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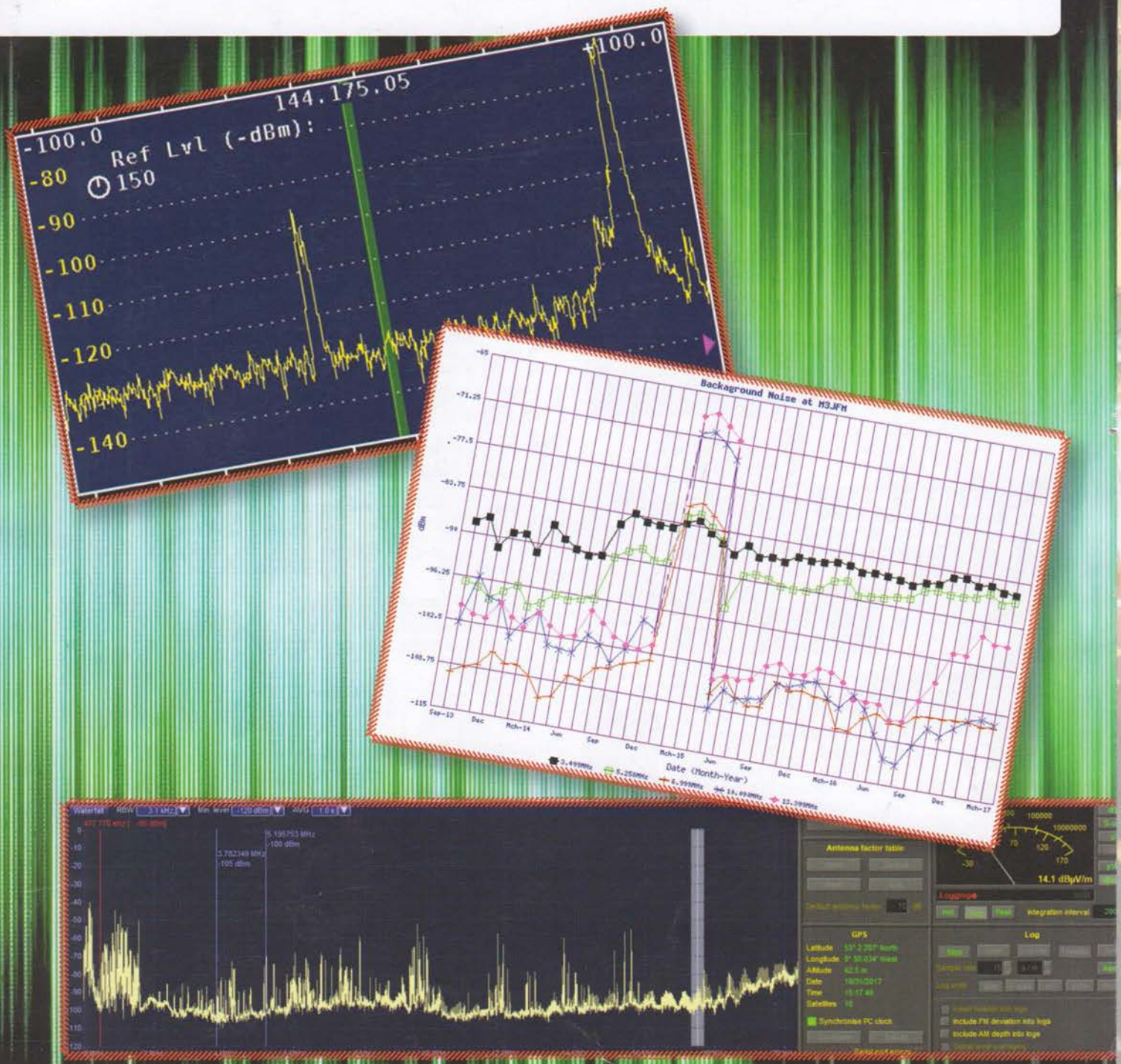

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NEW

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For more information with prices

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NEW PRODUCT

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- Smart Search Operation
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- Supply Voltage Display
- 4-level Display Dimmer
- Dual Watch

Supplied Accessories:
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Mobile Mounting Bracket (MMB-83)
DC Power Cord w/Fuse
Spare Fuse (25A)
Standing Foot

TWO NEW POWER SUPPLIES FROM NISSEI

NEW PRODUCT

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Each of these power supplies are available from stock at only £84.95, (non-metered) & £89.95 with.

Click!
www.HamRadio.co.uk/Nissei-PSU

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NEW PRODUCT

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NEW PRODUCT

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Beautiful DX Rig Covers from Prism – at ML&S. An ideal Christmas present

Prism Embroidery

NEW PRODUCT

YAESU FTDx3000
KENWOOD TS-590SG

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Bushcomm Horizon Loop 40/10. *Designed to be used portable or as a small space permanent set up.* ***£329.95.***

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- TM2 SuperPod Tripod
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- GB1 Go Bag
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All for only £229.95
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HUSTLER

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SG-7900		**£89.95**

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MX-610	HF/6+2+70 (for FT-8900)	**£69.95**
MX-2000	6/2/70 Triplexer	**£79.95**
MX-3000N	2/70/23 Triplexer	**£69.95**

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CX-210A	2-way, SO-239 Die Cast	**£46.95**
CX-210N	2-way, N-Type, Die Cast	**£54.95**
CX-310A	3-way, SO-239, Die Cast	**£59.95**
CX-310N	3-way, N-Type, Die Cast	**£89.95**

YAESU YA-30

The Yaesu YA-30 is very simple to use. Just open the box, roll out the antenna outside where you want to erect. Snap in the supplied spreaders, connect the high quality coax cable assembly (terminated with PL-259's so you don't even have to fit any plugs).
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R2010121	70LFA3 3 ele 4m beam	£84.95
R2010139	432LFA15 15 ele bea	£125.95
R2010251	ea270zb9 4/5 ele 2m/70cm beam	£74.95
R2010253	ea642zb7 2+2+3 ele 6m/4m/2m beam	£114.95

V/U Verticals

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R2010013	dbz40 double bazooka 7mhz wire antenna	£54.95
R2010048	ea1015204080dxs 5 band HF dipole	£119.95
R2010904	5 band cobweb 500W antenna	£284.95
R20109043	5 band cobweb 3kw antenna	£369.95
R2010050	ea101520dx dipole 3band HF dipole	£72.95

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DXE-UT-8213 ONLY £44.95!
This tool prepares RG-8, RG-213, 9913F7, LMR-400 (not LMR-400UF) and other similar size coax cable for installation of a PL-259 connector.

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100 W

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- High dynamic range and IP3 performance

HF/50 MHz Transceiver

FT DX 1200

100 W

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- Yaesu IF DSP provides powerful and effective QRM rejection
- 40MHz 1st IF produces excellent shape factor

YAESU
The radio

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Specifications subject to change without notice. Some accessories and/or options may only be standard in some areas. Check with your local Yaesu Dealer for specific details.

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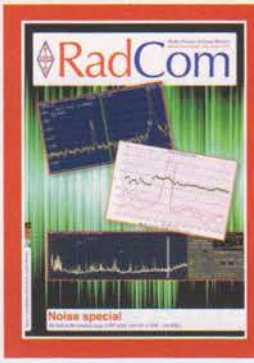

Cover image: Data gathered on noise in the HF and VHF bands, including that attributed to VDSL. Design Kevin Williams, M6CYB

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 February 2018 edition of *RadCom* is expected to arrive with most Members by 26 January 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.

The online *RadCom* is at www.rsgb.org/radcom/
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

The RSGB is on Twitter @theRSGB

Find us on Facebook at www.facebook.com/theRSGB

Strategy and the Spectrum

The recent RSGB Strategic review highlighted a number of priorities including Spectrum and closely related issues of Growth, Research and Participation.

One basic fact is that without spectrum there would be no amateur radio. The RSGB Spectrum Forum is unusual in its extensive range of participants from both inside the Society and external specialist groups (www.rsgb.org/spectrum-forum). These include experts from HF to microwave enthusiasts and collectively represent a very wide cross-section of the hobby. Overall we take a broad outlook as we recognise there are aspects around Spectrum Access, Developments, Usage and Protection. These range from frequency allocations, licensing and band plans, via new technologies and modes, to EMC, background noise and a host of Ofcom and international matters. Our annual meeting generates a large collection of reports – the 2017 meeting proceedings have just been published and provide a snapshot on amateur radio activity, emerging trends, band plans, EMC, the recent IARU Region 1 Conference and the forthcoming World Radio Conference in 2019 (WRC-19).

Activities in 2017 included a record effort at the IARU Conference, as well as participation in CEPT preparatory meetings for WRC-19. The agenda includes the goal of 50MHz harmonisation and the innovations we plan for it whilst trying avoid the setbacks we saw with 5MHz and other threats. On the home front we also continue to facilitate innovation via a range of NoVs for additional frequencies at VHF and microwaves. At a more basic level in 2017 we released illustrated licensing guidance to assist users and trainees and plan to expand this further in 2018. With only a few Spectrum Managers, we are grateful to the wide range of groups and volunteers who work with us on all this.

"The RSGB Spectrum Forum is unusual in its wide and extensive range of participants from specialist groups"

Looking ahead, one of our challenges is participation levels (sometimes termed spectrum occupancy) – spectrum is a valuable resource and we need to demonstrate that we are using it actively. We keep a close eye on licence numbers and band occupancy data, as do the Regulators. The old adage of 'use it or lose it' applies to the spectrum we have allocated to us and the Spectrum Forum continues to look at ways to increase amateur activity, particularly at VHF, UHF and microwave.

The Society's goal for 2022 is to continue to have an active and thriving community. The Spectrum Forum is working hard on a variety of issues throughout the year but we all have a responsibility to our hobby and the next generation. I wish you all the best for 2018 but do please keep an open mind and be prepared to support your hobby – it needs you!

Murray Niman, G6JYB
Chairman, Spectrum Forum

ETCC Chair vacancy

The Emerging Technology Coordination Committee (ETCC) develops and enhances the UK amateur radio repeater and data communications systems and promotes the introduction and rollout of appropriate new technologies. This committee performs a key role in the enjoyment of amateur radio by large numbers of RSGB Members. After many years of service to the society as the Chair of the ETCC, John McCullagh, GI4BWM, has decided that it is now time to retire from this role.

The position of Chair of the ETCC Committee is offered for an initial period of up to three years. RSGB Members who wish to be considered for appointment to this important role should write to Steve Thomas, M1ACB, General Manager via email to gm.dept@rsgb.org.uk providing details of their amateur radio and other relevant experience.

MX0RYC allocated once again

The RSGB Youth Committee is delighted to have the callsign MX0RYC re-allocated by Ofcom. This callsign was used during the youth DXpedition to Wales in 2015. It will be used by the Youth Committee for their outreach activities. You can follow what they do on twitter @theRSGByouth.

