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# Contents

October 2017

## News and Reports

Around Your Region – Club events calendar	84
Around Your Region – Events roundup	88
New products	14
News	12
RSGB Matters	6

## Regulars

Advertisers index	93
Antennas, Mike Parkin, G0JMI	26
GHz bands, Dr John Worsnop, G4BAO	73
HF, Martin Atherton, G3ZAY	68
LF, Dave Pick, G3YXM	66
Members' ads	94
Propagation, Gwyn Williams, G4KFH	96
Rallies & events	95
Silent Keys	95
Special event stations	95
Sport radio, Steve White, G3ZVW	78
The Last Word	97
VHF / UHF, Richard Staples, G4HGI	70

## Reviews

Book review, Giles Read, G1MFG	81
Moonraker HT-500D handheld, Richard Staples, G4HGI	62



40



40

## Technical Features

Data, Andy Talbot, G4JNT	80
Design Notes, Andy Talbot, G4JNT	30
EMC, Dr David Lauder, G0SNO	54
GB30RK 5.29MHz beacon upgrade, Andy Talbot, G4JNT	32
Homebrew, Eamon Skelton, EI9GQ	16
Multiband switchable dipole, J H Winnard, G3SPE	46
Practical Notes on the UKAC, John Wilkinson, G4HGT	22

## Features

Market surveillance and enforcement at Ofcom, Amy Hemmings	48
National Hamfest	56
RSGB Convention, Graham Murchie, G4FSG	58
The Patron's retirement from public engagements	83
YOTA 2017, Milo Noblet, MO1LO	40
Youth Contesting Programme, Philipp Springer, DK6SP	74



Cover image: YOTA 2017

**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 November edition of *RadCom* is expected to arrive with most Members by 23 October although this can take up to a week longer in some cases; international deliveries can take longer still.

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## YOTA 2017 and Strategy 2022



As I write this I am just back from YOTA 2017; a week of intense activity and, whilst I am exhausted, I am invigorated by the feedback that shows the event to have been a great success. The event was an excellent demonstration of our **Strategy 2022** in action and it is worth looking at how those high level strategy words can become much more tangible.

Did YOTA fit with our **Purpose**? The event certainly promoted and enhanced the use, understanding and enjoyment of wireless communication for those in attendance – just take a look at the Daily Video Diaries on the RSGB website if you need convincing of that! There was much media attention and social media was alive with tweets, re-tweets and likes around the globe. Some of the Scouts who watched our ARISS contact were ready to join a Foundation course the very next day.

Did we stick to our **Values**? The happy smiling faces that were clear to see confirmed **Enjoyment** was being had in learning about and using wireless communications, even when ARDF was effectively done 'under water' on the wettest August day ever. **Progression** was made in terms of overseas amateurs learning about UK training, assessment and exams and in many of the attendees experimenting with new modes or building transceivers for the first time; there were so many firsts during the week, I lost count. The **Community** spirit enshrined in the phrase 'International Friendship through amateur radio' was a real pleasure to observe; the diversity of around 80 youngsters from 26 countries gives you real optimism for the future of the amateur radio service and the IARU. And of course we could not have done any of this without the **Service** delivered by RSGB volunteers, HQ staff and helpers from our Affiliated Radio Clubs.

Will any of this help us meet our **Goal** for 2022? As a one-off event, maybe not, but it did highlight the fact that young people still find amateur radio fun, challenging and educational. There was also lots of evidence of youngsters with impressive expertise in wireless technology, ranging from brand new digital modes to high speed Morse sent by hand. If the engagement, enthusiasm, determination and success we witnessed at YOTA 2017 can be replicated in our contests, Club meetings, Conventions, DXpeditions, etc, we cannot fail to have an active thriving amateur radio community, supported by a strong, representative and influential RSGB by 2022.

You and your Clubs are part of the RSGB and you can use the RSGB Strategy to guide your activities and help contribute to the overall delivery of our Strategy. When you are planning your activities, see if the **Priorities** help spark ideas: What can you do to promote the **Growth** of amateur radio? Can you help with EMC issues to maintain and enhance our ability to use **Spectrum**? How can you support and encourage active **Participation**? Can you carry out some **Research**? How can you encourage people to experience the **Diversity** of amateur radio activities and radio amateurs? How can you help to increase our **Membership**? Who do you think deserves **Recognition** for their achievements/contributions? Can you help the RSGB **Organisation** in a more formal way by volunteering or standing for election? Not everyone will be able to contribute to all of the **Priorities** but if we all do something, we can meet that 2022 goal together.

Steve Hartley, G0FUW

RSGB Director & YOTA Project Manager

### DX Contest

Please put the RSGB DX Contest in your diary – the 8th of October. This year, the contest is a single day event but has been expanded to 18 hours, running from 0500-2300UTC, and now includes SSB and CW on the 3.5, 7, 14, 21 and 28MHz bands. The contest exchange is simply signal report (RS(T)) plus serial number – starting at 1 and incrementing by 1, irrespective of band. All QSOs will score but points are higher for DX QSOs and higher band contacts.

Multipliers are the countries of the DXCC list on each band and mode for United Kingdom, Channel Island and Isle of Man stations and for other stations the first contact with each United Kingdom, Channel Island or Isle of Man callsign prefix, for example, G3, GJO, MMO etc, on each band and each mode will be a multiplier.

The DX Contest is a development of a long-established series of HF contests on 21 and 28MHz that is now enhanced to accommodate a period of reduced propagation on the higher bands. This contest is always an excellent opportunity for United Kingdom, Channel Island and Isle of Man stations to have DX QSOs and for other stations to work United Kingdom, Channel Island and Isle of Man stations on multiple bands and modes.

The contest is held near to the autumnal equinox that can deliver excellent world-wide propagation.

Scores in the DX Contest contribute towards the RSGB HF Championship.

The full rules can be found from the RSGB HF Calendar page at [www.rsgbcc.org/hf/](http://www.rsgbcc.org/hf/)

### 60 years of Jamboree on the Air

This year sees the 60th anniversary of Jamboree on the Air. The Scout organisation hopes that radio amateurs old and new will take part in the event over the weekend of 21 and 22 October. JOTA and its little brother JOTI – Jamboree on the Internet – remain the biggest Scout event in the Scouting calendar, with possibly a million or more taking part. It seems that many young people get their first introduction to the hobby at JOTA and because they are encouraged to take an active part, they come back for more and sign up for courses.



There should still just be time now to apply to Ofcom for a special event callsign or run a station using your own. Scout groups are often looking for an amateur to assist them and even the smallest station is still part of the celebrations. At a Scout amateur radio seminar a few years ago, delegates were asked to come up with slogans – perhaps the best was 'Friends you didn't know you had!' See [www.rsgb.org/jota](http://www.rsgb.org/jota) for more details.

Richard Gaskell, GOREL

UK JOTA Co-ordinator

### Ofcom VHF and Microwave NoVs

Following work by the Society with Ofcom, improvements to two licence Notice of Variations are now available.

Successful applicants for 70.5-71.5MHz Special Research Permits (SRPs) for digital experimentation are now able to download their NoVs from the RSGB website at [www.rsgb.org/nov](http://www.rsgb.org/nov). However, the initial application process remains, in which an SRP application form must first be submitted to Ofcom for assessment.

Ofcom has updated the conditions of the 2300-2302MHz microwave NoV. Operation from Jersey and Guernsey is now also permitted under the latest terms. As many of the existing 3-year NoVs are due to expire, all holders are encouraged to renew on line from [www.rsgb.org/nov](http://www.rsgb.org/nov) in order to benefit from the latest terms.



## Convention Construction Competition

The RSGB annual Construction Competition is open for entries and judging will take place at the RSGB Convention in October. The aim of the competition is to encourage home construction, experimentation, design and innovation. It can be entered by individual Members or groups of Members where the build team will be treated as a single entrant. All entries must be available for judging at the RSGB Convention but the constructor need not be present.

The closing date is the end of September and any project that you have built, other than one that was a previous winner in this completion, may be entered.

Entries must have an amateur radio context and contain an element of home construction but we do not stipulate whether this is mechanical, electronic, software or system. The judges would appreciate a succinct description of the project objective, its design, interesting problems that needed to be solved, and evidence that it works, such as showing it working, showing a video of it working, providing photographs, details of contacts made with it etc.

Full details of the four categories – Innovation, Construction, Beginner and Junior can be found on the RSGB website. Full details are at <http://rsgb.org/main/about-us/rsgb-convention/convention-construction-competition/>

## New Chair of Examinations Group



The successor to Alan Betts who has stepped down as Examinations Group (EG) Chair is Prof Peter Richmond, MOHBL. Peter has been interested in amateur radio since his

schooldays and says it was this that led him to read for a physics degree in London. Research into the electrical and magnetic properties of semiconductors followed and it may surprise some readers to learn that this interest in electricity and magnetism led to a career with Unilever looking into the effectiveness of washing powders and the nature of food. A lengthy career in research and general management followed until the mid 1990s when he took up a post in Trinity College Dublin applying his physics skills to problems in economics and social science, which continues to this day.

Having retired, Peter managed to find time to return to amateur radio and obtained his licence in 2012. Shortly afterwards he joined the Examinations Group, making an early impact with a study on keeping up the standards of UK multiple choice amateur radio exams. His main radio interests centre around QRP and data modes using his SDR radios.

A key aim of the new Chair is to ensure the new syllabus is implemented. The traditional focus on examination questions remains important. The new syllabus demands more questions in new areas as well as updated questions in some traditional areas. New teaching material and support for tutors will also be needed. As Chair Peter welcomes input from any amateur who wants to help with these tasks.

## December YOTA month

Following on from an extremely successful YOTA 2017 summer camp, we would like to remind you all that every December, the IARU organises Youngsters on the Air (YOTA) month, which is a month-long activity specifically aimed at getting young people operating amateur radio.

The RSGB has arranged for clubs and groups to use the special callsign GB17YOTA on a rota basis. The application process for the use of the special callsign has now been finalised and the form is available by emailing [yota.month@rsgb.org.uk](mailto:yota.month@rsgb.org.uk)

There are only 31 allocations so applicants are asked to give three choices of date in an attempt to resolve diary conflicts. There are some conditions attached to using the GB17YOTA callsign and these are included on the application form. Events may be limited to club and group members or you might like to open the doors to Scouting, Guiding and Cadet groups or spend a day at your local school, college or university.

Applicants are encouraged to think about making the most out of the activation by including other activities, such as Morse demonstrations, ARDF hunts, WSPR beacon displays, listening to remote SDRs, use of Arduino or Raspberry Pi etc. The RSGB will gladly provide some promotional material, stickers, badges etc.

If young amateurs cannot get to these stations to take part, they can still join in by working as many YOTA stations as they can during December. Last year over 30 countries took part and there is an IARU award for working the YOTA special event stations.

Further details are available at [ham-yota.com/december-yota-month](http://ham-yota.com/december-yota-month)

## 2017 IARU Region 1 Conference

The IARU Region 1 General Conference is being hosted by DARC at Landshut in Germany from 16 to 23 September. These events are held once every three years and cover a wide range of topics from HF to microwaves, as well as other general and policy matters. The agenda has over 120 papers, aided by a record number of RSGB proposals.

Amongst the topics expected to have detailed discussion are the future of amateur radio, Region 1 constitution updates and budget priorities, WRC-19, youth and development programmes, EMC, changes to VHF contest organisation, band plans etc.

The event also marks the retirement of volunteers Martin Harrison, G3USF, Iain Philips, G0RDI and Colin Thomas, G3PSM, who have given valuable service over many years.

A future edition of *RadCom* and our news will have more information of the results, which will also be on the agenda for the annual Spectrum Forum meeting on Saturday 28 October.

Conference Papers can be found at [www.iaru-r1.org/index.php/general-conference/landshut-2017](http://www.iaru-r1.org/index.php/general-conference/landshut-2017)





## Club of the Year

The winners of the National Competition, kindly sponsored by Waters & Stanton, will be announced at the National Hamfest in September.



South Kesteven ARS were presented with the Region 13 Regional Club of the Year COTY award recently. Also present Ian, G4EVK, Andrew, MOSKA Jim, G0EJQ RM 13, Graham, G8NWC DRM 135 and Andrew, G0FVI DRM 137.



South Bristol Amateur Radio Club was joined at its summer BBQ by RSGB Region 11 Deputy Regional Manager Dick, G0XAY. He presented the club with their certificate for Region 11 Small Club of the Year 2016.

## New exam syllabus: update on progress

The draft exam syllabus put out recently for consultation by the Examination Group (EG) evoked a sizeable response and, through the pages of *RadCom*, the EG would like to express thanks to all those who took the time to respond with helpful and constructive comments. As everyone recognised, quite a few changes are proposed. Digital methods and technologies are included for the first time. Even a cursory read of *RadCom* will show that digital methods and technologies have been part of the mainstream of amateur radio now for many years; they have also been a feature of school syllabuses for some time and it is obviously time for these developments to be included in the amateur radio syllabus. The second issue the Group felt had to be addressed arose out of numerous discussion over the years with Ofcom who have expressed the view that the level of the Intermediate syllabus was too low relative to the privileges awarded. Moreover, the present exam did not provide an adequate preparation for the Advanced exam; the jump was simply too large. This is reflected in the pass rate for the Intermediate level exam that, in recent years, has been 95.2%. Compare this to the Foundation level (84.1%) and the Advanced level (67.9%).

The changes that drew the largest response were those proposed at Foundation level. Many felt the content was now too large and could not be taught within the usual two weekend sessions. With all exam syllabuses there is a balance to be struck between ensuring they can be taught within a finite time and ensuring they cover in a sensible and serious manner the necessary material. Some sections such as antennas and propagation included additional content simply because it is in these areas where a Foundation licensee can and should experiment. The new content is not intrinsically harder than that in the present syllabus and the EG holds the view that a more comprehensive but yet still basic knowledge of these aspects will enrich the ability of the Foundation licensee. A second point made was more specific. Why study resistors in parallel at Foundation level, which brings in another (complicated) formula to remember, making it more difficult? Our current thoughts are that we need to introduce some electrical basics because there is evidence that progress at Intermediate is being affected in those areas. It is intended to be helpful to the student to see these DC concepts first at Foundation, rather than at the same time that the more complex Intermediate level ideas have to be absorbed. However the EG will seek additional advice and guidance on all these aspects.

There were a number of minor typographical points and errors of fact pointed out, for which we are grateful. We shall be meeting to debate all the points raised and will also be open for discussion at the Convention. The aim remains to have the syllabus and associated questions in place during 2018.

A final general point that has guided the EG is the recognition that amateur radio is a hobby with diverse aspects. It is more than simply operating even at Foundation level. It includes contesting with all its associated knowledge of geography and the location of countries across the world; it requires knowledge of how radio waves propagate; how to construct and set up an effective antenna and link it to the radio. It requires novel use of with computers to generate for example digital modes. Last but not least any amateur at any level should know the constraints imposed by the Ofcom Licence, something recent debates on the yahoo tutors group suggest is not always the case.

Exams at all levels should recognise and offer questions across all these diverse aspects giving everyone a chance to show their individual talents and participate in the amateur radio community.

## TX Factor

The next episode of TX Factor is out on Friday 15 October and is likely to inspire a little bit of antenna envy as the team heads for Gilwell Park in London to meet the young radio amateurs from around the world who got to use of the impressive aerial farm at YOTA 2017. Bob McCreadie, G0FGX and Pete Sipple, M0PSX meet the teams and the organisers and find out about the many amateur radio activities the youngsters took part in, including an introduction to ARDF and an exciting and challenging construction project. We also meet a young German visitor who has taken bicycle mobile operating to a whole new level!

The antenna envy continues as Bob heads to Goonhilly in Cornwall to join a group of amateurs who have been given access to one of the site's huge 32 metre dishes to see if they can make some EME contacts on 3.4GHz and 5.7GHz.

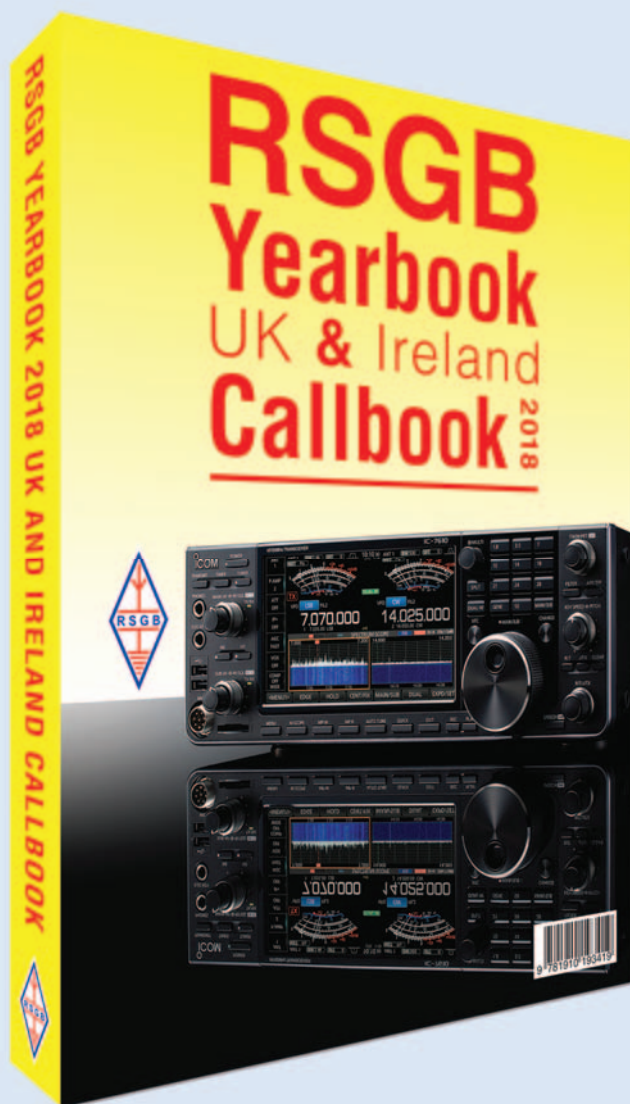
Episode 19 also gives you the chance to win a couple of great additions to your shack from the show's two sponsors. Up for grabs is a copy of the new RSGB *Yearbook* and, courtesy of Martin Lynch and Sons, a MyDEL Surecom SF-401 Plus Frequency Counter.

Episode 19 and all the previous episodes of TX Factor are available at [www.txfactor.co.uk](http://www.txfactor.co.uk) and on YouTube. As it is professionally produced in HD it looks great on a full size TV but works equally well on a PC, Mac, tablet or smartphone. The TX Factor team also provides a weekly podcast of the GB2RS news from the RSGB.



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## RSGB Yearbook 2018

Edited by Mike Browne, G3DIH

### **More calls than ever before and a new lower price too!**

There are more UK and Ireland callsigns on issue than ever and they are all included in the *RSGB Yearbook 2018*. With thousands of changes and updates included, this book contains the very latest details available of over 87,500 UK and Irish Republic callsigns in its massive 544 pages.

Not only does the *RSGB Yearbook 2018* remain the latest callsign information available for the UK but it is also the most comprehensive guide to amateur radio in the UK and worldwide. You will find over 170 pages of invaluable reference material for just about everything you are ever likely to want to know about amateur radio. There is all the latest information on every aspect of the RSGB from how the Society is organised, the services it offers, committees, who to contact for assistance, etc. Regional information provides details of the RSGB Regional Manager Teams, local clubs, contest, repeater and much more. There is a huge range of information sections included from Repeaters, Beacons, Band Plans, RSGB Awards, RSGB Contests and HF Propagation Predictions for 2017. There are also listings of special contest callsigns, permanent special event callsigns and much, much more.

The *RSGB Yearbook 2018*, is as always, much more than a simple list of callsigns and, if you haven't purchased a copy in a while, the updated information is an essential for every well-equipped shack.

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## Microwave beacon news

Ofcom has issued frequency clearances for four microwave beacons: GB3FNM at Farnham on 2.3GHz, GB3LPC at Bampton on 3.4GHz, a move of GB3KEU to Finningley on 5.7GHz and a change to GB3KBQ in Taunton on 10GHz. These are all secondary allocations where the RSGB supports and encourages activity.

## EMC Survey

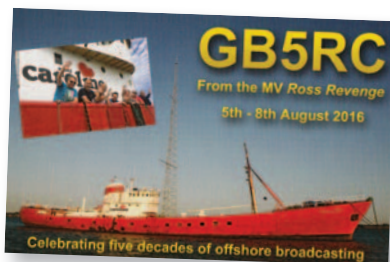
For three years the RSGB EMC Committee has been investigating the problems of interference from VDSL broadband on the HF amateur bands and lobbying for action to reduce the problem. It has a lot of historic data, but both Ofcom and Openreach contend that 150 reports from 50,000 amateurs are not indicative of a major problem when there are 9.5 million VDSL installations deployed. RSGB EMC Committee has set up a survey at <http://tinyurl.com/GB2RS-0309A> to collect current signal levels at the frequencies of VDSL band transitions, which indicate the presence and strength of interference. Please fill in the survey with your current readings, even if you have reported them before, and encourage your friends to do so. The EMC Committee plans to present its findings at the RSGB Convention in October and then use them to persuade Openreach to take further action. The survey closes on 30 September. This is the last chance we have to prove how many people are affected by this RFI. You could make the difference.

## QSL Matters

GB is one of the busiest QSL groups. Every summer, GB callsigns generate many batches of outgoing QSLs, both large and small. It's important for us to know that such operations are by Members or Affiliated clubs/groups. It allows us to process the cards and know who held the call at that time as some letter combinations are re-issued. Verification is easy, provided that Members include a copy of the NoV with every batch of cards.

Sometimes Members request sub managers to transfer cards for a previous or additional callsign to another manager or back to the bureau. This is not something that can be done unless a 'via' on the card has been missed. Where a Member holds multiple calls they should lodge separate envelopes for each call they hold with the appropriate manager.

The volume of incoming cards from USA remains good, but Europe has temporarily slowed down, which is not uncommon in summer. A larger than usual consignment of cards from Finland arrived recently containing many for the OH activity in Z6 in 2015: they will keep the bureau busy for quite a while.



## Congratulations

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

<b>70 years</b>			
Yeovil ARC	G3CMH	Mr A Papworth	G3WUW
Mr J C Bird	G3GIH	Mr T J Williams	G3XLS
Mr M J L Fadil	G4CCA	Mr T F Campbell Davis	G3YMM
		Mr R Reed	G3ZIG
<b>60 years</b>			
Mr F E Garrett	G3MVZ	Mr W R H Pevy	G4CWP
Mr C R Burchell	G3NKG	Mr R E Clark	G4DDP
Mr J Hogg	G3NUA	Mr G Kirk	G4FKG
Mr R M G Maule	G3OEF	Mr E Sandaver	G4KIT
Mr D B Whitfield	G8VMY	Mr M E Oliver	GW4N00
Mr J F Gray	GM3LRG	Dr D Hilton-Jones	G4YTL
		Mr M Higgins	GW4ZVL
<b>50 years</b>			
Mr I G Tutt	G0PEQ	Mr K W Quarman	G8CBE
Mr D D Bottomley	G3GAQ	Mr C Carr	G8CEE
Mr C F Way	G3LWJ	Mr R D Claridge	G8GYM
Mr E T Clarke	G3UYD	Mr A H Taylor	G8XJA
Mr P E Ford	G3VRU	Mr A Rose	GM3WED
Mr C Pell	G3WLH	Mr D J Ward	VE3IXH
		Mr P V Harman	VK6APH

## HF Contest Committee vacancy

The RSGB HF Contest Committee is responsible for deciding the HF Contesting strategy, organising the HF Contesting calendar, setting the rules and providing clarification of the rules to the contest adjudicators. This committee performs a key role in the enjoyment of amateur radio by many RSGB members.

The position of Chair of the HF Contest Committee is offered for an agreed term of up to three years. Nick Totterdell G4FAL, the current Chair, is approaching the end of his agreed term and has stated that he is not seeking to be reappointed.

RSGB Members who wish to be considered for appointment to this important role should write to Steve Thomas, M1ACB, General Manager via email to [gm.dept@rsgb.org.uk](mailto:gm.dept@rsgb.org.uk) providing details of their amateur radio and other relevant experience.

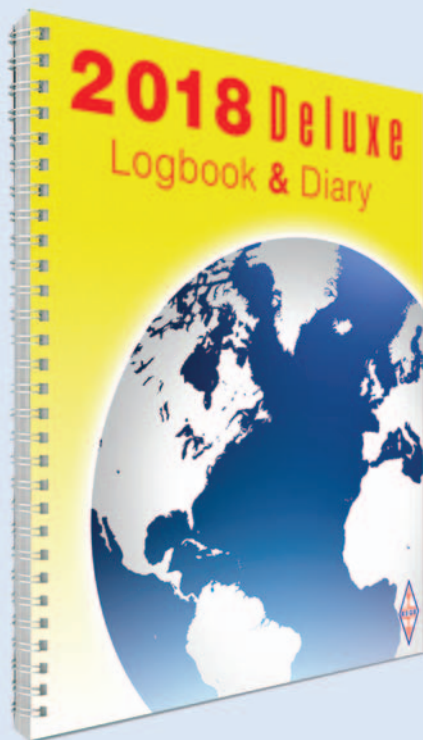
**The RSGB would like to welcome to the RSGB family the following new Members who have joined their voice to ours and are helping to keep the RSGB strong.**

Mr M Allen, 2EOLBF	Mr M Green, MOID	Mr J Hoeg, OZ7UE	Mr A Carter, RS313860	Mr S Sexton, RS314038
Mr B Schultz, AB9CV	Mr K Maddy, MOKHM	Mr P Sherwood, RS309753	Mr V Williamson, RS313872	Chelsea Pensioners RC,
Mr D Krause, DL1GKD	Sussex 4x4 Response, MOSSX	Mr R Rudelic, RS311975	Mr N Brown, RS313873	RS314046
Mr A Spencer, G1ZMA	Mr D Ramos, M0TFG	Mr C McLoughlin, RS312464	Mr S Totham, RS313886	Mr B Lewins, RS314069
Mr D Lund, G4FGM	Mr M Fearn, M0ZMF	Mr G Peters, RS313540	Mr D Mallinson, RS313907	Mr A Monaghan, RS314070
Mr C Stevens, G4LAU	Mr F Barker, M6JZO	Mr S Roderick, RS313661	Mr E Gordon, RS313918	Mr M Bell, VK2KMB
Mr N Gell, G7PYQ	Mr R Stone, M6KFX	Mr M Harley, RS313793	Mr J Flutter, RS313928	Mr P Dawson, VK4VW
Mr M Steiner, HB9GIB	Mr M Way, M6MWZ	Mr J Reece, RS313811	Mr M Feakins, RS313959	Mr W Gilliland, W0TG
Mr P Sorrentino, I2ZNY	Mr R Reynolds, M6RR	Mr C Shipman, RS313814	Mr R Cooke, RS313987	Mr A Jordan, W1PTO
Mr S Cunningham, K0SRC	Mr R Withers, M6TXR	Mr K Taylor, RS313826	Mr M Dolan, RS313988	Mr P Schwabel, W2TAU
Mr L Cioti, K2LRV	Mr N Mason, M6YFZ	Ms M Borg, RS313848	Mr A Lane, RS313999	Mr K Roersma, W8KGR
Mr D Inger, K6SBA	Sparks, MWOSML	Mr V Corcoran, RS313857	Mr A Jackson, RS314009	Mr H Rafferty, WB2HHW
Mr D Cox, KB7IVK	Mr T Owens, N3TJO	Mr M Lampe, RS313859	Mr J R Ridgway, RS314035	Dr W McCarty, WB6LA

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

Mr N Tideswell, 2E0BHS	Mr C J Colclough, G1VDP	Mr P Morris, G4XNR	Mr B J Keane, G8JNS	Mr L A Dixon, MOLED
Mr P Herron, 2E0CVZ	Mr P E Boast, G3XBI	Mr M Jones, G6DFZ	Mr P S Gebbie, G8YQN	Mr D De La Haye, M0MBD
Mr P N Gregg, G0AHM	Mr G Griffiths, G3ZIL	Mr M L Drinkall, G6XGK	Mr W Stewart, G4EIZ	Mr T L Taylor, M0TLT
Mr A Cotton, G0JHQ	Mr D J Morrison, G4GCW	Mr N Coombs, G7BAT	Mr E P Reid, G4YWW	Mr M A Buston, M1APU
Mrs E Clayton, G0KZH	Mr P H Trepass, G4HBD	Mr P Stimpson, G7HGT	Mr J Cantor, K1ZN	
Mr A C Wood, G1FJD	Mr R Tyson, G4NFR	Mr R Carder, G7SRK	Mr R Benitez, M0DHP	
Mr S W Rasmussen, G1MVF	Mr A G Fallows, G4UCL	Mr J Bissell, G7VVG	Mr J H Clark, M0IDC	





## RSGB Deluxe Logbook & Diary 2018

Looking back over old log books can bring back memories of old friends, satisfying and challenging QSOs. For many there is nothing like it and even today nothing sits better on the bench of an amateur radio shack than a well maintained log book. If you are looking for an attractive way to record your log year by year, the *RSGB Deluxe Log Book & Diary 2018* provides an ideal solution. This logbook isn't just somewhere to note your QSLs but much more.

This hugely popular annual logbook contains a wealth of extra material just where you want it, when you want it, right at your fingertips in your shack. The *RSGB Deluxe Log Book & Diary 2018* contains the latest UK Band Plans, RSGB Contest Calendar, DXCC prefix list and RSGB QSL Bureau information. The information doesn't stop there either, a locator map (and an explanation of how locators work), repeater information, diary section, notes pages, handy lists of operating abbreviations & codes - pretty much everything you want to know when operating is included. The logbook section isn't forgotten either and there is a generous log section with plenty of space for you to record a whole year activity. If you want to keep your log for years to come and make it easy to look over then the *RSGB Deluxe Log Book & Diary 2018* provides an attractive logbook that will grace any shelf for years to come.

The *RSGB Deluxe Log Book & Diary 2018* includes:

- Current UK band plans
- European locator map
- Prefix guide
- Repeater listings
- QSL bureau information
- RSGB Contest Calendar
- Generous Log section
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## Callseeker Plus 2018

**NOW with a Raspberry Pi interface**



As many will know, the *Callseeker Plus 2018* is the electronic version of the *RSGB Yearbook 2018* and much, much more. Now not only can you run this software direct from either a CD or Memory stick on your PC you can also run it with a Raspberry Pi.

As always *Callseeker Plus 2018* provides the latest UK and Republic of Ireland callsign data but as a bonus you also get call information from 9A, DL, EA, ES, F, HA, HB9, I, LX, LY, OE, OH, ON, OZ, SM, SP, SV and Z3 as well. All this takes up no computer hard disk space as it runs straight from the CD or memory stick, it is really easy to use and. You can search by callsign, name or location and navigating through the search results is quick and easy. You can print the results in a variety of formats including straight to an address label. *Callseeker Plus 2018* is the ideal way to search for European QSLs

*Callseeker Plus 2018* also boasts a host of "extras" from across Europe, including the *RSGB Yearbook 2018* reference information pages in an easily searchable PDF format providing the very latest amateur radio reference information from the UK and around the World.

### Two formats – one price

The *Callseeker Plus 2018* is available as either a traditional CD ROM or an USB Memory Stick version. The CD is in the full jewel case whilst the memory stick is encased in an Eco bamboo shell. Both are highly portable and easy to use and provide a great alternative to the traditional *RSGB Yearbook*.

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## Radio Communications Day at York Radio Club

On 15 October, York Radio Club will be hosting a Radio Communications Day for local Scouts, Explorer Scouts, Young leaders and leaders of Ebor District. The purpose of the event is to introduce Scouts to amateur radio and enable them to obtain their Communications badge. This will take place at the club's shack at Bishopthorpe Sports & Social Club YO31 OHQ.



### Welland Valley Amateur Radio Society "Lest we forget"

In 2016, Paul, G1FJH of Welland Valley ARS decided to research one of his relatives (Harry) who had lost his life in the trenches of the First World War. During his search, he turned up British Army Records including the Regimental Diary that detailed what happened on the day of the battle that took Harry's life. In June 2017, Paul gave a very moving talk to club members on what he had discovered on his search. Following the talk, members of the club decided to put on a series of special event stations in 2018 to mark the end of the 'war to end all wars', and in remembrance of the 18 million who lost their lives and the 24 million injured on all sides. A total of 12 special callsigns have been applied for and will be put on air during the year: GB1GW (January 2018); GB1FWW (February); GB2GW (March); GB2FWW (April); GB4GW (May); GB4FWW (June); GB5GW (July); GB5FWW (August); GB6GW (September); GB6FWW (October); GB8GW (November); GB0AD (November 10/11).

Details can be found on QRZ.com. OQRS via Club Log.

Four online certificates will also be available, see [www.wvars.com](http://www.wvars.com)

## Amateur training in Staines

The training academy at Martin Lynch & Sons has proved popular for Foundation and Intermediate courses. People have travelled from as far away as Portsmouth, Cornwall and Wales to take the training sessions and exams, but the furthest so far is Stephen Gillion who travelled from Fort William in Scotland! He passed with flying colours and has now ordered his new radio. Staff at the training academy in Staines hope to see him at the Intermediate training in November. [www.hamradio.co.uk/training.php](http://www.hamradio.co.uk/training.php)

## Morsum Magnificat

Since the initial announcement that copies of all issues of the English edition of *Morsum Magnificat* were available for free download from the internet, there have been over 12,500 hits on the website, demonstrating that there is still widespread interest in Morse telegraphy! A new addition to the downloads is a searchable consolidated index covering all issues of *Morsum Magnificat*, Numbers 1 to 89.

Copies of *Morsum Magnificat* or associated publications downloaded from [www.n7cfo.com/tgph/Dwnlds/mm/mm.htm](http://www.n7cfo.com/tgph/Dwnlds/mm/mm.htm) are copyright and are made available for personal use only. They may not be downloaded or distributed for any commercial purpose whatsoever.

## Opening of G8BBC

The BBC Director General, Tony Hall is to make the official opening of the Broadcasting House amateur radio shack, G8BBC. The station, home of the recently formed London BBC Radio Group, will move on from test transmissions to full operation following a watch period of a few months during which the Master Control Room were checking for any interference issues. It is hoped that the DG will be able to pass a greetings message over the air. G8BBC will be active on HF bands and VHF, and hopes to expand operations further in the near future. Kenwood UK has kindly sponsored the station through a donation of a TS-590 HF transceiver, which will be used on the launch day for the historic transmission by Tony Hall.

## Freidrichshafen lectures online

The major papers and speeches from the HamRadio 2017 show in Friedrichshafen have been made available by DokuFunk. You can find the information on the website [www.dokufunk.org](http://www.dokufunk.org) in the 'Lecture Room' along with material from 2016 and previous years.

## Hammersmith amateurs wanted

Selim, MOXTA is looking for radio amateurs who live in the Hammersmith area to help him form and find a suitable venue for a radio society in Hammersmith. The name of the society will be Hammersmith Amateur Radio Society. Anyone who would like to register their interest and helping him to form/join the society should e-mail Selim, MOXTA, via email to [MOXTA@outlook.com](mailto:MOXTA@outlook.com) for more information.



## International amateur radio exam



In Dhaka, Bangladesh an international amateur radio exam was successfully completed by the Bangladesh Telecommunication Regulatory Commission (BTRC) Spectrum Division on 19 August. More than 250 candidates participated in this exam. Congratulations to all the successful candidates.

### Quantum Technology Club

Quantum Technology Club is a new club in West Lancashire that as well as catering for the needs of the radio amateur, also welcomes those who are interested in electronics, computer hardware and/or coding, Raspberry Pi and Arduinos and technoCrafting (3-D printers, laser cutters, programmable embroidery machines, etc). The club is run along the lines of a 'maker' club where members turn up and work on their own projects and/or help others with their projects, discuss ideas and learn something new. Meetings will be held on the 1st and 3rd Thursday. Details are at [www.quantumtech.club](http://www.quantumtech.club)

## Special event stations

HF700LUB will be on the air until August 2018 to celebrate the 700th anniversary of the city of Lublin in Poland. Operation will be on HF using SSB, CW and digital modes. QSL via SP8AB.

ON36CLM will be on the air from 16 October to 15 November to commemorate a 33km march that the Canadian troops did coming from the town Hoofdplaat in Holland to liberate Knokke in 1944. See [www.qrz.com/db/op36clm](http://www.qrz.com/db/op36clm)

Solihull Amateur Radio Society will be running two JOTA stations on 21 October, GB1NSS for Nelson Sea Scouts in Solihull and GBOSDB in Birmingham.

Many other special event stations will be on the air this month for JOTA and other events; a list of all that we know about is on page 95 of this edition.

## Speakers sought for Scottish convention

The Scottish Amateur Radio and Electronics Convention is looking for speakers for next year's event in May. After a very successful series of talks in 2017, they would like to invite speakers to talk at the 2018 event. For more information please email [marcus@mm0zif.org.uk](mailto:marcus@mm0zif.org.uk) or call 0759 344 1518.

### 5MHz band news

The Malta Communications Authority announced that amateurs in Malta have been allocated 5.3515 - 5.3665MHz as a secondary allocation with 15W EIRP.

The Government of Canada has just released a consultation document to implement the changes from World Radio Conference 2015 including 60 metres. The consultation document is available at [www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf11306.html](http://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf11306.html). This is just the first step in the process for regulatory changes.

### BRARS AGM

The British Railways Amateur Radio Society is holding its AGM on 28 October at the Brunswick Inn, 1 Railway Terrace, Derby, DE1 2RU. This is almost opposite the railway station car park. It will commence with an informal chat at noon, followed by the AGM at 1.15pm. For more information contact Ian Brothwell, G4EAN via [G4EAN@BRARS.info](mailto:G4EAN@BRARS.info) or 0115 926 2360. Membership of BRARS is open to anyone with an active interest in amateur radio. See [www.BRARS.info](http://www.BRARS.info)

### Amateur radio in the news

Mainstream media has told the story of Mike Everett, M6MGE in the Bristol area taking an emergency contact from Jon Matthews, which helped rescue a young girl having a seizure in a remote part of Exmoor. A fuller report is on the BBC website at [tinyurl.com/GB2RS-2708b](http://tinyurl.com/GB2RS-2708b) or you can see the original *Bristol Evening Post* article at [tinyurl.com/GB2RS-2708c](http://tinyurl.com/GB2RS-2708c)

### ARRL award

RSGB Member Dennis, K8AGB received the ARRL 2017 Phillip J. McGan Silver Antenna Award for Excellence in Public Relations on behalf of Amateur Radio. More information about K8AGB can be found on [QRZ.com](http://QRZ.com)

### Surplus vintage radio test

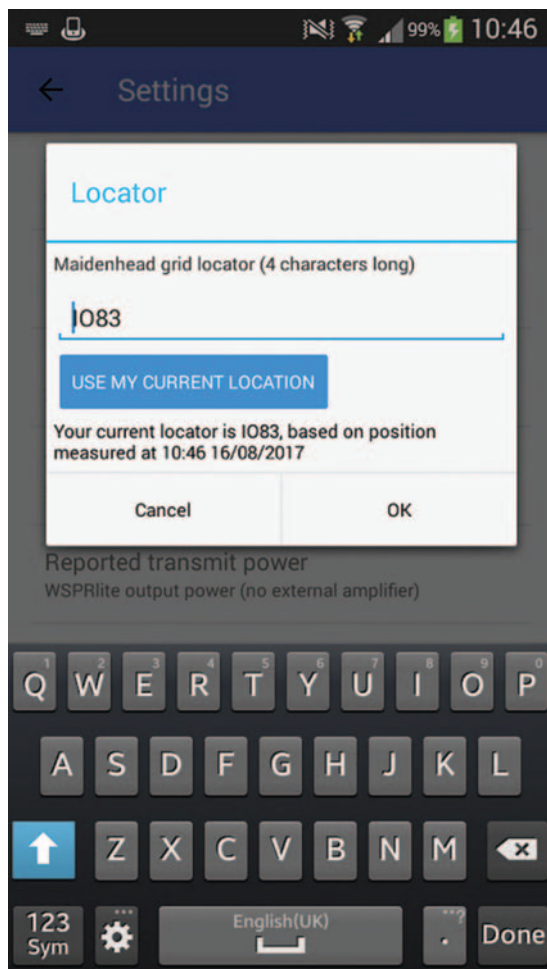
Anyone can take part between 0000UTC on 15 October and 2359UTC on 29 October, but the QSO is only valid if the two corresponding stations are using ex-military radio sets. The QSO should include the complete exchange of report, class and type of set in use (eg 599 / B GRC-9). Standard call for the event is "CQ ARO de....." where ARO stand for Army Radio Operator. In CW it can be "VVV VVV VVV de.....". Full details of this event, including the scoring points system, can be found at <http://crosem.altervista.org/forum/>

# New Products

## New desk mics

Nevada are stocking a new range of desk microphones and accessories for amateur radio use from INRAD USA. The new range consists of five desk microphones, each with a unique dynamic element and tailored audio response. From a full sounding SSB audio for 'rag chewing' to lots of high end punch for DXing, each microphone has its own characteristic. Of interest will be the M-629 model that gives outstanding audio on the new Icom IC-7300 SDR radio. The INRAD microphones are supplied with a 3 pin XLR to 1/8" mono cable, which can be used with a range of INRAD adapter cables suitable for connection to all transceiver brands. The microphone range is complemented with table stands, microphone clip, hand- and footswitches.

The INRAD microphone range is available exclusively through Nevada and IHSG stores, with prices starting from £69.99. [www.nevadaradio.co.uk](http://www.nevadaradio.co.uk)



## WSPRlite-to-go for Android

The WSPRlite portable HF beacon/antenna testing system has been enhanced with the release of WSPRlite-to-go. It is an Android app that allows your WSPRlite to be programmed and operated from any android device. It uses the location and timing data already available in your phone to provide enhanced functionality for a WSPRlite. It is available free from Google Play at <https://play.google.com/store/apps/details?id=net.dexplorer.wsprliteconfig>

To complement the software, SOTABEAMS stocks a special on-the-go connecting lead that retails a £1.95 (see below).

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



## Cobweb additions

The MFJ-1835 is one of MFJ's most popular antennas – a cobweb – which is compact and light weight and allows the modern amateur with a small sized garden the ability to install a horizontal antenna. The MFJ 1835 covers the 10 to 20m bands at up to 600 watts while the MFJ 1835H provides the same band coverage with 1.5kW power handling ability. With the launch of the MFJ 1835HK34, either of these versions can be extended to cover both 30m and 40m bands for just £139.95. For more information visit the Waters & Stanton website at <http://hamradiostore.co.uk/mfj-1835hk-add-on-kit-for-mfj-1835-cobweb-to-add-30m-and-40m.html>







### Smartlink for Flex

SmartLink facilitates the ability to securely and easily operate your FLEX-6000 SDR over the internet without the use of VPN or specialised hardware. All of the necessary software to use SmartLink is integrated into SmartSDR v2.0 for Windows, Maestro and iOS clients for seamless remote operation. The latest new features and enhancements include new metering sidebar for Maestro, 40dB preamp gain for increased VHF sensitivity on FLEX-6700/6700R, new N1MM spectrum feature with spot integration and pop out panadapters and control windows on SmartSDR for Windows.

