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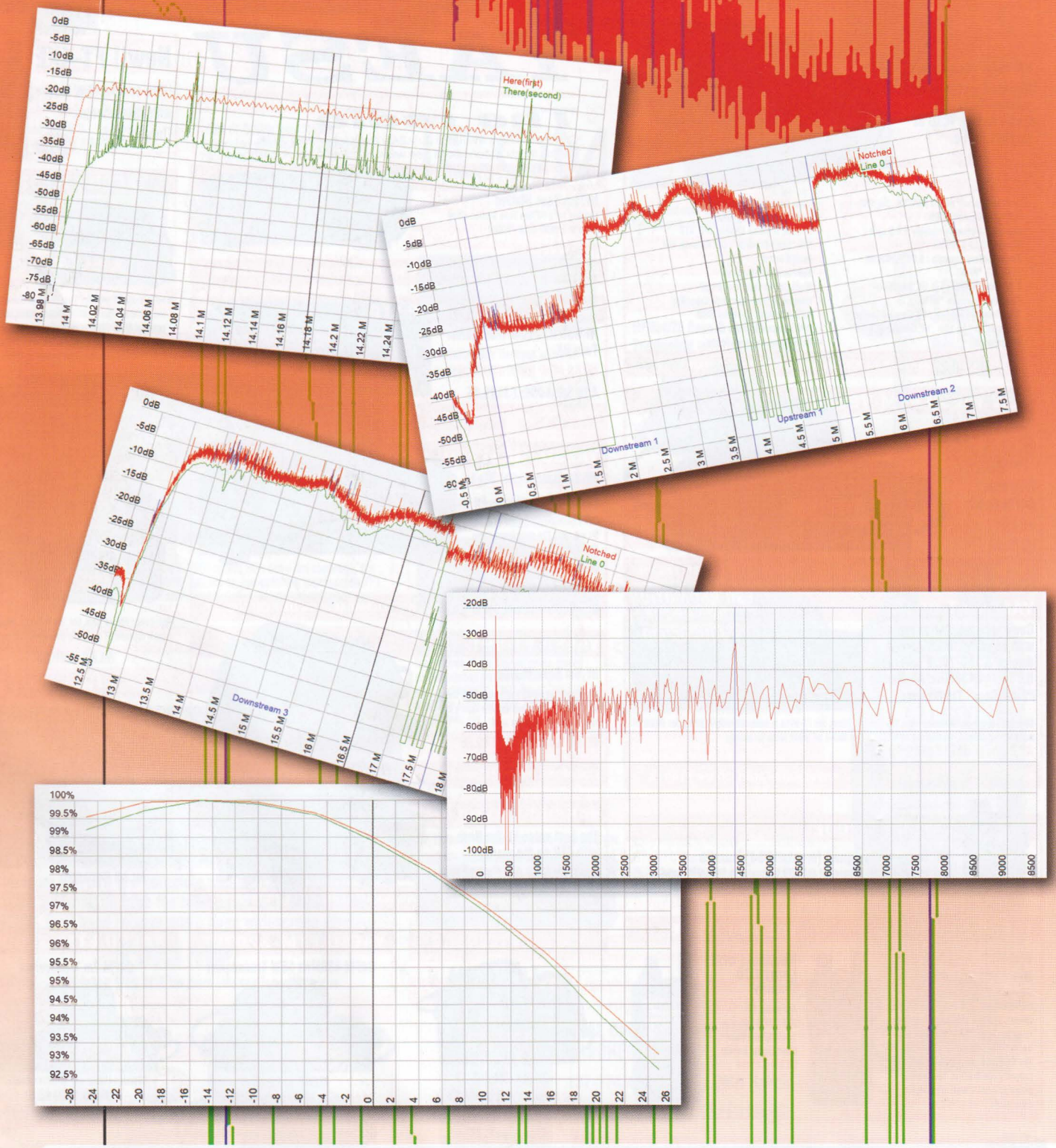

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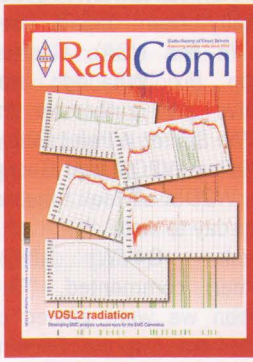

Cover design by Kevin Williams, M6CYB.

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

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RadCom is published by the Radio Society of Great Britain as its official journal and is sent free and post paid to all Members of the Society. **The December 2018 edition of *RadCom* is expected to arrive with most Members by 17 November 2018** although this can take up to a week longer in some cases; international deliveries can take longer still.

All material in *RadCom* is subject to editing for length, clarity, style, punctuation, grammar, legality & taste. Articles for *RadCom* are accepted on the strict understanding that they are previously unpublished and not currently on offer to any other publication. Unless otherwise indicated the RSGB has purchased all rights to published articles. No responsibility can be assumed for the return of unsolicited material. See tinyurl.com/radcompix for info on taking photos for publication.

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RadCom Plus is available to RSGB Members online at www.rsgb.org/radcom-plus
RadCom Basics for Members new to the hobby can be found at www.rsgb.org/radcom-basics/
Abbreviations and acronyms we use are listed at http://tinyurl.com/RC-acronyms

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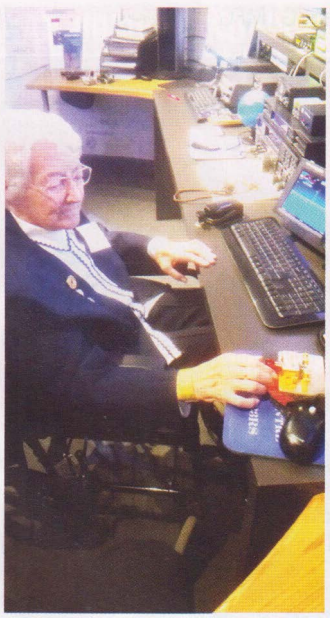
Congratulations to the NRC for a successful year

The RSGB National Radio Centre is an amazing resource for amateur radio and the RSGB is extremely grateful for all the hard work, time and enthusiasm that the volunteer team contribute to it. Last year it brought amateur radio to the attention of 26,000 people and this year the numbers are even better. Since January, we have been gradually raising the visibility of the NRC, via *RadCom* articles, GB2RS, social media, events, presentations, extra equipment, maintenance work, Bletchley Park signage and, of course, extra volunteers and opening days. The visitor numbers are growing beyond our expectations – all supported by the volunteers. In August, NRC volunteers showcased amateur radio to an incredible 10,713 visitors during a single month, beating all previous records by a very significant margin. The visitor numbers for September were also good at 7,243. A huge thank you to the NRC Coordinator Martyn Baker, GOGMB and the entire team of volunteers.

From Tuesday 23 October it is proposed to increase the opening times of the NRC to include Tuesdays on a regular basis. Thanks to those who have stepped forward: we now have two teams, each of 3 volunteers, who will work on alternate Tuesdays. Of course, we are always looking to recruit new volunteers, and we do need a few more to assist with the increased visitor numbers being experienced, particularly at weekends. Please contact Martyn, GOGMB by email to nrc.support@rsgb.org.uk if you would like to know more about volunteering at the NRC.

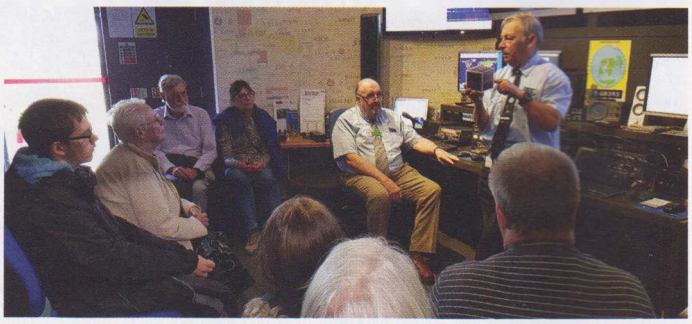
Joan Wilson, WW2 Morse op from 5 Group HQ Bomber Command at Morton Hall, Lincs called in to the RSGB's National Radio Centre at Bletchley Park and tried out the keys. She preferred the straight key to the paddles.

Graham Starkey, G4ZBF visited the RSGB National Radio Centre and enjoyed operating GB3RA, using CW on the NRC's Flex6500 transceiver.

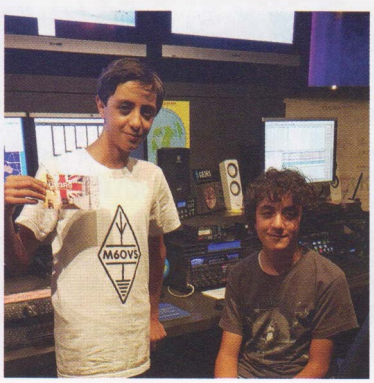


The RSGB National Radio Centre was recently privileged to receive distinguished visitors as part of Bletchley Park's annual Veterans' Reunion. John Swartz, WA9AQN (author of the recent *RadCom* article about VIs), Idiron Kato, AH6CY (originally from Japan, now living in the USA), Geoffrey Pidgeon (ex Whaddon Hall operative and author of the book *The Secret Wireless War*), Ann Keller, W2QN and George Keller, W2DM all took time out of their day to visit.

Derek, G4VWI (NRC Volunteer) commented, "This afternoon we were graced by a visit from Daphne Canning and treated to stories about her role during the war as a radio operator. Trained at the secret wireless operator school at the Science Museum, she survived a V1 rocket attack on London during which her friend nearby was killed. Daphne then went on to operate specialist equipment at the Bletchley Park Wireless Intercept outstation RAF Chicksands." Daphne is seen at the key (left), operating GB3RS.



NRC Volunteer Mervyn Foster, G4KLE is busy explaining to visitors at the NRC about the FUNcube amateur satellite and the use of data downloads for the purposes of STEM education in schools.



Harrow Radio Club visited the NRC in August, enjoying an evening discussing a variety of radio topics; the importance of the NRC in introducing amateur radio to the public at Bletchley Park; and operating the RSGB station GB3RS. If clubs would like an evening visit, please contact Martyn Baker, G0GMB by email to nrc.support@rsgb.org.uk

World Radio Conference Preparations step up

Next autumn sees the 2019 World Radio Conference (WRC-19) convene, with agenda items regarding the future of 50MHz in Region 1 and Wireless Power charging of electric vehicles being of particular interest to amateurs. The 5MHz band is not an ITU allocation in our Region, so harmonising it with Region 2 & Region 3 amateur allocations is a key goal to enhance activity.

The power levels used for charging vehicles may be in the order of 5-100kW in the ~20-90kHz range and generate a serious concern: their harmonics could be at crippling levels.

The WRC-19 agenda also includes small satellites, Wi-Fi and mobile telecoms expansion that may infringe on our microwave spectrum allocations. So the overall scope for this WRC cycle is particularly wide, literately from VLF to above 275GHz.

Over the summer, an Ofcom consultation was held on the UK preparations and potential positions for WRC-19. This saw the Society reply being developed by Spectrum Forum members. In the final run-up to the deadline, guidance to Members was made available online and notified in GB2RS. This was backed up for the first time by a social media 'mini-campaign' with different topics highlighted each day to raise awareness and encourage replies from individuals or affiliated groups.

Our guide and final response is now available on our WRC-19 web pages, http://rsgb.org/wrc-19 In due course, when Ofcom publishes the responses, others will be available including those from UKSMG, BATC, UK Microwave Group etc. So we take this opportunity to thank all those involved in a very wide-ranging effort.

GM3ULP SK

It is with great sadness we have to inform Members, especially those in Regions 1 & 2, that their previous Regional Representative (Regional Manager) Gordon Hunter, GM3ULP passed away at Wishaw hospital, peacefully, after a long illness. Gordon was an RSGB Member for more than 50 years and had an interest in radio before then. He was at one time an amateur TV operator and had a keen interest in the history of radio.

In his working life he was a television and radio engineer and ultimately became a college lecturer; a real gentleman who will be greatly missed. The RSGB offers its condolences to Gordon's family and many friends.

IARU in Seoul

Further afield IARU has also been considering WRC-19. The IARU Administrative Council (AC) met in conjunction with the IARU Region 3 Conference in Seoul in September. The AC reviewed the efforts of the two dozen IARU volunteers involved who defend amateur radio's frequency allocations against commercial pressures, heard serious concerns regarding wireless power and the ongoing effort to seek harmonisation of the 50MHz band. Looking to the future, the AC also considered succession policy, IARU branding and websites, and potential developments in QSL policy to reduce the burden of unwanted / undeliverable cards.

At the Region 3 Conference itself, the RSGB was represented by proxy. Attendees covered HF & VHF band plan harmonisation, emergency communications and youth/growth. It was agreed that the next IARU Region 3 Conference meeting would be in Thailand in 2021. Meanwhile nearer to home, IARU Region 1 will have an interim meeting in Vienna next April, for which topics are invited on HF/VHF/Microwave matters. If you have a topic to suggest then please contact the RSGB Spectrum Forum Chair via spectrum.chairman@rsgb.org.uk

Video release

The RSGB has placed the video of the 2017 Convention lecture ZL7G DXpedition: Planning, Logistics, Operating and Beer, by Chris Duckling, G3SVL. on the Members-only section of the RSGB website.

Go to http://rsgb.org/zl7g

Operating Advisory Service

The Operating Advisory Service, OAS, is an RSGB volunteer-run service that provides guidance to licensed radio amateurs in the UK and Crown Dependencies of Jersey, Guernsey and the Isle of Man. It helps promote good practice and advises you on how to manage problematic behaviour including poor operating practice on the amateur bands. The initial OAS pages are now on the RSGB website at www.rsgb.org/oas and will be developed further in the future.

Renew your 146MHz NoV

All current 146-147MHz band Notices of Variation (NoV) expire on Tuesday 31 October. Ofcom has agreed that the band will be made available for another year. However, to continue to use the frequencies you must obtain a new NoV. These are available free from the RSGB website via www.rsgb.org/nov Currently, 548 NoVs have been issued for this band.

YOTA 2018

The September 2018 issue of Radio ZS is available for download from the front page of the South African Radio League website at www.sarl.org.za It includes lots of reports from YOTA 2018, which can also be found in this issue on page 42.

CotY Regional presentation

Regional 10 Manager Keith Bird, G4JED presented the Regional Club of the Year shield to Hilderstone Radio Club secretary Ian, 2EODUE at the Lighthouses on the Air event. It was a very successful event and gave everyone a chance to operate on HF including Foundation candidates.

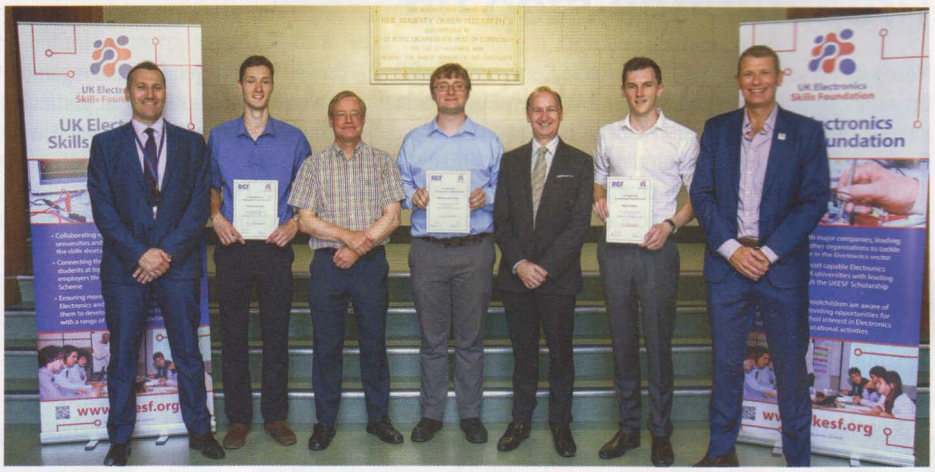
Youth Committee news

Mike Jones, M5PMJ, has decided to step down as the Youth Committee Chair due to increasing work commitments. Mike was appointed in 2014 and established and has continued to lead the Youth Committee in all their activities since. We would like to thank Mike for his contribution in the role and wish him every success for the future. Mike will continue to volunteer for the RSGB as the District Representative for Cornwall, Isles of Scilly and Plymouth.

There is now a vacancy for a Youth Committee Champion, who will be responsible for managing the Youth Committee members and activities; promoting YOTA month each December; ensuring participation each year in the YOTA Summer event through RSGB sponsorship and representing views of the Committee to the Board via the Board Liaison Member.

Full details of the role can be found at www.rsgb.org/volunteers

RCF undergraduate competition winners



The Radio Communications Foundation (RCF) has sponsored a competition for undergraduate projects in UK universities for the second year, in partnership with the UK Electronic Skills Foundation and aerospace group, Leonardo. The competition recognises undergraduate projects based on radio technologies. The competition was judged by a panel of representatives from Bristol University, Manchester University, RCF and Leonardo. RCF Trustee Trevor Gill explained that the RCF sought to increase the numbers of young people following a career in radio technologies, as a means of helping address the skills shortage in that sector of UK engineering. He also highlighted the role of amateur radio in encouraging interest and self-training in radio engineering. Johnathan, MOZJO, perfectly illustrating the educational value of amateur radio. Jonathan won the prize for his project at Imperial College London on automatic identification of the mode of HF radio transmissions using neural networks. Runners up in the competition were Scott Dearnaley of Lancaster University with a Low cost flexible antenna for Body Area Networks and Max Landles of Heriot-Watt University for his project on measurement of Satellite Propagation at Millimetre Wave Bands. Each winner received a cheque and a certificate to recognise their achievement. The photo shows (L to R) Merv Haynes (Leonardo), Scott Dearnaley, Trevor Gill (RCF), Jonathan Rawlinson, Professor Andy Nix (University of Bristol), Max Landles, Stew Edmondson (UKESF). More information on the RCF is at https://commsfoundation.org/

QSL Matters

G4T-Z sub-manager Eugene, MOHMS has asked us to remind all Members to use suitably strong C5 envelopes for their card collection. Almost daily we encounter torn envelopes and, from time to time, receive bundles of cards from the lost property centre in Belfast. Loose cards can batter their way out of an envelope – especially the self-seal type. We recommend all senders add a piece of tape to prevent this. Packing cards securely, plus a complete checklist and recommended postage are detailed in the current *RSGB Yearbook*.

Also a timely reminder that the RSGB policy is 'send all send any', thereby reducing delays to members receiving cards and, importantly, the originator receiving a reply. High value stamps don't mean you will receive more cards – 2nd class is always best value.

Long time volunteer sub-manager for the Isle of Man, Martin Parnell, GD3YUM is retiring after many years of valuable service to his fellow islanders. Tony, GD4SVD has kindly offered to take up the challenge of distributing cards to resident RSGB Members and visitors who deposit IOM stamped SAEs. See the RSGB website QSL pages for details, rsgb.org/qsl

At this time of year lower cost holidays and schools re-opening mean that many of our volunteer sub-managers take a well-earned break. This disrupts our UK despatch schedule well into autumn, but large quantities of cards arriving from other bureaux, closed during the summer months, keep us very busy indeed! A reminder therefore, to all Members to think about sending a few more C5 envelopes (not forgetting to include their Membership number) to their sub-manager and to the managers in any other prefix areas that they have operated from during their own holiday excursions.

Revalidating your licence

Although the current UK amateur radio licence is known as a 'licence for life', all radio amateurs are required to revalidate their licence at least every five years. This means every licence holder must contact Ofcom to confirm or update the details on the licence database. The quickest way to revalidate is simply to access the licensing system and confirm or re-confirm your details online via the Ofcom website, or by email to spectrum.licensing@ofcom.org.uk. Links to the Ofcom website as well as a helpful article about the Licensing Portal, Registration and Revalidation can be found on the RSGB website via tinyurl.com/GB2RS-0930A

YOTA Month 2018

The Youngsters on the Air (YOTA) programme is an IARU Region 1 initiative aimed at engaging youngsters in amateur radio, as well as supporting amateurs under the age of 26.

YOTA Month takes place each December, encouraging youngsters to experience amateur radio and get active on the air. It gives the opportunity to experience practical elements of the hobby, such as antenna building, ARDF, understanding the fundamentals of propagation and gaining an understanding of basic electronics. For further information about YOTA, visit www.ham-yota.com/

This year we have obtained the callsign GB18YOTA. We need clubs. groups, and individuals from all over the country to set up stations and host the callsign over the 31 days of YOTA Month this December. We are particularly looking for stations with a passion for running events aimed at engaging youngsters in the hobby. In the past we have had QSOs from 630kHz to 2GHz, Fast Scan TV, EME, SSTV and Satellites. Even if you could only offer an HF SSB/CW/FT8 station, please don't hesitate to apply. A log of all the QSOs is sent to a central system on ham-yota.com allowing you to compare your progress with other countries. Certificates and awards are given out by the IARU for participation in the event.

So if you think your club or group is up for the exciting challenge of hosting young people and operating a Special Event Station, please see www.rsgb.org/yota-month for further information and application details. For any questions email Ben, MONBA, the YOTA Month Coordinator, via email to yota.month@rsgb.org.uk The deadline for applications is Monday 29 October.

NEW

RSGB European Locator Map

If you are looking for something to grace the wall of your shack but also offers much more, then the RSGB European Locator Map could be for you.

This high quality Locator map is offset printed onto a thick 150gsm paper and contains all the features you would expect of this type of map. There is the usual QTH grid (Maidenhead) locator system covering Europe and a worldwide grid inset. You will see the various country prefixes which are easy to pick out at a glance and for extra reference large cities are also depicted. There is also a European DXCC table picked out with country flag which provides a checkbox for bands worked 6m, 2m, 70cm, 23cm & UHF. There are also other useful features such as a meteor shower calendar and a 2m & 70cm beacon list.

Delivered in a sturdy postal tube these large maps are 590x980mm and the ideal addition to any radio amateur shack.

Non Members' Price £8.99
RSGB Members' Price £6.74 (25% OFF)

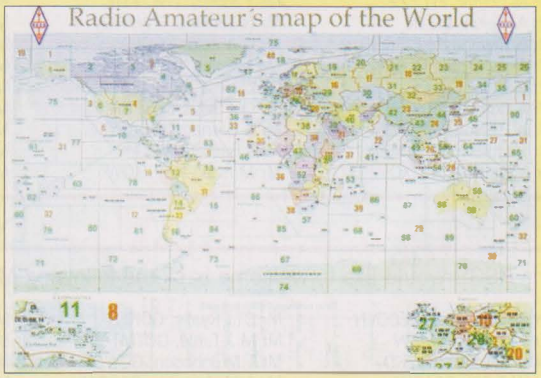
RSGB Map Bundle – Members Only Offer

Why not save some money by buying both of the RSGB Maps for only £10.99. That's a saving of £6.99 on the usual retail prices of these maps.

Still Available

RSGB World Prefix Map - Radio Amateur's Map of the World

Not only does this map show the location of worldwide prefixes there is an A-Z list of prefixes and expanded map sections covering the Caribbean and Europe making them much easier to read. The handy countries list also shows the DXCC entities with their continent along which CQ and ITU region that they fall in.



980mm wide by 680mm tall (approx 38.5"x 27") 1: 42,000,000 scale.
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Nominated Directors

The RSGB Board has decided to make changes to the way in which Nominated Board Directors are appointed. The RSGB Board is made up of 8 Directors – one is the elected President and four are directly nominated and elected by Membership ballot. A further three Directors are nominated by the RSGB Nominations Committee for endorsement by the Membership at the AGM. The role of the committee is to identify areas where the knowledge and skills of the Board members may need further support and to find suitable candidates; primarily they are looking for business skills and not those directly associated with amateur radio. Full details are on page 10 of the October *RadCom*. If you feel you have skills that could be of benefit to the RSGB Board, please get in touch by email to company.secretary@rsgb.org.uk

New Board member

Keith Haynes, G3WRO has recently decided to step down as an RSGB Board Director, for personal reasons. He was co-opted to the Board following his proposal by the Nominations Committee, and took on the liaison responsibilities for the RSGB Awards and Regional Team. We wish Keith well for the future and thank him for his contribution to the RSGB in the many roles he has undertaken.

The RSGB is pleased to announce that Mike Bruce, M0ITI has been co-opted to the RSGB Board, with immediate effect. Mike will provide focus and expertise to ensure that the Board is fully equipped to support the major changes within the Examinations Systems. Mike was recently appointed Examination Systems Review Manager, has been a member of the Examination Group for some years. Other Board changes of responsibility will be announced in due course.

Final 2017 Convention video now online

We are pleased to announce that the last of our series of lectures from the RSGB 2017 Convention – *Reflections on the History of Radar* by Hugh Griffiths, G4CNV – is now available to RSGB Members online. Go to www.rsgb.org and click on the Publications and Archives tab, then follow the link to 2017 Convention lectures. Once you have selected the video you will be asked to sign into your RSGB Membership account.

VHF Contests Consultation

The RSGB's Contest Committee has launched their annual consultation for next year's VHF Contest rules. They are specifically looking for your views around the AFS contests, FM Activity Contests, possible new MGM contests, Christmas Cumulatives, 432MHz Low Power and the SHF UK Activity Contests, but are open to hearing your broader views about what's right, and where you think things could be different. The survey at www.surveymonkey.co.uk/r/VHFCC2018 closes at midnight on Sunday 29 October.

Congratulations

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

70 Years

Mr J Reilly	GM3HOM

60 Years

Mr D L Byne	G3MRQ
Mr D Beales	G3MWO
Mr C R Fry	G3NDI

50 Years

Mr R C Bagwell	G4HZV
Mr D Mobbs	G4MEE
Mr P Smith	G8CYL

The RSGB welcomes to the RSGB family the following new Members who have joined their voice to ours, helping to keep the RSGB strong.

Mr G Marshall, 2E0BNI
Mr A Hoare , 2E0EVT
Mr S Jessop, 2E0EWU
Mr J H Baker, 2E0EXM
Mr G Fenton, 2E0HIS
Mr J Priestman, 2E0JOP
Mr J Gray, 2E0MHG
Mr P Randerson, 2E0PRA
Mr A Butcher, 2E0PXC
Mr R Ballard, 2E0RNB
Mr S Irwin, 2E0SSI
Mr S Dean, 2E0SZD
Mr M Iosifsohn, 4Z1IM
Mr J A Ramirez, EA2EHT
Mr M Coyne, EI1222
Mr A Walsh, EI3JK
Mr G Kavanagh, EI8DRB
Mr A Lancaster, G0JCC
Mr R Hide, G0LFF
Mr A Corbett, G0WFV
Mr K Pierson, G1APU
Mr P Littlewood, G1SQY
Dr A Eardley, G3UXO
Mr I Fielder, G3YUE
Mr D Bailey, G4HKK
Mr M White, G4HZG
Mr M Smith, G6OES
Mr G Munn, G6STB
Mr M Smith, G6WCW
Mr R Pickett, G7BZC
Mr M C Bounford, G8GLD
Mr A Bunting, G8JCS
Mr A Thompson, G8KSX
Mr A Taujanskas, G8OFS
Mr J Montgomery, GM0SUH
Mr J Jones, GM1YRD
Mr M Steventon, GW4GWH
Mr T Morris, GW7KNF
Mr N Jenkins, GW7RQV
Mr G Arnold, K6GKA
Mr A Vasile, KB9A
Mr C Hess, KE9LC
Mr O J Selle, LA8PDA
Mr A Barnard, M0ATM
Mr J Bassett, M0GJQ
Mr M Isaacs, M0HQW
Mr F Kroon, M0HXC
Mr L Fazal, M0LDF
Mr G Mattocks, M0THZ
Mr D Wardle, M0YJB
Mr D Forshaw, M0YKC
Mr K P Nelson, M3OVM
Mr T Jenner, M3TWJ
Ms S Reid, M5AAS
Ms K Richards, M6BJB
Mr T Holland, M6ISG
Mr K Burt, M6KBH
Mr L Smith, M6LHJ
Mr D R Hickson, M6NQB
Mr G Harko, M6ODV
Mr P Costall, M6OLH
Mr C Pendlebury, M6OQH
Mr S Chaney, M6OQO
Mr D Park, M6OSP
Mr M Rothwell, M6OTE
Mr M Johnson, M6OUN
Mr R Jacobs, M6OZN
Mr P Robbins, M6PKQ
Mr N Beer, M6PKV
Mr C Rainbow, M6PPQ
Mr R O'Leary, M6PQC
Mr B Edwards, M6PQV
Mr G English, M6UGE
Mr G Eason, M6UKT
Mr R Roebuck, M6URH
Mr D Millward, M6WVG
Mr J Blackwell, M6XNG
Mr D Spruce, M6XVN
Mr R Thomas, M6YTB
Mr A Stevenson, MI0HYB
Mr J Green, MJ6WJG
Mr R Walker, MM0ONX
Mr G Davies, MW6UGD
Mr J Markham, MW6XWP
Langdon Hills ARC, MX0LHX
Mr V McDonald, NN4K
Mr P van Staveren, RS318905
Mr S Hammond, RS319282
Mr D Currie, RS319381
Mr B Josyfon, RS319392
Mr M Franklin, RS319393
Mr N Baines, RS319399
Mr I Wright, RS319431
Mr F McGrath, RS319434
Mr G Venn, RS319455
Mr S Sabo, RS319468
Mr T Thomson, RS319469
Mr P Johnson, RS319524
Mr I Harding, RS319525
Mr D Coyle, RS319534
Mr N Beresford, RS319537
Mr K Jenner, RS319573
Mr J Hazle, RS319576
Mr K Birkett, RS319654
Mr P Murfitt, RS319664
Mr A Mableson, RS319670
Mr C Walson, RS319702
Mr M Humphrey, RS319723
Mr D Valaris, SV1UY
Mr J T Jonsson , TF3JA
Mr W Baynes, VK2BB
Mr P Anderson, WB0ZRD
Mr E Tanislav, YO3AS

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

Mr S R Treacher, 2E0CVN
Mr J Kelly, 2E0MAW
Mr D Cassar, 2E0VKD
Mr W T Pitt, 2E1SKA
Mr J Stuart, 2M0JST
Mr J M Yeromonahos, F5OQO
Mr M L Sharpe, G0BUB
Mr E Howells, G0GAL
Mr R Bates, G0IZE
Mr CTJ Ryalls, G0KLN
Mr M J Tuttle, G0TMT
Mr T M Johnson, G0WBR
Mr A M Knowles, G1KDU
Mr R Gugi , G1LEC
Mr A T Chadwick, G3AB
Mr P V Knight, G4CEC
Mr M R Haworth, G4EID
Mr A Salata, G4PLX
Mr Butcher, G4RLA
Mr J L White, G6LJF
Mr D Keene, G7GIK
Mr K Greenough, G8BEQ
Mr J D Cockett, G8YTZ
Mr C D Hills, GM4KHA
Mr D Witten, KD0EAG
Mr F Tyrer, M0DPX
Mr JW Richardson, M0JWR
Mr M D Smith, M0MTJ
Mr J Martin, M0PPY
Mr A J Strudwick, M0STD
Mr V Keeley, M0WQR
Mr G J Capon, M1CLO
Mr R B Damm, M1COQ
Mr M R Champness, M3IWT
Mr C Ashman, M3JCA
Mr M N Newton, M3LSE
Mr N Hanson, M6NNC
Mr P Hall, M6PGU
Mr C Glaister, MD6ZEE
Mr S J Walmsley, MW0GEI
Mr S McMurray, MW0SWA
Mr J S Alexander, MW1BAJ
Mr I D Finney, RS20039
Mr P Erickson, W1PJE

New Products

New Inrad microphone

The new DMS M-629 desk microphone from Inrad USA is compatible with most makes of transceiver. Mounted on a heavy-duty base, the DMS M-629 microphone is a unidirectional cardioid dynamic microphone with a large 1.125in diaphragm and internal rubber element suspension system for reducing undesirable noise. The mic is tailored with a rise in frequency response from 500Hz, crossing 1kHz up to 4kHz. The result is clear, overall well-articulated audio response, tailored to match intelligibility of human voice. The microphone is supplied with a transceiver interface cable of your choice but change your transceiver and you simply buy the matching radio interface cable.

INRAD, a division of Vibroplex®, now in their 36th year of business have been delighted to be appointed exclusive base microphone supplier to FlexRadio. The DMS M-629 sells for £158 including the rig interface lead. It is available from the UK exclusive distributors, Nevada Radio, see www.nevadaradio.co.uk

Light weight PSU

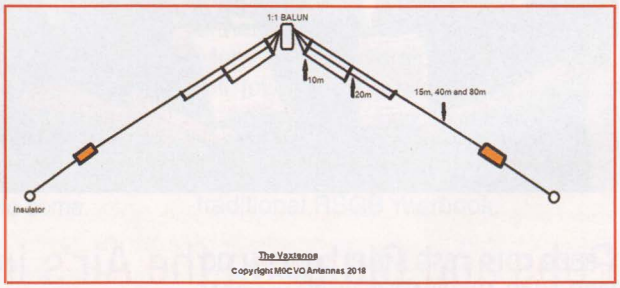
The KX-33 is a light weight, portable AC power supply primarily designed for Elecraft KX2 and KX3 transceivers but, with an optional lead, can also be used with the Yaesu FT-817 and FT-818 radios. Small enough to slip into the pocket, it uses switch mode technology to achieve such a small size. The primary design requirement was to achieve a very low level of noise and users confirm that noise is not an issue with this model. Output is 14V at 4A and the AC mains input voltage is auto switched between 115V and 230V. The KX-33 is now available from Waters & Stanton Ltd, priced at £69.95. See www.hamradiostore.co.uk

Stealth loop

Martin Lynch & Sons had the new Stealth Loop by Ciro on their stand at the National Hamfest in September. Ciro Mazzoni shipped their sample of the magnetic loop to ML&S in time for the show. Covering 6.6-30MHz, with a max of 125W, this extremely compact antenna is ideal for those who need a discreet antenna that doesn't attract unwanted attention. It can be mounted direct to the ground or a table on a balcony without a pole to give fully automated tuning across the entire frequency range. The photo shows Martin Lynch and Gary Spiers next to the new Ciro Stealth Loop. Price & availability to be confirmed, for more information see HamRadio.co.uk/stealth

ContestConsole for Icom radios

The Icom IC-7300 has established itself as one of the most popular HF radios of all time. SOTABEAMS has developed the ContestConsole to capitalise on some of the features of this radio. The ContestConsole is a 'plug and play' device that connects between the radio and the microphone. It allows direct access to voice and CW memories, frequency control, PPT and even a low power tune feature (with optional lead). It works with a wide range of different Icom radios – SOTABEAMS has a compatibility table on their website. The ContestConsole is stocked by SOTABEAMS and their agents including DX Engineering in the US and Funkbox Hard and software in Germany. Priced at £69.95, details can be found at www.sotabeams.co.uk



VaxTenna

A new product this month from MOCVO Antennas is the VaxTenna. At just 24m in length, this antenna covers 80m, 40m, 20m, 15m and 10m plus it will also work on the WARC bands when used with an ATU. Priced at £79.95, full details can be found on the website at www.mOcvoantennas.com

Dutch Resistance WWII anniversary

On 20 September at 0900UTC a Morse code message was sent to the UK on 3510kHz from the Amsterdam Resistance Museum in Holland by Bram Grisnigt, the last living World War 2 secret agent of the SIS MI6 Dutch Section. Bram was parachuted into Holland to provide communications to/from Britain for the Dutch Resistance. The message commemorated the 75th anniversary of his mission. Standing by to receive it at GB2IWM in the Radio Section of the Imperial War Museums, Duxford, were Martin, G3ZAY and Colin, G8TMV. Also in the net was Victor, G3JNB at the Signals Museum at RAF Henlow, GB4SMH.

The text of Bram's message concluded "I wish to take this opportunity to express my great admiration for the brave aircrews who flew from RAF Tempsford Airfield in support of Resistance movements in occupied Europe during World War Two. Many of the aircrews and secret agents lost their lives on these secret missions. We will always remember them. With warm regards and best wishes. Bram Grisnigt. St-Patrick."

A BBC film crew produced a short report about the event and incorporated footage from the Amsterdam end, all of which then featured on BBC Breakfast and BBC World News the following week. Additional context about the Clandestine wireless operators and the Mk7 'Paraset' radio was provided in an interview with Richard, G8DJK, Duxford Radio Section Head.

Gloucestershire RAYNET news

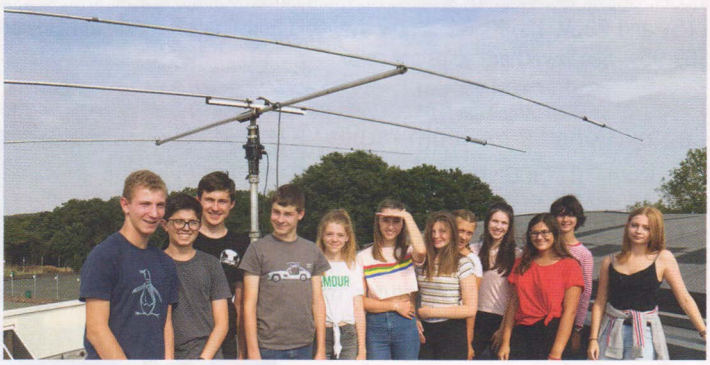
Following a review of the previous working document, a new strategic alliance has been signed between Gloucestershire Fire & Rescue Service (GFRS) and Gloucestershire RAYNET, to improve liaison that has taken place over many years. GFRS, along with the embedded Civil Protection Team of emergency planning officers, have long been supporters of RAYNET, with shared fire station access for meetings, training and 24/7 stores requirements. All elements work closely together, especially with the annual build up and implementation of the CPT operations for the Royal International Air Tattoo held within the county at RAF Fairford. The new agreement encompasses a single shared command system, new mobilising protocols for emergency responders, and further joint communications resilience and training. In the photo are (L-R) Clive Webber, District Area Manager GFRS, Max, MOVNG, RAYNET Group Secretary, Carole Pittaway, head of Civil Protection GFRS, Andy, MOWBA, Gloucestershire County Controller.

Brazil gets 60m and more

ANATEL, the Brazilian telecoms regulator, has produced an updated band plan that releases 60m to their amateurs. This is the WRC-15 Secondary allocation 5351.5 to 5366.5kHz with 25W EIRP for Class A operators. In addition they have been granted another two new bands – 135kHz (1W EIRP) and 472kHz (5W EIRP). The 160m band in Brazil has been expanded to 1.8-2MHz and the 80m band now becomes 3.5-4MHz. The new frequencies are expected to come into operation in the week beginning 26 November.

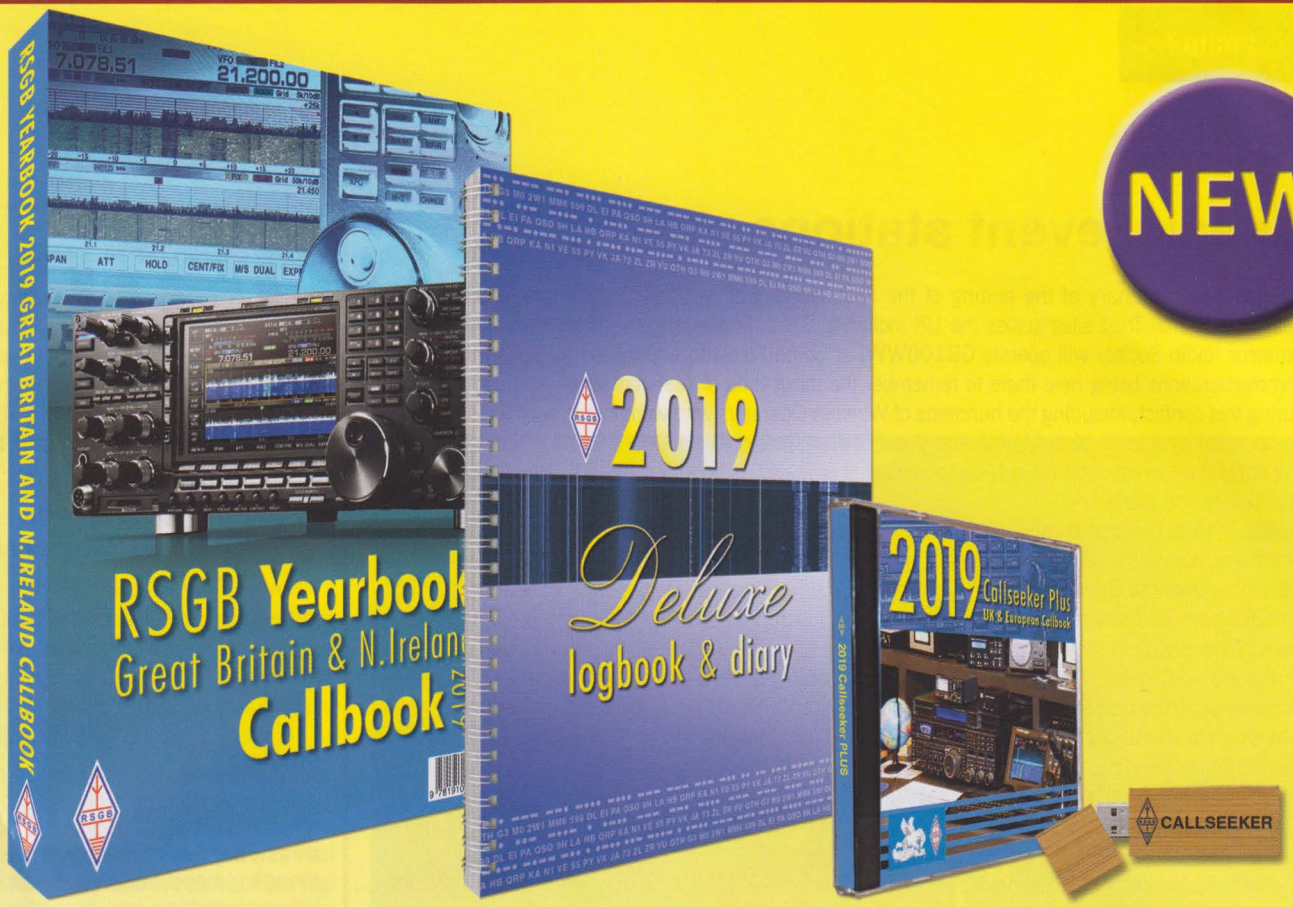
Nevada helps Sandringham

Nevada were delighted to assist the Sandringham School ARC (courtesy of Roger, G3SXW), by supplying a Yaesu rotator for their beam antenna. Headmaster Alan, G4DJX has set up an impressive radio club with pupils enthusiastic to learn about the hobby. "It is good to see younger people getting 'the bug' for amateur radio" said Mike Devereux, G3SED, Nevada MD.



Pubs and Clubs on the Air's inaugural event success

In all six stations took part in this inaugural year of Pubs and Clubs on the Air. Staffordshire, Cheshire, Yorkshire, Lincolnshire, Greater Manchester and Somerset were all represented. South Cheshire ARS operated GB4TRO in Harrisehead for the weekend and had a great takeoff East, South and West, with just the local landmark of Mow Cop hampering VHF/UHF to the north. GBOTGI near Bath, run by the Trowbridge and District RC was very successful with 392 contacts. The event was well received; thanks to everyone who worked any of the stations, and a huge thanks to the six stations that put the event on. Make a date in your diaries for 11 and 12 May 2019, PACOTA will be back!



NEW

RSGB YEARBOOK 2019

Edited by Mike Browne, G3DIH

There are more Great Britain and Northern Ireland callsigns on issue than ever and they are all included in the *RSGB Yearbook 2019*. With thousands of changes and updates included, this book contains the very latest details available with around 88,000 callsigns

The *RSGB Yearbook 2019* is also the most comprehensive guide available to amateur radio in the UK and worldwide. Starting with the latest information about the RSGB, its committees and services you will also find local information about our regional representation, affiliated clubs, contest groups and repeater groups. There is a huge section on operating, which covers from operating abroad, through Special Contest calls, RSGB Trophies, RSGB Awards to HF propagation forecasts for 2019.

Providing much more than a simple list of callsigns, the *RSGB Yearbook 2019* is an essential purchase for every amateur radio shack. The *RSGB Yearbook 2019* puts at your fingertips the best source of amateur radio information available.

210x297mm 528 pages,
ISBN: 9781 9101 9357 0
Non Members' Price £17.99
RSGB Members' Price £15.29

RSGB DELUXE LOGBOOK & DIARY 2019

For many there is nothing better than looking at a well maintained log book to bring back memories of challenging QSOs and memories of old friends. The impersonal face of a computer log is replaced by the tactile and easy to follow log book. If you are looking for an attractive way to record your log year by year the *RSGB Deluxe Log Book & Diary 2019* provides an ideal solution.

This logbook contains a wealth of extra material. Not only is there a generous log section with plenty of space for you to record a whole year activity, but much more. The *RSGB Deluxe Log Book & Diary 2019* contains the latest UK Band plans, RSGB Contest Calendar, DXCC prefix list and RSGB QSL Bureau information. It has 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 include. 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 2019* provides an attractive logbook that will grace any shelf for years to come.