Regional and Board elections 2018

This is the time of year when we call for volunteers to step forward for election at the RSGB's 2018 AGM.

The 2018 AGM will take place at the Jurys Inn in Birmingham (245 Broad St, Birmingham B1 2HQ) on 21 April 2018.

As the Board Chair and past Chair outlined on page 6 of the November 2017 *RadCom*, the Society is run primarily by its Members and we need volunteers who are willing and able to give their time and enthusiasm to keep the wheels turning.

In 2018 we will be looking to appoint a new President, two elected Board Directors, two nominated Board Directors and two Regional Managers.

The vacancy for President is because Nick Henwood, G3RWF will have completed his two-year term of office.

The Board vacancies are as a result of Graham Murchie, G4FSG standing down as a Nominated Director, Sara McGarvey, 2I0SSW standing down as Elected Director and Alan Messenger, G0TLK, coming to the end of his three year terms as an Elected Director – Graham and Sara are not seeking re-election.

The following Regional Manager vacancies also arise due to the end of the current post holders completing their three year terms, or because they were co-opted into a vacancy after the last AGM;

Region 1 – Scotland South and the Western Isles (Anthony Miles, MM0TMZ is currently co-opted and is willing to continue).

Region 11 – South West England and the Channel Islands (Pam Helliwell, G7SME is the current RM but is not seeking re-election).

Nominations for President require 25 nominations from RSGB Members of which five must come from the RSGB Leadership Team and from at least 3 Regions. Nominations for elected Board Directors and Regional Managers require the support of 10 Members.

Nominations for the Regional Manager vacancies must come from Members who reside in the relevant Region.

Further information about the election vacancies, together with nomination forms, are available on the Election page or can be obtained by post from the General Manager at RSGB HQ (3 Abbey Court, Priory Business Park, Fraser Road, Bedford MK44 3WH).

Candidates need to download, complete and post their candidate forms to the Company Secretary via HQ (an email copy is also helpful).

Nominators – nominations can now be submitted online via the Members' section of the RSGB website at http://rsgb.org/nominations

Completed papers, with their supporting nominations, must be received by 2359 hours on 31 January 2018.

Nominated Directors are recommended to the Board by the Nominations Committee and approved by the Membership at the AGM. The AGM will be asked to endorse Phillip Willis, M0PHI to fill one of the two Nominated Director vacancies – Philip is current serving as a co-opted Director and the AGM will be asked to formally endorse him as a Nominated Director.

The Nominations Committee are currently looking for suitably qualified and experienced candidates to join the Board and would particularly like to see Members coming forward with marketing/promotional skills and/or those who can help to enrich the gender/ethnic diversity of the current Board.

Those elected will also help to take the Society forward to 2022 with a revised strategy, which was launched at the 2017 AGM.

Volunteers are not paid but out-of-pocket expenses are covered.

If we do not get volunteers, we will either need to reduce services or increase subscriptions to pay for additional staff.

If anyone has any questions about the elections or would like to discuss the roles, please contact the President, Nick Henwood, G3RWF for the President vacancy via email to president@rsgb.org.uk, or Board Chair, Graham Murchie, G4FSG, for the Director vacancies, via email to g4fsg@rsgb.org.uk, or Ian Douglas, RM4, for the Regional Manager vacancies, via rm4@rsgb.org.uk. General enquires can be made to the RSGB Company Secretary Stephen Purser, GW4SHF via company.secretary@rsgb.org.uk

Stephen Purser, GW4SHF
Company Secretary

AROS Coordinator vacancy

The Amateur Radio Observation Service (AROS) is the RSGB's confidential advisory and reporting service. It is intended to assist radio amateurs and others who may be affected by problems that occur within the amateur bands or that develop on other frequencies as a result of amateur transmissions.

The AROS Coordinator runs a team of volunteer observers and liaises with Ofcom's enforcement team. They also oversee Intruder Watch, the RSGB's Monitoring System.

The current coordinator, Mark Jones, G0MGX is stepping down from the role after several years' invaluable service. The RSGB is looking for a volunteer, who must be an RSGB Member, to fill the vacancy. The role requires patience and tact, as well as managing the coordination of the team of AROS volunteers.

To find out more about the role or to apply, please send details of your amateur radio experience to RSGB Board Director Philip Willis, M0PHI by email to m0phi@rsgb.org.uk

Further information about the Amateur Radio Observation Service can be found on the RSGB's website at www.rsgb.org/aros

New HF Champs rules

The new rules for the 2018 HF Championship are now available on the HF Contest Committee website. Starting in January, all RSGB UK & CD members are valid entrants and are entered automatically by callsign in the 10 contests listed, starting with the 80/40m AFS contests in January.

The HF Championship is not a contest in its own right, rather it requires participation in a number of HF events during the year, with the results considered together. No entry is necessary; a running score will be tabulated after each qualifying contest.

The callsign used can be yours or a Short Contest Call or club call provided you register as the operator. Note that in 2018 the AFS contests include for the first time a data mode event and will now be split into Local and General categories, and the distance range has been expanded to 50 miles from the meeting point for Local clubs. This range also now applies to the 80m monthly CC's rules.

Arkwright Scholarships

The Arkwright Scholarships Trust has conducted its annual award of prestigious Scholarships to future leaders of the engineering profession. 425 sixth form Scholarships have been awarded this year at Ceremonies in London and Edinburgh. Arkwright Engineering Scholarships act as a beacon to the most talented STEM (Science, Technology, Engineering and Maths) students in UK schools and help to ensure that high potential young people stay engaged in the engineering careers pipeline, in the critical 16 to 18 age range. The Scholarships are supported by more than 200 different sponsoring organisations: including the Radio Communications Foundation, which is a Registered Charity set up by, but independent from, the Radio Society of Great Britain. Should you wish to donate to the work of the RCF, please go to http://commsfoundation.org/how-to-donate/

The three Arkwright students sponsored by the RCF are:

Tim Hare: Tim is studying A level Maths, Physics, Chemistry and Product Design at the City of Norwich School and has demonstrated a passion for engineering, science and computing as a licenced radio amateur (callsign M6HTJ) and a keen electronics hobbyist. In addition his radio licence and connection to the Norfolk ARC allowed him the privilege of being the first to establish contact with Tim Peake during City of Norwich School's live link up with the International Space Station in 2016.

Luke Andrews: Luke is currently studying to A2, Maths, Further Maths, Physics, Chemistry plus an Engineering EPQ at St Paul's School, London. He has experience in software defined radio, low power WANs and Wi-Fi development kits and environments as well as RF electronics, engineering and basic antenna and propagation theory. He is keen to gain his amateur radio licence and is booked to sit his Foundation exam on 2 December.

Martin Radulov: Martin is studying A levels at Dartford Grammar School. He is an all-rounder who is very keen on radio engineering and shows good competence in electronics. He is considering University study at either Cambridge or Southampton looking at courses that lead to a Masters in Electronic Engineering. He passed the Foundation, Intermediate and Advanced exams in a single year and now operates as MORYM. Martin cites representing the UK at the international Youngsters on the Air event in August 2017 as one of his biggest achievements to date.

Broadband HF noise investigations

There is a growing problem with wide spectrum HF noise radiated from phone lines carrying VDSL2 Broadband Services. Despite the mandatory requirement for VDSL2 equipment to support the protection of amateur bands (see ITU-T G.993.2) they are not notched in the UK.

Most amateurs suffering from VDSL2 interference will not be aware of it. It is a fact that the more efficient a communications system is the more it appears to be just broad spectrum white noise. This white noise masks weaker amateur HF signals.

Radiation from broadband telephone lines causes interference with other services including VDSL2 on other nearby phone lines. To combat this VDSL2 equipment uses a system called vectoring to cancel out this crosstalk and reduce data errors. Unfortunately, no such effort is made to mitigate against radiation into amateur radio antennas and Ofcom appears unwilling to intervene in this matter.

Given this unfortunate situation, some members of the RSGB EMCC have started a project, with RSGB Legacy Fund backing. The current work is to research and develop RF digital signal processing techniques that will identify the presence of VDSL RFI even among other masking signals and background noise. The first stage of this to analyse the signal to VDSL2 noise level (SVNL) has been achieved. This is currently being used to measure the files recorded and submitted by numerous RSGB Members in the VDSL survey – many thanks to all who helped.

This is another example of the RSGB's Legacy Fund being used to further amateur radio. There is Information on the RSGB website that has been updated recently, with a link to specific guidance for anyone thinking of applying (https://thersgb.org/publications/committees/legacy/legacy-fund-guidelines.pdf). The Legacy Committee is always pleased to receive proposals. Steve Hartley, G0FUW takes over as Legacy Committee Chair in the New Year.

Dates for your diary – 2018 Hamfest & Convention

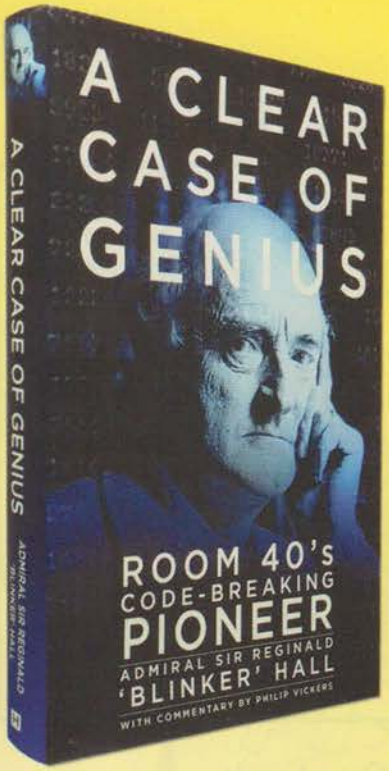
The National Hamfest will take place at the Newark & Nottingham Showground, Lincoln Road, Winthorpe, Newark NG24 2NY on 28 and 29 September 2018. It is organised by the Lincoln Short Wave Club in association with the RSGB.

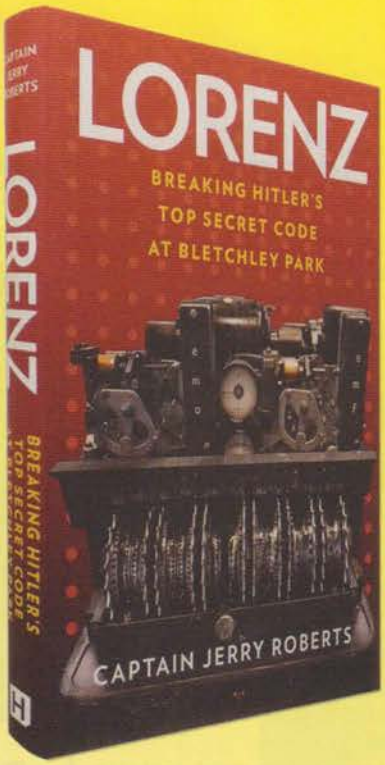
The RSGB Convention will be held Kents Hill Park Training and Conference Centre, Timbold Drive, Milton Keynes MK7 6BZ on 12 to 14 October 2018. The Convention is, once again, sponsored by Martin Lynch and Sons, whom the RSGB would like to thank for their continued support.

