsgb.org/ardf/](http://www.rsgb.org/ardf/)

### Awards

Chris Burbanks, G3SJJ, Awards Manager, email: [awards@rsgb.org.uk](mailto:awards@rsgb.org.uk), [www.rsgb.org/awards/](http://www.rsgb.org/awards/)

### Contests

Ian Pawson, G0FCT, Chairman, Contest Support, email: [csc.chair@rsgb.org.uk](mailto:csc.chair@rsgb.org.uk), [www.rsgb.org/radiosport/](http://www.rsgb.org/radiosport/)  
Nick Totterdell, G4FAL, HF Contest Committee email: [hfcc.chair@rsgb.org.uk](mailto:hfcc.chair@rsgb.org.uk)  
Andy Cook, G4PIQ, VHF Contest Committee email: [vfhcc.chair@rsgb.org.uk](mailto:vfhcc.chair@rsgb.org.uk)

### EMC

John Rogers, M0JAV, Chairman, EMC Committee, e-mail: [emc.chairman@rsgb.org.uk](mailto:emc.chairman@rsgb.org.uk), [www.rsgb.org/emc/](http://www.rsgb.org/emc/)

### General Technical Matters

Andy Talbot, G4JNT, Chairman, Technical Forum, email: [tech.chair@rsgb.org.uk](mailto:tech.chair@rsgb.org.uk), [www.rsgb.org/technicalmatters/](http://www.rsgb.org/technicalmatters/)

### General Spectrum & Regulatory Matters

Murray Niman, G6JYB, Chairman, Spectrum Forum, email: [spectrum.chairman@rsgb.org.uk](mailto:spectrum.chairman@rsgb.org.uk), [www.rsgb.org/spectrumforum/](http://www.rsgb.org/spectrumforum/)

### GB2RS News Service Management

Ken Hatton, G3VBA, GB2RS Manager, email: [gb2rs.manager@rsgb.org.uk](mailto:gb2rs.manager@rsgb.org.uk)  
(GB2RS news items should be sent to [radcom@rsgb.org.uk](mailto:radcom@rsgb.org.uk))

### HF Matters

Ian Greenshields, G4FSU, HF Manager, email: [hf.manager@rsgb.org.uk](mailto:hf.manager@rsgb.org.uk)

### Intruders to the Amateur Bands

email: [iw@rsgb.org.uk](mailto:iw@rsgb.org.uk), [www.rsgb.org/intruders/](http://www.rsgb.org/intruders/)

### IOTA Activity Programme

Roger Ballister, G3KMA, IOTA Manager, email: [iota.manager@rsgb.org.uk](mailto:iota.manager@rsgb.org.uk), [www.rsgbiota.org/](http://www.rsgbiota.org/)

### Microwave Matters

Barry Lewis, G4SJH, Microwave Manager, email: [mw.manager@rsgb.org.uk](mailto:mw.manager@rsgb.org.uk)

### Planning Advice

John Mattocks, G4TEQ, Chairman, email: [pac.chairman@rsgb.org.uk](mailto:pac.chairman@rsgb.org.uk), [www.rsgb.org/planning/](http://www.rsgb.org/planning/)

### Propagation Studies

Steve Nichols, G0KYA, Chairman, Propagation Studies Committee, email: [psc.chairman@rsgb.org.uk](mailto:psc.chairman@rsgb.org.uk), [www.rsgb.org/psc/](http://www.rsgb.org/psc/)

### Repeater and Data Communications

John McCullagh, G14BWM, Chairman, ETCC, email: [etcc.chairman@rsgb.org.uk](mailto:etcc.chairman@rsgb.org.uk), [www.ukrepeater.net](http://www.ukrepeater.net)

### Training & Education

Philip Willis, M0PHI, Chairman, Training & Education Committee, email: [tec.chair@rsgb.org.uk](mailto:tec.chair@rsgb.org.uk), [www.rsgb.org/clubsandtraining/](http://www.rsgb.org/clubsandtraining/)

### VHF Matters

John Regnault, G4SWX, VHF Manager email: [vhf.manager@rsgb.org.uk](mailto:vhf.manager@rsgb.org.uk)

### Youth Committee

Mike Jones, 2E0MLJ, Chairman, Youth Committee email: [youth.chairman@rsgb.org.uk](mailto:youth.chairman@rsgb.org.uk), [www.rsgb.org/youth-committee](http://www.rsgb.org/youth-committee)

Details of the Society's volunteer officers can be found in the RSGB Yearbook and on the RSGB website, [www.rsgb.org](http://www.rsgb.org)

## WEBSITE

### Main website: [www.rsgb.org](http://www.rsgb.org)

**Members Pages:** Log in using your callsign as the user name and your Membership number, without the leading zeros (see your *RadCom* address label) as the password. It is good practice to change your password.