Size 210x255mm, 80 pages
ISBN: 9781 9101 9344 0
Non Members' Price: £4.99
Members' Price: £4.24

CALLSEEKER PLUS 2019

The *Callseeker Plus 2019* not only benefits from the very latest UK and Northern Ireland callsign data but it also offers a host of European callsign data too. It is so easy to search for the callsigns included all on a simple to use interface that takes up no hard disk space as it runs straight from the CD or memory stick. You can search quickly by callsign, name or location and navigating through the search results is quick and easy. You can even print the results in a variety of formats including straight to an address label.

Callseeker Plus 2019 also includes the 50 sections and 170 pages of information from the *RSGB Yearbook 2019* in an easily searchable PDF format.

Two formats - one price
The *Callseeker Plus 2019* 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 an Eco bamboo shell. Both are highly portable and easy to use and provide a great alternative to the traditional RSGB Yearbook.

CD Version: ISBN: 9781 9101 9358 7
Memory Stick: ISBN: 9781 9101 9359 4 **Non Members' Price: £16.99,**
RSGB Members' Price: £14.44

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

Special event stations

To mark the centenary of the ending of the First World War, special commemorations are being held on National Trust sites across the UK including South Foreland Lighthouse. The Radio Officers' Amateur Radio Society will operate **GB100WWI** at South Foreland Lighthouse as part of the special commemorations being held there to remember the thousands of seafarers who sacrificed their lives during this conflict, including the hundreds of Wireless Operators who were lost at sea. The station will be operated by a team of ex-Marine and Coast Station Radio Officers from 10 to 12 November using CW only on all amateur bands subject to prevailing propagation conditions. QSLs will be via eQSL and Logbook of The World only.

The RNARS (Affiliated) London (HMS Belfast) Group has obtained the special callsign **GB100ARM** to commemorate the 100th anniversary of the Armistice. The callsign will be active from 1 - 28 November from the Bridge Wireless Office onboard *HMS Belfast* in London. QSL details are available on QRZ.com or from the group's QSL manager, Marc, G0TOC via g0toc@gb2rn.org.uk. See www.gb2rn.org.uk for details.

Poldhu ARC, which is based at the Marconi Centre, Poldhu will be operating **GB100MPD** to commemorate the cessation of hostilities of the First World War. At the outbreak of war, the station sent a message to all merchant ships informing them that hostilities then existed with Germany. During the war, control of the station was passed from the Marconi Company to the Admiralty. Messages were sent to Merchant ships using code and the callsign MPD. On Armistice Day, 11 November 1918, Poldhu again sent coded messages to merchant ships using the callsign MPD to advise them that hostilities had ceased. Poldhu ARC will be on air from 9-13 November.

North Queensferry Heritage Trust, with assistance from GM3MDX, is to operate an amateur radio station on various days from 4 November to 1 December (but particularly on 21 November), using **GB1FB**. The station itself will be located in the 'fisherman's hut' lying in the shadow of the Forth Bridge and next to the North Queensferry Light Tower. Over 300 ships from the Royal Navy, US Navy, Australia, New Zealand representing the Commonwealth and France all played their part as the German High Seas Fleet were escorted into the Forth, which became the 'last act of WW1'. This new facility aimed at attracting a younger audience who will be able to participate in WW1 themed code breaking and signal flag puzzles. The operation of the station is to be undertaken by members of the Museum of Communication Burntisland ARC ably assisted by members from the Glenrothes & District ARC transmitting on the 40 and 20m bands.

During the month of November, Chippenham & District ARC will be active with **GB1WWI** to commemorate the ending of World War 1. The activity will take place from the Chippenham & District ARC new QTH at Kington Langley Village Hall.

Grey Point Fort ARS will be on the air for 28 days with **GB1WWC** from Carrickfergus Castle, starting on 8 November. In addition, Grey Point Fort ARS members will also be operating from Grey Point Fort using **GB0GPF**. More information can be obtained on QRZ.com. QSL cards and a special certificate will be sent by email for confirmation of two way contacts. The main object of this exercise on 8 & 9 November is that school children, Scouts, Cubs, Girl Guides and the general public will be visiting Carrickfergus Castle, where they will be exchanging greeting messages between Carrickfergus Castle and Grey Point Fort ARS.

The Royals Signals Museum based at Blandford has a programme of taking the museum to schools and this November they are visiting Hillview School in Bournemouth as part of the 100 years since end of WW1. They are also setting up a special event station **GB100RSM** and hope to contact Belgian and French stations in area connected with WW1 on 6 and 7 November.

GB2RAF RAF Neatishead Air Defence Radar Museum will be off the air from 10 November to March 2019 due to the closure of the museum over the Winter period.

EI DX Convention

About 35 DXers gathered on the island of Inishmore off the west of Ireland from 14-16 September for the EI DX Féile. Foreign visitors came from the UK, France, Norway and the USA for a weekend of great craic, DX presentations, pile-up competitions, quizzes and operating from IOTA EU-006. Organiser Dave, EI9FBB pulled together the programme of activities at the Aran Islands Hotel in Kilronan and a team of helpers set up stations for HF SSB, CW, and data. The programme included 7Q7EI, the Irish IOTA tour, G3XTT on his expeditions, and F5UFX on 3B7A. Watch out for announcements next year about the 2019 event.

News in Brief

Kenwood has appointed **Martin Lynch & Sons** for amateur radio repairs as an authorised service centre. In addition, ML&S are the only service centre in the UK officially approved by Yaesu Musen (Japan), JVC-Kenwood and Icom UK with four engineers on site. To book your radio or accessory in for repair or health check, email workshop@mlands.co.uk or call 0345 2300 599.

Harwell ARS will be celebrating the 60th anniversary of their founding on 10 November with a day of radio-related activities and displays at Chilton Village Hall, Chilton near Didcot. Initially formed by radio amateurs who worked on the AERE Harwell site during the 1950s, the society has evolved over the decades to become a club of around 70 members serving the South Oxfordshire area. They look forward to welcoming friends old and new to the celebrations between midday and 5pm. Full details can be found on www.g3pia.net

On 8 September, operators from the **Essex DX Group** made what is thought to be the world's first moonbounce EME contact on a dipole antenna. At the other end was Bernd, DL7APV with his super array of 128 x 11-ele DG7YBN Yagis. At the MX0CNS end just 60W was used at the feed of a DG7YBN GTV2 2-ele Yagi with its reflector removed, leaving just the 'blade' dipole in place.

Sunday 18 November will see the first ever joint open day between **Nevada Radio and Waters & Stanton** at their warehouse and showroom complex in Portsmouth. Running from 10am to 4.30pm, major manufacturers will be in attendance to demonstrate their latest radios and there's a free burger and coffee for every attendee (available 11am to 2pm). The main warehouse will be opened to customers to wander around and pick up many one-off deals of the day, or pick through a large selection of vintage and used radio equipment. www.nevadaradio.co.uk

On 22 September between 1535 and 1610UTC, M5BXB successfully completed QSOs with G6ODA, M0HVC and M0IKO on 144.210MHz whilst airborne at 39,000ft on an Emirates flight from Mauritius to Dubai. Internet connection was not very stable due to lack of bandwidth but did allow for just over thirty minutes operation whilst off the Somalian coast. Measured internet speed on the Airbus A380 was just 48k using just an iPhone with the CommCat app linked to M5BXB's home station in Cheshunt, Herts, IO91xr.

News continues on page 44

Antennas

This month, we examine how an antenna's reciprocity can be observed from actual measurements.

An antenna's performance can be considered as being the same for both the transmit and receive modes of operation and this is often termed as *reciprocity*. This attribute may seem apparent; however it does not always seem intuitive.

Measurement technique

The measurement setup to be described was used to assess the reciprocity for a five element 2m Yagi beam antenna. This measurement technique was similar to the measurement setup described in last month's Antennas column that was used to obtain an indication of the radiation pattern for an antenna. However, this measurement setup was used to make measurements of the antenna when receiving and then transmitting an RF signal. The five element 2m Yagi beam used as the basis of the measurements is shown in Photo 1.

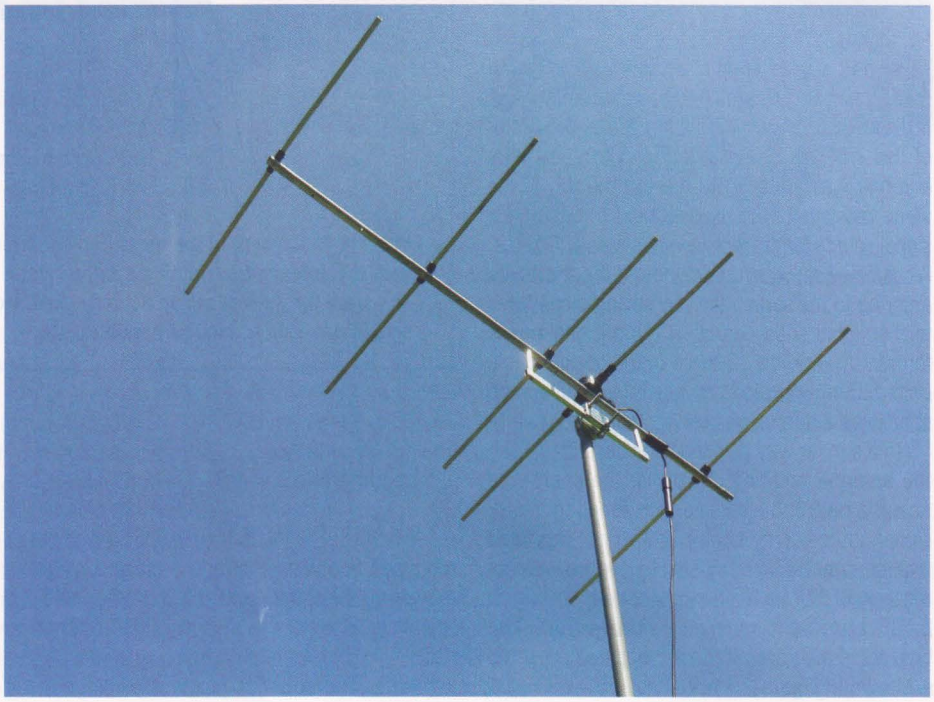


PHOTO 1: The 2m Yagi beam used as a basis for the reciprocity measurements.

Receive mode measurements

In a similar way as was described in last month's column, the five element 2m Yagi beam antenna was setup on a mast supported by a sturdy tripod to enable the antenna to be rotated through 360° with the antenna horizontally polarised. Using last month's Far-Field boundary table, the 2m antenna needed to be clear of any close objects by at least one metre (including any test equipment). Therefore, with the antenna mounted at 4.5m AGL, this allowed the antenna to be manageable while still keeping it in the Far-Field for measurement purposes [1].

The same circular protractor was used as last month and this was placed on top of the tripod. A pointer was attached to the mast to enable the angle to be read as the antenna was rotated at intervals of 15° (a template for the protractor used can be found in last month's column). The protractor/pointer arrangement used is shown in Photo 2.

A 145MHz low power signal source was placed at the same height as the antenna at a distance of about 12m from the end director of the 2m Yagi beam antenna using a mast supported by a tripod. The concept of the signal source used was similar to that described previously and comprised: a stable oscillator, buffer stage, filter, adjustable attenuator and internal battery to enable an extremely low level RF signal to be radiated from a short wire antenna of about 25mm in length. The power, measured where the antenna was connected, was about 10μW. The 145MHz signal source also included the facility to manually key the RF signal to enable the test transmissions to be signed on/off as appropriate during the measurements.

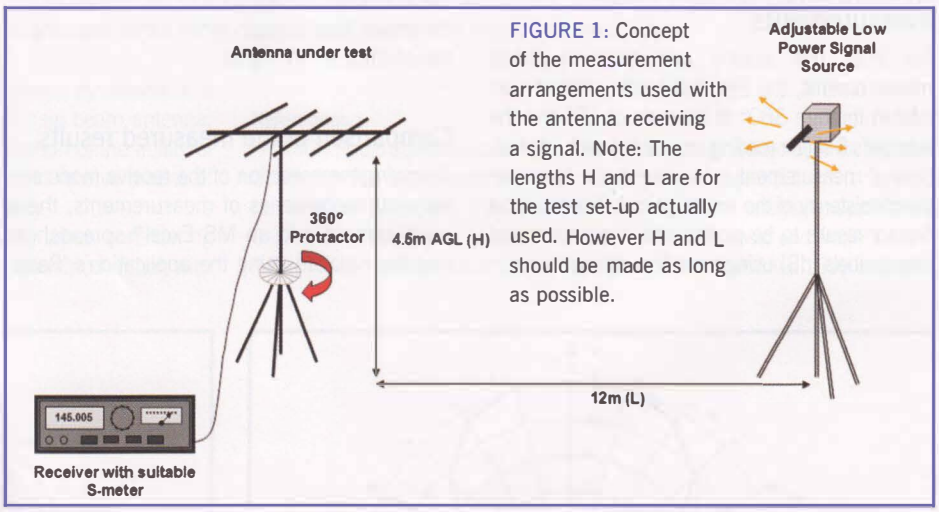


FIGURE 1: Concept of the measurement arrangements used with the antenna receiving a signal. Note: The lengths H and L are for the test set-up actually used. However H and L should be made as long as possible.

A coaxial cable was run from the antenna to a suitable receiver situated in the shack. The receiver used had an S-meter that was calibrated in half S-point steps corresponding to 3dB per step. With the antenna pointing directly at the signal source (ie 0°) and connected to the receiver, the receiver was tuned to the RF signal source. The receiver's S-meter was read and the signal source adjusted to give a consistent reading of S9 (ie a strength corresponding to 54dB above the receiver's noise level). The concept of the receive mode measurement setup is shown in Figure 1.

Mike Parkin, G0JMI
email2mikeparkin@gmail.com

Transmit mode measurements

To measure the 2m Yagi beam antenna in transmit mode the same measurement setup was used with the 145MHz signal source now connected to the coaxial cable run down from the antenna. The 145MHz signal source was placed at ground level beneath the tripod with sufficient coaxial cable provided to enable the antenna to be rotated through 360°.

A short wire antenna of about 25mm in length was placed at the same height as the antenna at a distance of about 12m from the end director of the 2m Yagi beam antenna. The short wire antenna was attached to the top the top of the same mast that was used to hold the 145MHz signal source for the receive mode measurements. A coaxial cable was run down from the short wire antenna to the same receiver, having moved this to a suitable shed nearby. A current choke was formed by winding 12 turns of the coaxial cable onto a 25mm plastic former just under where the short wire antenna was connected.

In a similar way as previously described, with the antenna pointing directly at the short wire antenna (ie 0°), the receiver was tuned to the RF signal source. The receiver's S-meter was read and the signal source adjusted to give a consistent reading of S9 (ie a strength corresponding to 54dB above the receiver's noise level). The concept of the transmit mode measurement setup is shown in **Figure 2**.

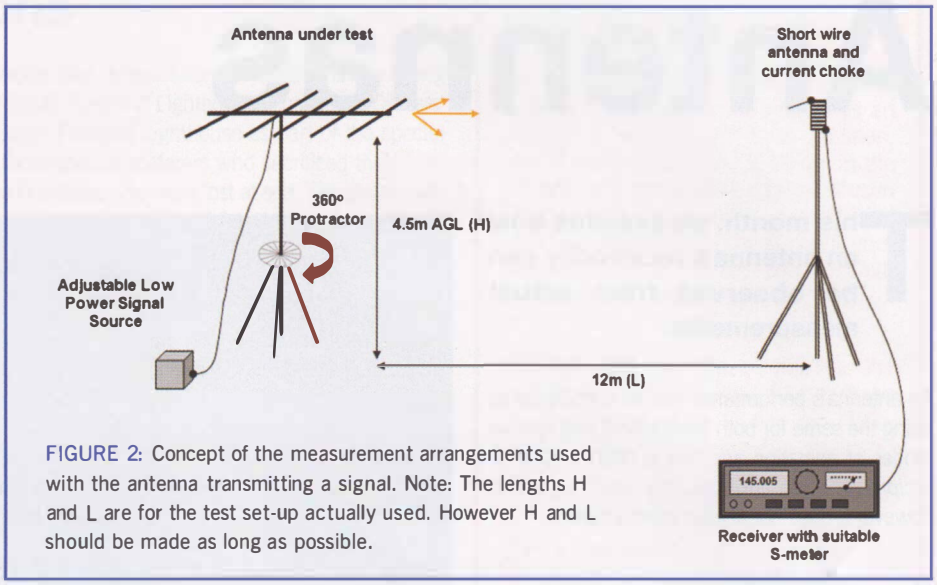


FIGURE 2: Concept of the measurement arrangements used with the antenna transmitting a signal. Note: The lengths H and L are for the test set-up actually used. However H and L should be made as long as possible.

Receive and transmit mode measurements

For both the receive and transmit mode measurements, the 2m Yagi beam antenna was rotated through 360° at intervals of 15° and the receiver's S-meter reading recorded at each interval. Several measurement runs were made to ensure the consistency of the results gained. To enable the S-point results to be plotted, they were translated into decibels (dB) using the following equation:

$$\text{Reading in dB} = ((S_{measured} \times 6) - 54))$$

Where $S_{measured}$ was the actual S-point result obtained from the receiver's S-meter. Using this equation, S9 equates to 0dB and other readings translate to a relative dB level (dBr) referred to 0dB.

Note: The equation provides a minus result to enable the measured data points forming the polar plot to be below 0dB. This enables the antenna's performance to be referred to the maximum field strength when either receiving or transmitting an RF signal.

Comparison of the measured results

Following the collection of the receive mode and transmit mode series of measurements, these were entered into an MS Excel® spreadsheet and then plotted using the application's 'Radar Plot' option to provide polar plots of the results obtained.

Figure 3 illustrates the results obtained as a polar plot (blue curve) for the 2m Yagi beam when used to receive the signal from the 145MHz signal source. **Figure 4** shows the results obtained as a polar plot (red curve) for the 2m Yagi beam when used to transmit the signal from the 145MHz signal source. When comparing the two polar curves, there are noticeable similarities between the measured receive mode and transmit mode polar plots. Both polar plots show a large lobe radiated ahead of the antenna with a smaller lobe radiated away from the rear of the antenna. Both polar plots show no evidence of any side lobes for the 2m Yagi beam antenna tested.

As a further comparison, **Figure 5** shows the transmit mode polar plot (dashed red curve) now transposed over the receive mode polar plot (blue curve). As can be seen, the two curves track each other fairly closely with only the rear lobe showing

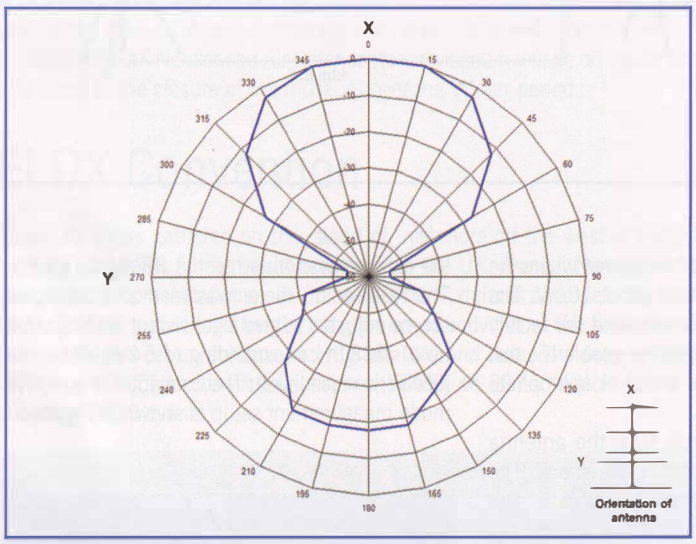


FIGURE 3: The measured polar plot for the 2m Yagi beam antenna in receive mode. Note that the outer scale is in degrees.

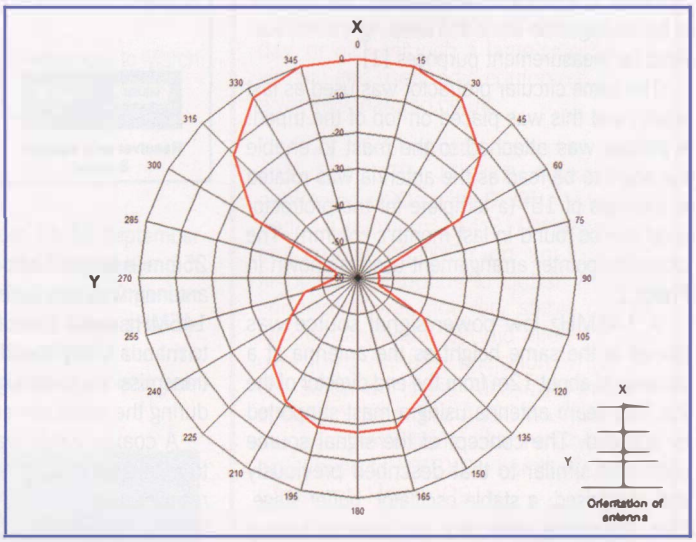


FIGURE 4: The measured polar plot for the 2m Yagi beam antenna in transmit mode. Note that the outer scale is in degrees.

PHOTO 2: The protractor and pointer arrangement used during the measurements.

any differences between the two sets of measurements obtained. These differences may have arisen due to accuracy errors because the receiver's S-meter was only able to be read to within a resolution of about 3dB. Even so, the receive and transmit mode measured polar plots follow the same general pattern.

Predicted and measured results

Figure 6 illustrates the predicted polar plot for the 2m Yagi beam made using the MMANA-GAL antenna analysis application [2] with the antenna horizontally polarised and modelled at 5m AGL. As can be seen, there are similarities between the measured polar plots and the predicted plot. The measured polar plots apparently show a larger rear lobe compared to the predicted plot for the 2m Yagi beam antenna. However, the measured polar plots used a linear dB axis while the predicted plot does not and this means that care is needed when examining the measured and predicted results. The measured results indicate a Front/Back ratio of about 18dB for the antenna, while the prediction suggests a Front/Back ratio of about 15.25dB. Allowing for any measurement errors, these Front/Back ratio results are quite close.

To summarise: the measured received mode, the measured transmit mode and the predicted polar plots follow the same general pattern for the antenna and serve to provide a practical demonstration of the concept of reciprocity for an antenna.

Conclusion

This month, an antenna's reciprocity has been examined by means of a series of measurements made for a five element 2m Yagi beam antenna. The results obtained have provided a reasonable indication of the ability of this antenna to perform equally in both the transmit and receive modes of operation as a demonstration of an antenna's reciprocity.

This is a useful attribute for an antenna because, when considering the antenna's radiation performance, this could be examined either with the antenna transmitting or receiving an RF signal, whichever is the more convenient to measure, provided the physical measurement conditions and constraints are kept the same.

PHOTO 3: The 6m/4m dual-band Yagi beam featured in the September Antennas column in use in the loft at G4FOY's QTH.

Reader feedback

A dual-band 6m/4m Yagi beam was recently described in the September Antennas column. Ken Scott, G4FOY has sent in a picture of the dual-band 6m/4m beam that featured in the Antennas column that he has now installed in his loft (along with a 2m/70cm dual-band beam). Ken installed a rotator to enable the antennas to be turned as shown in Photo 3. Using the 6m/4m dual-band beam Ken reports working several UK stations during the RSGB 6m/4m UK Activity Contests and a number of stations right across Europe during the Sporadic-E season this summer. It is good to see the antenna in use, thanks Ken for the information and picture.

References

[1] *RSGB Radio Communication Handbook*, 13th edition edited by Mike Browne, G3DIH. Section 13 Antenna Basics and Construction. Page 13.1.

[2] MMANA-GAL basic V3.0.0.31, freeware antenna analysing application. Original code by Makoto Mori, JE3HHT. MMANA-GAL basic and MMANA-GAL Pro by Alex Schewelew, DL1PBD and Igor Gontcharenko, DL2KQ. 1999 onwards.

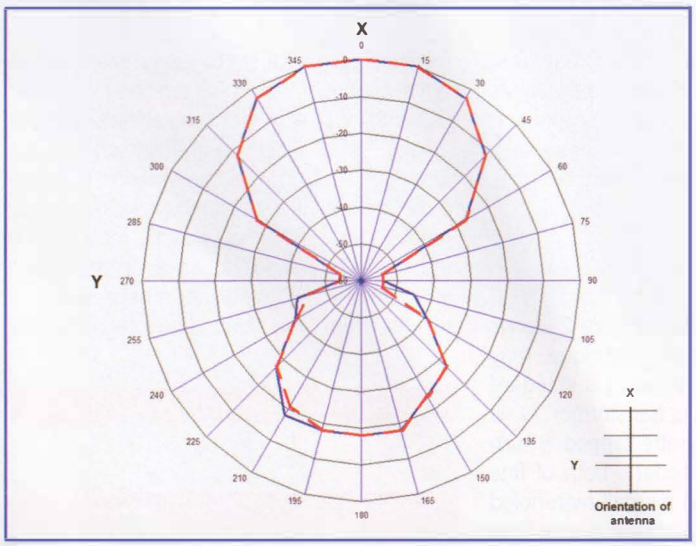


FIGURE 5: The measured Rx (blue) curve with the Tx mode (red dashed) curve superimposed over it for the 2m Yagi. Note that the outer scale is in degrees.

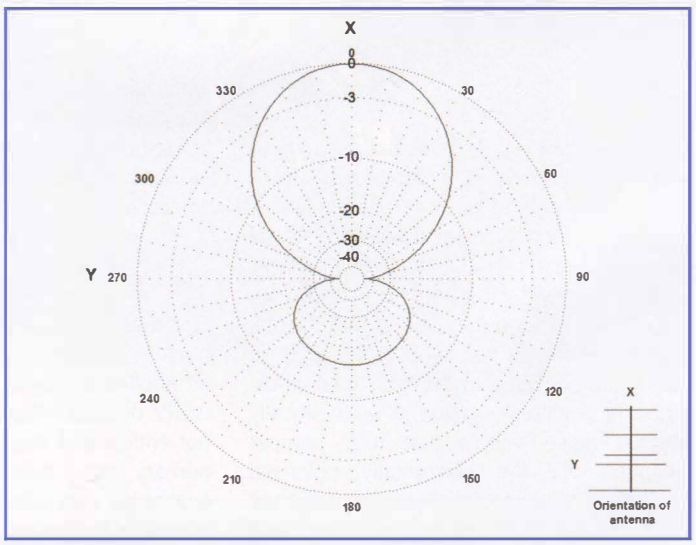


FIGURE 6: The MMANA-GAL predicted polar plot for the 2m Yagi beam antenna. Note that the outer scale is in degrees.

Make yours a QRM eliminating antenna

Do you have a G5RV or similar doublet antenna with balanced vertical feed line? Do you suffer from multiple sourced VDSL or similar local electrical QRM when listening on the 80m band? If the answers are affirmative then read on.

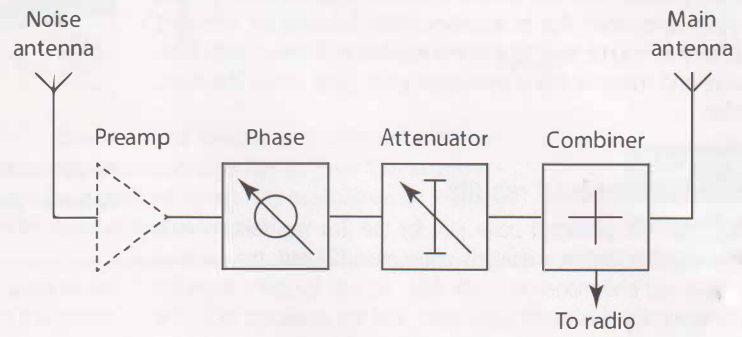


FIGURE 1: Typical arrangement of a conventional noise antenna arrangement.

Convention

QRM from a single direction or source may be reduced by combining an out-phased sample from a 'noise' antenna with that from the main antenna. **Figure 1** shows a typical arrangement. Such systems require space to electrically and physically separate the two antennas. Both antennas need to have the same reception pattern for noise, or the noise antenna may introduce QRM otherwise not audible on the main antenna, especially when the main one is a directional type. The second antenna may also introduce a null in the direction of signals that you are trying to hear. A wideband preamp allows a compact 'noise' antenna to be located close to a particular QRM source. This can make the system less directional to wanted signals but it may introduce other noises, not audible from the main antenna. Passive systems are preferred because a wide band preamp may not have such high dynamic range as your receiver and may therefore become a source of in-band intermodulation products from broadcast and other strong signals.

Consider this theory

At any instant in a particular location a doublet receives H field components of a local QRM signal after some attenuation by ground reflection; whereas a vertical antenna receives un-attenuated E field components leading in phase by 90° from the H field. With a T connection, the feed line of a horizontal doublet becomes a vertical antenna because no net current flows in the horizontal wires. A greater amplitude version, of *all* the locally sourced noise signals that may hamper reception via the horizontally polarised doublet, is therefore available as common mode current on its vertical balanced feed line. Normally we rely on a balun to keep common mode noises out of the receiver but we make use of them in the passive signal processing application described here. When the signal you are receiving is propagated at high angles of incidence it will produce a stronger received signal in doublet mode than in T mode. These are signals arriving at elevation above about 35° from distances up to a few hundred kilometres. We can reduce the audible noise *in this situation* by combining the doublet and common mode sets of noise signals. They should cancel after both equalisation of their amplitudes and addition of a further 90° relative phase advance, to put them in antiphase. Because both the doublet and T antennas are co-sited, their combined reception pattern has negligible directivity for high angle wanted signals and only slight directivity for local QRM when, for example, the source is closer to one half of the doublet. You may ask, what happens to the combined components of a wanted signal? The doublet component, being strongest, should only be marginally reduced when the weaker T component is subtracted.

Practical example

The simple passive circuit in **Figure 2** shows how this noise reduction technique may be applied on the 80m band at a standard G5RV doublet. Wideband transformer T1 is not critical and has a centre tapped 8 turn primary and 4 turn secondary, both of fine enamelled wire wound in a small twin-holed or toroidal ferrite core. Signals and noises from the horizontal doublet appear at its secondary winding. Common mode signals from the

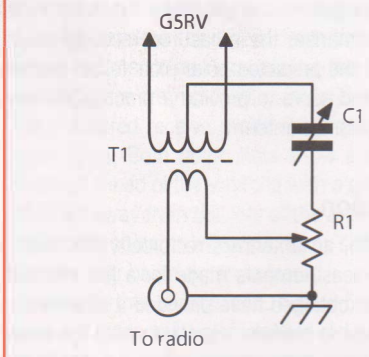


FIGURE 2: Applying the noise reduction technique to 80m. See text for details.

feed line accompanied by exaggerated noises are available at the centre tap of T1. Variable capacitor C1, also not critical but of about 200pF, is provided to initially cancel the inductive reactance of the antenna when in T mode. As C1's capacitance is subsequently reduced from that necessary for resonance it introduces reactance to advance the phase of current in R1. Further phase advance results from the feed line delaying the

Continued on page 44

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High power LPF for 80/40m SO2R

Introduction

The changes to the rules for the RSGB 80m AFS contest that transformed it into a dual band 80/40 event with no 'time on band' restrictions makes single operator two radio (SO2R) operation a possibility.

The current HF NFD open section rules provides for SO2R with 100W output. Several groups have gone down the route of triplexers and band pass filters (BPFs) to exploit this possibility. In both cases only one transmitted signal can be radiated at any one time. With 80/40m AFS the power level is full licence power (up to 400W) and this makes for extra challenges in terms of finding suitably rated components. It also requires finding an extra 6dB of rejection of the 'other' band. The homebrewed filter shown in **Photo 1** meets these requirements.

PHOTO 1: General view of the completed filter.

Possibilities

A typical SO2R setup is shown in **Figure 1**. 100W rated band pass filters – usually to the excellent design by Ed Wetherhold, W3NQN – are inserted between the outputs of the 100W radios and their respective amplifiers. The 80m amplifier has a 400W rated low pass filter (LPF) inserted in its output and this filter must explicitly provide high attenuation in the 40m band.

The 100W filters reject much of the unwanted harmonic and spurii that are produced by the transmitters. On receive their rejection of signals on the 'other' band prevents problems of blocking of the receiver. The antennas for the 80/40m AFS contest need to be suitable for near vertical incidence skywave (NVIS) and most operators would select half wave dipoles at an appropriate height. These antennas should be erected at right angles to each other to minimise the coupling between them since this adds to the total rejection of the 'other band' signal.

There is an issue with the amplifiers in that they will generate some harmonic output after the transmit signal has passed through the 100W-rated filter. In particular, the 80m amplifier is likely to have a significant second harmonic on 40m. It is essential to have a LPF on the output of the 80m amplifier capable of withstanding the full licensed power of 400W. This filter needs a peak of attenuation on 40m.

Design history

The design presented here has some interesting innovative construction features although the electrical design is that of Ed Wetherhold as presented in the February 1999 issue of *QST*. It is basically a three section LPF with the centre coil resonated to give maximum attenuation on 40m. In his article, Ed showed that a seven element Chebyshev SVC low pass filter offered poorer return loss and poorer attenuation of the second harmonic than the design presented in **Figure 2**, which he named as a "Chebyshev with Added Zero" 7 element design.

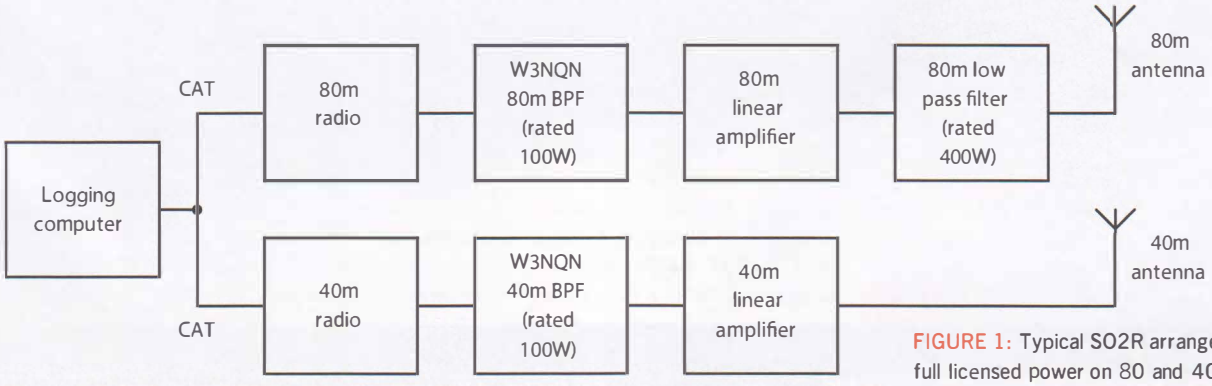

FIGURE 1: Typical SO2R arrangement for full licensed power on 80 and 40m.

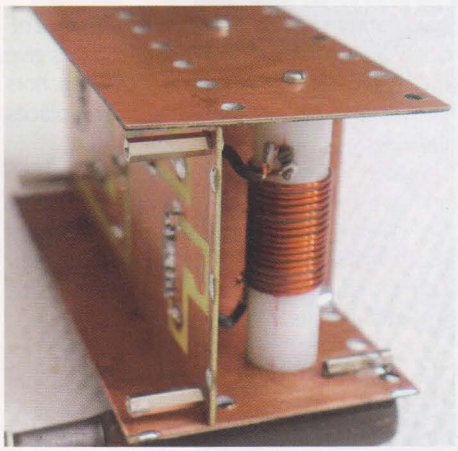

PHOTO 2: How the enclosure side plates are attached to each other by the coil formers.

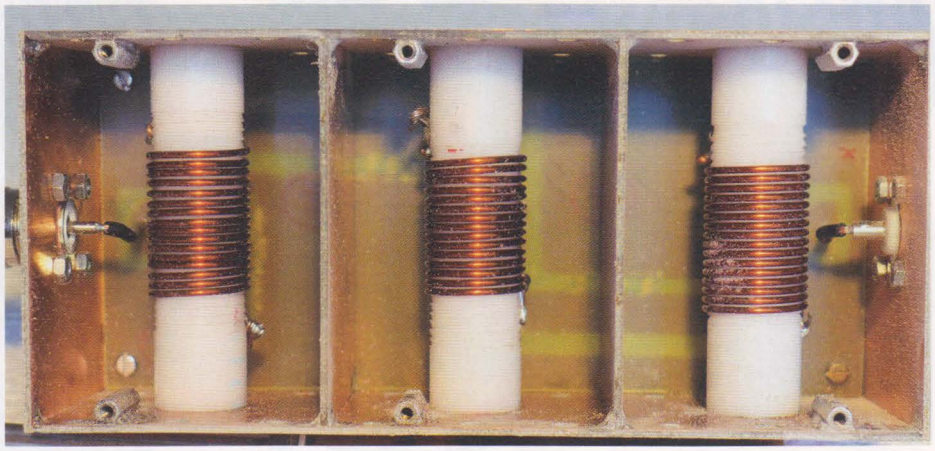

PHOTO 3: View from underneath the filter showing the 80mm by 60mm compartments for the coils. These compartments are 60mm deep in this view.

Components

High power filters present particular problems as far as the capacitors are concerned. These must be low loss and also able to withstand the (significant) currents and voltages present in the filter. High power surface mounted capacitors were used and the basis of the design is to use air cored coils wound on 20mm diameter acetal (aka Delrin) rods, not tubes. Hence the coils are more accurately described as acetal cored. These coils can easily be adjusted to give any exact inductance, which would be more difficult if dust iron toroids were employed. They are also less lossy.

It is important to space the turns accurately. Ideally, a lathe is needed to perform some operations on the acetal rod. The steps are:

- Part off the 20mm diameter acetal rod so that three 80mm lengths are obtained with true and flat end faces.
- Drill and tap an axial hole in each end of each rod with an M3.5 thread.
- Cut a helical groove (you'll need a thread cutting attachment for the lathe) at 12 turns per inch over the central 40mm of each rod. These grooves keep the turns located with a small air gap between the adjacent turns of 1.5mm diameter copper wire. This serves to reduce the self-capacitance of the coils.

Results will vary with the depth of the grooves. As a guide, make the grooves just deep enough to hold the turns in position and no more. I realise that many amateurs will not possess a lathe but do ask around – a fellow club member may have something like a cheap Chinese-sourced mini lathe, which is perfectly capable of the operations listed.

Should a lathe be unavailable then a result can be obtained with hand tools as follows.

- Cut three lengths of 20mm diameter rod about 5mm over length (that is 85mm instead of 80mm). Use pieces from both ends of the rod as purchased since these faces are likely to be square and true already. A third length must be sawn at both ends. Use a carpenter's mitre block and a hacksaw with a fine toothed blade to make these four cuts.
- It is more important to have the three pieces with exactly the same length than to have the length precisely 80mm. If the length is not exactly 80mm then the width of the top and bottom plates (together with the two end plates) can be adjusted accordingly.
- Position and clamp the three pieces in the mitre box so that the ends remote from the saw slot are exactly level with each other. Position all three ends together and side by side, so that a common final length will be cut by sawing off the excess at 80mm.
- Drill the axial holes (2.9mm diameter drill) by eye and try to get the holes centred on the ends of the rods and as close to parallel with the axis of the rods as possible. Tap the holes M3.5.

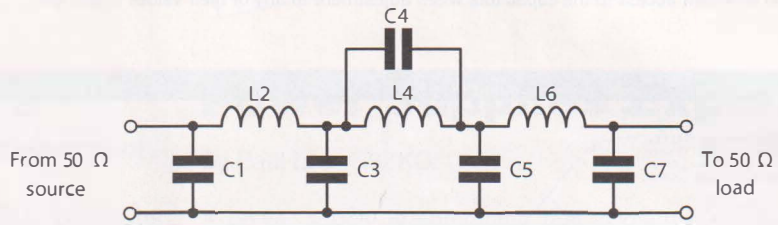

FIGURE 2: Original circuit. For an 80m LPF, C1 = C7 = 860pF, C3 = C5 = 1300pF, C4 = 197pF, L2 = L6 = 2.68μH, L4 = 2.43μH.

Winding the inductors

To wind the coils without a lathe-cut groove to position the turns, attach one end of the 1.5mm diameter wire about 20mm from the end of each rod, by soldering to an M2.5 solder tag fixed to the rod with a small self tapping screw. Then, with the help of an assistant, wind the wire onto the rod with a nylon spacer thread of 0.70mm diameter between the turns of copper wire (50-60lb monofilament fishing line is about the right size). Terminate the wire by soldering to a second M2.5 solder tag. The same method of fixing the turns is used with a lathe cut groove.

The ends of the windings are secured by drilling small diameter holes in the rod and using small self-tapping screws to hold 8BA solder tags, to which the ends of the windings can be soldered.

A means of measuring inductance is needed. I found that 16.25 turns were needed to give 2.70μH for L2 and L6, while 15.25 turns gave 2.46μH for L4. Your coils will probably need a very slightly different number of turns to give the right inductance values.

Wires are then soldered to the same six points (on L2, L4 and L6) to connect the coils to the capacitor PCB 'tray'.

Photo 2 shows how the two side plates of the filter enclosure are attached to each other by the coil formers. The filter is on its side in the picture, so the side plates are at the top and bottom.

The capacitor PCB (described later) is in position. On the left side of the photo you can see the threaded M3 hex spacers to hold the top cover in place. Soldered to the side plates on the right of the photo are more 20mm hex spacers to which the bottom cover will be attached.

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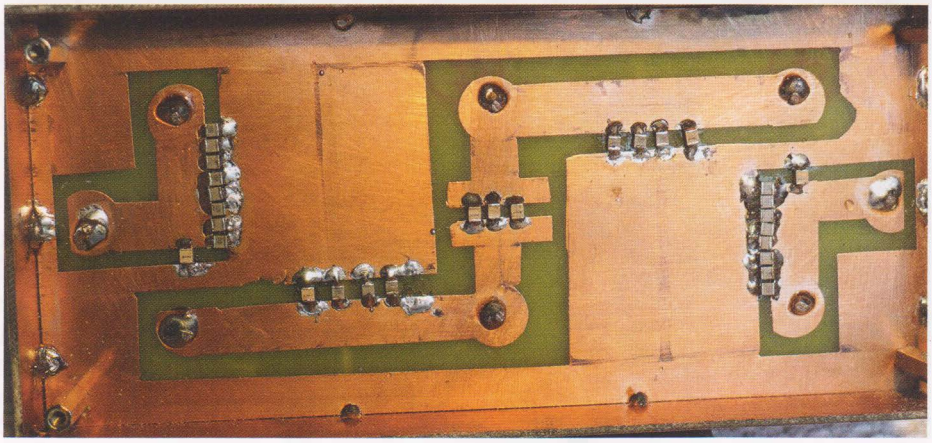


PHOTO 4: Looking down from above the finished filter with the top cover removed to show the capacitor PCB or 'tray'. This compartment is 20mm deep, dictated by the length of the threaded M3 spacers used to attach the lid. Wires from the coils are threaded through holes and are seen soldered to the large circular pads. Soldering this PCB to the inside of the end and side plates gives an extremely solid mechanical design and excellent access to the capacitors when adjustment to any of their values is required.

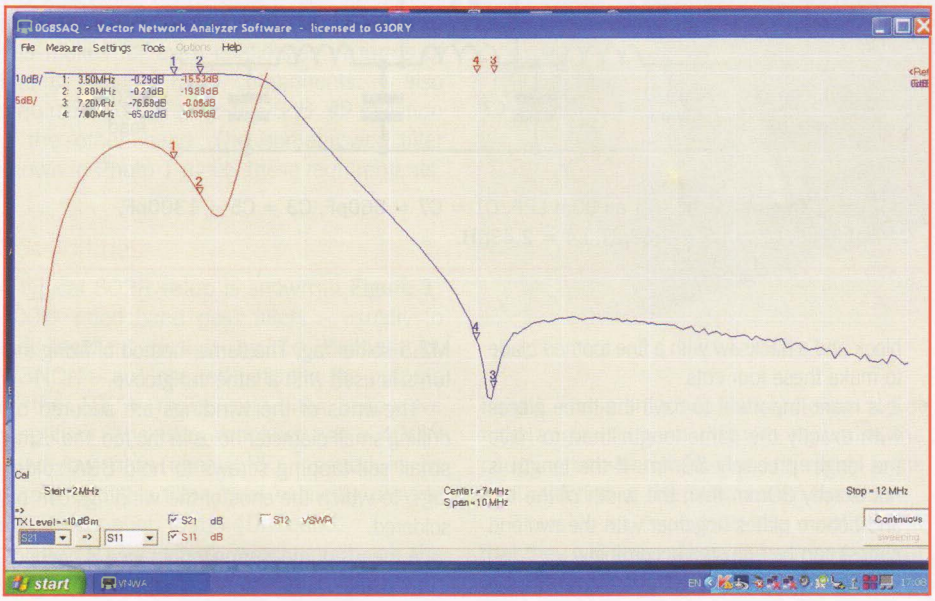


FIGURE 3: Screen grab of the vector network analyser results for the finished filter. S_{11} is the input return loss in dB and is shown by the red curve. S_{21} is the forward 'gain' of the filter in dB (as it's a passive device this is always going to be negative). A satisfyingly large value is shown by the blue curve at 7.1MHz.