'Breaking the mould' – clubs (or virtual clubs) for the future

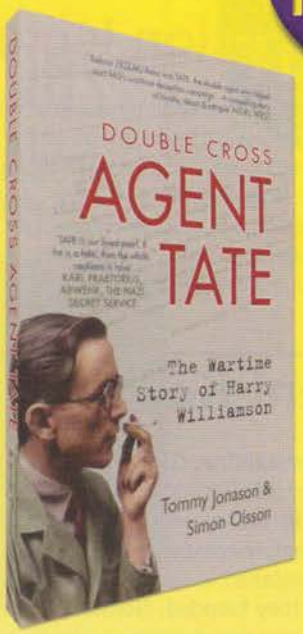
'Breaking the mould' was the topic of an RSGB Convention presentation by RSGB President Nick Henwood, G3RWF, followed by a very positive discussion. It showed that there are certainly many new ideas about different ways of organising groups to excite and develop enthusiasm – more than most of us would have believed! The video of Nick's presentation is on the RSGB website at www.rsgb.org/strategy-videos and should be useful if used to promote discussion.

To take things further, it has been decided to invite those with new ideas (or a successful slant on old ones) to showcase them on a new RSGB web page. We want to provide lively information about really good ways to 'break the mould'. Initially some invitations to contribute will be sent out and others will be very welcome to contribute as things gather momentum. Please join in and help us all to learn how to do things differently.





NEW TITLES



A Clear Case of Genius

Room 40's Code-breaking Pioneer

By Admiral Sir Reginald 'Blinker' Hall

In 1933, the Admiralty banned 'Blinker' Hall from publishing his autobiography, but here, for the first time, *A Clear Case of Genius* presents his story.

You can now read what the renowned spymaster had to say about the British Naval Intelligence. He explores the function of secret intelligence in wartime, censorship and subterfuge. He even writes about the significance of Churchill in the disastrous Dardanelles (Gallipoli) campaign. There is much about the famous Zimmermann Telegram and its perhaps pivotal role in the USA's entry to the First World War. 'Blinker' Hall was clearly at the centre of the code breaking in WWI and *A Clear Case of Genius* portrays the inner workings and successes of Room 40.

A Clear Case of Genius provides a unique insight into the thinking of one of Britain's pioneering intelligence leaders and a fascinating insight into code breaking before Bletchley Park.

Size 164x242mm, 224 pages
ISBN: 9780750982658
Non Members: £20.00
RSGB Members: £14.99 (25% off)

Lorenz

Breaking Hitler's Top Secret Code at Bletchley Park

By Jerry Roberts

Few know the story of the breaking of a German cipher machine, used by Hitler himself to convey messages to his top generals in the field. A machine more complex and secure than Enigma - a machine called 'Lorenz'.

For sixty years, no one knew about Lorenz or 'Tunny', or the determined group of men who finally broke the code. During the war Bletchley Park broke around 64,000 Lorenz encoded messages. The information in these was used to alter the course of WWII. Information for example was passed to the Russians warning of the German offensive at Kursk that allowed a Russian build up that completely altered the potential outcome of the Battle of Kursk. Here, for the first time, senior codebreaker Captain Jerry Roberts tells the complete story of this extraordinary feat of intellect and of his struggle to get his wartime colleagues the recognition they deserve.

Lorenz provides an insight into the codebreaking carried out at Bletchley Park and is thoroughly recommended reading.

Size: 164x242mm, 240 pages
ISBN: 9780750978859
Non Members: £20.00
RSGB Members: £11.99 (40% off)

Double Cross - Agent TATE

The Wartime Story of Harry Williamson

By Tommy Jonason & Simon Olsson

Double Cross- Agent Tate details the Second World War career of the longest serving double agent in the Double Cross system, Harry Williamson. Harry operated from September 1940 to the end of war after initially being parachuted into England by the Nazi secret service, the Abwehr. He was quickly caught and taken to Camp 020 for interrogation by the team led by the famous Colonel 'Tin-Eye' Stephens. He eventually agreed to work as a double agent with the cover name TATE and went on to send more than a thousand messages during the war for the Double Cross organisation, whose aim was to supply disinformation to the Nazi regime.

Harry took part in the famous D-Day deception, provided the Nazis with misinformation about the damage caused by the V1 and V2 rockets and misled the German Navy with faulty intelligence over U-boat minefields, critical to the success of British convoys. After the war he settled in Watford and worked as a photographer. He was almost completely anonymous (although still protected by MI5), partly through fear of revenge, until his name was revealed in the 1990s.

Size 124x198mm, 274 pages
ISBN: 9781 4456 0864 8
Non Members: £10.99
RSGB Members: £7.69 (30% off)

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

Convention lecture vidoes

The RSGB has just released three more RSGB Convention 2017 lectures that link with RSGB Strategy – you'll find them all on the video portal www.rsgb.org/strategy-videos

- Board Director Steve Hartley, G0FUW explains more about the Strategy itself
- President Nick Henwood, G3RWF gives a progress report on the "Breaking the mould – clubs and groups for the 21st Century" project
- Youth Committee Deputy Chair Milo Noblet, M0ILO provides a summary of the successful YOTA 2017 event and a brief look at how we will be building on it.

Silent Key

Lynne Constantine, G6CQG passed away during the night of the 19th-20th November 2017 after a long battle with cancer.

Early in her career she was the regional Post Office sales manager for Storno Radiotelephones and one of the very first people in the UK to have *two* phones installed in her car. In the early 1980s, together with her husband Richard, they founded, Northern Communications.

The company developed significant mail-order amateur radio business and Yaesu dealership. It was, for some time, the main importer of Cushcraft Antennas and distributed its own range of small towers, VHF/UHF antennas scanners and accessories. The company diversified into private mobile radio and expanded to become the regional installation and service centre for Vodafone, later moving into the emerging mobile telematics industry. For the last ten years Lynne was one half of the of the RSGB's QSL Bureau team and will be sadly missed.

Lynne is survived by husband Richard, G3UGF, son Matthew, 2E1BOO and daughter Emma, 2E1BVJ. The thoughts of all at the RSGB are with her family at this time.

Another licensed Arkwright student

Following a successful session on Saturday 2 December at the Cambridge Wireless Society with Martin Atherton, G3ZAY, Luke Andrews, one of this year's RCF Arkwright Trust scholars received an indicative pass for his Foundation exam. All being well this will mean the RCF is sponsoring three radio amateurs this year under the Arkwright Trust scheme: Luke, Martin Radulov, M0RYM and Tim Hare, M6HTJ.

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 F Pilkington	EA7FSF
Mr G Bagley	G3FHL
Mr E C Lambert	G3FKI

60 years

Mr H J Benjamin	G3MNB
Mr D Bemister	G3OBX
Mr R P Welch	G3OFX
Mr J Sleight	G3OJI

50 years

Mr P Eaton	G0MBY
Mr J M Brown	G0PIA
Mr C R Davies	G3JAU
Mr C J Squires	G3XCS
Mr D I Field	G3XTT

RSGB Contest Committee – Hall of Fame

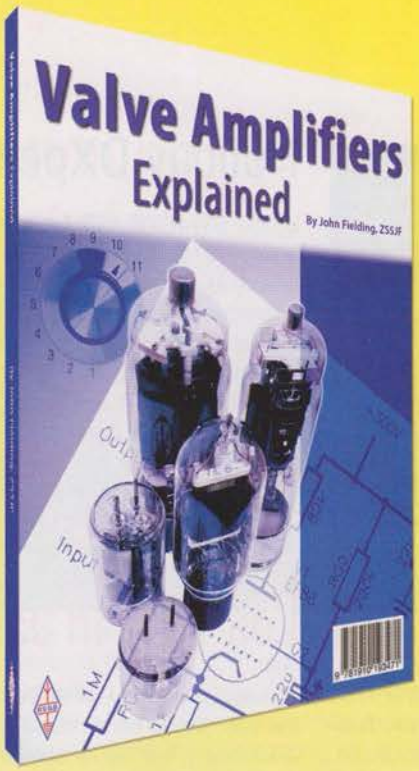
Over the past few years, various members of the Contest Support Committee have been involved in producing a definitive list of past winners of the contest trophies. This has required several visits to RSGB HQ to inspect the trophies (there are over 100 of them) and going through the archives of the *Bulletin* and *RadCom* (back to 1935!) to try and find information where it was missing, illegible or the trophy was not available. This information is now available at www.rsgbcc.org/cgi-bin/trophies.pl. Please visit these pages and, if you have won a trophy in the past and the information is missing or incorrect, do let us know. You can contact Jacqui, G6XSY (RSGBCC Trophy Administrator) via email to trophies@rsgbcc.org

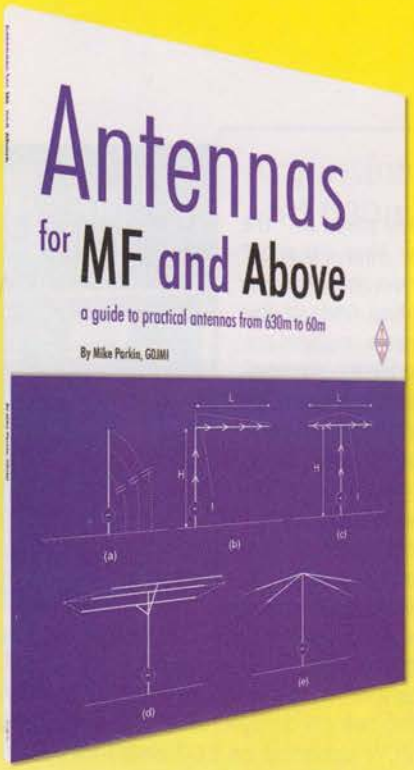
The RSGB would like to welcome to the RSGB family the following new Members who have joined their voice to ours and are helping to keep the RSGB strong.