Costing US\$199, you can download SmartSDR V2.0 by going to [www.flexradio.com/downloads/smartsdr\\_v2-0-17\\_installer-exe/](http://www.flexradio.com/downloads/smartsdr_v2-0-17_installer-exe/)

### Single Band SSB Transceiver Kit

The CS-40 and CS-20 are single band SSB transceiver kits, produced by CR Kits, that now integrates sandwich digital VFO with 100Hz resolution offering full 40m or 20m band coverage. A speaker microphone and a printed assembly manual are supplied with the kits, just connect to a suitable antenna and a 12V power source and you are ready for operation both from home station or portable locations.

The CS-40 covers 7.0-7.2MHz with up to 10 watts output and the CS-20 covers 14.0 – 14.350MHz with 5.5 watts output. Both SSB single band transceiver kits are a great project for licensed amateurs who would like to build their own SSB transceiver. Apart from one medium-sized SMD transistor, the kit uses conventional leaded components on a quality PCB with moderate component density and a classic uncomplicated circuit design. Assembly should be no problem if you have with some previous kit building experience. With guidance from an instructor, this kit also make a good first project. Technical support is provided by SDR-kits here in the UK.

The kit comes complete with black enclosure and all components including the speaker-microphone and costs £154.80 + postage and packing. More information at [www.sdr-kits.net](http://www.sdr-kits.net)



### Click2Tune for Icom

The ability to transmit a low power carrier for tuning up amplifiers or antenna matching networks is very useful. Unfortunately, it's a facility that many Icom radios don't have. Although various ingenious 'solutions' have been suggested they often provide a fixed tune interval that is not ideal in most cases. Sotabeams Click2Tune for Icom has been designed with functionality and ergonomics in mind. It is available as a kit or ready built. It retails at £7.95. Details at [www.sotabeams.co.uk/](http://www.sotabeams.co.uk/)

### Software apps

MOCVO Antennas now also has a subsidiary called MOGPiE developing software apps that are available in the Windows Store. These have to date all been amateur radio related apps. More info on the website at [www.m0cvoantennas.com](http://www.m0cvoantennas.com)



# Homebrew

## This month we add an Rx/Tx switch and local oscillator for the 160m transceiver.

The receive/transmit switching of the 160m transceiver is controlled by a pair of relays, as shown in **Figure 1**. I used a pair of DPDT (double-pole, double-throw) relays. Each relay has both poles connected in parallel. It would also be possible to use a single DPDT relay with one pole for RF and the other for DC switching, however using separate relays gives improved isolation between the RF output and switched DC circuits. For simplicity, the schematic shows just one pole to represent the 'strapped' pair in each relay.

Transmit is activated by grounding the PTT (push to talk) line. The PTT line has an open-circuit voltage of more than 12V and DC current of around 30-40mA when transmitting. A simple transistor or MOSFET buffer may be required if you use an electronic switch to control your transceiver for digital modes or CW. The relays are RSB-12-S (Maplin N17AW) or similar. A high voltage rectifier diode provides some protection against back-EMF transients from the relay coils. The assembled relay board is shown in **Photo 1**.

### Local oscillator

There are a few options available for use as the local oscillator (LO). To meet my specific requirements, the oscillator must be:

- very stable
- have a spectrally clean output and
- have an accurate frequency display.

Direct frequency entry via a keypad is useful, but not essential. I will need a rotary VFO (variable frequency oscillator) knob. The most obvious options are:

- a simple free-running VFO, but that won't be stable enough to meet my requirements.
- a direct digital synthesiser (DDS) or some form of phase locked loop (PLL). Digital control is easily achieved using a microcontroller.
- a mixer-type VFO and frequency counter. This might do the job, but it could end up being more complicated than using a digital solution.

Until now, I have been using my DDS-based bench signal generator as the LO source. The DDS meets all of my needs, except

for the lack of an accurate frequency display. This issue is easily addressed by some very simple changes to the microcontroller code. Something along the lines of:

```
DDS_freq=(dial+IF_OFFSET);
```

This takes the displayed 'dial' frequency and adds the required intermediate frequency (IF) offset before the LO frequency is loaded into the DDS IC.

### A DDS synthesiser

I have decided to use a DDS as the local oscillator. For comparison, I will also build a PLL-based LO based on the Silicon Labs Si570 oscillator IC.

The DDS is based on the Analog Devices AD9850 or AD9851 [1]. I have used the 9851 in several previous projects. I have not used the 9850 before. Both devices use similar hardware. With a 5V DC supply, the '50 has a maximum refclock frequency of 125MHz. The '51 can be clocked up to 180MHz and it has a refclock multiplier feature, but I won't be using that here.

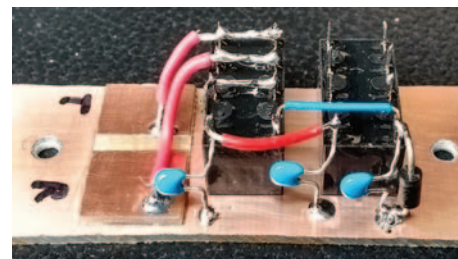
### Hardware

My 9851 DDS board has been described in detail for previous projects, notably in *RadCom* October/November 2009, March 2010 and July 2010. Details, plus schematics and PCB layout for the DDS board are available on my web page [2]. Using a homebrew board allows maximum flexibility when choosing refclock type, frequency and output filter design.

**Photo 2** shows the DDS with a 100MHz OCXO clock and a 32MHz 7th order LPF at the output. As an alternative to a home-made board, you can buy a complete AD9850 module on eBay and other auction sites. This is an attractive option because the cost of the complete unit is less than the retail price for a single AD9850 or 51 IC. The DDS modules come complete with the DDS IC, 125MHz oscillator and LPF on board.

To make a complete DDS system, you will also need a microcontroller board. Loading the frequency word into the

**FIGURE 1: Relay Tx/R switching setup. Note: the relays are SPDT with both sets of contacts paralleled (see text).**



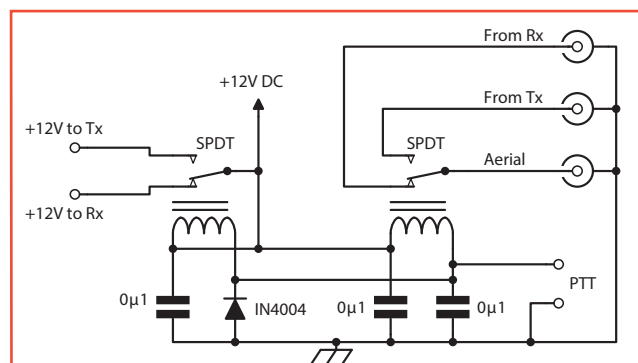
**PHOTO 1: The transmit/receive relays.**

DDS is not particularly difficult. Any of the popular 8, 16 or 32 bit microcontrollers should be suitable for this task. I used a PIC 18F4550 for my project. Other Microchip PIC or Atmel devices should be equally suitable. Programming is relatively easy when you use a standard development platform and language like Arduino [3] or Pinguino [4]. I used a home-made USB PIC board (see **Photo 3**) and the Pinguino IDE (integrated development environment). Layout and schematics for the PIC board are available on the web [5]. If you decide to make your own board, you will need a PIC programmer [6] to install the bootloader code in the PIC. You only need to do this once. After the bootloader is installed, you can quickly and easily upload your new code from your computer to the PIC via a standard USB cable. As an alternative to the homebrew board, commercially made boards with the Pinguino bootloader pre-installed are available on the Pinguino website and elsewhere.

### The PIC board

My bare-bones PIC board is probably the simplest possible application of the PIC18F4550. The board contains the PIC IC, a 20MHz crystal, USB socket and a few capacitors and resistors.

As the PIC and the DDS IC both use a 5V DC supply, interfacing between the two





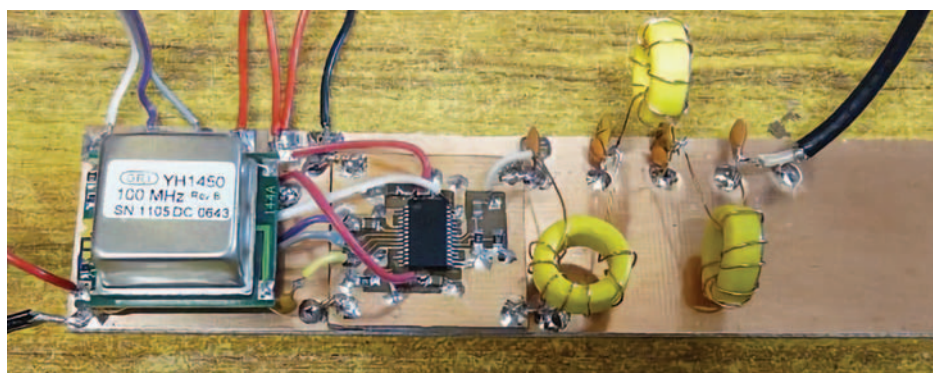


PHOTO 2: DDS module (centre) with 100MHz OCXO (left) and 32MHz 7th order output LPF.

PIC18F4550		DDS
(13) 2	DATA	25
(14) 3	W_CLK	7
(15) 4	FQ_UD	8
(16) 5	RESET	22

FIGURE 2: Pinguino pin numbers in red and physical IC pin numbers in black.

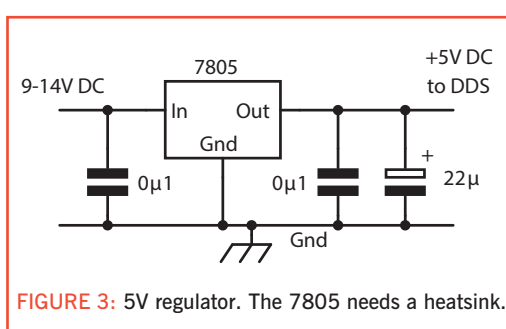


FIGURE 3: 5V regulator. The 7805 needs a heatsink.

Pinguino pin numbers are assigned within the program as:

```
/* PIC to DDS I/O pins */
#define DDS_DATA 13
#define DDS_CLK 14
#define DDS_UD 15
#define DDS_RESET 16
```

Unlike the physical IC pin numbers, these values are not set in stone and can be changed to accommodate hardware design changes or even porting the design to a different type of microcontroller.

I have tested the PIC software with a home-made DDS unit and an eBay DDS module. My breadboard circuit for the low cost AD9850 DDS module is shown in Photo 4. The module has a nominal 125MHz clock frequency and an output LPF with a cutoff around 40MHz.

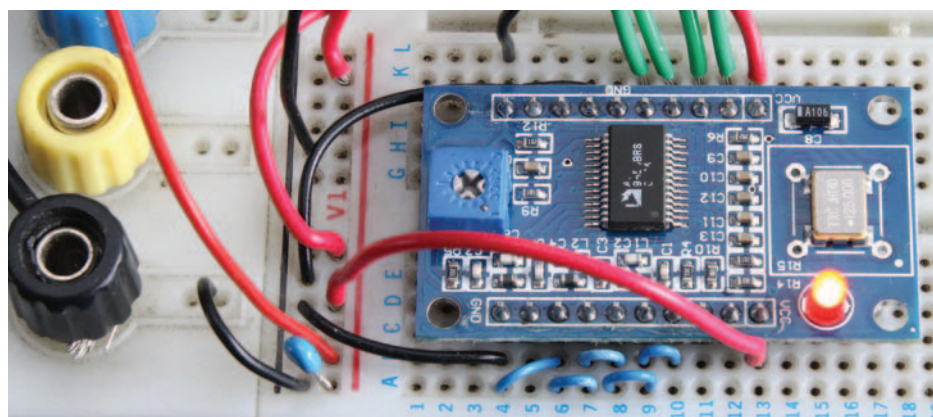


PHOTO 4: Breadboard circuit for the low cost AD9850 DDS module.

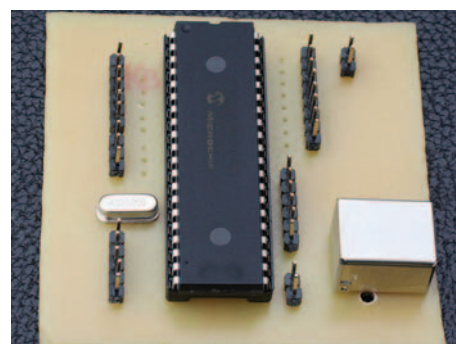


PHOTO 3: Homebrew PIC board.

## Power supply

I used a 5V, 1A regulator as the DC power supply for the DDS, PIC and LCD display module. My prototype rig with PIC, DDS and a 2x16 backlit LCD module draw 165mA from the 5V supply. Larger displays or a higher refclock for the DDS will draw even more current. The 7805 regulator will require a good heatsink. I used a strip of 1mm thick aluminium, bent into a U shape. The 5V regulator IC and heatsink are mounted on a strip of PCB laminate. The schematic is shown in Figure 3 and the assembled unit in Photo 5.

## Programming the DDS

The DDS frequency is controlled by a 32 bit binary number. In addition to these 32 bits, another 8 bits is used to set phase, power-down and, in the case of the AD9851, refclock multiplier. The 40 bits of data can be loaded into the DDS using serial mode (40 consecutive bits) or parallel mode, where the data is sent as 5 x 8 bits. I have chosen to use the serial mode because it is more economical in terms of PIC I/O pins.

As the DDS has a 32 bit frequency word, output frequency tuning step resolution is  $\text{refclock}/2^{32}$ . In the case of a 125.0Hz clock, tuning increments are 0.0291038Hz.

Pinguino is based on the C programming language. Most of the available functions are designed to be as similar as possible to the Arduino language equivalents, ie `digitalWrite(DDS_RESET,HIGH);` has exactly the same meaning on both platforms.

To send the 32 bit frequency word to the DDS takes 32 iterations of a FOR loop:

```
for(count=0;count<32;count++)
```

To determine if the last (least significant) bit is a one or a zero and set the DDS serial data accordingly:

Eamon Skelton, EI9GQ  
hbradio@eircom.net

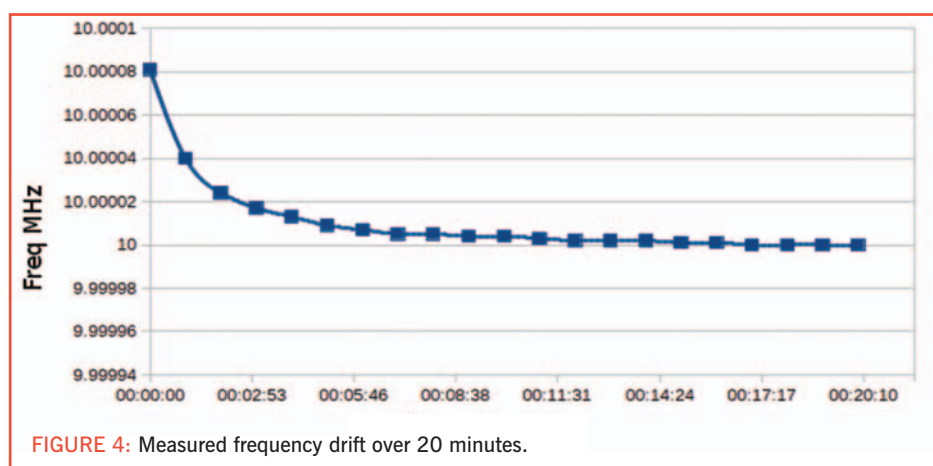


FIGURE 4: Measured frequency drift over 20 minutes.

```
if(freq&1){digitalWrite(DDS_DATA,HIGH);}
else {digitalWrite(DDS_DATA,LOW);}
```

Generate a word clock pulse:

```
digitalWrite(DDS_CLK,HIGH);
```

```
digitalWrite(DDS_CLK,LOW);
```

Do a bitwise right-shift of the entire 32 bit word before the next loop iteration:

```
freq=freq >> 1;
```

The 8 bit phase/control word is sent using a similar process.

Once the full 40 bits have been transferred, a frequency\_update pulse is sent to the DDS:

```
digitalWrite(DDS_UD,HIGH);
```

```
digitalWrite(DDS_UD,LOW);
```

Example Pinguino source code is at [7].

To achieve the precision required for amateur SSB/CW, we will need to determine the exact frequency of the refclock oscillator. Rather than trying to measure the frequency of the VHF crystal oscillator, it will be much

easier to set the frequency word for a known division ratio and then measure the DDS output frequency using a frequency counter. I tested my module at a frequency of exactly one eighth of the refclock. The required frequency word is  $2^{32}/8 = 536870912$ .

The Pinguino code is:

```
freq = 536870912;
```

```
dds(freq);
```

Measured frequency at the DDS output is 15.624933MHz, indicating a refclock frequency of 8 x this value = 124.999464MHz. Minimum tuning steps are  $\text{refclock}/2^{32}$ , or 0.0291037056. To calculate a new output frequency, the Pinguino code is:

```
dial=(10000000) // 10.000MHz
```

```
freq = (unsigned long) dial/min_step;
```

The cast to 'unsigned long' tells the compiler that we expect the result as a large, unsigned integer value.

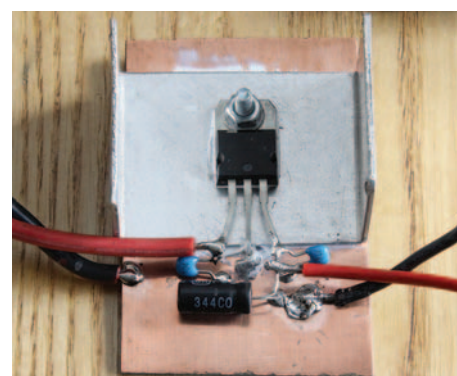


PHOTO 5: The finished prototype 5V regulator.

The DDS module was tested at an output frequency of 10.000MHz. Frequency stability was very good after an initial warm-up period of a few minutes. Drift for the first 20 minutes after a cold start is shown in Figure 4. Drift over longer periods was generally better than 5Hz per hour after a 6 minute warm up. This is not as stable as the 100MHz oven controlled oscillator in my home made DDS, but still more than adequate for use in a 160m transceiver.

#### Websearch

- [1] AD9850/1 DDS data sheet – analog.com
- [2] <http://homepage.eircom.net/~ei9gq/dds.html>
- [3] <https://www.arduino.cc/>
- [4] [www.pinguino.cc/](http://www.pinguino.cc/)
- [5] <http://homepage.eircom.net/~ei9gq/picboard.html>
- [6] Homebrew, July 2006
- [7] [http://homepage.eircom.net/~ei9gq/DDS\\_AD9850.html](http://homepage.eircom.net/~ei9gq/DDS_AD9850.html)

## Feature

# Writing for *RadCom* and *RadCom Plus*

**In last month's edition we invited anyone who'd like to review equipment, write articles or books to get in touch. Many thanks to everyone who has done so, and the invitation is still open to everyone else.**

Whether you're a brand-new writer or a seasoned professional, we welcome all sorts of articles – technical, reports and features. There's nothing quite like seeing your name in print for the first time! Getting your work published in *RadCom* or *RadCom Plus* might be easier than you think. And, best of all, we pay for the articles we publish.

### Practical notes

It's well worth phoning before starting anything so that we can talk about what you're thinking of doing. This is particularly important if your article is time-sensitive, eg about a forthcoming event. We normally need to agree feature articles at least *three months* in advance and to receive finished text two months before the cover date.

Text should be emailed as a plain Word or RTF document, with illustrations attached, not embedded. We always sub-edit (polish) everything – even the regular columns – and most diagrams are re-drawn by our illustrator. Vital information on sending photos and drawings is at <http://tinyurl.com/RadComPix>

Feature articles are often published quite

quickly. Technical articles are 'peer reviewed' by a member of the Technical Panel, then published when space becomes available.

### Around Your Region and GB2RS

The red box at the start of Around Your Region (eg p84 this month) describes the information we need for that section and for GB2RS News, plus the all-important deadlines for the next couple of months. GB2RS deadline is 10am on the Thursday before the broadcast.

### Contact us

We're always happy discuss possibilities and help any way we can. Call 01234 832 700, option 8, or email [radcom@rsgb.org.uk](mailto:radcom@rsgb.org.uk)





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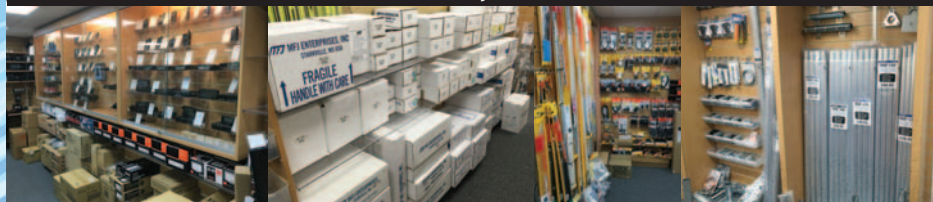
<b>MB-1</b> 1-30MHz 1:1 Current Balun 400W 50 Ohms.....	<b>£29.95</b>
<b>MB-4</b> 1-30MHz 4:1 Current Balun 400W 50 Ohms.....	<b>£29.95</b>
<b>MB-6</b> 1-30MHz 6:1 Current Balun 400W 50 Ohms.....	<b>£29.95</b>
<b>MB-1X</b> 1-30MHz 1:1 Current Balun 1000W 50 Ohms.....	<b>£39.95</b>
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# Practical notes on the UKAC Contests

**O**ver the past two years I've been taking part in the 70MHz and 144MHz UK Activity Contests and would like to share my experience so that others may find it useful.

Although I am new to the UK Activity Contests (UKAC), I've been contesting since the early 1980s as part of G4ZAP/P, though I'd not operated from home for many years. While chatting with Tony, G4NBS, he mentioned the UKAC contests were good fun and the leading stations were making lots of QSOs on a Tuesday evening. So I hatched a plan to take part, starting in January 2015.

During the first six months of 2015, I tried to make one significant improvement to the portable setup each month; changes have slowed since but I now feel that I have got a competitive station that can be assembled on site in around one hour. So I've put together descriptions of the little projects that I've built that pull the station together. I don't have much time for building/designing and much of what I'm going to show has been planned and put together during lunchtimes at work.

## Plan of action

On Tuesdays, I leave work at 1615, drive home, eat tea, load the poles and antenna onto the car roof rack and travel to site. I use Otley Chevin (IO93DV, 280m ASL) during the winter since it is easily accessible by road. Ilkley Moor (IO93BV, 380m ASL) is used during the summer. That site is a bit remote and exposed so I am always watchful of the weather when I use it. Ilkley Moor is 30 minutes from home so, after the contest, I can get home and unloaded before midnight, ready for the work alarm at 0620.

## Antenna supports

There seems to be a few ways that people use to get antennas in the air. I've thought that push up masts look a bit flimsy and I needed something strong but simple with a means of clamping to prevent rotation.

The Otley Chevin site is a pub car park and my Ilkley Moor stop was initially at the side of a road, so rope guys were not possible at either place. The system I've developed is best shown **Photo 1** and **Photo 2**.

I have attached a mast clamp to each of the rear roof rails, using locking nuts so I don't have to worry about anything coming loose. Through the clamps horizontally goes a short scaffold pole,

held in place with two exhaust clamps. The pole sticks out of the car by about 60cm. The mast base is a drive on unit from MMOCUG.

Initially, I put a second short pole into the base and make sure it clamps exactly vertically in both directions. Sometimes I need to slide the roof bar to get it in the right place. This clamp is used to stop the antenna rotating in the wind. Once all is well, I swap over to the main mast. I use two 12 foot poles to support the antenna. This is fairly heavy to push up and can be a bit of a handful on a windy site. If you follow in my footsteps I suggest you practice putting up (and taking down) the pole on its own before you try it with an antenna on top.

## Rig arrangements

The first few contests were done using my IC-706 but I found it rather limited, especially with its slow tuning speed. Changing to my vintage IC-735 and homemade transverter (circa 1985 design) gave a significant improvement in the number of contacts (increasing from 59 to 92 from March to April 2015). I finally settled on an Elecraft KX3, which has top-five receive performance and many bells and whistles including voice and CW memories, all in a small case that sits neatly on top of my transverters. Power is simply taken from the 12V lighter socket behind the centre console. The socket is fused at 10A, quite adequate for a 10W contest. I found that this supply was rather unregulated unless the engine was running.

The rig, transverter and control box sit on the passenger seat (**Photo 2**). It's fine for a 2½ hour contest but isn't too comfortable for much longer. Headphones are essential to block out wind or rain noise. And yes, the handbrake *does* get in the way!

I started with paper logging but also during early 2015, I moved onto computer logging and I now use a netbook that I prop against the steering wheel. I downloaded *Minos* (G0GJV), which I had used many times with G4ZAP/P, then spent a few evenings entering the paper logs so that I have check log files for use on subsequent contests.



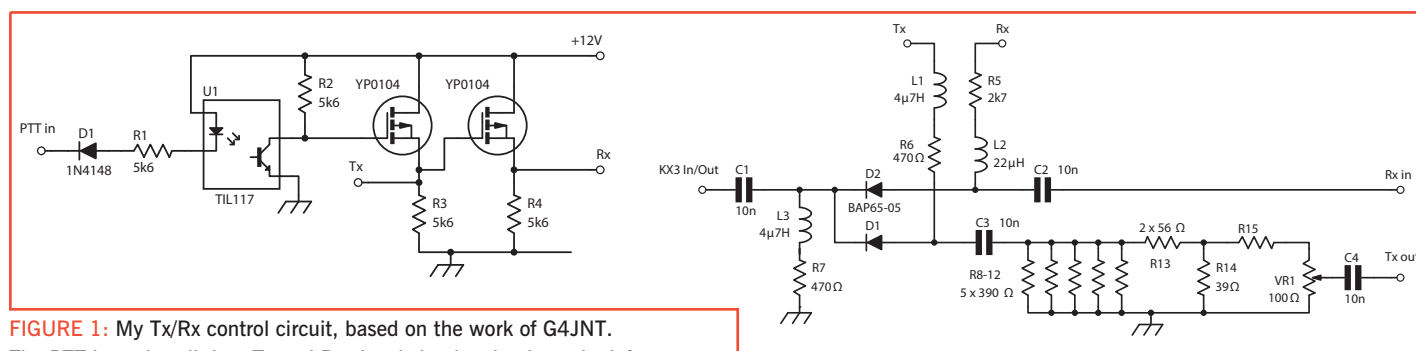
**PHOTO 1:** My portable aerial mast and 9-ele Powabeam. The inset shows the drive-on plate, stub mast and stabilisation arrangements.

## Control box

The only downside with the KX3 is the single Tx/Rx connector; I use separate feeds for my transverters so I needed a way to separate the two signal paths with a PIN diode splitter. The splitter should have low through attenuation when on receive. On transmit, the receive port is isolated and I needed to make sure the RF output on the transmit port could be adjusted. I found a G4JNT design for a PIN diode switch and power attenuator on the internet. The circuit I used is shown in **Figure 1**.

The KX3 power output can be adjusted from the front panel so I set this to minimum at 100mW. When the KX3 is transmitting, D1 is turned on so that the power goes into the attenuator formed by R8-R14. VR1 lets me set an appropriately low drive level to the transverter. D2, meanwhile, substantially attenuates the Tx signal path to the transverter Rx port. When the KX3 goes to receive, D1 turns off and D2 gives a low-attenuation path from the transverter Rx port to the KX3 antenna socket. **Photo 3** shows the prototype circuit.





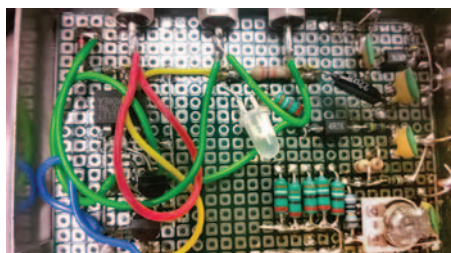
**FIGURE 1:** My Tx/Rx control circuit, based on the work of G4JNT.

The PTT input is split into Tx and Rx signals by the circuit on the left,

used by PIN diodes D1 and D2 in the right-hand circuit to switch the KX3 antenna socket between the transverter Tx and Rx ports. R15 is 91Ω.



**PHOTO 2:** KX3 and transverters sitting on the passenger seat.



**PHOTO 3:** Tx/Rx control circuit prototype.

Surprisingly, finding a leaded PIN diode was quite difficult and I compromised on a BAT65 dual device in an SOT23 surface mount package. The diode spec indicated I should get massive attenuation at 28MHz but in practice there seems to be stray coupling due to the board I used and there is a residual -36dBm from the receive port. I've now found a better type of RF breadboard but I'm not sure if I will produce a second version.

At this point a simple little project started to grow, with lots of little bits getting added on. **Photo 4** shows the result (this is the inside of the white box under the radio in Photo 2). In addition to the RF splitter, the box also contains LT1129 voltage regulators that protect the KX3 from any

spikes due to the car electrics, a sequencer that allows me to control a PA and mast head preamp, a 28V inverter for relays and finally three LM386 audio amplifiers for headphones and an external speaker. The volume controls for these can be seen on the left.

### Masthead preamp

While it may seem strange to be making a masthead preamp when only running low power, I'm planning a bit of higher powered operation at some time in the future. There are only a few relays available that are rated for high power and I imported a Narda relay (**Photo 5**) from the USA about 10 years ago. The case is drilled to suit standard mast clamps on the rear; the RF is routed round using thick coax (LMR400). I initially planned to use my 1985 vintage

BF981-based 70 and 144MHz preamps but after a little bit of reading round I realised the modern HA8ET modules would ensure I had sub-0.5dB noise figure and high dynamic range. At the time, HA8ET only made preamps for 144 and 432MHz so one email and one PayPal transfer later the new preamps arrived. I quickly refitted my old BF981 70MHz preamp with SMA connectors and that works fine, although HA8ET now makes a preamp for that band as well and I must admit I'm tempted.

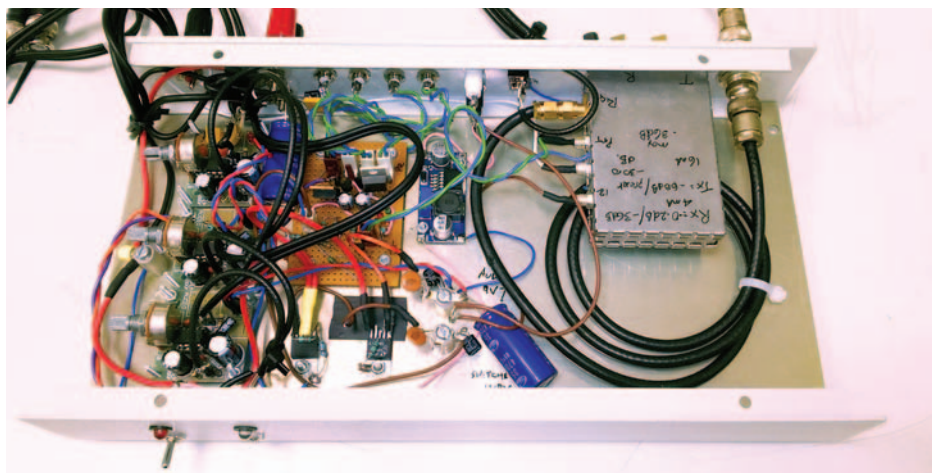
The masthead preamp and switching arrangement is shown in **Figure 2**. When no power is applied, the antenna connects to the transmit feed; this is done to suit G4ZAP/P contest operations so the VSWR of the antenna can be checked using a handheld rig before needing to power up the generator, which is necessary to run the main station equipment.

For flexibility, I can swap the preamps quickly so I can use the relay on different bands (for the different UKACs). The +12V has in-line 4mm terminals (you may be able to glimpse their blue colour to the right of the relay in Photo 5) and I use an 8mm spanner to ensure the SMA connectors are done up tight. I've also added a couple of LEDs: one on the preamp +12V and one on the +28V supply for the relay. That way if there seems to be a problem with the box, it is fairly quick to work out where the fault may lie.

### Tx/Rx sequencer

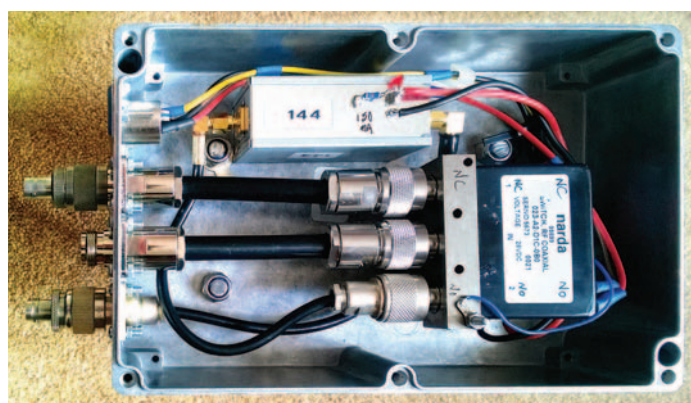
In any multi-element system it is essential to ensure that everything switches from receive to transmit in the right order. More than one preamplifier has been blown to smithereens by accidentally transmitting hundreds of watts into it! A Tx/Rx sequencer ensures everything happens in the right order.

My sequencer circuit shown in **Figure 3** has evolved from a W1GHZ design and is very uncritical on component values and layout. It was built on a small piece of stripboard. Going from



**PHOTO 4:** Inside my control box.

John Wilkinson, G4HGT  
g4hgt@btinternet.com



**PHOTO 5:** My Narda relay in its box with the exchangeable preamplifier.

receive to transmit, the antenna relay switches first followed by the PA and transverter; the transverter output is also used to switch the preamp off.

At the end of the transmit period, everything is switched back to the receive state immediately as D4 and D5 output the timing capacitors; it is also possible to introduce a small delay on the preamp supply by adjusting the value of Cde1.

I've used a couple of chunky MTP3055 FETs for the relay and preamp power switching and two smaller VN2222 FETs for the low current switching of the transverter and power amplifier. None of these devices are critical and you can use more or less anything you like as long as the devices have an adequate current rating for the application.

## Moving to 70MHz

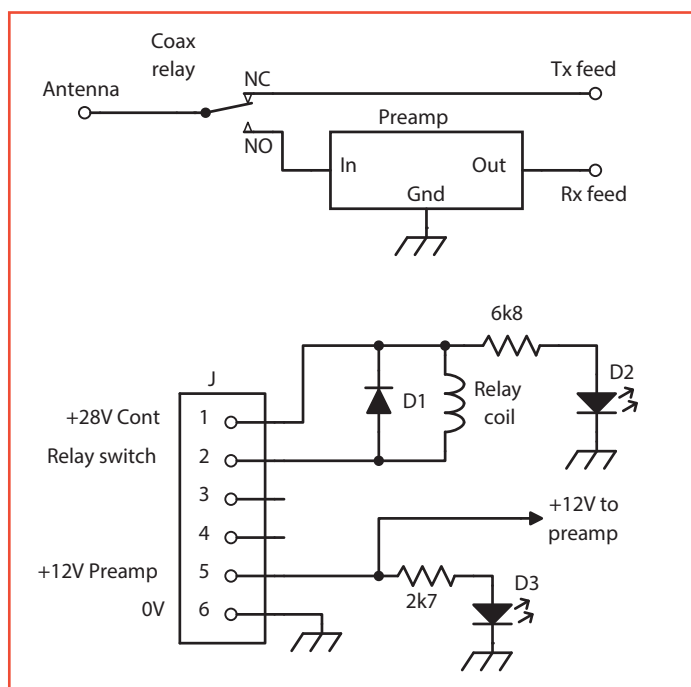
Once I had got going with the 144MHz UKAC contests, I decided to try on 70MHz. I pulled my old transverter out of the loft (a *Practical Wireless* Meon – from before it was actually published as a Meon: it was *that* old!). I realised it was not going to be too good, especially on transmit. So I contacted Sam Jewell, G4DDK, who sent me a part-populated Anglian transverter, together with the band-specific parts to get it working on 70MHz. A few lunchtimes were required for the soldering, then I made up new cables and put the new transverter (and the associated 8W Mitsubishi power amp) into the old case.

I tried a couple of UKAC contests with just 4W output to a 5-ele Yagi but found it hard going. I went back into the loft and pulled out an old Pye A200 amplifier. This works OK, giving about 35W output, but I don't seem to be able to get any more out of it. However, I now feel competitive in the 40W section: I was even called by an EA7 while setting up before the June contest but, unfortunately, we didn't complete. The PTT line on the A200 goes straight onto a relay so I have added an optoisolator, using the same arrangement as the input of the sequencer – this just means I don't need medium current transistors for switching.

## Safety

Just a few final comments about safety. If you are doing single operator operation make *sure* you can sort out any problem *and* be able to call for help. On my second outing, I walked into the scaffold pole on my car roof, broke my glasses and cut my nose. Now I always keep my phone in a trouser pocket so it is accessible even when I'm not in the car.

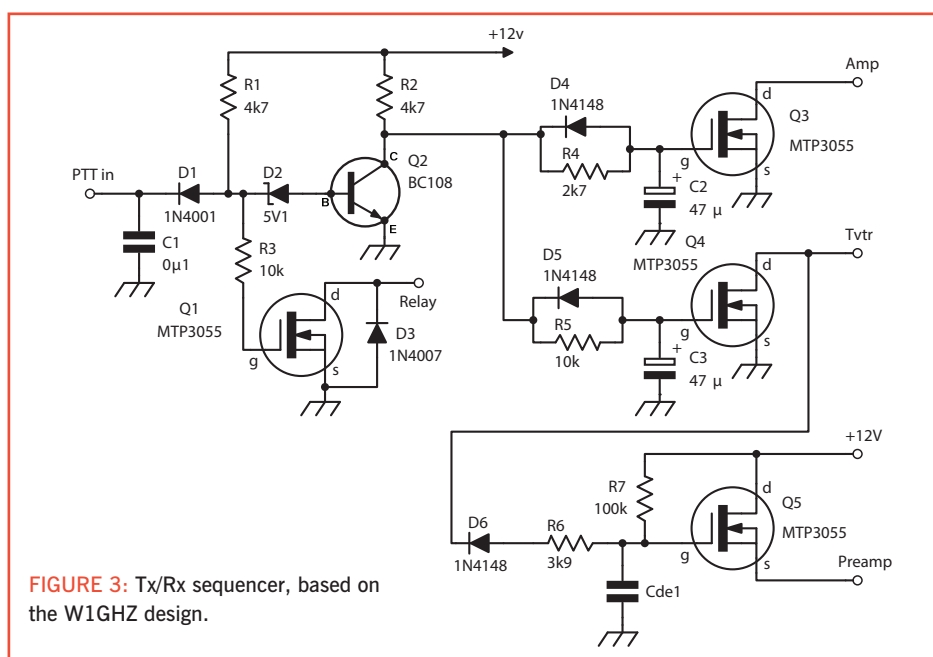
It is sensible to do a trial run one afternoon prior to doing the contest, which takes place in



**FIGURE 2:** Masthead preamp switching arrangement (top) and connections (bottom).

the evening hours. It's fine setting up in the twilight but you don't want your first take-down to be in the dark! Have a think about possible problems such as droppages – the way I attach my Yagi to the top of the mast is a bit awkward and if I drop my spanner I can't tighten the Yagi clamp, but I also can't take off the Yagi to start again. Therefore, I always have two spanners in my pocket. Also make sure you have a good torch/lighting – during winter evenings it is dark setting up as well as stripping down. A head torch is invaluable to keep both hands free while sorting out the aerial and mast. Spare torch batteries are a good idea, too.

Finally, check the weather before setting out and take plenty of suitable clothing. It is always colder and windier at the top of hills so it is fairly easy to get chilly while setting up and a good windproof jacket, hat and gloves are essential. A flask of tea or other hot drink is often also worthwhile.



**FIGURE 3:** Tx/Rx sequencer, based on the W1GHZ design.





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# Antennas

Thanks to everyone for their emails following the overview of the 20m and 40m vertical helical antennas in April's column. In response, this month's column includes details of the 20m helical vertical built by Robert Webster, WR8RW, and an 80m band version of the vertical antenna as requested by several readers.

## Design overview

A vertical antenna can be constructed by winding an electrical half wavelength ( $\lambda/2$ ) of insulated copper wire onto a suitable length of plastic pipe of at least 20mm in diameter. A short length of metal tube is connected to the wire end at the top of the antenna to act as a capacitive load. The lower end of the wire forms the antenna's feed point and the antenna is worked against the ground. An advantage of this vertical antenna system is that it does not usually require the use of radial wires, however the feeder cable should be run over the ground to the shack to maximise the antenna's performance. This vertical antenna design was described in the 1976 *ARRL Handbook* [1].

## WR8RW vertical helical antenna

Robert Webster, WR8RW, has sent details of the 20m vertical helical antenna he built using the information provided in April's column. Robert used a 2m length of 20.3mm (0.8") diameter PVC conduit for the antenna's former. The capacitive loading tube connected to the top of the antenna used 19mm (0.75") diameter aluminium tube that was held in position using self-tapping screws at the top of the PVC conduit. Robert obtained the PVC conduit and aluminium tube used for the antenna from his local Home Depot store. The 50 $\Omega$  coaxial feeder cable, run from the radio equipment, was matched to the antenna using a 1:4 unbalanced-to-unbalanced (unun) auto-transformer in a similar manner as described in April's column. Robert wound his unun on a toroidal core and it is shown in **Photo 1**. For completeness, the concept of the circuit of the 1:4 unun is shown in **Figure 1**.

Robert reports that the ground below his QTH is "red Georgia clay" containing a significant amount of mica. This means the ground below the antenna tends not to be very conductive and Robert found that the performance of the antenna



**PHOTO 1:** WR8RW's 1:4 unun auto-transformer used for matching the helical vertical 20m antenna. The brass wing nut 'common' connection enabled the  $1/4\lambda$  radial to be attached.

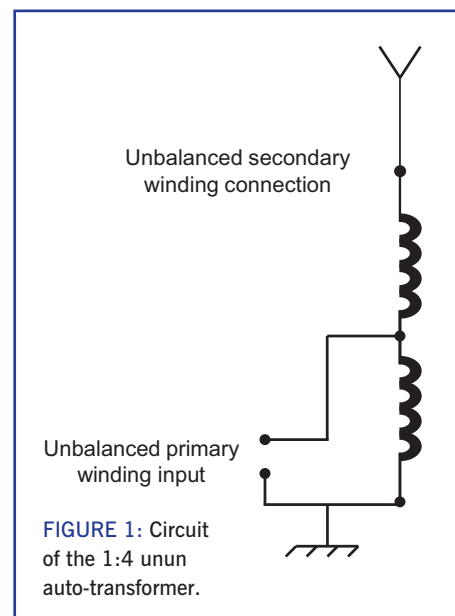
was improved by using a single radial of around a quarter wavelength (ie about 5.3m). Careful adjustment of the antenna's capacitive loading tube and the inductor, as described in the April column, enabled an SWR of around 1.5:1 to be obtained across the 20m band. **Photo 2** shows Robert's completed 20m vertical antenna set up in his back yard.

During testing, using around 30W of transmit power, Robert reports from his South Carolina QTH that "I have given the helical vertical antenna some testing in the last week or so... ..all things being equal, I believe the antenna performed fairly well."

His results are shown in **Table 1**.

For the longer term, Robert intends to use the antenna for generally operating on 20m including PSK31 mode and contests.

Many thanks for the feedback, Robert.