The two side plates of the enclosure are made from double sided PCB material and these have 3.5mm diameter holes drilled for the coil formers. Clamp the two plates together and drill both plates together to obtain perfect alignment. The coils are each mounted at the centre of a 60mm by 60mm compartment (80mm deep) divided by screens, as shown in **Photo 3**. The coils should be attached to the side plates with M3.5 brass screws.

The 20mm M3 treaded hex spacers that were visible in Photo 2 can be seen soldered to the side walls in Photo 3. The end plates (80mm by 80mm) can be seen in Photo 3 with the SO239 sockets attached. The board behind the coils is the single sided PCB of the capacitor tray (described later) with the tracks and SMD capacitors on the other side.

The capacitors

The capacitors are the most difficult components to source. I took advice from David, G3YYD and used high power RF porcelain capacitors made by American Technical Ceramics, which were sourced from [1]. Values up to 100pF are available at 500V rating; above this value, 300V components are available. In general, the bigger the capacitance required, the lower will be the voltage across it.

8x100pF at 500V plus 1x56pF at 500V were used to get the 860pF for C1 and C7. These can be seen at the left and right sides of **Photo 4**.

The voltages will be lower for C3 and C5 (if you are unsure, consider C1 and L2 as an L match from the 50Ω input and thus transforming the impedance down). A 1nF 350V and three 100pF 500V capacitors give the required 1300pF. These four capacitors can be seen clustered together in two places in Photo 4.

Visible at the centre of the photo are 2x75pF and 1x47pF to make up the 197pF required for C4. When the filter was tested, the maximum rejection of 40m was a tad too high in frequency and an additional 27pF (500V) had to be added to get the desired results.

Test Results

Figure 3 shows the test results. The blue line for S_{21} is the most interesting because it shows the attenuation in the 80m band (less than 0.3dB, or 26W loss for 400W input from the amplifier) and the attenuation in the 40m band where the marker #4 is set to 7.00MHz and the marker #3 is 7.20MHz. A perfectionist would want to add a little more capacitance to C4. The attenuation at the poorer #4 marker is still over 65dB, which is an excellent result.

A number of 6mm dia holes were drilled in the side plates to provide ventilation for the 26W of dissipation (see Photo 1).

In reality there is little point in further tweaking C4 since these results were obtained when the filter was connected between an accurate 50Ω source and load. In practice the output impedance of the amplifier will only be approximately 50Ω and the feed point impedance of the antenna will vary quite a lot around resonance (even assuming that it actually *is* resonant in the 80m band). These factors will give slightly less good results.

The red S_{11} curve shows the input return loss of the filter. It can be seen that this is best just above the 80m band but the in-band results are acceptable.

Conclusion

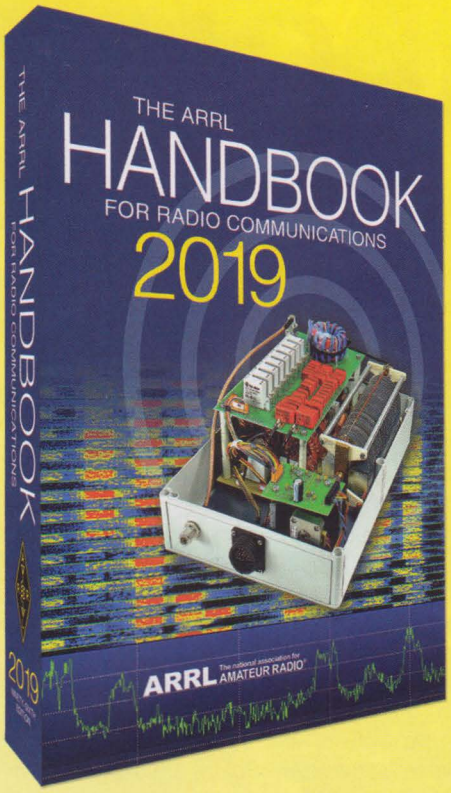
The completed filter provided excellent rejection of the 80m second harmonic during 80/40m AFS in 2018 whilst running the full legal power of 400W output. This, coupled with the alignment of the two antennas, allowed the operator to listen to the whole of the 40m band while transmitting on 80m.

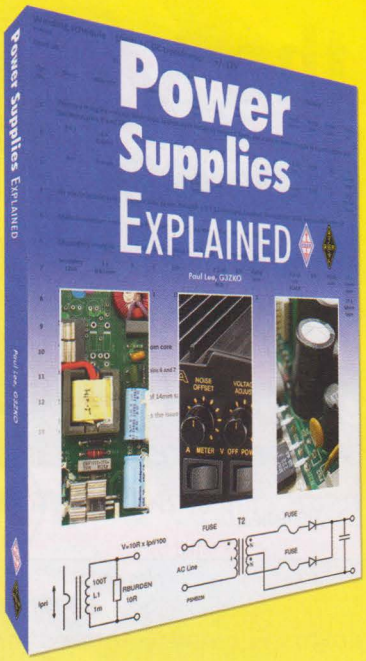
Acknowledgement

A version of this article was first published in the De Montfort University ARS club magazine and is used here with permission.

Websearch

[1] www.enigma-shop.com (look for 'high power RF porcelain capacitors')





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Power Supplies Explained

By Paul Lee, G3ZKO

A power supply is something that is often overlooked by radio amateurs, as for many it is simply the box that provides stable DC voltage. A modern power supply is though much more, combining theory that dates back to the nineteenth century incorporating the latest techniques in digital control, with a wealth of electronics practice in between. *Power Supplies Explained* sets out to explain what that box is doing, through to designing your own bespoke power supply.

Beginners are wary of the challenging mixture of digital, analogue, magnetics and control loops, with cooling, EMC and safety to contend with as well. *Power Supplies Explained* seeks to detail how circuits are chosen for the application and how circuits are designed including their inductors and transformers. Calculations are outlined in a simple way so that the reader can use them as a basis for their own designs.

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National Club of the Year 2017

Clubs from up and down the country entered the hotly-contested Club of the Year competition, which is generously sponsored by Waters & Stanton.

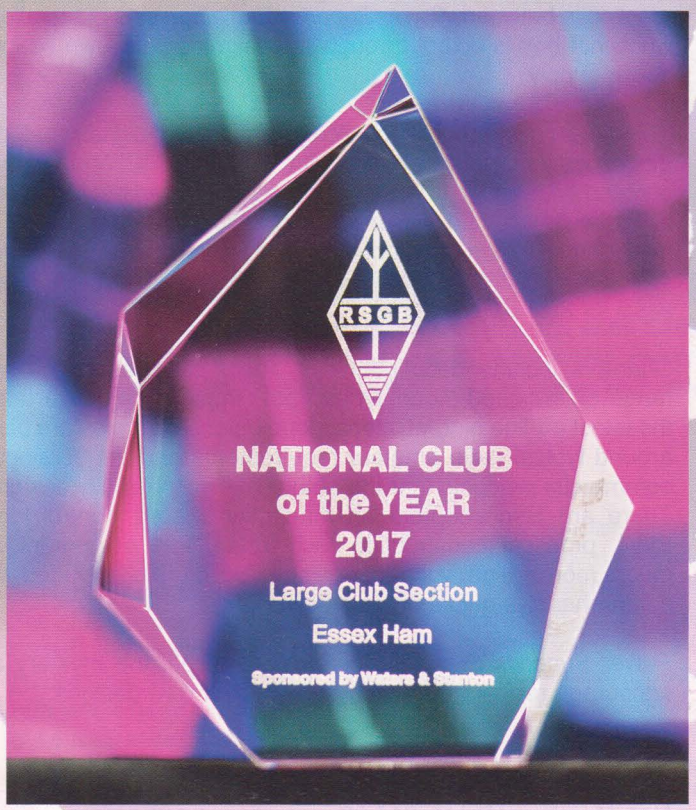
There are two categories: Small Club (under 25 members) and Large Club (organisations with over 25 members). Any RSGB Affiliated Club that wants to participate is invited to fill in a questionnaire that asks about how the club encourages licence progression, mentoring, motivating newcomers, activities to help people explore new areas of the hobby, and what they do to promote amateur radio to the wider community. There's also a 'free text' section for the club's representatives to say anything they wish about what makes their club special, with the opportunity to include some photos to illustrate what the club does.

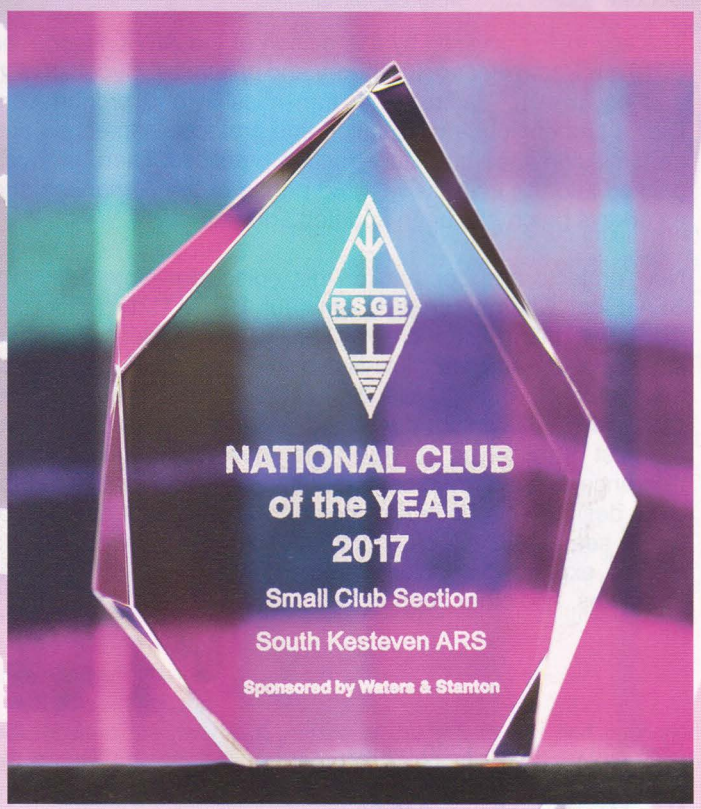
Judging of the regional 'heats', for want of a better word, was by each area's RSGB Regional Representative, who chose Regional Winners in the Small Club and Large Club categories. You may have seen various announcements in *RadCom* about these Regional Winners in the last few months.

Thank you to every single club that took part – the RSGB salutes your efforts in forwarding the cause of amateur radio.

Once the Regional Winners had been decided, the competition hotted up. All of the Regional Winners' questionnaires were considered by the RSGB Board, discussed in great detail and – once the deliberations had reached their climax – voted upon.

The top three clubs in each category were then informed by the RSGB that they had won a prize, so that they could make arrangements to attend the National Hamfest on Saturday 29 September. But the final result – who had come third, second and first – was a closely-guarded secret right up until the moment the RSGB President, Dave Wilson, MOOBW and Peter Waters, G3OJV started making the actual presentations at 11.30am on that day. The tension in the air was almost palpable, with dozens of club members and casual observers waiting with bated breath. Then the President began to speak...





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The magnificent engraved trophies awarded for first place in the Club of the Year 2017 Large Club and Small Club categories. Each is a weighty piece of solid glass, about 50mm thick.

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

Large Club 3rd place went to Stockport Radio Society, from Region 3, gaining them a certificate plus £50 worth of RSGB vouchers.

Large Club 2nd place went to Wythall Radio Club, from Region 5, who won a certificate and £250 worth of Waters & Stanton vouchers.

The overall winner of the Club of the Year 2017 Large Club category was Essex Ham, from Region 12, who were awarded the magnificent trophy (see photo opposite), a certificate, and £500 in Waters & Stanton vouchers.

In third place in the Small Clubs category was Greenisland Electronics and Amateur Radio Society, from Region 8, gaining them a certificate plus £50 worth of RSGB vouchers.

Small Club 2nd place went to South Bristol Amateur Radio Club, from Region 11, who won a certificate and £250 worth of Waters & Stanton vouchers.

The overall winner of the Club of the Year 2017 Small Club category was South Kesteven Amateur Radio Society, from Region 13, who were awarded a magnificent trophy, a certificate, and £500 in Waters & Stanton vouchers.

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VDSL2 radiation and its signal characterisation

The RSGB Legacy Committee has funded a project to develop EMC analysis software tools for the EMC Committee to use when supporting Members. This article describes the state of play of the first stage of that work, a sophisticated tool to detect VDSL interference.

The EMC committee of the Radio Society of Great Britain has been monitoring sources of RFI for many years. A particular problem for HF communications is that the density of modern digital equipment in the home is ever increasing. In many cities it is now virtually impossible to receive any but the strongest HF transmissions.

It is normally assumed that, below 30MHz, testing for conducted emissions is sufficient to ensure compatibility. In the case of equipment that is not explicitly intended to transmit over air, it is further assumed that only the equipment and not its cabling needs testing. In the case of network ports this judgement appears to be based on the assumption that the cabling is able to carry the intended signals without excessive emission.

There are various Digital Subscriber Line (xDSL) standards in use in the UK. These range from ADSL1 using frequencies up to 1.1MHz through VDSL2 up to 17.664MHz in the UK, and a few installations of the new G.Fast that has versions that go up to hundreds of MHz.

Our investigations have shown that the biggest problem for HF communications at present is VDSL2. This has been difficult to prove as often VDSL2 broadband interference goes unrecognised since it looks like background noise. This is not surprising as any characteristic of a communication system that is distinguishable from white noise represents inefficiency in the use of the spectrum. Since VDSL2 is broadband and can approach the Shannon limit [1] over its entire bandwidth it is difficult to identify. This has, in the past, misled Ofcom into the conclusion that there is no problem with VDSL2 as all one sees is what looks like (elevated) background noise.

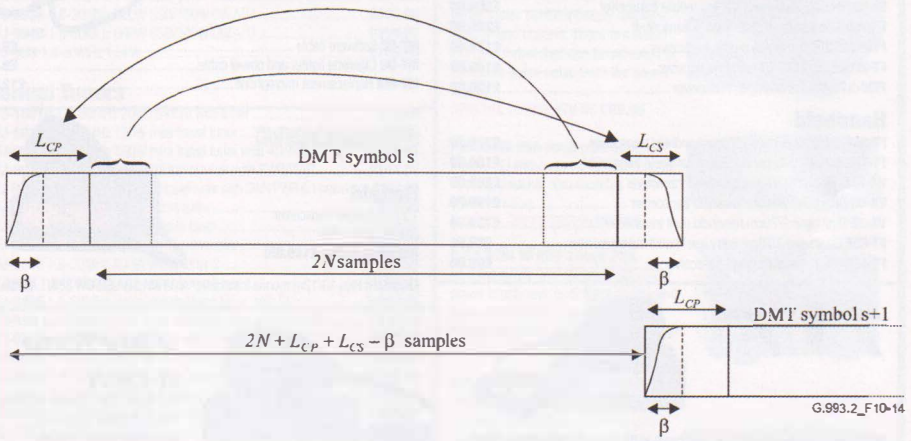

FIGURE 1: Cyclic extension, windowing and overlap of DMT symbols.

RFI survey setup

Measurements are typically made using a broadband magnetic loop such as a Wellbrook ALA1530 and the RF signals captured to a wave file (.wav) using a software defined radio (SDR). SDRs are used as they are commonly available and, with the correct processing, can produce good relative results. The sampling rates of the recording can be as low as 96kHz but 2MHz or more will produce clearer results provided the host PC doesn't drop any samples. These wave files are then processed using the software *Lelantos* I have developed. This article explains how this is done and describes some of the key results.

How to detect VDSL2 RFI

To detect modern digital communications signals such as VDSL2 within an RF recording, one needs to understand the coding techniques used and any aspects of them that are less random. There are two key features of a VDSL2 signal that are not fully random. These are Sync symbols and the Cyclic Extension.

A VDSL2 system typically has 4096 carriers and has a typical symbol rate of 4000/second. Each symbol carries of the order 10,000 bits spread over the carriers. Of these symbols, 256 out of every 257 carry data. The 257th is the same structure but is a sync symbol. All these symbols appear random. The data symbols have been scrambled with a pseudo random sequence. However, the sync symbol is a fixed pseudo random sequence and is nominally the same every time. Thus if one can find this sync symbol one can in principle detect this within background noise and thus measure the strength of the VDSL2 signal relative to the noise. However, this signal is not strong, being only 1/257th of the total VDSL2 noise power.

Before anything else can be achieved one needs to align one's measurement system, not only with the xDSL symbol rate but with its timing. An xDSL system starts up with a training phase during which timing parameters are exchanged and symbol alignment is established. This alignment is then maintained to high accuracy using digital phased locked loops relative to a crystal reference. It is not practical for a remote measurement system to obtain this information directly.

To obtain symbol alignment, one can make use of the second non-random feature of an xDSL system. This is the cyclic extension mechanism. This forms the core of the current measurement system as follows.

An introduction to cyclic extension

In any communication system that encodes data into symbols, a limiting

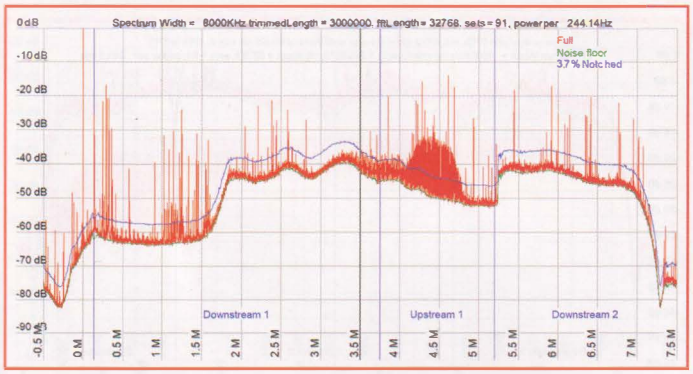

FIGURE 2: Recording from an SDRplay RSP1 centred on 3.5MHz.

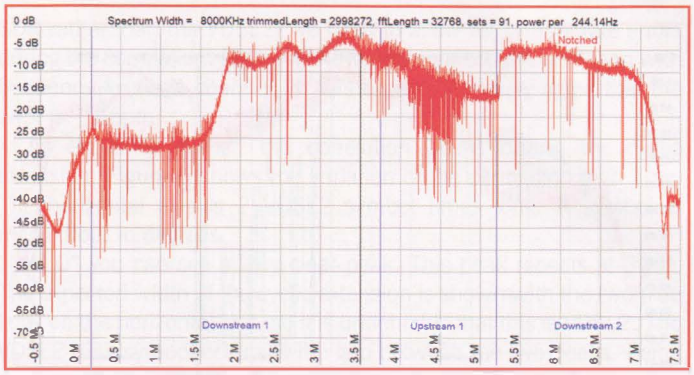

FIGURE 3: Processed version of Figure 2 with notching and scaling applied (see text).

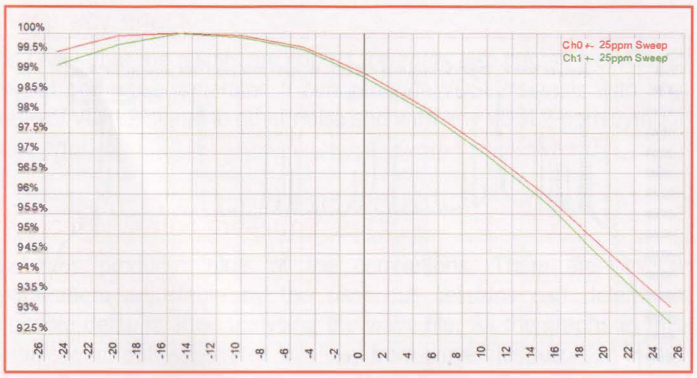

FIGURE 4: Variation in correlation with frequency for each channel.

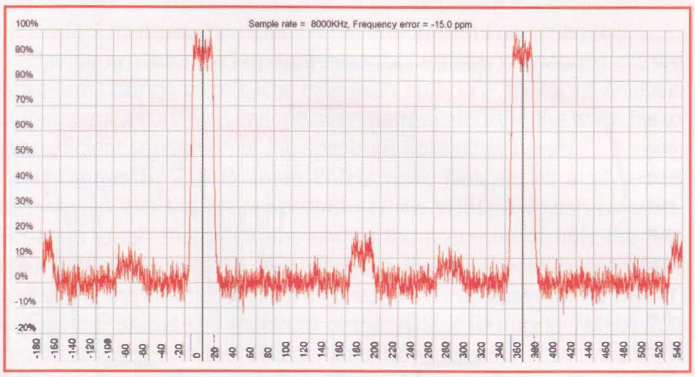

FIGURE 5: Variation of correlation with time.

factor is inter symbol interference. This results from dispersion in the media such that signals arrive spread out in time relative to when they were transmitted. To avoid these signals impinging on the following symbol one needs to leave gaps between symbols to allow time for the transient response ('ringing' of the line) to die down. In an xDSL system, Discrete Multi-Tone (DMT) symbols are constructed using an Inverse Fast Fourier Transform (IFFT). For VDSL2 this typically generates 4096 carriers at 4.3125kHz spacing. The individual carriers are modulated with (scrambled) data using Quadrature Amplitude Modulation (QAM). Thus each individual symbol looks like a random mush with a potential frequency spectrum from DC to 4.3125kHz x 4096 = 17.664MHz (depending on which carriers are used). 17.664MHz is the top of Band Plan 998ADE17 as used by BT Infinity.

If the signal were to drop to zero immediately during the inter-symbol gaps this would cause distortion leading to inter channel interference. To avoid this, the symbols are extended and their envelopes smoothed to minimise harmonic distortion.

Figure 1 is derived from the freely available VDSL2 G.993.2 specification. In this figure N corresponds to the number of carriers. For a typical VDSL2 system this is 4096. The symbol generated by the complex IFFT will have 2N=8192 time domain samples (2N corresponds to the Nyquist rate). This is the un-extended symbol length. The diagram shows that part of the end of the DMT symbol is copied and appended to the beginning of the symbol as Lcp. Similarly part of the beginning of the DMT symbol is copied and appended to the end of the symbol as Lcs. Lcp and Lcs are the cyclic prefix and cyclic suffix.

In order to provide the smoothing of the envelopes Lcs and Lcp are overlapped during a period β. There is a gradual fade done during the period β between one symbol and the next so there will be no noticeable join between symbols. (This contributes to the difficulty of detection without suitable software.)

The length of the cyclic extension CE is Lcs + Lcp - β. The VDSL2 specification allows for a varying length of CE and says that the duration of the overlap β is vendor-dependant. The length of the CE is negotiated during initialisation of the xDSL line. It is exchanged during negotiation in units of (un-extended symbol length = 2N) / 64. Though values from 2 to 16 are permitted, only support for the value 5 is mandatory. A value of 5 results in the usual symbol rate of 4000 symbols per second.

$$4.3125\text{kHz (channel spacing)} \times \frac{64}{(64+5)} = 4000$$

This is the value used in practice everywhere.

Detection of the cyclic extension

The cyclic extension provides us with both the symbol alignment information and a method of measuring the strength of the interfering xDSL signal.

To detect the cyclic extension in a signal from an SDR we need to do a correlation between the signal recorded by the SDR and a point on the same recording exactly one un-extended symbol period later, since the xDSL signals will be the same and genuine noise will not. To achieve this, we need to construct a digital delay of the correct duration.

Once we have this we need to do the correlation over a window of the length of the cyclic extension (CE). The un-extended

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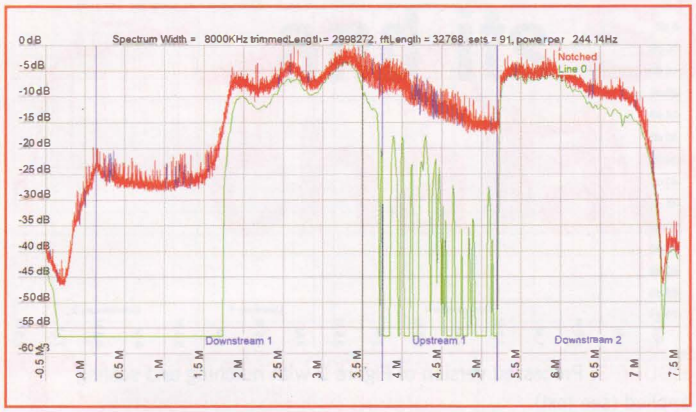

FIGURE 6: Analysis of first 8MHz file, DC-7MHz.

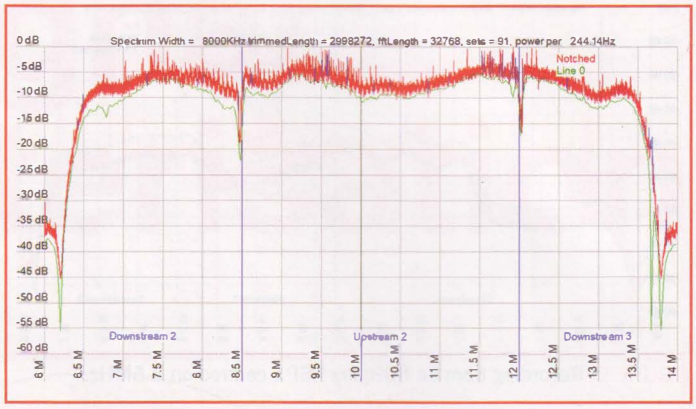

FIGURE 7: Analysis of second 8MHz file, 6.5-13.5MHz.

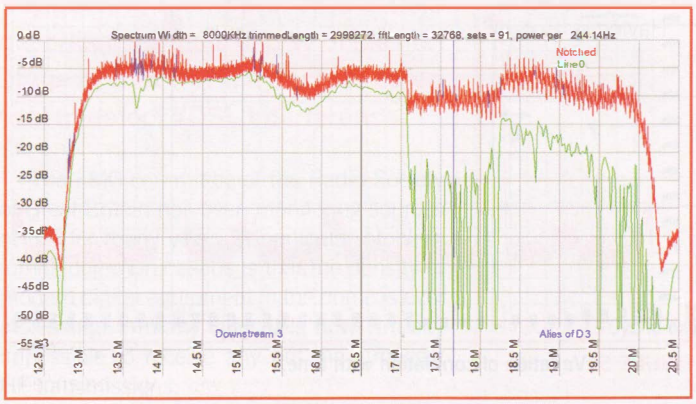

FIGURE 8: Analysis of third 8MHz file, 13MHz-20MHz.

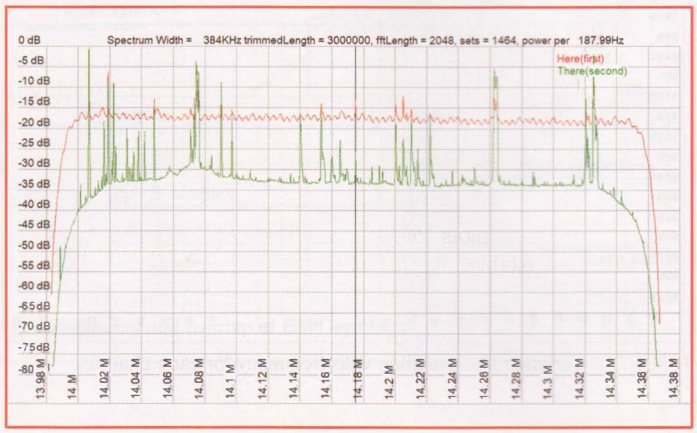

FIGURE 9: Comparison of two simultaneous recordings at different but nearby locations.

symbol period is 1/4312.5 seconds = 231.884μs. The extended symbol period is 1/4000 = 250μs. Thus the length of the CE is 250 - 231.884 = 18.116μs.

Processing the signals from an SDR

On some common SDRs and, in particular, the FUNcube Dongle PRO+, the maximum sample rate is 192k of stereo signals (In phase and Quadrature) or equivalent to 384k combined sampling rate resulting in a 192k bandwidth. In terms of VDSL2, one un-extended symbol time = 231.884μs = 89.043 SDR samples at 384k. The correlation window = 18.116μs = 6.95 samples at 384k.

Producing the delay

For the rather common sampling rate of 192k stereo, 89.043 samples can be rounded to 89 – but that's not a general solution for other sampling rates. An error of 0.043 samples corresponds to a phase error of about 8 degrees for the highest in band xDSL channel being measured (the Nyquist rate [2] being half the sample rate). That's a fairly negligible error so on the early versions of the software this technique was used, and the error calibrated out. In the current version of *Lelantos*, a software filter is used to give the exact non-integral delay for whatever sampling rate is being processed.

The correlation

Once one has derived the direct and delayed samples the correlation itself is in principle straightforward. All that is required to achieve this is to multiply the direct samples with their corresponding delayed counterparts and sum them over the number of samples in the width of the CE.

Finding the symbol alignment

The outputs from the correlation are noisy. To overcome this *Lelantos* averages the results over many symbols. Since we don't know the alignment yet *Lelantos* does this correlation for every possible symbol position. The position that emerges with the highest correlation is our correct alignment. However, there is an additional problem. The sampling rate of the SDR will not be perfectly calibrated relative to that of the VDSL2. When averaging over typically 10,000 symbols there will be alignment drift during the averaging process. To overcome this, *Lelantos* repeats the correlation for every possible phase alignment and also for errors in sampling rate from -25 parts per million (ppm) to +25ppm. It plots the variation in the highest correlation with sampling error in order to find the correct ppm error. Once it has determined this, it plots the variation in the correlation for different symbol alignments at the known ppm sampling error rate. The resulting graph should have clear peaks during the cyclic extension. *Lelantos* aligns the trace to show one symbol time with a CE peak at each end.

Measuring the ratio of VDSL2 noise to background noise

While doing the correlation just described, *Lelantos* also takes the squares of the samples, resulting in the RMS value of all signals. Once we know the symbol alignment we can square root both the correlation sum and the self product sum at the correct alignment. The ratio of the two is the ratio of the RMS values of the VDSL2 signal to the (VDSL2 + background noise) signal. *Lelantos* then calculates and reports the ratio of the RMS values of the VDSL2 signal to the other signals.

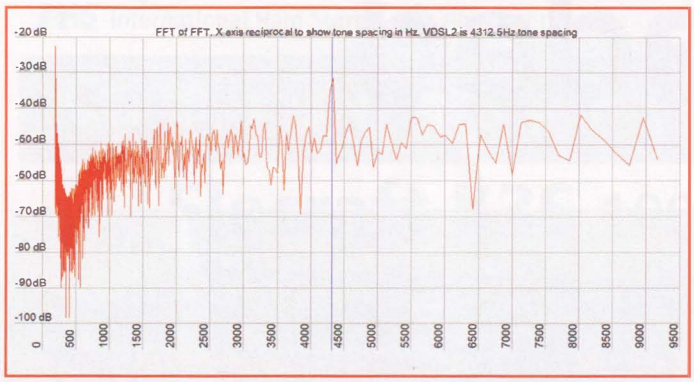

FIGURE 10: FFT of FFT, X-axis reciprocal to show tone spacing in Hz.

Accuracy check

To check that the results are correct, *Lelantos* also contains a VDSL2 signal and noise generator. It can generate VDSL2 signals with any ratio of VDSL2 signal to other noise and with any VDSL2 ppm symbol rate error.

Typical *Lelantos* measurements

Lelantos produces plots of the correlations. There are several parameters adjustable by the user but *Lelantos* can determine suitable defaults after analysing the wave file. All the graphs in this article were auto-generated this way from wave files recorded in the same RSGB Member's rear garden. The loop was placed in the centre of the lawn 12 metres from the house rear wall. The nearest phone lines were from a pole at the front, beside the road, 50 metres away. The drop wires run from this to the houses in the street. Behind the house are open fields but there is a low voltage overhead power line at the rear, no closer than 20m from the loop antenna.

Several 8MHz bandwidth recordings were made using an SDRplay RSP1 connected to the loop. On **Figure 2** the red line shows the spectrum of a recording centred on 3.5MHz. The vertical blue lines show the boundaries between the VDSL2 bands. Upstream 1 starts at 3.75MHz and Downstream 2 starts at 5.2MHz. One can already see that the spectrum has a 10dB discontinuity at 5.2MHz where the VDSL2 RFI has raised the noise floor.

To isolate and measure the VDSL2 signals, *Lelantos* needs to do the correlation explained earlier. However, one can see that there are a lot of strong narrow band signals / RFI. Some of them are 30 to 60dB above the noise floor. If any of these are harmonically related to the VDSL2 symbol rate they will impair the correlation. To avoid this, we need to remove these strong narrowband signals so that we can do a broad band correlation on everything else.

To achieve this, *Lelantos* constructs a mask to define the frequencies to be notched out. The green line on Figure 2 shows the noise floor that *Lelantos* has determined. The blue line marks a threshold 6dB above the local noise floor. All frequencies where the red spectrum is above this 6dB line are to be masked out. The blue text top right says that 3.7% of the total bandwidth will be notched out. This will enable the broadband correlation to be done but will have negligible impact on the results.

Figure 3 shows the resulting spectrum after the signals to be masked have been notched out. The vertical axis is scaled so that the strongest component is 0dB. You should be able to see that all the narrow peaks in Figure 2 are narrow troughs in Figure 3.

Now that we have a suitable signal to analyse we can do the correlation. As a confidence check the two notched (I/Q) channels are correlated separately.

Remember that due to calibration errors (predominantly in the SDR rather than the VDSL2) we need to allow for symbol rate errors during the correlation. **Figure 4** shows the variation in correlation with frequency for each channel. In this case they closely agree that the error is -15ppm.

As explained earlier, the correlation peaks during the cyclic extension. **Figure 5** shows the variation of the correlation with time. The horizontal axis is 2 VDSL2 symbol times long. A symbol is marked out in degrees.

At 0° you can see a very clear peak. This peak repeats at 360°. The expected width of the cyclic extension is shown with the two blue lines on the horizontal axis, so it is undeniable that this is VDSL2. The VDSL2 data symbol occupies the gap between the two peaks. Being random it has virtually zero correlation.

You can see a much smaller peak at 180° and one smaller still at 280°. These are other VDSL2 lines that are further away or have better balance so show lower RFI. Although they are at the same symbol rate their symbol timing is not aligned. If the loop antenna is moved one can in fact measure the radiation pattern of each line separately.

Having synchronised up to the symbol timing one can extract the waveforms during each cyclic extension and do a spectrum analysis of their correlation. This is done over many symbols in the wave file to get sufficient separation of the spectrum from other noise.

In **Figures 6, 7 & 8**, three 8MHz wave files are all analysed in this way so that the entire spectrum of the VDSL2 RFI can be seen. For each graph the green line shows the spectrum of only the line producing the strongest RFI. The red line is the total spectrum, containing the contributions of all lines, so is in places slightly higher.

Figure 6 shows the spectrum of the VDSL2 RFI up to 7MHz. You can clearly see that the VDSL2 band Downstream 1 is in use from 1.75MHz up to its limit at 3.75MHz. Upstream 1 should run from 3.75MHz to 5.2MHz. However, it is either very weak, well balanced, or not in use. Above 5.2MHz lies Downstream 2. The cause of the step in the red spectrum at 5.2MHz is now obvious.

Downstream 2 is shown continuing on Figure 7 up to 8.5MHz where there is a dip corresponding to the guard band. Beyond this, Upstream 2 raises the noise floor all the way up to 12MHz. Again, at 12MHz there is a dip for the guard band. Downstream 3 starts at 12MHz and continues to the next graph.

Downstream 3 runs from 12MHz to the highest usable frequency on the particular line, in this case 17.1MHz. However, there are clearly extraneous VDSL2 signals well above this. The theoretical limit for this VDSL2 band plan is 17.664MHz. VDSL2 symbols are generated using an Inverse Fast Fourier transform (IFFT) and then output via a digital to analogue (D/A) converter. In Figure 8 one can clearly see that the D/A converter is running at a sampling rate of 2*17.664MHz such that the Nyquist rate is 17.664MHz. This results in frequencies below 17.664MHz aliasing above that. The VDSL2 equipment at the exchange end may have only a crude analogue roofing filter giving the 4dB suppression of this alias.

Comparison of measurement sites

To illustrate the Harmful Interference that the VDSL2 is generating we set up a second identical listening station in a farmer's field outside the village. We then made simultaneous recordings in the amateur bands on both stations.

Figure 9 shows a comparison of the signals recorded on the two stations on the 14MHz band. The red ('here') line shows the signals in the Member's garden. The green ('there') line shows the signals in the farmer's field. It is very clear that most of the signals seen in the field (green) are totally obstructed in the Member's garden. One can in fact see the ripple in the red line corresponding to the 4.3125kHz VDSL2 channel spacing.

Continued on page 48

Enigma Reloaded

It is now well known how Voluntary Interceptors and Bletchley Park code-breakers listened into and cracked German wartime messages encrypted with the Enigma machine.

The Enigma Reloaded event was started five years ago to recognise the work of all those involved with the encrypted communications. A (slightly cryptic) website [1] sets out the details, which included a contest element plus, on the final day, pre-planned individual communications between special station II4OER at the Technical Naval Museum of La Spezia, Italy and nearly twenty museum stations around the world. What made the last day special was that the Italian would send a message in Morse that had been encrypted on-site with a real Enigma machine, which would then be decoded at each receiving site *also* using a real Enigma machine.

The RSGB National Radio Centre (NRC) in the grounds of Bletchley Park was the sole British participant. Volunteers – all expert Morse enthusiasts – manned the GB3RS station at the NRC and, at the appointed time, together took down the 5-letter groups of encrypted text. Whilst the equipment they used was modern, volunteer John Pether, G4JGG had set up an authentic WWII receiving station in the NRC foyer – so it was the first thing visitors saw – and he also successfully received the signals, using only portable 'field' aerials.

The received, scrambled text was written onto an authentic W/T Red Form and rushed (in a leisurely sort of way) to an authentic WWII Enigma machine that Bletchley Park had kindly loaned for the day – along with an operator – for decryption.

The proper code wheels were selected and all the initial settings were made as the audience held its collective breath. Letter by letter, and with a surprisingly satisfying mechanical sound, each character was typed in turn and the decrypted message became clear. Everything worked first time – a testament to the careful preparation by all concerned – and the decrypted message was met with a spontaneous round of applause.

Our thanks to all the RSGB and Bletchley Park volunteers and staff who worked so hard to make this a truly memorable day for the 500+ visitors.

PHOTO 1: The first thing the public saw was John Pether, G4JGG using authentic wartime equipment in the NRC foyer.

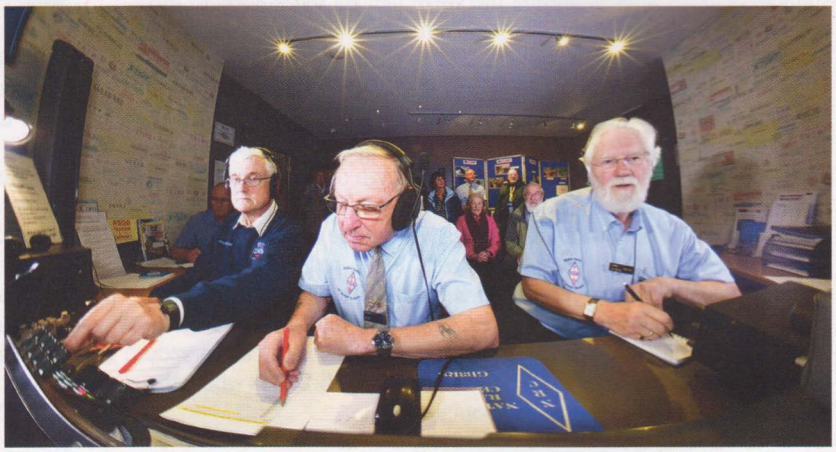

PHOTO 2: Martin Atherton, G3ZAY, John Bladen, G4FZA and Trevor Hughes, G4WKJ copying Enigma signals from II4OER.

PHOTO 3: Tom Briggs (Bletchley Park) and Martin, G3ZAY decoding the Enigma message.

Websearch

[1] www.enigma-reloaded.it/index_eng.html

Enciphered text BKKPP UWOOI GQWEL VHFWA FBNCG NBUDW COXWZ MQMFQ HXXXX
Deciphered text ENIGMA EVENT INTERNATIONAL FIFTH EDITION ITALY UZAC
The last XXXX were fillers to complete the 5 character block; they don't decipher to anything.
If you want to try your hand at deciphering the message (eg using an Enigma simulator), the settings were wheel order 1, 2, 3, ring settings A A A, Reflector B, start position ETR, stecker not used.

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

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A while back I listed the early days of Yaesu distribution. My old friend, Hal Perkins, G3NMH (who now resides in Spain) pointed out that I had not got the history quite right. So for the historians amongst you, the genealogy goes like this: Lowe Electronics introduced Yaesu into the UK in the 1960s. Then SMC took up the agency followed by Western Electronics. The fourth member to come on board was AE Electronics. In between times, Lowe Electronics dropped Yaesu in favour of Kenwood (Trio). Hal's Company still supports the current importers, Yaesu UK. Now you know!

Peter Waters G3OJV

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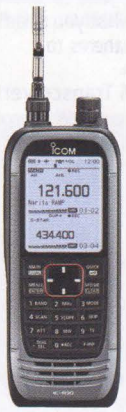

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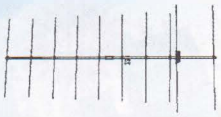

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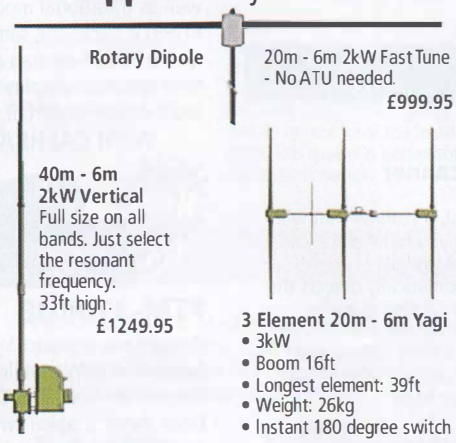

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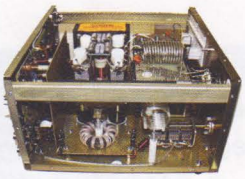
MFJ-939A	Plug and play auto ATU Alinco cable	£176.95
MFJ-939I	Plug and play auto ATU Icom cable	£176.95
MFJ-939K	Plug and play auto ATU Kenwood cable	£176.95
MFJ-939Y	Plug and play auto ATU Yaesu cable	£176.95
MFJ-941E	1.8-30 MHz antenna tuner 300W	£159.95
MFJ-945E	1.8-54 MHz mobile antenna tuner	£154.95
MFJ-948	1.8-30 MHz antenna tuner 300W	£187.95
MFJ-949E	1.8-30 MHz ATU / dummy load 300W	£199.95
MFJ-956	SW/MW/LW Preselector/tuner	£77.95
MFJ-974B	3.6-54MHz 300W Balanced ATU	£231.95
MFJ-974HB	HF 300W Balanced line ATU	£253.95
MFJ-976	HF 1500W Balanced line ATU	£550.95
MFJ-989D	HF 1500W SSB/CW roller tuner	£451.95
MFJ-991B	HF Auto antenna tuner 150W	£253.95
MFJ-993B	HF Automatic antenna tuner 300W	£289.95
MFJ-993BRT	HF remote auto antenna tuner 300W	£330.95
MFJ-994B	HF automatic antenna tuner 600W	£396.95
MFJ-994BRT	HF remote auto antenna tuner 600W	£440.95
MFJ-9982	HF 2.5kW antenna tuner	£771.95
MFJ-998RT	HF1.5KW remote auto antenna tuner	£848.95

Ameritron AL-811HXCE



Four rugged 811 tubes produce 800W output from one rugged desk top design. The pi-network easily copes with modes VSWR and the high voltage / low current configuration produces a clean low distorion signal. The tube replacements are not expensive and the cost is way below solid state designs.

£1099

- 800W PEP 600W CW
- Vernier Reduction Drive Tuning
- Input match tuning - adjustable
- 160m - 10m
- Dimensions: 8 ¼" x 13 ¾" x 15 ½"
- Weight 32 lbs

AL-811X 3 x Tube 600W Model £949

MFJ-939 Plug & Play Auto ATU

Here is an auto ATU with models dedicated for Yaesu, Kenwood, Icom and Alinco. Each one comes with a lead that plugs directly into your radio that provides power and operating signals back to the ATU. Tell us the model of your radio when ordering.

£176.95

Ready to go!

MFJ-991B Auto ATU

Similar to the MFJ-993BRT but without LCD display, antenna switch and balanced feed option. Ideal for coax or end fed wire.

£253.95

MFJ-403P Micro Keyer

Here is a little micro keyer with twin paddle and built in side tone. Ideal for QRP operators who want to travel light.

£79.95

MFJ-413

Morse code tutor.

£55.95

MFJ-402 Nano Keyer

A very compact little electronic keyer. Just 2" x 3" it will generate CW with its paddle from 5 - 65 spm. You keyer can be powered simply by plugging into transceiver key socket. Video link on our site.

£77.95

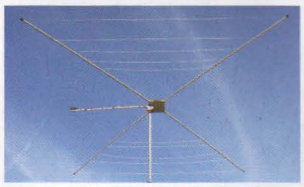
MFJ-557 CW Trainer

This unit comprises CW key, oscillator and speaker unit. Great for CW sending practice.