Miss H Talbot, 2OEFW
Mr T Ward, 2E0HYK
Mr K Fikri, 9M2KF
Mr J Hoffmann, DC7IA
Mr J Llado Sabater, EC6PG
Mr A P Guest, G0MSP
Mr C Rayns, G0WUS
Mr B Abell, G1SKV
Dr M Holli, G4OPQ
Mr A Cartwright, G6ABF
Mr J Weston, G7EFN
Mr T White, G7KLM
Mr T Coates, G7LVO
Mr P Hayes, G8FRJ
Mr B Mainwaring, G8GMT
Mr G Beadle, G8UBF
Mr S Raynes, GJ7DUX
Mr H Robertson, GM3RQQ
Mr T Egloff, HB9FKF
Mr L Wilkes, K0SDG
Mr W Overstreet, K4AJ
Mr P W Racine, KB0P
Mr M Hooker, KD2OCZ
Mr S Nafziger, KF4BY
Mr F Bohner, KM4UWW
Mr N Heyne, M0EDQ
Mr J Bednarek, M0IIO
Mr J Sheath, M0KBI
Mr M Cerveny, M0KBW
Mr M Marshall, M1MOW
Mrs T Douglas, M3TNI
Mr C Weal, M6BGR
Mr N Connor, M6CUE
Mr A C Sirrell , M6IWD
Mr D Richards, M6KSF
Mr F Keane, M6KUQ
Mr T Canning, M6KXN
Mr C Wooldridge, M6KXP
Miss O Dawkins, M6KZW
Mr J Bogdaniek, M6LJF
Dr M Fox, M6LNF
Mr M Edge, M6OME
Mr G Hudson, M6TYZ
Mr E Martin, M6UYF
Mr P Roche, M6VBO
Mr E Vrentzos, M6VRE
Mr L Robertson, M6XCL
Mr A Downs, M6XFC
Mr B Watson, M6YBK
Mr C Peters, M6YIT
Mrs L Scott, MI3RIL
Mr H McAllister, MI6NIM
Mr J Downing, MI6XGZ
Mr M Hodgson, MM6KVE
Mr T Yates, MM6TFY
Mr V Yadh, MW6VNY
Mr R Hajdak, N8QE
Mr I Jones, RS208411
Mr A Chapman, RS212343
Mr P Rayward, RS314152
Suffolk RED, RS314768
Mr T Stadler, RS314797
Mr R Kidwell, RS314798
Mr M Angus, RS314806
Mr B Wheare, RS314820
Mr V P Montague, RS314821
Mr J Hughes, RS314830
Mr M Concannon, RS314884
Mr N D Mantle, RS314945
Mr G Norbury, RS314992
RAF Halton RS, RS315026
Mr J Sanders, RS315027
Miss S Dempster, RS315064
Mr J Griffiths, RS315151
Mr D Reason, RS315153
Mr. J Homersham, RS315203
Mr U Helin, SM0IHZ
Mr D Dorward, VA3DDN
Mrs C M Comeau, VA3WTZ
Mr J Tregellas, VK5YL
Mr R Ross, W1HJT
Mr L Ford, W6AER
Mr G Schumacher, W7GGS
Mr J G Britton, ZL3ET

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

Mr R Overy, 2E0ERD
Mr M Bennett-Blacklock, 2E0ESC
Mr D J Mathewson, 2E0IOG
Mrs C Mathewson, 2E0MTC
Mr N Palin, 2E0NKP
Mr C Carter, 2E1FQE
Mr P A Woodward, 2E1PAW
Mr P R Draycott, G0OXB
Mr M A Lane, G0TMP
Mr W Chadwick, G1IBS
Mr J W Connor, G1OQV
Mr D M Tucker, G1SEA
Dr D Gordon-Smith, G3UUR
Mr R Calver, G4JGX
Mr K Johnson, G4SVN
Mr N Lee, G4WKY
Mr S Wolf, G4WPD
Mr GJ Platts, G4XOF
Mr A R Hale, G4ZKT
Mr J Hartnell, G6YWX
Mr J R F Smith, G7NTG
Mr N Larsen, G7RXO
Mr D Patrick, G8KAP
Mr D A Rees, GW1LFN
Mr M Bromley, M0CLM
Mr C Street, M0PGE
Mr M C Kitt, M0WZM
Mr K T Allen, M1EUQ
Mr J Degnan, M3BSQ
Mr A Clarke, M3DSI
Mr A G Woodsford, M3LHX
Mr P M Denehy, M3MPT
Mr A Brown, M6AFB
Mr R J Scott, MI5RJS
Mr E Newman, N4GNO
Mr J A Melcher Jr, N8JUC
Mr M Hibbins, RS307360
Mr D G Jones, WA7ZZI





NEW TITLES

Valve Amplifiers Explained

By John Fielding, ZS5JF

This is for everyone who uses – or is considering using – an HF or VHF linear amplifier. Some amateurs may be of the opinion that valves are an obsolete technology and semiconductors are a better way, John Fielding thinks otherwise! After reading this book you will be under no illusions that, in his opinion, valves are far superior to semiconductor devices for most linear amplifier applications.

The author guides the reader through the choice of valves for various purposes. *Valve Amplifiers Explained* starts with a chapter on basic valve theory and explains how to interpret valve characteristic curves. The various classes of operation of amplifiers – Class A, Class B, Class AB1, Class AB2 and Class C – are all covered in detail. The relative merits of grounded cathode and grounded grid amplifiers are discussed and a chapter is devoted to the causes of distortion in valve amplifiers – and how to avoid such distortion. The author explains that linearity is primarily a function of the power dissipation of the device and the supply voltage and he devotes a whole chapter to good power supply design. The various protection circuits that an amplifier should have are also covered. A chapter is devoted specifically to the design of VHF RF power amplifiers. Another chapter even discusses liquid cooling of valve amplifiers.

As John says, "There is a certain aura about valve equipment. The glowing filaments and the gentle buzz of a high voltage power supply are a sort of magic few have had the pleasure of knowing." After reading *Valve Amplifiers Explained* you will want to join that elite few!

Size: 174x240mm, 200 pages
ISBN: 97819101 9347 1
Non Members' Price: £14.99
RSGB Members' Price: £12.74

Also available on amazonkindle

Antennas for MF and Above

By Mike Parkin, G0JMI

Written by *RadCom* antenna guru Mike Parkin, this is a book that provides exactly what is says on the cover. *Antennas for MF and Above* is a practical guide to antennas for the relatively new 630m band, 160m, 80m and equally new 60m band.

This book is aimed at the constructor, or those who are curious to understand in further detail the theoretical aspects of the antenna techniques used on these bands. Rather than concentrating on single bands, Mike shows how you can often use the same approach or even the same antenna to work two or more bands. There are examples of how a 160m antenna can be pressed into service on 630m or even 80m ones that can be made to work on 160 and 60m. There are also specialised chapters covering, for example, antennas for 630m.

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

If you are interested in experimenting with the bands below 40m, you are sure to find much to interest you in this book. *Antennas for MF and Above* is without doubt one of amateur radio's standard reference works and THE practical guide for everyone interested in antennas for the amateur bands from 630m to 60m.

Size 174x240mm, 112 pages
ISBN: 9781 9101 9346 4
Non Members' £11.99
RSGB Members' £10.19

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KW days

The annual KW Days takes place on the first weekend after the New Year – 6 and 7 January. Every year it grows in popularity as more attic, barn and shed finds of this iconic line of British made equipment, including legendary Vanguards, Viceroys, Vespas and KW2000 series transceivers are restored. The KW company was founded on 5 January 1953 by Roly Shears, G8KW (SK). GB8KW will be operated by Cray Valley ARS and Sutherland Radio Club will be active as GB2KW in Scotland. Last year there were 50+ KW stations on the air.

The most popular transceiver of all, the KW2000B, with the very rare 2 tone SSB PEP meter. Courtesy G3UGF.

The KW Yahoo group would love to hear from clubs planning similar activities in other regions of the UK and from those overseas (https://groups.yahoo.com/group/KW_Radios).

Daytime SSB activity centres will be on 7.177 or 3.777MHz and 14.277MHz (KW77) as conditions permit. Operators are encouraged to use KW gear on other bands, so if you hear some AM on 1.977 or MCW operating on 160 or 80 metres at night, don't be surprised. AM/ CW activity will be on the VMARS net channels (see www.vmars.org.uk).

School talk

Glyn, GW0ANA (Region 7 RM) gave a talk on Marconi and basic radio theory, ending with a live demo of radio to a small section of 11 year olds at the Welsh School in Barry. They managed a few QSOs around Europe, which really impressed the students. Glyn says he enjoyed the day and the students had fun.

Holiday DXpedition

Brian, GW4DVB will be operating a small holiday DXpedition in January 2018 to Palm Island (aka Prune Island) in St Vincent and the Grenadines (IOTA reference NA-025). Using the callsign J88PI he will operate from 21 to 28 January using an FT-991A with 100W into a 10m vertical on the 40, 20, 17, 15 and 10m bands. QSL direct only (PO Box 20:20, Llanharan, Pontyclun, Wales CF72 9ZA). More at www.g4dvb.co.uk/

Advanced Distance Learning in January

The next Advanced Distance Learning run by the Bath-based team course is due to start on 26 January, aiming for an exam in early July. The course has been running for six years now and over 500 students have passed following the distance learning. The average exam pass rate is 85% for students who have completed the course. The course is free but students must provide their own textbook, calculator and arrange their own exam when the time comes. Guidance is provided by the course team. A £30 deposit is required to secure a place on the course and the deposit is refunded to those who see the course through. Deposits from students who did not complete the course, and generous donations from students who did, have so far raised over ten thousand pounds for charities like the RCF, Wireless for the Blind and RAIBC.

Depending on the forthcoming syllabus changes this may be the last of these courses under the current arrangements.

Places are limited in number and the last three courses have been full well before the start date. So, if you are interested in joining, contact Steve, G0FUW via e-mail to g0fuw@tiscali.co.uk

Newbury Radio Rally

Newbury and District ARS has changed the date of the 2018 Newbury Rally. It will be held at the Royal Berkshire Showground on Sunday 24 June, which is a week later than usual. Gates will open to sellers at 8am and to the public at 9am. The organisers hope the move away from Father's Day will allow yet more interested parties to attend. For further information please email NewburyRally@nadars.org.uk or go to www.nadars.org.uk

Scottish Microwave Roundtable

The Scottish Microwave Roundtable took place on 3 November at the Museum of Communication, Burntisland. During a break in the lectures, the judging of the entries for the GM4LBV Projects Trophy took place by John, G4BAO and Andy, MM0FMF. After much deliberation the judges chose the 13cm signal analyser by Kevin, G3AAF. More details at www.gmroundtable.org.uk/gmrt-2017-report

Air Cadets on the air

Recently, two cadets from the 106 Air Cadet Squadron based in Grays celebrated when they passed their amateur radio exam. The cadets had been studing via the Essex Ham online training course. Once they had completed this course they then attended a training day before taking the exam in the evening. During this practical session, one cadet had quite a surprise as after she had spoken into the microphone an amateur located in America responded. The picture shows (L –R) Lt Cmdr R James (RNR) who acted at the invigilator during the exam presenting the pass certificate to Cadet Lee and Cadet Mayes is seen receiving his pass certificate from Flt Lt Mark Jones RAFVR officer commanding the 106 Squadron. Both Lt Cmdr James and Flt Lt Jones commented on how hard the cadets had worked to achieve their pass certificate and they looked forward to seeing them talking on the squadron radio station, which is currently being set up at the squadron HQ. Should anyone wish to know more about amateur radio or the Air Training Corp please contact 106.oc@aircadets.org

Aloha from Hawaii

A birthday party took place on 8 November near Pearl Harbor and some well known KH6 DXers attended. Going from left to right around the table (anti-clockwise) the lady at the front of the photo in red is Joan, the wife of K1ER, who both live in Hawaii and John, K1ER is to the right. Leaning forward is Jim, AH6OY, then Ray, WH6ASW, Marge and Robyn Ray's wife and daughter, Lita, WH6BUJ, husband Randy, KH6IB, birthday boy Keith, KH6ZU/G3SZU/M4X, his long-suffering wife Barbara, Mary and husband Bill, KH6OO, Jim, WH6Q, Dan, KH6P and Tets, AH7C.