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Telephone: 01234 832 700, Option 4

### Amateur Radio Examinations

email: [exams@rsgb.org.uk](mailto: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](mailto:radcom@rsgb.org.uk)  
Telephone: 01234 832 700, Option 8

### GB2RS and Club News

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### Amateur Radio Licensing Enquiries

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## PLAY YOUR PART IN YOUR RSGB

### Have Your Say

Let us know how we're doing! Through "Have Your Say" you can let us know your views and you will receive a reply from the General Manager or a Board Member.  
Write to [haveyoursay@rsgb.org.uk](mailto:haveyoursay@rsgb.org.uk) or go to [www.rsgb.org/haveyoursay/](http://www.rsgb.org/haveyoursay/)

### Consultations

From time to time you will find we are consulting the Membership on aspects of Society policy. You can find current consultations at [www.rsgb.org/consultations/](http://www.rsgb.org/consultations/)

### National Radio Centre

Don't forget to tell your friends about the National Radio Centre at Bletchley Park. Full details at [www.nationalradiocentre.com](http://www.nationalradiocentre.com)  
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### Licensing & Special Event Stations

Licensing and Notices of Variation (NoVs) for special event stations are handled by Ofcom, 0207 981 3131, [www.ofcom.org.uk](http://www.ofcom.org.uk), e-mail [Spectrum.Licensing@ofcom.org.uk](mailto:Spectrum.Licensing@ofcom.org.uk)

### FAQs

The RSGB has compiled the questions most frequently asked by Members at [www.rsgb.org/faq/](http://www.rsgb.org/faq/)

### Band Plan

The latest version of the band plan is always available on the website at [www.rsgb.org/band-plans/](http://www.rsgb.org/band-plans/)

### Good Operating Practice

The RSGB fully supports the code of conduct and encourages all amateurs to read the advice at [www.rsgb.org/op-guidelines](http://www.rsgb.org/op-guidelines)

### RSGB Tech

The purpose of this service is to be the first port of call for technical queries on amateur radio matters. It is open to all radio amateurs. See <http://groups.yahoo.com/group/rsgbtech/>

### RSGB Shop

All RSGB goods – books, filters, clothing etc – can be purchased online at [www.rsgbshop.org/](http://www.rsgbshop.org/)

### Club Finder

Use the website to find your nearest radio club and check out the facilities they have to offer. [www.rsgb.org/clubsandtraining/](http://www.rsgb.org/clubsandtraining/)

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## JUST WHAT IS IT?

**Paul McGoldrick, G6AAC**

The strange antenna-like structure in the photo by Steve White is, unfortunately, not RF at all. It is the main Kuta siren system that is part of the Indonesian Tsunami warning system and includes emergency broadcasts. The siren is supposedly audible up to four miles away and wails for three minutes when an alarm is sounded. It is also tested once a month. This area of Bali is particularly vulnerable to a tsunami and is divided into Red and Yellow Zones. If in a Red Zone you are urged to go – on foot because of the narrow streets – into a Yellow Zone and if you're in a structure already, such as your hotel, to go to an upper floor. No rush, of course, not with a 15 minute warning...

## LETTER ON INTERFERENCE

**Peter Swinbank, GW8AHB**

The responses Paul Burgess, G3VPT received from his several correspondents were, as he said, essentially useless.

I spent ten years of my career helping newbies to the subject to implement the requirements of the EU Council Directive 89/336/EEC on the subject of EMC and it seemed that few people had really got the essence of the directive, never mind the subject.

The manner of the implementation was that the Directive is “addressed to the member States”, which means each State implements the directive by means of its own legislation. Britain, as with everything foreign, insists on taking it, rewriting it and publishing the rewrite as a Statutory Instrument called the Electromagnetic Compatibility Regulations 1998 or 2004.