£47.95

The Small Garden Solutions from W&S

MFJ-1836H Cobweb



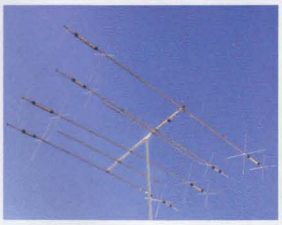
What is a cobweb? It's in effect a full size dipole bent into a square. This results in 1/8th wave sides. The antenna can be formed of multiple dipoles with a common feed via a balun. It is easy to support on a single mast and requires no rotating. This model covers 6 bands from 20m to 6m and will handle up to 1.5kW.

£269.95

Cushcraft MA-6B

Here is a new exciting design that operates as a 3 element Yagi on all bands from 20m to 10m. It uses end loading to reduce the element length to enable it to fit into quite small gardens. End loading enables the high current region to flow through full thickness element sections. Bandswitching is automatic and the whole antenna offers a light weight antenna solution in a compacy array.

£699.95



MFJ-1786X

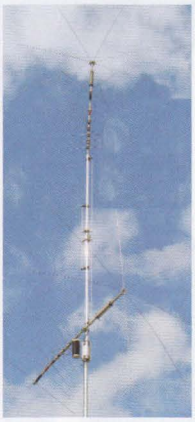
The MFJ-1786X covers 30m to 10m and handles 150W. Includes remote tuner and is around 1m in diameter. You also get low noise reception!

£539.95

MFJ-2389

80m - 2m 8.5ft! Heres a realy cool little vertical. Less than 9ft tall, all bands, counter-poise radials and handles 200W.

£279.95



MFJ-1799 Vertical

Here is a great design from MFJ. It gives you true all band coverage - 80 40 30 20 17 15 12 10 5 and 2m! All you need from just one antenna. It requires no radials and stands approx 6m high. Power rating is 1.5kW. So with an amplifier you are set to radiate a great signal.

£503.95

MFJ-223 Antenna Analyser

This very compact and handy antenna analyser covers 1 - 60MHz. It has a full colour LCD which offers a very clear graphic display. Includes recharge-able battery with USB lead.
A great little bit of test gear.

£299.95

MFJ-225

1 -180MHz measures a wide range of parameters including, VSWR, Impedance, Return Loss, Phase, Capacitance, Inductance, Cable length external 12v or USB power.

£232.95

The Xiegu X5105, an HF to 6m QRP transceiver

A user review of the portable transceiver from Chinese company Chongqing Xiegu Technology.

PHOTO 1: The Xiegu X5105, an HF to 6m QRP transceiver.

The X5105 arrived in a plain brown cardboard carton, with a stick-on label to identify the contents. Upon opening the carton the first thing to be revealed was the documentation, a 24-page photocopied instruction manual. The standard of English in it wasn't great, but I am informed that the supplied instruction manual is now an expanded, properly bound version. There was also a warranty/maintenance record card, a certification card and a self-adhesive Xiegu sticker. Beneath the documentation the radio and accessories were well packed, with the transceiver and microphone in separate poly bags and everything protected by polystyrene foam.

Included are a 1.7m-long 12 volt power cable with a 5 amp fuse in each leg (current versions are fused only in the positive leg), a multifunction microphone with a coily lead that stretches to 2m, plus a 1m-long programming cable (standard USB one end, 3.5mm stereo jack plug the other). Spare fuses, spare plugs and a microphone hook are not supplied.

Layout

In terms of size and format, the X5105 is so similar to the Elecraft KX3 that I cannot believe the designers didn't model this transceiver on it. That said, the electrical architecture is different, so it *isn't* a copy.

There are press button controls using tactile switches on the front panel and top of the transceiver, plus a rotary encoder that sits flush to the body for tuning and selecting menu options. A good sized monochrome liquid crystal display (LCD) completes the scene. All connecting cables plug into the sides/ends. On the left side there are sockets for 12V DC power, the antenna (BNC), a stereo headphone socket (3.5mm jack) and an output of the first IF (70MHz). According to the instruction manual the IF output is for connection to the Xiegu XDT1 data terminal, but presumably it could also be put to other uses. On the right side there are sockets for a

PHOTO 2: A nice little touch is that there are flip-out aluminium legs that can support the transceiver at an angle.

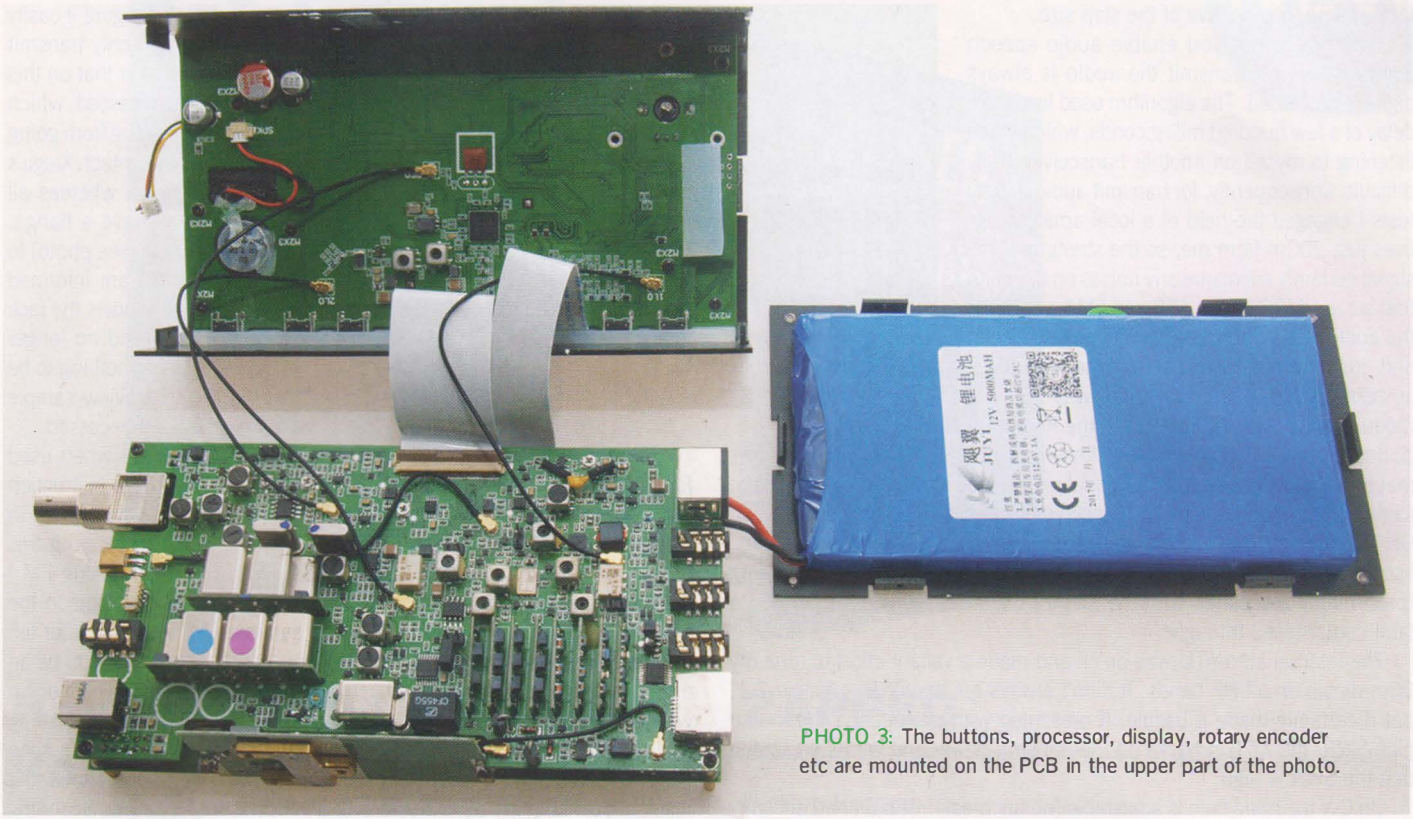


PHOTO 3: The buttons, processor, display, rotary encoder etc are mounted on the PCB in the upper part of the photo.

Morse key (3.5mm stereo jack), microphone (RJ45), accessories (8-pin DIN, carrying band data, ALC, PTT), serial data to a PC (3.5mm jack) and ATU (3.5mm jack). The casing of the transceiver is a mixture of pressed aluminium sheeting and cast aluminium. The finish is matt black, with white lettering. It has a solid feel to it and the weight is 905g. On the front there is also a 15mm diameter speaker grille. Although the grille is smaller than the size of a 5p coin I found the audio quality perfectly good for communication purposes and certainly loud enough. The display screen and buttons on the front panel are back-lit, while the buttons on the top are not.

Inside, the RF electronics are on a single PCB, with the crystal filters and band filters on daughter boards. If I had been the designer I wouldn't have put the transmit RF output right next to the microphone socket, but Xiegu seems to have got away with it. The buttons, processor, display, rotary encoder etc are mounted on the PCB in the upper part of the photo (above). The third part is the battery, which is located at the back of the transceiver when it is assembled. The battery itself is marked as having a capacity of 5000mAh, but I'm informed that this is a mistake.

Facilities

On transmit the transceiver covers all amateur bands from 1.8MHz to 50MHz, whilst on receive it covers 500kHz to 54MHz continuously. The X5105 has a built-in 3800mAh battery and an auto-ATU. The battery was fully charged when the transceiver was received. There are dual VFOs, a preamp/attenuator, an electronic Morse keyer with programmable memories, RIT and frequency/mode memories. Audio frequency DSP is provided for noise reduction and notch filtering, plus there's a band scope (not real-time). There's also a very useful function that works like a VNA, to scan the VSWR of an antenna across a range of frequencies. These frequencies are user selectable, the results of a scan being shown on the monochrome LCD screen. The radio also has an internal microphone and a headphone socket. The headphone output is not sufficiently powerful to use for a loudspeaker without additional amplification.

A very nice little touch is that there are flip-out aluminium legs that can support the transceiver at an angle. They engage with a click when folded out and click back flush with the body when folded in.

PHOTO 4: A standard 3.5mm jack plug with the flange ground off, the extended reach 3.5mm jack on Xiegu's programming cable and a standard 3.5mm jack plug.

On the air

I was keen to give this transceiver a try, but given the current state of the ionosphere was not optimistic about hearing or working a lot. I found the Xiegu's receiver really lively. On 20m an S7 signal on the X5105 was much weaker on my main transceiver, unless I switched in its preamp. This transceiver has a single stage preamp and a single stage attenuator. Cycling around the settings made about 2 S-points difference to the received signal in each case. Tuning steps are selectable from 10MHz down to 1Hz. When tuning there was no perceptible

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lockup time, irrespective of the step size.

Whether or not you enable audio speech compression, on transmit the audio is always digitally processed. The algorithm used leads to a delay of a few hundred milliseconds, which made listening to myself on another transceiver really difficult. Consequently, for transmit audio quality tests I engaged the help of a local amateur. He lives just 200m from me, so the strength of my signal certainly overcame any noises on the band that we used (80m). On SSB and FM he reported the audio quality from the X5105 as being good and 'just like me', whilst on AM he reported it as being 'a bit rough'. Given the way that AM modulation is applied, I could see the RF output power dip when I spoke. I don't know of any SSB modern transceivers that generate AM using the traditional method, so I wasn't surprised that it sounded less than perfect. The speech compression is active only on SSB. On SSB transmit I monitored adjacent frequencies to listen for problems. I could detect no wideband synthesiser noise, but there was a faint clicking (presumably associated with the Xiegu's digital audio processing) and a faint carrier bleed through.

The internal auto-ATU was quick and made a valiant effort to tune my 80m dipole on all HF bands. It didn't always get the SWR to below 2:1, but it certainly made it usable. If presented with an antenna that has a high SWR, the X5105 backs off the transmit power and warns on screen that the SWR is high.

On CW the hang time is adjustable (no full break-in), but I had difficulty with the internal keyer. I could configure it easily enough, but try as I might I could only transmit dots *or* dashes. What I discovered is that on this radio the jack plug sockets were recessed, which prevented a normal 3.5mm jack plug from going in all the way and making proper contact. Xiegu's programming cable has no flange, whereas all the other jack plugs I have do have a flange. I had to grind the flange off a plug (see photo) to make my external paddle work. I am informed by the importer that "On current models the jack sockets are flush with the case and no longer recessed", but it is nevertheless something to be aware of as a possibility. On the review sample all four jack sockets were similarly recessed.

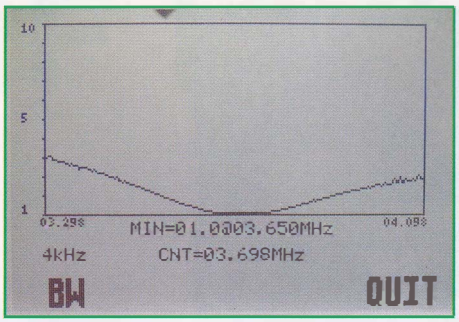


PHOTO 5: The result of scanning my 80m dipole over a bandwidth of 800kHz.

Some people have reported that this transceiver gets hot when used for extended periods, indeed heat is a topic mentioned in the instruction manual. To test this I left the transceiver switched on for two hours in receive mode. The transceiver's heatsink is underneath and during this time it rose to 29°C (nine degrees warmer than the room). Using FM I then left it on continuous transmit at full output power. This made the heatsink temperature rise to 40.5°C after five minutes and 44°C after ten minutes – indeed the whole radio got warm. I don't consider this to be an excessive temperature and, of course, it immediately started to cool down when I went back to receive.

I found the SWR scanning function really useful. The minimum scan bandwidth is 200kHz and the maximum is 1MHz. Photo 5 shows the result of scanning my 80m dipole over a bandwidth of 800kHz. Scanning is continuous until you press the 'Quit' button. The frequency of the lowest SWR is identified and displayed, as are the centre and limit frequencies of the scan.

When charging the battery the radio displays the voltage of the external supply and the battery itself, even when the radio is powered off.

Firmware

The firmware can be displayed in one of the menus and updated by the user. The update is performed using the USB to serial converter provided as part of the transceiver package. When I first plugged in the converter, Windows® found it, but didn't install a driver. I used the Device Manager's search online facility, which found the driver and installed it. It then appeared as 'Prolific USB-to-Serial Comm Port' on COM 6 (the number will vary from computer to computer).

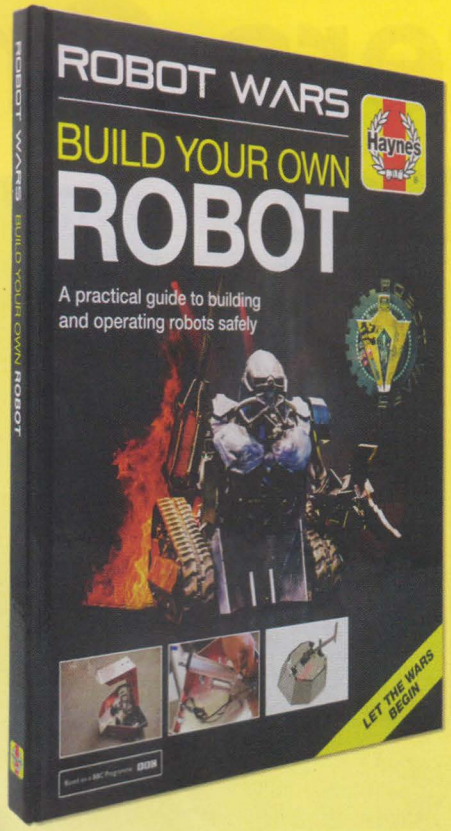
Terminal mode software is required to perform the firmware update. The Sinotel web site has a PDF document that gives detailed instructions for *TeraTerm*, so I downloaded it and followed the instructions. Updating the firmware went well, and indeed it was highly desirable because as received the transceiver exhibited a problem on SSB transmit. The firmware upgrade solved the problem, so I suggest if you buy one you make sure the firmware is the latest version.

Conclusions

This is a useful transceiver, especially if you are considering QRP portable operation or using it as a source for transverting. It is available ex stock from the importer, Sinotel, the price being £509.99.

Taking a wider look, I found the X5105 to be a vast improvement over Xiegu's previous HF offering, the X108G. If this level of advance and improvement is a sign of the things to come, it could be that the next Xiegu radio will be something really special. Time will tell.

I would like to thank Sinotel for the review model, Alan Clunnie for his cooperation in this review and George Miller, G6WWY for his assistance with the on-air tests.



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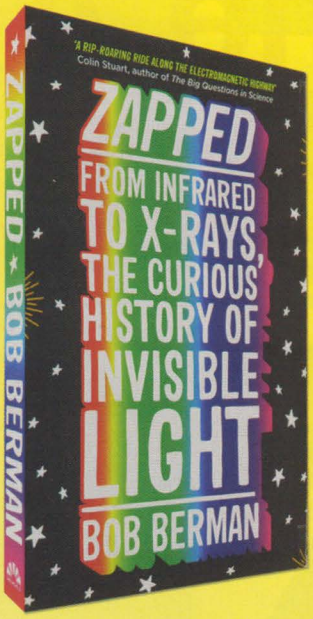

GREAT RSGB GIFTS

Haynes - Build Your Own Robot Manual

By James Cooper

Whether or not you are a follower of the highly successful TV series *Robot Wars*, this Hardback book is very well written and incredibly detailed. This Haynes manual is produced in a similar style to the familiar 'how to' guides for cars but doesn't just include details about building robots but much more.

This *Haynes - Build Your Own Robot Manual* provides a unique behind-the-scenes look at the show – the arena, and both house and competitors' robots. Lavishly illustrated with high quality pictures there are step-by-step extensively illustrated instructions for building three project robots, from a simple 'self-navigating' robot, to a fully controllable Robot Wars challenger.

If you have been fascinated by robot competitors 'fighting to the death' on TV this could be the book for you. Why not indulge yourself whilst reading about construction techniques and of course competitor teams battling each other and the fearsome 'house robots' – Dead Metal, Matilda, Shunt and Sir Killalot?

The *Haynes - Build Your Own Robot Manual* essential reading for all *Robot Wars* fans and anyone interested in something different to construct.

Size 216x279mm, 176 pages
ISBN: 9781785211867
Non Members £22.99
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ZAPPED

From Infrared to X-rays, the Curious History of Invisible Light

By Bob Berman

The universe is literally made of light. As you read this you are being swarmed by radio waves; step outside and you'll get a dose of ultraviolet and infrared from the sun. *ZAPPED'* written by popular science writer Bob Berman, tells the story of all the light we cannot see, tracing infrared, microwaves, ultraviolet, X-rays, gamma rays, radio waves and other forms of radiation. This book provides a view of the historic, world-altering discoveries in the 19th century through to their central role as invisible light in our modern way of life.

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With a unique talent for making science relatable and fun, Bob Berman provides a lively, and informative book.

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Youngsters On The Air 2018 - South Africa

AMSAT SA inflated the balloon with hydrogen, then payloads were joined together and connected to the balloon. Then the tracking began.

A report of some of the activities during the week spent with young amateurs from around the world.

This summer, 74 young radio amateurs from all over Europe, Africa and the USA travelled to Johannesburg, South Africa, to take part in Youngsters On The Air (YOTA). The 23 teams spent a week participating in various organised activities from building SDR transceivers to launching high altitude balloons. Peter, MOSWN was the UK team leader with Ben, MONBA, Nathan, MIONPR and Mike, 2EOMLJ. Thanks go to CDXC for their donation to each UK candidate to reduce their personal contribution.

We arrived at JNB airport on Wednesday morning, after an overnight flight from Heathrow and quickly bumped into some of the other teams. We were met by some of the South Africa Radio League organisers and were taken to the Kopanong Hotel and Conference Center.

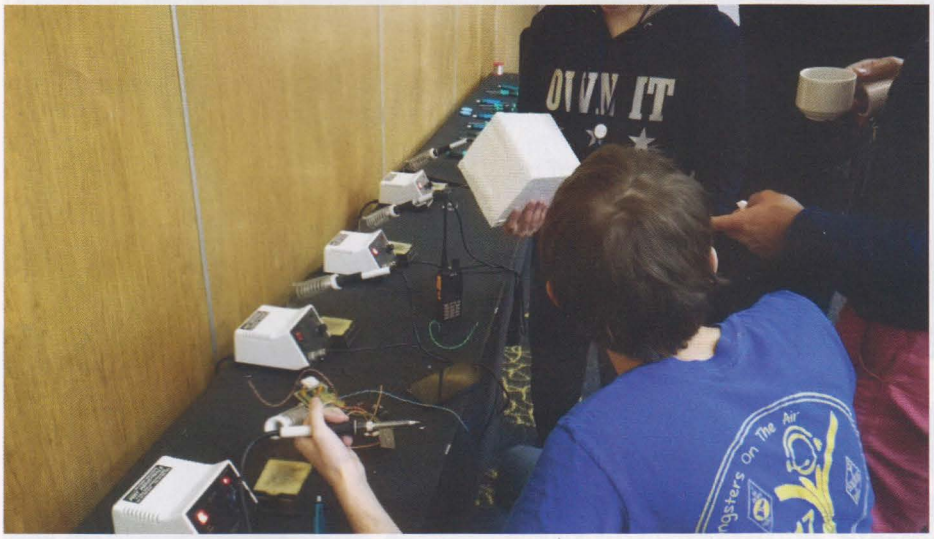
The first activity was an introduction into Software Defined Radio, SDR. We were each given our own SDR dongle and shown how to set up the SDRsharp software, allowing us to listen to and decode various data modes. The presentation also showed how to integrate the software with other programs such as GPredict, to allow us to decode SSTV from satellites, which would link in with our outing later in the week.

The next activity called each team to the front to outline their thoughts about how to bring more people into amateur radio in their home country. These ideas were then written down and the conclusion was that we could try more JOTA events, foxhunting and construction in the hope to grow our hobby. It was fantastic to collaborate with young people from so many different backgrounds, but ultimately working towards the same goal.

In support of the prevailing theme of satellites and high altitude ballooning, we constructed our own dual band Yagi antennas. The wonderful kit was created by Guy, ZS6GUY and came with a carry bag, allowing them to be easily transported for field days and SOTA activations. The finished antennas had low SWR readings and performed extremely well on 2m and 70cm.

Our second day of activities began with a BaCAR (Balloon Carrying Amateur Radio) introduction. We were briefed and told that we would be building our own payloads to send to the edge of space using a hydrogen balloon and had to design our own experiment that would be carried out by the range of sensors at our disposal, such as pressure, temperature and light sensors. We built a payload to monitor the change in pressure that takes place as the balloon increases its

Peter, M0SWN and Ben, M0NBA both got the SDR kit finished that day.



It was a tough challenge to finish the payload and some adjustments had to be made at the lauch site.

One group visited a local PCB manufacturer.

altitude. It was a tough challenge to finish the payload in time for the next day when the balloon would be launched. We did some drop tests and used a very high-tech vibration tester (we tied the payload onto the end of a brush and shook it as hard as we could). Both of these tests pointed out some flaws in our design, and the rush was on to get these solved before the end of the day. Despite our best efforts, some last-minute work was required at the launch site.

On Saturday we were told to be up and on the coach for 4.30am, not an easy task! The early morning was not helped by the freezing temperatures outside, but we got to see the sun rise as we got to Secunda. A truly amazing sight where there wasn't a cloud in the sky.

As previously mentioned, there were some necessary fixes to be made to our payload before we could send it up with the balloon.

AMSAT SA inflated the balloon with hydrogen, fighting the strong winds and cold temperature. Then payloads were all joined together with paracord and connected to the balloon. It was released and rose elegantly into the sky. Now the tracking and operating could begin! We made use of the Yagis that we built and our SDR dongles to track the balloon, and also to make contacts via its cross-band repeater. The balloon was cut off at a programmed distance from the launch site, allowing the payloads to be tracked and recovered by the team.

While the recovery team was busy, we had a talk about RaDAR, Rapid Deployment Amateur Radio. Nathan, MIONPR, made his first contact using his Full callsign, operating from a portable setup put together by Eddie, ZS6BNE.

Sunday was one of the most exciting days as it involved grand revealing and build of Hans Summers' new QSX kit, a full SDR transceiver with a huge number of built-in features. We started with an introduction into the radio and its specifications (www.qrp-labs.com/qsx.html). After the presentation we had the chance to ask Hans some questions. Despite the warning that the majority who chose to build the QSX kit wouldn't finish it that day, most went for it anyway. Ben, MONBA and I both stayed up into the early hours of the morning in order to complete our kits.

Our penultimate day of activities included two group outings, with one group going to a local PCB manufacturer, Bosco (bosco.co.za), the others visiting a military company, GEW (gew.co.za), which specialises in direction finding and radio jammers.

Nathan and I went to Bosco, where we had a fantastic tour, learning about the history of the company and how they recycle most of their waste products to stay as environmentally friendly as possible. They showed us all their processes, which were fascinating to watch, such as the CNC milling machine and the robotic continuity checker. Ben was in the group that went to GEW and said it was an amazing experience. For our final day of activities we went to the Dinokeng Game Reserve. We got up at a more respectable time of around 7am, and the weather was nowhere near as cold. The UK team was all together in one jeep and we had an excellent guide and spotter. We saw many different animals including buffalos, zebras, antelopes and wildebeests. Everyone who had brought their handheld radios scanned the PMR frequencies and listened in on the drivers talking to the base about animal locations.

Our last activity together as the YOTA 2018 group was our farewell event, where all the leaders spoke about the organisation behind the event. We all took some photos together and enjoyed our last few hours together before we had to leave the next day.

Now we have the knowledge of how to encourage more young people into the hobby, it's just a matter of putting that knowledge into practice and making a difference!

Peter Barnes, M0SWN
peter@m0swn.uk

Make yours a QRM eliminating antenna continued from page 18

doublet component. If necessary a 180° phase adjustment is available by reversing the polarity of a winding of T1. Attenuated and phase advanced common mode noise potentials from 100Ω linear potentiometer R1 are combined, by series connection, with those from the doublet at T1's secondary. Operationally C1 and R1 are iteratively adjusted for minimum audible noise.

Does it work?

Yes! The effect was most dramatic, particularly when listening to UK and closer European signals and was, to me, reminiscent of the 80m band when I first started listening in the late 1940s, before HF reception was polluted by the trappings of civilisation. Total local noise was typically reduced from S8 to S4 on my K3's meter, which brought many otherwise unintelligible signals up to Q5. As anticipated there was a noticeable drop in the strength of distant signals. Despite this, typical signal to noise ratio improvement varied from 24dB on daytime near-vertical incidence (NVIS) signals, 9dB on Southern Europe at night, 4 to 6dB on East USA – but there was no advantage for the USA West coast.

Will it work for you?

A simpler circuit is difficult to imagine, so just try it. Best results require a balanced antenna and balanced feed line to ensure separation of common and doublet mode signals. A reasonably low resistance ground connection is necessary to ensure that R1 will be effective at reducing the common mode noise signals down to the level of those from the doublet. My ground connection was a 1m square sheet of roofing copper buried 0.2m below the lawn where the feed line connected to a remote ATU. The noise elimination components were installed in the ATU box and adjusted whilst a receiver was taken to the ATU. Other combinations of antenna and frequency may require an inductor in parallel with C1 to achieve T mode resonance. **Using the antenna for transmission will require a suitably rated PTT controlled relay to switch to your normal tuning arrangement.** If you use a balanced type of antenna tuner, with common mode connection available at the centre of a split stator capacitor or centre tapped inductor, this may be substituted for T1. In this case it should only be necessary to break the connection to C1 and join R1's wiper to ground when transmitting. I have not tried this, but would expect proprietary QRM reducing devices to also work in this system if you allow T mode connection to provide a 'noise' antenna.

News continued from page 14

HMS *Collingwood*'s heritage collection

Members of the public have been given rare access to HMS *Collingwood*'s collection of radio, sonar, navigation and radar equipment during a Heritage Open Day visit. Small groups of visitors were shown around the collection that houses equipment and instruments taken from ships and establishments across the fleet, alongside many other interesting artefacts. The history of the objects was brought to life for the visitors by Honorary Curator of the Collection, Clive Kidd. The artefacts have been acquired through various means; Clive and his team have travelled extensively rescuing various pieces of equipment that would otherwise be dumped or destroyed.

The Curator of the Heritage Collection welcomes donations of old and unusual documents and equipment relating to Naval Weapons Systems. The Collection can be viewed by interested civilians by prior arrangement and by serving personnel whenever the building is open. Photograph courtesy of Keith Woodland, Crown Copyright.

Silent Keys

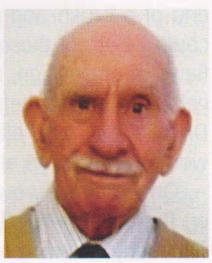
Roy Smith, G3MPB was born in 1913 and passed away on 9 September 2018. Despite operating from a postage stamp size suburban garden and only using 100W to a multiband vertical with single 4ft ground rod, Roy achieved the DXCC Honor Roll with 358 DXCCs to his credit.

He had participated in every Commonwealth (BERU) contest since he was first licensed in 1956 or 1957 and always tried to improve his previous year's score. In 2014 he was awarded the Commonwealth Medal.

During the Second World War he volunteered to join the RAF 'Y' squadron and spent five years searching for and copying signals from German reconnaissance aircraft. His amazing notes list all the callsigns, details and bases of these aircraft, as well as descriptions of the characteristic Morse sent by some of the regular operators. He lived in Wales for 20 years and also spent some time in Hong Kong.

He was active in BERU this year [2018] on 40 and 20m using his paddle as usual, with his distinctive sending of his call. He will be sorely missed.

Tribute by Peter Hobbs, G3LET



Victor (Vic) Flowers (10.2.1919 – 15.3.2018) joined the Society on 25 September 1935. He spoke often of his time as an 'Early Bird' but he also saw service in Singapore, India and England; North Creake in Norfolk and Flimwell in Sussex. During his time in Sussex he met his wife Dorothy marrying in December 1947. They had two children, Tony and Angela. On demob from the Air Force he worked as a the Home Office Wireless Technician based in the Regional Wireless Station in Cheveley. In 1969 he received a promotion and moved to the Regional Wireless Station Marley Hill, Gateshead. He remained there until he retired in 1979. Throughout his working career and retirement he kept an avid interest in amateur radio. At times this interest was limited as he was a carer for Dorothy. Sadly Dorothy died in 2007 and in 2011 he moved into residential care. Even in the care home he kept his interest going. He used a small handheld and an aerial that he attached outside the window every Sunday morning for his sked. As his eyesight deteriorated he wasn't able to join in but still enjoyed listening. He would have many a discussion over the "good days" of amateur radio with his friend Ernie Colby M5ERN who visited him every week. He was so proud to top the Old Timers' Honour Roll but he sadly passed away a few weeks later.

Design Notes

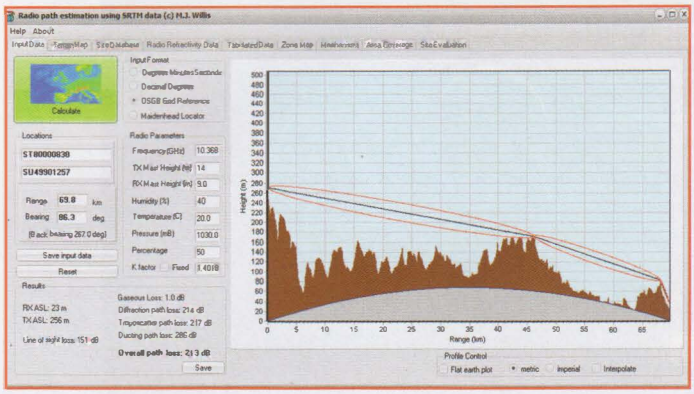


FIGURE 1: A typical plot from G0MJW's Path Profile software. Here showing the path from my home QTH to the GB3SCX Beacon in Dorset on 10GHz. Path loss is calculated using standard RF propagation algorithms for troposcatter and diffraction, taking atmospheric and meteorological effects into account.

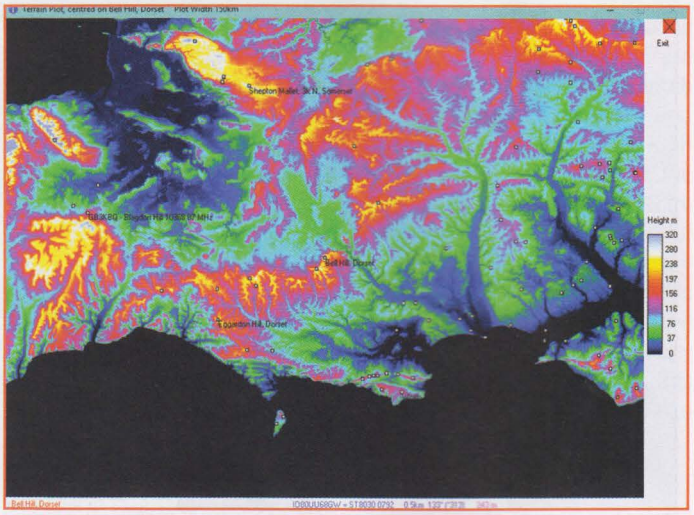


FIGURE 2: A terrain map of the Dorset area centred on the Bell Hill beacon site at IO80UU59NR. Ground height is represented by colour. NGR and Locator corresponding to the cursor position can be read off and the white dots correspond to sites stored in the site database. Double-clicking the mouse names the nearest site.

Where are we, and where are we going?

This column has now been running for a little over ten years, starting off originally as the bi-monthly *Short Circuits* where it alternated with *Data*. When I retired early from full time slavery, otherwise known as employment, back in 2010, there was more time to devote to actually experimenting and playing with projects and writing them up. Often this was with the sole intention of designing and building just for publication as I enjoyed playing with new ideas and hardware and components just for the sake of it.

I had no issues with buying components on a whim, using them, building something up, even if it was a small project that was just of interest at the time and one that I, personally, may have little use for it; someone else would surely be interested. The fun was in the design and build, not the use. Many such PCBs, modules and even boxed items of equipment lie abandoned, or waiting on a shelf, or in cupboards for that opportunity to burst into real usefulness. Or to be passed on to someone who could use them.

But, after ten years, *JNT Labs* is slowing down. There's a limit to the amount of stuff one can just pull out of the junk box, find at rallies, buy from new, play with, test out and write about that is applicable to the amateur radio community and of interest to you, the Members.

My own interests are also moving on, even more than they used to be, towards SDR, DSP and software generally. Can you see where this may be heading? I'm writing this month's column with only a few days to go, and a near complete block on anything of an idea technical or construction-wise to write about. The only hardware project in the current pipeline is the 12V to 42V charger for the lithium battery described last month – an item that will actually be used from time to time, but not essential enough to rush it to completion. That hasn't progressed far enough to be worth writing about, but may well form part of next month's column, unless other inspiration strikes.

So, your input please

Talking to amateurs at events such as round tables and rallies and monitoring several technical internet groups, there is still a fair bit of interesting home construction and design going on. So, to keep this column going as a primarily higher-end technical construction and home brewing forum, could I have your stuff please. What are you building, or doing? Modifying unusual kit, ripping it apart to get useful bits? Using modern components, either as they should be, or in an unconventional manner? Share it, however wacky the ideas may be. Please send anything you want to be included to the address at the bottom. If you want, just send notes or comments and I will put them into a readable form; or if you can, send a full block of text for copy and paste with little editing. It's the ideas and the interesting bits that count.

And now for something completely different

Back in the 1980s, even in the late 1970s, *RadCom* published quite a few articles on software for calculating distance and bearings for contest scoring, pointing antennas and the like. The new IARU world-wide locator system (abbreviated to *Loc*) had just arrived; an alphanumerical sequence such as IO90IV defining any QTH in the World to an accuracy of a few kilometres. These replaced the old QRA, codes like ZK04g that were only applicable to western Europe.

RadCom published quite a lot of software back then as home computers were new and exciting, and many radio amateurs were putting them to use in many areas of the hobby. There was considerable interest in using computers for contest scoring and algorithms were published for distance and bearings between two locators. There was even a very crude approximate conversion between Lat/Long and the National Grid Reference (NGR) as used for UK mapping and defining locations; it wasn't the exact Ordnance Survey conversion, but accuracy was good enough for the purpose at that time.

Moving on to the 1990s, I became interested in the microwave bands where most operating was done from hilltops with highly directional antennas that needed bearings to be calculated accurately. Several amateurs had put-together a database of sites used for microwave operating, good hill tops, some useable coastal spots and a few home stations. The database

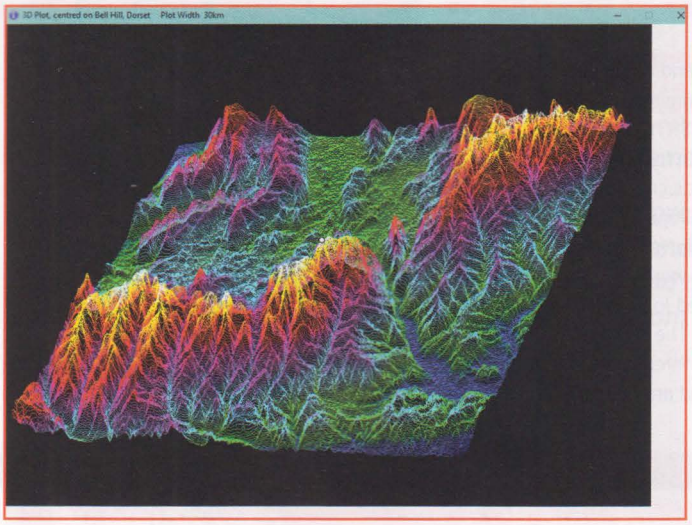


FIGURE 3: 3D representation of ground terrain showing a more localised view around the same site as Figure 2. The pseudo 3D image allows the effects of local obstructions to be visualised.

FIGURE 4: Plot of visible terrain from the same site. The colour corresponds to horizon angle, with black sections not visible. The cursor position reads out NGR, Locator, and the nearest site, allowing various high spots and line of sight paths to be discovered.

was, back then, used with BBC computers or other ones of the era, or hand calculators for the bearing calculations. I took the original site database and integrated it with locator conversion software to and from Lat/Long. Then added in NGR after finding the exact Ordnance Survey equations for the conversion to and from Lat/Long. That became a programme that printed out a list of distances and bearings from any user defined site, or any values typed in, as either NGR or Locator, or as a site name in the database. It was taken up widely by the microwave operating community. On the back of that I was given a copy of a height database of the UK that gave spot heights for every interval on a 500 metre grid. That was integrated into several programmes that plotted path profiles, terrain maps and even showed a three-dimensional plot of the local terrain. All the code was all written in the 16 bit programming language PowerBasic for DOS, which later-on ran perfectly well in a command screen within the early dialects of Windows. That original suite, *GEOG2*, worked happily up to Windows XP with several operators still using it in a DOS emulator after Windows 7 and then Windows 10 appeared.

Meanwhile, Mike Willis, GOMJW, had taken the idea and developed a full-blown path profile analysis tool for Windows with RF propagation calculations built in [1]. He used a higher resolution height database generated by the Shuttle Radar Terrain Mapper (SRTM). This is available for anyone to download for free and covers the whole world [2]. Individual 'tiles' of one degree latitude and one degree longitude are stored with file names such as N50W002.HGT (50° North, 2° West). There are an awful lot of them covering the World's landmass, so download only those needed. The spatial resolution is 3 arc-seconds, or 1/1200 of a degree which at mid latitudes corresponds to a squaroid [3] of about 93 metres – six times better than the original UK-only height database. A typical plot from Mike's

FIGURE 5: This plot shows the horizon angle in a linear form, as if you were up the mast on the reference site and scanned around through 360°. Cursor readout gives the bearing, showing-up narrow slots where DX line of site paths may exist.

software is that shown in **Figure 1**, which is the path profile from my house to Bell Hill in Dorset, the site of the South Coast Microwave beacons. Parameters are set for 10GHz propagation.

Meanwhile there had been a global shift in location accuracy available to the masses that changed everything. GPS (now GNSS) had come along and anyone could get their Lat/Long anywhere on Earth to a few metres accuracy. Any modern smartphone can do it, and the display apps are mostly free. One effect of GPS taking over was that a global terrain reference frame, or spheroid, referred to as WGS84 had to be used for defining Lat/Long instead of local mappings for each country or region – our original one was OSGB36. This meant the old UK Lat/Long, locked to the national grid from surveys dating back to the eighteenth century, was now in error more than hundred metres when compared with GPS measurements. It wasn't 'wrong', just a different, global, reference. The OS developed conversion algorithms and a WGS84 / NGR conversion accurate to about three metres with stand-alone software was included by Mike in his *Profile* package. The full high accuracy OS conversion is accurate to millimetres, but involves a lookup correction table based on 1km squares – unnecessary for our purposes. The OSGB36 / WGS84 error can be seen by comparing old 1980s generation OS maps in the 1:50000 series with their modern equivalents. The blue crosses indicating 5' intervals that are shown where they do not obstruct other detail have moved by up to a couple of millimetres.

After an idle period earlier this year I decided it really was time to update the earlier software that gave the nice plots that Mike's didn't go in for. Using a 32 bit version of PowerBasic, several of the earlier *GEOG2* suite were converted to use the SRTM data and run properly in a Windows environment. And, of course, use the WGS84 to NGR conversion. Full details can be found at [4] including more on the various programmes, and on mapping and conversions. Some of the plots typical of those generated can be seen in **Figures 1** to **5**. I also discovered the somewhat geeky joy of, while out hill walking, placing my iPhone on a Trig point, leaving it for several minutes to acquire and fix properly then comparing the displayed 1m NGR (with its 'declared' 5m accuracy) against the 'true' value for that trig point. A list of all 60000 of the old OS survey points, many of them now unfortunately lost or destroyed can be downloaded from the OS website; the NGR of each is given to one-metre accuracy. The iPhone GPS readout of NGR has never been more than a few metres out, with a couple showing, at least at the time of measurement, the exact value listed in the OS database. Very satisfying.

Andy Talbot, G4JNT
andy.g4jnt@gmail.com

So...

Until *JNT Labs* suddenly gets back on form with RF or other radio-related hardware, or I get enough reader input (that's you!), expect this column to move more towards SDR and DSP and software techniques. I'm doing the GNU Radio course running the day before the RSGB Convention in October, so hopefully that will inspire some ideas around existing low cost SDR hardware. At least, hopefully, it will make driving and using other people's hardware with my own software and ideas that little bit easier.

References
[1] GOMJW RF Path-profile and analysis software: www.mike-willis.com/software.html
[2] SRTM Height Data: The SRTM tiles of 1° squaroids can be found in the form of .ZIP compressed files at https://dds.cr.usgs.gov/srtm/version1/Eurasia/ for European locations, or https://dds.cr.usgs.gov/srtm/version1/ for an index into files for the whole world.
[3] The term Squaroid is used in place of the incorrect term 'square' here. The small subdivisions of Lat/Long are three-dimensional projections on a spheroid and are neither square, nor have their sides straight, nor at right angles. On a Mercator map projection they may appear rectangular, and at 60° latitude may even appear square but this is only an artefact of the projection in use. The term 'squaroid' removes this ambiguity.
[4] Latest path and height plotting software: www.g4jnt.com/GeogWinSoftware.pdf and www.g4jnt.com/SiteDatabase.htm

VDSL2 signal characterisation continued from page 31

To make it clear that this ripple is indeed the VDSL2 channels, **Figure 10** shows the spectrum of that spectrum. There is a very clear peak at 4.3125kHz marked with the blue line.

Summary

A software tool, *Lelantos*, has been developed that can be used to identify and measure the relative strengths and spectrum of VDSL2 RFI and desired signals. It can detect and compare the signals from multiple simultaneous VDSL2 lines. The tool also allows comparisons of recordings made at the same time, one being of the receiver obstructed by VDSL RFI and the other in a quiet environment close-by.

Conclusions

Surveys show that these results are typical for about half of those responding to the survey and are not just the result of unusual line faults. It is undeniable that VDSL2 is causing Harmful Interference in most areas of the country. This was predicted when the VDSL2 standard was developed and accordingly the standard mandates that the equipment can be configured to notch out 16 selectable frequency bands. The amateur radio bands for each region are listed in the standard as frequencies to be notched and it is left up to the operator to select the appropriate notches. In the UK no notches are being applied.

References
[1] The Shannon Limit of a communications channel is the theoretical maximum information transfer rate of the channel for a particular noise level.
[2] The Nyquist rate (or frequency) is named after electronic engineer Harry Nyquist. It is half of the sampling rate of a discrete signal processing system.

National Radio Centre

As you'll read on pages 6 and 32, the RSGB National Radio Centre (NRC) at Bletchley Park (BP) is a fantastic success, attracting thousands of visitors each month and, often, many hundreds on a single day.