Jersey Serves Fair

Peter, GJ8PVL (RSGB Deputy Regional Manager & Jersey RAYNET Controller), Nigel, GJ7LJJ and Simon, GJ4ODX recently promoted amateur radio and RAYNET at the Jersey College for Girls 'Jersey Serves' Fair that 30 local charities attended. School pupils, teachers and other charity representatives were given demonstrations of amateur radio, including voice, Morse and data, with a RAYNET slant, over a period of two days. The response was very favourable and useful connections were made with other local organisations.

Argentina gets 60m and 630m

The Radio Club Argentino has succeeded with its petition to their local communications authorities, having gained new privileges to the 630m and 60m and the extension of existing allocations at 160m, 80m and 30m. The new allocations are the final result of efforts made by the RCA during its participation in the preparatory meetings of WRC '07, '12 and '15; and will be effective early in 2018. The new allocations are 472 – 479kHz and 5351.5 – 5366.5kHz. With extended allocations of 1800 – 2000kHz, 3500 – 4000kHz and 10100 – 10150kHz.

Radio Amateur Old Timers' Association

The Radio Amateur Old Timers' Association (RAOTA) is celebrating its Diamond Jubilee in 2018. To commemorate this a tiered Diamond Jubilee award and a competition for authors in their magazine *OTN* has been planned. Details of both the award and the author's competition will appear on the website www.RAOTA.org Anyone who has an active interest in amateur radio is welcome to become either a full or associate member of RAOTA. See their website for more information.

GHz Bands Digifest

There is an initiative to grow activity on digital modes on the bands above 1GHz. On Wednesday evening operators gather on the ON4KST chat and around 1296.165MHz to experiment with digital modes and aircraft scatter. It's not a contest, there are no rules, just a gathering to have fun. Drop a line to the GHz Bands columnist if you want to take part, via email to john@g4bao.com

Special event stations

Celebrating the valve equipment produced by KW Electronics Ltd of Dartford Kent, GB2KW will be active between 1 and 28 January. Run by members of the Sutherland & District ARC, they will be operating from near Invergordon, Scotland. GB2KW operators will be using a KW2000, a KW2000A, a KW Atlanta, a KW1000 linear and a KW Viceroy Mk.II TX / KW77 RX combination, mainly on 160m to 20m SSB, with some CW. All QSOs with GB2KW will be confirmed electronically only on Club Log and the ARRL's Logbook of The World. GB2RAF, the Permanent Special Event Station at RAF Neatishead Air Defence Radar Museum, Horning, Norfolk NR12 8YB will be off the air until 14 April. This is due to the Museum closure for its winter break.

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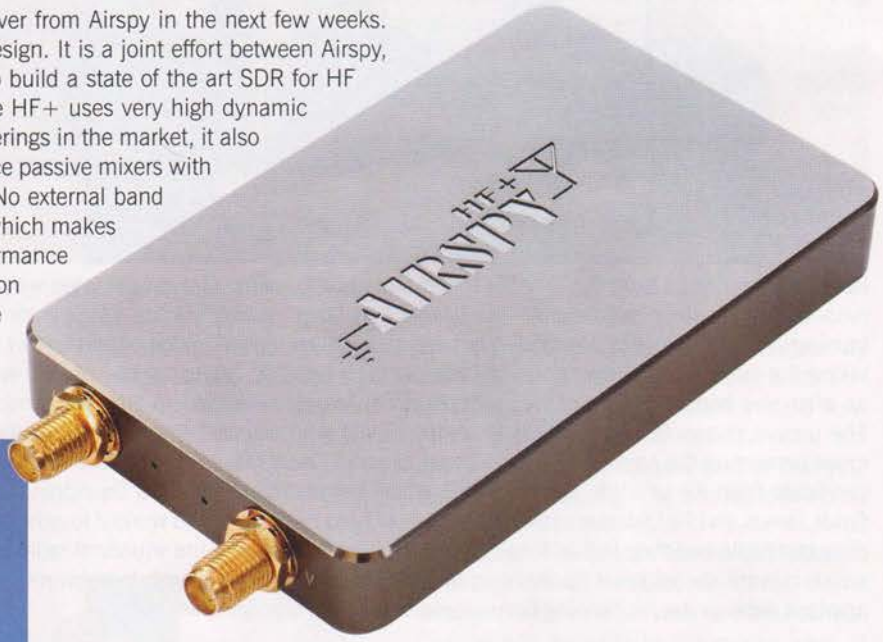
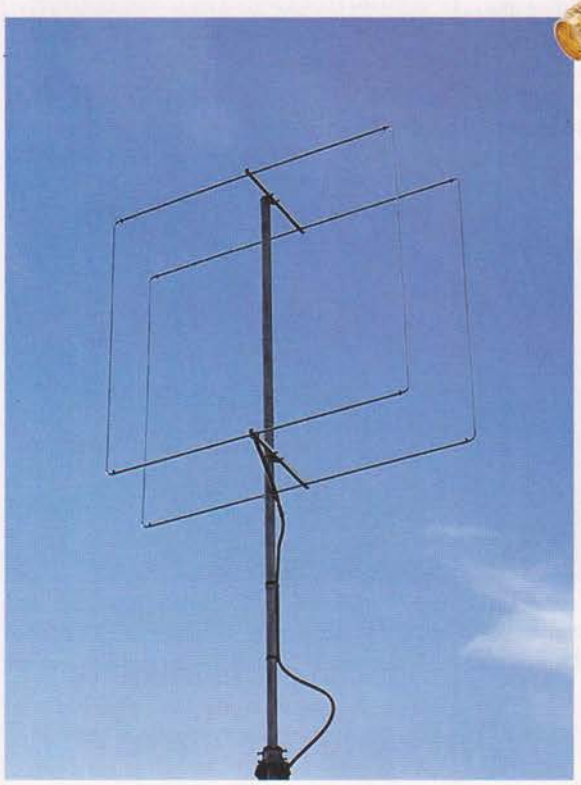
radcom@rsgb.org.uk

New Products

Airspy HF +

Moonraker UK Ltd will be shipping the new HF receiver from Airspy in the next few weeks. It is a paradigm shift in high performance HF radio design. It is a joint effort between Airspy, Itead Studio and a top-tier semiconductor company to build a state of the art SDR for HF and VHF bands. Like most high-end HF receivers, the HF+ uses very high dynamic range ADCs and front ends. But, unlike the current offerings in the market, it also brings more frequency agility by using high performance passive mixers with an excellent polyphase harmonic rejection structure. No external band filters are required like other lower end HF receivers, which makes it the ideal companion for light portable high performance operation. Both the architecture and level of integration achieved in this design brings top performance reception priced at £229.96.
Full details from www.moonraker.eu





Low pass filter kit

SOTABEAMS has introduced a new low pass filter kit. Low pass filters are an essential part of any transmitter and also have applications in receivers.
The kit allows one of two filters to be selected and also incorporates a 'bypass' mode. It has been designed to complement the WSPRlite Classic HF antenna testing system. To give users the most flexibility, the filter components are available separately to allow filters from 160m through to 10m to be constructed. The kit has an optional aluminium case that allows it to be finished to a high standard.
Priced at £14.95, details can be found at at www.sotabeams.co.uk

New quad antenna

Following on from the LFA-Q compact quads, InnovAntennas is adding a more traditional-looking quad to the range that boasts two of the features of the LFA-Q. It is a rigid quad using tubes rather than wires (that enhances gain) and uses twin booms top and bottom to complete a very sturdy package. The antenna looks more like a traditional quad too being very square in appearance although the height of the quad elements are the same, just the element width changes in length.
The example shown is for 50MHz and has a boom length of just 53cm yet packs a mighty punch with 7.6dBi forward gain and 18dB F/B. Like all G0KSC designed antennas has a direct 50Ω feed so no matching device losses or noise and no input power limit!
Register your interest at sales@innovantennas.com

International Shortwave Broadcast Guide

Short wave radio listeners who want to follow current events can do so by monitoring HF short wave radio broadcasts. But in order to tune in these broadcasts you need an accurate, all-language frequency guide to tap into the latest news and commentary. The 9th edition of the *International Shortwave Broadcast Guide* will be released at the beginning of December. An international all-language e-publication, it is available via Amazon.

The IC-7300 Resources Page

Ian Wade, G3NRW has developed the IC-7300 Resources Page, available at g3nrw.net/IC-7300 The site contains hundreds of references to IC-7300 documentation, software, firmware, HOWTOs, TechNotes, reviews and other support material, plus a collection of over 80 (mostly) YouTube videos demonstrating many aspects of using the transceiver.

Two new power supplies

ML&S have introduced two ultra-compact power supplies from the long established manufacturer Nissei Ltd. The Nissei NS-1230M with metering and NS-1230B (without) both offer continuous duty at 25 amps, peak to 30 amps at 13.8V. Both feature short circuit and the over-voltage protection. The PSUs are small, measuring just 154 x 127 x 63mm, (6"x 5" x 2") and weigh only 1.35kg. They both have a switchable input of either 110V or 234V at 47-63Hz. These power supplies are available from stock at only £84.95 (non-metered) and £89.95 (metered) and if you use the code RadCom when ordering online, carriage is included free for UK mainland, saving £10.95. For more information see www.HamRadio.co.uk/Nissei-PSU. Photo courtesy Steve White, G3ZVW from his forthcoming review due in the February 2018 *RadCom*.

Three new antennas

Waters & Stanton has three new HF antennas for those with smaller gardens. The first is the Cushcraft MA6B that, as its name suggests, is a 6 band antenna offering 2-element performance on all bands from 20m to 6m, apart from 17m and 12m, where it operates as a dipole. Power rating is 1.5kW.