Never mind too much detail of that, the “essential requirements” as they are called in the EMC Regs are that the equipment does not radiate too much and that it is reasonably immune. And these requirements are defined by test specifications that measure the radiation of the equipment, sees whether the radiation is below a certain level, and subject the equipment to an electric field of specified strength and see whether it continues working. Doing these tests is NOT mandatory.

Similar requirements apply to installations (except the CE Mark) essentially suggesting that proper installation must be done and suitable equipment used within it.

In the end, before a thing goes on sale it is necessary to make a formal Declaration of Conformity stating that it does meet the essential requirements. And also before it is put on the market a CE mark has to be affixed to the equipment or the packaging. A cowboy may take a punt and sign the Declaration of Conformity with no knowledge whatever of the subject – neither technical nor legal.

He is only found out when a problem such as that of G3PVT arises – and he knows there is little that can be done to bring him to book.

**James Eade CEng, G8AJP**

In the case G3VPT raises it seems to me that the issue is not specifically getting rid of the interference (as most of us have always thought since the days of the GPO) but the installation of a fixed installation (maybe well engineered, maybe not) using components that do not meet the requirements of the Directive.

In this case, the supplier is in breach of the law, and must cause the installation to meet the Essential Requirements.

The enforcers of this are the Trading Standards office of the local authority: begin with them (assuming they have enough budget to fund such action – which I doubt). My apologies for all the positivity of Eeyore; this is an ignored and badly understood subject despite five EU Directives over thirty years).

In respect of Paul Burgess' letter regarding his apparent dead-end in resolving an EMC issue, he has been misled somewhat. CERTSURE were probably wrong to suggest that its member's installation conforms to current requirements. In the Wiring Regulations, it is a requirement that installers ensure that the requirements of the EMC directive have been met (regulation 512.1.5), apparently not the case with this particular installation. Therefore it may not comply with BS 7671 and CERTSURE should intervene – the trade association the electrical company is a member of (either the NIC EIC or ECA) provide a warranty for the installers work.

While Mr Burgess could make representation to them, I have little confidence anything will come of it. The equipment manufacturer will blame the installer and vice-versa; Ofcom is too under-resourced to do anything and CERTSURE will argue (probably fairly) that to achieve such compliance is ill-defined and nigh-on impossible with the variety of installations it covers. The inclusion of installations into the EMC Directive is a problem that has vexed the Wiring Regulations Committee amongst others.

This is a shining example of how valuable the work of the RSGB EMC Committee is, particularly fighting some of these problems at the early standards development stage. Long may members support its good work – it's much needed, even if just to keep the committee supplied with painkillers for the constant head-banging that goes on...

## DON'T LET IT PUT YOU OFF

**Brian Butler, G4LUL**

I was interested to read the account in December's *RadCom* by Howarth, GW3TMP and the response he received from Ofcom and the power company to his interference complaint. The response by Ofcom was not what I experienced and hopefully this will not put him or other radio amateurs off making reasonable complaints to Ofcom. I had a

problem with Top Band interference in 2014 and after doing as much as possible to ensure that it was not coming from my property (all power, battery-backed burglar alarm and solar PV systems isolated) I contacted Ofcom. The response and service was superb and after three visits by Ofcom officers plus work by myself it was traced to a cheap non-EMC compliant Chinese copy of a laptop charger at a nearby house. The full account can be read at [www.ukqrm.org.uk/your-story.php](http://www.ukqrm.org.uk/your-story.php)

I would encourage any radio amateur that has interference to read my account and not be dissuaded by the potential charge of £96 per hour if the interference is found to be on the complainant's property or within his or her control. It is not difficult to prove that your property is 'clean', just carefully assess what you have and isolate it. From my experience the mains supply and solar PV systems or burglar alarms are simple to isolate and there should be little else that is difficult to identify as a potential source in a normal household. It also goes without saying that the complainant should do as much as they can to identify the source and if possible try to find an amicable solution, however this does raise a question as to how it will contribute to statistics if not reported to Ofcom. Perhaps the RSGB might be able to record such cases by virtue of their website; a small form would suffice.