Along with the history of radio, description of the spectrum, and hands-on displays for visitors, licensed radio amateurs will doubtless want to see the permanent special event station GB3RS. It's a top-class installation with HF, VHF/UHF and satellite equipment, all set up to showcase the best of amateur radio and enthuse visitors with what they can do in the hobby. If you want to use the station, bring along a copy of your licence and, time permitting, the volunteers will let you have a go – and are there if you need any help. RSGB Members can get free admittance to BP; download your voucher (in advance) via www.rsgb.org/bpvoucher

The NRC is now open every day that BP is open. It relies on a team of volunteers to greet and guide visitors, show them round, and generally engage about amateur radio. If you live within a reasonable distance and might be able to spare a day or two a month to help, please contact NRC Co-ordinator Martyn Baker, G0GMB, via email to nrc.support@rsgb.org.uk

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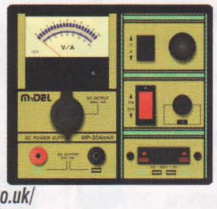

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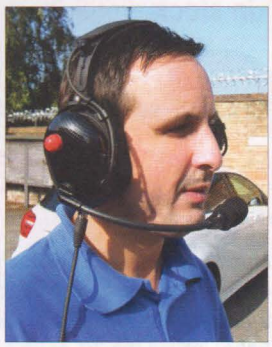

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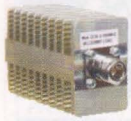

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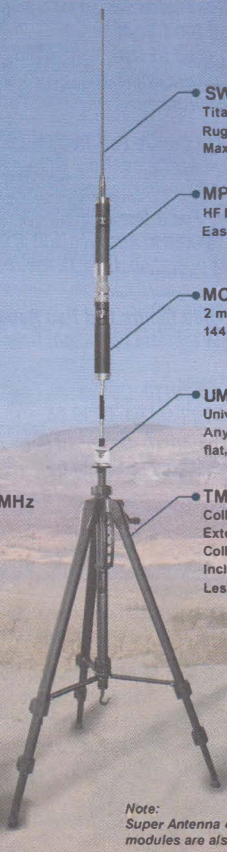

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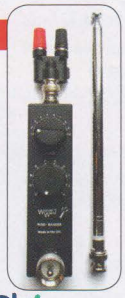

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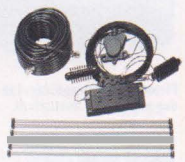

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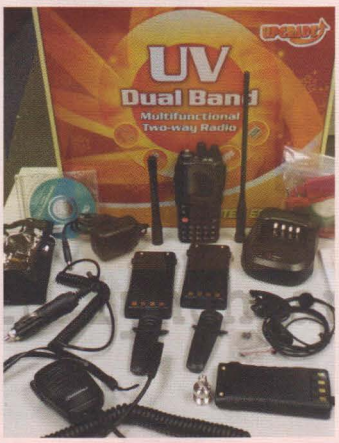

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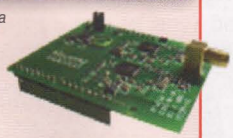

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A tilting stand for homebrew bench equipment

Slightly tilting a radio or piece of test equipment used on a bench or worktop can improve access to front panel controls and the readability of displays.

PHOTO 1: General view of the hinge supporting a homebrew test instrument.

Foldable tilt bails to do this can be hard to find, limited in choice of sizes and are often expensive. The homebrew tilting stand seen in **Photo 1** uses materials that are readily obtainable from good ironmongers or DIY stores and is scalable to suit almost any size of project case. It can be constructed by anyone with a moderate selection of tools and skills. **Figure 1** shows the principal parts.

The key component is a steel piano hinge approximately 14mm wide when folded shut. It is often sold as 'continuous hinge' with a brass finish in a range of lengths. When fully opened back on itself, it forms an acute angle of about 70 degrees, as seen in **Figure 2**. A pair of feet cut from aluminium strip or bar attached to the hinge increase the height of the stand as required.

Construction

The length of piano hinge you require obviously depends on the width of the project case. It's best to use a length of no more than 80-90% of the case width; the prototype shown here is on the high side of that range. Piano hinge can be cut to the required length using a hacksaw. It's not particularly expensive – typically under £10 for a 1m length – so it's practical to do a couple of test cuts of short lengths to 'get the feel' for it before attempting to cut the desired length.

Photo 2 shows the general assembly arrangement.

The aluminium feet should be made from aluminium strip or bar about 2-3mm thick and 30mm or so width. The actual length sets the angle of the stand and isn't critical, though the two pieces must be the same size. It may be worth draw-filing the cut edges to produce a clean edge; I did this on the end of the long aluminium strip in Photo 3 but not on the piano hinge or the feet; the difference in finish is clear.

Offer the feet to the hinge, generally as shown in Figure 1, then use a centre punch to mark the piano hinge in two places above each foot. Drill pilot holes in the hinge, then replace the feet and mark through those holes to let you drill and tap two holes in each foot for M2 pan head screws, as

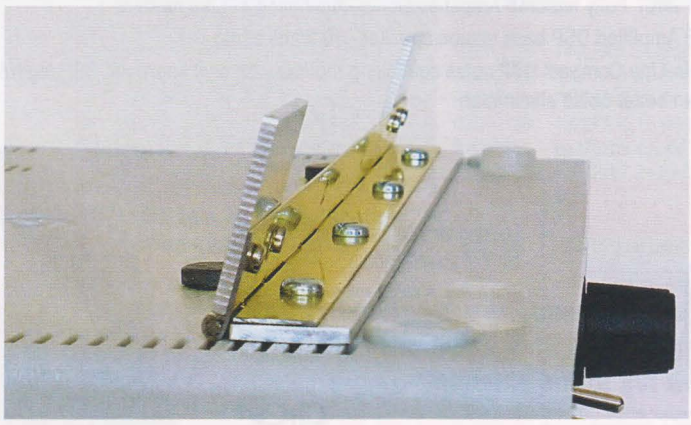


PHOTO 2: Detail of general assembly.

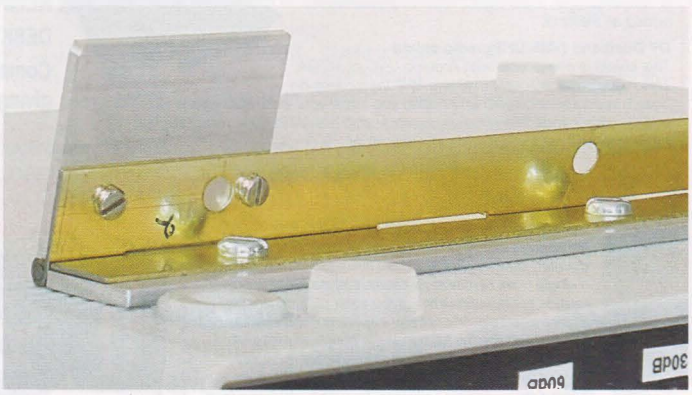


PHOTO 3: Further detail of assembly. Note general position of self-adhesive feet.

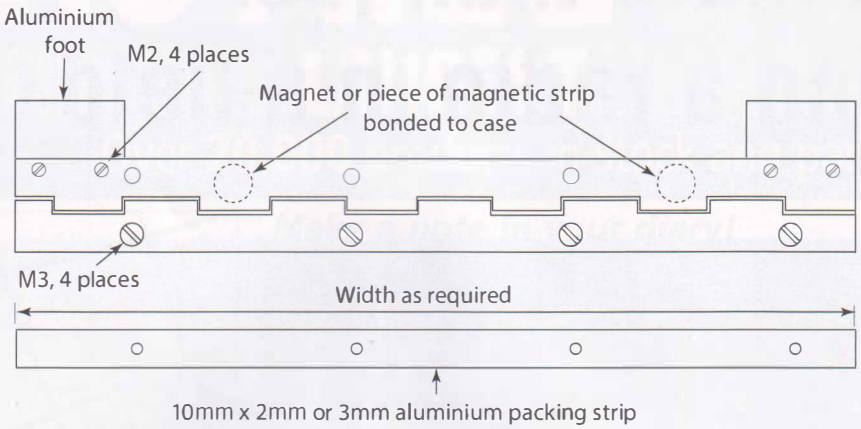


FIGURE 1: General assembly arrangement.

shown in Figure 3. M2 taps, tap holders and screws are available from hobby or model shops, eBay, [1] or [2]. Note that 2mm thick aluminium is only sufficient for about five threads of a standard (coarse) M2 screw; take care when you finally assemble the stand that you don't over-tighten the screws or you may strip the thread in the relatively soft aluminium. A drop of thread locking compound (or even super glue) will make sure that the screws stay put. It's not practical to put nuts on the screws because this will prevent the stand from folding flat properly.

If you can't buy screws of exactly the right length, you can cut down longer screws to the size you require. The trick here is to put one or two nuts on the thread and wind them up until they're nearly at the screw head so that when you've finished the cut you can remove them, re-forming the end of the thread in the process.

The hinge is bolted to the base of the project case with M3 pan head screws. A strip of aluminium sandwiched between the hinge and the case provides clearance for the hinge pin. 2mm strip is usually sufficient, but some hinges may require thicker material or a packing strip (shim) to allow the hinge to lie parallel to the case, as seen at the bottom of Figure 2.

Glue small magnets or pieces of magnetic strip to the project case using impact adhesive. This will attract the steel hinge and hold the stand in place when folded away. The magnets do not need to be powerful. Their number and position is best determined by trial and error, as the attracting force depends on the air gap (if any) between the magnet and the hinge. Magnetic strip material and small magnets can be recovered from unwanted refrigerator decorations or magnetic closures. If nothing suitable is to hand, they can be purchased from craft shops such as [3] and some DIY stores.

The amount of tilt required will depend on the reasons for wanting to tilt the case and personal preference. If it is to provide easier access to a connector or a control near the bottom of the front panel, raising its centre to 40-50mm above the worktop should be sufficient. To improve the visibility of LCD and similar displays, an elevation of 10-15 degrees may be more appropriate, dependent on the display viewing angle characteristics.

The stand and its fastening screws will project 5-6mm below the case when folded away, so self-adhesive feet may be needed to provide adequate clearance if the feet supplied with or moulded into the case are not deep enough. You will have to decide for yourself where to put them – if the self-adhesive feet are tall enough then you can put them on the bottom of the case, as seen in **Photo 3**, or on the piano hinge where it's screwed to the case.

The position of the back feet will determine whether the case sits on its rear edge or on the back feet when it is tilted, and this in turn affects how long the aluminium feet on the stand should be.

The dimensions shown in the figures were used for a 190mm deep instrument case where the position of the lowest control knob (see Photo 1) drove the design. The stand hinge line is 150mm from the rear of the case, which sits on 5mm thick self-adhesive feet. The back feet are about 15mm from the rear of the case, ensuring that it sits on them when the case is tilted upwards. Note that some dimensions are not shown in the figures as the position of the holes in the hinge can vary, which can affect the choice of drillings for the foot fastenings. With plastic cases, check the interior for mounting bosses or PCB card guides where the hinge is to be bolted through, and make adjustments accordingly.

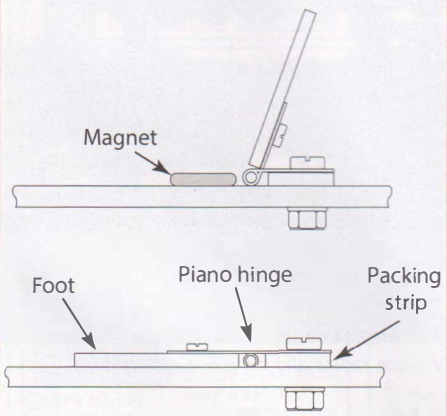


FIGURE 2: Hinge open and closed.

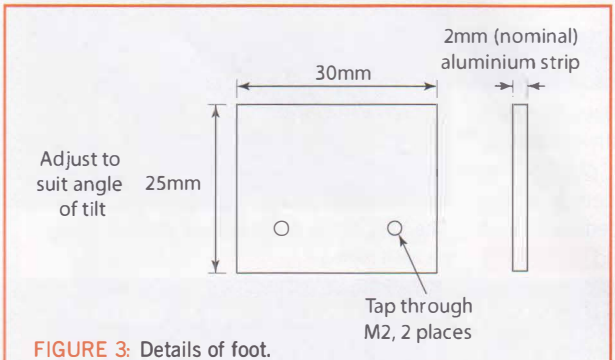


FIGURE 3: Details of foot.

Smaller cases

A lightweight version for small instruments can be made by discarding the aluminium feet entirely and protecting the lowered edge of the hinge with split PVC or rubber sleeving. A stronger version for heavier equipment can be made by fastening a single piece of aluminium across the full width of the hinge and cutting holes to clear the magnets.

Websearch

[1] www.chronos.ltd.uk (taps and holders)
[2] www.kayfast.co.uk or search "kays fasteners ebay"
[3] www.hobbycraft.co.uk (magnets and magnetic strip)

Peter Swallow, G8EZE
swallowp@aol.com

Feature

Club Field Day – much more than just operating a radio in a field

There is a lot more to a Club Field Day than operating a radio in a field. GB2MFM was the 4th field event this year for Thames Amateur Radio Group (two more were cancelled due to adverse weather).

The club wanted to try something different so came up with the idea of operating from a World War II Pill Box and encouraged people to call-in from other military monuments within VHF range, which, via repeaters, includes most of South East England.

Wat Tyler Country Park, just south of Basildon, has a preserved Pill Box with a secure fence around its roof giving spectacular views over the Thames Estuary. This is a popular location for dog walkers and bird watchers. On the sunny weekend of 1 and 2 September, the park was extremely busy.

This was great news for us having set up our 'Control' with a VHF omni-directional antenna on a massive telescopic mast towering above the trees. A Yagi on the Pill Box roof with flags, signs and information leaflets made us an obvious point of interest. Some walkers were ex-military radio operators or lapsed amateurs, and others just wanted to have-a-go on the Morse key.

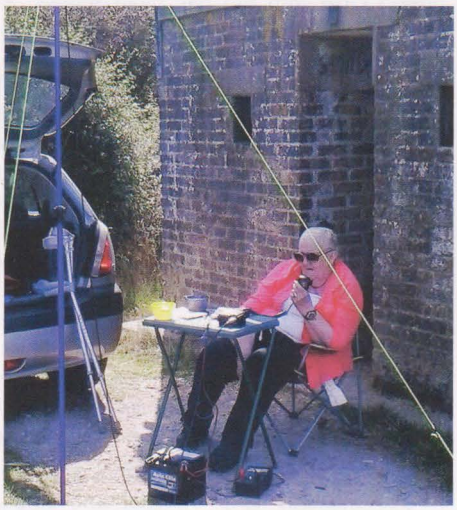
Learning to operate portable

Club members benefited from a lesson in how to operate portable from both an RF point of view and precautions over Health and Safety. Vice-Chair John, MOLFX, promoted the theme by driving to two WWII airfields (Hornchurch and North Weald) and called in using a collapsible Yagi on his car roof, and Dorothy, MOLMR called in from two forts.

Operating over the weekend

We had intended to monitor frequencies on a whole range of 2m modes but found that transmitting tended to interfere with other operators despite using a different mode. So we prioritised the conventional FM calling frequency (which also kept us off 2m SSB as there was a contest taking place). Billed as a 2m event we did bring HF and made contact with some stations in Europe via CW and using the ex-Military Clansman.

Tables were placed parallel to the footpath so the public could see what we are doing.



Eve, 2E0EVN using a 2m J-pole.

Benefit to the club

As always with these events, there was plenty of opportunity for club members to learn new skills and get involved with promoting the hobby to members of the public. The following day there was a meeting of the TARG Committee. Positive feedback was received from all those involved and, as a result, two more Field Days are planned for 2018 and we will return to Hadleigh Country Park (where we did a Satellite event) and Wat Tyler Country Park in 2019.

Various radios and a 'have-a-go' Morse key.

The Yagi at the WWII airfield 20 miles away.

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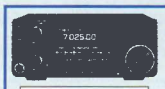

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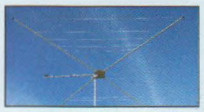

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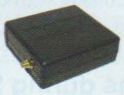

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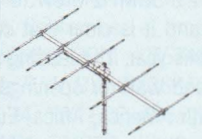

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HF

The PJ4DX QTH in Bonaire with 80m vertical, Spiderbeam, and two element phased array on 40m.

Conditions during September picked up slightly though the solar flux remained around 70.

The best DX last month was on 20m but probably required a beam and a linear to make a QSO at most times. V73NS and E51JD were audible over the North Pole on many days around 0800UTC and the RIOB IOTA team were S9+ around lunchtime every day they were on.

There was an interesting Caribbean opening around 2230UTC on 8 September in the WAE contest when Steve, PJ4DX worked a dozen UK stations on 15m. Signals were so good that Jamie, M0SDV, operating from M6T, requested a QSY to 10m where a QSO was just possible.

The CDXC HF Challenge for working DXCC entities on 21-50MHz drew to a close on 30 September and it is clear that conditions were well down this year. The leading stations had to be patient and wait for openings but contacted most of South America, Africa, Europe, the USA and Canada, China and Japan but struggled with the Pacific and nearer Europe. In particular, I noticed an absence of UK contacts with Hawaii, Alaska, Guam, Samoa, Marshall Islands and New Zealand, which are normally present. On 2 October the leading claimed scores were M0BCT 137, MW0CRI 122, M0NKR 114. These contrast with winning scores in 2017 of 162 and in 2016 of 174. Martin, M0BCT noted, "The daily pattern was Western EU and some Middle East to start with, as 15 opened up by around 0700 to 0800UTC. A pipeline to Indonesia mid morning through to afternoon and then, as expected, swinging through Mayotte, South Africa and on to South America. Mostly PY, LU, CX, occasionally Chile and the north of South America, HK and HC. Rarely getting up into the Caribbean or NA until towards the end of the month. I often heard A71AE and 2 or 3 VR2s on FT8, but never managed a QSO. I only worked 0N once on FT8 15m. Even EI didn't get logged". 72 of Martin's 137 DXCC entities were only worked on FT8.

The CQWW SSB Contest takes place over the last weekend of October and as always provides a lot of DX opportunities on the contest bands. Look for Caribbean stations in particular as most of the islands will be on the air and easily workable from 3.5 to 18MHz – with some possibilities on 21MHz and higher. Check 80 and 40 just after dawn and the higher bands from mid-day to mid-evening.

DXpeditions

The VP6D operation from Ducie Island (OC-182) should be starting on 20 October. I expect this to be fairly easy to work on the low bands around or just after dawn. 20m could be open for much of the day with peaks around 0800 and 1600-1800. 1600 could also mark a long-path opening from the east so if you have a beam it would be worth checking both ways. Despite the low solar flux I will be surprised if there are no UK QSOs on 15m in late afternoon.

From 17 – 23 November, Rob, M0VFC, Dan, M0WUT and Dom, M0BLF (all previous winners of the RSGB's G5RP Trophy for newcomers to DX) will be active as VP2MUW from Montserrat (NA-103). They'll be on all bands 80m-10m CW and SSB only. More information at vp2muw.com

Ali, EP3CQ has been given a permit to operate as 6O100 from Mogadishu while he works for the United Nations in Somalia. He plans to operate SSB on 20/15m from 1500-1700UTC during the week, and 1100-1500UTC on Friday-Saturday. QSL information and updates will be on QRZ.com.

Willi, DJ7RJ will be active as FR/DJ7RJ from Reunion Island (AF-016) until 27 October on CW/SSB 160-10m, with a focus on 160m.

Eric, EL2EF, Col, MM0NDX and Jonathan, MM0OKG plan to be active as EL2EL/4 from Telengbe Island (AF-111, new one for IOTA) on 5-9 November. This activity is dependent on weather and sea conditions. They will have up to three stations on 40-17 metres, but will check propagation on other bands as well. This is a 'charity DXpedition' and all donations will be used to help MAF (Mission Aviation Fellowship) to provide humanitarian flights in Liberia. See af111newiota.com for more details.

Steve, G4EDG is active as ZD9CW from Tristan da Cunha (AF-029) until 22 October. If you miss him then Declan, EI6FR, recently announced a late September 2019 expedition when, subject to space on the boat to be confirmed nearer the time, he will be joined by 9V1YC and EI5IX. ZD9EI is the callsign they have asked for.

Mandu, VU3NPI and friends are heading to Dhanushkodi on Pamban Island (AS-173) on

The RIOB QTH on the Arctic Institute Islands.

The RIOB team on Tyrtova Island with plaque to Swedish explorer Nordenskjold.

3 and 4 November. They will be on CW, SSB and FT8 on 80-10m.

Don, K6ZO will be on the air in the CQ World Wide DX SSB Contest on 27-28 October as 7Q6M (and for a few days each side).

Look for Kazu, JD1BNA to be active from Ogasawara (AS-031) mostly on 160, 80 and 40m from 24-28 October.

Mike, JA6EGL should be active as T88SM from the VIP Guest Hotel in Koror City (OC-009), until 24 October.

Four US ops have rented a house at the south end of Bermuda (NA-005) for the October CQWW SSB Contest and from 22-31 October. They will be active as VP9/K4AJA in the contest and as VP9/home call outside it.

A Spanish group will be active with HH2MK as 4V7R from Haiti (NA-096) on 19-29 October. They will operate CW, SSB, RTTY and FT8 on 160-6 metres. The website is http://lazydxers.com/4v7r

A Slovenian team will be active as XT2SZZ from Burkina Faso on 22-30 October. Activity will be on various HF bands and 6 metres and will include the CQ WW DX SSB Contest.

Clive, GM3POI will be staying with V47JA/W5JON (NA-104) for a holiday style operation from 23-30 October, including the CQ World Wide DX SSB Contest. Outside the contest he will be operating as V4/GM3POI. During the contest he'll be V47X.

Correspondence

Andy, G3SVD found conditions marginally better in September than in August but still not great. He reports: 15m – 7Q7ELA, T060K, ZD7FT, 9X0T; 17m – 4S7AB, 3W3B, 7Q7ELA, ZD9CW, T060K, 8Q7SD, 9X0T, VK9XT; 20m – RI0B, 7Q7ELA, 9V10W, ZD9CW, FK8IK, T060K, H88X, 9X0T, FP/DK7LX; 40m – H88X, 9X0T.

Peter, G4XEX had builders working around his antenna using RF-generating tools so had a sparse month on the DX front. He was only on 20m and found on SSB ZD7BG, on CW TR8CA, ZD9CW, 9X0T, RI0B, and on data JAs, VU2EKJ, JA1JA, ZP6SKY, V31VP.

Ken, CT7AGZ found conditions disappointing as he had been hoping for great propagation for the CDXC HF Challenge. Once again FT8 was the dominant mode (shown in italics) for his QSOs: 10m – *YV5KAJ*, T060K; 15m – *Z21MH, FG5FI, HC1DX, HH2MK, HK3VHZ, A71AE, 9K2OK, ZP6SKY, TR8CA*, VP2V/AA7V, *BG9NJY*; 17m – *9G5AR, WP4JCF, 4S7AB, J73HGL, XT2BR*, CP4BT, FG/HG0R, *V31MA*, EX3NOMAD, *S79LD, 3B9FR, PZ5RA*, CX5UA, TI5/N3KS, *XE1MEX*, V26K, *TI2CDA*, ZD9CW, *T060K, HC5VF, ZF1RC, VR2CH*, 9X0T, T060K; 20m – *TR8CA, S01WS, ZD7BG, UN7LZ, KV4FZ, C08LY, HI8PJP*, V26K, 4F30M, HK1MV, HZ88ND, ZD9CW, T060K, *9X0Y*, FP/DK7LX; 30m – *5A1AL, 6W1SR*, C08LY; 40m – *KV4FZ, YV5JLO, XT2BR, YD2YSW, A41ZZ*, A61Q, *YS1MAE, 6W1SR*, HZ88ND, *H88X*; 80m – *ZL2IFB, C08LY, FO5QS, ZL4AS, ZF1RC, HI8AR*.

Fred, G3SVK was busy chasing 9X0T, T060K and H88X on various bands. His DX report included: 17m – A61Q, *YB0EIN, A45MS, A45XR, 3B9FR, ZS6JES, LU8HGI*; 20m – 4S7KM, FP/DK7LX, 9M4CKM, YB208B, VU3ARP, JW/DJ2AX, 9Z4Y, CE2ML, XR208D, HS3NBR, VU2RAK, XR208C, XT2BR, PY0/PY7RP, XR1SDC, A5A, RI0B, PJ4/PA3BWK, V26K, PJ7/K5SL, HC2AO, PZ5JW, A61Q, EL2DT, 9M2PUL, 3B9FR, KP4TF, 9X0T; 40m – OJ0C, VU2GSM, HH2AA, XQ6CFX, HZ1TT, OX3XR, FG/HG0R, A5A, FM5FJ, V26K, 7Z88ND, HB0/DL5YM, S01WS, CP4BT, FP/DK7LX, T060K, 4S7AB, H88X, ZD9CW, 9X0T.

Peter, G3HQT kept his score moving along with: 20m – V26K, 9X0T; 30m – 4S7AB, A5A; 40m – UK7AL, H88X.

Finally, Gordon, G3PXT said he 'only' made 1125 QSOs in September – mostly FT8 – including as follows: 20m – *T6TMM*, V26K, P49X, *VK3BM, PJ4, BY, CO3SAR, J73HGL, HI8AR, TG9IN, JA, YN1ECF, 4S6RYD, PZ5RA, HS1NGR, 3V8MM, 9M2TO;* 30m – *BY;* 40m – *KV4FZ, TR8CA;* 80m – ZL2OK.

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

TABLE 1: 2018 Worked DXCC Entities (ranked by All). Showing Top 4 from RSGB or British Isles table in Club Log plus submitted scores or Club Log scores of recent correspondents where available.

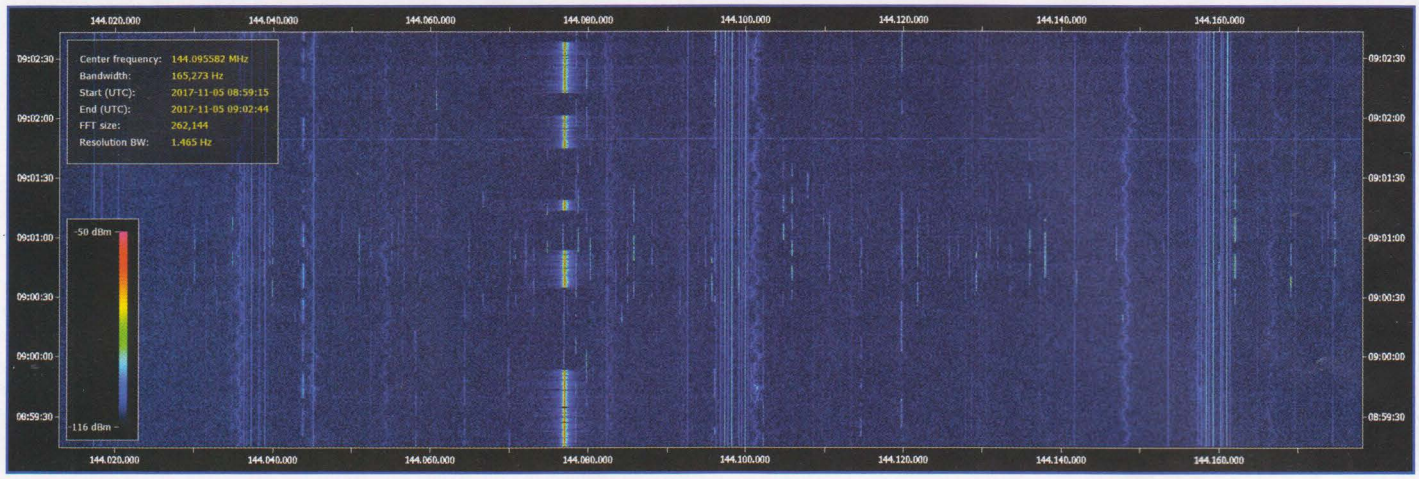
Call	CW	SSB	Data	All
M0NKR	159	197	173	259
G4TUK	150	141	208	255
G0DWV	169	164	160	242
G3TBK	230	119	120	233
G3PXT	103	115	198	216
CT7AGZ	189	1	159	210
G8APB				198
G3SVD	123	138	0	194
GI4D0H	165	6	80	180
G4IDL	165	0	64	168
G3SVK			164	164
G4XEX	75	77	122	157
G3HQT	149	0	0	149

TABLE 2: DXpeditions.

Until 24 Oct	T88SM
Until 27 Oct	FR/DJ7RJ
Until 29 Oct	WH8/DL2AH
Until 21 Oct	Chad by LA7GIA
Until 4 Nov	YJ0GC
Until 30 Oct	VK9X by 6Gs
19-29 Oct	4V7R Haiti
20 Oct – 3 Nov	VP6D Ducie I
22-30 Oct	XT2SZZ
22-31 Oct	VP9 by US ops
23-30 Oct	V4/GM3POI
24-28 Oct	JD1BNA
25-29 Oct	7Q7M
3-6 Nov	VK9XQ
3-4 Nov	VU Pamban I (AS-173)
5-9 Nov	EL2EF/4 (AF-111 new)
6-10 Nov	VK9CH
10-17 Nov	VK9XQ
17-23 Nov	VP2MUW
21-28 Nov	J8NY
August 2019	St Paul Island
2020	Sable Island

Martin Atherton, G3ZAY
g3zay@btinternet.com

VHF/UHF



The waterfall display from G4XZL's SDR receiver during the Marconi CW Contest 2017.

More 2m DX during September, including another Region 1 DX record broken.

September has traditionally been a month for good tropo DX on VHF and UHF. Many will have excellent DX in their logs with significant openings mainly down to the Spain, Azores, Portugal and the Canary Islands, which have been possible by large, slow-moving high pressure systems coming from the Azores area. 2018 didn't disappoint with yet another DX record set for IARU Region 1 on 2m and this time it was a repeat of last month's report with D4Z /D41VC (Cape Verde) active once again.

Conditions during the IARU/RSGB 2m Trophy Contest from the south of UK anyway were excellent down to the northern coast of Spain and also to the north east to Denmark and Northern Germany. DX QSOs of well over 1000km were commonplace; however these excellent conditions didn't find their way up into the northern areas of the UK.

As the summer months passed into autumn, there was a slow down in low band Sporadic-E conditions however, overall, 2018 probably could be recorded as one of the best in recent times.

Another new Region 1 tropo record

News came through that Peter, G3SMT (IO82) had completed a tropo QSO with D4Z in the second spectacular opening of 2018. Peter comments, "On Tuesday 25 September, I was monitoring the 2m band beacons as usual and noticed that the Spanish beacons were increasing in strength. So I called CQ to the south from IO82KV and worked EA1ED in IN53TI. As no further calls were heard I went back to monitoring the beacons with the occasional flick back to 144.300 just in case anyone was around. Whilst I had QSYed to 23cm, I heard someone on CW on 144.300 so I quickly turned the volume up only to hear D4Z in the Cape Verde Islands (HK76MU) off the coast of Africa, who quickly increased in strength to 599. I hurriedly gave him a call and a contact ensued at 2146UTC at a distance of some 4436km according to QRZ for one of my best contacts. It was quite noticeable that altering the beam heading over quite a few degrees either way had little effect on the received signal strength. Oh I have to mention that I didn't use ON4KST Chat or any computer, just old fashioned CQ and reply."

Paul, G4RRA (IO80) also completed a QSO with D41CV later in the evening using FT8 mode. Paul saw the station calling CQ at 2230UTC with signal strength at -19/-20dB. At 2238UTC the QSO was completed for another DXCC in the G4RRA log.

More Cape Verde QSO news on 2m

From news in last month's column I am indebted to David, GM4JJJ who followed up with very interesting information about the first 2m Cape Verde tropo event back in August.

It appears that Chris, GM4ZJI (IO86) did hear the D4C beacon on 144.436MHz. This was on 5 August at 1659UTC when the band was open to EA8 from his QTH. The distance would be 4739km to Chris in IO86KE. Chris later reported to me that it was peaking S7 at his QTH but had lots of QSB and he accidentally misreported the frequency as 144.463MHz on the DX Cluster in the excitement, which is entirely understandable. I initially listened on the reported frequency but sadly the only thing detectable was a birdie with no keying. Later I realised that the frequency I was listening on was incorrect but by the time I looked up the correct frequency of 144.436MHz nothing was detected.

Although delighted and surprised to work EA8TJ on 144MHz, Chris, GM4ZJI didn't consider his remarkable D4C beacon reception as of much interest, because he didn't have a two way QSO. I am very interested, as it proves that the 4700km path GM to D4 is workable given there being a suitable Azores stable high and good settled conditions in the UK that allows inland stations to access the duct. Generally it is in the month of August that I have observed such conditions here.

We have had such tropo ducting conditions to EA8 at least four times in my amateur radio life at my IO86GB QTH since moving here in 1989. All apart from this recent one on FT8, all were made on SSB, although some were made with four Yagis at my station. However we now have the more sensitive FT8 mode that can make up for my lower single Yagi antenna gain.

I hope that the D4C station can be upgraded to allow remote operation on 144MHz, perhaps on FT8, so that if we get another chance and the beacon is heard that we won't have to send EA8FF there to key the beacon! The Montverde Contest Team who maintain the D4Z/D41CV beacon and station detail all the equipment and antennas specifications on their website [1].

Going back to the GM tropo distance records, I spent a bit of time finding out the exact locations of stations at both ends of the recent and historic GM to Canary Isles tropo contacts. I used the addresses in QRZ.com and then Google Maps to find the distance between them rounded to

the nearest km. Previously the results reported were calculated from the centre of the 6 digit locators, so could be a fair bit out. So here are the new distances that I calculated on Google maps from addresses in QRZ.com [2] confirmed the following:

Distance to EA8TJ on Tenerife, GM4ZJI to EA8TJ (2018) 3270km, GM0KAE to EA8BML (1988) 3267km, Jim, GM4FVM (2018) 3264km and David, GM4JJJ (2018) 3250km. Distance to EA8BML on Gran Canarias GM0KAE (1988) 3267km previous record now 2nd place GM4COX (1988) 3260km (note exact location unknown so centre of IO85JX still used) 4th place. Distance to EB8BTV in 1998 (Now EA8TX) on Tenerife 3252km my ODX 5th place GM4JJJ. Distance to EA8BPX on Tenerife GM4JJJ (2003) 3239km.

What's your locator?

As DX distance records tumble, clearly using the established 6 character reference is not accurate enough to give definitive locations over paths of 3500km. Plus, the 'actual' location of both stations could be critical if a record depends on the odd few kilometres.

The history and the development of the current Maidenhead system is quite interesting. By the time of the VHF Working Group met in April 1980 in Maidenhead, there were 20 different proposals to deliver a replacement of the QRA locator grid system. The system devised by Dr John Morris, G4ANB was deemed to be the best and was adopted with a fairly slow and resistant take up through the 1980s. The excellent website of Tim, EI8IC [3] gives a clear description of how the now-named IARU Locator system works.

Fast forward some years and the extension to 8 characters fills the bill for analysis – somewhat difficult to transfer over the air as, say, a contest exchange, but it proves a good basis to work out DX records. There could well be winners and losers in this process. As software distance calculators usually calculate distances from the centre of a given locator square, eg IO83MM, it could be that if stations are located at the extremes of their respective square they could be closer in actual km distance. The opposite is also the case so the new 8 digit system will resolve to a much more accurate measurement.

Tim, G4LOH (IO70) advised of an excellent online tool to make the calculation of the 8 digit system easier and at the same time deliver the accuracy required from K7FRY [4]. The K7FRY global search allows the search for the stations address (via QRZ.com or QRZCQ.com) and, in the case of the G4HGI QTH, the 8 &10 character locator is discovered to be IO83PL59(SV). The GB3VHF beacon that shows a locator of JO01EH08 returns a distance of 317.8km.

The improvised paper log from D4.

Correspond that with the 6 locator system for both locations which returns a distance of 319.7km. In terms of DX records the difference of 2km could be make or break!

Band reports

Not such a busy month radio-wise for Bob, G8HGN (JO01). However some good QSOs in the log with some excellent DX worked during the opening to the south west. FT8 was the main mode of operation with some SSB activity. Bob has also some uncomplementary remarks about a PLT device that seems to be have been installed at a neighbour's property while he was away. HF through to at least 4m is S9 QRM, with some QRM noticeable at lower levels on 2m! Log highlights included EA1UU, EA2XR, EA1UR (IN83), F5GHP (IN96), EI3KD (IO51), F4HER (JN06), DD3SF (JN39), DK2GOX, DJ4WT, DH3FBI, DK5IR, DH8IAT, DF5HC, DL8FCL, DK3XT (JN49), DL8DAU (JO40), DB3OI (JO52), DK5SO (JN58), DGØKW (JO64), DM2ECM (JO62) DL4DTU (JO60), DF7DX (JO42), DL5ZA, DJ6AG (JO51), DK2EA (JO50) and DL/UT8AL (JO43). A rare SSB QSO on 432 on 3 September with DL8DAU, QSYing from 2m, and one with PA4VHF in the 2nd 4m contest on the 16th.

Dale, MM0INH (IO85) says the only significant dates on 6m were 30 July and 3 / 4 August. In total he only managed 34 QSO. Nine were SSB, the rest FT8; much reduced from the previous month. "Clearly we have passed peak season and the only contact of note for me was completing QSO with Estonia on SSB for a new DXCC on 3 August and an interesting opening on the 21st that appeared to be for me, solely centred over Switzerland. 4m for me was almost entirely dead when I was QRV and I only managed a single FT8 QSO on the 3rd August, it did however give me Latvia, which was a new DXCC for me, giving me a round number of 10 entities on 4m this season."

Marconi CW 2m Contest revisited

Andrew, G4XZL was going through some recordings he made last year of the 144MHz Marconi CW contest and found a huge meteor burst in the waterfall of his SDR receiver. Ignoring all the interference, he counted about 50 stations that appeared for almost a 1 minute. Andrew was beaming east from his home location in IO90 and must have had a significant 'common volume' from many directions. Clearly there would have been a number of very high power and elevated stations QRV from central Europe however it is quite possible the geometry of this type of burst could support reflections from south and north.

The SDR receiver was centred on 144.095MHz with a 165kHz bandwidth and the screen shot shows the CW keying clearly on some of the traces. Andrew has noticed events like this before but this was the first time he was able to capture such a lengthy burst. He plans to leave the SDR running again this year and if his CW is up to it, try and identify the stations in any of the bursts.

The contest runs from 3-4 November and is well supported in EU countries with some real fast CW operators so you have to be quick to read it [5].

Beacon news

Information from Hakan, SM6CEN that the SK6VHF 2m beacon has moved to a new permanent frequency 144.406MHz. All other details of the beacon are the same, with 25 watts to an M2 Loop at 120m ASL and located on Tjörn Island (JO57TX). This beacon can be a key propagation indicator across the North Sea from the UK and John, G4SWX confirmed reception on the new frequency with a reasonably stable -27dB in 2.5kHz, with occasional meteor pings.

Sign off

What a month, what a summer for VHF/UHF DX, with records tumbling, new modes opening up new propagation path possibilities and numerous Firsts. With autumn approaching the emphasis on testing propagation paths has never been more in the spotlight.

The report from GM4JJJ re the 4700km path from GM4ZJI to D4C opens up tremendous possibilities and considerably further than the path from Ireland over to the Canadian coast. Clearly the North Atlantic doesn't benefit from the Azores High phenomenon however 2m is all about 'possibilities'.

Websearch

[1] http://d4c.cc/?p=13166
[2] www.qrz.com
[3] www.mapability.com/ei8ic/maps/gridloc.php
[4] http://k7fry.com/grid/
[5] https://www.rsgbcc.org

Richard Staples, G4HGI
g4hgi@live.com

GHz Bands

Home station operation on the GHz bands

Last month I made some suggestions as to some easy starter projects for the GHz bands. This month, I want to look at setting up a GHz bands station from home. Back in August, the 10GHz Sunday Contest saw the apparent rediscovery of rain scatter (RS) on 10GHz. Lots of people had fun working 10GHz DX most of the day, but by some reactions it almost seemed like they were seeing something new! Those sorts of RS conditions are not uncommon in the UK, but we need more people operating from home to benefit from them. Good GHz conditions rarely coincide with activity weekends and contests, so you need to be able to pop in to the shack when the conditions look promising.

So how do you go about this and set up a useful station from home? What can be done with no tower and a simple pole on the gable end? On 10GHz, a small 45cm Sky dish and a waterproof box for the gear is really all you need, and there won't be a waveguide in sight! The big issue is to reduce the losses between your dish feed and the receiver front end/PA. If you are just going to run a 'barefoot' transverter such as the DB6NT MKU series and are happy with a few hundred mW, it couldn't be simpler. Kuhne's website [1] page 14 of 'transverter configurations' shows this simple arrangement. The transverter and a small SMA changeover relay are mounted close to the feedpoint, with a short SMA lead to the feed. **Photo 1** shows the new UKuG loan system that uses this setup (actually it has a 2W PA and a sequencer built in in, so see version 2 in [1]). This whole thing can be mounted on a 2-inch pole. Remember that these dishes have a 24° upward tilted radiation pattern when the face is vertical, so you'll need to modify the dish mount so it can tilt down by 24°. Feed it with 12V DC and a single IF coax carrying +12 V for PTT **[2]**. This is the arrangement of the UKuG 'Quickstarter' **[3]**. The same applies to the other bands where you can maybe use one of the excellent 23 and 13cm transverters from SG-Lab in Bulgaria **[4]**.

If you want to run a PA, you start getting in to the issue of weight and DC power with a small setup. The way I get around this is to have just a coax transfer relay and masthead preamp at the dish, housing the transverter and PA in the loft. For me, this is close enough to enable a run of just 5 metres of FSJ2-50 coax up to the masthead. M&P ultraflex13 coax will work just as well. The loss of such cable at 10GHz is around 0.5dB/m so I have just 2.5dB loss between the transverter and masthead. With a high gain preamp this does not affect my RX noise figure and my 15W from the PA becomes 8W at the feed. You still have significant power and lightweight masthead unit. The lower losses make the numbers even better on the lower bands such as 5.7 and 3.4GHz so there is no need for high current or heavy units on your pole. Add this to the number of designs for dual band feeds **[5]** and you can begin to see how a multiband home station can be set up. At my QTH I run three bands on one pole. The single 60cm dish is illuminated by a dual band 10/24GHz feed and a slightly offset 9cm feed. Only the 3 and 9cm preamps (and in my case the 24GHz transverter system) are mounted outside: the 24GHz transverter is slung under the dish arm, as seen in **Photo 2**. I run two 13mm feeders (for 9cm Tx and 3cm Trx) plus three lightweight feeders for 9cm Rx, 24GHz IF and LO.

PHOTO 1: The UKuG loan equipment for 10GHz.

PHOTO 2: Three GHz bands on one pole at G4BAO.

German mmWave DXpedition to the Irish Sea

It seems like August's DXpedition by a group led by Michael, DB6NT and Henning, DF9IC created some good QSOs for people in range. Chris, G4DGU, now back in Cornwall and operating from IO70qr, made two QSOs on 24GHz. EI/DF9IC/P in IO62te with 55/54 reports on SSB, followed by EI/DG8EB/P with 53 reports both ways. Chris used a 0.8m offset dish with a Skobelev/Potter type feed of his own design. These were Chris' terrestrial ODX on the band at over 200km and may surprisingly be a G-EI first, unless you know of earlier QSOs? Roger, G8CUB decided at to travel up north to operate from IO83ro and try and work one or more of the DLs, in Scotland, Wales, Isle of Man or Ireland. He worked Thomas, MW/DC8TM, Horst, MW/DL4SBK and Martina, MW/DF3TS on 10GHz, all on the Great Orme IO83bh on 24, 47 and 76GHz, all at 59+. MM/DK5NJ called on 10GHz, from IO74TQ. Moving further up the rough road, for a potentially better path to Scotland, he worked MM/DB6NT in IO74TQ, now 59+ on 10GHz, at 170km and on 24GHz at 55/55 with QSB. They tried on 47GHz; Roger quickly found Michael's signal and had a one-way contact over a very non-LOS path.

Finally

If you have anything to contribute to the GHz discussion, email me or Tweet @g4bao and @ukghz using the hashtag #GHz_bands.

Websearch

[1] https://bit.ly/2x8Mjp5
[2] https://bit.ly/2MpBIRy
[3] www.microwavers.org/10ghz-starter.htm
[4] SG-Lab transverters: www.sg-lab.com/amateur.html
[5] Dual band feeds: www.ntms.org/files/Dual_Band_2_3_and_5_10GHz.pdf
[6] www.microwavers.org/support.htm

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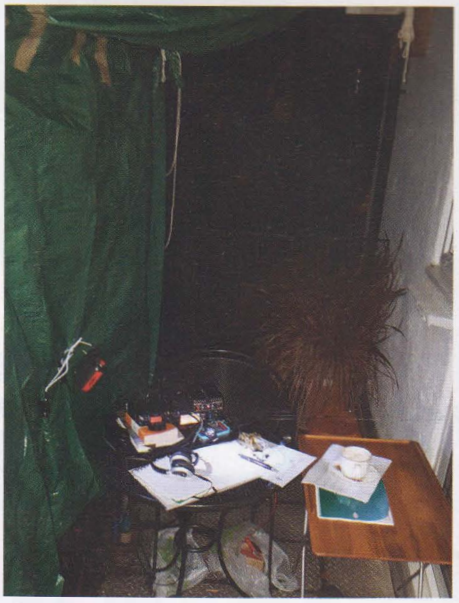

PHOTO 1: Protected only by a tarpaulin, G0OOG operated in the 2017 Marconi CW Contest.