The second antenna is the MFJ-1846 Hexbeam with a turning radius of just 11ft. Again it is a 6 band antenna covering 20m to 6m and has a very low wind loading with excellent bandwidth.

Finally, there is the MFJ-1848, which adds 30m and 40m to provide an 8-band version. Details and pricing will be available at www.hamradiostore.co.uk

News continued from page 15

SOTABEAMS has moved

As a result of expansion, UK amateur radio manufacturer SOTABEAMS has relocated. Richard, G3CWI explains "for the last few years we have operated out of a historic 19th century silk mill in the centre of Macclesfield. However the growing needs of our business has required new premises. Our new unit is a modern two-storey office block that gives us a much improved lab area for product development and more space. Most importantly for our five staff, it's actually warm in the winter too!"

SOTABEAMS manufactures and markets a wide range of unique ham radio products via their online site www.sotabeams.co.uk

Worksop's National Winners

Two members of Worksop Amateur Radio Society have won national contesting awards. Tony, M6KTP and John, 2E0DXK won the RSGB Leading Foundation and Intermediate awards in the UK activity contests, being the highest in the league table at the end of the contest year. These awards were presented at the RSGB Convention, unfortunately neither Tony or John were able to make that occasion. So, they were presented locally by Martin, MOZMF, Chairman of Worksop Amateur Radio Society Both Tony and John received training and took their exams at Worksop ARS.

Homebrew

Enclosures for homebrew equipment, plus another look at time and frequency calibration.

Some of my more trivial projects will remain in their original prototype form indefinitely. Such projects may eventually be discarded, or perhaps recycled as parts for a new project. Quite often, they just get damaged or lost under the increasingly large junk-pile in my shack. The more valuable projects like transceivers or test instruments will be housed in some form of box or enclosure. For most projects, the constructor will be able to choose between making a suitable box, or buying a commercially made unit. Another option is to modify a surplus enclosure to suit your needs. Scrap telecommunication, broadcast or medical equipment is a very good source of high quality, rack mounted enclosures. These may be found at radio rallies, or sometimes at low cost from your local scrap metal dealer.

In most instances the front and rear panels of surplus enclosures will have the holes and apertures designed for the original purpose of the equipment. This will rarely be compatible with your intended application. A typical receiver or transceiver project will have a fairly complicated front panel with rectangular holes for the frequency display, S-meter and possibly a keypad for direct frequency entry. There will also be round holes for switches, rotary pots and sockets for headphone, microphone or Morse key plugs. Rear panels are usually a simpler affair with just a few round holes.

I will be using the rack mount enclosure in **Photo 1** to house my new homebrew 160m transceiver. As the original front and rear panels are completely unsuitable for this purpose, they have been removed and discarded. The new rear panel is a simple sheet of aluminium with a few holes for input and output connections.

There are a few options available for use as a front panel. In most of our previous projects, I have used aluminium sheet as the front panel. This approach can give very good results in practice, but it can be difficult to get a flawless finish on thin sheet metal when working with simple hand tools. The difficulties in painting aluminium (and my lack of metalworking skills) have led to a search for a more suitable material. One possible solution is to use PCB laminate for front and rear panels. Where single sided PCB is used for this purpose, the copper side is usually placed on the outside because it is smoother than the glass-fibre weave. PCB also provides excellent screening from electrical signals. For smaller projects, the entire enclosure can be made from circuit board panels that are soldered together. But PCB enclosures tend to be impractical and quite expensive for larger projects, unless you have a good source of surplus PCB laminate.

PHOTO 1: Carcass of the box I plan to use.

I have chosen to use a sheet of clear plastic for use in the front panel. This is a relatively tough material that is often used for windows and skylights in garden sheds. The two commonly available materials are acrylic and polycarbonate. Acrylic makes a good replacement for glass because it is hard, optically clear and has better impact resistance than ordinary window glass. Polycarbonate is an extremely tough material that is commonly used as the outer shell for motorcycle helmets and windscreens. Both materials are easily available as clear plastic window sheet. I bought a 1220x610x2.5mm sheet of Clearlite from the local DIY store. This should be enough for my next 14 rigs! As I was unsure which material it was made from, I put on my safety goggles and struck a small offcut with a hammer. The material shattered into several pieces, so it is almost certainly acrylic. This is ideal for use as a front panel, but it must be cut and drilled very carefully to prevent cracks.

Small cuts can be made using a standard hacksaw. For larger cuts, you may use a standard handsaw. Some saws are specified for cutting both wood or plastic. Mine is just a standard wood saw with approximately 8 teeth per inch. Acrylic sheet can also be cut using a table saw or band saw with a fine tooth blade.

Leave the protective film on the plastic sheeting. Use a fine-point waterproof pen to mark the lines for the saw cut. A fine laundry marker is ideal. A large workbench is the best place for cutting large sheets. I had to make do with the kitchen table. Cut slowly, smoothly and at a low (almost horizontal) angle. The cutting process is shown in **Photo 2**. Take care to support the end of the strip you are cutting, particularly as you approach the end of the cut. So far, I have managed to cut a couple of strips without any cracks appearing.

Once the panel is cut, it is reasonably easy to drill round holes using a HSS drill. A drill stand or a pillar drill will greatly reduce the risk of cracking. Wear eye protection and hold the piece steady while drilling. Don't try to go too fast.

For holes bigger than about 8mm, use a hand reaming tool to open a smaller hole to the required size. A typical 4-pin microphone socket requires a 16mm hole, which would be very difficult to drill in a home workshop.

Cutting rectangular holes

Without access to special tools, the easiest way to make rectangular holes is to use the 'chain drill and file' technique. Mark out the outer periphery of the planned aperture using a fine pen. Inside this rectangle, mark a smaller rectangle and use this as a guide for drilling holes. See **Figure 1** for details. The spacing between inner and outer rectangles will depend on the drill size. I used a new 5mm (2.5mm radius) HSS drill and a 3mm line spacing, theoretically leaving 0.5mm between the edge of the holes and the wanted aperture. Once the holes are drilled, it is easy to remove the centre part, using a sharp craft knife to cut through any sticky bits. Use a coarse file to clean up the rough edges. The

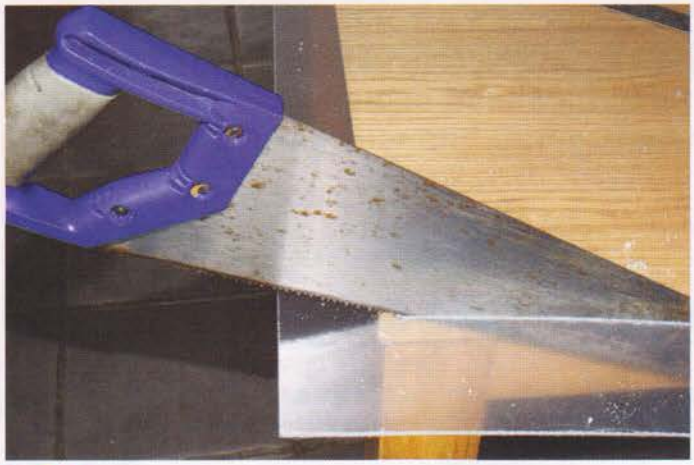


PHOTO 2: Cutting an acrylic sheet on the kitchen table.

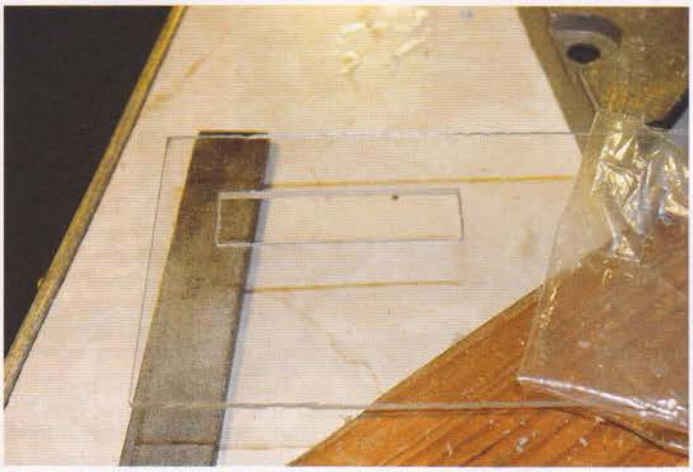


PHOTO 3: Finished rectangular aperture after drilling and filing.

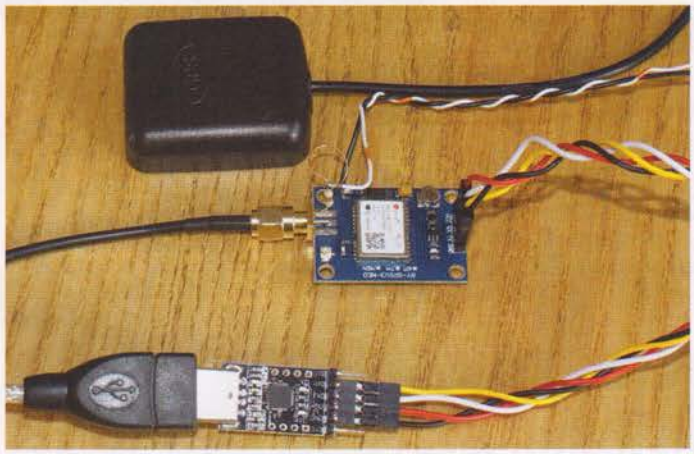


PHOTO 4: My GNSS receiver setup. Top: external antenna, middle: Ublox Neo-7M GNSS receiver, bottom: USB to TTL serial UART converter.

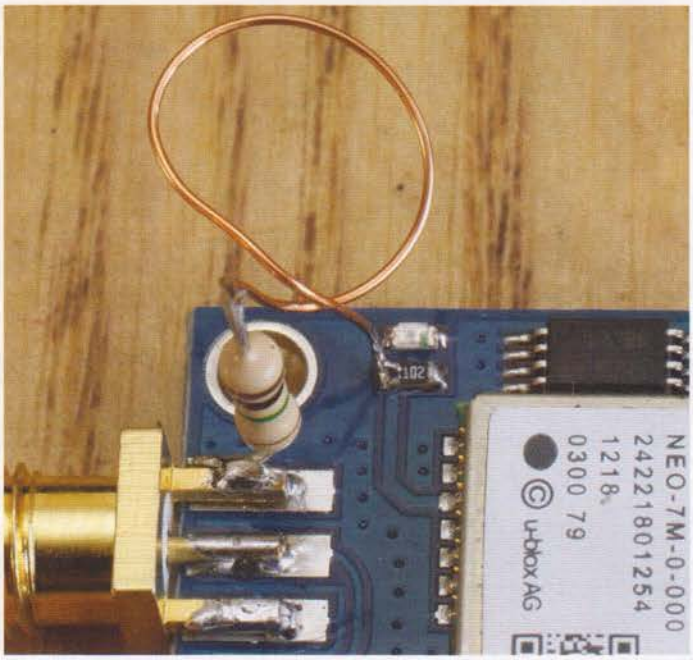


PHOTO 5: Getting the Timepulse signal from the Ublox receiver. The signal is extracted from the junction of the copper wire and large 1MΩ resistor (see the white/orange wire in Photo 4).

hole should now be the perfect size and shape – in my case for a standard 1602 LCD display module. **Photo 3** shows the finished result. A similar hole will be required for the S-meter, but this will be delayed until the new moving coil meter unit arrives in the post and I can be sure of the dimensions.