It is clear from what we read in this and other journals that many cases of interference are due to non EMC compliant equipment or supposedly compliant equipment that is not being used in the manner in which it was meant to be or tested. Surely the reason that Ofcom has recently made changes to the Wireless and Telegraphy act reinforces this view. If we don't report these problems to Ofcom the statistics will indicate that the problem is not as bad as it is and organisations with a vested interest in importing and selling non-compliant electronic junk will continue to get away with it. This problem affects all users of radio and electronic equipment and sadly we can't rely on politicians or trade bodies to do anything about it, as has been seen with the PLT situation. There are many good manufacturers of equipment who take a responsible attitude to EMC but there are so many more who don't care or don't understand, sadly so far regulation or policing of this situation has been poor as legislation states that enforcement is complaint driven and this is all the more reason to report interference problems. It is Ofcom's responsibility to take note of these matters but this can only take place if we as radio amateurs report interference problems to them. I also recall one leading expert in EMC saying that “radio amateurs are the canaries in the coal-mine”: we are likely to detect interference / EMC issues before any other users and therefore have a responsibility

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to report problems and, as we can't rely on other people addressing the problem for us, we have to do it for ourselves.

*Peter, James and Brian make good points in their replies but as always there is some 'devil in the detail'. Ofcom do not consider wiring between solar panels as "apparatus" and thus claim it is not covered by S54 regulations. Ofcom also argue that Solar PV are not Fixed Installations as defined by EMCD. We tackled them on these points when they consulted and then updated the S54 regulations last year this is the answer they gave (from the RSGB website) <http://tinyurl.com/he9nmb7>.*

*In our experience most solar PV installations can be made RFI quiet by correct wiring layout and judicious use of ferrites. There are a few poor inverters and optimisers that exceed emission levels and cannot be fixed in this way.*

*As Brian says Ofcom will resolve issues caused by non-compliant apparatus like SMPSUs and they can then follow up to stop them being sold. EMCC also offers advice and support on how to find and resolve EMC problems yourself, which can allow Ofcom to utilise their scarce resources on more difficult problems.*

*If you have an EMC problem please report it to us; we will try to help. You can use the 'submit your interference report form' on the RSGB website. We collect the information together and use it to lobby Ofcom for action on non compliant apparatus. Thanks James for your words of support for the overworked volunteers of the EMC Committee. If you would like to help this work please email me.*

**John Rogers, MOJAV**  
[emc.chairman@rsgb.org.uk](mailto:emc.chairman@rsgb.org.uk)

## FUTURE OF UK ACTIVITY CONTESTS

**Trevor Clapp, formerly 2E0LDZ/P**

Being relatively newly licensed, this year [2016] I embarked on my first year of VHF contesting on the UKAC, and a great time I had doing it. I couldn't operate very well from home so developed a portable station to do as well as I could. However we end 2016 not knowing what we might be doing next year with the 'shake up' at the VHFCC and it looks as if all my 'development' will go to waste. As a new licensee and a year-old VHF contester I write to express my concern at how the contesting review has been handled. Perhaps this is the usual way that the RSGB go about

things but it seems a very odd to me.

Coverage in December's *RadCom* told us that decisions had been made but gave no detail, leaving our club with no ability to plan for what we might be doing next year. Surely the detail has to be worked out before the decision to make changes are made? So either the decision to change the rules has been made in advance of the detail or something is being held back.

There seems to have been a unilateral decision to change pretty much all of the rules without even seeking a mandate from the contesting community who actually haven't asked for change, and who, when asked at the Convention, gave the view that the UKAC wasn't broke and didn't need fixing.

Having faced the wrath of Mrs LDZ for converting the car to a mobile contesting station (with a 40' mast on it) and seeing the possibility that this might now be sitting in the drive doing nothing next year I thought I ought to find out what was behind this. Digging a little deeper it turns out that a minority group, some of whom are current testers and some not, have been lobbying the VHFCC for over a year to make changes that would favour them. Not most of the testers, only some of them (fewer than 10 active testers out of 200) and this is that has instigated the President's and the VHFCC's drive for change.

We were then issued with a questionnaire that was written on the basis that there had to be change. A change that nobody wanted and there was no option for us to vote for staying as we were with the rules.

So we now have a biased scoring system imposed upon us, some changes to how clubs can be structured to fit in with, as yet, unpublished rules and the rearrangement of the days on which some bands take place.

Could I please ask that a good look is given to the instructions given to the VHFCC to ensure that they start to act on behalf of



all of the testers and RSGB Members that they represent. Until that time "I'm out", as they say on *Dragons Den*, but unlike some of our disgruntled community I will retain my Membership as I am optimistic that the powers that be in the RSGB will take a careful look at how this has been handled and now steer the CC in the right direction.