The Super League series continues and the last in this year's VHF CW Championship events takes place this month.

The first RSGB HF event of the month is the Club Calls Contest. Also known as the 160m AFS, it is the second in the Super League series and runs for three hours on the evening of the 10th. CCC can be a useful training ground for people new to contesting, so why not see if some of your members will invite newbies along to their shacks? After that we move into the Autumn Series, with datamodes on the 12th. The 2nd 1.8MHz Contest is on the 17th, then it's back to the Autumn Series with CW on the 21st and SSB on the 29th.

The Marconi CW contest takes place on the 3rd-4th. There are 6- and 24-hour sections. Last year, operating from an outside balcony and protected only by a tarpaulin, David Gorman, G0OOG was the leading station in the 25W Single Antenna category, Photo 1. After that it's a straight run of Activity Contests through to the end of the month; the 2m FMAC and UKAC (6th), the 6m FMAC and UKAC (8th), the 70cm FMAC and UKAC (13th), and the 4m FMAC and UKAC (15th). Moving above 1GHz, the 23cm UKAC is on the 20th and the SHF UKAC is on the 27th.

November is the third month of the UKEICC 80m series and the SSB leg is on the 7th. The RTTY leg of the Worked All Europe DX Contest runs over the 10th-11th and everyone can work everyone. The IRTS (Irish) Evening Counties Contest takes place on 80m on the 13th. The skip distance could be quite long for this event, and stations in mainland Britain could work the Irish stations easier than they can work one another. The UK Microwave Group has a Low Band contest on the 18th. The duration is shorter so that portable stations can vacate hilltop sites while it is still daylight. The biggie this month is the CQWW DX CW Contest on the weekend of 24-25th. I doubt conditions will be good, but at least CW is a narrowband mode so weak signals should be more copyable than on other modes. This month's UKEICC 80m CW contest is on the 28th and the ARRL 160m contest starts at 2200 on the 30th. It runs for 42 hours because on 160m everything happens at night and those times include two full nights across the USA. For stations in Europe, the first North American stations should start to appear on the band at about 2200. The first to be heard should be from the east of the continent, with stations further west becoming workable as darkness spreads. Wherever you are in Europe, expect them all to disappear soon after it gets light with you.

Steve White, G3ZVW
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RSGB HF Events

Date	Event	Times (UTC)	Mode(s)	Band(s)	Exchange
Sat 10 Nov	Club Calls (1.8MHz AFS) §	2000-2300	CW, SSB	1.8	RS(T) + SN + Club info
Mon 12 Nov	Autumn Series	2000-2130	Data	3.5	RST + SN
Sat 17 Nov	Second 1.8MHz *	1900-2300	CW	1.8	RST + SN + District code
Wed 21 Nov	Autumn Series	2000-2130	SSB	3.5	RS + SN
Thu 29 Nov	Autumn Series	2000-2130	CW	3.5	RST + SN

RSGB VHF Events

Date	Event	Times (UTC)	Mode(s)	Band(s)	Exchange
Sat-Sun 3-4 Nov	Marconi CW Δ	1400-1400	CW	144	RST + SN + Locator
Tue 6 Nov	144MHz FMAC	1900-2000	FM	144	RS + SN + Locator
Tue 6 Nov	144MHz UKAC	2000-2230	All	144	RS(T) + SN + Locator
Thu 8 Nov	50MHz FMAC	1900-2000	FM	50	RS + SN + Locator
Thu 8 Nov	50MHz UKAC	2000-2230	All	50	RS(T) + SN + Locator
Tue 13 Nov	432MHz FMAC	1900-2000	FM	432	RS + SN + Locator
Tue 13 Nov	432MHz UKAC	2000-2230	All	432	RS(T) + SN + Locator
Thu 15 Nov	70MHz FMAC	1900-2000	FM	70	RS + SN + Locator
Thu 15 Nov	70MHz UKAC	2000-2230	All	70	RS(T) + SN + Locator
Tue 20 Nov	1.3GHz UKAC	2000-2230	All	1.3G	RS(T) + SN + Locator
Tue 27 Nov	SHF UKAC	1930-2230 ~	All	2.3-10G	RS(T) + SN + Locator

Best of the Rest Events

Date	Event	Times (UTC)	Mode(s)	Band(s)	Exchange (info)
Wed 7 Nov	UKEICC 80m	2000-2100	SSB	3.5	4-character Locator (Grid) square
Sat-Sun 10-11 Nov	WAE DX RTTY	0000-2359	RTTY	3.5-28	RST + SN
Tue 13 Nov	IRTS Evening Counties	2000-2100	CW, SSB	3.5	RST + SN (EI/GI also send county)
Sun 18 Nov	UKuG Low Band	1000-1400	All	1.3-3.4G	RS(T) + SN + Locator
Sat-Sun 24-25 Nov	CQWW DX CW	0000-2359	CW	1.8-28	RST + CQ Zone (UK=14)
Wed 28 Nov	UKEICC 80m	2000-2100	CW	3.5	4-character Locator (Grid) square
Fri 30 Nov - 2 Dec	ARRL 160m	2200-1600	CW	1.8	RST (Ws & VEs also send ARRL/RAC section)

In the case of differences between this calendar and the Contest Committee website, the website takes precedence.
* HF Championship event. Δ VHF CW Championship event. § Super League event. ~ Different bands at different times.
For all the latest RSGB contest information and results, visit www.rsgbcc.org

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National Hamfest 2018

This year the National Hamfest celebrated its 10th anniversary at Newark Showground – and what a show it was! Blessed by sunny weather, yet not overheating the hall, a record number of visitors came and enjoyed the biggest two-day show in the UK, hosted by National Hamfest (Lincoln) Ltd in association with the RSGB and actively supported by dozens of amateur radio traders from around the country, across Europe, and as far away as the USA.

At this year's Hamfest we held our first Buildathon for novice constructors. The event was attended by a wide range of ages and a fun and successful build was enjoyed by all. The Buildathon was sponsored by the RSGB Legacy Fund and undertaken in accordance with the Board's Growth objectives as published in the October edition of *RadCom*.

On the left is 8-year-old Noah being helped by Peter Barnes, M0SWN to construct the Redruth radio kit, which worked first time. The photo on the right shows Lauren, 2E0HLR (formerly M6HLR) happily tuning the kit she'd just built. Many other people of all ages also successfully completed the project.

A diverse range of goods were on offer from a wide range of traders. Here we see a selection of surgical and dental-type instruments jostling side-by-side with ferrite rings and batteries.

Nevada Radio MD Mike Devereux, G3SED (left) chose the National Hamfest as his first rally for over a decade. He was welcomed here by RSGB Chairman Ian Shepherd, G4EVK.

Volunteers representing many RSGB committees and special interest groups attended, helping to enthuse visitors with their unique perspectives and/or offer practical support.

The National Hamfest is one of the best places to rub shoulders with experts and senior staff from the major manufacturers. Happy to chat about amateur radio as equals, there's rarely any hard sell.

Numerous Special Interest Groups had stands and were ideally placed to discuss their particular facets of the hobby and, of course, invite people to join in.

Yaesu showed their brand new 100W FTDX101D all mode HF, 6m and 4m transceiver. Demonstrating their long commitment to amateur radio, they also showed a 1970s FT-101B and an FT-101ZD. Separately, on the RSGB QSL Bureau stand, was the historic, fabled and *ultra*-rare KW 2000D, courtesy of the National Radio Centre.

Bob, W2CYK of RFinder demonstrating their new K1 4G/LTE Android-based DMR radio that, uniquely, self-configures its settings from the web, requiring no codeplug. It will work with any DMR or analogue repeater within its band coverage.

One highlight of the 10th Anniversary National Hamfest was the special free draw for a 'shack in a box' prize, with setups centered around top-quality radios kindly donated by Yaesu, Kenwood and Icom, plus accessories from many other benefactors. The winner of Saturday's draw was Grant Cratchley, G4ILI, seen here being presented with his fabulous prize by Sam Taylor-Nobbs of Icom.

You could get pretty much anything you needed at this year's National Hamfest, from radios to lengths of cable to "jewellery for your tower", otherwise known as fittings, clamps, pulleys and suchlike. LF to microwave parts were readily available.

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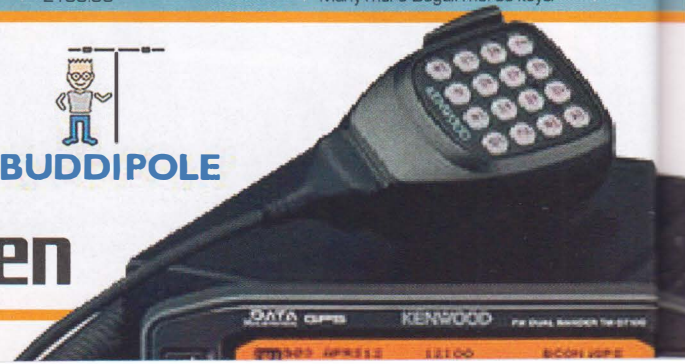

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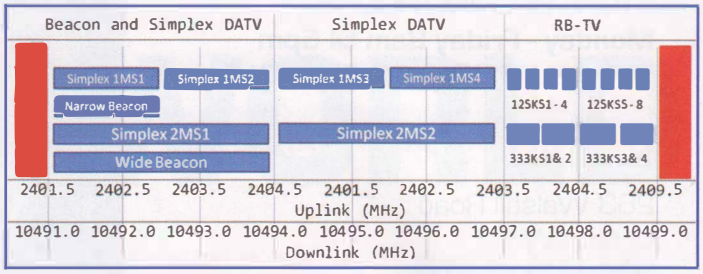
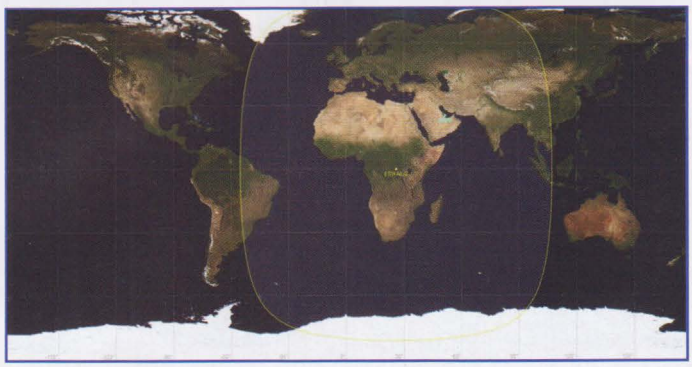


BATC's proposed initial band plan for the Wideband (DATV) transponder.



Es'hailSat coverage map.

Graham Shirville, G3VZV and Noel Matthews, G8GTZ with the Es'hail-2 receiving dish at Goonhilly.

Es'hail-2 – a geostationary satellite for amateur television – promises to be something of a revolution.

Es'hailSat, the Qatari Satellite Company [1], is planning to launch its second geostationary satellite, Es'hail-2, before the end of 2018. The satellite will carry two transponders that will be available for amateur radio use, both with uplinks at 2.4GHz and downlinks at 10.49GHz. The first of these transponders is only 250kHz wide and is intended for narrow band operation. The second is 8MHz wide and should enable digital amateur TV transmissions to be relayed over all of Europe, Africa, much of Asia and parts of South America.

The digital amateur TV transmissions should be easily receivable in the UK using an 90cm dish and a standard 'Universal' LNB with the MiniTiouner receiver [2]. On the transmit side, 25W at 2.4GHz with a 1.2m dish should be sufficient to enable the relaying of 333KS reduced-bandwidth ATV signals.

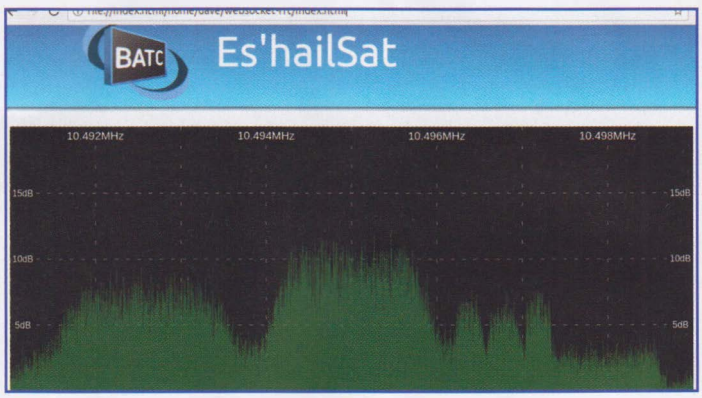
The satellite is due to be positioned at 26° East (not 25.5° East, as previously reported) in the same slot as the existing BADR-4 satellite. This means that you can check that you have a clear line of sight to the satellite and pre-align the dish by using a standard domestic TV satellite receiver to tune to the signals at 11996MHz, Horizontal, 27500, 3/4 FEC. Further information is available on the BATC Forum [3].

DATV band plan for Es'hail-2

The British Amateur Television Club (BATC) has proposed an initial band plan for the Wideband (DATV) transponder. This allows for a beacon transmission and a number of other simultaneous transmissions. Full guidance, including the centre frequency for each channel, is available in the full text of the band plan [4].

Es'hail-2 reception

As most amateur satellite receivers need to be pre-programmed with frequency and symbol rate, a web-based spectrum monitor and chat facility [5] is being established by the BATC and AMSAT-UK. This will use a receiving dish kindly hosted by Goonhilly Earth Station, feeding an Airspy connected to a Linux web server that will enable users to see the activity on the transponder. They will also be able to announce or request the details of each transmission in the chat window.



Web-based spectrum view showing two 2MS signals and three 333KS RB-TV signals.

A websdr is also being set up to enable monitoring and reception of the narrow-band transponder.

Launch date

There has been a lot of speculation about the actual launch date, but the most reliable information that was available as this issue went to press was "Before the end of 2018". Monitor the BATC Forum and Wiki for further details.

Websearch

[1] www.eshailsat.qa/en/
[2] https://wiki.batc.org.uk/MiniTioune
[3] https://forum.batc.org.uk/viewforum.php?f=101
[4] https://wiki.batc.org.uk/images/b/bf/Eshail2_DATV_Bandplan_V1.pdf
[5] https://eshail.batc.org.uk/

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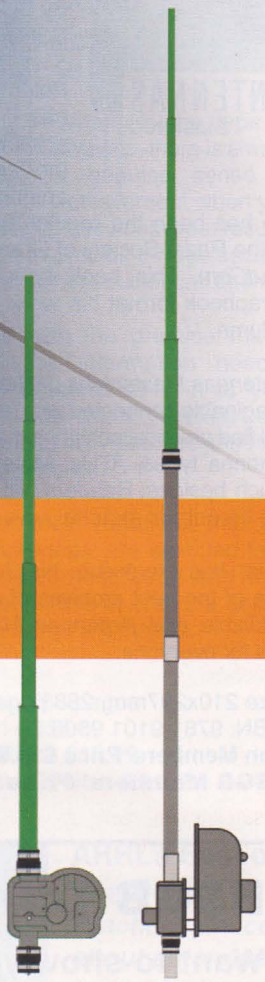

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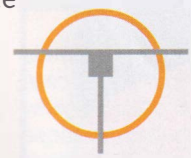

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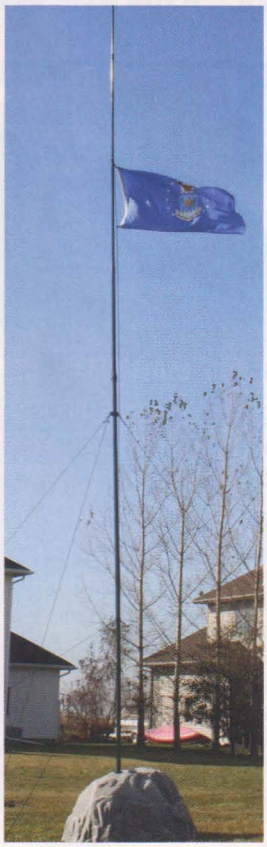

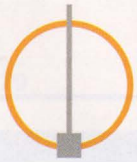

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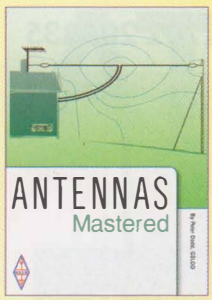

Antennas Mastered

By Peter Dodd, G3LDO

Peter Dodd, G3LDO has long been acknowledged as one of the leading experts on antennas in the world. He has been the regular antenna columnist of the Radio Society of Great Britain's journal *RadCom*. This book brings together in a scrapbook format his work from this regular column.

Antennas Mastered is packed with everything imaginable connected with antennas. Readers will find practical solutions that cover all bands, antenna types, ATUs, Meters, Software and much besides. Readers will be staggered by the breadth of material covered.

Peter has created in his 'Antennas' column one of the best archives of antenna material available and *Antennas Mastered* provides this for everyone.

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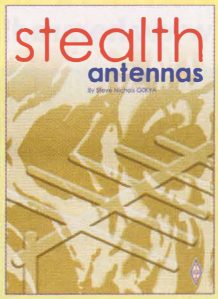

Stealth Antennas

By Steve Nichols, G0KYA

Many amateur radio operators are faced with the fear of interference being caused to televisions, telephones, and anything with a plug on it. In these circumstances a stealth antenna may be the solution to allow you to get on the air.

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From using house rain gutters and drain pipes, or a magnetic loop in the loft, through to a tuned loop around the window frame *Stealth Antennas* provides a wide range of ingenious antenna solutions, and continues to be the 'must have' antenna book for everyone.

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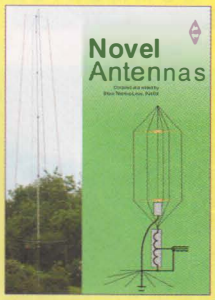

Novel Antennas

Compiled and edited by Steve Telenius-Lowe, PJ4DX

Many Radio Amateurs often experiment with antennas to get the best performance. But few have ever considered anything beyond the basic antenna designs - this book tries to set that right with a myriad of 'novel' antenna designs from around the world.

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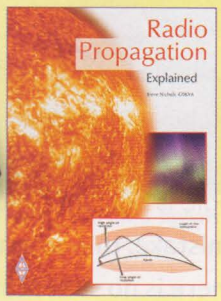

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Steve Nichols, G0KYA

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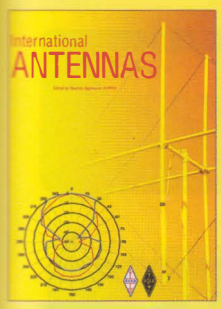

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Edited by Stephen Appleyard G3PND

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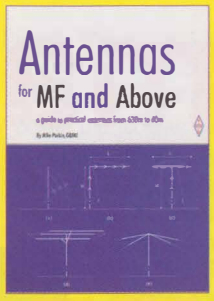

Antennas for MF and Above *A guide to practical antennas from 630m to 60m*

By Mike Parkin, G0JMI

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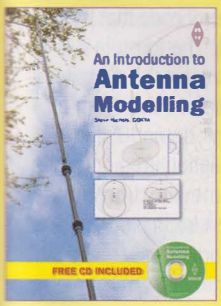

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By Steve Nichols G0KYA

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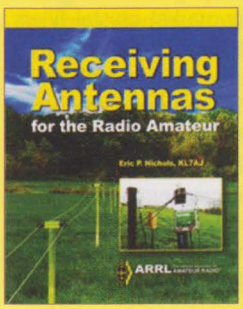

ARRL Receiving Antennas for the Radio Amateur

By Eric P. Nichols, KL7AJ

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DSP – magic or mathematics?

Most modern amateur radio transceivers and receivers have some sort of digital signal processing; software defined radios (SDR) are almost *entirely* digital signal processing.

Is it, as I suspected, all done with magic? Or is it simpler than it looks? This article looks at the evolution of DSP and attempts to unravel some of its mysteries.

The digital world

Like it or not, the world has gone digital. The music you listen to, the TV you watch, your mobile phone and the tablet or computer that entertains you, are all digital and there are some very good reasons for that.

Digital signal processing (DSP) is the manipulation of analogue signals using digital circuits, usually programmable digital circuits. To use digital signal processing the analogue signal must first be converted into a digital data stream using an analogue to digital converter (ADC). At the end of the DSP stage, the signal is converted back to analogue using a digital to analogue converter (DAC). Often the input to the DSP is at a low intermediate frequency (IF) and the output is at audio frequencies. Software defined radios sample a section of the radio spectrum directly. So the input to the digital signal processing is at RF frequencies.

In analogue radios, every oscillator, mixer and amplifier adds noise to the signal. The primary advantage of DSP is the ability to mix, filter, modulate, demodulate, amplify and attenuate the signal without adding any significant noise or distortion. Other advantages of DSP include the ability to make extremely sharp filters without adding ringing distortion and being able to create various noise blankers, filters and notch filters that are significantly cheaper and better than analogue alternatives including even the best crystal filters.

Amateur radio DSP

Almost every ham rig since the mid-1990s has some form of DSP inside. The first generation is now called 'AF DSP' because it was applied to the audio frequency signal, after the receiver's demodulator. AF DSP allowed you to change the audio signal. You could apply a notch, or a high or low cut to eliminate an interfering signal. This was great, but the downside was that the interfering signal was still within the IF passband and therefore still affecting the receiver AGC. Which meant that even though you could no longer hear a strong unwanted signal, it still suppressed a weaker wanted signal.

Most modern transceivers are equipped with IF DSP, operating on the signal before demodulation (when it is still RF of some frequency or other). This is the second generation of digital signal processing. IF DSP eliminates the AGC 'pumping' problem by providing IF shift and width controls that operate before the AGC stage in the receiver. You also get better noise blankers and filters and, in some receivers, a band-scope display.

The bhi Dual In-Line is a standalone audio DSP system.

Ubiquitous

I think that many people have forgotten what it was like before radios had IF DSP. In most receivers, the IF bandwidth was fixed. You could buy narrow band after-market crystal filters for CW operation or to improve the receiver's selectivity on SSB. But you could not adjust the receiver bandwidth so that you could hear just a single CW signal or tune out a station operating very close to the signal you wanted to hear. In a conventional superheterodyne receiver, the IF DSP stage usually follows the second mixer (or, in a triple conversion receiver, the third mixer). This IF input to the DSP is typically centred around 36kHz.

It is generally accepted that it's best to convert the signal from analogue to digital as early in the receiver chain as possible. You can consider direct sampling software defined radios to be the 3rd generation of the DSP evolution because in a direct sampling SDR the incoming RF signal is converted directly to digital data streams, with no analogue mixing. Software defined radios thus use RF DSP.

Mathemagics

Even though I am very comfortable with digital transmission and computer technology in general, I struggled initially with the concept of manipulating the sampled radio spectrum using mathematics implemented as a computer program running on computer hardware. I knew that audio and radio signals are routinely changed to digital data streams by ADCs and turned back to audio or radio signals by DACs, but I had not appreciated the way that DSP software or firmware uses mathematical algorithms to perform the same functions that analogue circuits in a conventional radio do. Modulators, demodulators, limiters, amplifiers, oscillators, mixers, and filters can all be expressed in terms of mathematics. Each DSP feature is expressed as a set of mathematical operations applied to the numbers representing the signal. Some of the maths is very complex, particularly the Fast Fourier Transform (FFT) code. FFT is the maths used to convert signals from the time domain to the frequency domain and back again. But some DSP software is surprisingly simple, such as the single line of code that is used to demodulate an AM signal. The formula AM = the square root of I^2+Q^2, calculates the magnitude or 'amplitude' of each IQ sample, resulting in a data stream representing the demodulated AM signal. The simple DSP calculation is an envelope detector that fulfils the same function as the diode, capacitor and load resistor in a crystal set.

Domains

Signals in the 'time domain' can be displayed on an oscilloscope, with time on the X axis and amplitude on the Y axis. Each 8, 14, or 16 bit data word represents the level of the signal at the time that the ADC sampled it. The next digital data word contains the level that the signal was at a time one clock cycle after the first, and so on. After an FFT transformation, the digital data streams contain a representation of the RF signal levels at different *frequencies* rather than at different *times*. Each digital word is called a frequency 'bin' rather than a 'sample.' A 'bin' contains a number representing the average level of the sampled RF within a narrow frequency range, usually only a few Hz wide. You can think of it as being like a spectrum analyser or panadapter display divided up into narrow vertical stripes, each stripe representing a 'bin'. Signals in the 'frequency domain' are displayed with frequency on the X axis and amplitude on the Y axis.

Another simple DSP operation is making a signal louder. You just multiply all of the 16-bit

The DSP in Kenwood's TS-2000 operates on a 12kHz IF at the end of an otherwise traditional analogue superhet architecture.

samples by the same number. For example, multiplying each sample number by two will double the level of the data stream. To multiply a binary number by two all you have to do is move all of the bits one place to the left and add a zero into the least significant bit. For example, 0111 x 2 = 1110 or (7 x 2 = 14). You do have to be careful to avoid losing the most significant bit if it is a one. Limiters are applied by looking ahead in the data stream and simply not allowing the level to exceed the allowable threshold.

Noise

Digital signal processing provides adaptive noise filters rather than the simple audio filters that were used in the old days. These filters are designed to pass periodic repeating signals like speech and reject non-periodic incoherent signals such as noise. An automatic notch filter is very similar to the noise filter. In fact, the software code is almost identical although the reference variables have different values because the time constants are much longer. In this case, the unwanted signals are the longer period constant signals like unwanted carriers and the wanted signal is the less periodic speech. So, the notch filter works in the same way as the noise filter, but the output is taken from a different part of the filter code loop.

For a noise filter, the data stream is passed through a delay line and an adjustable finite impulse response (FIR) filter, which is a band pass filter or band stop filter that automatically moves to the signal that we want to keep (or, in the case of a notch filter, eliminate). The delayed signal becomes a kind of reference signal at the periodic frequency. It is subtracted from the current samples, creating an error level. Over a period of time, the filter coefficient automatically adjusts in order to progressively reduce the error level, meaning that the delayed signal becomes as close as possible to being in phase with the current samples. When the error signal is at its smallest value, the wanted periodic speech is enhanced and the unwanted non-periodic noise is suppressed. The technique uses a least mean square algorithm developed by Widrow and Hoff in the late 1950s. These adaptive filters work in the time domain; no FFT is required.

DSP noise blankers also work in the time domain. The software looks ahead in the data stream and modifies any data words that show a rapid increase in level compared to the average level. The process imposes a slight delay or latency to the speed that the DSP processes the signal, resulting in a tiny (unnoticeable) lag before the receiver can output the audio signal. Considering that an audio data stream is likely to be at 48,000 samples per second, a delay of a few samples is insignificant. Noise blanking can also be done on the much faster RF data streams at the start of the DSP process. When a spike is detected, the software can make the offending data word equal to zero audio level. But it is more common to replace the word with an average level calculated from the levels of data words preceding and / or following the sample that has the noise spike. The system works extremely well against sudden noise spikes like lightning crashes that are well above the average level. However, DSP noise blankers do not work at all on noise spikes that are at a lower level than the rest of the audio signal. Depending on the strength of the problem, the noise blanker may have limited success against electric fence pulses and car ignition interference.

Hardware

Most conventional (non SDR) receivers with IF DSP and some SDRs use dedicated specialised DSP integrated circuits to perform the digital signal processing tasks. These chips are often configurable using updatable firmware. Most of the chips used for amateur radio receivers and transceivers were actually designed for video signal processing rather than specifically for radios. For example

- the FlexRadio 6000 radios use a Texas Instruments TMS320C6A8167 DaVinci chip for DSP. It incorporates an ARM Cortex-A8 microprocessor, which is used for control functions.
- the Elecraft KX3 uses the Analogue Devices ADSP21479 SHARC chip.
- the Icom IC-7300 uses a Texas Instruments TMS320C6745 DSP chip.
- the Icom IC-7610 uses DSP code running on a field programmable gate array (FPGA).

An FPGA is a programmable integrated circuit containing thousands of logic gates that can be individually configured by firmware so that the chip behaves like a computer CPU, or as a highly parallel digital signal processor, or both. Software defined radios that use SDR software running on a personal computer for their digital signal processing, use software .dll files such as WDSP written by Warren Pratt, NROV, or SharpDSP written by Phil Covington.

Pure & applied magic

Arthur C Clark wrote that "Any sufficiently advanced technology is indistinguishable from magic". He meant that if somebody demonstrates a device to you and you are completely unaware about how it works, such as showing a cave man a car, or your neighbour your amateur radio transceiver, then "it works by magic" is as good an explanation as any other. As far as I am concerned, FFT is mathematical magic. It uses very complex mathematics including 'real' and 'imaginary' numbers to convert signals in the 'time domain' into signals in the 'frequency domain' or back the other way.

Rather than using any analogue mixers, the Icom IC-7610's leading-edge receivers directly sample the incoming RF at very high speed, downconverting digitally in an FPGA.

Who wrote the software?

Most DSP software used for hobby and amateur radio SDR software relies on a software library called FFTW – "Fastest Fourier Transformation in the West" – to perform the complex FFT calculations. FFTW calculates the data that is used for the panadapter 'frequency domain' display. Some DSP filters, particularly band pass filters and tracking notch filters are also applied while the data streams are in the frequency domain. Phil Harman, VK6PH is working on a new way of implementing the DSP for SDR receivers that works almost completely in the frequency domain. The technique is called DFC, 'direct Fourier conversion'. The philosophy is to convert the output of the ADC into a frequency domain signal immediately after the ADC so that you can select the bands and slices of the spectrum that you want to display on your panadapter displays directly. This is not as easy as I'm making it sound. The technique will allow you to have multiple receivers and several panadapters displaying any bandwidth you desire. If you are interested there are videos online.

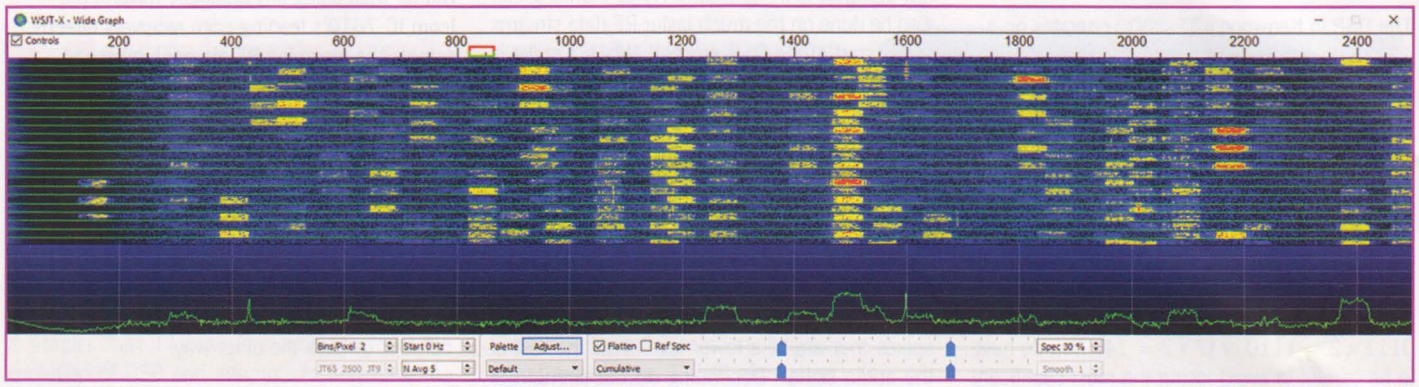
Because computer chips and digital technology becomes more powerful every year, there have been huge improvements to DSP since it was first introduced in the 1990s. DSP may be magic after all. But aren't you glad of the clever magicians who created it?

Andrew Barron is the author of *SDR, Software Defined Radio for Amateur Radio Operators and Shortwave Listeners*, available from the RSGB bookshop.

Andrew Barron, ZL3DW
zl3dw@outlook.co.nz

Feature

Experiences with FT8



An FT8 spectrum display.

Last year Joe Taylor, K1JT introduced a new digital modulation system as part of the WSJT-X suite that can be freely downloaded from the internet. It caught on very quickly.

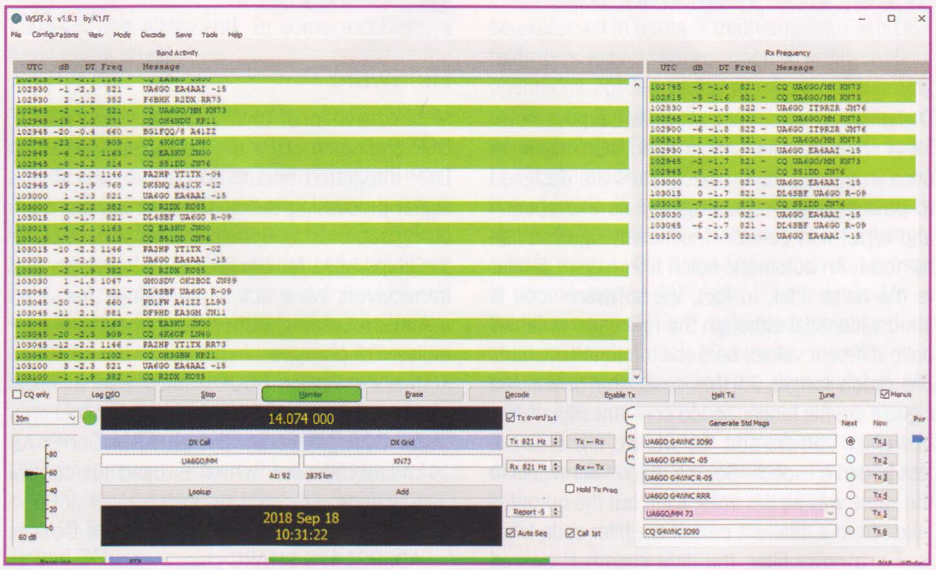
So far, this mode has been used at my QTH mainly on 10m, 6m and 2m with very simple antennas. On 10m, a low triband Par antenna is used, on 6m a V2000 omni vertical and on 2m a big-wheel horizontal omni antenna – no towers or beams! The transceiver is an FT-817ND.

My impressions around the bands

On 10m, my impressions are that FT8 is extending the Sporadic-E season. All FT8 activity is concentrated in a few kHz, it works with weak signals and occupies just 50Hz per transmitter. Perhaps the most important feature is the short transmit periods, just 15 seconds long, so very brief openings are spotted. On SSB and CW it is easy to miss openings, but this is *far* less likely with FT8.

On 6m FT8, North America, the Caribbean, South America, Africa, Asia and Europe have all been spotted this summer. My impression is FT8 is not quite as good as WSPR for digging out weak signals, but the 15 second transmit duration with FT8 helps. Also, there seem far more stations on FT8 than on WSPR.

On 2m FT8 many of the signals come in via aircraft reflection. Some are by tropo.



An WSJT-X main screen display for FT8.

Every day, stations that would be considered juicy DX are copied. Most days stations beyond 600km are spotted. When calling CQ with 2.5W on 2m FT8 I seem to get 400km plus by 'normal' tropo every day! By this I mean no lifts.

Hopes for the future

What I hope does *not* happen is that stations completely desert SSB and CW in favour of FT8. FT8 is fine for minimal QSOs, but it is not a mode for chatting. A plus point is that high power and big antennas are not needed and even with QRP, DX can be spotted and worked.

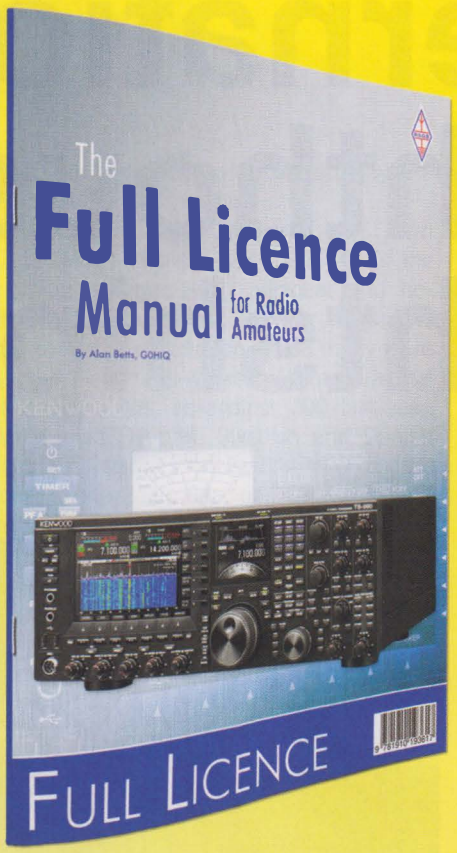
Sadly, it is unlikely newcomers will chance upon us with FT8. Years ago, my first experience with amateur radio was accidentally picking up a local on 160m AM station with a crystal set. How newcomers come into our great hobby is something of which we all need to be mindful.

Overall, FT8 is a great mode, especially for those with modest stations. Join the fun!

Could you write an article for *RadCom*?

We are always looking for people with interesting, new, unpublished ideas, even if you've never written for publication before. It doesn't have to be a long essay – the article on this page is just under 400 words. We give lots of practical help including sub-editing for spelling and grammar; we also re-draw most circuit and other diagrams. Best of all, we pay (modestly) for the articles we publish. More information is at https://tinyurl.com/RC-guidance – we'd really like to hear from you.

Roger Lapthorn, G3XBM
rogerlapthorn@gmail.com



NEW TITLE

The Full Licence Manual

By Alan Betts, G0HIQ

Syllabus 2019 Edition - for exams from August 2019 onwards

This book is the third course-book in the RSGB series for those interested in obtaining an amateur radio licence. In line with the progressive three-tier UK licence structure *The Full Licence Manual* completes the natural progression from Intermediate and Foundation Licences.

Fully revised to reflect the changes introduced in Syllabus 2019 the *Full Licence Manual* contains all of the information required to move to the final stage of amateur radio licensing. Written to match the Full licence syllabus the book is broken down into logical sections. Licence conditions are covered in detail as are operating techniques and amateur radio safety. As you would expect, there are sections covering technical matters such as circuits, semi-conductors and more. The Transmitter and Receiver are covered in detail along with the material required for understanding the Software Defined Radio section of the syllabus. Feeders, Antennas and Propagation all get chapters of their own, as do Electromagnetic Compatibility and Measurements, All this means that the *Full Licence Manual* is the ideal companion to a formal training course. The book is also a useful reference source and many amateurs will find themselves referring to it long after they have passed their examination.

The *Full Licence Manual* is for everyone progressing from the Intermediate licence to the Full licence and is the best route to success in the examination.

Size: 210x297mm, 104 pages
ISBN 9781 9101 9361 7
Non Members' Price: £11.99
RSGB Members' Price: (25% OFF) £8.99

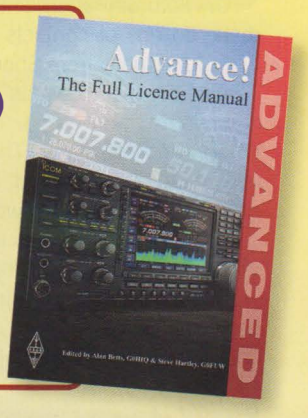
Still Available

Advance - The Full Licence Book (3rd Edition)

By Alan Betts, G0HIQ & Steve Hartley, G0FUW

This book is the third course-book in the RSGB series for those interested in obtaining a full amateur radio licence for exams until August 2019.

Size 210x297mm, 104 pages, ISBN 9791 8723 0995 7
Non Member's Price: £11.99
RSGB Member's Price: (25% OFF) £8.99



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FROM FREE P&P
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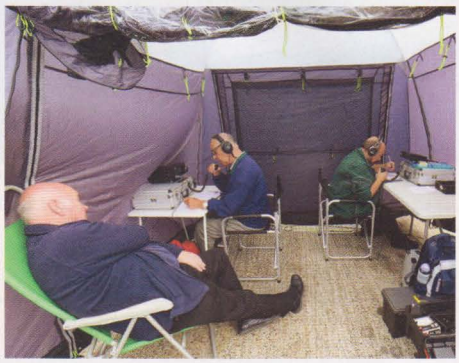
International Lighthouses and Lightships on the air Weekend

In 2018, the International Lighthouses and Lightships Weekend (ILLW) took place on 18 and 19 August.

Worthing & District ARC put GB8SL on the air from Shoreham Lighthouse.



Marc, G0TOC operates on HF whilst John, G0VEH runs the VHF station and John, M0JGR supervises! Photo courtesy David, M0TAZ.

Worthing & District ARC put GB8SL on the air from Shoreham Lighthouse in West Sussex for the 19th year in a row. They used the club's Elecraft K3 and a Tokyo linear amplifier to produce 400W. The antenna was a multi-band trapped dipole, with one end tied off against the railings at the top of Shoreham Lighthouse and the other to a pump-up mast.

They made 30 QSOs on Friday evening to test their setup. Two contacts were with Brazil but the highlight was when Slangkop Lighthouse, ZS1FRC, called them on 40m. This ended up being their best DX of all, despite the QSO happening a couple of hours before the ILLW officially started!

They made all their contacts using SSB and almost all were on 40m. They managed contacts with the United Arab Emirates and Lebanon in addition to Brazil and South Africa, but all the rest were inside Europe.

Last year that band suffered from extremely deep and rapid QSB, particularly where signals had been very strong initially. The trend this year was for signals to be weak but to stay weak throughout. QSB was present at times but nowhere near on the scale of 2017.

On Saturday afternoon they managed to make dozens of contacts within the UK on 40m. Unusually from Shoreham Lighthouse, propagation ran towards Spain at times in addition to more usual countries such as France and Germany. Those are the three foreign languages that Ed, MOMNG speaks... so he definitely had his work cut out!

Even the weather was kind. There was no rain but, more importantly, the temperature was ideal. The operating tent would have been very uncomfortable if the temperature had not dropped significantly in time for the ILLW. The heatwave throughout July and the first half of August will doubtlessly live long in all our memories!

GB8SL made 482 contacts altogether on HF, which included 34 lighthouses. This compares to 300 contacts in 2017 but they worked almost 40 lighthouses then. Scotland was in the lead with nine, and England and Germany came joint second with five lighthouses each.

Thanks as ever to the Shoreham Rowing Club, who provide mains electricity and use of their facilities every year. There is more information on the GB8SL page on qrz.com, and search for the callsign on YouTube to find the video Ed, MOMNG made.

Ed Spicer, MOMNG

Loughton & Epping Forest ARS spent a successful weekend activating London's only lighthouse at Trinity Buoy Wharf. The historic lighthouse is located by the confluence of the River Thames and Bow Creek at Leamouth. It no longer functions and is now home to various art projects. Originally, the lighthouse was used for lighting trials for Trinity House's lights around England and Wales. Michael Faraday also carried out experiments there. The site was also a maintenance depot and storage facility for the many buoys that aided navigation in the Thames, and the Wharf for Docking and repair of lightships. In fact retired lightship *LV95* is moored at the wharf, now a modern recording studio.

GOTBW was on the air on both the Saturday and Sunday and was visited by 18 club members and guests (plus Orla the dog!). In addition, DRM Peter Onion, GODZB made an appearance to see what we were up to, along with another surprise visitor, Damien, 2E0EUI, Chairman of the Crystal Palace Radio and Electronics Club.

Whilst HF conditions were generally lacklustre, nine operators managed to make 136 HF QSOs (135 on 40m SSB and one on 20m SSB) and 45 VHF QSOs on 2m FM (who says VHF is dead?). Sixteen ILLW stations made it into the log including 10 UK, three German, two Irish and one Netherlands entry. Countries worked during the activation included G, GD, GI, GM, GW, DL, EI, F, I, OH, ON, PA and SP.

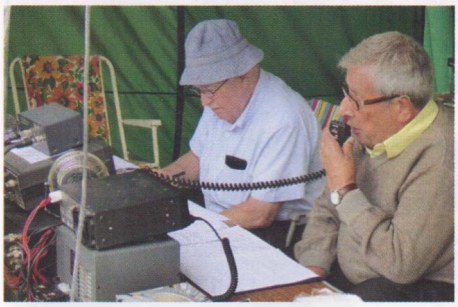
The team always enjoys this activation, watching the boats go by along the Thames and spotting planes flying overhead departing from London City Airport. The view is spectacular with the O2 on the opposite bank of the Thames and being very close to the Docklands and also the Emirates Airline cable car.

Dave De La Haye, MOMBD

Beaulieu Millennium Beacon was built in the grounds of Lepe House, Lepe, in Hampshire. Its purpose is to assist mariners entering and leaving the River Beaulieu, at its mouth, where it flows into The Solent.

Waterside New Forest Radio Club has for some years operated GB0BMB adjacent to the lighthouse and, having once again received kind permission from the Lepe Estate, this year was no exception. Club members set up the station on the 17th, and operated

Waterside New Forest Radio Club operated GB0BMB from the Beaulieu Millennium Beacon.



Robin, G0OSG operating GB0BMB with Norman, G4BPN logging.

the station throughout the following two days (daylight hours only). The club's large gazebo-type tent was used as an operating area, and the aerial was the club's G5RV. Tony, G6MNL's Yaesu transceiver, tuner, and 300W amplifier were used to provide excellent communication, not to mention his petrol generator! Weather conditions were very favourable, with pleasant daytime temperatures and no rain.