For applications that require electromagnetic screening, the back of the panel may be covered with aluminium or copper foil. To keep things tidy, the foil can be glued to the panel before it is installed. In a rack mounting case, the edge of the foil will usually be grounded to the metal frame at the front of the case.

GNSS time and frequency standard

After many years of good service, my shack frequency standards are starting to show their age. My ultimate frequency reference was a CW12 timing GPS. This unit provided a GPS controlled 1pps (pulse per second) output and a separate output with a default frequency of 10MHz. After a period of strange and unpredictable behaviour, it has now stopped working altogether and has resisted all efforts to revive it. My other standard is a 10MHz GPS disciplined oscillator (GPSDO) that has also been a bit flaky recently, although the unreliable operation did coincide with a big geomagnetic storm and it now seems to be working again. It is based on a Jupiter GPS receiver that is over 20 years old and will no longer output the correct date on the serial port. This is a well-known issue with the old Jupiter receivers. Its time, pps and the 10kHz frequency output are still working correctly, so hopefully the unit will continue to operate for another few years.

To replace the CW12 timing GPS, I have acquired a couple of satellite navigation receivers via eBay. In the past, satellite navigation (or satnav) generally referred to GPS. As there are now other navigation/positioning systems like the Russian Glonass, European Galileo and Chinese BeiDou system, the term 'global navigation satellite system' (GNSS) is more appropriate.

My receivers are based on the Ublox Neo-7M module. The receiver boards have a built-in voltage regulator so they can be powered from a 3.3V or 5V supply. To make a complete system, you will need the GNSS module, an aerial (GPS antenna), power supply and serial connection to a computer. A small ceramic 'patch' aerial is usually supplied with the receiver. Indoor reception tends to be unreliable unless you are in an ideal location. I use a compact waterproof 'mouse' or 'hockey

Eamon Skelton, EI9GQ
hbradio@eircom.net

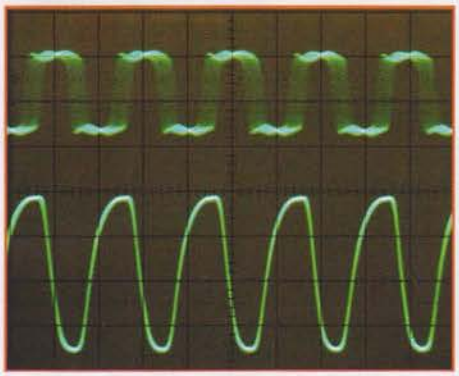


PHOTO 6: Test signals from the Timepulse output and my old GPSDO.

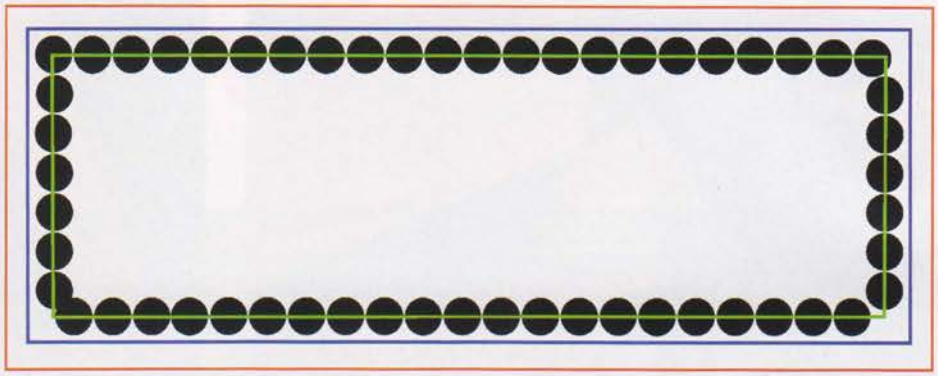


FIGURE 1: Rectangular aperture general drilling plan. The blue line represents the final wanted size, the green line marks the centre lines of the 'chain' of holes to be drilled (which are shown in black). The space between the red and blue lines is half the drill bit diameter plus a tad: ~0.5mm this time.

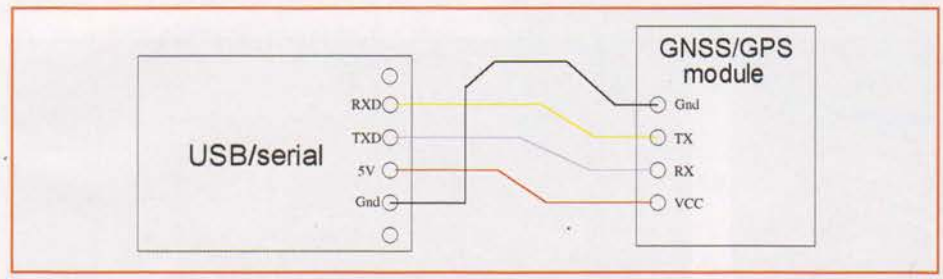


FIGURE 2: The connections between my GPS/GNSS module and the off-the-shelf eBay USB/serial interface are quite straightforward.

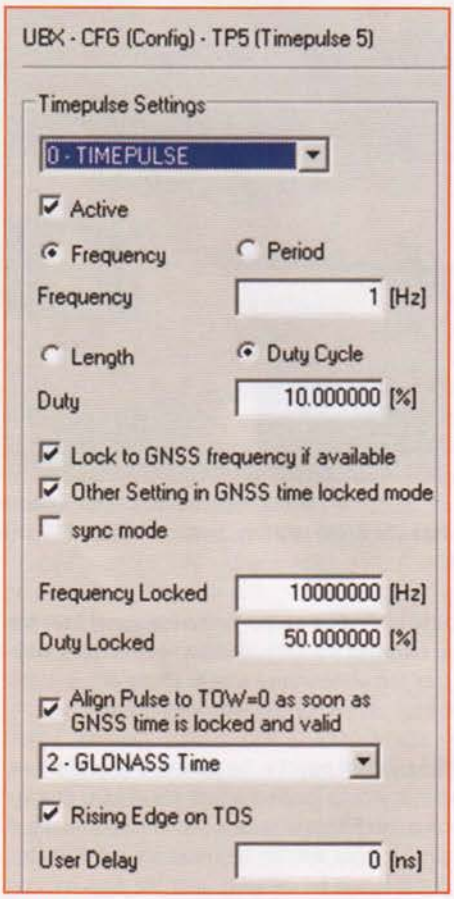


FIGURE 3: Ublox U-Center settings for 10MHz, 50% duty cycle output.

puck' style aerial with a 3 metre coax feeder. This is mounted on the roof of my outdoor shack, where there is a clear view of the sky. The eBay item was described as: "28dB Gain 1575.42MHz RP-SMA Male GPS Antenna". Pads are provided on the GNSS receiver PCB for soldering on an edge-fitting SMA socket. Check male/female polarity of the socket and feedline connectors before soldering.

The serial connection to the PC and 5V power supply are provided by a cheap USB to TTL serial UART converter. These cost about £1 each on eBay. **Photo 4** shows the complete setup.

Connections

The connections between the GNSS module and USB converter are shown in **Figure 2**. Note that some other receiver types may not have an on-board regulator and may require a 3.3V supply instead of 5V.

The Ublox receiver module has a Timepulse output, which drives an LED through a 1kΩ current-limiting resistor. The default output is 1pps, but this can be programmed in 1Hz steps to produce any frequency from 1Hz to well above 10MHz. As there is no Timepulse output provided on the board, it is necessary to solder a thin wire to the 'hot' side of the 1kΩ resistor to extract the signal. I used a one-turn loop of copper wire for the connection and a 1MΩ resistor soldered to GND at the SMA socket as a secure point for making a connection to external circuits with less risk of damage to the PCB traces. The arrangement is shown in **Photo 5**.

Testing

By default, the receiver will produce 1pps, with a 10% duty cycle. The rising edge of the pulse is aligned to the start of the UTC second. The Ublox U-Center software [1] allows you to analyse the receiver output and change settings. Although U-Center is for Windows, I have found that it performs very well under the Wine emulator on my Linux PC.

The Neo-7M receivers can receive GPS or Glonass, but not both at the same time. I tested the receiver using the Glonass satellites. This option can be chosen in the GNSS Config section; GPS must be disabled first.

The Timepulse output is adjusted in the View: Configuration View menu. Select TP5 (Timepulse 5) and then choose your required settings. For 10MHz: Frequency and Duty cycle, then 10000000 and 50% in the Locked section. See **Figure 3**. This will produce a 10MHz square wave output when the receiver is locked to the satellite signals.

I compared the Timepulse output frequency to the 10MHz output from my old GPSDO (see March 2008) using a dual-beam oscilloscope. As expected, the 10MHz output has a fair bit of short-term jitter, but long term stability is extremely good. it has no measurable drift, even over periods of several hundred seconds. Stability of one part in several billion is more than good enough for my purposes. **Photo 6** shows the test signals on the scope.

As I have a spare receiver and a 10MHz OCXO on the shelf, I will probably build them into a new GPSDO in the near future.

Websearch

[1] https://www.u-blox.com/en/product/u-center-windows

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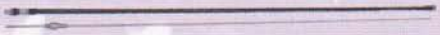

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Antennas

Revisiting the doublet (part 2)

Last month we summarised the design and operational concepts of the doublet antenna. We continue the theme this month with an overview of the practical aspects associated with installing a doublet antenna at a given location.

Doublet overview

The doublet comprises a wire span that is fed at its centre with a balanced two-wire feeder cable. Ideally, the length of the wire span should be an electrical half wavelength ($\lambda/2$) at the lowest frequency of operation. However, the wire span's length can be reduced to three-eighths of an electrical wavelength ($3\lambda/8$) without significantly compromising performance provided the ATU used is capable of handling the impedances presented by the antenna. The balanced two-wire feeder cable could be either open wire or ladder line and either gives a lower loss compared to coaxial cable. If ladder line is used, this can be either the 300Ω or 450Ω impedance varieties. The length of the balanced feeder cable is not important and can be cut to suit the installation requirements.