*I'm surprised by your view of the way that the changes to the 2017 UKAC rules have been. The new proposals were developed as a part of a major Presidential Review of Contesting that started in 2015 – not by "pressure from a group with less than 10 active testers" – but from a much wider push from the UK contesting community for changes. The major VHF action from that review was to attempt to develop a scoring system that has no discrimination across the whole of the UK. Options to build a scheme that was fairer across the whole UK (from the perspective of where the actual activity exists) were developed and described in considerable detail in a number of public reports. One question within the annual survey, sent to all entrants, and responded to by well over 400 people, asked if they supported these changes to the scoring system change or not. 58% of those who expressed a view on this question supported the change. The size of the majority was too large to ignore, and after 16 months of discussion it seems time to test the new scoring system through 2017 and use what we learn to refine what we do in 2018.*

*Equally – the moves of some of the UKACs to Thursdays were based following many requests over a number of years to separate the 6m and SHF events, and to allow for more than four 4m events per year. These were also clearly consulted on, and the changes received very clear majorities.*

*I'm sorry that we weren't able to finalise the rules for the 2017 contest season more quickly, but the intensity of the discussion around these rule changes took a huge amount of unplanned volunteer time to resolve between September and December. This delayed us getting the final rules published. I'd really like to encourage you and others to come on for the UKACs. Nothing has been done here that should make your developments go to waste, we don't expect the events to significantly change in their feel, and the contests should remain great fun.*

*We've taken great care to give everyone the opportunity to comment on these changes and have then implemented the majority view. Sadly, it's impossible for the committee to please all of the people all of the time and so the whole contesting community relies on people entering, even when they personally don't personally like every one of the rules.*

**Andy Cook, G4PIQ**  
**Chair, RSGB VHF Contest Committee**



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Full 1.8-30MHz operation 300W antenna tuner with peak cross meter.

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HF/VHF/220 MHz, .53-230 MHz, SWR Analyser.

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300/150W Dual power ATU 1.8 - 30MHz.

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### MFJ-991B

HF 300/150W Dual Power ATU.

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Yaesu Rotator Controller with USB port for remote control, Graphic LCD screen, user-programmable call sign, 9/16" antenna direction display and more

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VNA Antenna Analyzer covers 1-230MHz, 1Hz resolution.

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Deluxe Morse Code Practice Oscillator with a straight key on a non-skid heavy steel base.

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## Martin Lynch & Sons

**A family owned and run business serving  
the Ham Radio Community since 1990**

**David Boyd M16GPQ**

I am writing to express my gratitude  
for a fantastic customer experience  
with Martin Lynch.

**Adam**

I just wanted to say thank you for  
some great service I received on  
Saturday just gone.

**Mick G4PRJ & Angela G8XCX**

Many thanks for the prompt  
dispatch and delivery which  
arrived at 11:30 today. I  
appreciate the great service you  
provide, all the best for Christmas  
and the New Year to all at ML&S.

**Phil Gell - G0NIK**

Purchased, by phone, diamond car hatchback mount  
and antenna lead for same in the week. Ordered by  
2pm arrived by 8.30am next day in Suffolk.

Advice v. helpful from knowledgeable team member at  
shop.

What brilliant service. So glad I buy from Martin Lynch  
& Sons. Thanks.

**Francesc EA3HGP (Aug 16)**

Hi Martin, greetings again.

A few days ago bought a 6300 FlexRadio used in your store.  
He has come home properly and I'm enjoying it very much.

Thank professionalism and their treatment.

Greetings from Catalunya.

**Joe G0FY5**

Thanks for prompt delivery of my  
order which I received today at  
11:26 am. Less than 24 hours from  
ordering. Good Service.

**Owen G0RCL**

I'd just like to say a big thank you  
to all at Martin Lynch & Sons for the  
professionalism within the company,  
with a very speedy and positive  
response to my radio fault.

**G6ATJ**

All equipment now  
working 100%. Thanks  
to fantastic no-quibble  
customer service.

**Dr. Tony Hawker G4CJZ / G8CJZ /  
M0RXQ**

Many thanks to the sales team for  
their help in selecting the product  
and the superb packing and  
despatch at your end.

**Marko, oh8gbo**

I will totally recommend you guys!

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