**FIGURE 1:** Circuit of the 1:4 unun auto-transformer.



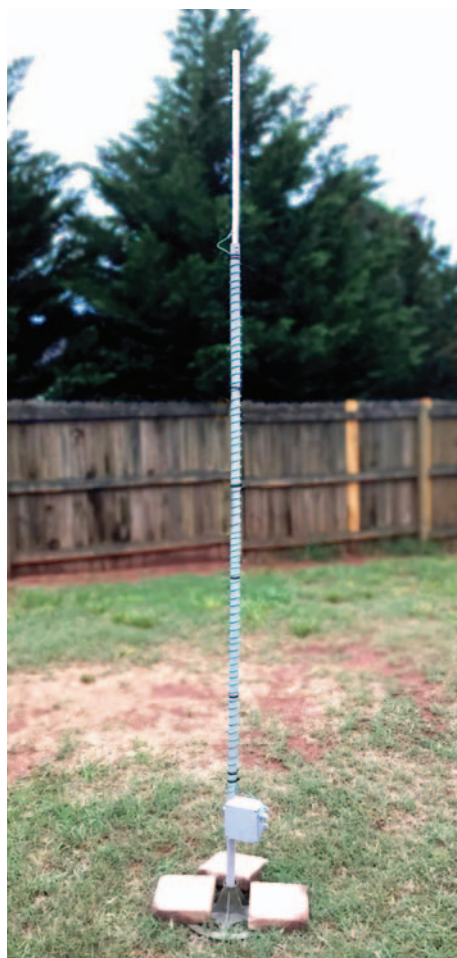


PHOTO 2: WR8RW's 20m vertical helical antenna in use.

### A compact 80m helical vertical antenna

The concept of an 80m version of the vertical antenna is shown in **Figure 2** where a 1:4 unun auto-transformer was used to match the antenna to the coaxial feeder cable as described in April's column (based on the VK6YSK unun design [2]).

The 80m band version of the helical vertical antenna was made using a 2m length of 70mm diameter PVC pipe as the antenna's former. This pipe can be obtained from many hardware suppliers and DIY outlets, however a robust variety of pipe should be chosen that does not bend easily. Onto this PVC pipe was wound 26.8m of insulated stranded copper wire of 5 amps rating (giving an electrical  $\lambda/2$  in this particular case). The winding started about 300mm along the PVC pipe and was formed of nine separate series connected coils with a gap left between them extending over the remainder of the pipe's length. Figure 2 shows details of the spacing left between each coil and the number of turns used, giving a combined total of 114 turns. When winding the inductor, care must be taken to ensure that the windings continue in the same direction around the pipe. The

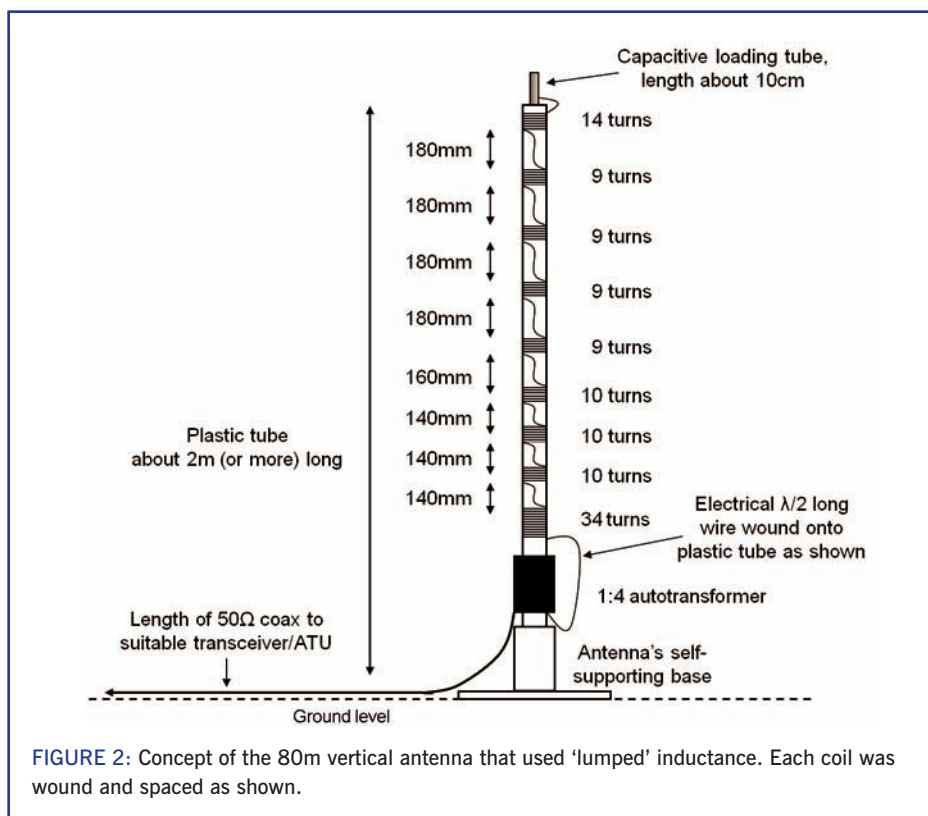
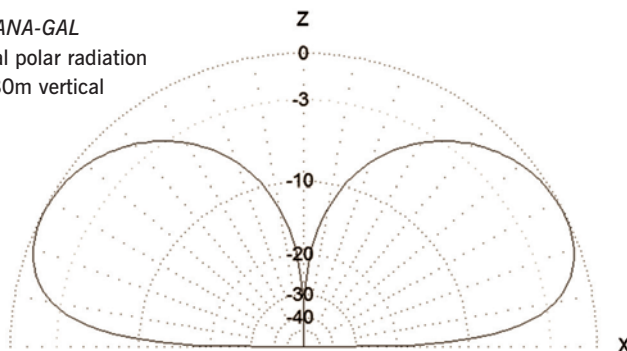


FIGURE 2: Concept of the 80m vertical antenna that used 'lumped' inductance. Each coil was wound and spaced as shown.

FIGURE 3: MMANA-GAL predicted vertical polar radiation pattern for the 80m vertical antenna.



coils were held in position using insulation tape, although cable ties could be used. Strictly speaking, this arrangement is not a helical winding and is a 'lumped' inductor. This technique was used because it made winding the inductor easier compared to trying to wind a single helical coil using stranded copper wire.

A 100mm length of 12mm diameter aluminium tube was secured to the top of the PVC pipe to form the capacitive load. A length of about 50mm of the aluminium tube was fixed inside PVC pipe and held in position using two self-tapping screws. This left 50mm of tube protruding above the top of the pipe and this was found sufficient to tune the antenna to 3.65MHz. The inductor's upper wire-end was connected to the aluminium tube's centre just above where it emerged out of the pipe. This connection

was made by first drilling a small hole into the tube and using a self-tapping screw to hold a ring-tab in place. The wire-end was soldered to the tab and a smear of grease was used to weatherproof the joint.

A 1:4 unun auto-transformer was used to match the antenna to the 50Ω coaxial feeder. The unun comprised 18 bifilar wound 2-wire turns on a T200-2 toroid core that was obtained from an online supplier. The unun was housed in a suitable ABS box and two long cable ties secured the arrangement to the lower end of the PVC pipe, as shown in **Photo 3**. The coaxial cable feeder and

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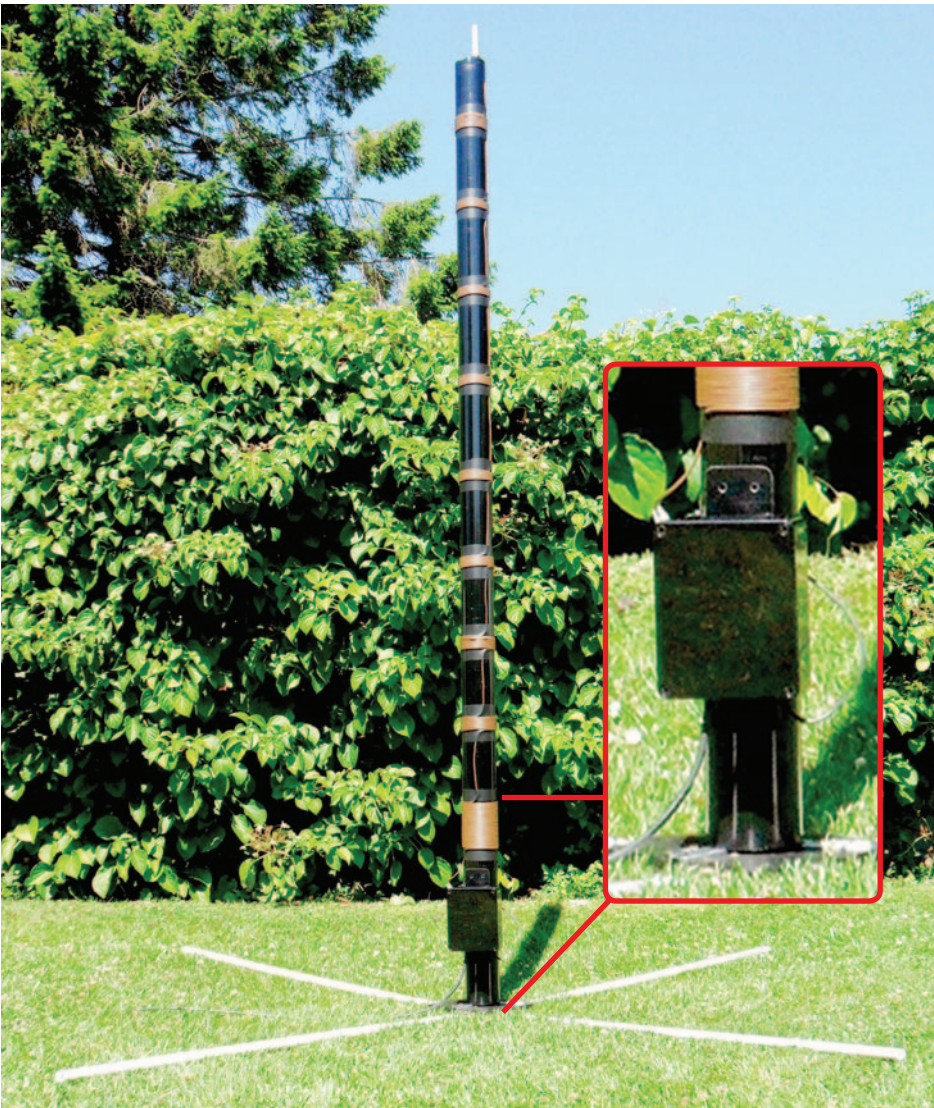


PHOTO 3: The 80m vertical helical antenna in use. The inset shows details of the unun box and mounting arrangements.

antenna wire were passed through holes drilled in the ABS and soldered to the unun. The ABS box and the cable access holes were sealed with external grade sealant to weatherproof the assembly. This unun arrangement looked very similar to WR8RW's auto-transformer used for his 20m vertical helical antenna, as shown in Photo 1.

A plywood base was made to support the antenna when in use. This base consisted of a 500mm length of 50mm diameter PVC pipe that was held vertically in position on the plywood board using three angle-braces and a jubilee clip. Four 600mm long horizontal supports, made from 25mm oval conduit, were screwed to the bottom of the base at right angles to enable it to stand upright on the ground when the antenna was slid over the 50mm pipe. Photo 3

shows the antenna standing on its base in the back garden.

To tune the antenna to 3.65MHz, it was found necessary to connect at least 15m of coaxial cable to the antenna's unun auto-transformer and the antenna was set up on the ground clear of local objects. This length of coaxial cable enabled a reasonable match to be obtained with the cable run over the surface of

the ground. For testing, a MFJ antenna analyser was connected to the end of the coaxial cable to monitor the SWR. Initially, the antenna's inductive section was formed by winding 39m of wire on to the 70mm PVC pipe. The inductance was reduced by trimming the wire and the SWR monitored until a good match was obtained (giving a wire length of 26.8m, in this case). The antenna was resonated at 3.65MHz, where it gave an SWR of 1.2:1. The antenna's inductance was measured using the MFJ antenna analyser and found to be around 120µH. This correlated closely with the calculated inductance of 122µH, made using the equations published in the *Radio Communication Handbook* [3].

Using this information, a *MMANA-GAL* model was made of the antenna to examine its performance. The model predicted a low angle radiation pattern of about 27° to the horizontal and a gain of about 0dBi with the antenna at ground level. **Figure 3** illustrates the predicted radiation pattern for the 80m helical vertical antenna.

Although the antenna was resonated at 3.65MHz, it gave an SWR of around 2:1 at 3.51MHz and 3.79MHz. Under a drive of 100W CW the antenna maintained an SWR of 1.2:1 at 3.65MHz, however for operational use an ATU was used to ensure the best possible match.

A comparison of the 80m vertical antenna was made with a 20m long end-fed wire. Generally, the signals received using the 80m vertical were about 1 S-point lower compared to the end-fed antenna. However, the transmit signal reports received during an activity contest were around 3 to 4 S-points down compared to the end-fed antenna – and this was not surprising for an electrically very short antenna.

To date, from southern England, the antenna has allowed CW/SSB contacts with a number of stations up to around 500km in distance using 100W. These have included stations in northern France, western Germany, the north of England and GR2HQ (the RSGB HQ team IARU contest station).

Conclusion

I hope the designs described here have provided something to think about if you have only limited space to set up an HF antenna and would like a basis to access a specific amateur HF band.

References

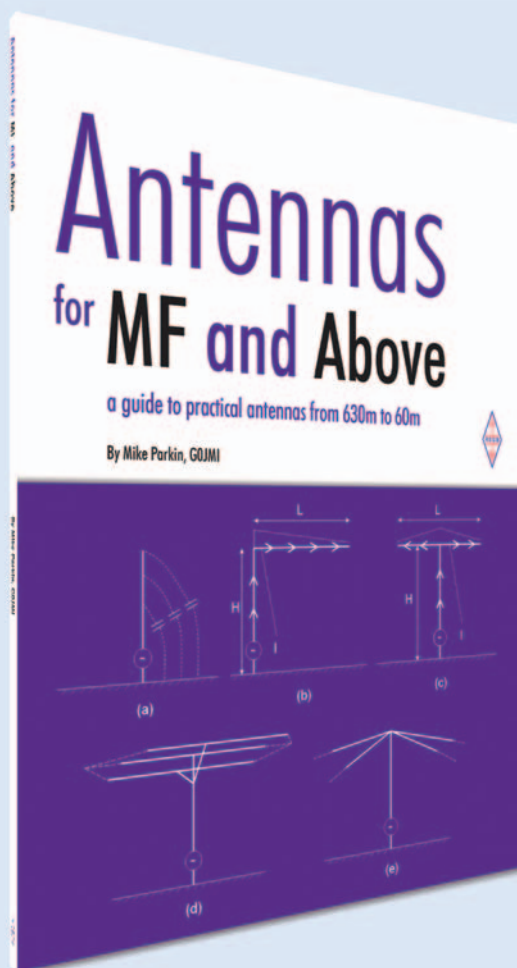
[1] *ARRL Handbook* (53rd edition, 1976), chapter 21, HF Antennas, pages 606-607  
[2] VK6YSF Projects, Peter Miles, [http://vk6ysf.com/unun\\_9-1.htm](http://vk6ysf.com/unun_9-1.htm)  
[3] RSGB *Radio Communication Handbook*, 13th edition, edited by Mike Browne, G3DIH. Appendix A, General Data, Coil Winding, page A.3

TABLE 1: WR8RW vertical helical antenna results.

Direction	Place	Distance (miles)
East	North Carolina (sea coast)	255
East	Virginia	384
North	Illinois (Chicago)	565
North	Ontario (just N of Toronto)	665
West	Missouri (St Louis)	535
West	Arkansas (SW)	615
West	Texas (Dallas Ft Worth)	877
West	Nebraska (W of Omaha)	960
West	California (East of LA)	1931
South	Venezuela (E of Caracas)	1963



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By Mike Parkin, G0JMI

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You will find examples of single band and multi-band working designs for both vertical and horizontally polarised antennas. There are explanations of the operation of antennas with radiation pattern diagrams used to help with understanding the concepts introduced. You will also find practical techniques for matching the antenna to the transmission line, which are covered using examples of baluns, transformers and ATUs to illustrate these methods.

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# Design Notes

## Keep it clean

Over the last couple of years, two modern digital frequency sources have become popular amongst radio amateurs: the AD9850 Direct Digital Synthesiser and the Raspberry Pi. They're used, among other things, to drive low power transmitters. The former was described in this column in February 2013 and May 2014; the latter makes use of an integral clock generator chip on board. Both can generate RF at quite fine tuning resolution, making them suitable for narrowband modulations. The Raspberry Pi is now being used, for example, as a standalone WSPR beacon system.

The trouble is, neither of these two sources are terribly clean. They are beset by close-in spuri.

Instructions for the Raspberry Pi WSPR code (*WSPRRY-Pi*) emphasise the absolute necessity of adding a low pass filter to clean up harmonics. As the output from the board is a square wave, harmonics levels are very high but no mention is made of its cleanliness at frequencies *other* than harmonics. The AD9850 does not suffer from high harmonic levels, but does instead generate alias products and a very unpredictable set of close-in spuri. We'll now look at each of these two sources in turn, examine how the spurious products are formed and look at possible ways to mitigate them, or how to accept their presence.

## AD9850 DDS module

A DDS works by addressing a sine lookup table from an accumulator driven from a master clock. The amount by which the accumulator increments for each clock cycle defines the resulting output frequency. The value stored in the accumulator addresses a sine lookup table, outputting the result via a D/A converter as an analogue waveform. The result is a stepped sine wave output at a nominal frequency related to the clock and the programmed increment. For example, the AD9850 has a 32 bit accumulator that rolls over after  $2^{32}$  (around 4 billion) counts. If this is clocked at 125MHz and the accumulator is set to increase by 100 million for each clock cycle, the resulting output is  $10^7 / 2^{32} * 125\text{MHz} = 2.91\text{MHz}$ .

There are two mechanisms that work together to generate unwanted frequencies as well as the wanted one. Note the magic words: 'stepped sine wave'. The steps add extra frequency components. Figure 1 shows a perfectly sampled sine wave whose frequency is *exactly* 1/16 of the clock – hence there are *exactly* 16 steps. This is a special case of a DDS-generated waveform where the output is an exact submultiple of the clock. We'll look at the more general case shortly. Figure 2 shows the spectrum of this stepped sine wave. Spurious products, called alias products, are present at all multiples of Fclock plus/minus the wanted frequency. The amplitudes of each alias product roll off as 1/harmonic number, so the 15th term has a (voltage) amplitude of 1/15; the 2nd Fclock – Fout at 31 times frequency and amplitude of 1/31 and so on. If these alias products were the *only* spuri to be found, there would be no problem as they can all be removed with a low pass filter.

Aliases are the reason why a DDS is normally specified to generate up to about 35% of Fclock. This is about the limit to which a practical LPF can be built to remove all alias products. The unfiltered output from a DDS generating a frequency that is not a submultiple of the clock looks a bit of a mess on an oscilloscope trace as there are a multitude voltage levels being output in succession. But the (ideal) result is still clean and, when passed through a LPF, gives just a single tone output.

The next real practical problem comes about by an imperfect conversion of the digital word to the analogue output in the D/A converter. The converter will only be using the most significant, say, 10 bits of the accumulator and therefore can only generate 1024 different voltage levels. This isn't shown in Figure 1, which is illustrating 'perfect' reconstruction, but imagine the flat tops of the staircase being, randomly, a little above or below the corresponding point on the curve.

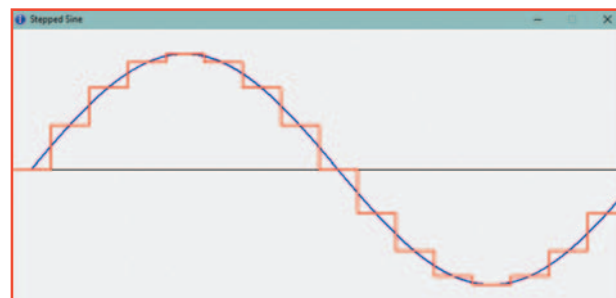


FIGURE 1: 16 step approximation to a sine wave.

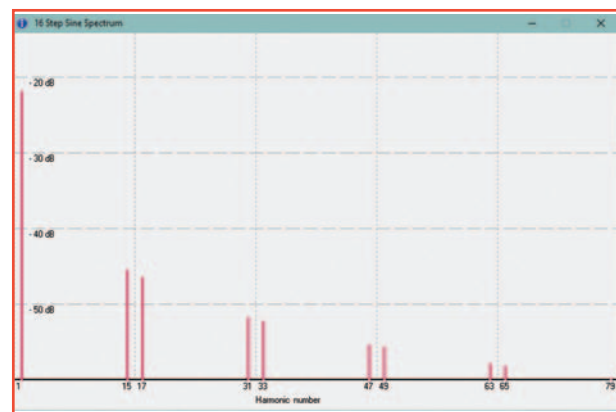


FIGURE 2: Unfiltered spectrum of the waveform shown in Figure 1.

The resulting sampled sinewave will now exhibit distortion – and we know that a distorted sinewave means there are harmonics present. And these are harmonics of the output waveform, which is anything we ask it to be. Since the step interval is that of the clock, we can expect the distortions on the sinewave to go to quite high frequencies, just as the alias products do. So now, before we have done any filtering, we have all harmonics of the clock and lots of high order, non-related harmonics from the wanted output. Now it gets interesting!

Take one example, a DDS clocked at 125MHz generating 21.01MHz. Harmonics of the output frequency will occur at 42.02, 63.03, 84.04MHz etc. The ones we're interested in first of all are the 5th and 7th harmonics, at 105.05 and 147.07MHz. Internally to the DDS (remember, this is all before any output filtering can be applied) these terms mix with the clock to give  $125-105.05 = 19.95\text{MHz}$  and  $147.07-125.07 = 22.07\text{MHz}$ . We now have sidebands separated by about 1MHz from the wanted one that cannot be removed by filtering. The 11th and 13th harmonics interact with the second harmonic of the clock to give sidebands spaced by about 2MHz – and so on. As an exercise, see what happens when the same DDS with 125MHz clock is asked to generate 20.8333MHz and think what would happen if the 21MHz output were forming the local oscillator for a receiver.

The internal harmonic levels are a function of the quality (including the number of bits) in the D/A converter and of the ratio of Fout to Fclock. The AD9850 has a 10 bit D/A converter



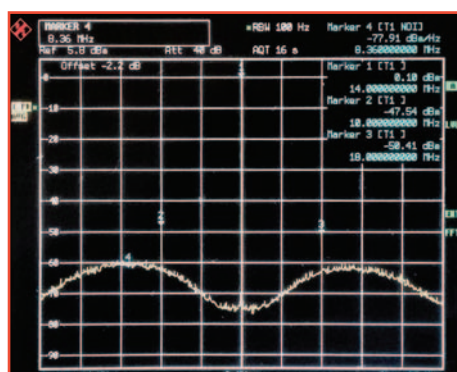


FIGURE 3: Spectrum of the *PiCW* generator software at 7MHz.

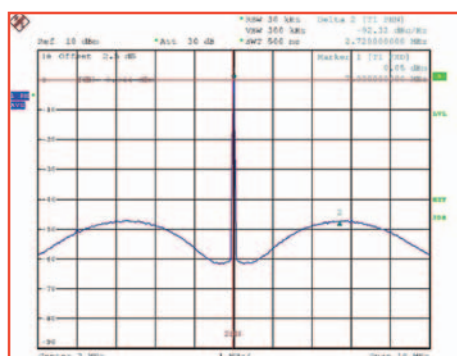


FIGURE 4: Raspberry Pi spectrum at 14MHz.

and, as a very rough approximation, the average level of spuri can be estimated from  $6 \times 10 \text{ bits} = 60\text{dB}$  down. The faster AD9852 DDS has a 14 bit converter so the spuri for that are more like  $6 \times 14 \text{ bits} = 84\text{dB}$  down. The example shown earlier used the 6th harmonic, but if the DDS were generating 137kHz, to get close-in products we'd be looking at the 912th harmonic, whose amplitude will be so much lower that close-in spuri will not be an issue.

So to ensure a clean DDS derived signal there are two rules – use as high a clock frequency as possible for any wanted RF and aim for the best possible D/A converter. The low cost, rather-old AD9850 meets neither of these criteria when used for generating RF much above a few MHz. The close-in sidebands on a DDS can appear completely wild, whipping around all over the place for even a tiny change in output frequency, as many constructors who have used it as their LO for an HF receiver know only too well!

### Raspberry Pi as a transmitter

This popular single board computer has an on-board clock generator that uses Fractional-N synthesis techniques to generate arbitrary frequencies. Fract-N synthesis was described here in the April and November 2012 editions, but essentially involves 'jiggling' a frequency divider to average out at some non-integer division ratio. The rate at which the jiggling is done results in sidebands at some relationship

to that frequency and there are all sorts of techniques to fiddle with sideband spread – many involving randomisation and pseudo-random sequences.

The arbitrary frequency generation used in the R-Pi WSPR beacon source and CW generator software is no exception. Glynn, MOXGT has made some spectral plots of the R-Pi used as a CW source (using the *PiCW* software). These can be seen in Figure 3 and Figure 4. He says,

"The generic problem here is that the period is quantised by the underlying clock – the transitions on the output waveform can only happen at a discrete set of times and (in general) the synthesiser attempts to build an average waveform by gluing together a sequence of the discrete ones.

"In the fractional-N DDS (I guess) it adds and drops clock periods as it goes along to get the correct average and the *PiCW* software builds a table of the nearest frequencies and switches between them in sequence to get the correct average. If the sequence is fixed then we get fixed spurs, which will depend in a complex way on the switch sequence and specific discrete frequencies. There are two versions of the *PiCW* code: an old one that uses a fixed mix that produces bad spurs, and the newer one that spreads them. The software can vary the mix as it goes along directed by a random number generator – this will 'spread' the spurs into a continuous broadband spectrum and (presumably) it can do a bit of noise shaping (push the noise away from the carrier where an external narrow bandpass filter could deal with it).

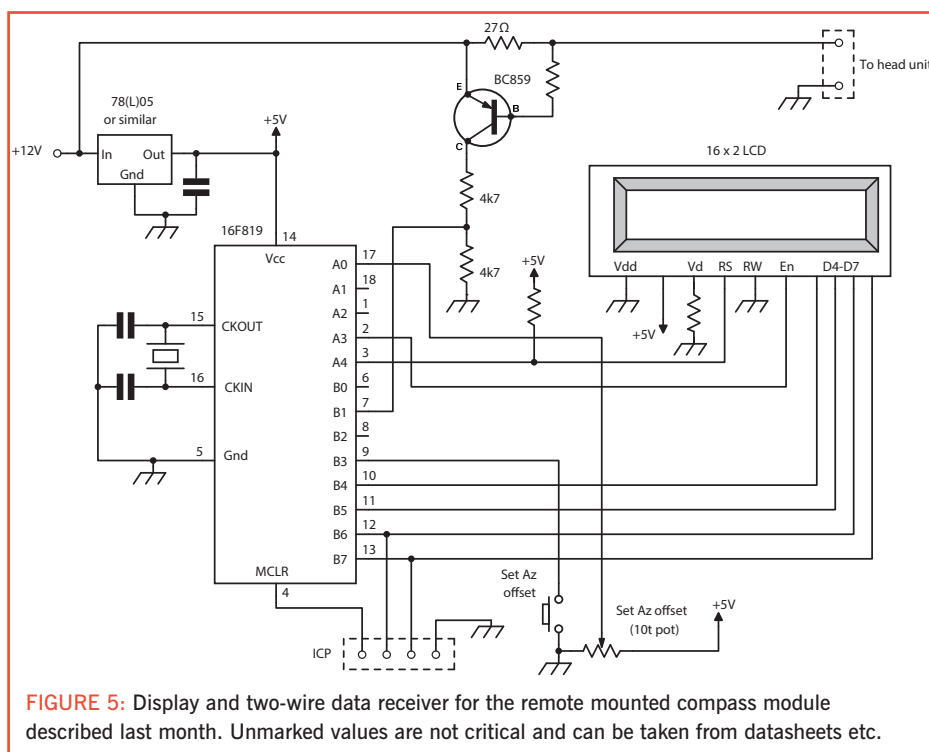


FIGURE 5: Display and two-wire data receiver for the remote mounted compass module described last month. Unmarked values are not critical and can be taken from datasheets etc.

"I had a look at the code in *PiCW.cpp* (from the R-Pi source archive) and it constructs a sequence of, on average, 1000 frequency switches per symbol. This is the WSPR code, but used for CW tone by repeating. To get 14.00MHz it mixes two nearest quantized frequencies in the ratio 0.589... but uses the Pi's random number generator to dither the number of frequency switches per symbol and recalculates the mix ratio each time".

### Display module for the compass bearing readout

Last month we looked at a design for a remotely mounted compass module and digital display. Space precluded showing the circuit diagram of the display module, so for completeness this is shown in Figure 5. The PIC 16F819 has an internal A/D converter which reads the value of a 10-turn preset potentiometer used to manually set calibration in the field. The value from this is converted to a number in the range 0 – 359.9 and added to the value returned via the current-sensing digital link from the head unit. The result is normalised to the range 0 – 359.9° for display on a two-line LCD. The push button allows the value of offset on the potentiometer to be read. PIC code in assembler and .HEX format can be found at [www.g4jnt.com/RemCompass.zip](http://www.g4jnt.com/RemCompass.zip).

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# GB3ORK 5.29MHz beacon upgrade

**G**B3RAL, GB3WES and GB3ORK were three beacons that formed part of the RSGB 5MHz Experiment [1] [2] [3].

They went live back in 2004 and transmitted nearly continuously for over ten years. They have provided a wealth of information on propagation, which was reported in [4]. GB3WES and GB3ORK are to continue operating because of their usefulness. However, the GB3ORK hardware recently failed and the opportunity was taken to refurbish the beacon and include a modern weak signal data mode. The original driver hardware can be seen in **Photo 1**.

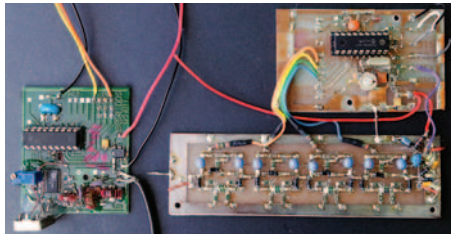
## Corroded switch

The failure mechanism turned out to be trivial. A test-mode switch carried the logic signal to activate the beacon's power. This was a 5V signal passing just a few hundred  $\mu$ A during the one minute transmission every 15 minutes. After many years of exposure to the sea-laden atmosphere on Orkney, the switch contacts had corroded and the very low current passed was not enough to break down the oxide layer. The switch was removed and replaced by an alternative method of selecting a test or tune-up mode.

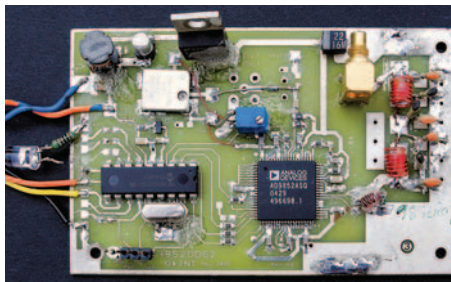
## Data mode

Originally the 30 second period after the main beacon transmission had finished was filled by a sounder sequence of short pulses. Those were no longer needed. The sounder had already been removed from GB3WES and a previous upgrade to GB3RAL had replaced that one with a PSK31 message. That appeared to offer very little since PSK31 is not a weak signal mode and the desire was really for something that would offer below-audibility signalling. So it was decided GB3ORK would not be modified the same way.

Of the weak signal modes within the WSJT-X suite [5] there are a couple, namely JT9-Fast and ISCAT, that can make use of a time slot of 30 seconds, but these are similarly not 'weak signal' modes. Since GB3ORK occupies the last timeslot of the sequence of three beacons, the following minute's timeslot becomes available, the timeslots hh:03, hh:18, hh:33 and hh:48, meaning any of the WSJT-X weak signal modes could now be



**PHOTO 1:** Original GB3ORK driver hardware. The AD9851 DDS source is on the left with its dedicated controller. A second PIC microcontroller for the beacon timing is at top-right and at the bottom right the programmable PIN diode attenuator for on-off CW and power steps.



**PHOTO 2:** AD9852 DDS module with PIC controller, similar to the one now used at GB3ORK. This replaces all of the hardware shown in Photo 1.

used. It was decided to use JT9A, probably the most sensitive of the modes thanks to its 1.74Hz noise bandwidth.

The WSPR beacon mode was briefly considered but rejected for two reasons. 5.29MHz is not in the normal WSPR part of the band, so it would miss all the regular users monitoring with their automatic uploads to the WSPRNet database – and there is already a huge personal beacon network using WSPR. JT9A allows auto monitoring using WSJT-X and has a sensitivity comparable to that of WSPR. So now the beacon sends its original transmission format in the hh:02 etc time-slots, then a JT9A message starting 30 seconds after that ends.

The first part of the transmission is as before: every 15 minutes, starting at a 2 minute offset with callsign, a bit of carrier, then two sets of power steps, reducing power each time by 6dB until it reaches -48dB. Then from 25s to 30s it reverts to full power carrier.

One minute later, ie at 03, 18, 33 and 48 minutes past the hour, there is a JT9A transmission on the same frequency, which takes about 48 seconds and is followed by the callsign in CW.

## New driver source

The original beacon used an AD9851 DDS as a standalone frequency source, with a dedicated 'boot-and-forget' PIC to set the frequency at start up. A programmable PIN diode attenuator and PIN switch were driven by another PIC, with a GPS module supplying timing information. Both PICs were obsolete 16F84 devices that I could no longer easily program and the separated DDS and attenuator made a new controller complicated to get going. To handle both power steps and frequency shift keying, it would need multiple I/O lines and connections to both modules, as well as PA control and the test mode switch.

I chose to abandon the existing RF driver hardware and replace it all with an AD9852 DDS and single controller, similar to that shown in **Photo 2**. The Motorola GPS module would be retained to deliver the NMEA timing data, as it worked perfectly. The AD9852 DDS has the ability to program the output amplitude to a resolution of 12 bits, allowing up to 70dB of output level change. A PCB for the DDS and a PIC controller already existed [6] and a ready-built couple were to hand.

The result was a new driver that could do all the required frequency and amplitude shifts, controlled by timing from the GPS NMEA output. The new module was integrated into the driver assembly and the beacon tested initially with my own callsign from home for two weeks. After it proved itself, the callsign was reprogrammed, tested (into a dummy load) for a couple of days continuous operation and then the complete beacon was shipped to its final location. It is now fully operational from the Orkney site.

## References

- [1] <http://tinyurl.com/Data-10-17-A>
- [2] *Design and construction of the 5MHz beacons GB3RAL, GB3WES and GB3ORK*, Andy Talbot, G4JNT, *RadCom* June / July 2005. A shortened text version is at <http://tinyurl.com/Data-10-17-B>
- [3] <http://tinyurl.com/Data-10-17-C>
- [4] HF Near Vertical Incidence Skywave Propagation: Findings associated with the 5MHz Experiment. Marcus C Walden, *IEEE Antennas and Propagation Magazine* volume 58, issue: 6, December 2016. Reprinted in *QEX* July / August 2017
- [5] <http://tinyurl.com/Data-10-17-D>
- [6] <http://tinyurl.com/Data-10-17-E>

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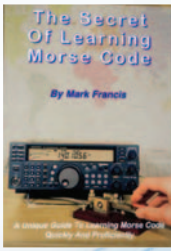
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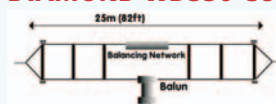
GPS Disciplined Oscillator (GSPDO)..... **£724.95**

Flex 6700 8 slice Receiver flagship..... **£6899.95**

Flex 6500 4 slice Receiver ..... **£3799.95**

Flex 6300 2 slice Receiver..... **£1849.95**

## DIAMOND WD330 COMPACT DIPOLE



80M - 10M  
25M Long

This is a dipole that covers all bands from 80m to 10m. It also comes with 30m of coax feeder terminated in PL-259 plugs. The antenna will handle up to 150W and typically has a VSWR of 2:1 or better. This is easily matched with internal ATUs. Can be erected as an inverted V, sloper or horizontal. .... **£199.95**

## Hustler HF Verticals

### 4BTV

40m - 10m 4 Band vertical that will handle full legal power and can be ground mounted Height is 6.52m..... **£209.95**

### 5BTV

The ever popular 5-band model that covers 80m to 10m. This is a great backyard antenna that can be ground mounted. The height is 7.64m ..... **£269.95**

### 6BTV

This antenna is identical to the 5BTV above but has the 30m band added. Again it handles full legal power and stands 7.3m high..... **£289.95**  
 All antenna are rated at 1kW.

## Diamond HF Mobile Whips

Here is a great range of single band whips that have PL-259 bases and an easily adjustable upper tuning section for quick hand adjustment.

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HF-12FX..... 12m whip 1.1m long..... **£58.95**

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HF-16FX..... 17m whip 1.2m long..... **£40.95**

HF-20FX..... 20m whip 1.2m long..... **£63.95**

HF-30FX..... 30m whip 1.4m long..... **£63.95**

HF-40FX..... 40m whip 1.4m long..... **£64.95**

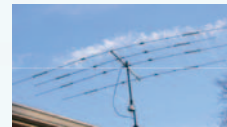
HF-80FX..... 80m whip 1.4m long..... **£71.95**

### W-300S Magnetic Mount

This is a 3-way mount that is great for HF operation. SO-239 socket and 4.5m cable terminated in PL-259..... **£39.95**



## Mosley Mini Beam 5 Bands



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- 3 element on 10-15-20
- 1 Element 12m and 17m
- Boom approx 2m
- Longest El. approx. 6m
- £689.95**

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The Ultimate Compact Antenna



- Just 1m Diameter
- Dipole Efficiency
- Remote tuning
- Controller included
- Mast mount kit
- VSWR Tuned
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- Cross Needle Metering

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MFJ-1788..... 7MHz - 21MHz Continuous..... **£589.95**

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Here is a range of high power antenna tuners made by Palstar in the USA. An ideal investment for keen HF operators

AT-500..... Differential Tuner 160-6m 500W..... **£529.95**

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AT2KD..... Differential 160-6m 2kW..... **£599.95**

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HF-Auto..... 160m-6m 1.8kW Auto ATU..... **£1599.95**

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4 band mobile whip antenna that was designed with the FT-8900 quad band mobile in mind but works with over radios.....£89.95

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Fixed station vertical operates on 2m/70cm with a gain of 4/7.2dB and power handling of 200W with PL-259.....£59.95

#### X-200N

#### X-200N

Fixed station vertical operates on 2m/70cm with a gain of 6/8dB and power handling of 200W with N-Type.....£84.95

#### X-300

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#### SRH-771

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#### SRH-815

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- Covers 1.8-54MHz
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Output: 2000W PEP  
Optional 4:1 Balun for  
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Differential HF Tuner  
Covers 6-160m  
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1.5kW fully auto  
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Covers 6-160m  
Output power: 2-1800W  
Display: 4 line large print

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Covers 6-160m  
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• Covers: 1kHz (VLF)-2GHz  
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**RSP-2 Pro** As above but  
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- USB interface
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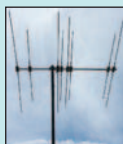
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# YOTA 2017

## a successful event



Over 80 young people from all around IARU Region 1, as well as Japan, gathered at Gilwell Park for a week of radio activities.

**Y**oung people from Europe and beyond travelled to the UK for YOTA 2017. They flew in to various airports, arrived at different train stations, even cycled from Germany; but they all ended up at Gilwell Park for a week of amateur radio pursuits.

The event opened with a welcome meeting hosted by Mike, 2E0MLJ (RSGB Youth Committee Chair) and Lisa, PA2LS (IARU Region 1 Youth Working Group Chair). The delegates were divided into five streams that would take on the various activities planned for the week including visits to London, operating GB17YOTA, and building a transceiver. The groups – named Hertz, Marconi, Morse, Tesla and Turing – each had an RSGB Youth Committee member to oversee the activities.

Throughout the week, Daily Diaries were uploaded to the RSGB YouTube channel ([youtube.com/theRSGB](https://youtube.com/theRSGB)). They give a real flavour of what it was like to be involved with such a successful youth event.

### Operating GB17YOTA

One of the main highlights of the week was operating any one of five of the Special Event

Stations with the callsign GB17YOTA.

It was important that each participant had a fair chance at operating, so each stream had two sessions in the week and evening sessions were allocated through a sign-up sheet in the lodge hall at breakfast. For those especially keen operators, operating started at 6am and went on until early hours. Those operating rotated around the stations every half-hour, ensuring that they experienced both the 'good' and 'bad' bands.

Many of us enjoyed hearing from the German team, who held a data mode seminar to display the use of data modes, including some more obscure ones such as Hellschreiber. Jakob, DK3CW, enjoyed telling people about one of his favourite parts of amateur radio – Hamnet, which he helps to develop. Hamnet is a fast, high bandwidth amateur radio mesh networking system that is widely deployed across Germany and Europe. It was interesting to hear about how this network is being used to do VoIP, FTP and web browsing only over amateur bands.

CW was also a highlighted mode in the week. Just over 20% of QSOs of the final 10,384 QSO count were made in CW. Many of us also enjoyed a showcase of High Speed Telegraphy sending by the Romanian team, including Mihaela, YO8TLK, Ene, YO8TOC and Teodora Neagu. Even though they were using double lever paddle keys, which aren't typical for HST, they still managed a stunning demonstration! A few of the delegates also

enjoyed operating using the 17m CW transceiver and 17m ground plane kits they constructed.

GB17YOTA was active on a wide variety of bands and modes throughout the week, such as meteor scatter MSK144 on 6m/4m and PSK, DominoEX and other digital modes on HF 30m. Thanks to all of those who worked us, and those who did so at least three times on three different bands can claim their award at [www.rsgb.org/yota2017](http://www.rsgb.org/yota2017)

On Friday afternoon, Mike, 2E0MLJ spoke to Bob Inderbitzen, NQ1R from the ARRL as GB17YOTA and W1AW respectively on 20m in a pre-arranged sked.

### Summits on the air (SOTA)

We were fortunate to have Kevin, G0PEK and his daughter Lauren, M6HLR, fresh from completing their challenge of activating all 214 Wainrights in the Lake District the week before. They were able to talk about their SOTA experiences, the lessons learned and the type of equipment involved, whether that's building of ultra-lightweight antenna systems or repurposing mountaineering equipment such as Nordic poles into masts.

Each of the visitors then went on to build a 17m ground plane antenna from a kit that could be used with the 17m transceiver the youngster had the opportunity to build during the week. All the youngsters had the opportunity to go to Wendover Woods (SOTA





Operating one of the five GB17YOTA stations, supervised by Camb-Hams, was a popular activity. This group from Finland were excellent operators.

reference G/CE-005) at some point during the week and some – depending on the order in which they undertook the activities – had the opportunity to use their YOTA-built antennas and transceiver. For those that didn't have the equipment built before going to Wendover, two FT-817 all mode portable transceivers were available allowing everyone the chance to activate the SOTA location.