We spent the weekend on 40m (7.192MHz), which was difficult in the morning at times with adjacent and co-channel interference, but conditions improved in the afternoon, when many more Gs were heard and worked. We made a total of 205 contacts, as against 200 last year. We worked German, Swedish and Danish lighthouse stations on islands in or on the coast of the Baltic Sea, one Danish station from Sjaelland Island, EU-029, one German YL Maritime Mobile in the Baltic Sea 50km South of Stockholm and several UK & Eire lighthouse stations. We also worked a French lighthouse station run by Dutch amateurs.

The spread of countries included the Netherlands, Belgium, France, Germany (many), Austria, Sweden, Denmark, one from Poland, Spain, Slovenia & Switzerland, UK of course, including a few from Scotland & Wales. There were several from Eire.

The following radio amateurs took part in setting up the station, operating it and / or dismantling it: Tim, G4YVY, Robin, G0OSG, Tony, G6MNL, Bob, 2E0CZK, John, G1MKY, Norman, G4BPN and Darren, M6DPY. All agreed that the weekend had been a great success, and Tim, G4YVY (a veteran of many Lighthouse weekends) said it was the best one he'd experienced!

Rod Hickey, G6LVJ, with thanks to Robin, G0OSG

Hartlepool ARC operated GB0HLH from Hartlepool Lighthouse. The station was set up in the grounds of the Heugh Gun Battery Museum adjacent to the lighthouse at the most easterly point of Hartlepool Headland.

Using SSB/CW on 20 and 40m as well as FM on 2m, the station made a total of just short of 250 contacts. This total included 23 contacts with other lighthouse stations from around the coast of Britain and Eire, Norway, Germany and one contact with a Swiss lighthouse. We were puzzled at first when contacting the Swiss station until the operator explained that Switzerland may be a 'land locked' nation but does in fact have lighthouses: this one was located on Lake Constance.

Some members of the public who came to visit the Gun Battery Museum also came across to talk to us and time was taken to explain the reason for our special event station.

Up to 10 club members visited the special event station over the weekend, both to take a turn at operating and to give support. The club is very grateful to the Huegh Gun Battery Museum for giving permission to operate from the site and for the help they gave to us over the weekend.

Stan Taylor, G7VGM

A team of five from **Bushvalley ARC** participated from Rathlin Island. The club members activated all four lighthouses on the island as well as GIFF-0024 Keeble Nature Reserve, all the WAB squares and the Hump Kilpatrick Hill GI/HAH-006.

We used various antennas and radios including an Elecraft KX2 and KX3, Yaesu FT-897, Yaesu FT-891, Kenwood TS-2000, Icom IC-7100, Diamond X510, Western HF10, end-fed long wires, 2m and 70cm beams.

Band conditions were pleasing considering how bad they have been of late, allowing us to get almost 200 contacts in the log in a matter of hours, this year has proven to be a massive success not only with the ILLW event but also to get the Flora & Fauna site activated for the first time as well.

Jason Smyth

Colchester Radio Amateurs got some TV coverage on the Friday evening as part of their ILLW activity. You can see the programme at www.youtube.com/watch?v=xTgo7IAPTb0&feature=youtu.be

radcom@rsgb.org.uk

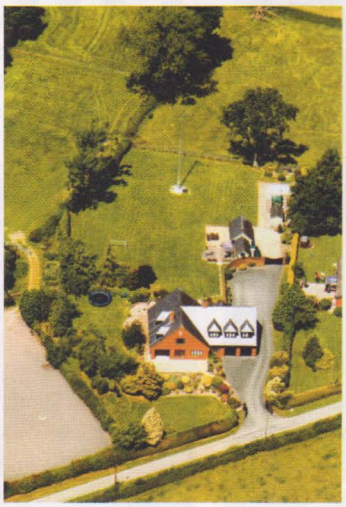
Operating GB0HLH are (Back row l-r) Stan, G7VGM and Simon, 2E0NMK. (Front row l-r) Tom, M6TJI and Charles (SWL).

A team of five from Bushvalley ARC participated from Rathlin Island.

MW0EDX / MW5R Dream DX & SO2R Contesting QTH for sale.

Offered chain free, modern designer built in 2000, 4 bedrooms and 3 reception rooms modern property on 1 acre plot, with a massive 350m2 of living space. QTH LOC IO82 KR. Rural yet within minutes from the A458. The property post code is SY22 6QL.

Planning permission and consents for an EXTRA heavy duty mast with various types of aerials, including the Steppir DB42 80-6m yagi. Currently installed is the Mosley Pro-96B "BIG GUN" 40-10m yagi and wire verticals for 80 and 160m.



A dedicated shack is located away from the main house, allowing a cosy full-time DXing and Contesting, including multi-op entries.

A full-time entry in a major contest often results in the 1st place or a World Record (CQ WW, CQ WPX etc – see my QRZ.COM entry for a full list of the contents won).

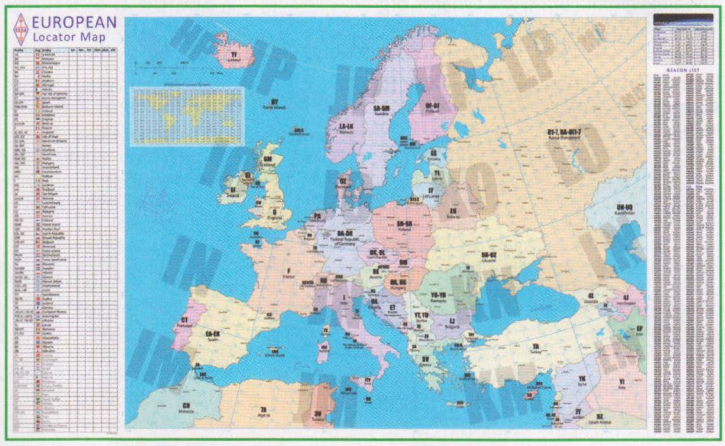
VK and JA can be worked from my QTH on 160m. NA on 160m is a daily occasion in the winter months.

The price is £600,000 to include the mast and the beam.

Enquiries to Anton Koval, MW0EDX / MW5R,
m0edx@yahoo.com or 07791145923 to arrange a viewing
(or via the www.RightMove.co.uk web-site)

Book Review

RSGB European Locator Map



How on earth do I review a map? That was my first thought when I was presented with this, but I soon realised that it had a great deal more to offer than basic cartographic geography. This is the first update of the RSGB European Locator Map for some time; since the last one there have been some boundary and name changes.

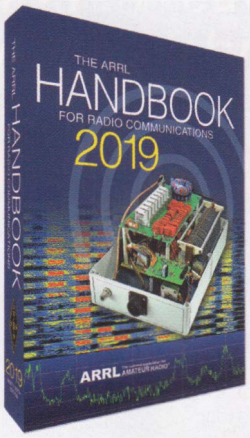
As one might expect, it contains many aids for the VHF/UHF operator. Around the periphery you'll find lists of the major meteor showers – crucial for Meteor Scatter operators, a list of beacons on 2m and 70cm, complete with callsigns and locators, plus a tick-off chart to record when you've worked from 1A to ZB (and a few more besides) on 6m, 4m, 2m, 70cm, 23cm and, intriguingly, UHF. There's also an inset small map of the world showing the whole Maidenhead Locator System so you can quickly associate, say, FDxx with the tip of South America.

The largest part of the poster is of course taken up with the map of Europe. It's overprinted with the country and major city names plus common prefix letters, and of course the all-important Maidenhead squares. The detail is remarkable: for instance, Alboran Island is marked, though not named, in square IM85 (it's a tiny Spanish possession of just under 18 acres, 130 miles east of Gibraltar).

If you're serious about your VHF-and-up operating, this new map is an indispensable tool; it's also interesting in its own right, and easily deserves its place on your shack wall.

Size 590x980mm
Non Members' Price £8.99
RSGB Members' Price £6.74 (25% OFF)

ARRL Handbook 2019



Now in its 96th edition, the *ARRL Handbook* has been continually revised and reshaped so that it stays current and always reflects the latest techniques and activities in amateur radio.

The secret to its longevity is that it is always updated by the people who are best placed to know what's going on and who have the writing skills to convey their message in the clearest manner possible. The ARRL Handbook is a weighty tome, two inches thick, with truly enormous coverage of our hobby from all angles. Its text is further supported by a range of downloadable extras, ranging from printed circuit board designs to full-blown articles.

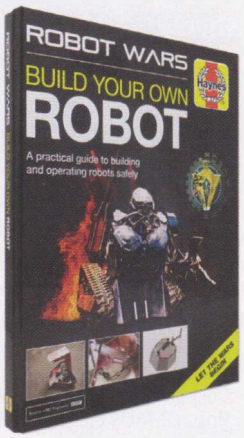
If you've never seen a copy of the *ARRL Handbook* it's difficult to explain just how comprehensive it is. Its 28 chapters are further sub-divided into sections that each let you drill down deeper. You'll find fundamentals, practical design principles, CAD, SDR, DSP, PSUs, synthesisers, filters, transmitters, receivers, digimodes, power amplifiers, repeaters, propagation, antennas, transmission lines, test equipment and much, much more. Taking the 54-page RF Power Amplifiers as an example, there's a thorough grounding in the whys and wherefores of amplifiers – even including a look at who *needs* high power – and a selection of well-documented projects from HF to microwaves.

For the past several decades I have used the *ARRL Handbook* as one of my go-to references for absolutely anything to do with amateur radio; I have no hesitation in recommending it as one of the key books every amateur should have. Yes, at first sight it's expensive, but the amount of priceless knowledge it contains actually makes it a real bargain.

Size 208x274mm, 1280 pages, ISBN 97816259 5088 8
Non Members' Price: £49.99
RSGB Members' Price: £42.29

Robot Wars: Build Your Own Robot

by James and Grant Cooper



This hardback by Haynes piqued my interest. It is based on the eponymous BBC series hosted by Dara O'Briain; a light dusting of wit is served alongside technical knowhow, satisfying both fans and weaponised-monster makers. It's not Dara's work or words, but those of the show's technical consultants, James and Grant Cooper.

From a brief history of the Robot Wars franchise, through the design and development of robot tech anatomy – laser-cut monocoque chassis, anyone? – we reach the goal of safely building and operating your own robot. Inevitably, some crafty metalwork skills are desirable – think welding and angle grinders – but there are step-by-step instructions with illustrated schematics and printable templates for three robots of increasing size and menace. Fans of the TV programme will be enthralled by chapters on the evolution of the BBC series and details of what goes into making a 'House Robot' (eg Sir Killalot). Whether you're into tools-out construction or just curious, you won't be disappointed by this well-illustrated, authoritative book.

176 pages, 216 x 279mm
ISBN 9781 7852 1186 7
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Giles Read, G1MFG
Jonathan Andrews
radcom@rsgb.org.uk

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CLUB EVENTS CALENDAR

INTERNATIONAL

Pafos Radio Club, Cyprus
Richard, 5B4AJG, 00 357 97 857 891, 5b4ajg@gmail.com www.cyhams.org
Meets 3rd Thursdays at the Hole in the Wall Restaurant, Coral Bay, 6 for 6.30. Visitors 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 & Camping Club, membership@arcc.org.uk
www.aarc.org.uk

AMSAT-UK – http://amsat-uk.org/
Open net every Sunday, 10am, 3.780MHz (±)

British Railways ARS
Ian, G4EAN, www.brars.info
23 (Tuesday) AGM at the Brunswick Inn in Derby, 11am for chats, 1.15pm formal start

British Young Ladies Amateur Radio Association www.bylara.org.uk
Net Thurs, 3.688MHz±, 6.30pm. All YLs welcome.

Civil Service Amateur Radio Society
Weekly net every Tuesday, 8pm, 3.763MHz

CDXC – The UK DX Foundation – cdxc.org.uk
For all interested in HF DX and contesting

Radio Amateur Old Timers' Association
MemSec@RAOTA.org, www.RAOTA.org
Diamond Jubilee year. Nets: see website

Worked All Britain Awards Group
www.worked-all-britain.org.uk
Nets most evenings, 3.760MHz±, time variable with propagation. Non-members welcome.

REGION 1: SCOTLAND SOUTH & WESTERN ISLES

RR: Anthony Miles, MM0TMZ, RR1@rsgb.org.uk

Ayr ARG
Derek, MM0OVD, 0744 793 1941
9 Telescopes, Alexander MacKinnon
23 CW & oscilloscopes, Dennis & Andy

Cockenzie & Port Seton ARC
Bob, GM4UYZ, 01875 811 723
2 Club night
17 Repurposing routers, Bjoern Franke
21 The µbitx xcvr kit, John, MM0JXI

Kilmarnock & Loudoun ARC
Len, GM0ONX, Klarcinfo@gmail.com
6, 20 Training & construction
13, 27 Club meeting

Lothians RS
Mike, MM0MLB, secretary@lothiansradiosociety.com
14 RV Jones: Most Secret War, Prof J McGeough
28 Club night

Stirling & District ARS
Jess, MM3RCR, secretary@gm6nx.com
1, 8, 15, 22, 29 Club meeting, 7pm
4, 11, 18, 25 Club meeting, 10am

West of Scotland (Glasgow) ARS
Jack, GM4COX, www.wosars.org.uk
2, 9, 23 Winter programme
7, 14, 21, 28 Solder Group
16 FDM sojournings, Tom, GM4FDM
30 Construction competition

REGION 2: SCOTLAND NORTH & NORTHERN ISLES

RR: Andrew Burns, MM0CXA, RR2@rsgb.org.uk

Aberdeen ARS
Fred, GM3ALZ, 01975 651 365
1 Junk sale
8, 22 Club night / Video evening
15 Members' ten-minute talks
29 Construction & on the air

Dundee ARC
Martin, 2M0KAU, 0776 370 8933
6 Repeat or talk, Ian, GM4AUP
12, 19, 26 Club night/ Foundation training

Inverness & District ARS
John, GM0OTI, 01463 791 444
7 Club net, 145.575MHz & GB7BI slot 1, 8pm
14, 28 Club night / Club night with speaker

REGION 3: NORTH WEST

RR: Kath Wilson, M1CNY, RR3@rsgb.org.uk

Bolton Wireless Club
boltonwireless@gmail.com
12 Meeting with talk
26 Show and Tell evening

Central Lancs ARC
Peter, G3UCA, g3uca@blueyonder.co.uk
3 Club meeting, 11am
4, 11, 18, 25 Net, 1.940MHz FM, 11am
5, 12, 19, 26 Net, 70.425-70.475MHz FM, 9pm
10, 17, 24 Net, 11am, 1.940MHz AM

Macclesfield & District RS
Greg, M0TXX, Info@gx4mws.com
5 Shack on the air
12, 26 Film night / Construction night
19 Maintenance & social evening

Oldham Radio Club
Mike, M1CVL, 0740 276 3203
1 Intermediate exam
4, 18 C4FM net, FCS004-55, 9.30am
7, 14, 21, 28 2m FM net, 8pm
8, 15, 22 Club night
11, 25 D-Star net – REF 14B, 9.30am
29 Construction group

South Manchester R&CC
Ron, G3SVW, 01619 693 999
1 DMR radio and hotspots, Steve, M6PPF
8 Future club activities
15 Website and Drupal, Dave, G4UGM
22 Propagation clinic, Ron, G3SVW
29 Build a 47GHz transverter, Dave, G4MVU

Stockport Radio Society
Heather, M6HNS, 0750 690 4422
5, 19 Advanced tutorial
6, 15 Society meeting / committee meeting
13 Net, 51.550MHz FM, 7.30pm
15, 28 Net, 145.375MHz FM, 7.30pm
20, 27 Radio night / Skills night
24-25 CQWW with SRS Contest Group

Thornton Cleveleys ARS
John, G4FRK, 01253 862 810
5 Natter night and on air
12, 19 Project night / Video
26 FT8 workshop, G8KBH & G3WBB

Wirral ARS
Bill, G4YWD, 0780 488 4245
1, 8, 15, 22, 29 G3NWR ATV net, talkback 144.750MHz
6, 13, 20, 27 Natter night & Intermediate course
7 Chairman's night
14, 28 G3NWR on the air
21 VHF Propagation video plus authors Skype link

REGION 4: NORTH EAST

RR: Ian Douglas, G7MFN, RR4@rsgb.org.uk

Angel of the North ARC
Nancy, G7UUR, 0799 076 0920
5, 12, 19, 26 Training and on the air
12 Equipment demo in shack

Bishop Auckland RAC
Gail, M3GBB, 0191 372 0473
1, 8 Club night & training
25 Rally, Spennymoor Leisure Centre

Blyth Radio Club
John, 2E0DCV, 0191 237 1729
7, 14 Club night
21, 28 Club night & Morse training

Durham & District ARS
Michael, G7TWX, 0782 692 4192
7, 14, 21, 28 Club night

Hambleton ARS
John, M6BHP, 0798 000 3293
14, 28 Club night

Hartlepool ARC
Stan, G7VGM, stan.g7vgm@gmail.com
2, 16, 23 Club night, Foundation/Intermediate training
9 Junk sale; light wave comms, G4DXP
30 Launch of club project

Hornsea ARC
Gordon, G3WOV, 01377 240 573
7 General club discussion
14 Contest operating, G4YTV
21 G0AZQ station demo
28 Annual General Meeting

Ripon & District ARS
David, G3UNA, 01423 860 778
1, 8, 15, 22, 29 Club night

Sheffield & District Wireless Society
Krystyna, 2E0KSH, 0788 406 5375
7 Baluns, John, 2E0DXK
14, 28 Social night & training
21 Social night

Sheffield ARC
David, G6DCT, littlewood20@btinternet.com
5, 28 Club night
12 Raspberry PI PSK xcvr, David, G6DCT
19 Shack night operating GX3RCM

Spen Valley ARS
Russell, G0FOI, 01274 875 038
1, 15 Shack meeting / Shack meeting & OTA
29 Curry night

Tynemouth ARC
mail@g0nwm.com, www.g0nwm.com
9 Junk/equipment sale
16, 30 Club night
23 Aircraft scatter

York Radio Club
www.yorkradioclub.uk, contactus@yorkradioclub.uk
1, 8, 15, 22, 29 Club night
4 Breakfast meeting, 10am
7, 14, 21, 28 Club net, 8pm, 145.450MHz

REGION 5: WEST MIDLANDS

RR: Martyn Vincent, G3UKV, RR5@rsgb.org.uk

Bromsgrove & District ARC
John, G4OJS, 0788 9678 303
2, 9, 16, 23, 30 Club night

Coventry ARS
John, G8SEQ, 0795 877 7363
2 Bangers and mash evening
9 Committee forum & project discussion
23 Radio Workshop and on the air
30 Open net, 145.375MHz, in lieu of meeting

Gloucester AR&ES
Anne, 2E1GKY, 01242 699 595 daytime
5, 19, 26 Informal activities (exam on 5th)
7, 14, 21, 28 Club net, 7.30pm, 145.475MHz FM
8, 15, 22, 29 Club net, 7.30pm, 145.475MHz then 80m SSB
9, 16, 23, 30 Club net, 7.30pm, 432.220MHz SSB
12 Diversions on Lundy, Brian, G4CIB
26 2m 3-ele portable Yagi, Brian, G4CIB

Malvern Hills RAC
Dave, G4IDF, 01905 351 568
13 Getting started with digital ATV
27 Informal

Midland ARS
Norman, G8BHE, 0780 807 8003
7 Open meeting, ragchew, training
14 Committee meeting, training
21 General meeting, on the air, training
28 Christmas party plans, training

Mid-Warwickshire ARS
midwarwicks@gmail.com
13 Club net, 145.275MHz
27 Video afternoon

Rugby ATS
Steve, G8LYB, 01788 578 940
3 Antenna discussion, OTA, projects
4 Hut maintenance, Management committee
6, 13, 20, 27 CW training, radio operation and projects
6, 13,20 UK Activity Contest
10, 17 OTA, practical evening / OTA, committee
24 OTA; Frequency standards, Steve, G8LYB
27 HF & VHF shack on the air

Salop ARS
Eamonn, M0MEB, salopamateurradio@gmail.com
1 Natter night / committee meeting
6, 13, 20, 27 CW net, 4.30pm, 144.070MHz
7, 14, 21, 28 Club net, GB3LH, 8.30pm
8 Field Day presentation by Al, M0UAL
15, 22 Natter night
29 RAYNET, Eric Howells, G0GAL

Solihull ARS
Roger, G4BBT, 0121 743 7277
1, 8, 22, 29 Net, 8pm, 145.450MHz
15 Surplus equipment sale

South Birmingham RS
Gemma, M6GKG, gemmagordon.m6gkg@gmail.com
1, 15, 22 Training classes, Dave Murphy G8OWL
2, 9 & 12,26 Work in the shack / Sorting rally stock
6, 13, 20, 27 Coffee morning, 11am, visitors welcome
7 AGM, 8pm prompt
30 Arranging Christmas party

Stratford upon Avon & District RS
Clive, G0CHO, 01608 664 488
5, 19 Club net, 145.275MHz FM, 8pm
26 Secret Listeners, John, G1AWJ

Sutton Coldfield ARS
Robert, rob2e0zap@gmail.com
5, 19 Open net, 145.250MHz, 7.30pm
12, 26 Club meeting
13 Open net, 70.475MHz, 7.30pm
27 DMR open net, slot/local 2 gb7fw, 7.30pm

Telford & Dstrict ARS
John, M0JZH, 0782 473 7716
7 Committee meeting and GX3ZME OTA
14 28 RSGB video / YouTube amateur radio videos
21 10 minute topics

Deadlines are 24 October for the December RadCom and 21 November for January 2019

REGION 6: NORTH WALES

RR: John Pritchard, MW0JWP, RR6@rsgb.org.uk

Porthmadog & District ARS
Peter, GW0DFK, 0773 177 1319
15 AGM

REGION 7: SOUTH WALES

RR: Glyn Jones, GW0ANA, RR7@rsgb.org.uk

Carmarthen ARS
Andy, GW0JLX, 0776 828 2880
6 On air & social
20 Rig clinic, Peter, GW4JQP

Llanelli ARS
Steve, MW6CCG, 0787 849 4337
5, 26 OTA / Junk sale and on the air
11 GB1BAF for Remembrance Day
12, 19 Social evening / DVD night

REGION 8: NORTHERN IRELAND

RR: Philip Hosey, MI0MSO, RR8@rsgb.org.uk

Bangor & District ARS
Harry, GI4JTF, 0289 042 2762
1 Surplus equipment sale, admission £2

Grey Point Fort ARS
Stephen, GI4RNP, 028 9185 2731
8 Nov-6 Dec GB1WWC, see QRZ.com
8-9 Public visiting Carrickfergus Castle

West Tyrone ARC
Philip, MI0MSO, 0784 902 5760
14 Meeting night
28 Activity night

REGION 9: LONDON & THAMES VALLEY

RR: Tom O'Reilly, G0NSY, RR9@rsgb.org.uk

Aylesbury Vale RS
avrs@rakewell.com
14 Quiz vs Chesham club

Bracknell ARC
David, M0XDF, M0XDF@alphadene.co.uk
7, 21, 28 Club net, 8pm, 145.375MHz
14 Antennas

Edgware & District RS
Mike, G4RNW, 02089 500 658
8 Eastcote – looking back and forward
22 My last job discussion

Hammersmith ARS
Selim, M0XTA, M0XHS@outlook.com
8, 15, 20, 27 Club net, 144.700MHz FM, 8pm
9 AGM (members only)
23 General club night with radio operations

Harwell ARS
John, G6LNU, 01235 223 250
8 Grove Airfield in WW2, Don Summers
10 60th Anniversary celebration, Chilton Village Hall, 12-5pm

Newbury & District ARS
Rob, G4LMW, 0797 088 5614
28 Maxwell's Equations, Michael, G0POT

Radio Society of Harrow
Linda, G7RJL, lcasey100@outlook.com
2 Equipment sale, Blackwell Hall, 8pm
4, 11, 18, 25 Club net, 1938kHz LSB, 12 noon
5, 12, 19, 26 Net, 145.5/145.35MHz FM, 8.15pm
16 Electronics from the drawing board, M0ITI

Shefford & District ARS
David, G8UOD, 01234 742 757
1 Feeding antennas pt 2, Richard, G3NII
8 My old rig discussion
15 CCTV systems, John Cherry
22, 29 Quiz night, G8UOD / Video

Silverthorn Radio Club
Robbie, M0HVC, 0742 913 1105
2, 9, 16, 23, 30 Club night, 7.30pm

Southgate ARC
Keith, G8RPA, g8rpa@arrl.net
8 Junk/surplus sale

Verulam ARC
Greg, M0PPG, 01582 413 345
20 Workshop practices medley, 8pm

Whitton ARG
Ian, G0OFN, 0795 620 3495
2 Club satellite equipment activation
9, 23, 30 Club night & on the air
16 Video presentation

REGION 10: SOUTH & SOUTH EAST

RR: Keith Bird, G4JED, RR10@rsgb.org.uk

Bromley & District ARS
Andy, G4WGZ, 01689 878 089
7, 14, 21, 28 Net, 145.500MHz and QSY, 9pm
20 TRF / construction evening
27 Club meal

Chippenham & District ARC
secretary@g3vre.org.uk
1-28 GB1WWI commemorating WW1 end
1, 8 Foundation course
6, 13, 29, 27 Weekly meeting, 7.30pm
20 SDR Radio – The Future (RSGB)

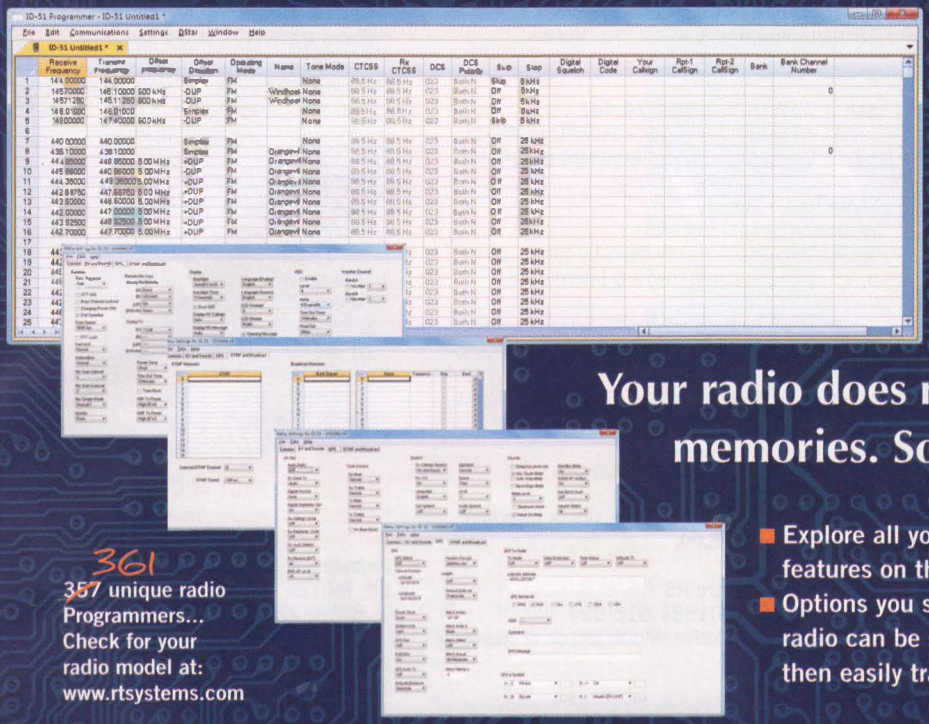
Crawley ARC
John, G3VLH, 01342 714 402
7 I was a Cold War Spy, Brian Spiby
21 HARC/CARC inter-club contest

Cray Valley RS
Dave, G8ZZK, 0773 954 9822
1 Australia open to the world, Nigel, G1BUO
15 LoTW talk + natter night

Crystal Palace R&EC
Bob, G3OOU, 01737 552 170
2 Network radio, Martin Butler, M1MRB
7, 14, 21, 28 Net, 8pm, 145.525MHz ± QRM

Darenth Valley Radio Society
Mike, G8AXA, 0788 415 7776
14 Video night
28 Radio on the air & natter night

Take the Mystery out of Radio Programming



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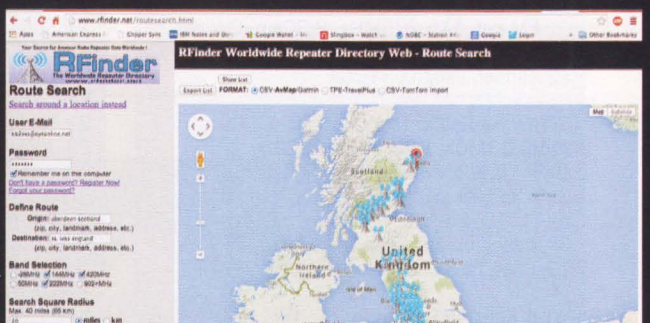
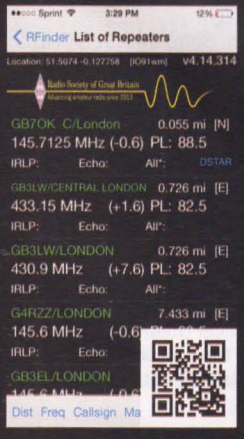
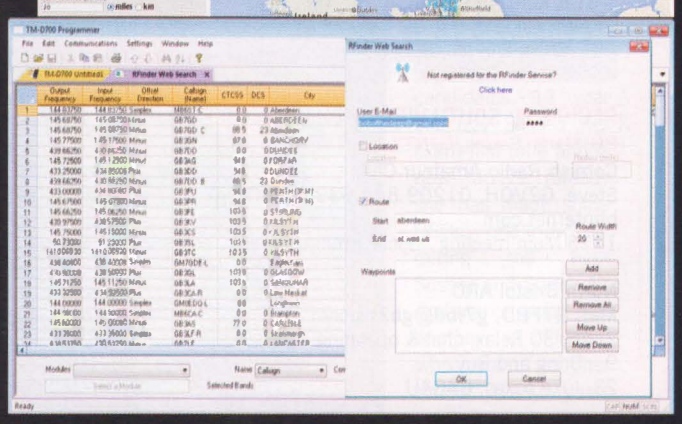






www.rfinder.net - +44 (0) 1234 923 021 - +81 3457 95839 - +1 631 610 5120 - w2cyk@rfinder.net

Dorking & District RS
David, M6DJB, djb.abraxas@btinternet.com
27 AGM and RSGB film

Farnborough & District RS
Mel, M0JMR, sec@farnboroughradio.org.uk
14 Natter night
28 AGM

Fort Purbrook ARC
Chris, G3WIE, g3wie@fparc.org.uk
5, 12, 19, 26 Open net, 8pm, 145.275MHz
30 Club meeting in room FP-1

Hastings E&RC
Gordon, M3YXH, 01424 431 909
28 DVD show, Tony Lunn, G0EYE

Hilderstone R&EC
Ian, 2E0DUE, secretary@g0hrs.org
8 AGM
22 Natter night

Hog's Back ARC
Ray, G4LUA, 0118 981 4174
12 History of Wood & Douglas, Alan Wood, G4EEE
26 Surplus equipment auction

Horndean & District ARC
Stuart, G0FYX, 02392 472 846
2 Natter night
16 Club night

Mid Sussex ARS
Peter, G4AKG, 01444 239 371
2 Surplus equipment sale
9, 30 Natter night / Movie night
16 Radio night and table top sale
23 Construction contest

North Kent Radio Society
Stephen, G8JZT, 0798 575 3370
6 Club meeting
20 AGM
27 Christmas curry night

Southdown ARS
Tom, M6ONX, secretary@sars.club
7 Hailsham shack meeting, 10.30am
7, 14, 21, 28 Cafe meeting, 12.30;
FM net, 145.275MHz, 8.30am; CW net, 144.060MHz, 7pm
12 Dinner, Langham Hotel

Surrey Radio Contact Club
John, G3MCX, 020 8688 3322
1, 8, 15, 22, 29 Net, 70.300MHz, 8pm
2, 9, 16, 23, 30 Net, 145.350MHz, 8pm
4, 11, 18, 25 Net 1905kHz 9.30am
5 Inter-club quiz with CATS & S&CRS
19 Chat, fix-it and skills, John G8MNY

West Kent ARS
Keith, G4JED, 01732 446 331
12 Show and tell, 8pm

REGION 11: SOUTH WEST & CHANNEL ISLES

RR: Martin Sables, G7NTY, RR11@rsgb.org.uk

Cornish Radio Amateur Club
Steve, G7VOH, 01209 844 939, G7VOH@btinternet.com
1, 15 Main meeting / Social evening

North Bristol ARC
Mat, G7FBD, g7fbd@gb3bs.com
2, 16, 30 Relax, chat & operating
9 Bring and Buy
23 Juke boxes, G4GAU

Plymouth ARC
David, 2E0DTC, d.beck123@outlook.com
18 Rally, Harewood House, 10.30am

Poldhu ARC
Keith, G0WYS, 01326 574 441
1-28 GB100MPD (Poldhu was MPD in WW1)
13 LF DXing and Lifeboat experiences, G4AMT

Poole Radio Society
secretary@g4prs.org.uk
1 Fusion, C4FM and Wires-X by Yaesu rep
8, 15, 22, 29 Activity night & Intermediate training, 7.30pm

Saltash & District ARC
Mark, M0WMB, 0781 054 8445
1 AGM, 7.30pm, Burraton Community Centre
15 Open meeting, all welcome

Torbay ARS
John, G4VUD@tars.org.uk
2, 9, 16, 23 Club night (9th business meeting)
30 Totnes Image Bank

Weston Super Mare RS
Martin, G7UWI, 01934 613 094
5, 12, 26 Construction, Morse tuition & operating
19 Main meeting

REGION 12: EAST & EAST ANGLIA

RR: Peter Onion, G0DZB, RR12@rsgb.org.uk

Braintree & District ARS
Edwin, G0LPO, 01376 324 031
6, 20 Club net, 8pm, 145.375MHz
13 TX Factor 20
27 Surplus equipment and junk sale

Cambridge & District ARC
Richard, G4AWP, 0770 229 5300
9 History of ATV + RB-DATV demo, G3KKD
23 Transmitter testing with G0LRD's spectrum analyser

Essex Ham
Pete, M0PSX, news@essexham.co.uk
3 Essex YL Net, GB3DA, 8pm
4 Start of online Foundation course
5, 12, 29, 26 Net, GB3DA, 8pm, www.essexham.net
17 Supporting Essex 2m activity afternoon

Felixstowe & District ARS
Paul, G4YQC, pjw@btinternet.com
2 Natter night
26 Junk sale

Great Yarmouth Radio Club
Simon, M0TRJ, g3yrc.radioclub@gmail.com
9, 23 Club night and radio operation

Harwich Amateur Radio Interest Group
Kevan, 2E0WMG, 0749 352 1049
14 The Desert Rats, Ian, G4TZM

Leiston ARC
John, G4XVE, secretary@larc.org.uk
13 AGM

Loughton & Epping Forest ARS
Dave, M0MBD, 0798 016 5172
1, 8, 15, 22, 29 Net, 144.725MHz, 8pm
23 Bring & Buy at All Saints House

Lowestoft District & Pye ARC
secretary@ldparc.co.uk
1, 15, 22 Club evening
8 Talk / film
12, 26 Informal/operating evening

Norfolk ARC
Chris, G0DWV, 01603 898 308
7 Amateur radio in history, Elaine, G4LFM
14 Informal + Morse in the computer room
21 Talk on Flex developments, Steve, K5AC
28 Informal + Bright Sparks

South Essex ARS
Terry, G1FBW, 0798 607 0040
13 AGM

Thames ARG
Patrick, G8JLM, 01621 855 461
2 AGM
16 TARget night – practical radio projects
6 SSTV net, 7.30pm, 144.500MHz
17 Activity event, 1-5pm, 145.500MHz
20 SSTV by Nick, G4HCK

REGION 13: EAST MIDLANDS

Regional Manager: Jim Stevenson, G0EJQ
RR13@rsgb.org.uk

Kettering & District ARS
Ed, M0TZX, M0TZX@yahoo.com
1, 8, 15, 22, 29 Net, 7pm, 145.300MHz FM

Leicester RS
Sandra, G0MCV, 0793 027 4044
1-28 GB2LWF marking 100 years since WW1
5 Morse practice, bonfire bingo and firework food
6 Inter-club quiz night
10-11 GB2LWF
12 Morse practice & committee meeting
19 GB2LWF, CW special

Lincoln Short-Wave Club
Pam, G4STO, 01427 788 356, pamelagrose@tiscali.co.uk
1, 15 Club net, GB3LM / GB3LS, 8pm
3, 10, 17, 24 Open shack, 9.30am
7, 14 Nibble and natter night
8, 22 Club net, 145.375MHz, 8pm
19 Committee meeting
21 Talk by Dave Wilson, G0OBW, RSGB President, 7.30pm
28 Formal meeting

Loughborough & District ARC
Chris, G1ETZ, 01509 504 319
6 The role of CSI, Tim, M0ZRR
13 The Bruneval raid, George, G4EUF
20 Safety in the shack, Andrew, G7SEG
27 Practical evening

Melton Mowbray ARS
Phil, G4LWB, 01664 567 972
16 DMR, Graham, G4PTK

Nunsfield House ARG
Paul, G1SGZ, pr@nharg.org.uk
2, 23 Club night / Club events
5, 12, 19, 26 Shack night
6, 13, 20, 27 Club net, 8pm, 145.325MHz
9, 16 Projects night & social / Projects update
30 TX Factor

RAF Waddington ARC
Bob, G3VCA, 0797 116 6250
2, 16, 23, 30 Club night
5, 12, 19, 26 Club net, 145.325MHz, 8pm
9 Committee meeting

Welland Valley ARS
Peter, G4XEX, 01858 432 105
1-28 GB8GW, Main Street Great Bowden
5 Club net 145.275 (all welcome)
11 Armistice day. SES on air subject to permission
19 Calibration evening

REGION 1: SCOTLAND SOUTH & WESTERN ISLES

On 25 and 26 August the 1st Aviation and Radio Rally was held within the Montrose Air Station Heritage Museum. There were a lot of visitors on the Saturday, slightly fewer on the Sunday due to heavy rain. Around 40 light aircraft landed on the football pitches (original runway). On the Sunday, CQ Scotland and Mid Lanarkshire ARC ran a buildathon (see right). Use of the RSGB Loan Toolkits ensured most projects were completed successfully. Thanks to all who made the event successful.

Congratulations to the Oakes family on all passing their Foundation exam at Stirling EARS. It was great to see a whole family pass in one sitting and wanting to go forward to the Intermediate. For any training or exam enquiries in Central Scotland, contact Douglas on 07724 140 376.

REGION 3: NORTH WEST

Furness ARS held their final 2m fox hunt for the year in early September. The winners were Nick, G0HIK and Dave, G3VUS in less than 15 minutes. They only needed to take 3 bearings before finding the fox hiding under the railway bridge. There were 6 teams out, which is the highest number for a long time and it was good to see some new faces take part. The club was represented in this year's RSGB SSB National Field Day at the beginning of September by Ivan, G3IZD and Stewart, G3RXQ, in the Fixed Station category. The contest results have yet to be published. However, a position at or very near the top is expected.

South Manchester R&CC celebrated its 70th birthday with a party. RSGB Region 3 Representative Kath Wilson and RSGB President Dave Wilson were in attendance.

REGION 5: WEST MIDLANDS

It is with great sadness that **Midland ARS** announced the death of their long-standing committee member Derek Buckley, G7ORT. He held many posts with the society over the years and will be remembered for his interest in astronomy, his talks and slide shows.

REGION 9: LONDON & THAMES VALLEY

At **Verulam ARC's** September meeting, club members, Greg, M0PPG and Roger, M0RBK gave a joint presentation on the use of digital circuitry in radio design. Roger drew attention to the fact that the first commercial radios, crystal sets, had very simple analogue components which, as science advanced, were supported by valves and transistors and eventually replaced by the integrated circuit. Greg discussed the architecture of modern SDR radios and talked about analogue to digital conversion, proper sampling and how the advancement of computing technology, enhancing the performance of a radio, could be achieved by many strategies ranging from using a separate computer to task specific embedded chips.

REGION 10: SOUTH & SOUTH EAST

Amateurs from three Guildford-based clubs joined together at Stoke Park over the August bank holiday to celebrate 100 years of radio activity in the area. They ran special events stations working CW, SSB, FM and DMR with the call GB1GWA (Guildford Wireless Alliance). In 1918, seven years before the fledgling BBC could be received in the town, a group of local enthusiasts formed the **Guildford Wireless Alliance** to promote amateur radio. At that time, wartime restrictions banned the construction and use of radio equipment by the public. In 1920, the restrictions were relaxed and radio licences re-introduced. This allowed experimental work by amateurs to recommence in earnest, which continues today.

Hilderstone Radio Club took part in Lighthouses on the Air. It was a very successful event and gave everyone a chance to operate on HF including Foundation candidates. 11 year old Izzy passed her exam first time and is now M6TZI. Already she has made some QSOs – one in Bosnia during the Kent Sussex and Surrey Air Ambulance event and another in Florida, who went to her school many years ago!

radcom@rsgb.org.uk

REGION 11: ENGLAND SOUTH WEST & CHANNEL ISLES

On 18 August **Sidmouth ARS** hosted a Desert Island Construction Contest whereby teams from visiting clubs have to construct an electronic solution to a situation devised by the winners of last year's contest. **South Dorset ARS** described a situation that necessitated the discovery of which of the radio-enabled alarms guarding radio amateurs captured by pirates on an island were working. A disguised radio wave detector was the answer and **Sidmouth ARS** were deemed the winners. **Exeter ARS** were enthusiastic participants and all three clubs enjoyed an excellent barbecue and camaraderie.

Weston super Mare RS held their 3rd annual rally at the Campus Community Centre. It was a very successful event with over 200 people through the door and traders reporting that they had done good business. The large hall was occupied by the 25 traders and the side rooms used for the Bring & Buy stall, surplus equipment sale and the lecture.

REGION 12: EAST & EAST ANGLIA

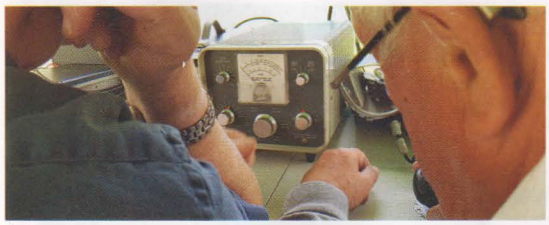
In September, the team from **South Essex ARS** ran a special event station at the Canvey Transport Museum. Several of the museum visitors were interested in learning more about amateur radio.

August finished with the **Peterborough & District ARC** 'all day' meeting. It was a chance for members to bring along radios and antennas for testing. The club radios were set up for use plus a display of older receivers and transceivers. One member brought along a 70ft mobile tower on which he put a homebrew 20m beam. RSGB Region 12 Manager, Peter, G0DZB, dropped in and plugged in his Morse key and made some contacts. Two of the members got stuck into surface mount soldering. The day was rounded of with a fish and chip meal, enjoyed by all.

Bittern DX operated GB5GFW at the Village at War event at Gressenhall Farm and Workhouse. Over the weekend they had several hundred visitors to the station with a good percentage trying their hand at the Morse code table. There were four stations up and running HF SSB on 40m, FT8 on 20m, 2m SSB and FM and last but not least a satellite station. The most popular was the satellite station with Julian, M0NUX hardly getting time to draw breath. Good contacts were made on all stations with many on HF SSB about 40m using a Windom on Saturday and a G5RV aerial on Sunday. There were 92 HF FT8 contacts using a fishing pole at ground level and several on 2m SSB and FM using a horizontal beam and a X510 vertical again at the top of the tower. Thanks to the staff of Gressenhall Farm and Workhouse who were more than helpful. A special mention and thank you for the resident catering department Adam, M0OAS and Ian, M0IWB.

Cambridge & District ARC entered the 2m Trophy contest & SSB Field Day. Two stations were set up on a remote hillside. The VHF station consisted of 2x11 element Tonna aerials on a portable SCAM mast, and HF aerials using a DX Commander fan vertical along with a G5RV. Dawn arrived with a bang and smoke coming out of the 2m linear, luckily a spare was on hand. Sunday 16 September saw 14 members and families gather for the CDARC annual picnic. The club's remote HF station was available to use and David, G0LRD took the opportunity to make a few CW contacts during the Scandinavian Activity Contest. There was also a demonstration of FT8, which several members had yet to try. This was both a well enjoyed social event, and educational.

In support of International Air Ambulance Week, Essex Ham was active at the airbase of the Essex & Herts Air Ambulance. The team operated GB4EAA for two days and for the third day, was active using GB1NHS with Paul Devlin from the NHS. Three stations were active on a variety of bands over the three days, and during some crew down-time, Essex Ham members were able to take a close look at the MD902 Explorer. Essex Ham would like to express its thanks to the Essex & Air Herts Air Ambulance, and also to Anglian Flight Centres for the hospitality.