### Building a 17m transceiver

Hans Summers, GOUPL of QRP Labs. designed a 17m CW transceiver kit for attendees at YOTA 2017. The kit gave an output of 3 to 5W depending on the supply voltage and came with a software Morse decoder – making it ideal for those for whom the Foundation Morse Appreciation was their first encounter with CW. A microswitch on the printed circuit board could also be used as a surprisingly effective straight key, making CW operation even more accessible. There was even an integral signal generator and alignment tools for setup, and test equipment such as a voltmeter, RF power meter, and frequency counter. The kit's beacon mode also allowed for automatic

CW or Weak Signal Propagation Reporting (WSPR) operation.

Despite the kit building being some attendees' first brush with a soldering iron, they took to it well – with helpful guidance from RSGB volunteers. A few kits were finished in the allocated half-day slot, but most needed a second session in the shack. One keen builder was even seen adding the finishing touches at the dinner table! Everyone was able to take their newly-built transceivers home with them.

### Visiting Bletchley Park

Each stream was able to pay a visit to Bletchley Park, the home of Britain's wartime codebreakers where they enjoyed a guided tour including the working rebuilt version of Turing's bombe, which was seen successfully giving the correct rotor and plugboard settings to decode an Enigma encoded message in a demonstration.

Many in the groups were interested to learn about the role of RTTY, still used to this day on the bands, in World War 2, in the form of a lesser known, but far more advanced, German cipher machine. The



Building a 17m transceiver from scratch.

**Milo Noblet, M0ILO**  
with support from Jonathan,  
M0JSX and Martin, M0YRM

# Thanks to the YOTA 2017 Supporters

Whilst YOTA 2017 was organised and paid for largely by the International Amateur Radio Union (IARU) and Radio Society of Great Britain, we are immensely grateful to the many organisations, clubs and individuals who financially supported the event. We would therefore like to thank the following for their support of YOTA 2017 along with those who chose to remain anonymous.



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Olaf Lundburg, G0CKV



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Some tricky Amateur Radio Direction Finding courses were set, with some youngsters covering large sections of the 108 acre Gilwell Park site.

Lorenz was connected to a teleprinter and used to encode and decode radio teletype – used instead of the Enigma for sending much longer messages. It was surprising to learn that the logical structure and workings of the machine were deduced only from a couple of received messages, three years before one of the Lorenz machines were obtained by Britain. Some visitors also had the opportunity to go around the National Museum of Computing, seeing a working, rebuilt Colossus – the first electronic, digital computer, which was developed to break the Lorenz cipher using statistical analysis.

Everyone was able to visit the RSGB's National Radio Centre and had the opportunity to operate the permanent special event station GB3RS. Some even managed to work GB17YOTA back at Gilwell Park.

### Off to London

All the groups enjoyed their day out in London, as Gergana Ruseva, LZ1ZYL, team leader of the Bulgarian delegation told us “it's great to see in real life places I've only ever seen on TV!”. Each of the groups started at Parliament Square where they learned about the background of the

UK's Parliamentary democracy. They were then taken to Westminster Abbey, back around to Whitehall, passing the Cenotaph and monument to the women of World War II, before going past Horse Guards Parade. Then it was up to Trafalgar Square, through Admiralty Arch, along The Mall, seeing the Royal Society, St James's Palace and Clarence House before finishing at Buckingham Palace. Phew! It was a lot of walking but an extremely enjoyable tour.

Lunch was in Green Park before heading to the Science Museum. Here we were able to see Tim Peake's re-entry module from last year's Principia mission. For those visiting at the beginning of the week this was a build up to the ARISS contact planned during the week. Those who visited after the successful contact with the International Space Station were able to get a good feel for what it's like for the astronauts.

A few streams managed to squeeze in a trip to platform 9¾ at Kings Cross – an important location for fans of the Harry Potter series!

### Amateur Radio Direction Finding

Throughout the week, the young people were challenged with finding a number of low

power transmitters in YOTA 2017's very own ARDF challenge. Two courses were devised, each with five transmitters. One course was on 80m and the other on 2m; these had the participants running across most of the 108 acre site.

All the transmitters were an AM carrier sending Morse. Each would transmit for 30 seconds giving an ident and would then fall silent allowing the next beacon to transmit. This meant that when searching for a specific beacon, participants needed to wait 2½ minutes between transmissions.

The receiver used on 80m was a handheld device that used an internal ferrite rod, giving two possible directions (front and back). A telescopic sense rod could then be enabled to allow a more positive direction. These were surprisingly effective and most participants found most if not all beacons on 80m. The fastest 80m time of 22 minutes was posted by three people, Eugen Vusak, Szabolcs Androsi and Lennart Kieft.

On 2m a simple 3-element Yagi constructed from metal tape measure and PVC piping was deployed. This had the receiver mounted to one end of the boom, resulting in a very lightweight receiving setup that could handle being knocked about as



London gave an opportunity for some to see places only seen on TV before.



Visiting the National Radio Centre at Bletchley Park.

participants moved through vegetation. The only rule laid down was that the receivers couldn't go for a swim in Gilwell Park's famous Bomb Hole pond! The best time on 2m (44 minutes, 6 minutes faster than 2nd place) was achieved by Peter Barnes, MOSWN from the UK team.

### Amateur radio with the ISS

Talking to the International Space Station was one of the big highlights of the week. The ARISS UK team arrived on Monday, in advance of the planned contact with Italian astronaut Paolo Nespoli. They assembled an 18m tower holding one XQuad antenna with polarisation switching capability and a 10-element XY antenna (right-hand polarisation) on the same rotator – both with preamps. The main station comprised of a Kenwood TS-2000 into a power amplifier, giving approximately 250W output, connected to the antenna systems by 50m of Ecoflex15+ coax.

On Tuesday evening there was excitement in the air as a letter from the Society's Patron, the Duke of Edinburgh was read out.

We started calling on the VHF uplink early – "NA1SS, NA1SS this is GB4YOTA listening and standing by for a scheduled contact with the International Space Station". At the predicted acquisition-of-signal (AOS) time, there was no downlink. The ARISS team remained calm and switched to different uplink channels but to no avail, though we could see Paolo on HamTV via the Goonhilly Earth Station. Although disappointed, everyone understood that things don't always go as planned.

In the background, the ARISS team negotiated a second attempt with the ISS Mission Control Flight Director. This time using the 25W transceiver in the Russian module of the ISS. This second attempt was a huge success much to the relief and excitement of all those in the ARISS tent,

with twelve questions asked and answered ending with resounding cheers and applause from the audience.

### Ofcom's listening station

We were lucky to be offered a visit to Ofcom's monitoring station at Baldock on the Thursday of YOTA 2017. Delegates were able to look at some of the new technology in use, including technology from Texas Instruments to record and later play back RF samples from a site, and backpack based equipment for surveying mobile phone coverage – as well as a similar unit designed for inclusion in Network Rail's New Measurement Train to monitor and thus help improve mobile coverage for those travelling on the National Rail network. For those of us in Team UK, it was also a great opportunity to discuss career opportunities!

Ofcom's field technicians gave us a demonstration of the equipment in their vehicles, including the roof-mounted direction-finding antennae, fed to a display on the sun visor, and we had a miniature DF contest using their handheld analysers to find various transmitters, including a US-standard DECT base station that conflicts with Three's mobile allocation, and the Ofcom DF pigeon (an 800MHz microphone transmitter – *almost* a 'wild goose chase'!).

### Foundation exam time

Out of 72 young people who completed all their practical assessments during different activities, 54 delegates chose to sit their Foundation examinations and 63% had indicative passes – with two individuals scoring 'full marks'.

### Thanks

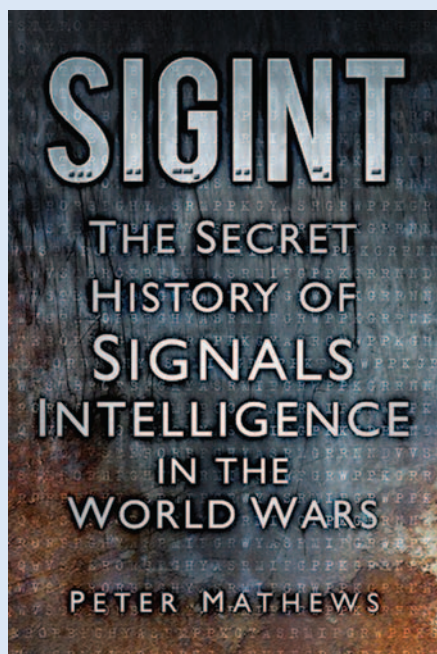
The week just would not have been so successful if it hadn't been for the volunteers

and helpers who went a long way to making the event so enjoyable. To everyone, a big thank you, although we need to single out some individuals and groups who went above and beyond.

- Our mini bus drivers Geoff, G0DDX, Neville, G8CDG and Gervald, G0GNF
- Kevin, G0PEK and Lauren, M6HLR for their inspirational SOTA talks
- 17m project assistance from Pete, M00FN, Peter, M0DZB and Terry, G3VFC with debugging help from Rob, M0VFC and Gavin, M1BXF
- Maggie, London Tour Guide of the Year 2017 for her enjoyable London visits
- ARDF course setting and help from Frank, M0AEU, Alan, G3WNS and Barbara, G8AKU
- The ARISS UK team, led by Ciaran Morgan, M0XTD who worked miracles enabling us to complete the contact with the ISS
- Paul Chapman and all his team at Baldock who made the visit possible
- Alan and Barbara Wilson kindly invigilated both exam sessions, and thanks to Joy Burrells and Carol Meredith, M6MUP at the RSGB for the smooth administration
- Heather Parsons and Rob, M0VFC who stayed up very late to make sure the 'Daily Diary' videos were ready to go as quickly as possible
- GB17YOTA wouldn't have been so successful without the support of Camb-Hams, including Rob, M0VFC, Dan, M0WUT, Lawrence, M0LCM, Gavin, M1BXF and Dominic, M0BLF, as well as GB2GP's shack technician John, 2E0XLX, whose technical knowledge was invaluable
- Stream leaders Milo, M0ILO, Rebecca, M6BUB, Kieran, 2E0NCN, Oliver, M6EUB and James, 2E0JPM
- Finally, the YOTA 2017 Project Team; Steve, G0FUW, Steve, M1ACB, Heather, Mark, M1MPA, Mike, 2E0MLJ and Sara, 2I0SSW. Thanks to all.



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# Multiband switchable dipole



**PHOTO 1:** General view of one leg of my pneumatically-switched dipole. The feedpoint is *just* visible on the extreme left.

**A**t my location I needed an aerial for short to medium distances working on 80, 60 and 40 metres and came up with the basic idea of an 80 metre dipole with switched 60 and 40m sections.

I have for a long time tried to think of a way of switching various lengths of aerial wire whilst not affecting the RF pattern by the switch cabling. I have now at last come up with the idea of using plastic pipe and air-operated switches, although I am informed by a reliable source this technique is very occasionally used in the commercial broadcast area and has also previously been explored by amateurs. However I am not aware of any recent publications on the topic.

The dipole had to be in the form of an inverted V, supported at the centre, partly due to the limitations of my site but mostly due to the extra weight imposed by the switches and pipework.

## General description

The antenna is basically a dipole for 80m, with air-operated switches included at critical points to isolate outer sections and thus shorten the dipole, thus bringing the antenna to resonance on different frequencies. Although my prototype was for 80, 60 and 40m, the same principle can be used for any combination of bands, limited only by the weight of the switches that can be supported. There is no requirement for the resonant bands to be harmonically related because the switches can be inserted at any appropriate pair of points.

There are no readily-available pneumatic switches I'm aware of that are designed to resist high RF voltages, which will limit the amount of power you can put into this aerial before contacts start arcing over.



**PHOTO 2:** Close-up view of the feedpoint. Note how the pairs of tubes are joined by a T-piece to the 'feeder' tube.

I've used sensitive, mains (250V-rated) switches intended for a Hotpoint washing machine – and increased the contact gap, as described later – which work for me at up to 200W. I haven't tried it at higher power [*we recommend 100W maximum – Ed*]. Please be aware that you could easily get a flashover (arc) on higher powered SSB speech peaks, giving a momentary but significant mismatch at the very time your output stage is delivering its highest power and thus possibly most prone to damage. Short-duration mismatches won't necessarily show up on an SWR meter, so the first indication of trouble might be when your radio suddenly goes QRRP.

My aerial has two pneumatic switches on each leg of the dipole, positioned so that they shorten my 80m dipole for 60m and 40m. The switches on one leg of the dipole can be seen in **Photo 1**. Each switch is fed by a PVC tube that runs along the dipole wire. At the feed point each pair of tubes is connected via a 'T'-piece (**Photo 2**) to one of two tubes that lead to the shack and terminated in a suitable tap (**Photo 3**). The



**PHOTO 3:** Taps at the shack end of the 'feeder' tubes.

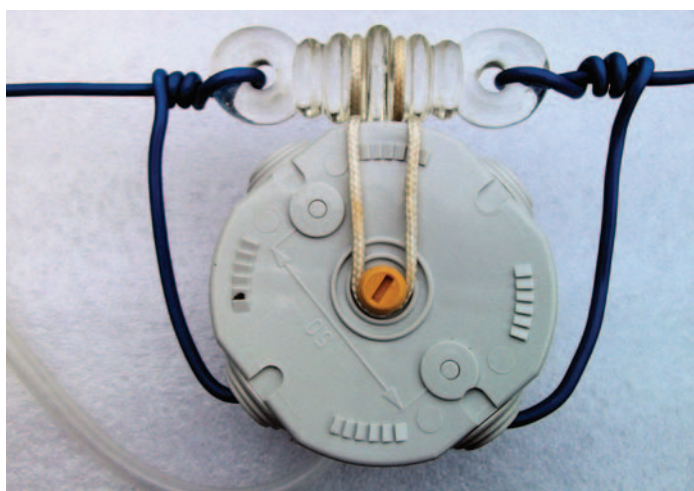
switches are actuated by opening the tap, blowing gently into the pipe, then closing the tap to retain the slight pressure. I've found that the pressure is retained for eight hours or more. The switches are released simply by opening the tap.

## Parts sources

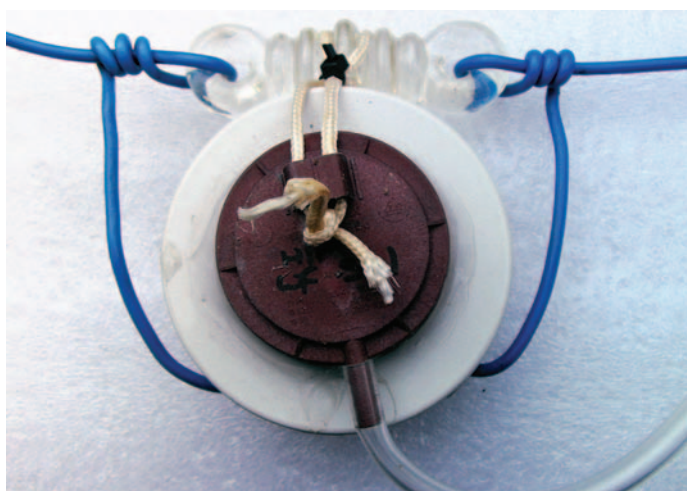
As mentioned earlier, my switches were originally intended for use in a Hotpoint washing machine, where they detect levels by detecting a (very slight) increase in air pressure. They are usually available, new or used (with plenty of life left in them!) on eBay and elsewhere. Get the type with Lucar-style spade terminals. Although the switches are normally factory-set to suit their intended application, it is possible to make adjustments to them, described later, that make them more suitable for this application.

The PVC pipe, tees and stop valves were Hozelock brand. The bore is 5mm and the outside diameter 7mm. Check the dimensions of your switches before ordering! These sorts of pipes and fittings are widely





**PHOTO 4:** Back of the Gewiss box. In the middle is a yellow number plate screw that provides an attachment point for the suspension string.



**PHOTO 5:** Front of the Gewiss box. Note how the brown switch is siliconed to the box body.

used in home brewing, hydroponics and even aquarium applications and are readily available on eBay and from other sources.

The switches aren't waterproof, so I protected them using round Gewiss boxes, 85mm diameter and 45mm deep, that I obtained from my local DIY shed. The boxes have four rubber cable entry points, two of which are to be punctured and used for the aerial wire entries.

### Construction

The first step is to prepare the switches. Remove the plastic terminal cage if it's detachable and bend the terminals outwards. The two inner ones are the ones used. **Figure 1** shows a general view of the switch and identifies the adjustments. Your type may differ from mine, but the principles are the same. Start by unscrewing (1) by half a turn. Then screw (2) in one turn. Finally, screw (3) in until there is no sound of the switch return after you blow into the air inlet (4), then unscrew it half a turn. These adjustments alter the sensitivity and increase the contact gap from the standard 3mm to about 5mm, increasing the withstand voltage. Note that once you've done these adjustments you shouldn't try to use the switches as spares in your washing machine unless you like mopping up floods! By the way, don't be tempted to open the switch case to see what's going on inside: you'll ruin it.

Now, prepare the Gewiss box to accept the switch. **Photo 4** and **Photo 5** may be useful. Use a rotary hole saw to cut a hole in the box snap-on lid so that you can put the terminal side of the switch into the box. I found I needed a 50mm hole. Seal the switch onto the lid using a suitable silicone sealant. I used Dow Corning 781. I used a shortened yellow number plate screw (see **Photo 4**) at the centre of the electrical box to hold a cord support to the aerial insulator.

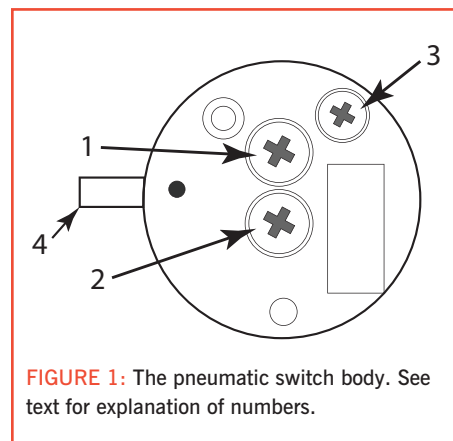
### Dipole elements

You can estimate the overall length of a half wave dipole, in metres, by dividing 143 by the frequency in MHz. For example, for 80m (3.65MHz),  $\text{length} = 143 / 3.65 = 40.1\text{m}$ . Note that each leg will be half that length. It is worth putting up a rope where you plan the dipole to go, then attach test lengths of wire to act as the dipole elements so that you can find out the exact length you'll need. Start with the lowest frequency band, adjust the length for best match and note that length. Then you can shorten the wire to the next-longest calculated length and repeat the exercise. This should mean your resulting aerial is a pretty good match on each of the bands and reduce to a minimum any post-construction fiddling.

Once you know the appropriate lengths you can construct the aerial proper using your final element structure. I used a PVC-insulated copper wire that was strong enough to support not only its own weight but that of the switches and the pneumatic tubes.

Fit the pneumatic switches between the dipole segments as guided by **Photo 4** and **Photo 5**. Use cable ties to attach the pneumatic tubes to the dipole elements and bring them to the feed point. Leave a little spare, then connect them to T-pieces as shown in **Photo 2** so you can use just one feed pipe per pair of switches. Be careful to ensure you pair the switches correctly if you're using more than one pair – pair up switches in the same position on the dipole (ie pair the two outer switches, then the two inner switches). Bring the feed pipes into the shack and terminate them with stop valves, as shown in **Photo 3**.

When you use the aerial you'll have to remember to blow into both tubes to use the lower band and the inner-pair tube for the middle band. For the highest frequency (shortest dipole), neither switch should be on.



**FIGURE 1:** The pneumatic switch body. See text for explanation of numbers.

### Conclusion

Any combination of bands can be chosen, not just the ones I have selected. You might now ask, why not just use traps? Well, remember that traps have a degree of loss and they also allow any spurious emissions from a transmitter to be radiated readily. By using the directly-switched method you have a dipole for each band and therefore a tuned circuit that helps to attenuate any signals outside each band. Also, of course, as you have a dipole on your chosen bands you should also get the classic dipole radiation pattern, not the more complex pattern with lots of lobes that you tend to get when, say, using an 80m dipole on 40m.

The whole system works very well here and is easy to use – and will continue to be so as long as I have breath with which to puff into my 'magic dipole'.

**J H Winnard, G3SPE**  
c/o radcom@rs.gb.org.uk

# Market Surveillance and Enforcement at Ofcom



**This is one of a series of articles that Ofcom is writing for RadCom on topics of interest to radio amateurs.**

As the first Market Surveillance and Enforcement Officer at Ofcom, I wanted to provide an insight into the work I am doing to secure standards and prevent harm in the world of radio.

Principally I'm interested in radio and electrical equipment as both have the potential to cause interference to radio communications, perhaps through inefficient use of the spectrum or by creating electromagnetic disturbances. I conduct targeted market surveillance to monitor radio and electrical products currently available on the market. I normally focus on products that present the most significant risk of interference, including equipment we know has actually caused interference having been identified by Ofcom engineers in the field.

My colleagues at Ofcom's Spectrum Management Centre in Baldock do a great job trawling the internet for harmful equipment made available on shopping websites, including Amazon and eBay. The sale of this type of equipment is against the terms and conditions of these selling platforms and they are usually quick to act when we bring these issues to their attention. Last year alone we were involved in removing apparatus valued in excess of a million pounds.

## Enforcing the law and making a difference

I regularly encounter businesses selling radio and electrical equipment oblivious to their obligations. Whether they know it or not, recent changes in product law throughout the EU has clarified their responsibilities as economic operators and where discrepancies are found they may be held accountable. I find that the vast majority of economic operators I deal with want to do the right thing and, once any compliance issues are pointed out, they ensure their entire range is brought into conformity to the relevant regulations.

However, Ofcom has a range of powers

available and can suspend sales and even bring criminal prosecutions when a product does not comply. Recently a UK importer was ordered to pay over £6,000 following a conviction for selling non-compliant cellular enhancers. High street retailers have also been held to task by Ofcom for importing wireless headphones that were found to operate on frequencies reserved for the Emergency Services.

Radio and electrical equipment must meet the requirements of the relevant legislation before it is made available within the EU and Ofcom has a duty to enforce the regulations in order to protect and manage the radio spectrum.

But what is the legislation in question and who does it affect?

## Electromagnetic Compatibility Regulations 2016

The Electromagnetic Compatibility Regulations 2016, or EMC Regulations, came into force in the UK in December 2016. They amended and updated the former regulations from 2006 but still require that electrical and electronic equipment does not generate, and is not affected by, electromagnetic disturbance.

Furthermore, the new EMC Regulations now set out the obligations of each economic operator in the chain of distribution of an electrical product, from the manufacturer and the importer all the way down the chain to the sellers. This makes everyone's obligations clearer and improves the traceability of a product so that enforcement agencies like Ofcom can identify the responsible person, which was a little more complicated under the old 2006 regulations.

## R&TTE Regulations 2000 and the Radio Equipment Directive

The Radio Equipment and Telecommunications Terminal Equipment Regulations 2000, better known as the R&TTE Regulations, concern the sale of radio apparatus (and telecommunications terminal apparatus) and ensure that radio products use the spectrum effectively and avoid harmful interference. Harmful interference could include interference that prevents a radio navigation device from working, interference that seriously degrades or repeatedly interrupts a legitimate radio communication, like a licensed radio station or a licence exempt key fob for example.

While the EMC Regulations have already taken effect, changes to UK law concerning radio apparatus are imminent. At the time of writing

this article the government had just consulted on the incoming UK radio legislation. This stems from the European radio legislation known as the Radio Equipment Directive (RED), which was created in 2014 and refreshed the law throughout the EU regarding the sale of radio apparatus.

One of the most significant incoming changes is the new definition of radio equipment, meaning some products not covered by the R&TTE Regulations will now need to conform to the new regulations. For the first time all radio receivers, including broadcast radio and TV receivers, fall within the scope of the RED and therefore the incoming UK regulations. This is because the RED requires that both receivers and transmitters must make efficient use of the spectrum.

Fixed-line terminal equipment will no longer be considered alongside radio products, but will be regulated by the EMC Regulations and the Low Voltage Directive instead.

The wide-ranging changes of the RED will require some significant adaptations to how radio equipment is manufactured and supplied, so it is vital that those in the supply chain understand their specific obligations and ensure their equipment can continue to be sold on the European market. However, as the RED has been available since 2014, economic operators should already be aware of the changes and their responsibilities.

## How does this all affect radio amateurs?

The needs of radio amateurs have been recognised during the updates to the legislation. In summary, radio equipment used by radio amateurs may be excluded from the Radio Equipment Directive. Specifically excluded are radio kits for assembly and use by radio amateurs, radio equipment modified by and for the use of radio amateurs, and equipment constructed by individual radio amateurs for experimental and scientific purposes. However, in some circumstances amateur equipment *will* be covered by the RED, like radio kits that arrive preassembled for example, so all economic operators should check what obligations they have.

*If you believe a non-compliant radio or electrical product is being sold, get in touch via email to [marketsurveillance@ofcom.org.uk](mailto:marketsurveillance@ofcom.org.uk).*

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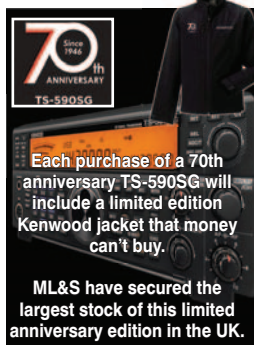
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##### includes:

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- UM2 SuperMount
- GB1 Go Bag
- FG1 Frequency Guide
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R2010251 ea270zb9 4/5 ele 2m/70cm beam ..... **£74.95**  
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R2010904 5 band cobweb 500W antenna ..... **£284.95**  
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R2010050 ea101520dx dipole 3band HF dipole ..... **£72.95**



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# EMC



PHOTO 1: Creyke Beck 400kV substation near Cottingham.



PHOTO 2: Lackenby 400kV substation near Middlesbrough.

**This month we focus on high voltage DC electricity transmission, wind farms and cable TV networks.**

## Offshore wind farms and HVDC

There are various offshore wind projects under construction around the UK and these will allow the UK to reduce its emissions of 'greenhouse gases'. The environmental benefits are clear but it is hoped that associated high voltage DC (HVDC) converter stations will not cause pollution of the electromagnetic environment by radiating radio frequency interference, as has happened with some onshore wind farms (discussed later).

The August 2017 EMC column included an item on HVDC electricity transmission, which stated in error that the 400MW Rampion Offshore Wind Project in the English Channel would use HVDC transmission with an onshore converter station to convert DC to AC for connection to the National Grid at Bolney Substation at Twineham near Hickstead in West Sussex. This particular wind farm will actually use high voltage AC transmission all the way so there shouldn't be any onshore EMC issues but other offshore wind projects will use HVDC transmission.

One offshore wind project using HVDC transmission is the Dogger Bank Offshore Wind Farm Zone in the North Sea, 125 – 290km off the coast of the East Riding of Yorkshire. This will have two new onshore HVDC converter stations to connect to the National Grid via existing substations. One of these will be at Creyke Beck (Photo 1) between Cottingham and Beverley in East Yorkshire. It will be fed by two 1.2GW offshore wind farms, each with up to 200 wind turbines located about 131km off

the UK coast. Another HVDC converter station will be located on Teesside at Lackenby near Middlesbrough (Photo 2).

There are also three Hornsea offshore wind projects in the North Sea to the east of Kingston upon Hull. The proposed route for the export cables for Hornsea Project Three would come ashore near Weybourne in Norfolk and would then run underground 55km to a location south of Norwich. Currently published information shows that HVDC or HVAC cables may be used, or a combination of the two. It is therefore not currently known whether the new substation near the 400kV Norwich Main National Grid Substation will include an HVDC converter.

HVDC converter stations convert DC to 50Hz AC and have the potential to cause RF interference to be radiated from high voltage AC overhead lines. Section 30 of UK Statutory Instrument 2015 No 318 *Infrastructure Planning The Dogger Bank Creyke Beck Offshore Wind Farm Order 2015* is on interference with telecommunications. However, this appears to be intended to cover broadcast radio and TV reception rather than amateur radio.

The RSGB EMC Committee is keeping a close watch on HVDC converter stations because of concerns about the possibility that these may produce similar levels of RF interference as some wind farms, especially in the 1.8MHz and 3.5MHz amateur bands (discussed later). In the case of HVDC converter stations where the AC output is via high voltage overhead cables, RFI could potentially propagate along these cables for a distance of some kilometres.

## Onshore wind farms

An item in August 2014 EMC column mentioned radio frequency interference radiated by a wind farm in the range 1.81 – 2.0MHz and, to a lesser

extent, 3.5 – 3.8MHz. The company operating the wind farm reduced the level significantly but even after the reduction, measurements by RSGB EMC Committee in March 2017 showed that at a distance of 4.5km from the apparent source, the disturbance raises the background noise level by at least 25dB compared to a relatively quiet area away from the wind farm. At a distance of 13km, the disturbance still raised the background noise level by at least 9dB and it was detectable beyond 20km, covering an area of at least 1250km<sup>2</sup>. Ofcom does not consider this interference is 'harmful interference'.

The wind farm in question has a public footpath through the middle of it and further measurements at 1.9MHz were made on foot (see Photo 3). The objective was to find out whether there is one predominant source or multiple sources, but results were inconclusive.

Wind farms are classed as 'Fixed Installations' and need to comply with "good EMC engineering practice". This is not defined, but there is an EMC standard for wind turbines. This references the Generic EMC Standard but that standard has no radiated emission limits below 30MHz for the 'enclosure port', ie the case of the equipment. This approach assumes that that the equipment under test is small compared to a wavelength so that it is too small to act as an efficient antenna and only emissions via the power port (and others) are considered. There are two problems with this approach. First, wind turbines have rotor tips that may be 125 – 140m above ground level, so they are clearly *not* small compared to a wavelength of 160 metres (for example). The second problem is that the 'power port' conducted emission limits in the Generic Standard only apply to 230V AC mains ports, not conducted emissions from a large wind turbine that may have 2MW output at 33kV AC.



Although EMC standards for wind turbines are being considered by standards organisations, it appears that there are currently no radiated emission limits and no conducted emission limits for wind turbines below 30MHz. It would appear that the same situation may apply to other types of fixed installation such as HVDC converter stations.

Only *some* onshore wind farms radiate detectable levels of RFI but if there is one near you, we would be interested to know whether it radiates any detectable interference with 100Hz modulation, particularly in the 1.81 – 2.0MHz amateur band.

### Cable TV networks

In 2016, Virgin Media announced its 'Project Lightning' expansion plans for fibre optic broadband direct to homes and businesses using fibre to the premises (FTTP). FTTP requires new optical fibre cables to the premises, whereas most existing UK cable TV (CATV) networks deliver TV channels and broadband internet access using a Hybrid Fibre Coaxial (HFC) network. The core network uses optical fibre cables as far as the street cabinets then the connections to the customers' premises use coaxial cable. Data services generally use the Data Over Cable Service Interface Specification (DOCSIS3) standard, with a European variant sometimes known as EuroDOCSIS. Due to increasing demand for high speed internet access, there is pressure to increase the capacity of existing HFC networks.

Recent advertising by major UK internet service provider (ISP) shows images of coaxial cables compared to twisted pair cable used for ADSL and VDSL services. Coaxial cable has the advantages of much wider RF bandwidth than twisted pair and it also has much better EMC characteristics due to being screened. Nevertheless, the frequencies used extend up into UHF and a case has been reported where a broadband internet service using CATV network appears to have poor immunity to amateur radio transmissions in the 430 – 440MHz band.

It has been reported that following a recent new upgrade from 150Mbps to a 200+Mbps service, some CATV networks are using frequencies that include 435MHz and that transmitting with 5W ERP on certain frequencies in the 144 – 146 or 430 – 440MHz amateur bands can cause the CATV internet service to drop out at a distance of up to 100 metres away. It appears that the service reconnects no more than 15 seconds after transmission stops but this does raise the question of what EMC immunity standards the network and connected equipment should meet.

Cable TV networks were covered by a UK national Regulation MPT 1510: *Radiation Limits and Measurement Standard; Electromagnetic radiation from cabled distribution systems operating in the frequency range*



**PHOTO 3:** Portable EMC measurements at a wind farm.

30 MHz – 1 000 MHz; May 1984 (revised 1989 and 1997). There was also a related standard MPT 1520 May 1984 (revised 1989, 1997 and 1999) that covered 300kHz – 30MHz. MPT 1510 and MPT1520 only covered emissions (egress) from CATV networks and MPT1510 had some 'notches' with much lower emission limits in the 50MHz, 144MHz and 432MHz amateur bands. In practice, the frequencies in the 'notches' were not used by CATV operators in order to comply with the emission limits. In the case of MPT1520, there was a narrow notch with a very low limit of -40dB(μV/m) measured in 9kHz bandwidth centred on the 2182kHz, an international voice distress, safety and calling frequency for maritime radio communications.

There is a current EMC standard, BS EN 50083-8:2013 *Cable networks for television signals, sound signals and interactive services. Electromagnetic compatibility for networks*. This standard does not fall under any directive of the EU and Annex A.1 includes some national 'A-Deviations', which are the MPT1510 limits for UK.

This means that if a CATV network (combination of cables and equipment) complies with BS EN 50083-8:2013 with the UK 'A-Deviations' then the emissions (egress) measured at a distance of 10m and in 120kHz bandwidth should not exceed fairly strict emission limits of -8dB(μV/m) from 50 – 54MHz, -18dB(μV/m) from 144 – 146MHz and -15dB(μV/m) from 432 – 440MHz.

Section 5.3 covers immunity of cable networks and specifies a maximum expected field strength of 106dB(μV/m) from 150kHz – 1000MHz. That's only 0.2V/m and this field strength could be produced by a 1W transmitter at a distance of 35m. Section 4.3.2 states that

if the measured interfering field strength exceeds this value, the problem should be referred to the national regulatory authorities, which would be Ofcom in the UK.

We would be interested to hear of any emissions or immunity problems with cable TV networks.

### Faulty insulators

The MFJ-5008 Ultrasonic Receiver with Parabolic Reflector is designed to help in locating RF interference sources generated by corona discharge and arcing components on an electrical power system. This sort of problem is likely to be more common in the US due to the widespread use of overhead electricity distribution along streets with pole-mounted transformers. Nevertheless, it could be useful in the UK in rural areas if there is power line noise and a faulty insulator is suspected.

The MFJ device is an acoustic receiver tuned to the ultrasonic frequency of 40kHz and it is claimed to allow you to hear the ultrasonic noise generated by a corona discharge or arcing connection. It would be possible to homebrew something similar using a satellite dish (solid, not mesh) to give a narrow beamwidth. Fit a 40kHz ultrasonic transducer (receive type) at the focus of the dish and connect it to a radio receiver that tunes down to 40kHz or build a 40kHz downconverter. Alternatively, you could try a bat detector at the focus of the dish.

One practical point in the UK is that overhead power lines often go across private land so unless there is a public right of way or it's 'open access' land, you would need permission to walk along the route of an overhead power line.

It goes without saying that you should not attempt to touch power lines or their supports, or otherwise interfere with or try to fix any power line issues, but instead should report your findings to the relevant authority.

### Electricity meters

Following the item on electricity meters in the August EMC column, one member commented that traditional electromechanical electricity meters have both a voltage coil and a current coil, so respond to the (integrated) instantaneous product of voltage and current. The item in August may have implied that they only respond to average current but they do actually multiply voltage and current, taking account of phase angle in order to measure real power. The question of interest from an EMC point of view is whether conventional and electronic meters give the same reading if the current waveform is very different from a sine wave.

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

# The National Hamfest

**K**eeep the dates of 29 and 30 September free for the biggest rally in the UK.

Organised by the Lincoln Short Wave Club in association with the RSGB, the National Hamfest takes place at the Newark & Nottingham Showground, Lincoln Road, Winthorpe, Newark NG24 2NY.

The site, staffed by many members of local radio clubs and societies, will open at 9.30am each day, with the exhibition hall opening 30 minutes later at 10am.

The venue enjoys easy connections via road and rail to most parts of the UK. Local connections are available from Newark Northgate Station, which is served by both Virgin East Coast and Hull Trains. Alternatively, if travelling from the Lincoln area or Leicester, trains arrive at Newark Castle Station. The showground is approximately 2 miles from the nearest A1 junction and there is ample free parking on site. Parking for those with 'blue badges' is located near the exhibition hall within dedicated area of the main car park. Access to all areas of the site is on one level with well maintained pathways (with the exception of a few outside areas that are located on grass).

## Traders

The major manufacturers are represented again this year, and the majority of the traders who attended previous events have already booked their space for this year, as have some new attendees (a full list is shown near the floor plan on page 57).

Spalding & District ARS will be managing the flea market this year. A flea market table can be rented for £20 per day. A maximum of three tables may be rented. Each table includes one National Hamfest entry ticket. The selling space will be the table and the ground underneath the table only. There will be no public access to the rear of the tables. Cars may be parked nearby to the rear of the area.

A limited number of outside trading spaces for those requiring more space may still be available by the time you read this. These are approximately 3m x 3m and will be fenced and will NOT be provided with tables. If tables are still available (unlikely) then these may be rented by arrangement.

Bookings for the outside trading area must be made in advance with Chris Danby, see [www.nationalhamfest.org.uk](http://www.nationalhamfest.org.uk) for details.



Whether you are looking for components or a radio, there's plenty on offer at the National Hamfest.

## New products on show

Several traders have told us about new products they intend to bring to the National Hamfest.

Telonic has a new range of hand held battery power oscilloscopes. The Micsig tBook mini TO1000 series has an 8 inch display and is available with 2 or 4 channels, 70MHz, 100MHz and 150MHz bandwidth and 1G Sa/s sample rate. More details are at [www.telonic.co.uk/Micsig-TO1000-Series-Oscilloscopes-s/2049.htm](http://www.telonic.co.uk/Micsig-TO1000-Series-Oscilloscopes-s/2049.htm) and they will be available on the Telonic stand along with Rigol's popular range of bench oscilloscopes, spectrum analysers, function generators and DC power supplies.

Martin, OL5Y says that Mastrant will be bring a new thin, high strength, rope – the Mastrant-M, 2/32" (1mm). It has a breaking strength of 220lb and elongation of 0.6%. Learn more on their website at [www.mastrant.com](http://www.mastrant.com)

Total Mast Solutions is selling off all ex-demonstration mast systems. Look for second hand kit as well as the full range of mast systems at special show prices.

R Design will show the new Spectrum Analyser ToolKit that extends the performance of your spectrum analyser to include noise figure alignment plus a unique very low noise amplifier (VLNA) for the lowest DANL (noise floor) available.

Konstantine Kisselev from KMK UK Ltd says to look out for plenty of RigExpert antenna analysers from the AA30 for 30MHz to the AA1400 for 1400MHz as they will have a variety to compare on the stand. Also available will be the GMantenna MAGLOOP range and accessories.

Martin Lynch & Sons will have their usual huge stand in the left-hand corner of the hall. Martin tells us that he particularly like this spot in the past because of the high-quality fruit stall selling apples and pears opposite! He says that hopefully the new Icom IC-7610 will be available to buy (or collect if you've pre-ordered). Once again Rodrigo, the owner of E-Antenna from Spain, will be showing off his range of HF and VHF antennas including the best from his LFA range. Again from Spain, the excellent Phonema Speakers will be on show, wired for demo. The high quality units are specifically designed for communications use and start at £150. Launching at Newark, the new MyDEL AT-779VU is a very compact 2/70 FM mobile transceiver costing £89.95. Visit the stand to see just how easy this is to use.

bhi have just launched their new ParaPro EQ20 range of audio DSP products – as reviewed last month in *RadCom*. The ParaPro EQ20 range will be available at the National Hamfest and you will be able to compare the different versions.

Of course the RSGB will be present and will be launching several new books, including the *RSGB Yearbook 2018*. They are also running the free bag offer, which is always popular.

## Special Event Station

Camb-Hams will again be in attendance with their mobile station vehicle (Flossie 2) and will be operating GB17NH on most bands. Visitors are welcome to come along and operate the station; please bring your current licence with you.





A free RSGB bag always attracts big crowds to the book stall.

### Club of the Year

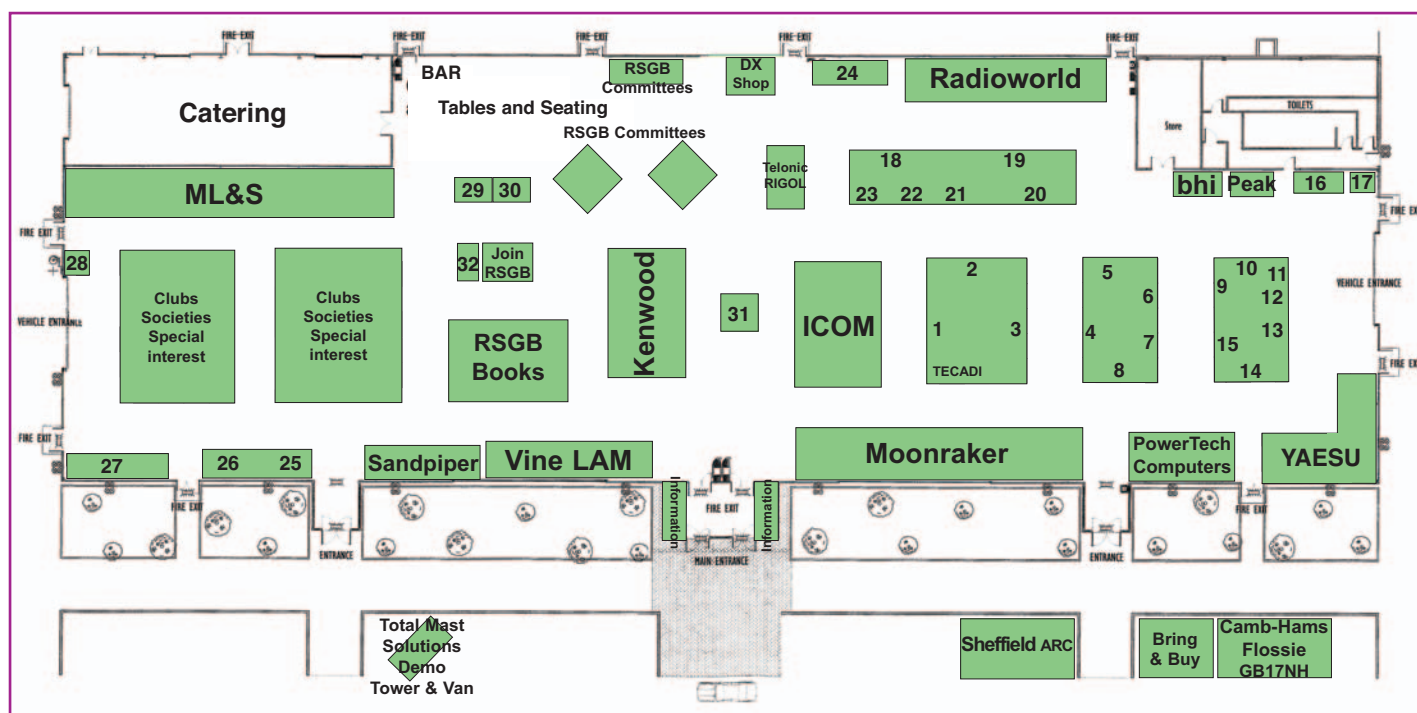
The National Hamfest will again host the presentations for the RSGB National Club of the Year, sponsored by Waters and Stanton. The Regional winners were announced at the RSGB's AGM and the National winners and two runners up for both the large club and small club category will be announced on Saturday.

### DXCC card checking

The UK Six Metre Group has kindly agreed to host Fred, G4BWP so he can facilitate DXCC checking. Fred will be able to check QSL cards for all DXCC awards (except 160m contacts) and from any current DXCC entity (ie no deleted entities), with no date restrictions.

We look forward to seeing you there.

## NATIONAL HAMFEST 2017



### Exhibitors

AM Tools (15)  
bhi  
Bonito (16)  
DX Covers (23)  
Ecosource Electronics (18)  
G4LUE (24)  
G4TPH Magloops (12)  
GS Electronics (19)  
Icom UK Ltd  
J Birkett (27)  
Join the RSGB  
John Dilks (13)  
Kanga Products (9)  
Kenwood UK Ltd  
LAM Communications  
Linear Amp UK-DX Shop  
LUSO Super Techno (31)  
MA Components (26)

Martin Lynch & Sons  
Marts Brackets (3)  
Mastrant (14)  
Mickey's Electronics (25)  
Mirfield Electronics (6)  
Moonraker  
Ofcom (29)  
Petar Blagoev (4)  
Peak Electronic Design  
PowerTech Computers  
*Practical Wireless / Radio User* – Warners Group  
QRP Labs (7)  
Radioworld  
R Finder (30)  
RF Design UK Ltd (21)  
RigExpert & MixW (17)  
Sandpiper  
SDRplay (10)  
SOTabeams (20)  
Tecadi

Telonic Instruments Ltd  
Tony Mallin G1KVQ (1)  
Towermate Ltd (11)  
Total Mast Solutions  
UES&S (5)  
Waters & Stanton (2)  
Weatherquest (22)  
Yaesu UK Ltd

### Clubs, Special Interest Groups and Societies

807 Amateur Radio Operators  
BYLARA  
BATC  
Birmingham Repeaters  
British Railways ARS  
Fists CW Club  
International Short Wave League

Kirklees RAYNET  
Lincoln Repeater Group  
LSWC Books  
March & District ARS (28)  
Ossett Amateur Radio Operators  
Podium (32)  
RAFARS  
RAOTA  
Royal Signals ARS  
Travelling Wave Contest Group  
UK Six Metre Group  
UK Tesla Coil Builders  
VMARS  
WAB Group  
WACRAL

### RSGB

RSGB Books  
RSGB Committees:  
Amateur Radio  
Direction Finding  
Amateur Radio  
Observation Service  
Contesting  
Emergency  
Emerging Technology  
Coordination (ETCC)  
Regional Teams  
Training  
Youth Committee  
RSGB Membership Stand

# The RSGB Convention 2017

**ML&S** martin lynch & sons  
The World's Favourite Ham Store

**Whether you are a beginner, expert, DXer, technical guru or interested in other aspects of amateur radio then there is almost certainly something for you at this year's RSGB Convention. The dates of the event are 13 to 15 October.**

The Convention is, once again, sponsored by Martin Lynch and Sons, whom the RSGB would like to thank for their continued support. It will take place at the Kents Hill Park Training and Conference Centre, Timbold Drive, Milton Keynes MK7 6BZ. The Centre is well signposted from the A421. We will be using five large lecture rooms as well as various side rooms for exams, workshops and forums including two social areas where you will find Special Interest Groups, the display from ML&S, the RSGB bookstall and displays from Icom, Kenwood and Yaesu.

If you are planning a visit this year, don't forget that the National Radio Centre is open inside Bletchley Park on the Friday and all RSGB Members can download a free pass to visit for the day. If you would like to operate either the permanent special event station there or the one at the Convention, please make sure to bring a copy of your licence.

## Lectures

The programme is shown on page 60 and there are more detailed descriptions of the lectures on the RSGB website at [www.rsgb.org/convention](http://www.rsgb.org/convention)

There's only space here to mention a few of the highlights – check the website for all the other details – as there are over 50 different talks taking place over the weekend.

One of the big DX talks is *ZL7G DXpedition: Planning, Logistics, Operating and Beer* by Chris Duckling, G3SVL. Chatham Islands was the third DXpedition by the 6Gs Group. Putting on a successful DXpedition requires meticulous planning. This presentation will provide an insight into how the 6Gs go about choosing a DX location and planning the DXpedition. It will conclude with the sights and sounds (RF sounds) from the DXpedition.

A Convention favourite, Alwyn Seeds, G8DOH, will be presenting on a very topical issue - *Measuring Spectrum Pollution at VHF/UHF*. He will explain that noise generated by low energy lighting, solar power, switched mode power supplies, computers and



Lectures for all interests can be found in the programme.

broadband communications is becoming an increasing problem in the VHF and UHF bands. Measurements can be made regularly to identify new sources of noise and steps can then be taken to locate the noise sources and eliminate them where possible. The talk will be illustrated by measurements of spectrum pollution at various UK sites.

This year, the AMSAT-UK Colloquium is combined with the RSGB Convention and, amongst other space and satellite talks, we are delighted that Professor Monica Grady, who many of you will have seen on television talking about the Rosetta mission, has agreed to come and present. Monica is Professor of Planetary and Space Sciences at the Open University and has presented the prestigious Royal Institution Christmas Lectures.

Alex Csete, OZ9AEC will be talking about *Software Defined Radio for the Satellite Geek*. The availability of low cost SDR hardware and single board computers like the Raspberry Pi creates many new opportunities for radio experimenters. Alex will take a look at recent advances in SDR technology and some practical applications in satcom, including hybrid setups where SDR is combined with traditional radios to get the best of both worlds.

More and more amateurs are operating their stations remotely. John Regnault, G4SWX, will cover the technology to support remote operation of amateur stations that is developing and the many possible solutions

that are around. John, who has run a remote home station for the last six years, will review the technology options in the light of the licence conditions. He will then show some relatively simple options to add mains switching and metering to what would otherwise be 'always on' remote systems. Although John is the RSGB VHF Manager, his talk will be relevant to all frequencies.

Professor Hugh Griffiths, who many of you will know as G4CNV, will talk on *Reflections on the History of Radar* making use of recently declassified material from the Public Records Office at Kew.

Andy Talbot, G4JNT will be talking about his *Third Method Narrowband Direct Upconverter for LF/MF* that has become a popular read in *RadCom Plus* and earned him the prestigious RSGB Wortley-Talbot Trophy.

Continuing on a (fairly) technical theme, Alan Messenger, G0TLK will talk about *DSP without the Maths*. This will be a simplified introduction to Digital Signal Processing without the complicated maths. Alan will take a spin through sampling, with a demonstration of what happens if you get it wrong and he will take a quick look at digital filters.

Graham Murchie, G4FSG  
[www.rsgb.org/convention](http://www.rsgb.org/convention)



Many of you will be aware that YOTA 2017 was a huge success. Milo Noblet, MO1LO, was the UK Team Leader and he will be explaining what happened at the event and what a wonderful opportunity it presented for ideas to flow across the different international delegations.

RSGB President Nick Henwood, G3RWF reports back on his search for new (and not so new) ways of bringing success to clubs and groups for amateurs of all ages and passions. The talk will explore challenges and solutions. In an interactive session he will also discuss how we can share good practice.

On the contesting front, Ian Pawson, G0FCT and Nick Totterdell, G4FAL will give some top tips for improving your score. They will explain how your log is adjudicated then provide some suggestions that could help you move up the results table. Newcomers will be able to get a feel for more addictive aspects of modern radio contesting. Also Dave Lawley, G4BUO will talk about the *World Radiosport Team Championship (WRTC)* that takes place once every four years and puts contesters on the fabled 'level playing field' to find the very best radio contesters in the world. Dave has attended five previous WRTC events, competing three times on behalf of the UK and serving as on-site referee in the other two.

## Exams

Both UK and US exams may be taken at the Convention. The Foundation and Intermediate exam will take place on Saturday and the Advanced on Sunday. Places *must* have been pre-booked via [exams@rsgb.org.uk](mailto:exams@rsgb.org.uk) and are not available 'on the day'. The cut-off date for Foundation and Intermediate exams is 23 September and the cut-off for Advanced exams is 25 September. Please note the practical element of the Foundation and Intermediate exam *must* have been completed and signed off before the Convention.

US exams are available on Sunday from 1pm. Please reserve your space with Martin, G3ZAY via email to [g3zay@btinternet.com](mailto:g3zay@btinternet.com)

The RSGB would like to thank the volunteers that are involved with invigilation and facilitating these exams.

In addition, on both Saturday and Sunday, you will be able to try the new online examination system that was launched earlier this year. This demo was run at the AGM in Cardiff and proved 'interesting' for many of those who have held licences for a long time – come along and try it!

## Buildathon

This year's Convention Buildathon will be using the MOTGN Morse Tutor kit supplied by Kanga UK. The tutor is an Arduino controlled Morse oscillator that can generate code at

various speeds and spacing; it can send letters, numbers or a mix. It can also be used with a key as an oscillator to practice sending – ideal for learning the code or improving your speed. Dennis from Kanga UK and members of the Bath Buildathon crew will be on hand to assist. The cost of a seat at the Buildathon is £39.95. If you would like to book a place, please buy your ticket from the Convention website [www.rsgb.org/convention](http://www.rsgb.org/convention) (please note the Buildathon ticket does not include admission to the Convention).

## Construction competition

This year the competition is again being sponsored by Martin Lynch & Sons and the prestigious Pat Hawker, G3VA Trophy will be awarded to the best overall entry. See <http://rsgb.org/main/about-us/rsgb-convention/convention-construction-competition/> for full details of the various categories and the entry form. It really is very easy to enter and almost any home-constructed project is eligible.

## The social scene

On Friday evening, the ML&S Buffet takes place. It is a pre-booked ticket-only event with entertainment before and during the early part of the buffet provided by close-up magician Steve Dean – a great favourite of regular Convention delegates. In the bar we will have guest ales on tap and the bar is open from 5.30pm on both Friday and Saturday evening. During the day there is a bottle bar with light 'tuck shop' snacks available in the social area along with tea and coffee during the breaks between lectures. Lunch tickets are available from Kents Hill on the day (£10 for a two course lunch) and these tickets must be purchased by 10.30am each day.

On Saturday, it is the Gala Dinner where the after dinner speaker will be none other than Bob Beebe, GU4YOX. Bob, besides being everybody's 'GU multiplier' in DX contests, is a veteran of many top-flight DXpeditions, including D68C, 3B9C, and T32C. He has 327 DXCC entities confirmed and is a member of the Chiltern DX Club, FOC, RSGB and the Legacy Circle of ARRL. Bob also loves comedy and, with his many years of experience in DX circles and with his insatiable zest for life, we are in for a uniquely fun evening of entertainment as GU4YOX (perhaps painfully) describes *The Funny Side of Radio*. The Gala Dinner is also a pre-booked ticket-only event. Tickets for Friday and Saturday evening may be booked at [www.rsgb.org/convention](http://www.rsgb.org/convention)

As in previous years, AMSAT-UK are organising a Colloquium Dinner for the satellite community. It too must be booked in advance. Details can be found at <http://tinyurl.com/y7x3862l>

## Trophy presentations

The main VHF and HF contest trophies will be presented on the 15th and this is in addition of Contest Forums later in the day. The winners of the prestigious G5RP and ROTAB trophies will be announced by the RSGB President, Nick Henwood, G3RWF.

## Tickets

Tickets are still available online and those attract a discount over the ones bought on the door (in advance £15 Saturday, £10 Sunday and £20 for the whole weekend). On the door these tickets will cost £20 for Saturday, £15 for Sunday or £25 for the weekend.

Those under 21 can attend the Convention free of charge but under-16s must be accompanied by a responsible adult. Tickets are issued 'on the door' to those with a suitable proof of age, so please make sure you bring it with you.

Bookings for dinners, bedrooms, and packages are available until 8 October. Visit [www.rsgb.org/convention](http://www.rsgb.org/convention) to book all elements of the convention.

## Raffle

This year we have excellent prizes for the DXpedition raffle including an Icom IC-7300, Kenwood TS-480SAT, two Yaesu FT-817s and a number of other prizes. Our thanks go to Icom UK, JVC-Kenwood and Yaesu UK for their kind donation of these prizes. Tickets will be on sale throughout the weekend from the usual range of enthusiastic sellers! All proceeds go to the RSGB DXpedition Fund, details of which can be found online at the RSGB website.



Icom IC-7300



Kenwood TS-480SAT



Yaesu FT-817

## Saturday 14th October Timetable

	Lecture Room 1	Lecture Room 2	Lecture Room 3	Lecture Room 4	Lecture Room 5
Start 9.00am	Official Opening Nick Henwood G3RWF RSGB President 9.00 - 9.10				
	Botswana revisited - A25UK 2017 Tony Bettley G4LDL 9.15 - 10.00		Getting started in Summits on the Air (SOTA) Michael Sansom G0POT 9.15 - 10.00		Everything you wanted to know about ARISS Kenneth Ransom N5NVO 9.30 - 10.15
Coffee 10.00 - 11.00	COFFEE	Good design practice for home Yagi construction Richard Mason G6HKS 9.30 - 10.15	COFFEE	Free DV Matthew Phillips G6WPJ 9.45 - 10.30	COFFEE
	SO2R Contesting Techniques Mark Haynes, M0DXR 10.30-11.15	COFFEE	Train the Trainers - Tips & Tricks for New and Existing Trainers Derek and Ali Hughes 10.30 - 11.15	COFFEE	An introduction to Amateur satellites David Johnson, G4DPZ 10.45 - 11.30
		Reflections on the History of Radar Hugh Griffiths G4CNV 10.45 - 11.30		Lifting the Lid on Mosfet Power Transistors A Manufacturers Perspective Rob Coleman 11.00 - 11.45	
	E51LYC Brings Pukapuka Atoll (OC-098) in North Cook Islands on the Air Cezar Trifu, VE3LYC 11.30 - 12.15	Combined Mode Propagation on 144MHz enables ultra-DX contacts Tim Fern G4LOH 11.45 - 12.30	Ofcom Carys Reynolds 11.30 - 12.15	A Review of Antipodal Propagation Carl Luetzelschwab K9LA 12.00 - 12.45	Es'hail-2 Geostationary Amateur Satellite Peter DB2OS AMSAT-DL 11.45 - 12.30
Lunch 12.15 - 13.45	LUNCH	LUNCH	LUNCH	LUNCH	LUNCH
	RSGB Contesting – top tips for improving your score Ian Pawson G0FCT/Nick Totterdell G4FAL 13.30 - 14.15	Measuring Spectrum Pollution at VHF/UHF Alwyn Seeds G8DOH 13.45 - 14.30	Breaking the mould - clubs and groups for the 21st Century - a progress report Nick Henwood G3RWF 13.30 - 14.15	NVIS Research Ben Witvliet PE5B 13.45 - 14.30	NOAA Satellites Weather Images from Low Earth Orbit Michael Butler G4OCR 13.45 - 14.30
	HF Mobile DXing Alan Birch G4NXG 14.30 - 15.15	VHF-UHF DX - the Game of Decibels Ian White GM3SEK 14:45 - 15:30	RFI Update John Rogers M0JAV 14.30 - 15.15	HF propagation at sunspot minimum Steve Nichols, G0KYA 14.45 - 15.30	Practical Satellite Operation Dr Chris Bridges SSC 14.45 - 15.30
Tea 15.15 - 16.00	Tea	Tea	Tea	Tea	Tea
	World Radiosport Team Championship 2018 Dave Lawley, G4BUO 15.45 - 16.30	Sporadic-E: a Propagation Update Chris Deacon G4IFX and Jim Bacon G3YLA 16:00 - 16:45	YOTA 2017 Milo Noblet 2E0ILO 15.45 - 16.30	Third Method narrowband direct converter for the LF/MF Andy Talbot G4JNT 16.00 - 16.45	Software defined radio for the satellite geek Alex Csete OZ9AEC 16.00 - 16.45
	M1N-the-Middle, a flexible hardware control add-on for your K3 James Patterson, M1DST 16.45 - 17.30	Further Advances in Amateur Television Noel Matthews G8GTZ 17.00 - 17.45	Schools and Amateur Radio: the Challenges John Hislop 16.45 - 17.30	Raspberry Pi Mike Richards 17.00 - 17.45	ARISS-RU activities Sergey Samburov RV3DR 17.00 - 17.45
Other Activities	RSGB Construction Competition Display 9.15 - 15.00	Prize Presentation RSGB annual construction competition 15.00 - 15.15	Training and Education/Exam Open Forum 13.30 - 15.30	Convention Buildathon Steve Hartley G0FUW 13.00 - 17.00	UK Examinations 13.00 - 15.00 AMSAT AGM (Members Only) 17.45 - 18.15

## Sunday 15th October Timetable

	Lecture Room 1	Lecture Room 2	Lecture Room 3	Lecture Room 4	Lecture Room 5
Start 9.15am		Some Practical Hints for VHF Solid State PA construction John Quarumby G3XDY 9.15 - 10.00	Antenna selection for the 6G DXpeditions Mike Chamberlain G3WPH 9.15 - 10.00		
	HF Awards Presentation 9.30-10.00			Remote Station Operation: Technology choices John Regnault, G4SWX 9.30 - 10.15	Philae and Rosetta Missions Prof. Monica Grady, Open University 9.30 -10.15
Coffee 10.00 - 10.45	COFFEE	COFFEE	COFFEE	COFFEE	COFFEE
	VHF Awards Presentation 10.30-11.00	Homebrew 23cm EME on a budget Graham Moore G4DML 10.30 - 11.15	ZL7G DXpedition: Planning, Logistics, Operating and Beer Chris Duckling G3SVL 10.30 - 11.15	RSGB Strategy 2022 Progress to date Steve Hartley G0FUW 10.45 - 11.30	FUNcube Status and New Developments Wouter Wegelaar, PA3WEG 10.45 - 11.30
	VHF Contest Forum 11.15 - 12.45	Extreme Microwave Activity Ian Lamb G8KQW & John Hazell G8ACE 11.30-12.15	Ionosonde data/HF propagation Jim Bacon G3YLA 11.30 - 12.15	SDR - The station of the future John Linford, G3WGV 11.45 - 12.30	An update on the ESA-supported University of Southampton Small Satellite programme Phil Crump, M0DNY 11.45 - 12.30
Lunch 12.15 - 13.45	LUNCH	LUNCH	LUNCH	LUNCH	LUNCH
		Amateur Deep Space Reception Paul Marsh M0EYT 13.30 - 14.15	Latest developments in IOTA (how to double programme take up) IOTA Management Team 13.30 - 14.15	Mullard Space Dr Colin Forsyth 13.30 - 14.15	Going to space the libre way Pierros Papadeas, Libre Space Foundation 13.30 - 14.15
	HF Contest Forum 13.45 to 15.15		DSP without the Maths Alan Messenger, G0TLK 14.30 - 15.15	Low Cost remote Radio Andy Webster G7UHN 14.30 - 15.15	ARISS Report Ciaran Morgan, M0XTD 14.30 - 15.15
	Raffle - 15.30 -16.00				
Other Activities	10am UK Examinations 1pm US Examinations	Please note that sometimes lectures will be subject to last minute change and revision. We will do our best to notify visitors of any changes on the day but cannot be held responsible if individual lectures do not take place or are given at different times or have different room allocations from that advertised. You may check with the organisers on the day if there is something specific you are planning to attend.			





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# Moonraker HT-500D

## dual band 70cm and 2m DMR / analogue handheld

**E**arlier in the year I was able review my first DMR handheld radio, which took me on a journey through the initial steps of actually getting on the air with a mode that I hadn't tried before.

With the required hurdles being jumped, the operation of DMR radios was still a little clouded in mists of code-plug folklore, with even some experienced DMR users responding to queries with a sharp intake of breath as soon as you mention the subject! Undeterred, I was fortunate to be able to review this Moonraker HT-500D and with a second attempt at the world of DMR certain things became a little clearer.



The HT-500D dual band DMR / analogue handheld and its user manual.

### Easier this time

The significant advantage of the HT-500D is that it comes supplied with a code plug already installed and should you require to re-program the radio, the software is readily available as a download from the Moonraker website. More of that to follow.

The HT-500D sports 3000 channels, 10000 contact slots, built-in CTCSS/DCS (analogue mode only), single call, group call and all call, remote kill/stun/activate, transmit interrupt, VOX, TOT, Monitor, Scan, Talk around and lone worker function. There is also a record function where reception audio can be recorded and played back at a later date.

As supplied, the radio came with all the necessary accessories to get on the air including charger, mains adapter, belt clip and the all-important USB programming lead. Visually, the HT-500D looks and feels like a product similar to the Retivis/Tytera commercial mobile radio manufacturing style. Further research reveals that the radio is in fact a Retivis RD82 that Moonraker have developed to their own specific requirements and performance.

Once again the handbook is quite confusing in the beginning as some of the sometimes amusing terminologies used might not chime immediately. But, as long as you read it thoroughly, operation and connections etc all

become clear. An important section is called 'Safety and Overview' that details all the functions of the keys, particularly useful when some have a short and long press function.

Assembling the radio was quite straightforward. First with the battery and then the antenna and belt clip if you require it.

Having seen a few of these radios I was impressed by the battery installation and the neat clip that allows the battery to be changed with ease without losing some of your fingernails in the process. With battery connected I allowed the HT-500D to fully discharge to flatten the battery before giving it a full charge. This took some time. In fact it was over 24 hours on receive before it went totally flat – this with a half charged battery. Full battery recharge takes about 5 hours from flat to full.

Also supplied by Moonraker was an A4 multi page document detailing the codeplug updates up to 25/7/17. This will come in handy if there is a requirement to change or manually update the contact lists in the code plug. Moonraker maintain the code plug and updates are available on request. It could be that required contacts are not

available in the code plug therefore it's handy that this information is available.

### Setting Up & On the Air

At switch on, the first thing I did was turn off the keypad tones and the channel announcement



The well-fitting battery pack can be changed with ease.





Keep the cover over this connector unless you are programming the radio.



Power output is controlled by the orange-coloured button.

facility as I was in close proximity to others in the family etc. They can be seriously annoying to those around you as you find your way through the main menus. This can be done directly in the Radio Settings menu or also in the software configuration using a PC.

Although the HT-500D had a code plug installed and was ready to go, some good judges in the DMR field advised that it would be better to download and install the code plug for my local DMR access point. In this case it was to be GB7JL located in Lowton, Wigan. If you are happy to stay with the installed code plug, which is quite extensive, you can supply your callsign and DMR ID and this will be programmed into the radio before shipment from Moonraker.

Here is a brief *résumé* of how to change the code plug in the HT-500D and most other cloned radios of this type. As mentioned, the USB drivers and software are conveniently hosted on the Moonraker website [1]. Once downloaded and initialised, the driver software should unpack into a folder on the C drive of your PC. I tried this on both Windows XP and Windows 7 and all ran fine. Code plugs that are written for the popular MD380 will also work in the HT500D fine, so if you are upgrading to this new radio then the code plug installation should be a breeze.

Removal of the side cover on the HT-500D and connection of the programming lead was easy (a small coin does the job if you don't have a screwdriver handy) and it is important to make sure that the USB programming lead uses a dedicated port on the PC/laptop, not through a hub, as this can corrupt the programming. As this cover protects the external connections during normal use, I would recommend to always have it in place when not programming the radio.

Modifying and changing code plugs seems a bit of a black art at first however there are numerous websites and just as many YouTube videos that give all the information you need to experiment.

There are numerous code plugs to download however before experimenting with others it is essential that you save the original one that is in the radio. Should there be any disasters and you

want to return to the original setup, just write the original backup back into the radio.

The whip antenna screws on to the female SMA connector, which also lends itself to trying a dual band 70cm & 2m mobile antenna. On a recent trip this worked extremely well – a pity that I didn't have the external speaker/microphone combination at the time.

The HT-500D specifications also claim that there is certification to IP67 standards with good waterproofing and dust resistance. As all these radios are initially produced for the commercial market they have to withstand significant abuse and the case and buttons certainly felt as if they were of good quality. Although the 1m immersion test wasn't attempted, it is clear the radio will certainly survive the rigours of mobile and portable operation.

On the air audio reports were made using analogue and digital modes and were more than complimentary. Receive audio was also fine with little speaker distortion – however the volume control seemed somewhat non-linear, with volume position 1/2/3 being rather quiet and then full blast from then on! After a little practice the optimal position was found and all was well but the situation would certainly be improved with the use of the optional speaker mic.

### Buttons and controls

All the radio's functions are accessed via the buttons on the top and left hand side of the radio. All these seemed positive in operation. The keypad on the front of HT-500D also has good quality keys, which again were positive.

An unusual feature however is the 'trackball' that works as a scroll control, which comes in very handy if you get fed up of pushing buttons. It will alter most of the on screen menus. It is very sensitive however and might not be to everyone's taste, in which case it's back to the buttons!

Power output is controlled by the top orange coloured button. The high power setting on 2m and 70cm measured within spec on a Bird 43 wattmeter and suitable dummy load.

The Menu Operation Settings in the manual

details how to manipulate all the settings – I would advise a good read through before you start keying away as it will save time in the long run.

### Accessories

Optional accessories are available from Moonraker that would make for easier use while out and about or mobile. These include a car charger/battery eliminator and a connected earpiece or speaker mic. The latter would be an essential, especially if used in a mobile environment. Moonraker also maintain the code plug and updates are available on request.

### Final summary

All in all a very pleasant experience using this radio and with all the functions available is considerable upgrade from previous DMR radios reviewed. Once the basics of code plugs are mastered then there is a whole world of programming and modification to get even more from your radio. The pre-installed code plug idea is also a good one to give the flexibility of not having to make any significant changes to the radio if a PC is not to hand.

Your local DMR access point website should have more details and information about getting the best from DMR. In my case, the GB7JL website [2] is an excellent source of code plug information and links to the Brandmeister website.

Thanks once again to Moonraker for the loan of the unit, which retails at £199.95. See [www.moonraker.eu](http://www.moonraker.eu) for full information.

### Websearch

[1] [www.moonraker.eu/](http://www.moonraker.eu/)

[2] <http://gb7jl.webs.com>

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# LF

**D**espite atrocious conditions on most HF bands, it seems that LF and MF have been performing quite well recently.

It's true that the summer months are always difficult because of the high level of atmospheric noise and the short hours of darkness but, as has been well observed in the past, there is still an opportunity for DX.

WH2XND (Phoenix, Arizona) topped the 136kHz distance rankings in July and early August with consistent WSPR2 reports from Laurence, KL7L in Alaska, 4,023km away. Later in August, WH2XND still held the honours with a WSPR2 spot from JA5FP, 9,254km distant. To cap it all his signals were eventually decoded by VK4YB at 11,982km. Well, it's still winter down there I suppose!

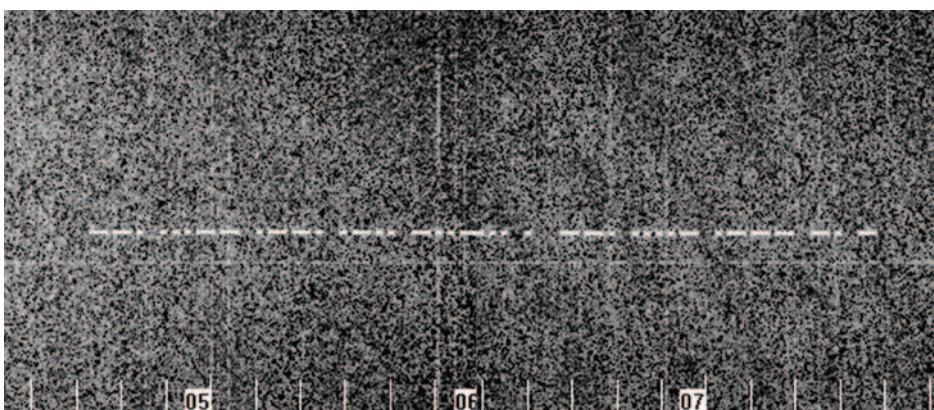
## It was 20 years ago today...

Back in 1997, things were very different on the LF bands. Here in the UK we did not yet have access to the 136kHz band and were using a temporary LF allocation from 71.6kHz to 74.4kHz. The techniques we take for granted now had not yet been developed and experimenters were delighted to get a reception report from a few tens of kilometres away. The best distance achieved using conventional techniques was 100km between G4JNT and G3YGF on CW.

Any CW operator knows that narrowing the bandwidth allows you to copy a weaker signal but with the narrower bandwidth comes a 'ringing' effect that limits the speed of CW that can be read. The narrower the bandwidth, the slower you have to go but the better the signal-to-noise ratio.

Peter, G3PLX decided to take this idea a stage further; slow down the CW to a dot-length of several seconds and use DSP to narrow the receiver bandwidth into the millihertz (mHz) region. G4JNT's proven transmitting station provided the test signal and Peter's FFT program running on a DSP development board processed the receive audio. Andy's 100 second dot-length transmission was clearly copied in Kendal on Peter's experimental system. A new mode – later called QRSS – was born.

Over the next few years PC software like *Gram*, *QRS* by ON7YD and, later, *Argo* by I2PHD made it easy for everyone to join in and QRSS was used extensively. Most of the



Excellent reception of G4JNT by G3PLX in 1997.

headline distance achievements – such as the first crossing of the Atlantic on amateur LF – were made using this mode.

The 20<sup>th</sup> anniversary of the birth of QRSS was celebrated on 14-16 July on 136kHz in an event suggested by Mike, G3XDV. Stations took part from many countries including VO1NA from St John's in Newfoundland who was, as usual, a very strong signal over here. Quite a few European stations reported enjoying the experience of actually having a QSO! Interesting as experiments with new modes are, it's always nice to make a contact rather than just get a report via the internet.

## Dreamer's band news

Stefan, DK7FC's experiments on ULF at 2.97kHz were curtailed by failure of part of his huge multi-section loading coil. Not to be deterred by such a problem, Stefan merely bypassed the faulty winding and QSY'd to 3.675kHz to continue tests. An *EbNaut* message was successfully decoded by Marcus, DF6NM over 150km away. After this test another section of the coil arced over and again Stefan changed frequency, this time to 4.470kHz, where another message was sent at a calculated 5µW ERP.

Marcus was using the big antennas at the Amberg Radio Club in Cadolzburg (DLOAO), which appears to be a quiet location, and was able to decode the message 'PEACE' from the *EbNaut* transmission. He reports the signal was about the same as at 3.675kHz.

Tests continue and the hope at the time of writing is that several days worth of transmissions can be 'stacked' by Paul Nicholson to see if he can get an *EbNaut* decode in Todmorden.

Where will he QSY next I wonder?

## Scottish tests

As far as I know there aren't any Scottish stations active on LF or MF at the moment, so in an effort to rectify the situation I took my newly constructed transportable gear up to Galloway

recently. The equipment consists of the Elad SDR transceiver, a newly home-brewed multi-band MOSFET amplifier and an old Dell laptop. The Elad and the laptop worked beautifully but the amplifier was only producing 50W from a DC input of about 200W and the output filter was getting hot. Even so, WSPR2 transmissions were received all over Europe at distances of up to 1,400km despite some terrible static levels.

Further investigation revealed that the second inductor in the 5 element low-pass filter was absorbing most of the power and it was bypassed – reducing the LPF to 3 poles – and that raised the amplifier efficiency to over 60%. I can only assume that I have fallen victim to one of the sub-standard dust-iron cores that seem to be around. The inductance measured correct for the filter design so further tests will need to be done.

The other problem that reared its head was that the built-in SWR bridge wasn't working on 472kHz. It would always indicate some reflected power – even into a dummy load. I had tested it on 160m before installation but obviously the grade of ferrite used for the transformer wasn't suitable for lower frequencies. An old Sky box power supply that I'd kept for 'spares' provided a small ferrite ring that worked a treat. Never throw anything away!

Whilst setting up the L-match tuning unit in the garden I was reminded just how useful my trusty SARK antenna analyser is. Being able to set up the ATU whilst sitting next to it, rather than running backwards and forwards to the shack after every adjustment, makes setup so simple. Just select the right taps and capacitor setting to get a good match, reconnect the feeder, go back to the shack and start operating!

On a weekend with high static and generally poor conditions I was pleased to make CW contact with several G stations plus contacts with PA3ABK and DJ6CB. There is still life on 472kHz CW!

**Dave Pick, G3YXM**  
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# HF

**P**ropagation was helped towards the end of August by a small rash of sunspots.

The solar flux index briefly reached 90, which improved conditions on 20 and 17m despite occasional periods when the K index was 5+. The A35JP/P (OC-191) IOTA DXpedition was worked in Western Europe on 20m over the North Pole around 0800 on several days, as was 5WOHA (OC-097). NL6/AA7CH on Kayak Island (NA-157) was worked by some but a pirate was also active and many will have been disappointed to find they weren't in the log. By mid-September conditions generally should be improving with higher MUFs on HF and longer nights for the LF enthusiasts. September is also one of the best times to look for ZL on Top Band.

FT8, the new digital mode, seems to be popular at the moment and is a great way to make short QSOs when conditions (or antennas) are poor. Its cycle time is much faster than the older JT modes so QSOs are quicker. But I hope it doesn't replace the traditional modes when conditions are good. I've loaded the latest WSJT-X on a shack PC but I am a bit old fashioned as I like to hear the signal I am working and have the option to send more than "599 TU" or the FT8 equivalent.

The EI DX Group is organising a DX Convention, DX Féile, on the Aran Islands on 7 October. This is a great location and an opportunity to activate EU-006 while attending a convention. Ferries run from Ros a Mhíl near Galway. See [dxfeile.ie](http://dxfeile.ie) for more info.

Users of DX information from the 425DX News website may like to try the 425DX Android app available from the Google Play Store. It's free and there are no ads. The only snag is that it can take a few days for the latest email bulletin to appear in the app.

The CDXC HF Challenge on 21MHz and above is now at its halfway point but there is still time to build up your score if you have been moderately active so far this month. It will be interesting to see what was possible with so few sunspots and I suspect there will be a lot of FT8 QSOs in the mix.

## IOTA

Dr Jeff Cantor, K1ZN has been appointed a director of IOTA Ltd. He is a retired college administrator and professor who lives in Georgia, USA, and has written about DXing.



The NL6/AA7CH QTH on Kayak Island with Pinnacle Rock outside the window.

He has 600 IOTA groups confirmed in the latest Honour Roll.

A team of six operators (DL6KVA, G3KHZ, G4EDG, S21ED, S21TV and SM6CVX) will be active from the islands of Bhola (AS-140) and St Martin's (AS-127) during the second half of October. Approximate dates are 15-18 October for AS-140, and 21-25 October for AS-127. They will operate CW and SSB on 40-15 metres using vertical dipoles. Check [s21iota.weebly.com](http://s21iota.weebly.com) for the latest info.

Eight Italian ops will be on the air from Bubaque Island (AF-020) in Guinea Bissau from 13-25 November. Activity will be 160-10m CW and SSB. RTTY will be 20m only. Check [i2ysb.com/idx](http://i2ysb.com/idx) for the latest info.

The VK5CE/9 operation from the Rowley Shoals (OC-230) has been cancelled and there have been a few important changes to the Ashmore Reef (OC-216) operation. The new callsign for the DXpedition is VK9AR and the dates are 7-10 November. Craig, VK5CE will be joined by father and son AD5A and AB5EB. They will operate SSB and CW with three stations on 40 to 15 metres. At the moment they have only been authorised to operate from dawn to dusk, ie from 2100UTC to 1000UTC. See [ashmorereef.wordpress.com](http://ashmorereef.wordpress.com) for more information and updates.

The Dateline DX Association has announced that it has been selected by the Pacific Islands Refuges & Monuments Office of the US Fish and Wildlife Service to pursue an amateur radio expedition to the Baker Island National Wildlife Refuge (KH1 – OC-089). Provisional dates for the

DXpedition are around the third week of June 2018 – which is far from ideal for Europe as there will be no short path LF propagation and conditions will be affected by the summer doldrums. The co-leaders for the DXpedition are N1DG, N4XP and K6TD. KH1 is #3 in the Club Log Wanted List (after North Korea and Crozet) for British Isles stations.

The 2018 Bouvet DXpedition expects to depart from King George Island in the South Shetlands on 13 January 2018. Transit time to Bouvet will be 9-11 days depending on the sea state. Upon arrival at Bouvet they will conduct reconnaissance flights to the island and select a campsite. They are planning to be at Bouvet for 21 days, and depending on weather and other factors hope to be on the air for 14-16 days. Check their website [www.bouvetdx.org](http://www.bouvetdx.org) for updates.

F5UFX and seven other operators (F2DX, F4BKV, F4FET, F4HAU, F5CWU, F5PTM and F6AGM/FM5CD) will be active from the Saint Brandon Islands (AF-015) for two weeks in April 2018. They will operate CW, SSB and RTTY on 160-6 metres with seven stations. Check [www.saintbrandondx.com](http://www.saintbrandondx.com) for the latest information.

A group of amateurs from India will be active from the St Mary Islands (AS-096) as VU3NPI from 30 September – 1 October. The group will be operating on the HF bands on battery power with various antennas including verticals and Yagis.

A 16-man Malaysian team will be active from Indah Island (AS-074) as 9M4IOTA from 16-18 September, operating on 80-10m, CW/SSB/digimodes.





Masa, JA0RQV in his shack at A35JP/P.

The VK9MA DXpedition team now includes nine operators. They will be active from Mellish Reef (OC-072) on 3-16 November with four stations on the air around the clock. They will try JT65/JT9/FT8 if propagation isn't good enough for RTTY. See <https://vk9ma.com/> for details.

Adrian, G0KOM is planning to operate as ZC4MK from Avdimou Beach (AS-004) from 27-31 October. He has recently renewed his ZC4 licence, which is good for 12 months and plans several more trips over the next year.

Three ops are going to Guantanamo Bay, Cuba (NA-015) in October. W4WV/KG4WV and W6HGF/KG4HF will stay for two weeks from 6-20 October. KQ4LA/KG4LA will just be there from 6-13 October. They plan to work all the bands that are open!

JA3KIO will be QRV from Koror Island (OC-009) as T88XA from 20-26 Sept. He'll be using an FT-991 and linear amplifier with a wire dipole or long wire on 30 metres and below and a Yagi on 20 metres and higher.

EA5IDQ will be operating as S9CQ (AF-023) from 12-21 October on SSB and RTTY on 80-6m.

**TABLE 1: 2017 Worked DXCC Entities (ranked by All). Showing Top 3 from RSGB or British Isles table in Club Log plus submitted scores or Club Log scores of recent correspondents where available.**

Call	CW	SSB	Data	All
G4TUK	171	160	169	254
M0IKW	158	105	42	252
M0NKR	183	204	41	252
G4PTJ	195	99	0	245
G3SVD	161	166	55	233
G4IDL	190	0	35	197
G14DOH	184	8	60	187
G3PXT	92	105	142	186
G4XEX	126	108	104	181
G3HQT	171	0	0	171
CT7AGZ	170	-	41	172
G3SVK	157	0	0	157
G8APB	72	57	64	107

JR1FKR will be V63FKR while on vacation from Pohnpei Island (OC-010), Micronesia from 27 September to 2 October, operating holiday style on SSB and RTTY on 40, 20, 17, 15, 10 and 6m.

There has been a callsign change for the March 2018 trip to Vanuatu by Michael, G7VJR. The call was going to be YJ0G but will now be YJ0GB. The dates are 2-19 March 2018.

JJ2CJB will be operating from Guam (OC-026) from 27-30 October as AC2AI/KH2 – mainly SSB but with some CW.

**TABLE 2: Forthcoming DX activity.**

11-29 Sept	YJ8RN/P
14-25 Sept	E6AG
15-25 Sept	A25 operation
16-18 Sept	AS-074
16-28 Sept	5T5OK
18-22 Sept	FP by CUWS ops (NA-032)
19-29 Sept	5W0RA
20-26 Sept	T88XA
27 Sept – 2 Oct	V63FKR
29 Sept – 30 Oct	XT2AW
30 Sept onwards	RI1F (EU-190)
30 Sept – 10 Oct	7Y7AI (AF-104)
30 Sept – 1 Oct	AS-096
6-20 Oct	KG4 ops
12-16 Oct	VK5CE/8 (OC-198)
12-19 Oct	N6SJ in Bhutan
12-21 Oct	S9CQ
15-18 Oct	AS-140
21-25 Oct	AS-127
23 Oct – 6 Nov	VK9CZ (OC-003)
27-30 Oct	AC2AI/KH2
27-31 Oct	ZC4MK
1-4 Nov?	Baiyah Island (AF-111)
3-16 Nov	VK9MA (OC-072)
7-10 Nov	VK9AR (OC-216)
6-20 Nov	VP2MDL
13-25 Nov	AF-020
Early 2018?	D2 IOTA (AF-108)
Early 2018?	3Y0Z Bouvet (AN-002)
March 2018	Pajaros Rocks (SA-100)
10-20 Mar 2018	9M0W Spratly (AS-051)
April 2018	St Brandon by F ops

AI, K7AR will be active as 5W0RA from Samoa (OC-097) on 19-29 September. He will operate CW, SSB, RTTY and maybe FT8, and will participate in the CQ WW RTTY Contest.

YJ8RN/P will be QRV from Loh Island (OC-110) until 29 September. He will have antennas for 80, 40 and 20, and a solar powered 100 watts on SSB. It is a work trip but he hopes to have some radio time from 04-09Z.

Not IOTA, but Harald, DF2WO will operate as XT2AW from 29 September – 30 October. He plans to be on 60 metres almost every night and, with conditions as poor as they are, he may be on JT65 and FT8 more than CW or SSB.

## Correspondence

Richard, G14DOH sent in an updated score for **Table 1** but lamented that the solid state key he purchased at Friedrichshafen had not delivered many new countries!

Ken, CT7AGZ made fewer QSOs than in any month since getting his CT7 callsign and made more data QSOs than CW. His meagre haul included: 10m – OH0X; 17m – PY5EJ, XE2YWH, OH0/OF5C, CO2DC, CU3AC, A45XR, CO8LY, RA2FKD, KP4KD, LU8EX, YV5CHJ; 20m – TX5EG, ZD7BG, PZ5RA, OY/CT1BWW, JW/DL4AOJ, HP3SS; 40m – 9M2KDX, TZ4AM, VK5PO.

Gordon, G3PXT is now at 110 DXCC entities on FT8. 20m highlights included: T6TM, LU2FGL, VE7SV, BG9FJD, VUs, JAs, TZ4PR, 3W3B, S01WS, HS3PJF and ZSs.

Fred, G3SVK, noted a mixture of good and bad days. He found: 17m – 5Q7DX, YB72RI/1, OH0/OF5C, 9K2NO, JA's; 20m – A71EM, JT5DX, OH0Z, OD5SK, P2FAP, P4/DF4XX, YB72RI/1/4/6/7/8, XU1A, 5A1AL, 9Q6BB, OH0/OF5C, 7X0A, KH7XS, 9M2SEKAL, RI1ANO (South Shetland), ZP6CW, HI3A; 30m – PZ5RA, KP4JRS, OH0/OF5C, 5Q7DX, OJ0BH, VP9/DL1YAF; 40m – VU2GSM, TI5/N3KS, D1DX, J49A, CR3G, OH0/OF5C, VK3CWB, YB72RI/1/6/8, OH0Z.

Peter, G4XEX didn't find much DX but his antenna is still ground mounted and one of the 811A valves in his linear blew. On 20m he managed: CW – HS3NDR, RI1ANO, 5R8UI; Data – E21YDP, JA6GCE, JA2BQX, YW5T.