Over the August bank holiday, **Braintree & District ARS** enjoyed a summer camp, hosted by John, M5AJB with around half of the club's members dropping in at some time and operating an assortment of transceivers through a Windom, 40/20 trap dipole and collinear. Equipment was brought along for testing, and Peru on FT8 was perhaps the best contact followed by hearing the Falklands on the same mode. Two weeks later, courtesy of Geoff G1GNQ, the club carried out a practice run of an SSB field station operation in order to evaluate the site and gain familiarity with N1MM contest logging software. The best DX on the day was Japan. The next event was at Ridgewell Air Museum during its 75th anniversary year operating GB0RID.

Thames Amateur Radio Group ran a weekend Foundation Course for two candidates, Ken and Juan. They both passed, which brought more people into the hobby. So lots of work behind the scenes to make sure this all happened safely and on time; paying it forward.

REGION 13: EAST MIDLANDS

Several members of **South Derbyshire and Ashby Woulds ARG** took part in the RSGB's SSB Field Day. After a few initial problems the tower was up and the beam moving correctly. Just before the start of the contest it became apparent that the radio was 'deaf' on 40m, so 2E0PKS jumped in his car and dashed home for a replacement. Then a power supply for the laptop was causing interference and had to go. The contest was enjoyed by all and was a great time for the club. Lots of lessons were learnt and next year will be even better. A big thank you to all who helped. The crew consisted of Vic, M0VCS, Richard, 2E0PKS, Ian, 2E0SQN, Mark, 2E0MGA, Gary, 2E0EVR, Peter, M6GPR, Dave, G0VVF and Matt, M0KGO.

Lincoln Short Wave Club held a pre-Hamfest briefing for the team working at the show, also attending were reps from neighbouring clubs at RAF Waddington, Spalding and Grantham. Afterwards a BBQ was enjoyed by all.

The new shack for RAF Waddington ARC was formally opened by Phil, G0LFE who opened the original shack in 1999. Phil was the first member of the club. A very successful BBQ was held with friends from Lincoln SWC.

South Kesteven ARS competed for their 2nd year in the RSGB SSB Field Day. Field day operation often gives a chance to operate from a well-sited location, which may be on top of a hill and away from sources of interference and TVI hassles. SKARS used a site near Ancaster with a Yaesu FT-450D running at 100W PEP, connected to an off-centre fed dipole suitable for 80, 40 and 20m The antenna supported on a 12m high Racal mast. Power was supplied by a petrol generator with several 12V leisure batteries on standby if required. Stewart, M0SDM, Konrad, M0KVF and Andrew, M0NRD along with Stewart's son camped overnight with other SKARS members and their wives visiting during the activation. A modest 151 contacts were made on HF, finishing early on Sunday.

For Sale

FIBREGLASS TUBE
High strength tube, square box, rod, and other sections stocked in 6m lengths, can be cut. Engineered Compositions, Chester. Tel: 01244 676000 e. info@engineered-composites.co.uk www.engineered-composites.co.uk

SINOTEL UK - AUTHORISED UK importers for Xiegu, TYT & Baofeng. HF & mobile transceivers, handhelds, accessories, antennas and more. www.sinotel.co.uk, 01926-460203, sales@sinotel.co.uk

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Replacement microphones for a wide range of transceivers. Cables for Heil and studio microphones, headsets and mixers, PC headset adapters, PTT switches and replacement curly cords. DTMF microphones for echolink. For these and more great items go to www.technofix.co.uk or technofix.uk

QRP CW X-TALS 6OFF - 3.55, 3.56, 7.02, 7.03, 21.06, 28.06MHz £2.55. 5.262MHz £1/unit Freepost UK. voyjako@gmail.com

HYCAS 9.0MHZ IF AMPLIFIER KIT
Proven design from W7ZOI and WA7LMH updated by G4JXX. Full details from Mike, 07980 194227 mhadley157@gmail.com

Wanted

VINTAGE RADIO & VALVES WANTED national cash settlement for silent key, shack clearouts 07552 678725, vintageradio@btinternet.com

Equipment

REPAIRS TO RECEIVERS, TRANSMITTERS
New/Old, valve/transistor. Call 07903 023437 for details: www.kent-rigs.co.uk

RADIO REPAIRS BY MONKL
Icom, Yaesu, Kenwood etc, plus linear amplifiers, please contact Nick on 07770 397668 or email np262@yahoo.com

Aerials

M0CVO ANTENNAS
For quality HF Wire antennas, BALUNs, UNUNs, VHF/UHF base or mobile antennas, all made in England, for QRP to QRO. Also available accessories and kits for home builders. At a price to suit your pocket. www.m0cvoantennas.com

WESTERN HF 10
67ft wire dipole 160-6m, full details lookup m0bzi at: www.qrz.com buy direct: m0bzi@outlook.com or 07748331458 reviews at: http://g0kya.blogspot.com/2010_08_01_archive.html **or** http://www.eham.net/reviews/detail/9424

G4TPH MAGLOOPS BACK IN PRODUCTION.
Remote tune and manual tune models for 40m through 10m. Details at www.g4tph.com

QUAD BAND COLINEARS.
10/6/2/70 Quad band 2.5/2.5/3.5/5.5 dbi gain only 1.2m length £59.95 ea 6/4/2/70 Quad band yes Includes 4m, 2.5/2.5/3.5/5.5 dbi gain 1.2m length £59.95 ea 2/70 Dual band 3.5/5.5 dbi gain 1.1m length only £37.95 ea. UK post £7.95. Website: mirfield-electronics.co.uk Email: martin.stokes@hotmail.com or Tel: 07825549430

NEW ANYTONE ATD868UV 2/70 DMR + ANALOGUE handheld radio, 4000 channels,built in GPS, Multiple DMR ID's , inc charger, program lead, handbook etc£139.95, QYT KT8900D 2/70 25/20w mobile only £79.95 ea, Mirfield Electronics 07825549430 www.mirfield-electronics.co.uk

HAMTENNA UK
Manufacturers of Antennas, Baluns, Ununs and suppliers of antenna wire and accessories. Checkout www.Hamtenna.co.uk

COMMERCIAL BALUNS
Professionally made commercial baluns and matching transformers, multicore Mil spec, resin potted, IP68, custom made by Geoff Brown G4ICD. www.rfcomms.co.uk

PRO ANTENNAS
Improve your HF reception with the I-Pro Home. I-Pro Traveller and Dual Beam Pro. Visit www.proantennas.co.uk for details.

Miscellaneous

ALL UK STATIONS – CALL IN ON OUR 'M1CRA' CHRISTIAN NETS!
WACRAL welcomes all amateurs & listeners to our Sunday morning 'GOOD NEWS' nets, now at 0730-0830 on 3.747 MHz +/- QRM and, again, at 14.00-15.00 on 7.147 MHz. Or, do join us on Wednesdays 07.30 3.747 MHz +/- QRM, 10.00 on 7.147 MHz (if no contact established after 5 mins QSY to 3.747 MHz and 21.30 on 3.751 MHz, for nationwide Christian fellowship and relaxed chat. All UK Local times. See www.wacral.org for more net info and WACRAL details or just call Ian G4OPP on 01622 746650 or g4opp@wacral.org

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Payment to: RSGB, 3 Abbey Court, Priory Business Park, Bedford, MK44 3WH

Advertising. All display and classified advertising enquiries (except Members' Ads, which go to memads@rsgb.org.uk) should be sent to: Chris Danby, GODWV, Danby Advertising, Fir Trees, Hall Rd, Hainford, Norwich, Norfolk NR10 3LX
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e-mail adsales@rsgb.org.uk

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FREE MEMBERS' ADS OF UP TO 40 WORDS

Email your Members' Ad to memads@rsgb.org.uk. You must include your name, callsign, phone number, email address and location (not counted in the 40 word limit). Optionally, attach your own photo of the item (min res 800 x 600, must be in focus and well lit). Max 1 ad per Member per month; other terms & conditions also apply (see tinyurl.com/MemAdsInfo). Please note we can no longer accept ads by post or phone.

FOR SALE

ALTRON SM30 slimline telescopic mast plus new rotor cage and ground socket. Lowered 15.5ft, raised 31ft, one winch operation to raise or tilt, well maintained, very good condition with original assembly instructions, £200. Collection only or arrange own transport. Richard Lewis, G8RAU, 0778 737 1313, g8rau@yahoo.com (Southend On Sea, Essex).

BUTTERNUT HF6V antenna, also a Cushcraft R5, both free for collection from Alan, M0AVN, 01803 863 075, ruth.alan@tiscali.co.uk (Totnes, Devon).

EARTHING RODS, two 4' x 5/8", solid copper, £10. Buyer to inspect and collect. Peter Carey, G3UXH, 0114 245 9081, g3uxh@stanage-edge.com (nr Sheffield).

ELECRAFT KX3 plus KX3AT3 ATU & KX3-2M-AT VHF module installed, manual & box, 2 microphones (not original Elecraft), aftermarket 4 parts protect cover, case & heatsink kit. Excellent working condition, hardly used. RRP £1600, asking £1100 plus postage. Darius, M0KCB, 0792 582 3231, qsl.m0kcb@gmail.com (Warrington).

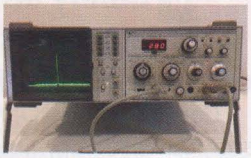
ELECRAFT P3-K PANADAPTER, virtually unused, £475. Heil Pro-Set K2 headset & mic, virtually unused, £100. AV-200 VSWR power meter, £35. p&p extra at cost, or collect. Chris, M0PSK, 01568 610 186, chrism0psk@gmail.com (Leominster).

EQplus AUDIO PROCESSOR by W2IHY, includes audio processor and amplifier, plus audio speech compressor (see www.w2ihy.com). Works very well and in good condition, comes with cables and user operating manual. Will accept £170 including postage & packing. Brian, G3WCY, 01276 500 648, briansfx@btinternet.com (Sandhurst, Surrey).

GAP TITAN DX ANTENNA 10m-80m, unboxed but never erected, still in its original zip ties. Complete. Buyer collects (you'll need a roof rack). £250, no offers, this is a giveaway. Nick Collis Bird, G0WZK, 01929 421 110, nickcollisbird@gmail.com (Swanage, Dorset).

HEATHERLITE EXPLORER HF linear amp in good working order. Offers please. Surplus to requirements. Prefer collection. C James, G0GFY, 0793 247 3601, c.james1@sky.com (Croydon).

HP 1.5GHz SPECTRUM ANALYSER, HP831A + HP8558B, 0.1 to 1.5GHz, in excellent working condition. Complete with cover, calibration tools and mains lead. Ideal for workshop use. £275. Prefer buyer collects, could deliver up to 100 miles. Steve, G3VMW, 01937 845 503, steve.wilson@g3vmw.net (Wetherby, Yorks).



HOWES CTU-150 aerial tuning unit, 1.8-50MHz. Only used on 5W QRP. Built-in alloy case 8 x 7 x 2.5 inches, £15, cash and collect. Bill, G4EHT, 0783 546 9149, bill.g4eht@yahoo.co.uk (Lichfield).

HP 432a POWER METER plus the thermistor mount model 478a with leads. Thought to be working, SK sale. £50. Collect or carriage at cost. Mike Nicholas, G3TOI, 01202 419 394, mikenicholas888@btinternet.com (Bournemouth).

ICOM IC-2730 dual band mobile radio, c/w bracket MBF4 & MBA4. As new, fully boxed with manual. Only air tested. Still under Icom guarantee, £325. Includes UK mainland delivery only. Dave, G1LNA, 01209 717 261 (Cornwall).

ICOM IC-518 c/w cover & PSU, hardly used, £250. MFJ259B, antenna analyser, VGC, £125. TYT SF-401 Plus frequency counter, boxed, VGC, £25. MFJ201, dip meter, VGC, £75. Sold as seen, no offers, buyer collects only. Stan, G3OSP, 01785 240 379, g3osp@mypostoffice.co.uk (Stafford).

ICOM IC-7100 all mode xcvr, HF, 6m, 4m, 2m, 70cm. Touch screen etc. Boxed, complete £725. LDG IT-100 auto ATU £115. Yaesu FT-7900R/E. 2/70 FM transceiver £155. Yaesu FT2DR/DE Fusion/FM H/H. boxed, complete, £295. Prefer buyer collects, but can post. Martyn, G3UKV, 01952 255 416, ukv@ukv.me.uk (Telford).

ICOM IC-7200 with MYDEL MP304 power unit, recently bought and hardly used, £500. Buyer to collect. Comet CHA-250 BX11 vertical antenna covering most HF bands and 6m, £250. Buyer to undertake removal from bungalow. Ron, G4RTH, 01692 406 923, ron.hamstead1@gmail.com (North Walsham, Norfolk).

ICOM IC-756 Pro 2 with hand mic, power lead, unmarked, boxed, £550; GEC BRT400K £90; Murphy B40, B41, £50 each; Eddystone 740, 750 £80 each. All recently working and in good cosmetic condition. Buyer to collect please. Ken, G3XSJ, 01179 683 003, g3xsj@btinternet.com (Bristol).

KENWOOD TS-590s HF transceiver. Good working order, and good condition – comes boxed with DC lead, MC-43 speaker mic, manuals, various wires, connectors etc. Non-smoking home. £550 + postage or collect from BS41. Mat, M0YTB, 0794 992 4337, mat@crzy.co.uk (Bristol).

KENWOOD TS-680 HF+50MHz transceivers x2, both fully working and in good condition, but one has a blank display, £100 for both together. Versa-Tuner MFJ-969 very good condition, £100. Buyer collects. Peter, G3XJE, 0797 995 3359, pjds@mrao.cam.ac.uk (Huntingdon, Cambs).

LINEAR AMP GEMINI 2 (300W). Solid state 144MHz power amplifier, 10W drive for 300W output. As new, fully working with manual and original box, £550. David, G4EEV, 01423 770 922, dwarwick@msn.com (Yorkshire).

QRP LABS DELUXE 6 BAND U3S KIT. Includes 6m, 10m, 15m, 17m, 20m & 30m LPFs, GPS receiver and enclosure. Complete and unbuilt. See QRP Labs website for full info. £45 plus P&P. David, G4EDR, 0743 466 4898, radioham73-qsl@yahoo.co.uk (Filey, N Yorks).

SDR-Kits VNWA3 & matching, dedicated automatic 2-port S-parameter test set, excellent condition, presentation boxes, instruction manuals. Amphenol male & Rosenberger female SMA cal kits, torque spanner, SMA cables and inter-series adaptors. Contact for details (too numerous to list). £500. Steve Webb, G4GHO, 0794 704 5068, steve@sawfly.net (Norwich).

SHACK CLEARANCE Elecraft K3 100W, 2x K1, Kenwood 590s, Yaesu FT-991 (not A), FT-857D, FT-7, FRG-7, FRG-7700, FRG-100, assorted PSUs + ATUs. Buyer collects. Stephen Walters, G7VFY, 0795 654 4202, mister35mm@yahoo.co.uk (Barnet, N London).

SILENT KEY (G3XIU) gear for sale, offers only to G0RZI please. Icom IC-229H, Icom 746, Icom Pro 2 HF, Yaesu FT-8800, plus various other bits including matching speakers and base mics. SWR meters and power meters. 60ft mast and rotator. Barry Easdon, G0RZI, 01946 812 092, barrydrm31@hotmail.co.uk (Cumbria).

SK TRIO STATION, boxed, mint condition. TS-830 transceiver £260, MC-50 mic £30, SP-230 speaker £80, AT-230 ATU £180, SM-220 Monitorscope £150. The lot £620, would prefer not to split. Iconic VOX Continental organ, chrome Z stand, swell, case £350. Collect. Mike, G4AQS, 01234 308 449, mike.g4aqs@hotmail.co.uk (Bedford).

TEKTRONIX SPECTRUM ANALYSER 2711 9kHz to 1.8GHz, 50Ω input. In good working condition, but last calibrated decades ago. £300 ONO. Collection only. David Tarr, G3OUA, 01903 692 811, david349tarr@btinternet.com (Worthing).

TOKYO HY-POWER auto antenna tuner HC-1.5KAT, £395 plus FREE faulty matching linear amp HL-1.5KFX (has overdrive protection fault). Free delivery included. Les, M0BUI, 01288 355 940, lesjacsty@hotmail.com (Bude, Cornwall).

TOP BAND/80m AM SET UP comprising R107 and home built transmitter. Not pretty, but it works, in regular use from 1964 until last December. Property of G3TOZ, SK. FREE to a good home. Text 0785 077 2207 for photo. Bruce, G3WCE, 01692 538 794, g3wce@grimblepoos.co.uk (North Walsham, Norfolk).

WIMO 23 ELEMENT 70cm beam, £85. Wimo 67-ele 23cm beam, £110. Both in as new condition, only outside one day per month for UKACs. Collection only. Avair 3-way coaxial switch, unused N connectors, £28 plus postage. John Higson, G4NTY, 0161 790 7673, jhigson42@gmail.com (Manchester).

YAESU FT-221R including matching YC221 digital frequency display. GWO, recently re-aligned including FM TX set to 12.5kHz. Fitted with muTek front end board & 11 fixed-channel crystals. Includes original microphone, user manual, double boxes. £300, collection preferred or +£25 carriage. Mike, 01249 443 037, g4oqg@hotmail.co.uk (Wiltshire).

YAESU FT-221R with muTek & original RF module, VGC, all original packaging etc, £215. TS-590S, as new, £615. MC60 desk mic, £50. MMT144/28-R 25W transverter, £85. 4m 5-ele Yagi, £40. Keith, G4GZS, 0785 991 7317, keith4gzs@hotmail.co.uk (Rugby).

YAESU FT-290 MkII with microphone, antenna, excellent condition, £150. Icom IC-207H VHF/UHF transceiver, boxed, £110. Yupiteru MVT-7100 scanner, boxed, VGC. All plus p&p. Email for pictures. WANTED – copy of 1965 Callbook. Ron, G4XOU, 0748 640 5031, pwa987fa@gmail.com (Nottinghamshire).

YAESU FT-790 all mode 70cm portable c/w mobile mount, YM49 speaker mic, whip aerial, battery chargers (no batteries), Alinco ELH 730 linear, with mobile frame, remote headset SB2 PTT, all manuals

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 supplied by Ofcom on 19 September 2018.

RSGB will do its best to publicise your special event and its callsign, but you must help us to help you. On the back of Ofcom's SES NoV application form there is a Data Protection section with two tick boxes. Please tick both 'yes', Ofcom can't give us the details so they won't appear here, on GB2RS, or on the RSGB website.

Start Date	Callsign	Event details	Location
01/11/2018	GB0PPY	GB0PPY = G POPPY	South Harrow
01/11/2018	GB1WWI	Wiskey Wiskey India	Kington Langley
02/11/2018	GB1WWO	World War One	Bromsgrove
03/11/2018	GB0PLF	Pontefract Liquorice and Fireworks	Pontefract
03/11/2018	GB2LWF	Lest We Forget	Leicester
04/11/2018	GB1FB	Forth Bridge	North Queensferry
08/11/2018	GB1WWC	Whiskey Whiskey Charlie	Carrickfergus
11/11/2018	GB1BAF	British Armed Forces	Carmarthenshire
11/11/2018	GB2WYS	West Yorkshire Scouts	Huddersfield

SILENT KEYS

Due to an administrative issue it has not been possible to compile the Silent Keys list this month, for which we sincerely apologise. A future list will include all those we have missed this month.

To notify us that a Member has passed away, email details to sales@rsgb.org.uk or phone 01234 832 700, option 1. This will ensure that their Membership will be ended properly and that they appear in the Silent Keys list. We need to know the name, callsign and date of death.

Please note that Ofcom must be informed separately, on 0207 981 3131 – we are not permitted to pass on details on your behalf.

and 100% working. Buyer inspects & collects. No splits. £300. Francis, G0JIV, 01508 538 752, f.gurneysmith@btinternet.com (Norwich).

YAESU VR-5000 communications receiver, 100kHz–2600MHz. Original manual, power supply and box, £350. Non-smoking shack, good condition, ideal for SWL. Ideally buyer collects, or we could meet. Tim, G4MFU, 0796 618 2040, tim.riggott@btinternet.com (West Midlands).

WANTED

2 x 4-400a VALVES or an unfinished homebrew amplifier project please. Wolf, G4SSX, 0795 142 3668, g4ssx@yahoo.co.uk.

EXPERT SPE 1.5K-FA or 2K-FA HF linear amplifier and the SUN SDR2 Pro transceiver (ideally with the E-coder unit), clean and in good working order. May collect or arrange a courier. Anton, MW0EDX, 0779 114 5923, m0edx@yahoo.com (nr. Welshpool, Powys).

NUMERICAL INDICATOR TUBE type 5870 to repair an SEI SM200 Mk2 timer counter. A scrap counter is an alternative. Phil, G3SES, 01244 383 954, philg3ses@gmail.com (Chester).

OLD TIMER, wishing to turn the clock back, seeks components and/or parts to construct a replica "All World Two" receiver. Alternatively, an Eddystone All World 2 in need of some TLC would be welcomed. If you can help, please contact Alan Strong, G3WXI, 0750 134 9723, g3wxi@qsl.net (nr Sheffield).

OPEN FRAME DYNAMO as used with vintage stationary engines, Complete switch boards, metal-cased voltmeters, ammeters, switch gear; fuse holders, terminals, knife switches etc. Amanco and other vintage hit and miss stationary engines also sought. Collect within 75 miles of SN15. John, G0LJS, 01380 859 088, hubertsims@btinternet.com (Chippenham, Wiltshire).

POINT CONTACT TRANSISTORS. Examples: 2N110, GET1, GET2, LS737, OC50, OC51. There are others. Even better if working. Godfrey, G4GLM, 020 8958 5113, cgmm2@btinternet.com (Edgware, Middlesex).

SILENT KEY CLEAROUT or just not wanted – please don't throw them away. I collect QSL cards for historic interest and research. Any date, but prior to 1970 preferred. Tony, G4UZN, AQuest1263@btinternet.com (Leeds).

WODEN UM0 or UM1 modulation transformer. Alternatively, a push-pull audio output transformer, about 10W rating, similar to that used in the AT5 TX. Brian, G3RKZ, brian.tibbert1942@hotmail.com (Ilkeston, Derbyshire).

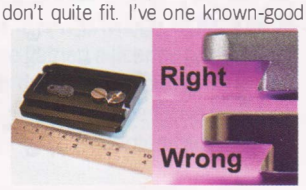
YAESU FT-897 battery pack FNB-78 & CD-24 charger. Also Yaesu FT-7800 or 7900. Stuart, G4KUR, 0771 750 0952, g4kur@btinternet.com (Coventry).

HELPLINES

Can you help? We are asking if anyone would be willing to donate equipment for our very newly formed radio club at Dulverton Junior School in Somerset – MOLPR. Initially looking for: HF/50 transceiver, ATU, PSU & antenna. Thank you. Jon, G6ASK, 01398 341 377, g6ask.jon@gmail.com (Somerset).

LORIN KNIGHT'S 1980s transceiver design – appeal for help. I would be very pleased to hear from anyone who has experience with this design, which appeared in *RadCom* in 1984. Distortion from the modulator is my main concern. Alan Charles, G4ORE, 01923 283 579, mail@cramond14.plus.com (Hertfordshire).

MACHINIST'S HELP NEEDED! I bought three aluminium tripod shoes that don't quite fit. I've one known-good sample but haven't the tools or skills to make the six shallow cuts required. If you're handy with your milling machine, could you help? Giles Read, G1MFG, giles@rsgb.org.uk, 01234 832 714 (Bedford).



RALLIES & EVENTS

Members of the RSGB Regional Team will be present 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

3 NOVEMBER

VERON Ham Radio Convention (Dag voor de RadioAmateur 2018)

IJsselhallen, Rieteweg 4, 8011 AB, Zwolle, Netherlands. OT 9.30am, admission €9, (16s. free) On-site parking €5. Lectures, homebrew exhibition, demos & measuring facilities, AMRATO (amateur radio equipment sales), component market, flea market, special interest groups, Youth Zone and announcement of VERON 'Radio Amateur of 2017'. [https://dvdra.veron.nl/].

4 NOVEMBER

BUSHVALLEY ARC ANNUAL RADIO RALLY

United Services Club, 8 Roe Mill Road, Limavady, Co Londonderry BT49 9DF.

OT 11am, disabled access 10.50am. Admittance £3. There will be an auction, trade stands, a Bring & Buy, RSGB representation and Special Interest Groups. A talk-in station will be on the air. On-site catering. Jason Smyth, MI3UIW, 0779 331 4313, jason.smyth@pepsico.com.

4 NOVEMBER (CANCELLED)

West London Radio & Electronics Show (Kempton Rally)

17 NOVEMBER

RADARS TRADITIONAL RADIO RALLY

St Vincent de Paul's, Caldershaw Road, off Edenfield Road (A680), Norden, Rochdale, OL12 7QR.

Doors open to the public at 10.30am with disabled visitors gaining access 15 minutes earlier. Admission is £2.50 (under 12s free). £5 per pitch (for traders with own tables) or £10 for a pitch with table provided. Bring & Buy, commercial traders, amateur radio sellers. Refreshments available including bacon and sausage butties. Robert, MONVQ, 0777 811 3333, m0nvq@outlook.com.

18 NOVEMBER

41st CATS RADIO & ELECTRONICS BAZAAR

Oasis Academy, Homefield Rd, Coulsdon CR5 1ES.

Free car parking, doors open 10am, admission £1.50. Trade stands, special interest groups, refreshments. Andy Briers, G0KZT, 0772 986 6600. [www.facebook.com/events/437043790050777/].

18 NOVEMBER

PLYMOUTH RADIO RALLY

Harewood House, Church Rd, Plympton PL7 1NH

Doors open at 10.30am, Entrance is £2. Details from David Beck, d.beck123@outlook.com [www.plymouthamateurradioclub.btck.co.uk].

25 NOVEMBER

BISHOP AUCKLAND RADIO AMATEURS CLUB RALLY

Spennymoor Leisure Centre, 32 High Street, Spennymoor, Co Durham, DL16 6DB.

Good parking and easy level access to a large ground floor hall. Doors open at 10.30am, 10.15am for disabled visitors. Admission £2, accompanied under-14s free. Radio, computer, electronics and bring and buy stalls, catering and bar facilities. Talk-in on S22. Contact John, G4LRG, 01388 606 396. [www.barac.org.uk].

1 Dec – **South Lancashire ARC Winter Rally**
29-30 Dec – **Hamfest India**
3 Mar – **Exeter Radio & Electronics Rally**
24 Mar – **Hamzilla (Dover ARC)**
24 Mar – **Callington Radio Rally**
9 Jun – **Junction 28 Radio Rally**
16 Jun – **West Of England Radio Rally**
28 Jul – **Wiltshire Radio Rally & Electronics Fair**

Remember: we can only publicise your event if you tell us about it. Please send full details as early as possible to radcom@rsgb.org.uk (not less than three months before the event) and we'll put your information in *RadCom*, on the RSGB website, and on GB2RS News broadcasts.

HF F-Layer Propagation Predictions for November 2018

Compiled by Gwyn Williams, G4FKH

	3.5MHz	7.0MHz	10.1MHz	14.0MHz	18.1MHz	21.0MHz	24.9MHz	28.0MHz
Time	000011111220	000011111220	000011111220	000011111220	000011111220	000011111220	000011111220	000011111220
(UTC)	246802468020	246802468020	246802468020	246802468020	246802468020	246802468020	246802468020	246802468020
*** Europe								
Moscow	998....58888	647654567557	..565556....	...66663....	...4664.....	...2332.....	...1221.....	....11.....
*** Asia								
Yakutsk	6.......6666	...3.......3	...3........	.....	.....	.....	.....	.....
Tokyo	.....	...5..55....	...4..33....	.....	.....	.....	.....	.....
Singapore	.....	......55....	......54....	.....33.....	.....2......	.....	.....	.....
Hyderabad	5.....	5......55455	......44....	......3.....	.....2......	.....	.....	.....
Tel Aviv	88......8888	7773...57777	..654345....	..355453....	...5533.....	...221......	.....	.....
*** Oceania								
Wellington	.....	...567664...	...46664....	....454.....	.....21.....	.....	.....	.....
Well (ZL) (LP)	.....	.....	.....	.....	.....	.....	.....	.....
Perth	.....	......55444.	......54....	.....342....	.....22.....	.....1......	.....	.....
Sydney	.....	.....565....	....4554....	....344.....	....231.....	....11......	.....	.....
Melbourne (LP)	.....	...4........	...43.......	....3.......	....1.......	.....	.....	.....
Honolulu	.....	...444.5....	.....3.3....	.....	.....	.....	.....	.....
Honolulu (LP)	.....	.....	.....	.....	.....	.....	.....	.....
W. Samoa	.....	...45555....	....454.....	.....42.....	.....1......	.....	.....	.....
*** Africa								
Mauritius	5.....	5......55..4	.......4....	.......3....	.....	.....	.....	.....
Johanesburg	5.....	55.......555	3..........	.......3....	.......2....	.....	.....	.....
Ibadan	.77.....	7675....6777	6.654...56..	...543......	...54444....	...2444.....	....1.......	.....
Nairobi	.....	654.........	..4.........	...3........	...3........	.....	.....	.....
Canary Isles	9997.....899	887753.46888	7646544567 55	22.35555.3..	....2222....	.....1......	.....	.....
*** S. America								
Buenos Aires	...5........	55.6........	...5........	...2........	.....	.....	.....	.....
Rio de Janeiro	.....	5545.......5	...4........	...3........	....2.......	.....	.....	.....
Lima	.....	.....	.....	.....	.....	.....	.....	.....
Caracas	.....	...5........	....4.......	.....3......	.....3......	.....	.....	.....
*** N. America								
Guatemala	.....	...5........	.....	.....	.....	.....	.....	.....
New Orleans	.....	...5........	.....	......2.....	......2.....	.....	.....	.....
Washington	67775.....56	6..45....455	.....3.33...	......33....	.......4....	.....	.....	.....
Quebec	6776......66	....4....4..	.....3333...	.....333....	......31....	.....	.....	.....
Anchorage	..55........	........4...	.....	.....	.....	.....	.....	.....
Vancouver	..55........	.....	.....	.....	.....	.....	.....	.....
San Francisco	.....	...44.......	.....	.....	.....	.....	.....	.....
San Fran (LP)	.....	.....	.....	.....2....	.....2....	.....	.....	.....

Key: The figures represent approximate S-meter readings, whilst the colours represent expected circuit reliability. **Black** equals low to very low probability, **Blue** equals good probability and **Red** equals a strong probability. No signal is expected when a '.' is shown. The RSGB Propagation Studies Committee provides propagation predictions on the internet at www.rsgb.org.uk/propagation/index.php. An input power of 100W and a dipole aerial has been used in the preparation of these predictions; therefore a better equipped station should expect better results. The predicted smoothed sunspot numbers for November, December & January 2019 are respectively (SIDC classical method – Waldmeier's standard) 2, 2 & 1 and (combined method) 2, 3 & 3. The provisional mean sunspot number for September was 3.3. The daily maximum / minimum numbers were 16 on 11 September and 0 on 1-7, 13-16 and 18-29 September.

LONELINESS AND AMATEUR RADIO

Paul Billingham, M0KIA

Whenever my edition of *RadCom* hits my doormat I look forward to reading the letters page as a reflector on what fellow radio amateurs would like to voice.

There was a definite theme in September's edition that I would like to pick up and query. Ivan Eamus, G3KLT in his letter about 80m beacons made a very good point and something I have wondered for some time. Ivan made reference to us 'Chocolate Boxes' who once (and maybe still) used Citizens' Band radio. In its heyday this was an excellent way for people who were isolated and possibly had disabilities or caring commitments to have contact with the community around them. Those who used CB also had a good leg up into studying for an amateur ticket as you had to make a setup work on 11m, albeit for local contacts. I have seen very little regarding disability, old age or isolation mentioned in the amateur radio press, yet what a boon this hobby could be to someone outside the amateur radio community who maybe out of work, in ill health or any manner of reasons that cause isolation.

Linking Ivan's letters to others such as Julie Dunn's message on using FT8 and Mike Kerry's communication on falling VHF/UHF repeater and simplex use, it has occurred to me not for the first time that our hobby (with its newer, sensible entry requirements) could be a boon to those who are isolated or just plain lonely. FT8, for instance, though I have not used it myself means a transceiver can be connected to a computer and as with PSK31 and similar modes, your keyboard becomes your means of communication. I agree with Julie Dunn's comments that a decent QSO through a keyboard is better than a 3 second garbled 5/9, 73s and good luck! Foundation licensees can communicate worldwide using low power and very compromised home built antennas on data modes that also bypass any issues with poor speech.

I have noted that there are organisations such as the RAIBC who are an amateur radio charity for licensees with disabilities and even loan out equipment, but taking this a step further it's great to have the loan of equipment, but how does someone without help set up a station?

I used to be on a local club committee as magazine editor. At meetings, which were usually very well attended, I could not believe how many members were in the area but never went on air, never came on a net, but enjoyed the interaction of a club meeting. I asked this question of many members and got very similar replies; setting up antennas and other station related requirements such as earthing and ground wires isn't easy with poor mobility and this includes age as well as disability. Let's face it, people don't generally like to ask the help of others and in our hobby that obviously is a massive issue. I spoke to some who had not been on air for many years and stated setting up a station and antennas as being the greatest hurdle preventing them being on air.

Recently I have found my home-made 2m/70cm antenna needs maintenance due to a rising SWR, which will be replaced with a shop bought antenna mounted higher up. My multi band end-fed is also somewhat poorly and in need of the 'middle-aged Tarzan' routine of going up a ladder and risking life and limb for 25 yards of wire. In ringing local antenna installers to get a quote on erecting a collinear on my chimney stack, I have been met with several replies along the lines of 'for £200 I'll put whatever you like on your chimney'. This does not leave me feeling confident it will be done properly and the cost, though affordable to me, is a great deal to someone on a low income.

I read a great deal about the latest interests in amateur radio and the enjoyment that can be gained in all manner of the facets of the hobby, but almost nothing about two or more human beings just having a conversation, by whatever means and modes over the air, which let's face it is a privilege that's free to us, once we have gained a licence and bought some kit, which could mean being on air for as little as £25 as per Terence Bone and Bob Houston's letters (also in September).

VOLUNTARY INTERCEPTORS

John Swartz, WA9AQN

Re the article on Voluntary Interceptors in the September *RadCom*. With great thanks to you, the RSGB and the *RadCom* staff, I wanted to report that the list of Voluntary Interceptors is growing. Peter, G8VG has been receiving a steady stream of information from readers who are reporting what they know about friends and relatives who were listeners during the war. A number of these have been confirmed with extraneous evidence, so the effort is encouraging, to say the least.

Readers who may be reluctant to come forward are encouraged to do so, please. Any documentation that can support the claim of service would be appreciated, or, if not available to the reader, please send any information known about relatives or sources that may be contacted to verify or provide documentation.

Again, our thanks for your efforts, and those of the Membership. Peter is making good progress. Again, his email contact address is peterwindle220@gmail.com.

THE VHF & UHF BANDS

Colin Topping, GM6HGW

Following the several comments concerning the lack of operation on the amateur VHF and UHF bands, may I suggest that one of our talented RF designers devise a simple three channel crystal controlled VHF FM transceiver with an output of around five watts. The selected channels could be a local repeater, calling frequency and one simplex channel.

Once a design is selected, boards produced parts and components sourced in bulk to keep costs low, the kits could be supplied to trainers and built as part of the training for a Foundation or Intermediate licence. I appreciate that Foundation licensees are not permitted to use a home-made transmitting device, however, if built by the trainee in supervised classes and tested by a course trainer and a test certificate produced, this may overcome this condition of their licence?

There is a great sense of achievement in building a first radio device and the thrill of a first contact; hence if adopted may well encourage far greater use of the VHF bands.

RadCom *has been mulling over a simple one- or two-band transceiver based on ready-built RF transceiver modules like the DRA818U used by Clemens Verstappen, DL3ETW in his homebrew 70cm handheld (*RadCom Plus*, Vol 2 no 2, July 2016). Our problem is simply a lack of time to develop it – if someone would care to pick up this project, or has other suggestions, please email radcom@rsgb.org.uk*

RADICAL IDEAS?

Ray J Howes G4OWY

Stephen Blake, RS316144 (*RadCom* October 2018), has hit the nail squarely on the head. I congratulate him for daring to even suggest it. That the Foundation licence exam be available to all and sundry online. And yes, the practical element too.

Well, it does make sense. After all, as Stephen rightly implies, this entry type amateur licence is relatively easy to pass. Obviously, it was designed that way to encourage those with a minimal amount of electronics/RF knowledge to gain an amateur licence. Of course, not unsurprisingly, there are a small sliver of amateur radio operators/technicians – call them what you will – who would prefer that such a licence be abandoned. That it is a slippery slope towards dumbing down the hobby of amateur radio to unacceptable levels.

I mention this because the other evening whilst listening to a couple of 'grey-beards' (G3s) on HF discussing the ills of a Foundation licence – and being very disingenuous to new operators and digital radio in general, I suddenly thought, like Stephen, that it would be great idea to move the Foundation licence exam online.

Besides, we do need more young people to enter our hobby. Young people to invigorate and bring new blood and ideas into our

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common hobby. Okay, old people too. The more the merrier. Yes, as Stephen points out, some people will cheat. Let's not forget that cheating has always been a very small feature of sitting exams, and that's not likely to change.

So I say, bring it on. Make obtaining a Foundation amateur radio licence more accessible to a lot more people – via an online exam – it's a no-brainer, isn't it?

That's an interesting suggestion. We have for a while now been running online amateur radio exams, but not quite as Ray suggests. They take place in approved examination venues with invigilators present to ensure fair play and to assist candidates with any technical difficulties with the system. However, nowadays, many online professional training packages, consisting of short courses followed by a test, can be taken by the individual at home or in their office. So, perhaps, Ray's idea is something that the Examinations Standards Committee could look at in the future, but such a development would need Ofcom approval.
Tony Kent, G8PBH, Chair, ESC

HIGH ALTITUDE BALLOONS

John Robb, M0JRZ

Further to the excellent letter by Richard Horton, G3XWH in the October *RadCom*, I would like to point out that High Altitude Ballooning (HAB) is legal, utilising the license free UHF and VHF bands and is alive and well in the UK.

Please take a look at www.ukhas.org.uk. HAB can and is used as a first class teaching resource through it encompassing:

- Project planning; definition, coordination with other agencies, project control ...
- Design; for example, interfacing a GPS module to a radio module using a microcontroller ...
- Operation; launch, tracking and recovery.
- Post flight analysis; evaluation of telemetry data.

Besides basic GPS data, latitude, longitude and altitude, additional telemetry data might be outside air temperature and pressure, images from on board camera and pretty much anything you may think of that can fit the payload.

A further site of interest, though this would have legislative difficulties, is http://qrp-labs.com/circumnavigators.html, a WSPR application.

THE MAGICAL WORLD OF RADIO

Andy Sutton, GM6ZAK
(Cameron's granddad)

The following letter was sent to the Worked All Britain Awards Group by Andy, GM6ZAK, thanking them for the help he received.

I have many interests outside the world of amateur radio; one of which is supporting my grandson Cameron, now 8 years of age, who suffers from autism. His condition means that we, as a family, must become part of Cameron's world as opposed to Cameron integrating into 'our' world. This is not easy to accomplish but, once achieved, it is truly rewarding.

Cameron attends mainstream school and, with 1-2-1 support provided by a brilliant assistant, is making steady progress with his education, social and communication skills. To encourage him to communicate, we decided to introduce him to the magical world of radio. Using the licence-free PMR band, Cameron and his younger brother Finlay have been taught how to use hand-held radios and encouraged to use them when playing in the local area. Of course, getting to use granddad's radios adds another level of excitement to the experience.

Cameron occasionally came home from school and chatted about other students, who had brought in certificates and trophies to show the assembled classes on a Friday morning. Given the extraordinary challenges Cameron overcomes daily, I thought it would give his confidence a boost if he, too, had a certificate to show the school assembly.

In April, I contacted the WAB President and, having explained my goal, I asked for assistance. In keeping with the motto and stated aims of the organisation, the response I received went far beyond any expectations I initially held.

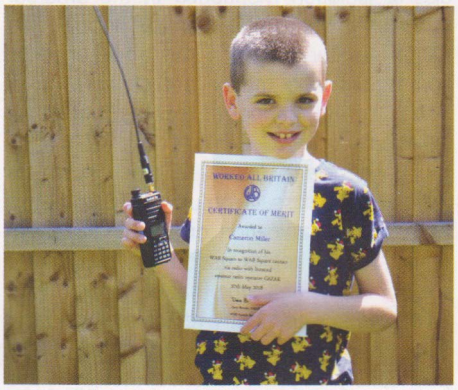
John, G8XTJ very kindly agreed to my proposal and forwarded my request to the committee. Ken, G0FEX promptly offered to sponsor Cameron's membership to WAB, something so obvious I wish I had thought of it! Dave, G4IAR designed and produced a wonderful 'Certificate of Merit' in time for 27 May, the weekend of our next visit.

On the stated day, I drove the short distance into the adjacent square (SJ82) and called Cameron, who answered the call. He informed me that he was in his home square (SJ92), that I was "loud and clear – top o' the shop" and unprompted he wished me a very happy birthday, which was the reason for our visit. He then went on to have a nice and unexpected chat with me, mainly about the merits of cake and Star Wars.

On the following Thursday, the postman delivered a package for Cameron containing his certificate and membership pack. The look of pure delight on his face and the excitement in his voice was amazing. Later the next day, I presented Cameron with his certificate and his mum photographed the event for posterity.

Cameron returned to school the next week, following the late May holiday break. In keeping with the school's policy, Cameron, who had a massive smile, was presented to the school by the Headmaster, receiving an enthusiastic round of applause from teachers and fellow students alike.

On behalf of my family, may I extend my sincere and heartfelt thanks to the organisation for making a very special and unique young man very happy. We think you are all brilliant.



RISK OF LOSING THE BANDS

Andrew Marshall, G8BUR, M0MAA

Regarding the reply by John Regnault, G4SWX to the letter from Mike Kerry, GW1SXT, the last sentence has me scratching my head somewhat. Surely, unless DCS (or, for that matter, CTCSS) decode is enabled on an FM radio, no otherwise-audible FM signal can be hidden from that radio.

I cannot imagine that anyone would call CQ with any form of tone or digital RX squelch enabled, except perhaps inadvertently. That said, many people use CTCSS (and perhaps a few use DCS) RX squelch on simplex frequencies, such as at rallies to fend off the RF 'mush', or to listen for specific stations only, on an agreed, out-of-the-way, quiet 'chat' frequency, at home, when mobile, or when portable; I see no harm in that.

In my view, the most likely reason for newcomers' (or anyone's) lack of contacts using a handheld is its limited range, especially with a standard antenna and/or indoors and/or from a poor location. A simple outdoor, mobile or loft antenna, or a trip to a suitable high point, would doubtless bring them many more contacts. Are such things not covered in training for the Foundation licence?

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E&OE*

Yaesu FTdx101D (100W) & FTdx101MP (200W)

In homage to YAESU Musen Founder, Sako Hasegawa, Yaesu Japan is excited to introduce a new High-Class HF/50/70MHz Transceiver, the all-new FTdx101D (100W) & FTdx101MP (200W).

A pre-production sample of the FTdx101D was first displayed to thousands of visitors at Dayton Hamvention 2018.

The FTdx101D & just announced FTdx101MP utilise the latest SDR Technology and classified as Yaesu's High-End HF line, the FTdx series, which amateurs have come to know represents superior quality and leading edge performance.

Here's a few of the remarkable features of the new FTdx101D/MP:

- Superb and Astonishing Close-in Dynamic Range Performance even in today's crowded bands situations
- 9MHz IF Roofing Filter Producing Excellent Shape Factor
- 400MHz HRDDS (High Resolution Direct Digital Synthesiser)
- Hybrid SDR: Direct Sampling & NBW (Narrow Bandwidth) SDR
- Completely Independent Dual Receivers
- High-Q VC Tuning Front-End
- YAESU Renowned Interface Reduction System
- Large Touch-Panel Precision Colour Display
- 3DSS (Three Dimension Spectrum Stream) Waterfall Display
- Active Band Indicator with LED illumination of the operating band, enables rapid band changes
- MPVD (Multi-Purpose VFO Outer Dial) provides Sub VFO dial, Clarifier operation VC-TUNE adjustment, VFO fine tuning or a CS (custom selection) function

YAESU High-Class HF/50MHz/70MHz* 100W (D) & 200W (MP) Transceiver

- Full SDR Technology and Waterfall Display
- Large Touch Panel precision Colour Display
- Active Band Monitor enables rapid band changes with LED illumination of the operating band
- Independent control of the Main and Sub Bands allows effortless operation for the serious contester needing to move quickly between the amateur bands High-Q VC Tuning Front-End
- Main tuning dial for Main and Sub Band frequency control includes an Outer Dial for clarifier, VC tuning, fine tuning or custom settings.

As you may recall, the name "101" comes from Yaesu's legendary, popular best-seller FT-101 series.

With all its strength & design power, YAESU produced this new HF transceiver to carry on the tradition of high quality known from the original 101 series. The new FTdx101D & MP will be certain to satisfy the variety of many amateur radio enthusiasts' demands.

As soon as pricing and availability is known we will update this advert.

*70MHz Output Power TBA