## Finally

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

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# VHF/UHF

## **A**n average Perseids meteor shower doesn't live up to expectations in August.

The main highlight of the meteor scatter year is the Perseids shower that has for some years exceeded expectations. It can also deliver fairly average reflections even though the predictions are more than positive. There was lively TV and press coverage about good visual conditions but even in clear sky areas this didn't materialise.

Expeditions during the period are usually in great demand operating from rare locator squares or DXCCs. EI was well represented with two very active expeditions. Dirk, ON5GS was active from the West of Ireland as EI/ON5GS from 8-16 August and planned to be on the air using 2m meteor scatter. Skeds were arranged on the ON4KST channel as he had reasonable internet access. An interesting moment occurred on 11 August when, after finding a nice spot near the town of Tubbercurry in IO54, an angry farmer chased Dirk away after he had made four QSOs. DXpeditioners are very resourceful and another location was found finally with no interference. The EI9E team were also on the air from the QTH of EI2FG in Co Waterford, locator square IO61. Mek, SP7VC was transmitting from Latvia on 4 and 6m with his own inimitable rover style. He activated KO36 and KO37 squares and was a good signal in the east of UK. Kevin, G1KAW/P was active from his usual site in JO00EW and Chris, PA2CHR was active from Luxembourg (LX) during the Perseids.

There were fleeting Sporadic-E (Es) openings as August progressed with isolated DX worked on 6 and 4m.

### Band Reports

Bob, G8HGN (JO01) made some interesting tropo/aircraft scatter QSOs with FT8 on 6m over difficult path lengths where Sporadic-E would be too far and tropo too short. There was also a short Sporadic-E opening to Greece from his QTH in Essex. The Perseids meteor shower over the 12/13 August was disappointing. The predicted peak on Saturday the 12<sup>th</sup> didn't seem to occur and conditions were better on Sunday late morning. Bob spent some time during the night of 12/13 on 2m FSK441, but reflections weren't very good. In previous



A meteor seen during the Perseids meteor shower. The lighter horizontal line is an aircraft trail. (Photo by Paul Williams, CC BY-NC 2.0, [www.flickr.com/photos/pcw/9500530260/](http://www.flickr.com/photos/pcw/9500530260/)).

years the screen would have been filled with calls but he only copied a few on this occasion. Reflections are usually better in the mornings, so the predicted peak on Saturday wasn't best timed. Highlights were as follows. 6m: EA8AQV (IL28) and EA8YV (IL18), EI9E (IO61), F2CT (JN08), LA7DHA (JP68), DM4DS (JN49), EK7DX (LN20) for DXCC #95 and UT7KF (KO21) all worked using FT8 mode and LB8DC using MSK144. On 4m: ER1SS (KN46) on SSB (DXCC #33) and 9A/S51DI/P (JN74) and, on the 11<sup>th</sup>, DK5EW (JN48) on MSK144. 2m: SV2JL (KN10) on SSB via Es. Bob continues to monitor all bands from 6m to 70cm for any good conditions.

Gordon, G3PXT (JO02) continues his impressive operations on 6m with his tree mounted 2-ele 6m Quad. Up to the end of August, Gordon has worked 66 DXCC Entities in 2017 on a variety of digital modes and traditional SSB and CW. In particular, Gordon has been experimenting with FT8 and MSK144 working the following choice QSOs OH3UAI (KP20), OH8JGG (KP24), ZB2CW (IM76), SV1NZX (KM17), SV2BZX (KN00), SV6JHA (KM06), HA5AUC (JN97), HA7CD,

HA9PP (KN07), HA8BT, HA8EK (KN06), HA8TKS (JN96), HA9RC (KN08), EI3KD (IO51), EI4DQ (IO52), EI9E (IO63), YL2GJX (KO26), LX1JX (JO30), Z37M, Z32KF (KN11), 9H1TX (JM75), 4O6AH, 4O6ZD (JN92), CT1EKU (IM76), CT1GVN (IM67), YT1Q, YT1ZA (KN04), S57AC (JN76), SMONKZ SM00OM (JO99), SM6CMU (JO57), UR5TW (KN39), UR5WA (KN29), UT3UA (KO50) and UT5DA in KN18. All these contributed to his 212 QSOs on 6m during August! Gordon is looking forward to good conditions for the CDXC 6m Challenge in September.

Dale, 2MOWDG reports activity as being sporadic this month (pun intended) and did wonder if there would be anything of note to report! On 30 July and 5 August, using FT8, there were a number of QSOs via Es with Spain, Portugal and France and Slovenia. FT8 is really proving itself on 6m, certainly when the band picked up. On 20 August there was good Es to Italy using SSB with I6WJB. Higher Maximum Usable Frequency on 25 August allowed activity on 4m but Dale's antenna is less suited to that band. However, he still managed to work EA1YV,



EA3GP and EA1HRR one after the other on 70.180MHz FT8.

Better-equipped GM stations are performing significantly better, however Dale is keen to develop his station on 6 and 4m ready for next year. When this season ends he will look at a new antenna with higher performance on both bands. 27 August then produced a super opening on 6m with very strong and persistent propagation to Italy with several stations at S9+ and it was very easy to work 9 Italian stations on SSB within 30 minutes at the peak around 0830UTC. As the Es path swung around to the north-east, again using FT8, Dale worked Latvia, Norway and Finland prefixes YL, LB and OH. As Sporadic-E tends to do, the path swung back to the south for yet more Italian and French stations worked on 6m via SSB and FT8 digital mode. In all he managed 24 QSO on the 27<sup>th</sup>, split evenly between phone and FT8. At the same time as the peak of activity on the morning of the 27th, there was significant FM breakthrough on 4m but, sadly, the only station heard was a local GM.

Nic, G3YEG (IO91) kindly sent in his resume of activities through the Chinese CubeSat satellite linear transponders. He has been using the various CubeSat satellites over the past few months and wondered just how sensitive they are. Nic's usual aerial system is located the attic space and fixed in azimuth and elevation. On 70cm a 21-ele Yagi is used, with an 11-ele Yagi on 2m. Always keen to experiment, Nic tried to access the satellite on the most minimal system available during an evening pass of satellite XW-2C. He was surprised to hear his own CW signal back through the transponder 2m downlink with just 5 watts of transmit power to a quarter wave vertical on 70cm! Furthermore, the reception on the 2m downlink signal must have been off the back of the 2m antenna! Nic uses a TS-2000 transceiver. He wondered if any other users of these satellites have received similar results using small aerials and low power.

These particular CubeSats, five of which are still working, are all slightly different mainly regarding their size but they all do the same thing. They all have a linear inverting transponder between 70cm and 2m with a receive bandwidth of 20kHz. The downlink for

XW-2c is 100mW centred on 145.805MHz, with a CW beacon on 145.790MHz plus an FSK beacon on 145.770MHz. Doppler shift can vary these frequencies by about 5kHz over a pass so you have to first find yourself and then it is quite easy to work stations. The Kenwood TS-2000 is quite good for this operation as it can work full duplex and once you find the downlink you can set the rig up to reverse track the signals between 70cm and 2m. The five different satellites do vary in the accuracy of the frequencies – not just because of Doppler shift. Activity is quite variable, with Spanish and Italian stations plus French, Russian, Dutch (worked PE1JXI), Belgian (worked ON4CJQ) and Polish (worked SQ3SWF) all on recently. Nic says that if he can hear someone he can normally work them without any problems. "All my aerials are in my attic space and they have probably got a 6–10dB loss through the concrete slates, which is why I was quite surprised at hearing my own 5W signal back from a 1/4 wave discone vertical on 70cm. The initial test was with 50 watts output on the 70cm uplink but the power was backed off – I did start by using 50W to find myself and then backed it off to 5W but the copy was 529. In the past at my old QTH in Reading I used AO40 until its batteries went u/s and with a helical aerial on 13cm for the downlink. I worked many stations including South Africa ZF1VX, ZS6JT, the USA W9AF and Puerto Rico KQ3A all with the TS-2000 uplink on 70cm (using just 8 elements of the 21-ele Tonna) and downlink on 13cm.

The AMSAT-UK website [1] is full of information regarding satellite operation. In particular the link shows the development of the Chinese CubeSat programme and details of each of the satellites as in the ARRL dedicated satellite information pages [2].

## LZ2HV software update

Christo, LZ2HV has made further additions to the now very popular MSHV suite of software, which is another choice over the well known WSJT K1JT software. MSHV Version 1.44 now supports MSK144, JTMS, FSK441, FSK315, ISCAT, JT6M, JT65, PI4 and the newest mode FT8. Acknowledgements go to Steven Franke,

K9AN, Joe Taylor, K1JT and the WSJT Group for developing modes MSK144 and the now very popular FT8. Recent updates also packaged into Version 1.44 package includes auto sequencing for MSK144mode, faster decoding of aircraft scatter signals and recommended settings for more sensitivity in mode FT8. For further details on the software check out the MSHV website [3].

## ElectroSmog

Thanks for all the comments last month on the contributions from Alan, G4GNX and Carl, G3XGK.

Lyn, GW8JLY who is a regular contributor to the column with his meteor scatter activities, also has a noise issue. White noise to the southeast is always there in daylight. It's from a massive solar panel installation. Lyn reported it to Ofcom and the RSGB but after completing 2 weeks of logs at Ofcom's request, they closed the case saying that solar panels are not covered. Fortunately Lyn is able to beam east, north of east and south through to north without too much noise but, sadly, south east is a major MS activity direction.

Unfortunately this seems a common issue. The situation is exacerbated if you run a multi band VHF/UHF setup, with a continuing battle against this menace. From my location there seem to be different types of noise on different bands. Here, 6 and 4m present different problems than, say, 2m, which is getting to the point of being unusable in the south easterly direction with a very strong white noise/hash. Trying to direction find the interference is impossible with the amount of houses around. So basically we seem to just have to continue operating on frequencies/bands that are relatively QRN free.

## Sign off

Once again thanks to all contributors this month and looking forward to the autumn with potential for tropo openings down to the south west and potential for random meteor scatter conditions to increase. Best 73.

## Websearch

[1] <https://amsat-uk.org/satellites/communications/camsat-xw-2/>

[2] [www.arrl.org/news/search\\_Chinese\\_cubesats](http://www.arrl.org/news/search_Chinese_cubesats).

[3] <http://lz2hv.org/mshv>

## CubeSat linear transponder frequencies.

Satellite	Uplink frequency (MHz)	Downlink frequency (MHz)
XW-2A (CAS-3A)	435.030 - 435.050	145.665 - 145.685
XW-2B (CAS-3B)	435.090 - 435.110	145.730 - 145.750
XW-2C (CAS-3C)	435.150 - 435.170	145.795 - 145.815
XW-2D (CAS-3D)	435.210 - 435.230	145.860 - 145.880
XW-2E (CAS-3E)	435.270 - 435.290	145.915 - 145.935
XW-2F (CAS-3F)	435.330 - 435.350	145.980 - 146.000

**Richard Staples, G4HGI**  
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Leakage current $I_C=0.027mA$	Leakage current $I_C=0.000mA$	Test current $I_F=4.663mA$	Test current $I_F=4.663mA$	Test current $I_F=4.663mA$

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# GHz Bands

**This month I focus on some of the new GHz hardware making an appearance on the market.**

It must be said that nothing has really changed in the amateur GHz hardware area since the 1990s, when we started using coaxial and microstrip techniques rather than waveguide on the lower bands. Apart from the widespread use of synthesised and reference locked local oscillators, transverters follow the same superhet design philosophy that they always did, right back to the G3JVL days of the 1970s; only the implementation has moved on from waveguide through to microstrip and SMD technology.

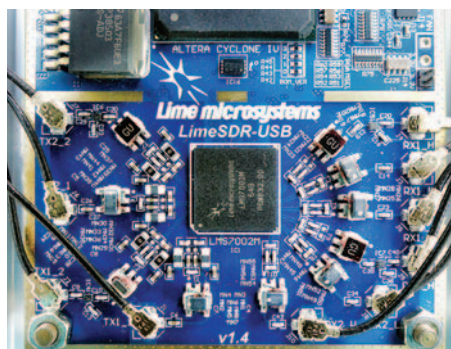
Make no mistake, the winds of change are blowing through the wireless industry, so let's take a look at some of the new SDR technology that's becoming available for the lower GHz bands.

In professional wireless circles the move has already taken place, towards 'low cost, open source, apps-enabled software defined radio (SDR) platforms' that can be used to support just about any type of wireless communication standard. Rather than having dedicated wireless hardware, transceiver integrated circuits with open source interfaces have been developed that can be field programmed to do whatever your imagination allows you to consider.

To quote one such manufacturer [1], "While most SDRs have remained in the domain of RF and protocol experts, these new devices are usable by anyone familiar with the idea of an app store, meaning you can easily download new apps from developers around the world. If you're a developer yourself, you can share and/or sell your apps easily."

Now I can already hear the groans of the traditionalists and the 'GHz bands are difficult and elitist' brigade, but I'm not apologising for pointing the way that the 'maker' aspect of our hobby must go if it is to attract a younger generation and survive. Amateurs have always developed new ways of doing things, so why shouldn't it be in the new arena of apps on standard RF platforms?

Five minutes thinking what could be done with open source hardware and software and my head spins. Single board beacons that have a receiver to allow you to command them to change mode or beam direction; ultra-wideband modes for high speed data on the GHz bands; adaptive EME systems; multichannel receivers for diversity reception; repeaters where you can select the mode you want to use; full duplex DATV transceivers – the list is as long as your imagination is wide! I'm making it my winter



**PHOTO 1:** Close-up of the Lime SDR RF section. There are 4 Tx (left) and 6 Rx channels (right).

project this year to get my head round this new approach to wireless design.

## What's available?

Many of us will have used SDR receivers such as the inexpensive RTL SDR [2], the FUNcube Dongle [3] and the SDRPlay [4] with great results. I've tried all three and I've championed them in this column as a good introduction to receiving on the GHz bands. The thing that frustrated me is the lack of an associated transmitter. Remember, 'a million receivers make no noise' (noise that Ofcom will count as band usage, that is!)

We are only scratching the surface with these devices by running off the shelf, 'standard' SDR receivers. Where these open platforms come in to their own is when we learn to write apps to run on them. As yet, I don't have a clue how to do this, but I aim to find out. At a recent Camb-Hams 'Pye and Pint' meeting I joined a crowd watching Rob, MOVFC write, from scratch and in just a few minutes, a simple receiver that displayed the signal from his 433MHz car key fob on a spectral display. This ran on one of these new platforms, the LimeSDR [1]. Like others, this board is based around a chipset designed for femtocell and picocell base stations, repeaters and other broadband wireless communication devices.

The LimeSDR is a sub-\$300, single board using 12-bit IQ sampling and a USB3 interface. It uses the LMS7002M RF chip [5] and has 6 Rx and 4 Tx connections. The Rx connection pairs are optimised for use either above or below 1.5GHz, and it can operate as a full duplex transceiver producing a few mW to drive suitable filtering and a PA. The Rx is RF-optimised around 1GHz but covers a frequency range of 100kHz to 3.8GHz. To use

the boards at HF and LF requires some small hardware mods on one of the receive inputs.

At around \$450, a slightly more expensive 12-bit transceiver board is the BladeRF-X40 [6]. It's been around longer than the LimeSDR, uses the earlier LMS6002d RF chip [7] and covers 300MHz to 3.8GHz. It provides single Tx and Rx ports that can be operated in full or half duplex. It is fully field programmable and has a 1ppm reference that can be locked to an external source. It's already supported by the popular *SDRconsole* and *SDR#* software, but can be programmed independently. It also seems to be well made from the RF point of view in that the RF module on the board is in a screened enclosure.

The least expensive of the three I'm looking at this month is the HackRF1, available at under \$250 [8]. It's cheaper because it's an 8-bit, single channel, half duplex device. This makes it akin to an RTL dongle with transmit capability but it does much more, claiming operation up to 6GHz. It also has good support from existing SDR programs.

I plan to write more about this subject in future columns, once I start to understand it better myself. If readers out there have used these and similar platforms on the lower GHz bands or VHF, please write to me with your experiences. I'd appreciate the help!

## Finally

Let's not forget what our licences are for: make some noise experimenting on the GHz bands! And why not plan to visit the GM Microwave Round Table [9] at Burntisland, Fife on 4 November? Please keep sending band reports and technical snippets to me by email.

## Websearch

- [1] <https://myriadrf.org/projects/limesdr/>
- [2] [www.rtl-sdr.com/](http://www.rtl-sdr.com/)
- [3] [www.funcubedongle.com/?page\\_id=1073](http://www.funcubedongle.com/?page_id=1073)
- [4] [www.sdrplay.com/rsp2/](http://www.sdrplay.com/rsp2/)
- [5] <http://bit.ly/2uF6XyT>
- [6] [www.nuand.com/blog/product/blade-rf-x40/](http://www.nuand.com/blog/product/blade-rf-x40/)
- [7] <http://bit.ly/2uKS0Hi>
- [8] <http://bit.ly/2vzr7sQ>
- [9] [www.gmroundtable.org.uk](http://www.gmroundtable.org.uk)

**John C Worsnop**  
PhD CEng MIET, G4BAO  
[john@g4bao.com](mailto:john@g4bao.com)

# Youth Contest Programme –

## young operators visit 9A1A in Croatia

**F**or a while now the Youth Contest Programme (YCP) event has been organised by the Youngsters on the Air (YOTA) group, funded by the IARU Region 1. It offers young amateurs under the age of 26 the opportunity to operate in a team during international contests from so called 'Big Gun' stations around Europe.

These big gun stations include ES5TV in Estonia, 4O3A in Montenegro, SK3W in Sweden or even 9A1A in Croatia. All levels of contest experience are accepted but a participant should have at least basic knowledge about contesting and using a transceiver. Also, the fun of contesting and the opportunity to learn new things about how to operate more efficiently in contests are important points for the event's success. This year three contests were announced on the webpage of YOTA to be in YCP 2017 [1].

On 13 and 14 May 2017, seven youngsters from all over Europe gathered at the 9A1A station to take part in the CQ-M International DX Contest. The contest takes place on all the classic short wave bands from 160m to 10m in mixed modes, CW and SSB. The special thing about this contest is that Multi-operator stations are allowed, but only one Tx signal at any time is allowed on the air. Our Croatian hosts provided a really nice PTT interlock system at the station including software (DXLog) and hardware to assure we followed the rules.

Tomi, HA8RT had asked me at the beginning of the year if I was up for participating in a contest from somewhere abroad (and I couldn't say no!), so shortly after I signed up to the YCP on the YOTA website. Florian, OE3FTA (organiser of the YOTA Youth Camp 2016 in Wagrain, Austria) was immediately ready to join us without question. After an email giving us the all clear from our hosts in Croatia, the three of us planned our travel to Zagreb.



Team 9A1A – from left to right Tomi, HA8RT, Philipp, DK6SP, Flo, OE3FTA, Mihaela, 9A7MIM, Marina, 9A5CKM, Aron, 9A7ROR and Domagoj, 9A7CDZ.

Tomi came by train from southern Hungary, whereas Florian came by car from Vienna. My journey was the shortest though: I checked in at Munich airport on late Friday evening and headed towards Zagreb by plane. At 22:30 local time Nikola, 9A5W waited for me at the arrivals and afterwards we drove together about 20 minutes to the location at the heights of Kojaca. All the other participants of the Croatian Contest Club (Marina, 9A5CKM, Mihaela, 9A7MIM, Aron, 9A7ROR and Domagoj, 9A7CDZ from the local youngsters' club 9A1RBZ) as well as Emil, 9A9A, Braco, 9A7R, Flo and Tomi were already gathered there. After a warm welcome we had dinner together. Afterwards, we felt really tired and went to our beds in the dormitory to gain some energy for the upcoming contest.

On Sunday morning we had a great breakfast and saw the impressive antennas in daylight. Four towers with a height of approximately 50m astonished us. For the contest we had switchable monoband Yagi stacks from 10m to 40m and dipoles for 80m as well as 160m. No effort was spared, because for the low bands they provided us

with Beverage antennas.

After learning the network of the logging software and the six microKEYERS, including reinstallation of their software, we had a little team meeting in the shack and an introduction to the station.

Tomi and I started on time at 1200UTC with interlocked CQ on 20m and 15m CW. Meanwhile the available mults were hunted on the other bands in CW and SSB. The interlock switching of hardware and software between all the stations prevented two stations transmitting at the same time. Using CW we managed to accumulate high QSO rates.

While we had many QSOs in the shack, the culinary side of the visit was not left out. Braco, 9A7R, our chef, always prepared delicious food, from risotto to roast pork. This way we could always fill up our energy during our breaks, before we headed back towards the radio.

After about 2 hours of operating we changed from CW to SSB. Unfortunately, we had not had pileups, as expected from last year, in this mode. Shortly before dusk the night shift began. We thought that 20m had





9A/DK6SP transmitting on 20m.



Dinner with local BBQ specialties – from left to right Emil, 9A9A, Mihaela, 9A7MIM, Philipp, DK6SP and Nikola, 9A5W.



Antenna forest at 9A1A with the shack in the background.

died but fortunately we ran on that band until around 4am. High rates on 40m and 80m were mostly only doable in CW though. But we had also a lot of attention on the DXCC multipliers on every band. On Saturday morning our two female secret weapons opened up 15m and 20m SSB. Shortly after Tomi had to leave us. Emil, 9A9A drove him to the train station in Zagreb.

But the contest was still ongoing. We had a big fight with our rivals on [www.cqcontest.net](http://www.cqcontest.net), where we uploaded our score during the contest. Until 1159UTC we fought for every QSO and for every mult and had a good reason to celebrate our result afterwards. After 2728 QSOs in 24 hours and a bit over 2 million points we were claimed in front of UA4M and RT4F, and claimed number 1 in the world. Many thanks for all your calls during the contest at this point!

After the contest we had a roundup and a cold ice cream in the shack. Despite the great effort, the positive team spirit was

emphasised, without which we would not have achieved this result.

Afterwards, we took some pictures of the awesome antenna forest outside. Flo left the group shortly thereafter, because he wanted to return home before the imminent storm. The Croatian youngsters left the location shortly after Flo.

I used the time and wanted to do some activity as 9A/DK6SP on 20m. First I had a great pileup on CW with about 200 QSOs and afterwards a pileup in SSB with about 300 QSOs put into my logbook. But because of the upcoming thunderstorm we shut down the station and unplugged all the antennas from the transceivers.

A short time later we were in darkness because a lightning bolt hit the substation in Zagreb. No more electricity around us. After a short dinner together with Nikola, 9A5W and Emil, 9A9A – with flashlights – we could all make up for the missed sleep of the previous weekend.

When we had electricity at the station on Monday morning again, all transceivers and microKEYERS were dismantled and loaded into the cars. Afterwards we left the station and Emil and I left for Zagreb. There Marija, 9A6PAX the daughter of Braco, 9A7R, was waiting for me to give me a tour of the city. From the foundation of Zagreb, the government buildings and the statue of Nikola Tesla to the new city, the history of the city was really well explained and shown to me. Mihaela, 9A7MIM joined us after her lecture at the university and we sat down in a café next to the bureau of the Croatian Amateur Radio Society (HRS), where Marija works as a secretary. Local delicacies and beer ended the wonderful city tour.

Then Emil, 9A9A picked Mihaela and me up by car to meet up with Nikola, 9A5W again for dinner in a grill just outside the airport. We had really great local BBQ specialties there and ended the very successful and eventful weekend before I was taken back to the airport by Nikola. After about an hour and a half flight I came back exhausted, but with many new impressions, in Munich.

Finally, on behalf of the entire team, I would like to thank all for the hospitality and cordiality of our Croatian radio friends during our stay. This indescribable weekend in connection with the participation in the CQ-M International DX Contest was simply incredible and definitely not the last time.

In the end, of course, only the compulsory question arises ... where do we go next?

#### Websearch

[1] [www.ham-yota.com/youth-contesting-program/](http://www.ham-yota.com/youth-contesting-program/)

Philipp Springer, DK6SP  
dk6sp@gmx.de

# Technical books,



## Restoring Old Radio Sets

By Philip Lawson,  
G4FCL



Nothing can be more charming than an old broadcast receiver glowing away in a wooden or Bakelite case.

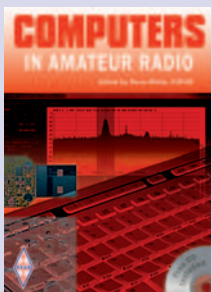
However these are now a rarity and it is much more likely that old radio sets will be non-working curios found at car boot sale in a dusty, unloved condition. *Restoring Old Radio Sets* sets out to provide a step-by-step guide to bringing an old set back to life, getting it working properly, and restoring its looks.

*Restoring Old Radio Sets* is a practical guide that explains what you need to do, and how to do it when bringing an old radio back to life. Topics include cleaning methods for electrical and mechanical parts, typical electrical repairs and the process for performing live tests.

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

Size 174x240mm, 80 pages  
ISBN: 9781 9101 9322 8

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**RSGB Members' Price £7.64**



## Computers in Amateur Radio

Edited by Steve  
White, G3ZVW

For many, the personal computer has become the essential tool to get jobs done quicker and easier. Connecting a

personal computer to a radio takes the potential of both to another level. *Computers in Amateur Radio* provides a practical guide to what is possible for radio amateurs who wish to combine both technologies.

Revised and updated, *Computers in Amateur Radio* includes new material on Raspberry Pi and the wide variety of data modes now available. Chapters are dedicated to the computer modelling of antennas, propagation and even terrain for HF, Remote Operation, Software Defined Radio, APRS, SSTV and log keeping.

This book is supplied with a CD packed with nearly 640MB of software.

Size 174x240mm 256pages  
ISBN: 9781 9050 8685 6

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## Getting Started in Amateur Radio

By Steve Nichols  
G0KYA

*Getting Started in Amateur Radio* explores what is possible and gets you started.

If you want to know about the hobby, newly licensed, or just looking for something different, *Getting Started in Amateur Radio* provides the answers. Receiving digital images from the International Space Station? Talking to friends around the world via satellite? Or being able to help out during natural disasters? All of these things are possible with amateur radio and *Getting Started in Amateur Radio* details these and many other possibilities.

*Getting Started in Amateur Radio* provides the ideal book for those interested in amateur radio, the newly licensed or even those looking to widen their amateur radio outlook.

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ISBN: 9781 9101 9311 2

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## RTTY/PSK31 for Radio Amateurs

By Roger Cooke,  
G3LDI

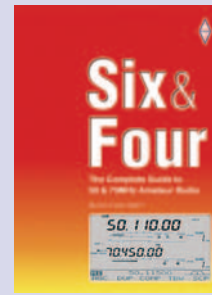
This book is a practical guide to the two most popular data modes, RTTY and PSK31.

An expanded and fully updated 2nd edition of the popular RTTY and PSK31 for Radio Amateurs. 50% bigger than the 1st edition, there is no better guide to these data modes. Readers will find details of where to find data modes on the amateur bands, through getting started, to making the most from both these modes. DXpeditions and contests use these modes and there is information on how to get the best from these.

The free CD that accompanies this book has also been fully updated to provide a wealth of amateur radio data mode programs.

Size 174x240mm 48pages,  
ISBN: 9781 9050 8688 7

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## Six & Four

By Don Field, G3XTT

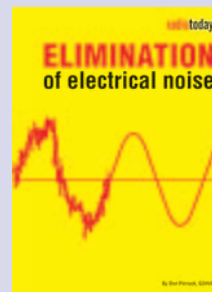
Six Metres (50MHz) - the 'Magic Band' - has always been 'different'. It sometimes behaves as an HF band, with world-wide propagation, but at other times acts more like a VHF band,

enjoying the benefits of Sporadic E, meteor scatter and other occasional propagation modes. Because it has so many facets, 6m is both a challenge and an enigma and it draws amateurs from both the VHF and HF worlds. *Six & Four* is the complete guide to this fascinating band and the similar Four Metre (70MHz) band.

*Six & Four* is based on the hugely popular 6 Metre Handbook, which is credited by some with doing much to popularise the 50MHz band. This book has moved on and is intended as a handbook for both the 6m and 4m bands. It includes a host of new material on the 4m band and the 6m material has been extensively rewritten to bring it fully up to date.

Size 210x297mm, 288pages,  
ISBN: 9781 9050 8690 3

**Non Members' Price £13.99**  
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## Elimination of Electrical Noise 2nd Edition

By Don Pinnock, G3HVA

Electrical Noise is a problem for most radio amateurs, and many are forced off the radio bands because of it. Don

Pinnock, G3HVA, is a firm believer that radio amateurs not be forced from the air but should deal with the problems. *Elimination of Electrical Noise* tells of Don's personal experiences, and provides solutions to noise problems.

Various types of noise 30kHz to 30MHz, are detailed, from computers to electrical light fittings and much besides. Computers are almost an essential in a modern shack. New to this edition is a chapter on how to reduce or eliminate noise from the computer itself and numerous interconnecting leads.

Don's experiences and advice may well provide the solution you are looking for. *Elimination of Electrical Noise* provides the help you may need to take charge and tackle that noise problem.

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Order on the internet at [www.rsgbshop.org](http://www.rsgbshop.org) or you can order by post making cheques and postal orders crossed and made payable to Radio Society of Great Britain or telephone your credit card order to **01234 832 700**. Open 8.30-4.30 (Mon-Fri). Send no cash. **Post & Packing:** Standard Delivery - 2nd Class Post (4-9 Days), For one item £1.95, For two or more items: £3.50, **For orders over £30.00 standard delivery is FREE.** Priority Delivery - 1st Class Post (2-4 Days), For one item £2.95, For two items: £4.95, For three or more items: £5.95. **Overseas:** Worldwide Surface Delivery, For one item: £3.00, For two items: £5.00, Extra items: £1.00 per item. Worldwide Air Delivery: For one item: £9.00, For two items: £15.00, Extra items: £3.00 per item.





# Computing & EMC



## RSGB Radio Communication Handbook

Edited by Mike Browne, G3DIH

This handbook remains one of the most enduring guides in the world to amateur radio technology.

The new edition of the *RSGB Radio Communication Handbook* has been updated, rewritten and provides an invaluable guide to amateur radio theory and practice. 600,000 words, 2000 illustrations and diagrams in 25 chapters and two appendices in 864 pages it covers the breadth of amateur radio.

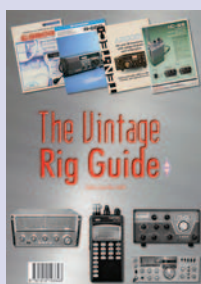
Readers will find explanations from the basic components of amateur radio to semi-conductors through oscillators, amplifiers, mixers, transmitters, receivers and a complete transceiver project. There are chapters covering design and practice in VHF/UHF, Microwaves, and frequencies below 1MHz. *RSGB Radio Communication Handbook* also includes chapters dedicated to propagation, antenna basics and transmission lines.

Written by 'thinking amateurs', for 'thinking amateurs' the *RSGB Radio Communication Handbook* is simply the book that every radio amateur should have.

210x297mm 864 pages, ISBN: 9781 9101 9326 6

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**RSGB Members' Price £24.99**



## RSGB Vintage Rig Guide

Edited by Steve White, G3ZVW

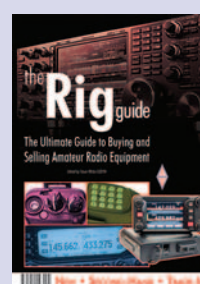
Amateur radio equipment saw great changes from the 1960s onwards with the arrival of solid state designs and equipment from the latter decades of the 20th Century is available in the second hand market. This publication focuses on the amateur radio equipment from these decades in the same format as the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

From 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 early editions of that publication. 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.

If you are interested in vintage amateur radio equipment, its likely this book provides a valuable insight. Recommend reading for anyone interested in old equipment

Size 210x297mm 80pages, ISBN 9781 9101 9330 3

**Price: £5.99**



## Rig Guide

Edited by Steve White, G3ZVW

The *Rig Guide* is a unique publication that sets out to answer the question 'what is the right price for this radio?'. What will you get for a radio if you trade it in

or try to buy or sell it on an online auction site? - The *Rig Guide* provides the answer.

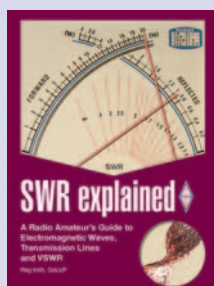
The *Rig Guide* continues to define the prices of amateur radio equipment in the UK, fully updated and covering more than ever before The *Rig Guide* is rightly one of the most popular amateur radio books around.

If you are planning to buy or sell any amateur radio equipment you should not be without The *Rig Guide*. The book begins with tips for buyers and a guide to selling and trading. There is a handy guide to selling on ebay and even tips on how to avoid getting lumbered with stolen gear. The *Rig Guide* contains a list of the abbreviations used in the descriptions and an explanation of them all.

Knowing the worth of any piece of equipment means you can easily cover the cost of The *Rig Guide* with just one purchase or sale. Selling or Buying, you need a copy of The *Rig Guide*, don't be at a disadvantage - buy a copy today!

Size: 210x297mm, 96 pages, ISBN: 9781 9101 9320 4

**Price: £5.99**



## SWR Explained

By Reg Irish G4LUF

Many radio amateurs are familiar with the concept of the Standing Wave Ratio (SWR) and the effect it has on the transmission and reception of signals.

Few however understand much about it beyond the adjustment of an antenna tuning unit to reduce SWR. *SWR Explained* sets out to fill that gap and provide the context that makes electromagnetic Waves, transmission Lines and VSWR comprehensible.

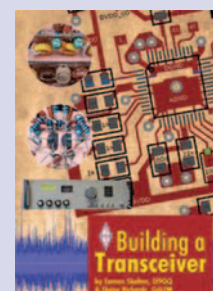
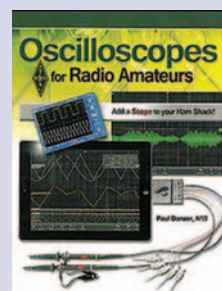
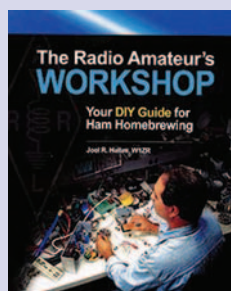
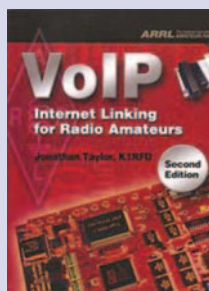
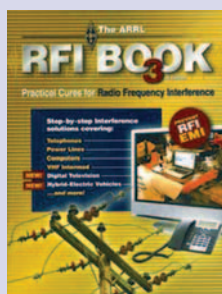
*SWR Explained* provides a guide to the mysteries of electromagnetic waves, transmission Lines and VSWR yet is light on heavy mathematics. If you want more information about this topic, this book is recommended reading.

174x240mm, 64 pages, ISBN: 9781 9050 8699 3

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# Sport Radio

**O**ctober marks the start of this season's series of Super League contests.

The Super League began as a series in 2011. No new contests were created, but existing contests were brought together and a league table created in an attempt to increase participation and generate rivalry. Initially it was four contests, but after the first year it became six. Little did the Contest Committee know in the early days that they had created a monster!

## Last season

This time last year I said that Bristol would find it hard to equal what they had achieved in the 2015-16 season, when they won four out of the six qualifying events. And so it turned out to be. In that season, Camb-Hams were missing their mobile shack Flossie, which had been pensioned off. Flossie Mk2

hadn't been finished and it certainly showed what an advantage it had given them in the past. With their new mobile shack, Camb-Hams came roaring back, winning five of the qualifying events and moving up from third place overall to first.

The Camb-Hams started the season as they meant to carry on, by winning 6m AFS. It was a clear win over Bristol, but not huge, with the top two teams way ahead of the teams that came third, fourth and fifth. These teams were very closely spaced, indeed Grimsby were just one point ahead of the Camb-Hams B team.

The top five teams were more closely spaced in 160m AFS, but once again Camb-Hams won. Also known as Club Calls Contest, 160m AFS has a unique format. It is often used by clubs as a training ground



Steve Cole, GW4BLE (SK).

for new contesters, some of whom sit in on a club station or become one of the operators. That said, there's not much evidence of this practice amongst the top teams.

2m AFS was in December and guess what... Camb-Hams beat Bristol into second place again. This time it was a by a huge margin, so by the time the results were

## RSGB HF Events

Date	Event	Times (UTC)	Mode(s)	Band(s)	Exchange
Sun 8 Oct	DX Contest *	0500-2300	CW, SSB	3.5-28	RS(T) + SN
Mon 9 Oct	80m Autumn Series	1900-2030	CW	3.5	RST + SN
Wed 18 Oct	80m Autumn Series	1900-2030	Data	3.5	RST + SN
Sun 22 Oct	RoLo 2	1900-2030	CW	3.5	RST + Rolling Locator
Thu 26 Oct	80m Autumn Series	1900-2030	SSB	3.5	RST + SN

## RSGB VHF Events

Date	Event	Times (UTC)	Mode(s)	Band(s)	Exchange (info)
Sat-Sun 2-3 Sep	144MHz Trophy +	1400-1400	All	144	RS(T) + SN + Locator
Sun 3 Sep	5th 144MHz Backpacker	1100-1500	All	144	RS(T) + SN + Locator
Tue 5 Sep	144MHz FMAC	1800-1900	FM	144	RS + SN + Locator
Tue 5 Sep	144MHz UKAC	1900-2130	All	144	RS(T) + SN + Locator
Tue 12 Sep	432MHz FMAC	1800-1900	FM	432	RS + SN + Locator
Tue 12 Sep	432MHz UKAC	1900-2130	All	432	RS(T) + SN + Locator
Thu 14 Sep	50MHz UKAC	1900-2130	All	50	RS(T) + SN + Locator
Sun 17 Sep	Second 70MHz	0900-1200	All	70	RS(T) + SN + Locator
Tue 19 Sep	1.3GHz UKAC	1900-2130	All	1.3G	RS(T) + SN + Locator
Thu 21 Sep	70MHz FMAC	1800-1900	FM	70	RS + SN + Locator
Thu 21 Sep	70MHz UKAC	1900-2130	All	70	RS(T) + SN + Locator
Tue 26 Sep	SHF UKAC	1900-2130 ~	All	2.3-10G	RS(T) + SN + Locator

## Best of the Rest Events

Date	Event	Times (UTC)	Mode(s)	Band(s)	Exchange/info
Sun 1 Oct	UKEICC DX	1200-1200	SSB	3.5-28	RS(T) (optional) + SN + District Code
Wed 4 Oct	UKEICC 80m	2000-2100	SSB	3.5	4-character Locator (eg IO93)
Sat-Sun 7-8 Oct	Oceania DX SSB	0800-0800	SSB	1.8-28	RS + SN
Sat-Sun 7-8 Oct	IARU 432MHz-245GHz	1400-1400	All	432-245G	RS(T) + SN + Locator
Sat-Sun 7-8 Oct	WAB HF Phone	1900-1900	Phone	14-28	RS + SN + WAB area + Book No
Sat-Sun 14-15 Oct	Oceania DX CW	0800-0800	CW	1.8-28	RST + SN
Sat-Sun 21-22 Oct	Worked All Germany	1500-1500	CW, SSB	3.5-28	RS(T) + SN (DLs send DOK)
Sun 22 Oct	UKuG 24-76GHz	0900-1700	All	24-76G	RS(T) + SN + Locator
Wed 25 Oct	UKEICC 80m	2000-2100	CW	3.5	4-character Locator (eg IO93)
Sat-Sun 28-29 Oct	CQWW DX SSB	0000-2359	SSB	1.8-28	RS + Zone (UK=14)

In the case of differences between this calendar and the Contest Committee website, the website takes precedence.

\* HF Championship event. + VHF 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)



released everyone knew which way the wind was blowing. The Black Sheep specialise in VHF/UHF contesting and made it into third place, just ahead of Crawley.

CW AFS is the contest where a team needs Morse skills to win. The Three A's team won, as they have for eleven out of the past twelve years. Camb-Hams came second and Aberdeen third. Bristol were fourth and GMDX North fifth. The fact that two teams from Scotland came in the top five suggest to me that propagation for this contest was long.

In theory the result of SSB AFS should be similar to CW AFS, but no teams from Scotland appear in the top five. Again Camb-Hams won and Bristol came second. The Three A's were third, while the teams from Cray Valley and De Montfort University made their only appearance in the top five, in fourth and fifth places.

Camb-Hams stamped their authority on the series by winning 70cm AFS, once again from Bristol. Trowbridge are an active club with an interest in contesting. They came third, Grimsby were fourth and Camb-Hams B team fifth.

In the 2016-17 season, Camb-Hams came first in five of the qualifying events and set a new record score. Bristol came second in five of the qualifying events and took second place. Grimsby made it into the top five in four of the qualifying events and came third. Pembroke and Tall Trees didn't appear in the top five in any of the qualifying events, but prove that if your club enters all of them with a reasonable number of stations you can still make it near to the top. 104 teams appear in the overall League Table.

## This season

The 2017-18 Super League season starts on Sunday 22 October with 6m AFS. Notice of all the events will appear in Sport Radio and, of course, on the Contest Committee websites.

This year's Club Calls Contest takes on a new shape. Traditionally it was SSB only, but now it is CW and SSB. Also, in this contest it will no longer be necessary to send an RS(T) report.

Solar (in)activity means that conditions on 80m and 40m for the January AFS contests are once again likely to be poor. 40m might be OK for short distance (NVIS) working at the start of these events, but I expect the skip will lengthen early on. Consequently 80m is likely to carry the bulk of the traffic. Even then the skip will lengthen before the end of the contest, making it difficult to work – and hear – stations closer than a few hundred miles. In 2018 there will also be a new datamodes AFS.

Finally, a club I'd like to mention is the Drowned Rats CG. They were just outside the top five in some Super League contests last season, but if they are able to field a stronger team and/or enter all the qualifying events this time I think they could easily make it into the top five overall.

## This month's contests

There's a remodelled HF contest from the RSGB to take part in this month.

In 2006, the 21/28MHz Contest replaced what were separate contests on those bands. Last year the DX Contest replaced the 21/28MHz Contest and 14MHz was included. This year it has evolved further, with 3.5 and 7MHz included. The new contest takes place for 18 hours on Sunday 8th, although there are 12-hour sections too. With conditions on the HF bands as they now are, I see this as a sensible move, but there's still a points incentive to use the higher frequency bands. We move then into the second month of the inaugural Autumn Series, with CW on Monday 9th and datamodes on Wednesday 18th. RoLo 2 (CW) is on Sunday 22nd and we return to the Autumn Series with an SSB session on Thursday 26th.

The 144MHz FM Activity Contest (FMAC) and UK Activity Contest (UKAC) are on Tuesday 3rd. There's a big microwave weekend on the 7-8th, with the 1.2-2.3GHz Trophy Contest on the Saturday. Starting at the same time the 432MHz-245GHz Trophy Contest runs for 24 hours. We then have lots of Activity Contests; the 432MHz FMAC and UKAC on Tuesday 10th, the 50MHz UKAC on Thursday 12th, the 1.3GHz UKAC on

Tuesday 17th and the 70MHz FMAC and UKAC on Thursday 19th. The first of this year's Super League contests is 50MHz AFS on Sunday 22nd. Please see the earlier information about this hotly-contested series. We return to the Activity Contests for the SHF UKAC on Tuesday 24th.

The UKEICC DX Contest started on 30th September and ends on Sunday 1st October. It is followed by an SSB session in the UKEICC 80m series, on Wednesday 4th. There are three separate contests of interest on the weekend of the 7-8th. The Oceania DX SSB Contest runs for 24 hours. Work VK, ZL and Pacific islands only. The IARU 432MHz-245GHz Contest coincides with an RSGB contest, so if you enter that one an entry will be forwarded for you. The Worked All Britain HF Phone Contest runs for 24 hours on 14-28MHz. The Oceania DX CW Contest runs for 24 hours over the weekend of the 14-15th. The Worked All Germany contest runs for 24 hours over the weekend of the 21st-22nd. Single-operator stations can enter CW-only or mixed mode. No single band entries. Work German stations only. The UKuG have a 24/47/76GHz contest on Sunday 22nd. There's a CW session of the UKEICC 80m series on Wednesday 25th and we finish the month with the biggie; the CQWW SSB Contest takes place for the full 48 hours of the 28-29th.

Talking about CQWW SSB leads me to mention Steve Cole, GW4BLE (see photo) who died on 2 December 2016 at the age of 64. He was "...exceptionally well known in the DXing and contesting world", said Ian Pritchard, G3WVG, and "an ardent (and highly successful) supporter of the CQWW SSB contest. CQWW organisers have agreed that every year from 2016 onwards a plaque in memory of him will be awarded to the highest scoring European station in the Classic section. It will be managed by the World Wide Radio Operators Fund (WWROF)."

**Steve White, G3ZVW**  
steve.g3zvz@gmail.com

**TABLE 1: The top five teams in the 2016-2017 Super League series.**

	1st	2nd	3rd	4th	5th
6m AFS	Camb-Hams A	Bristol A	Grimsby A	Camb-Hams B	Chesham
160m AFS	Camb-Hams A	Bristol	Camb-Hams B	Grimsby	Chesham
2m AFS	Camb-Hams A	Bristol A	Black Sheep	Crawley A	Grimsby A
80m CW AFS	Three A's	Camb-Hams A	Aberdeen	Bristol A	GMDX North
80m SSB AFS	Camb-Hams	Bristol	Three A's	Cray Valley	De Montfort Uni
70cm AFS	Camb-Hams A	Bristol	Trowbridge	Grimsby	Camb-Hams B
<b>Overall</b>	<b>Camb-Hams</b>	<b>Bristol</b>	<b>Grimsby</b>	<b>Pembroke</b>	<b>Tall Trees</b>
Points (% of max)	5985 (99.75%)	5867 (97.8%)	5587 (93.1%)	4884 (81.4%)	4832 (80.5%)

# Data

## New WSJT-X mode

This column is being written just as another mode is added to the WSJT-X suite. But this one is different: it is designed for short, rapid QSO exchanges and was developed as a result of discussions on the WSJT Yahoo Group. Aimed initially at 6 and 10m Sporadic-E operating, where openings are short and exchanges have to be completed quickly, the new FT8 mode has also been taken up in a big way by the DX chasers.

FT8 (the FT stands for Franke-Taylor, the two authors of the mode, K9AN & K1JT) is part of the latest incarnation of WSJT-X, version 1.8.0. The software can be found at [1]. FT8 adopts the same short message structure as most of the other WSJT-X modes, but differs in that the transmit / receive switching is conducted on 15 second cycles rather than the one-minute cycle of JT9, JT65 etc. This means a complete minimum QSO can take place in one minute rather than the four minutes needed for the other slow modes. A typical exchange would look like this:

```
CQ G9BOF IO90
G9BOF DA1SY JO41
DA1SY G9BOF R-12
G9BOF DA1SY R-08
```

All a bit mechanistic, but a qualifying contact for awards and lists and not vastly different from a minimal CW contact.

FT8 uses 8 tone signalling at 6.25Hz tone spacing and 6.25 symbols per second (baud). The whole signal is about 50Hz wide, so many users can sit within a single SSB filter bandwidth. As well as the normal 72 information bits, three more bits are available, but they haven't yet been allocated a function; FT8 is still work in progress! The 75 bits have a 12 bit cyclic redundancy check added, then expanded to 174 information symbols. These are taken three at a time, encoded to the eight transmitted tones and appended with three 7x7 Costas arrays for synchronisation, making 79 transmitted symbols in total.

## Implementation difficulties

The whole FT8 experience took most users by surprise. When the mode was announced, the only version of the software to be found had to be individually compiled – there was no executable download available. This forced many potential operators to try to install and run the compilation suite, available from the WSJT-X repository, but needing a fair bit of expertise in getting it up

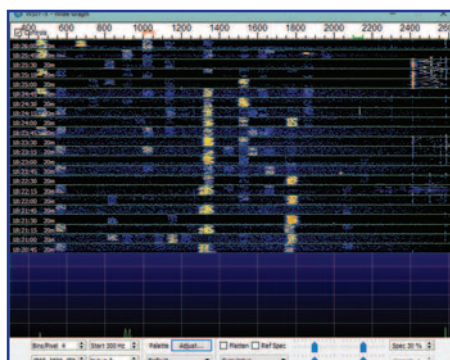


FIGURE 1: FT8 signals on 14MHz.

and running. Those who succeeded then had to work out where to operate. The HF bands already had defined spots where JT65 and JT9 operation sat and they needed to co-exist. Eventually, after much discussion on the WSJT-X Yahoo Group, a carrier (or so-called 'dial frequency') that was 2kHz below the JT65 one was chosen. Initial attempts to go above JT65/JT9 had to be abandoned as that would intrude into the parts of most HF bands where RTTY and PSK31 are used.

## Auto sequencing

With just a few seconds in each over for operators to type their entries, some very deft sleight of hand was needed, so some automation was added. By clicking on callsigns in a message, the call can be transferred to the next message to be sent with the measured signal report added automatically – so the TX messages are generated almost completely automatically. It is theoretically possible, if the rules are followed rigidly, for the QSO to complete on its own. Whether this is what the authors intended is debateable and it is possible some of the more contentious auto sequencing may be changed in later versions.

To see just how this rapid-fire mode has come to dominate HF data operation in the space of just a few days after it was launched, look at Figure 1. It shows the waterfall display of the FT8 segment on 14MHz on a normal weekday evening where at least 14 (and possibly 17) stations are in QSO or calling CQ. Figure 2 shows the user screen with some of the decodes.

## A one bit QSO – or was it?

Twenty years ago on 20 July 1997 I had the first 'proper' one-way slow-CW (QRSS) exchange on the 73kHz band with Peter, G3PLX who used then-new DSP techniques to look for my signal in a very narrow bandwidth on a waterfall display. But the first proof the 393km path worked actually happened about two weeks earlier when, during a phone call, Peter asked me to turn

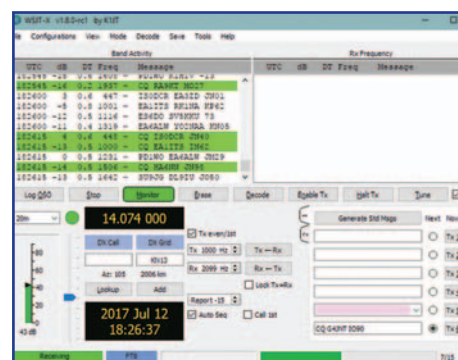


FIGURE 2: FT8 decodes on 14MHz.

the transmitter on. After about a minute, needed to build up the signal in his 50mHz FFT bin, he said "I can see you, now turn it off" I did so, and his trace disappeared, proving proper signal reception. Not a QSO by any stretch of the imagination, but a valid test of a radio path.

This simple exchange shows perfectly the difficulty in defining information sent on RF links. For example, did I send one bit of information, or two? Or anything at all? When Peter first saw a trace pop up, it *might* be me and not some locally generated carrier. Being time-correlated meant it *probably* was me. When I turned it off, and he saw it disappear, that was near-perfect proof. Had it not disappeared, it wouldn't have been my signal. So the '1' and '0' I sent using amplitude shift keying could be described as a simple form of error correction. But the information to be sent was known in advance – he 'knew' I intended to transmit when asked and turn off when asked. So there is no unknown information there. Or is there? We now knew the path worked, that had previously been unknown. Is that one bit of information?

Had we agreed on the phone that I should go Tx on then Tx off, OR Tx off then on each for a period of a minute from a known start time, then I could have transmitted a genuine, unknown bit of information. But if a '11' or '00' pattern were to be received, the meaning would be ambiguous; and so it goes on.

Two weeks later a proper callsign was sent in QRSS and the rest is history, but the trivial one bit test does hopefully make you stop and think about what a 'bit' of information might mean – and how many are going to be needed to guarantee correct reception of any message.

## Websearch

[1] <https://physics.princeton.edu/pulsar/k1jt/wsjsx.html>

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



# Book Review

## Antennas for MF and Above

### *A guide to practical antennas from 630m to 60m*

by Mike Parkin, G0JMI

Readers of *RadCom* will be well aware that Mike Parkin has been our Antennas columnist since the sad loss of Peter Dodd, G3LDO, and he has filled those big shoes with aplomb. His clear writing style, informative diagrams and high quality photographs are a pleasure to see and I always consider it a perk of my job that I'm the first amateur to read the Antennas column every month.

Observant people will also know that Mike has significantly overhauled several sections of the RSGB *Radio Communication Handbook 13th Edition*, including the Antenna Basics & Construction, Transmission Lines and Practical HF Antennas chapters.

Now Mike has turned his attention to lower bands in this standalone work on antennas for 630m, 160m, 80m and 60m. Of these bands, 60m (5MHz) is relatively new to most amateurs, and 630m (472kHz) much more so. As a result there is perhaps less material available to people wanting to experiment with antennas on these bands: this book redresses the balance and puts things right.

Instead of concentrating on just one band, or just the newer bands, Mike Parkin shows how you can often use the same or very similar approaches – or even physically the same aerials – to work two or more. For example an existing aerial for 160m can often be pressed into service on 630m, and there are even some for 80m that will also work on 160 and 60m with suitable arrangements.

It would be a mistake to believe the commonly-heard 'old wives' tale' that Top Band is only for those with enormous back gardens and, by extension, the 630m band more so. Starting with an overview of antenna theory for both MF and HF antenna systems, we learn a number of quite practical designs for all four bands – some of which are surprisingly compact. Whilst acknowledging that 630m aerials tend to be somewhat specialised – and dedicating an entire chapter to them alone – we do learn that if you are careful and have a good understanding of the theory and practicalities, something that will work quite satisfactorily is within the grasp of the average amateur's talents.

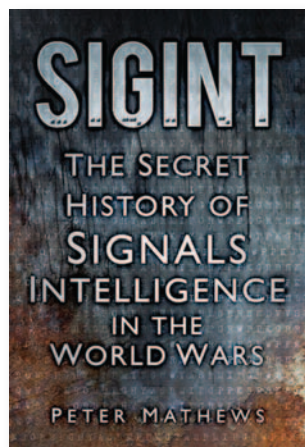
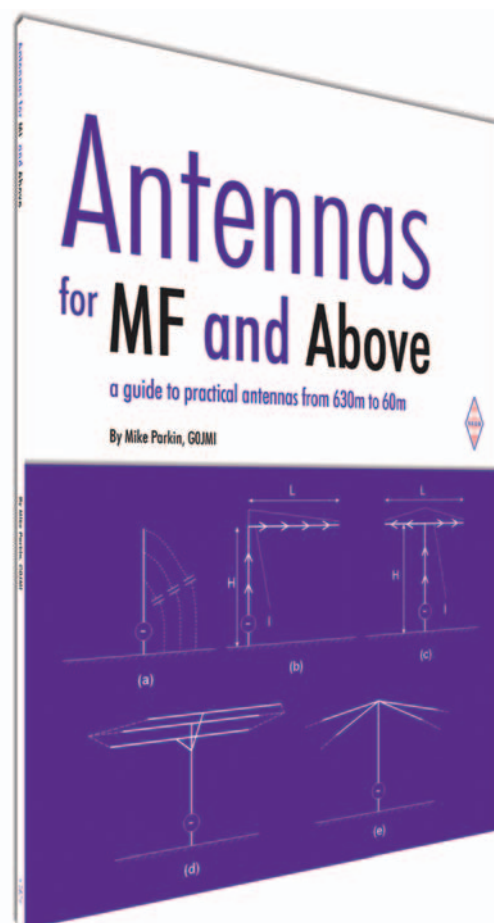
Various types of antenna are discussed, ranging from long wires, dipoles, doublets, off-centre feeds, loops and even Beverages (although, to be fair, you do need a *rather* long back garden for an effective 630m Beverage: a mile would be useful, although we do see a calculation of the expected results from one a mere one wavelength – 630m – long, barely over a third of a mile!

The text is supported by around 80 drawings and photographs, all created specifically to illustrate points in the text and convey meaning in an easy-to-absorb fashion.

If you haven't ever experimented with the bands below 40m, or even if you have done, you are sure to find much to interest you in this book. I feel sure that it will become one of amateur radio's standard reference works and have no hesitation in recommending it wholeheartedly.

Size 174x240mm, 112 pages, ISBN: 9781 9101 9346 4

Non Members' Price £11.99, RSGB Members' Price £10.19



## SIGINT

### *The secret history of signals intelligence in the World Wars*

by Peter Matthews

This award-winning book takes a fresh look at how enemy messages were secretly intercepted, decoded and interpreted in World War 1 and World War 2. Signals intelligence – SIGINT – played a massive role in many of the most decisive battles and this book casts a light on how the craft created a new role for listeners and spies. The book spans the change in official attitudes from “Gentlemen do not read each other's mail” to all-out exploitation of enemy communications for military advantage. Fascinating stuff, and a very interesting read.

Size: 157 x 234mm, 256 pages

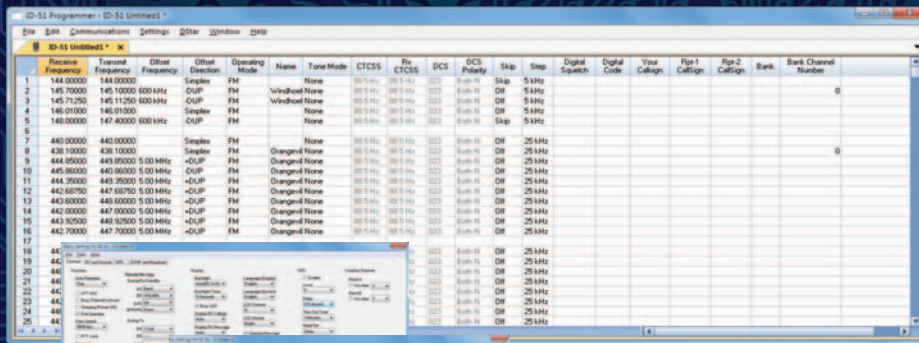
ISBN: 9780 7524 8734 2

Non-Members' Price: £18.99

RSGB Members' Price: £14.24

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

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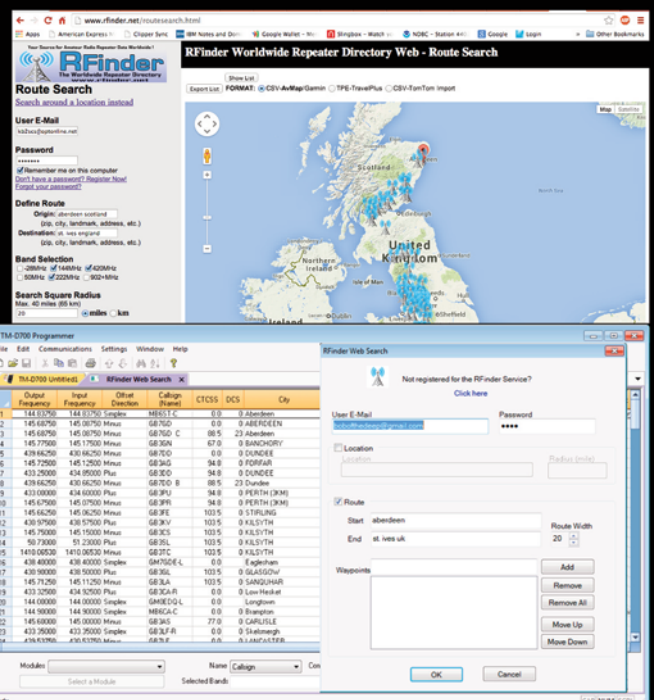
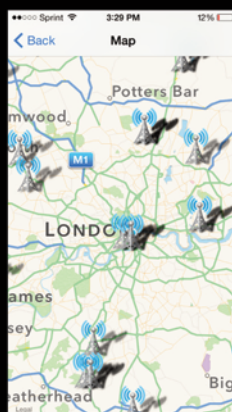
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# The RSGB Patron

**The RSGB would like to wish His Royal Highness, The Duke of Edinburgh, KG KT all the very best in his retirement. He has, since 1952, been the Patron of the RSGB and joined the Society on several occasions.**

In August, The Duke of Edinburgh KG KT attended the last of his 22,219 solo engagements after more than 65 years by the side of his wife, Queen Elizabeth II. He may decide to attend certain events, alongside the Queen, from time to time. He is patron, president or a member of more than 780 organisations, including the RSGB, and will continue to be associated with them, but "will no longer play an active role by attending engagements".

His Royal Highness, The Duke of Edinburgh, KG KT generously extended his Patronage to the Society in November 1952. On 1 November 1952, an announcement came from Buckingham Palace with the news that 'despite having undertaken a great number of additional responsibilities, he will do his utmost to take a personal interest in the Society.' The announcement appeared in the November 1952 *RSGB Bulletin*.

As Patron, The Duke of Edinburgh has visited a number of events with the RSGB including special event stations, anniversary events and exhibitions. He attended the 75<sup>th</sup> Anniversary Convention at the National Exhibition Centre (NEC) and, after touring the display of amateur equipment through the ages, he exchanged a short greetings message with Windsor Castle. His opening address was carried on a special edition of GB2RS that was carried live from the NEC.

He also attended the 90th anniversary celebrations at Windsor Castle.

Despite retirement from public events, his most recent interaction with the Society was the message he sent to YOTA 2017: "I am delighted to have this opportunity to welcome everyone who is participating in The Radio Society of Great Britain's youth event 'Youngster on the Air 2017'. The skills involved in amateur radio are a valuable foundation for careers in science, technology, engineering and maths. I hope that all those taking part in this event will gain valuable experience for their chosen career. I wish all participants a very enjoyable week, and trust that the friendships formed will last longer after the conclusion of the camp."

We look forward to continue working with him as Patron in the future.



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 November issue is 21 September and for December it's 26 October. 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.

**International Federation of Railway Radio  
Amateurs (FIRAC) www.firac.org.uk**  
Nets Sun 14.320MHz at 0830UTC, Wed  
21.3MHz at 1430UTC g4gnq@hotmail.co.uk

### NATIONAL

**Amateur Radio Caravan and Camping Club**  
membership@arcc.org.uk, www.arcc.org.uk  
Caravan Rallies October – Banbury, Oxon

**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: RM1@rsgb.org.uk

**Cockenzie & Port Seton ARC**  
Bob, GM4UYZ, 01875 811 723  
6 Normal club night  
28-29 CQWW SSB contest

**Livingston & District ARS**  
Cathie, 2M0DIB, 01506 433 846  
3, 17, 31 Operating and/or training  
10 Talk  
21-22 JOTA 2017  
24 Operating/feedback from JOTA

**Lothians RS**  
Mike, MM0MLB,  
secretary@lothiansradiosociety.com  
18 Surplus equipment sale  
25 DXpeditions, Tom, GM4FDM

**Mid Lanarkshire ARS**  
Kevin, 2M0KVM, 0772 509 6279  
6, 13, 20, 27 Club night

### REGION 2: SCOTLAND NORTH & NORTHERN ISLES

Regional Manager: Andrew Burns, MM0CXA  
RM2@rsgb.org.uk

**Aberdeen ARS**  
Fred, GM3ALZ, 01975 651 365  
5 Junk sale  
12 Beginners' guide test equipment  
19 Construction & on-the-air  
26 AGM

**Dundee ARC**  
Martin, 2M0KAU, 0776 370 8933  
3 VHF radio hands on/ contest  
10 Tuition/club night  
17 JOTA prep/tuition  
21-22 JOTA-Monikie Scout Hall  
24 JOTA debrief  
31 Tuition/club night

**Glenrothes & District RC**  
Dougie, MM6KNR, dougie@digitalmaker.co.uk  
4 AGM  
11 Virtual earths – Simon  
18 RSGB/DX Factor video  
25 Presentation on Tam Club

### REGION 3: NORTH WEST

Regional Manager: Kath Wilson, M1CNY,  
RM3@rsgb.org.uk

**Chester & District RS**  
Bruce, M0CVP, 01244 343 825  
28 CQ WW SSB from QTH of Phil, G4FVZ

**Isle of Man ARS**  
iomars@manx.net  
10 UK op in South Africa, John Dowling  
20-22 JOTA with IOM Scouts  
25-26 CQ WPX contest

**Macclesfield & District RS**  
Greg, MOTXX, info@gx4mws.com  
2 Shack on the air  
9 Film night  
16 Equipment maintenance night  
23 Talk: activating data modes / P  
30 AGM

**South Manchester R&CC**  
Ron, G3SVW, 01619 693 999  
5 Discussion on shack safety  
12 Shack night  
19 Transformers, G8ZCJ  
26 Noise testing, G4MVU

**Stockport Radio Society**  
Heather, M6HNS, 0750 690 4422  
3 Society meeting  
10 Net, 51.550MHz FM, 7.30pm then  
50.270MHz SSB, 8.15pm  
12 Net, 145.375MHz, 7.30pm  
17, 24 Radio/Skills night

**Thornton Cleveleys ARS**  
John, G4FRK, 01253 862 810  
2 Natter night practical / club on air  
9 Marine radio, Eric, 2E0EEW  
16 AGM  
23 New Chairman's address  
30 Auction

**Wirral ARS**  
William, G4YWD, 0780 488 4245  
3, 4, 5, 10, 11, 12, 17, 18, 19, 24, 25, 26, 31  
G3NWR on air to promote new location

### REGION 4: NORTH EAST

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

**Angel of the North ARC**  
Nancy, G7UUR, 01914 770 036  
2, 9, 23, 30 On the air  
7 eDay workshop at Central Library, Gateshead  
16 Impact of super speed broadband on  
amateur radio, David, G0EWW  
21 JOTA

**Bishop Auckland RAC**  
Gail, M3GBB, 0191 372 0473  
5, 12, 19 Normal club night and training

**Colburn & Richmondshire District ARS**  
Colin, 01748 876 391  
12 General meeting and training  
26 FUNcube and space comms

**Durham & District ARS**  
Michael, G7TWX, dadars@gmx.com  
4, 11, 18, 25 Club night  
5, 12, 19, 26 Club net, 145.475MHz, 7.30pm

**Hull & District ARS**  
Tony, G0WJK, 01430 423 837  
5, 19 Club night and on the air  
12 Visit by Ian, RSGB Region 4 Manager  
26 Video evening

**Ripon & District ARS**  
David, G3UNA, 01423 860 778  
5, 12, 19, 26 Club night

**Sheffield ARC**  
David, G6DCT, littlewood20@btinternet.com  
2 PSK31 operation, Steve, M1ERS  
9, 23, 16, 30 Club night/shack night

**Spen Valley ARS**  
Russell, G0FOI, 01274 875 038  
5 Discussion about Christmas social  
19 On the air

**Wakefield & District RS**  
Charles, M0OXO@wdrs.club  
6, 13, 20, 27 Social and natter night

### REGION 5: WEST MIDLANDS

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

**Bromsgrove & District ARC**  
John, G4OJS, 0788 967 8303  
6, 13, 20, 27 Club night  
7 Foundation/Intermediate exam

The next deadlines are 21 September, 26 October and 23 November.  
Send your news, dairy dates and photos to radcom@rsgb.org.uk  
and see tinyurl.com/radcompix for hints on taking good photos



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## Coventry ARS

John, G8SEQ, 0795 877 7363

- 2, 9, 16, 23, 30 Net, 8pm, 145.375MHz FM and/or 7.16MHz SSB ± QRM
- 5, 12, 19, 26 Net, 8pm, 50.175MHz SSB
- 13 AGM
- 20 Video night
- 21-22 JOTA at 1st Bulkington Scout HQ
- 27 Radio workshop

## Gloucester AR&ES

Anne, 2E1GKY, 01242 699 595 daytime

- 2 Batteries, Vernon Morris, GOHTO
- 4, 11, 18, 25 Club net, 7.30pm, 145.475MHz FM
- 5, 12, 19, 26, 31 Club net, 7.30pm, 145.475MHz, moving to 80m SSB
- 6 Club net, 7.30pm, 432.220MHz USB
- 9, 16, 30 Informal and general operating
- 23 No meeting (school closed)

## Midland ARS

Norman, G8BHE, 0780 807 8003

- 4 Open meeting, shack on the air & training
- 11 Committee meeting 7.15pm and training after
- 13-15 RSGB Convention at Milton Keynes
- 18 Club AGM 7.30pm prompt
- 25 General meeting and training

## Mid-Warwickshire ARS

Don, G4CYG, 01926 424 465

- 10 Homebrew and construction
- 24 Programme planning for 2018

## Salop ARS

salopamateurradio@gmail.com

- 5 Natter night / committee meeting
- 12 Shack night, G3SRT on the air
- 19 Pre-AGM discussion
- 26 AGM

## Solihull ARS

SolihullRadioClub@gmail.com

- 5, 12, 26 Club net on or around 145.450MHz, 8pm
- 19 AGM
- 21 JOTA

## South Birmingham RS

Gemma, M6GKG, gemmagordon.m6gkg@gmail.com

- 2, 9 16 Work in the shack/sorting stock
- 3, 10, 17, 24, 31 Shack coffee morning, 11am-1pm
- 5, 12, 19, 26 Training classes with G8OWL
- 6, 13 Checking equipment for Field Day
- 14 Club visit to RSGB Convention
- 23 Pre-AGM review

## Stratford upon Avon & District ARS

Clive, G0CHO, 01608 664 488

- 2, 16, 30 Club net, 145.275MHz FM
- 9 Antenna workshop, G1EIX & G0CHO
- 23 Satellites, Keith, G8FRS

## Sutton Coldfield ARS

Robert Bird, rob2e0zap@gmail.com

- 2, 16, 30 Open net, 7.30pm, 145.250MHz
- 9, 23 Club meeting
- 10 Open net, 7.30pm, 70.475MHz FM
- 24 DMR open net, 7.30pm, gb7fw slot/local2

## Telford & District ARS

John, MOJZH, 0782 473 7716

- 4 Committee meeting, GX3ZME OTA
- 11 Equipment sale
- 18 Arduinos for beginners
- 25 Soup and roll social evening

## Wythall Radio Club

Chris, G0EYO, 0771 041 2819

- 1, 8, 15, 22, 29 Club net, 145.225MHz or GB3WL, 8pm
- 3 Morse class then free and easy
- 10 Morse class then committee meeting

17 Morse class then LF talk, Dave, G3YXM

24 3-15 show

30 Curry night

31 Morse class then prep for Club Calls

## REGION 6: NORTH WALES

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

### Dragon ARC

John, MW0JWP, on 0751 503 1025

- 2 Chairman's dinner
- 16 Introduction to WSPR, John, MW0JW

### North Wales Radio Society

Liz, GWOETU, 0776 019 0355

- 5 General meeting
- 12 Technical topic
- 19 SOTA talk, David, GW8NZN
- 26 On the air

### Wrexham ARS

Eifion Parry, mw6eyu@gmail.com

- 3 Talk by Mark Harper, MW0MDH
- 10 Txt night
- 21 GB1BSW from Brymbo Heritage, Wrexham
- 24 Tx Factor night

## REGION 7: SOUTH WALES

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

### Aberystwyth & District ARS

Ray, GW7AGG, 01970 611 853

- 12 AGM

## REGION 9: LONDON & THAMES VALLEY

Regional Manager: Tom O'Reilly, G0NSY  
RM9@rsgb.org.uk

### Aylesbury Vale RS

vic@rakewell.com

- 10 Discussion evening

### Bracknell ARC

David, MOXDF, MOXDF@Alphadene.co.uk

- 4, 18, 25 Open net, 8pm, 145.375MHz
- 11 Hernia Cup

### Edgware & District RS

Mike, G4RNW, 02089 500 658

- 12 Club archives evening
- 26 Medium Wave in the '80s, Steve, GOPQB

### Harwell ARS

John, G6LNU, 01235 223 250

- 12 Digimodes, G0UGO

### Newbury & District ARS

Rob, G4LMW, 0797 088 5614

- 25 RAYNET, Denis, G4KWT

### Radio Society of Harrow

Linda, G7RJL, lcasey100@outlook.com

- 1, 8, 15, 22, 29 Net, 12 noon, 1938kHz LSB
- 2, 9, 16, 23, 30 Net, 8.15pm, 145.500/145.350MHz FM
- 6 Underground comms, Rob, G8DSU
- 27 Jerry Stone
- 29 Outdoor event, 2-5pm, Old Redding car park

### Reading & District ARC

Laurence, G2DD, 0758 470 6625

- 12 Low cost mechanical audio filter from Screwfix, G2NF
- 19 STFC Chilbolton Observatory visit, M1ELK

26 Autumn junk sale

### Shefford & District ARS

John Burnett, john@hobart-europe.co.uk

- 5 Prep for CQWW
- 12 Talk on RAE Bedford
- 19 Autumn junk sale
- 28-20 CQWW

### Southgate ARC

Keith, G8RPA, g8rpa@arri.net

- 11 Planning meeting

### Verulam ARC

Greg, M0PPG, 01582 413 345

- 12 Social with GB3VH Repeater Group
- 17 RSGB talk/visit

## REGION 10: SOUTH & SOUTH EAST

REGIONAL MANAGER: MICHAEL SENIOR, G4EFO  
RM10@rsgb.org.uk

### Bromley & District ARS

Andy, G4WGW, 01689 878 089

- 4, 11, 17, 25 Club net, 9pm, 145.500MHz (and QSY)
- 8 Foundation course day 2 (and exam)
- 17 Club meeting and skills night

### Coulsdon ATS

Andy, G0KZT, secretary@catsradio.org

- 9 Swimming pool maintenance, David, G6VMI

### Crawley ARC

Richard, G3ZIY, 01342 843 545

- 25 How the internet works, Stewart, G3YSX

### Cray Valley RS

Dave, G8ZZK, 0773 954 9822

- 5 Radio astronomy talk
- 19 Old fashioned junk sale

### Crystal Palace R&EC

Bob, G30OU, 01737 552 170

- 1 Antenna modelling, G3WRR, visitors welcome
- 6 SDR without maths, Alan, G0TLK

### Dorking & District RS

David, M6DJB, djb.abraxas@btinternet.com

- 24 Rise and fall of amateur radio, David, MOSXD

### Dover RC

Aaron, 2E0FQR, 0771 465 4267

- 12 QRP presentation, Tony Fishpool
- 21-22 Railways on the Air

### Hastings E&RC

Gordon, 01424 431 909

- 25 On air operating and chat

### Hilderstone R&EC

Ian, 2E0DUE, secretary@g0hrs.org

- 12, 26 Club night

### Horndean & District ARC

Stuart, G0FYX, 02392 472 846,

- www.hdarc.co.uk
- 6 Natter night/social evening
- 20 AGM

### Horsham ARC

Alistair, G3ZBU, 0785 526 8666

- 5 Junk sale
- 19 Social at The Chequers, Rowhook

### Mid-Sussex ARS

Dennis, MOYDC, 0747 630 1044

- 6 Aviation, Richard
- 13 AGM
- 20 Radio night and table top sale
- 27 On the air



#### Southdown ARS

**John, G3DQY, 01424 424 319**

- 2 EMC and LED lights, Peter Metcalfe
- 4 Hailsham shack meeting, 10.30am
- 4, 11, 18, 25 Net, 8.30am, 145.275MHz; cafe meeting, 12.30pm; CW net, 7pm, 144.060MHz

#### Surrey Radio Contact Club

**John, G3MCX, 020 8688 3322**

- 1, 8, 15, 22, 29 Net 1905kHz, 9.30am
- 2 Surplus Equipment Sale.
- 5, 12, 19, 26 Net 70.300MHz, 8pm
- 6, 13, 20, 27 Net 145.350MHz, 8pm
- 16 Chat and Fix-it, John, G8MNY

#### Worthing & District ARC

**Al, M00AL, information@wadarc.org.uk**

- 1 Breakfast meeting, 9am
- 4 AGM
- 11 Lecture
- 18 Junk sale
- 25 Practical evening or workshop demonstration

### REGION 11: SOUTH WEST & CHANNEL ISLES

**Regional Manager: Pam Helliwell, G7SME  
RM11@rsgb.org.uk**

#### Appledore & District ARC

**Alan, M6CCH, 01237 422 833**  
16 Clansman radio, Chris, G0FJY

#### Bristol RSGB Group

**Shaun, G8VPG, 01225 873 098**  
30 Big Data, Professor Chris Budd, G4NBB

#### Burnham on Sea ARC

**Charles, G0SKA, 01753 647 101**  
2 Transmitter design & technical issues, G4AUC  
16 Construction evening

#### Cornish Radio Amateur Club

**Steve, G7VOH, 01209 844 939**  
4 Committee meeting  
5 Main meeting  
15 Social evening

#### Gordano Amateur Radio Group

**Malcolm, G4KPM, info@g4kpm.co.uk**  
25 Club meeting

#### Mid-Somerset ARC

**David Edwards, G8BFV, 01749 670 085**  
9 AGM and Tx Factor

#### North Bristol ARC

**Mat, G7FBD, g7fbd@gb3bs.com**  
6 Relax, chat, operating & training  
13 Video evening, relax & chat  
20 Relax, chat, prep for JOTA  
27 Software Defined Radio talk

#### Plymouth Radio Club

**David, 2E0DTC, d.beck123@btinternet.com**  
10 Club night

#### Saltash & District ARC

**Mark, M0WMB, 0781 054 8445**  
5, 19 Club night, all welcome

#### South Bristol ARC

**Andrew Jenner, G7KNA, 0783 869 5471**  
5 Committee meeting  
12 Calendar for 2018  
19 AGM  
26 Open house and on air night

#### Torbay ARC

**John, g4vud@tars.org.uk**  
6, 20, 27 Club night  
13 Club night with business meeting

#### Weston Super Mare RS

**Martin, G7UWI, 01934 613 094**  
2, 9, 23, 30 Construction, operating & natter  
16 Talk on the RNLI

#### Yeovil ARC

**Rodney, M0RGE, 01935 825 791**  
5 Coax and SWR, G3MYM  
6, 20, 21 Construction and on-air  
19 Morse Practice with G3MYM  
21 71st Anniversary Day at Sparkford  
26 On the air and problem solving

**John, g4vud@tars.org.uk**

- 1, 15, 22, 29 Club night
- 8 Club night with business meeting

#### Weston Super Mare RS

**Martin, G7UWI, 01934 613 094**  
3 DF hunt  
4, 11, 25 Construction, operating, natter night  
17 Rally at WSM campus  
18 Main meeting, rally discussion

#### Yeovil ARC

**Rodney, M0RGE, 01935 825 791**  
1, 15 Construction and on the air, Sparkford  
2 Intermediate course at Davis Hall  
7 Amateur radio activities, G3MYM  
21 Morse practice, G3MYM  
28 Problem solving and committee meeting

### REGION 12: EAST & EAST ANGLIA

**Regional Manager: Keith Haynes, G3WRO  
RM12@rsgb.org.uk**

#### Braintree & District ARC

**Edwin, G0LPO, 01376 324 031**  
3, 17, 31 Club net, 8pm, 145.375MHz  
10 JOTA planning  
24 TX Factor 15

#### Bury St Edmunds ARC

**g3lpt@btinternet.com, 01359 259 518**  
18 Talk on FreeDV digital voice codec

#### Chelmsford ARC

**secretary@g0mwt.org.uk**  
3 AGM and awards  
16 Skills night at Danbury Village Hall

#### Colchester Radio Amateurs

**Tony, 2E0FTQ, 0783 177 4669**  
19 AGM

#### Essex Ham

**Pete, M0PSX, news@essexham.co.uk**  
2 Online Foundation course  
2, 9, 16, 23, 30 Net, 8pm, GB3DA, www.essexham.net  
7 Essex YL net, 8pm, GB3DA,

#### Felixstowe & District ARC

**Paul, G4YQC, pjw@btinternet.com**  
9 Supper, Saigon, Felixstowe  
23 Worked all FDARS competition

#### Loughton & Epping Forest ARC

**Dave, M0MBD, 0798 016 5172**  
5, 12, 19, 26 Net, 8pm, 144.725MHz  
13, 27 Club night  
28 Intermediate practical assessment and exam

#### Norfolk ARC

**Chris, G0DWV, 01603 898 308**  
4 The radio in radio astronomy, Elias Brinks  
11 Table top sale  
18 EZNEC antenna modelling, Quin, G3WRR  
25, 28 Informal, Bright Sparks

#### Norfolk Coast ARC

**Steve, G3PND, info@norfolkcoastamateurs.co.uk**  
5 Meteor scatter  
12 Contests  
19 JOTA  
26 Talk on 6m

#### Peterborough & District ARC

**Alan Ralph, secretary@padarc.co.uk**  
2, 9, 16, 23, 30 Net, 1.980MHz  
3, 17 Net, 145.400MHz  
25 CW without a radio, Tony, G0IAG

#### South Essex ARC

**Terry, G1FBW, 0798 607 0040**  
10 Talk with Vic, Deputy Regional Manager RSGB

#### Thurrock Acorns ARC

**Gordon, M0WJL, acorns@taarc.co.uk**  
3 2m SSTV open net, 7.30-8.30pm  
5, 12, 19, 26 2m FM open net, 7.30-8.30pm  
17 Club meeting and on the air

### REGION 13: EAST MIDLANDS

**Regional Manager: Jim Stevenson, G0EJQ  
RM13@rsgb.org.uk**

#### Leicester RS

**Sandra, G0MCV, 0793 027 4044**  
2, 9 Informal / committee meeting  
16 Bingo night  
23 On the air  
26 Drop in for a cuppa noon-5pm  
30 Project night

#### Lincoln Short-Wave Club

**Pam Rose, G4STO, 01427 788 356, pamelagrose@tiscali.co.uk**  
4 Nibble and natter night  
5, 19 Club net, 8pm, GB3LM/GB3LS  
7, 14, 21, 28 Open shack 9am  
11 Basic First Aid training  
12, 26 Club net, 8pm, 145.375MHz  
16, 18 Committee / formal meeting  
25 Used equipment sale

#### Loughborough & District ARC

**Chris, G1ETZ, 01509 504 319**  
3 AGM, 8pm prompt  
10 On air from club  
17 Magazine & book review  
24 TX Factor video  
31 Practical evening

#### Melton Mowbray ARS

**Phil, G4LWB, 01664 567 972**  
20 Marking club's 60th year

#### South Kesteven ARS

**Andrew, M0NRD, 0796 906 2859**  
4, 11, 18, 25 Club net via GB3GR  
6, 20 Club meeting

#### South Normanton Alfreton & DARC

**A Lawrence, 2E0BQS, 01246 456 625**  
2 Talk  
9, 30 Natter night  
23 Junk sale

#### Welland Valley ARS

**Peter, G4XEX, 01858 432 105**  
2 SSTV net, 8pm, 144.550MHz FM  
16 HF DXing, Pete, G4XEX

## REGION 2: SCOTLAND NORTH & NORTHERN ISLES

The longest serving president of Aberdeen ARS, Ian Fraser, GM8MHU, passed away on 2 August 2017, after a long illness. He will be much missed by all club members and the wider amateur radio community. For a number of years Ian had

been the RSGB newsreader on HF for the North East of Scotland and made many friends on the air after the broadcast was complete. The club wishes to express their sincere condolences to Ian's wife, Margaret, and family.

## REGION 3: NORTH WEST

**Wirral ARS** has moved to a new location at Unit 17 Peninsula Business Park, Squibb Drive (off Reeds Lane), Moreton, Wirral CH46 1DW. Over the last six months, club members have transformed part of a disused warehouse into their new club room with a purpose-built shack, workshop, test area, kitchen, toilets and a lounge/presentation area. The last stage is to install the 80' Strumech mast and all the antennas. The club is open on Tuesday, Wednesday and Thursday from 7-10.30pm. <http://g3nwr.org.uk/>



At a Furness ARS meeting, Chris, M0KPW and Nick, G0HIK gave a talk and presentation on their building of short boom, 2 element 6m Yagi antennas. They covered theory and construction methods. Following the presentation, one of the antennas was set up outside in the hope of working some late season QSOs. Unfortunately the band was not open, but the antenna was tested on a host of analysers that showed less than 1.1 SWR and an impedance of exactly 50Ω. A number of club members are planning on building the antenna ready for next year's 6m season.



Stockport RS recently hosted two aviation-focused special event stations, GBOXWB and GBOAHM. The former, held at the Manchester Aviation & Transport Fair, celebrated the recent commencement of passenger services to Manchester of the new Airbus A350-900XWB airliner. The other, at the Avro Air Fair, commemorated the renowned aircraft manufacturer AV Roe, which built the Lancaster and the Vulcan. After many weeks of painstaking restoration, John, 2E0GCX had a Lancaster Bomber radio receiver R1155 up and running again. He also built a dedicated PSU with internal speaker and volume control so it could be taken to special events. Numerous visitors were attracted to the stand.

## REGION 4: NORTH EAST

**RAFARS** had a stand at the annual Hull Veterans Weekend that celebrates the UK's armed forces. As usual the stand attracted a steady flow of visitors interested in seeing old equipment as well as seeing and hearing the RAFARS station on the air. The RAFARS members were once again supported by members of Hull & District ARS.

**York ARC** would like to invite any amateurs, in the York area, who would be interested in getting together on a regular basis with like minded people. They meet every Thursday at 8pm at The Bishopthorpe Sports & Social Club, 12 Main St, Bishopthorpe YO23 2RB. [www.facebook.com/YorkAmateurRadioClub/](http://www.facebook.com/YorkAmateurRadioClub/)

Finningley ARS hosted the UKuWG's Microwave Roundtable in July that was well attended by microwave enthusiasts from far and wide, plus international guests. Talks were given on various technical topics, there was a test lab and microwave kit demonstrations. The annual rally, also in July, brought its own problems and the club would like to thank everyone for their patience. The photo (right) shows G4HJW operating on nanowaves across the grounds.



## REGION 5: WEST MIDLANDS

Gloucestershire County RAYNET team were on duty over the weekend of RIAT. RAYNET has provided the back up communications for the County Council emergency planning team for many years, operating a backbone link from RAF Fairford to their control centre in Gloucester, and to outlying rest centres which may need to be activated. As usual they enjoyed a spectacular, and somewhat deafening, view of the displays above the location on the non public side of the runway. Paul, 2E0ITU took the rather appropriate photo of GOWXT, GOAZD, MOVNG and M6DLV at the end of the weekend.





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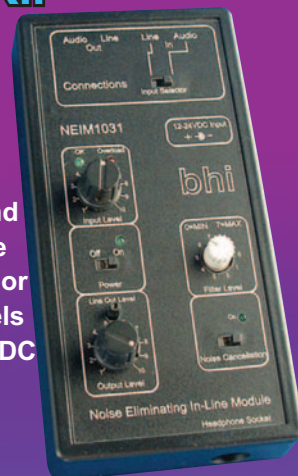
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## REGION 6: NORTH WALES

Wrexham ARS would like to congratulate Simon Gordon on passing his Advanced exam. He is now MWOXAD. Congratulations also to Thomas Cording on passing his Intermediate exam; his new callsign is 2W00GT.

## REGION 8: NORTHERN IRELAND



Antrim & District ARS held its second field day event at Antrim Boat Club on the shores of Lough Neagh in August. It was a great success despite operating conditions not being as good as one would like. Activities included kite flying, SSB operation on 40m and 20m. There was also QRP activity with QSO contact to Italy and with inter-G stations. Perhaps the highlight was a CW demonstration with many contacts logged, the furthest being in the USA.



Bangor & District ARS held its 50th rally in Donaghadee. They were delighted to have had RSGBs President Nick Henwood, G3RWF and RadCom author Ian White, GM4SEK in attendance with Richard White, G14DOH.



## REGION 10: SOUTH & SOUTH EAST

Farnborough & District RS had a talk by Colin Lewis who is a member of the National Coast Institution, a volunteer organisation who keep a visual watch along UK shores. Currently 50 NCI stations are operational and manned by 2000 volunteers. Accompanying Colin was Phil, G6LDJ a volunteer and his wife. In August, Neil, G7PWA gave a talk on Software Defined Radio Dongles and what can be achieved using a small USB stick and a simple antenna.

## REGION 9: LONDON & THAMES VALLEY

In August Verulam ARC held a 'Fox Hunt'. Seven teams gathered at the start point, displaying a wide range of designs of hand held antennas for use on 2m. Each team was given a sealed envelope with details of the Fox's location before setting off by car. By the end of the evening six of the seven teams had located the Fox and presented their sealed instructions as proof they had not looked.



Waterside New Forest RC members were able to dodge the rain showers for their traditional HF Picnic in the beautiful New Forest. In the morning, Tim, G4YVY and Tony, G6MNL collected the tent and aerial, Bob, 2E0CZK collected the aerial poles and all was transported to Yew Tree Heath, where Robin, G00SG helped them to assemble the station. A transceiver was set up in the club tent, and a portable station nearby. Several contacts were made on 40m and 20m during the day, in spite of imperfect RF conditions. Light refreshments were served by the ladies. All thought the HF Picnic had been a very satisfactory event.



## REGION 11: SOUTH WEST & CHANNEL ISLES

Christian, DL7AYD visited **Torbay ARS** whilst holidaying with his wife, Cristin. He gave a very detailed presentation on VHF Propagation. It's a wonder that we receive any signal at all when all losses are taken into consideration. When you start going into this seriously, the height of the transmitter is very important and if the receiving station is high this also can make a difference. Christian highlighted that for the same signal strength on Earth, signals can be transmitted from space over many thousands of miles because they have a clear path. A very interesting talk enjoyed by the 36 or so members.

## REGION 12: EAST & EAST ANGLIA

In August, Pete, MOPSX gave **Thurrock Acorns ARC** a talk looking behind the scenes at a broadcast radio station, explaining how radio shows are put together. Pete also presented a summary of the Ofcom Monitoring Station at Baldock.

**Norfolk Coast ARS** ran three stations from their club shack during the IOTA contest. Each member operated using their own callsign. There was an element of rivalry between the SSB and CW operators to see who could have the most contacts within their allotted time.

**South Essex ARS** recently celebrated its 35th anniversary in style at its venue in Thundersley. As well as a cake cutting ceremony, there was an opportunity to tune in to the ARISS contact being made at Gilwell Park for YOTA 2017.



A small group of Essex Hams visited the Medway ARTS field event in August. Dorothy, MOLMR and Jane, M6OFM took to the air to make contact with amateurs in Essex and Kent.

July closed with Peterborough & DARC holding its annual Summer Camp and radio experimenting weekend at Sacrewell Mill camping park. The aim of the weekend was to allow club members to test radios on established antennas or test antennas. The club TS-590SG was available for use plus a dual band mobile, both were used under the club callsigns of GX4EHW and M1PRC respectively. Peter, G6AYU set up a slow scan TV station using a homebrew vertical was able to down load some signals onto his laptop. Tony, G0IAG used a Clansman 320 to make contacts to the continent on a whip antenna. Thanks go to the Management of Sacrewell Mill for the use of their land. At Baston In The Blitz, GB0BIB was on the air using a Clansman PRC 320 manpack radios operating on HF. Two Clansman 320s were set up as base radios using their own 24 volt batteries for power. One was on 14MHz and the other on 21MHz. Club members spent most of their time explaining about the radios and the hobby.



GB2MFM was on the air at the Military Flying Machines Show, operated by Thames ARG. Positioned right by the entrance, the tables had the radio operating controls facing the crowd, which helped with people intrigued by what all the buttons do. Thanks to John, 2EOLFX, Norman, M0FZW and Nigel, M0ICH who represented the club over two days in blazing sun. TARG produced specially designed leaflets for the show aimed at people with military equipment, with a view to encouraging them to sign up for a training course to obtain their licence. The Morse key went down really well, perhaps as it was a military show.

**Bury St Edmunds ARS** operated the club station for Rougham Tower's Echoes of the Past event. Melvin, M0IID had the opportunity to use his new licence on HF for the first time

Following a 4 week training course four members of the **Lowestoft District & Pye ARC** all passed the Foundation exam. Congratulations to Richard Stone, Bev Arthrell, Bill Holden, Jeff Loveland and a big thank you to Carl Leake for his time and effort teaching the course.

**King's Lynn ARC** ran thier first Intermediate course for seven members and thanks to Olly, M00LY, Peter, G0IJU and all the work put in by the candidates they all passed. Kevin, now 2E0KKM, has already started helping new, unlicensed members with their Foundation training. L-R Ben, 2E0TKK, Sarah, 2E0NRX, George, 2E0EKK, Kevin, 2E0KKM, Jack, 2E0HSP and at the front Karen, 2E0TPK. Unfortunately Bob, 2E0GIE, was not able to make it that evening.



Loughton & Epping Forest RS has continued its successful training program with the 30th Intermediate course and exam. Four Candidates attended, three of which: Ken Bryant, Paul, M6PMX and William, M6JOI sat the exam and (indicatively) passed. The construction project was a small Vellman Signal Generator kit, which the candidates took home with them afterwards. The course was led by John, G8DZH, assisted by Derek, M0XDC, Ron, G6LTT, Marc, G0TOC with Dave Comer providing refreshments and exam invigilation. Photo by G8DZH.

## REGION 13: EAST MIDLANDS

**Lincoln SWC** held another successful Foundation course in August when all five candidates passed the examination. Congratulations to Callum Thompson, Alan Middleton, Matthew Burton, Celia Meanwell and Frank Barker. Club members spent a week on the Lincolnshire Showground with 5000+ Scouts and Guides, from 25 different countries, helping over 160 of them helping them get their Communications badge. The club, with help from **RAF Waddington ARC**, set up an amateur radio station where visitors could send greetings messages. An enjoyable time was had by all club members taking part, including those at 'the other end of the microphone' speaking to the Scouts and Guides.



## For Sale

### FIBREGLASS TUBE

High strength tube, square box, rod, and other sections stocked in 6m lengths, can be cut. Engineered Composites, Chester. Tel: 01244 676000 e. [info@engineered-composites.co.uk](mailto:info@engineered-composites.co.uk) [www.engineered-composites.co.uk](http://www.engineered-composites.co.uk)

### SINOTEL UK - AUTHORISED UK

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## Equipment

### REPAIRS TO RECEIVERS, TRANSMITTERS

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### RADIO REPAIRS BY MONKL

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## Computer Software

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## Aerials

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### HAMTENNA UK

Manufacturers of Antennas, Baluns, Ununs and suppliers of antenna wire and accessories. Checkout [www.Hamtenna.co.uk](http://www.Hamtenna.co.uk)

## Wanted

### VINTAGE RADIO & VALVES WANTED

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## Advertisers Index

bhi Ltd	89
Goodwinch Ltd	25
Hammond Enclosures	25
ICOM UK Ltd	85
JVC Kenwood	67
KMK Ltd	72
LAM Communications	99
Martin Lynch & Sons	2, 3, 4, 49, 50 51, 52, 53, 90, 100
Moonraker	20, 21, 61
Nevada	38, 39
Peak Electronics	72
Radioworld	64, 65
RFinder	82
RF Parts Company	72
RT Systems Inc	82
RSGB	9, 11, 27, 43, 45, 78, 79
SDR kits	89
SDRplay	87
SOTAbeams	25
TowerMate Ltd	72
Upshot UK Ltd	72
Waters & Stanton	33, 34, 35, 36, 37
Yaesu UK Ltd	19

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## FOR SALE

**2 LENGTHS ALUMINIUM** scaffold pole, 4 x 5m x 50mm aluminium tube, 1 x 5m x 45mm aluminium tube. Some swaged tube, two 50mm jointing sleeves, folding ground spike. 6m halo antenna. Wall brackets and other ironmongery. I am moving and can't take this stuff with me so please take all or nothing. GOCHK, 0771 734 3036 (West Sussex).

**ACOM 1000 1kW HF LINEAR AMPLIFIER** plus unused spare GU74B valve. Bought new by me from Ron Vine. Mint condition. Never actually pressed into service but dummy load tested every 6 months. Includes a black vinyl cover. £1400 OVNO. Paul, MOCVX, 01522 532 727, paulbradbeer@paulbradbeer.plus.com (Lincoln).

**AMERITRON ALS-600X HF linear amp.** 160-10m, FET o/p. Exc cond inside and out, in regular use, genuine reason for sale, non smoker, with manual, boxed, £795. Prefer buyer collects, will send at cost; heavy. Bob, G8BCA, 01638 714 051, g8bca@talktalk.net (Mildenhall, Suffolk).



**DIGIMESS 10MHz** single channel oscilloscope compete with leads and manual. As new, £60. Mr A M Lifton, GOPEH, 0775 156 5429, tonygOpeh@btinternet.com.uk (Kent).

**DRAKE TR7, PS7, RV7.** Used as monitor RX. Covers Top Band to 10m including WARC. Needs TLC, £200 ono. ETM 9C with Schuur Paddle (internal), £175 ono. SPC Super Transmatch 1500W, £180 ono. Buyer collects. Brian, G4GIM, 01905 354 727, migferg@talktalk.net (Worcester).

**FLEX 6300 SDR** with Z11 pro tuner, hand mike 2 base mics, Flex controller, a pair of powered speakers – all the bits you need. The Flex is in great condition and works well. Will consider a swap for an Icom IC-9100 or sell for £1800. David, 2EORVV, 0787 505 6588, davidkemp1950@outlook.com (Newark Notts).

**FT-990AC**, £595. FT-450D, £425. FT8-100R, £140. FT-290R MK2, £225. FT-840, £325. FT-817ND, £400. All mint and boxed. IC-761, £425. IC-737A, £325. IC-R7000, £290. IC-R7100, £365. IC-2720H, £120. FT-8100R, £95. SP6, £75. SP20, £95. SP8, £95. SP2000, £100. All A1, boxed. GONMP, 0778 546 2445 (Norfolk).

**FT-991 HF / VHF / UHF** transceiver, mint condition, hardly used, 5 months old, £825 ONO. Kenwood TS-590SG, mint condition, little use, £825 ONO. Both with original packaging and accessories etc. Capco 3kW ATU module in HB case, £125. G4GZS, 0785 991 7317, keith4gzs@hotmail.co.uk (Rugby).

**RGS-232B ROTATOR CONTROLLER INTERFACE.** Mint cond. USB computer controller for most Yaesu rotators (G-800/1000/2800DXA/C). Works with HRD, N1MM, PstRotator etc. £47 – will post within UK for free. Contact me for more info. Arthur Loukes, MOJZG, 0781 720 2628, arthurloukes@gmail.com (Sheffield).



**HOLIMAST.** Will need attention. Sensible offers please. Cash on collection or other payment by prior arrangement. Mike Nicholas, G3TOI, mikenicholas888@btinternet.com (Bournemouth).



**HOUSE SALE** complete with planning permission for full roof height Versatower type mast (current mast only recently removed). This four bed detached house in Altham Grove Harlow is in need of modernisation but expecting offers over £320,000. This is a silent key sale for the estate of G3RSP. Details on 01376 584 661 or email dave.c.thompson@btinternet.com.

**J-BEAM V-3** trap vertical antenna for 20, 15 and 10m. Total length 4.1m. Good condition, been in dry storage since 1993. C/W 4 radials, £75. Buyer collects please or can deliver 25-mile radius of Cambridge. Steve, G4FOH, 01763 838 936 (Essex/Cambs border).



**KENWOOD TS-2000** S/N 70400008. Good condition with only slight rub to casing top left. Lead, manual, box and VS3 voice chip. Backup, so little used. Very smart, fully operational. OIRO £850, inspect and collect. Kelvin Marsh, MOAID, 0787 814 1527 (Somerset).

**KENWOOD TS-570D.** VGC, £350. NO OFFERS. Kenwood desk mice MC60, £80 OVNO, hardly used. Signalink USB, £80 OVNO. I Barber, M6IBC, 01502 567 199, ibarber1@yahoo.com (Lowestoft).

**KENWOOD TS-590 SG**, mint with SP23, used only as receiver, £795. AOR AR 8600 Mk 2 with PSU, mint, £375. Icom R8500, £675. Yaesu FT-817D, mint, with soft case, £375. Wonder Wand, £80. All with original packaging etc. Anthony Ryan, G6XYZ, 01949 211 15, anthonyfryan8@gmail.com (Nottinghamshire).

**MP2000MK5**, all filters, £800. MP1000 + filters, £500. Acom 1010 amp, £800. 25A PSU, £40 30A PSU £50. Icom IC-746, £300. Many other items. GW3NAS, 01545 581 108, gw3naskeith@gmail.com (Ceredigion).

**YAESU FT-2900E** rugged 2m mobile transceiver. 3 power levels up to 75 watts. Light use. Mint condition, £80. MFJ-993B Auto Tuner 1.8-30MHz, 300W. Cross needle and bar displays. Mild use and nice clean condition. Many other features. £140. David, 2E1CIK, 01904 863 239 (York).

**YAESU FT-857** transceiver in unmarked, excellent cosmetic condition and in perfect working order (serial no starts 3i – it's the model with DSP). It comes with its original Yaesu mic and its original power lead. I don't have its box or manual. £410 ONO. Lyn, GW8JLY, 0780 673 3334 (Cardiff).



**YAESU FT-450D** HF/6m transceiver with built-in ATU, DSP. Excellent condition, non-smoking home, all original packaging, paperwork, accessories. Includes optional carrying handle, extra mic (non-Yaesu), power lead. Tx expanded by dealer. £420, strictly no offers. Prefer buyer collects or carriage extra. Mark Palmer, G0OIW, 0118 948 3593, g0oiw@qsl.net (Berkshire).

**YAESU MD100** base microphone £75. Hytera MD785 UHF DMR radio, £350, manual and programming cable. Phil Manning, G1LKJ, 0781 086 3354, pad.manning@gmail.com (Hants).



**YAESU FRG-8800 RECEIVER.** Covers 150kHz to 29.999MHz and includes the optional VHF converter (118MHz to 174MHz). AM, FM, SSB and CW. Very good condition, original box, manual and sales leaflet. Pickup or delivery to be agreed. £250. Chris, G3ZJK, 01788 810 535, chrisjim@runbox.com (Rugby).

**YAESU VX3** hand held transceiver, c/w spare battery, all new and never used, £125 inc UK mainland delivery. Dave. G1LNA, 01209 717 261 (Cornwall).

## WANTED

**10.7MHz SSB CRYSTAL FILTER** around 2.7kHz BW. I/O impedance not important but would be nice to know. Other centre frequencies would be considered. Rob Macfie, G4FAX, 0771 308 4244, rob.macfie@gmail.com (Luton).

**COLLINS KWM-2A**, late model, preferably with power pack, for my own use. If you have one of these and would be willing to part with it please contact me. Can collect SW otherwise I can arrange packaging and collection. Philip, MOPAE, 0771 170 3959, papa.echo@macace.net. (Cornwall).

**DEAD YAESU FL2100Z** for spares, or more specifically the top and bottom case from a non working FL200Z linear. Mike, GMOPHW, 07722 929 757, gm0phw@hamcall.co.uk (Shotts).

**LARGE SATELLITE DISH** for homebrew radio telescope project. Does anybody have a surplus to requirements parabolic reflector? The larger and cheaper the better. Lee Garton, MOLEG, 0795 624 0175, mOleg@outlook.com (Essex).

**MICROPHONE** for Trio/Kenwood TS-9000 or TR-7850 (part T90-0313-05), 6-pin dynamic with up/down buttons. Also seeking SP-150 and BO-9 accessories. Gareth, GM7WFT, 0771 181 2615, gareth@edwardsfamily.org.uk (Edinburgh).

**MONITOR SCREEN.** Glass/CRT, 15-pin (VGA type) connector, 14-16" diagonal, working. Don't throw your old monitor when you upgrade to flat screen! Godfrey, G4GLM, 020 8958 5113, cgmm2@btinternet.com (Edgware).



## HELPLINES

I WOULD LIKE HELP to configure a Dahua SD-59225U-HNI camera and XVR-4104H recorder either by via Teamviewer or with free accommodation in the villa in Javea. Hal, G3NMH, 0844 586 0073 or hal@villa-spain.com.

## RALLIES &amp; 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)**

## 1 OCTOBER

## HACK GREEN HANGAR SALE

Hack Green Secret Nuclear Bunker, French Lane, Nantwich, Cheshire CW5 8AL  
Doors open 10am. Sale of amateur gear, electronic equipment, comps, military radio sets and vehicle spares. Refreshments available on site. Lucy Siebert, 01270 623 353, lucy@hackgreen.co.uk.

## 8 OCTOBER (NEW DATE)

44<sup>th</sup> BLACKWOOD ARS RALLY

Rougmont School, Newport, Gwent NP20 6QB  
Free parking and disabled parking on site. Doors open 10am and entry is £2.50. Trade stands, special interest groups, an RSGB bookstall and a Bring & Buy. Raffle. There are talks and lectures during the day. Catering on site. Mike Rackham, GW4JKV, 01495 226 149, rackhamone@aol.com [www.GW6GW.co.uk].

## 13-15 OCTOBER

## RSGB CONVENTION

Kent's Hill Park Training and Conference Centre, Swallow House, Timbold Drive, Kent's Hill Park, Milton Keynes, Buckinghamshire MK7 6BZ  
The Convention programme of lectures for all interests is on the website. Principal sponsor Martin Lynch & Sons. [www.rsgbevents.org].

## SILENT KEYS

For administrative reasons we have had to delay publication of this month's Silent Keys until next month. We apologise for any inconvenience or distress this might cause.

## Silent Key column entries

To notify the RSGB that a Member has passed away, please email details to [sales@rsgb.org.uk](mailto:sales@rsgb.org.uk) or telephone 01234 832 700 then select option 1. This will ensure that their Membership will be ended properly and that they appear in the Silent Keys list (unless you specify otherwise). We need to know their name, callsign and date of death.

Only former RSGB Members appear in this list. Please note that Ofcom must be informed separately, on 0207 981 3131 – we are not permitted to pass on details on your behalf.

## Obituaries

Obituaries are published at [www.rsgb.org/sk](http://www.rsgb.org/sk). Please send details by email to [sk@rsgb.org.uk](mailto:sk@rsgb.org.uk) and include everything that you would like to appear. All submissions are moderated and may be edited. Obituaries are welcome for any former amateur, irrespective of whether they were ever a Member of the RSGB.

## 15 OCTOBER

## HOLSWORTHY ARC RALLY

Holsworthy Community College, Victoria Hill, Holsworthy, Devon EX22 6JD  
Free car parking on site, disabled access. Trade stands and Bring & Buy. Catering on site. Howard, MOMYB, holsworthyarc@gmail.com.

## 15 OCTOBER

## HORNSEA AMATEUR RADIO RALLY

Floral Hall, 7 The Esplanade, Hornsea HU18 1NQ  
There is car parking at the venue. Doors open at 10am, admission £2, under 14s free. Trade stands, Bring & Buy, special interest groups and an RSGB bookstand. A raffle will take place. There is catering on site. Rick, MOCZR, 01964 533 712, R106221@aol.com.

## 21 OCTOBER

## YEOVIL ARC 71st ANNIVERSARY

Sparkford Village Hall, Sparkford, Nr Yeovil Somerset BA22 7ED  
Free admission. OT 10am. Wheelchair friendly. Also celebrating the 75th anniversary of El Alamein with radios and artefacts from that battle, plus radios from the 1920s onwards, spy sets, Secret Listener radios and more. Light refreshments available. Bob, 01963 440 167, wjh069@gmail.com.

## 21 OCTOBER

## CARRICKFERGUS ARC RALLY

Downshire Community School, Downshire Rd, Carrickfergus BT38 7DA  
Doors open 11am, entry £3. Light refreshments will be available. All will be welcome. Details from Elizabeth Forde, elizabethforde64@yahoo.com.

## 22 OCTOBER

## GALASHIELS RALLY

The Volunteer Hall, Galashiels TD1 3JX  
OT 11.15am (disabled: 11am). Entry £2.50. [http://galaradioclub.co.uk]

5 NOV – West London Radio & Electronics Show

5 NOV – Bush Valley Radio Rally

11 NOV (NEW DATE) – Fog on the Tyne Rally

12 NOV – Great Northern Hamfest **CANCELLED**

18 NOV – RADARS Traditional Radio Rally

19 NOV – Plymouth Radio Club Radio Rally

19 NOV – 40th CATS Electronics Radio Bazaar

26 NOV – Bishop Auckland RAC Rally

14 JAN 2018 – Red Rose Winter Rally

15 APR 2018 – W London Radio & Electronics Show

10 JUN 2018 – Junction 28 Radio Rally

24 JUN 2018 – 15th West of England Radio Rally

4 NOV 2018 – W London Radio & Electronics Show

## SPECIAL EVENT STATIONS

These callsigns are valid for use from the date given, but the period of operation may vary from 1-28 days before or after the event date. Details published here were kindly provided by Ofcom on 4 September 2017

Start	Callsign	Name	Location
01/10	GB4RAF	Boscombe Down Collection	Salisbury
04/10	GBOTSS	Twelfth Swinton Scouts	Swinton
07/10	GB6CRI	Caerphilly Rhymney Islwyn	Newport
07/10	GB6BBS	Barnet Borough Scouts	Barnet
09/10	GB50PA	ASE	Blaenau Ffestiniog
10/10	GB4SL	Space Lectures	Pontefract
11/10	GB2YMR	Yorkshire Moors Railway	Pickering, N Yorkshire
13/10	GB2WLS	West Lothian Scouts	Torphichen, W Lothian
15/10	GB0NSX	Neville's Cross Scouts	Durham
16/10	GB4CKS	Collingham Kingfishers Scouts	Collingham
17/10	GB2COS	Chester Oldfield Scouts	Chester
19/10	GB2CP	Crays Pond	Reading
19/10	GB2WLS	West Lothian Scouts	Torphichen, W Lothian
19/10	GB2WSG	2nd Wellington Scout Group	Telford
19/10	GB0HS	Hatherley Scouts	Cheltenham
19/10	GB6OLS	Operating Lincoln District Scouts	Sudbrooke
19/10	GB4KLS	King's Lynn Scouts	King's Lynn
19/10	GB2HWC	Hampshire Winter Camp	Shedfield
20/10	GB2FCS	Footscray Cub Scouts	Sidcup
20/10	GB0TDS	TDS	Grays Thurrock
20/10	GB0NFB	Ninety-First Bristol Scout Group	Bristol
20/10	GB1FMS	Foxtrot Mike Sierra	Bowburn
20/10	GB2CUB	JOTA CUB Groups	Bromsgrove
20/10	GB1CUB	CUB	Bromsgrove
20/10	GB5HSG	Hardingstone Scout Group	Hardingstone

Start	Callsign	Name	Location
20/10	GB2RSC	Radio Scouting Chesterfield	Chesterfield
20/10	GB0DBS	Dalgety Bay Scouts	Kirkcaldy
20/10	GB2FGS	ASE	Garstang
20/10	GB0WHT	Wilson House Scout Troop JOTA	Crewe
20/10	GB2PS	Second Patchway Scouts	Bristol
20/10	GB0PSJ	Peterborough Scouts Jamboree	Peterborough
20/10	GB4RG	Fourth Royal Greenwich	London
20/10	GB8LES	Long Eaton Scouts	Long Eaton
20/10	GB80PW	80 years of Phasels Wood	Kings Langley
20/10	GB1GLO	Gloucester	Gloucester
20/10	GB2TS	Tyneside Scouts	Newcastle
20/10	GB0RSR	Reading Scout Radio	Reading
20/10	GB2GCS	Grimsby Cleethorpes Scouts	Cleethorpes
20/10	GB1SMS	JOTA	Shepton Mallet
20/10	GB4GSS	Goodwick Sea Scouts	Goodwick
20/10	GB0MSG	Malton Scout Group	Malton
20/10	GB1MSG	Muthill Scout Group	Muthill
20/10	GB0SSW	Shropshire Scouts West	Shrewsbury
20/10	GB0GDS	Greenock District Scouts	Greenock
20/10	GB2BCS	Bristol Cabot Scouts	Bristol
20/10	GB5FRR	First Roughton Rural	Norfolk
20/10	GB1SHS	Sevenoaks Halstead Scouts	Halstead
20/10	GB1NSS	Nelson Sea Scouts	Solihull
20/10	GB0MKS	Milton Keynes Scouts	Milton Keynes
21/10	GB8CS	JOTA (Clevedon Scouts)	Kenn, Nr Clevedon
21/10	GB0TVS	Tees Valley Scouts	Hartlepool
21/10	GB1BSW	Brymbo Steel Works	Brymbo, Wrexham
22/10	GB1BSG	JOTA	Belton, Gt Yarmouth
26/10	GB2WYS	West Yorkshire Scouts	Huddersfield
27/10	GB1BST	British Summer Time	Nottingham
29/10	GB0GMT	Greenwich Mean Time	Nottingham

# HF F-Layer Propagation Predictions for October 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	664.....15666	445322346566	116444455321	..35555531..	..1555531...	...24431....	...1222....	....111....
*** Asia								
Yakutsk	21.....3333	.....1133	..11.....	.....	.....	.....	.....	.....
Tokyo	.....2221	.....134432	...223321..	.....1211....	.....	.....	.....	.....
Singapore	.....2222	.....344321	.....14431..	.....2331....	.....121....	.....11....	.....	.....
Hyderabad	1.....13333	2.....134433	.....2322..	..1.131....	.....1122....	.....121....	.....	.....
Tel Aviv	552.....3555	554.....35555	115321245311	..5443443...	..144443....	...22221....	.....	.....
*** Oceania								
Wellington	.....12...	...333334...	...344324...	...2332.2...	....11.....	.....	.....	.....
Well (ZL) (LP)	.....	..1.....	...2.....	.....1....	.....	.....	.....	.....
Perth	.....111	.....13433	.....23321..	.....1221....	.....1....	.....	.....	.....
Sydney	.....111..	.....13433..	.....23321..	.....1232....	.....111....	.....	.....	.....
Melbourne (LP)	.....	...4.....	...3.....	...2.....	.....	.....	.....	.....
Honolulu	..12.....	..1321.....	...111.1...	.....	.....	.....	.....	.....
Honolulu (LP)	.....	.....	.....	.....1....	.....1....	.....	.....	.....
W. Samoa	..1.....	...32212...	...23331...	...232....	.....2....	.....	.....	.....
*** Africa								
Mauritius	2.....1222	3.....34433	1.....44211	.....132....	.....12....	.....1....	.....	.....
Johannesburg	22.....133	33.....3443	11.....24322	.....331....	.....11132...	.....1121....	.....11....	.....
Ibadan	555.....2455	55531.13555	51532124532	..24322353..	...43345...	...43442...	...12212...	...1....
Nairobi	33.....2333	442.....4444	1.3.....24411	..12.134....	...211231...	...1.232....	.....	.....
Canary Isles	6663....1566	66652..14666	636543345663	211544446611	...1355552..	...155551..	...4343...	...2222...
*** S. America								
Buenos Aires	222.....2	3322.....23	21.3.....11.	...2.....1..	....1...1...	.....	.....	.....
Rio de Janeiro	333.....3	433.....233	2112.....321	...2.....12..	....11.12...	....11.11...	.....	.....
Lima	222.....1	3213.....12	1.1.....	.....	.....	.....	.....	.....
Caracas	3333.....23	33131.....133	...12.....21.	...22..12..	.....2112...	.....2....	.....	.....
*** N. America								
Guatemala	2222.....1	32141.....12	1..2.....1.	.....1....	.....	.....	.....	.....
New Orleans	3332.....2	31.3.....13	.....1.....	.....1.1....	.....21....	.....	.....	.....
Washington	44432.....24	431131..234	.....211221.	.....32223..	....1333...	...11....	.....	.....
Quebec	3443.....23	31.1..1233	.....11123..	...22221..	.....331....	.....	.....	.....
Anchorage	131.....	..1.....11	.....21..	.....	.....	.....	.....	.....
Vancouver	1232.....	1.....1	.....	.....1....	.....	.....	.....	.....
San Francisco	2222.....	21131.....1	.....	.....	.....	.....	.....	.....
San Fran (LP)	.....	.....	.....	.....2....	.....2....	.....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 October, November & December are respectively (SIDC classical method - Waldmeier's standard) 19, 18 & 17 and (combined method) 24, 24 & 24. The provisional mean sunspot number for August was 33.1. The daily maximum / minimum numbers were 74 on 31 August and 12 on 13 August.



## SPECIAL EVENT STATION LISTING

**Don Ward, GOMDO**

Could I please make a plea to alter the title of the special event station list from Event Phonetics to Event Name?

We know what the phonetics are, we need to know what they mean. Most of those in the September list gave the full name and location so no problem there some other gave almost no clue as to their event.

Just a thought.

Yes, *that's a jolly good idea. We'll do so from this month onwards. Thanks for the suggestion! If anyone else has any thoughts about how we could improve RadCom, please let us know via email to radcom@rsgb.org.uk*

## CORRECT LOCATION

**Dr Mark R StJ Foreman, SA6BID / G7LSZ**

Regarding the letter by Ray, G4OWY, I could not agree more that the correct location and correct aerial makes a vast difference. About location, when I was studying for my doctorate I regarded Beacon Hill near Loughborough as my personal radio tower. Using a FT-290RII and a 5 element ZL special I used to beat a lot of higher powered station on 144MHz SSB. Having tried different aerials in my life I can quite perfectly agree that right choice of aerial is very important. I hold the view that he has mixed up 'equipment' and 'rig'. My letter wrote about price limits for equipment, equipment includes the rig, the tower, the aerial and other items used in a radio station. I hold the view that in some ways a person with an old 100W rig like a TS-440 and a simple dipole is closer to the core idea of QRP than a person running a FT-450 turned down to 10 watts with a noise cancelling network (like a MFJ-1026), a 60 foot tower and 4 element HF beam. If we consider the price of the station being only the rig, the aerial and the aerial support then I am sure that the second station will cost much more than the first, which could be put together for less than £1000 assuming that you were to use two trees to hold up the dipole.

I would like to suggest an experiment, whose results might be of great interest. For all the major contests next year the contestants should have to declare what aerial they used, how high above sea level they were, what rig they used, what aerial they used, the value of the rig and the estimated cost of all the equipment used. This data, together with the number of points each station scored, would allow us to test the theory that "an expensive rig is associated with winning a contest" and to explore what other factors are associated with winning a radio contest.

*Much of the information you request is already collected and published with the contest results. HF entrants report a brief description of their antenna system*

*and equipment, and VHF entrants report the same together with details of antenna height AGL as well as the height of the site ASL. In addition the logs that the entrants submit are placed in the public domain for analysis when the adjudicated results are published.*

*Collecting total equipment cost (though really you would need both OPEX and CAPEX) would be intrusive, a significant time burden on entrants, and would not tell the full story by any means. The teams that win contests are those that have leadership, commitment, and good operating skills, and manage to combine these with mechanical, electronic, software, systems integration, operations research, logistics, project management and other engineering skills, together with an awareness of the electromagnetic environment. Such teams normally purchase or borrow good equipment, but it is chosen for fitness for purpose and is not necessarily the most expensive on the market.*

**Dr Stewart Bryant**

**Board liaison member to the Contest Committees**

*Some entrants to HF contests are very reluctant to disclose what equipment they are using because they fear they will be targeted by thieves. In order for these individuals to continue entering RSGB contest, we struck a deal with them that they would disclose equipment details to the HFCC/CSC on request but this information was never to be published. So, any suggestion that entrants have to disclose any financial information about their stations will result in a very negative reaction from these people.*

**Ian Pawson, GOFCT**

**Chair, RSGB Contest Committee**

## CW TRAINING

**Peter Williams, G4NPU**

Some 30 years ago I twice failed to learn CW before adopting the following method.

Start with a code generator set to deliver ALL characters and punctuation at random. Start at 5wpm if you like. Write down what you hear but once you have achieved around 70% correct copy stop and move on to a faster speed by two words per minute and similarly when that's achieved 70%, again move on by another two words per minute and so on. Soon you will find that when dropping back to a lower speed you will have near 100% copy.

It's similar to charging a capacitor through a resistor – it will never reach the supply voltage but if you raise the input and then later drop it you will have the voltage you set out to achieve.

As G4OWY/G6AUW suggests with his method, this is a useful principle to apply to learning other things.

## DMR RADIO – CONVERT

**John Paine, M6IEM**

At the age of 70 I took my Foundation licence, was given a dual band Kenwood for the car and I bought a Yaesu FT-857 for base working. I went through all the usual problems of setting up suitable antennas for both HF and VHF/UHF on the roof and using the 10 watts permitted output. Taking the Intermediate exam was always on the cards to increase to 50 watts but then I was introduced to DMR.

With just 5 watts and a standard whip aerial screwed into the radio I am now all over the world for less than £100.

I can hear the diehards muttering that DMR is not 'real radio' but for those who may be on a low budget and cannot afford all the expensive equipment/ancillaries but with a simple Foundation licence and the price of a night out they can talk to the world.

## WHY WAS CW COMPULSORY?

**Ken Randall, G3RFH**

With reference to the letter from Eric Edwards, GW8LJJ (*RadCom* September 2017) regarding the requirement for the Morse test for an HF licence. I enquired about this back in 1962 when I was first licensed, and I was told that it was a requirement in case of interference being caused to a Government (Diplomatic) wireless service, the station being interfered with would use Morse code to tell you to either QRT or QSY. In those days almost every government or diplomatic agency used Morse code on HF. Nowadays, amateur radio is probably the only service using Morse on HF radio.

**Laurie Booth, G4XEC**

GW8LJJ asks why a CW test was necessary to qualify for operating on the HF bands.

When ships relied on coastal radio stations for various communications including emergency and navigational warnings, interfering transmissions on their frequencies were to be warned. 2182kHz, for example, was a coastal waters calling frequency and close to the amateur Top Band of 1800kHz to 2000kHz – and not all amateur transmitters of the day were terribly frequency accurate. Licence conditions obliged newly-licensed amateurs to operate only CW for one year at a maximum power of ten watts – by which time, they should be adept enough to recognise a CW message indicating they are causing interference on a shipping frequency.

## CW TRAINING

**Peter, G3NBQ (VE7NBQ)**

I would like to point out that CW has to be learned. Nobody can do that for anyone but there are many ways that trainees can help themselves thanks to various ways already mentioned.

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Back in the '50s we didn't have computers, paddles and lessons etc. We just had to learn it and preferably with a friend sending Morse to each other using a 'buzzer' of some kind. Barry, G3NAP and I use to sit in his shack and do just that until we got good enough to pass the Morse test at 12 WPM at the Post Office HQ. Oh yes, we used to listen to CW on our radios in between (some good and some not so good CW) but better than nothing and anyway we were SWLs at the time.

No licence until two City and Guilds theory exams were passed plus the Morse certificate back then. No simple way in those days, it was a full ticket or nothing and we learned it all the hard way at home using books (*RSGB Handbook* was perfect) and *RadCom* etc.

But it was all fun because we were keen to learn and pass and get that precious licence and we both did. Those certificates also helped me get the jobs I wanted so amateur radio totally shaped my life in a very big way and I am still just as keen about the hobby as ever.

## GB6CRA

**Stephen Nicholls**

The World Association of Christian Amateurs and Listeners (WACRAL) is celebrating its 60<sup>th</sup> anniversary year. To commemorate this achievement WACRAL applied for and was granted a special event station callsign GB6CRA. Several members of the association are on rota to operate GB6CRA from their home QTH around the UK.

From 19 July to 15 August the SES was operated by Mike, G4SMB located in Driffild, East Yorkshire IO93SX (see photo below). During this period, Mike worked 148 worldwide stations and 53 countries. The best DX over the period for GB6CRA: HP3SS Panama, NP4R Puerto Rico, SO1WS Western Sahara, VP2ETE Anguilla, 4X1VF Israel, ZP6CW Paraguay, PV8ADI Brazil,



HI3A Dominican Republic, 3V8SS Tunisia, YV5LAY Venezuela, A71OK Qatar.

Most of the contacts were made on CW and, whilst looking up worked callsign R17CWC on QRZ.com, Mike found that GB6CRA had qualified for a certificate of achievement issued by the Russian Radio Telegraphy Club having contacted 5 different Russian radio clubs during their CW marathon competition. A first for WACRAL in its 60<sup>th</sup> anniversary year.

Further information about the history of WACRAL and the work of the association can be found at [www.wacral.org](http://www.wacral.org).

## HORSE-POWER OF 'WHIP-CRACKS'

**Dr Guy Moore, G3RVU**

I enjoyed the feature article 'From Spark to Speech' by Dr Bruce Taylor, HB9ANY (*RadCom* July 2017). The 'whip-crack effect' reminds me of some experiments I did as a youth many years ago.

I made a primitive coherer detector with iron filings and found that when I switched my Collins TCS12 transmitter on with a 50 watt carrier to my long wire aerial, the filings on the bench became conducting. But something didn't tally and I found that it wasn't the carrier causing conduction but a small spark in the transmitter switch. With the transmitter output connected directly to the coherer, it took a lot of sinusoidal RF to obtain conduction, and the filings ignited.

I concluded that the coherer detector is very sensitive to spark transmission but extremely insensitive to pure carrier waves and I reflected upon the ingenuity of the early radio pioneers in inventing such devices to suit their transmissions. So what was happening?

The answer seems to be, like in a modern laser or radar system, the peak power in a pulse can be many times bigger than the mean power. Thus James Erskine-Murray says in his excellent *Handbook of Wireless Telegraphy* 1913, page 139, "In a small station which sends out about one foot-pound of energy per spark, the horse-power during the spark is about 300; in a larger station it is proportionately greater, probably amounting to tens, or even hundreds, of thousands of horse-power."

The coherer detector is a loosely packed non-conducting agglomeration of metal particles between two electrodes with a DC

bias voltage, awaiting the arrival of enough RF volts to give inter-particle attractions and trigger conduction. This favours pulse transmission rather than continuous wave transmission. The subsequent DC current through the coherer can operate a bell or a Morse recorder. The device needs tapping to break the conduction in time to receive the next pulse.

These effects probably caused the various scientists mentioned in the article to have believed that impulses or 'whip cracks' were essential to achieve transmission. Additionally, a high-frequency sinusoidal alternating current needs matching to the antenna, whereas with impulsive excitation and with the antenna forming part of the resonant system, then matching is easier to achieve.

If you wish to hear micro-'whip-cracks' then take a common-or-garden long wave AM radio, tune it off-station and listen to the clicks produced on it when you turn a room light on and off (which a coherer receiver can also detect). Crackles can also be heard on the radio caused by the sparks made when you take off your pullover or T-shirt on a dry day. If there are thunderstorms around, QRN (or noise from natural sources) will be audible too.

I suspect that the early pioneers of wireless didn't take too much notice of Maxwell's equations – these pioneers were masters of experimentation, like master-chefs not needing advanced mathematics to invent a new recipe!

Maxwell isn't in the index of Erskine-Murray's book, but he has reached the index of the *Admiralty Handbook of Wireless Telegraphy* of 1931, though only in connection with a suggested name for units of magnetic flux, which would have belittled his achievements – his mathematics of waves and other contributions to physics were far more general and fundamental in the development of science and the modern world.

Notes:

- 1 horsepower = 746 watts
- 1 foot-pound = 1.36 joule
- 1 joule per second = 1 watt

Example:

Five pulses per second, each pulse of duration 2 microseconds ( $\mu$ s), with a mean transmitted power of 100 watts is equivalent to a mean power of 100 joules per second or 20 joules per pulse.

- Power in each pulse is 20 joules per  $2\mu$ s
- = 10 joules per  $\mu$ s
- = 10 megawatts
- = 10,000,000 divide by 746
- = 13,405 horsepower.

- Energy per pulse
- = 20 divide by 1.36
- = 14.7 foot-pounds.





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## More about the IC-7610 HF/50MHz 100W SDR transceiver.

Following on from the technology incorporated into the IC-7300, the IC-7610 adopts the same RF direct sampling system for signal processing. By converting the analogue signal directly to a digital signal and processing it within the FPGA (Field Programmable Gate Array), it provides improved transmission phase noise and excellent RMDR of 105 dB (at 1kHz detuning).

The IC-7610 will have two independent receivers, enabling simultaneous reception of two frequencies in different bands/different modes.

The IC-7610 will also feature high-speed, high-resolution performance. The real-time spectrum scope supports different bands and a dual display that can monitor different modes. It will also have a waterfall display function that displays received signals in time sequence. The DIGI-SEL unit will be available

to both the main side and the sub side of the receiver. In addition, the IC-7610 adopts a large 7-inch full-colour touch screen panel.

Main features include:

- Further evolved RF direct sampling method.
- Excellent RMDR: 105dB realized.
- Dual watch function can receive simultaneously in different bands and different modes.
- DIGI-SEL unit that eliminates excessively strong signals is installed in the main and sub of the receiving section.
- High-speed real-time spectrum scope and waterfall display function.
- 7-inch full-colour touch panel, outstanding operation and visibility

The IC-7610 adopts the direct sampling method debuted in the IC-7300 for signal processing. By converting the analogue signal directly to a digital signal and processing it within the FPGA, resulting in improved transmission phase noise and excellent RMDR of 105dB (at 1kHz detuning). Furthermore, it has two independent reception circuits of main/sub of identical performance, and it enables simultaneous reception of different bands/different modes.

Boasting high-speed, high-resolution performance, a real-time spectrum scope also supports different bands / dual display that can monitor different modes. It also has a waterfall display function that displays received signals in chronological order. Also, the DIGI-SEL unit is mounted on each of the main side and the sub side of the receiver. Shut out powerful radio waves from shortwave broadcast stations. In addition, it adopts a large 7-inch full-colour touch panel, improving visibility of various setting information and intuitive operation.

In addition to high basic performance including RF direct sampling method, this machine with many new functions is an authentic HF transceiver that fascinates a wide range of amateur radio users.

Please note these specifications may be subject to change before release and have been translated from Japanese text.

**Place your deposit now for just £100.**

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