Wire span height and wavelength

When installing a doublet antenna (or any HF antenna) a prime aspect to consider is the height of the antenna's wire span above ground level (AGL). The higher the wire span can be installed above the ground the more RF radiation becomes directed towards the horizon, improving the possibility for making more distant contacts. This concept is shown in **Figure 1** for an electrical $\lambda/2$ long wire span installed at a quarter and then a half wavelength above the ground. As the height of the $\lambda/2$ wire span increases, so lobes form either side of the plane of the wire span enabling the RF signal to be radiated at a low angle towards the horizon favouring longer distance skip when the conditions allow.

At a domestic location, installing the wire span to allow operation on a lower HF band at about half a wavelength above the ground is often impossible for many radio amateurs. For example, a 20m wire span intended for use on the 40m band would need to be installed at a height of around 20m above ground level, potentially leading to a number of practical difficulties and possible limitations associated with planning permission. Installing the same antenna at 12m AGL is often a more realistic option.

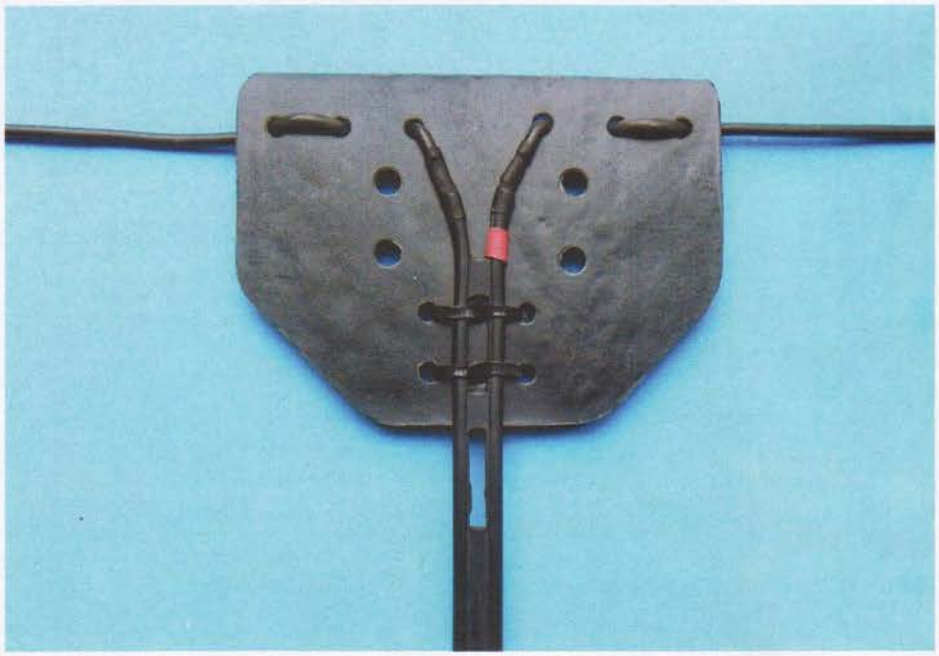

PHOTO 1: The dipole centre used for the doublet antenna, made from a small sheet of uPVC.

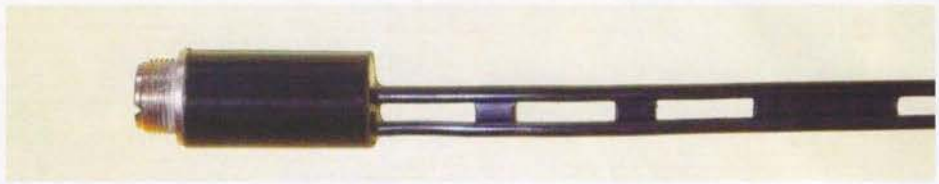

PHOTO 2: Balanced feeder cable SO239 termination.

For this 20m wire span at 12m AGL, the antenna's RF radiation pattern is more likely to favour shorter-skip contacts on the 40m band, as indicated in **Figure 2**. However, when operating on the 20m band, the wire span's height now becomes close to a half wavelength. In a similar manner as previously described, the antenna now develops lobes either side of the plane of the wire span (as also shown in Figure 2). Consequently, on 20m, the antenna now tends to radiate an RF signal at a low angle towards the horizon, enabling longer distance skip contacts to be made when the conditions allow.

The influence of close objects

The doublet is a balanced antenna and nearby objects and structures can disturb the equilibrium of the antenna's RF field pattern, as shown conceptually in **Figure 3**. This can lead to an imbalance in the RF currents flowing in the feeder cable, which can impair the performance of the antenna by allowing undesirable common mode currents to flow. When transmitting, this imbalance in the RF currents causes the feeder cable to radiate RF energy, making it a potential source of RF interference to other electrical equipment and be a cause of problems associated with RF in the shack. When on receive, any imbalance in the currents flowing in the feeder cable can allow RF noise to be picked up, impairing the signal being received.

To minimise this unbalanced effect, good practice is to install the antenna as high and as clear of local objects as possible, with the feeder cable running straight downwards. This maximises the electromagnetic coupling between the opposite halves of the antenna, allowing a more regular RF field to be established, improving the antenna's balance and enabling the undesirable effects arising from common mode currents to be reduced.

Physical aspects

The feeder cable's connection to each leg of the doublet is usually suspended in the centre of the wire span and necessitates a physically strong but lightweight dipole centre design. Commercially, there are various dipole centre designs available that can be acquired from radio equipment stockists, online suppliers or at rallies.

The August 2017 column described how a dipole centre suitable for use with a doublet antenna could be made from a sheet of 3mm thick unplasticised polyvinyl chloride (uPVC), as shown in **Photo 1**. In summary, this design had three holes drilled along the upper section of the dipole centre either side of the middle. These holes are used to hold in place each leg of the wire span by lacing the wire through the holes. To weatherproof each soldered connection, a short length of heatshrink was passed over each of the feeder cable's legs before forming each connection. Once a connection had been soldered, the joint was wrapped in PTFE plumbers' tape. Then the heatshrink was slid over each joint and shrunk using a heat-gun to help protect it. Two rows of three equally-spaced holes were drilled into the lower section of the dipole centre to hold the balanced feeder cable in place using cable-ties that were passed through the holes and the feeder cable in a figure-of-eight configuration as shown. To terminate the wire span's ends dog-bone insulators could be used as described in the March 2016 Antennas.

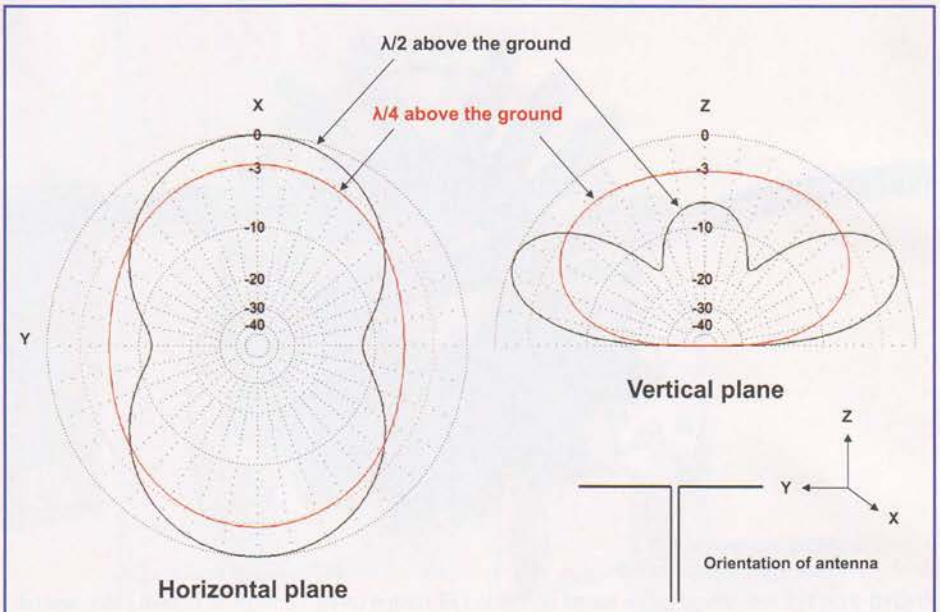

FIGURE 1: Comparison of a half wavelength wire span installed at λ/2 and λ/4 AGL, as predicted by MMANA-GAL.

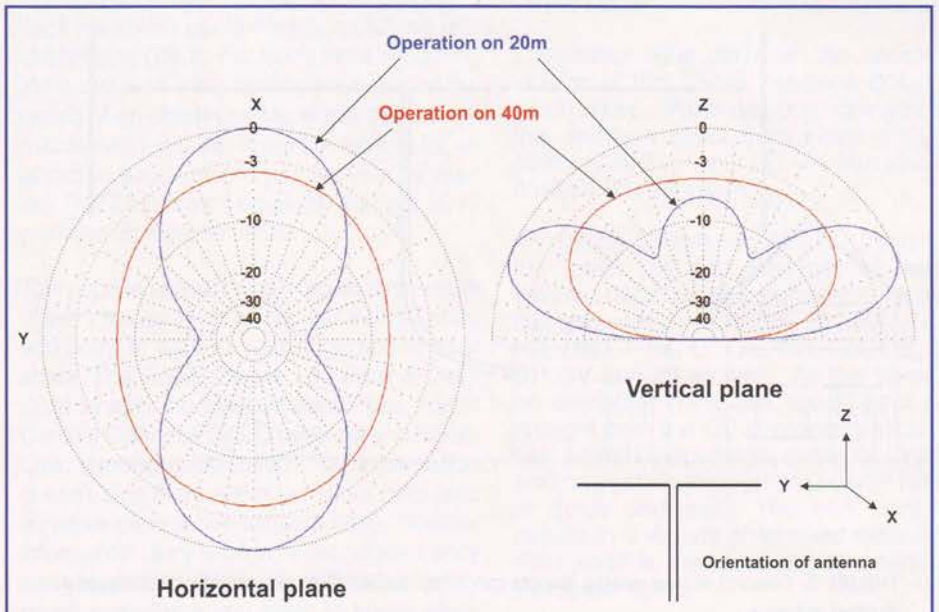

FIGURE 2: MMANA-GAL comparison of a 20m long wire span installed at about 12m AGL when operated on the 40m and 20m bands.

Connection and matching arrangements to the radio equipment

If the antenna is to be used as a random-length dipole with its balanced feeder cable connected straight into the ATU's balanced socket, then possibly no special connection arrangements are needed, with the cable conductors connected to the ATU balanced terminals as appropriate. Some commercial ATUs use 'banana' socket (4mm) connections and so the balanced feeder cable could be terminated using 4mm banana plugs for ease of connection.

If the antenna is used as a Comudipole, where coaxial cable connects the balanced feeder cable to the ATU's unbalanced socket, then a suitable arrangement to terminate the feeder cable will be needed. One method is to terminate the end of the feeder cable in a SO239 socket, as described in the March 2016 Antennas and shown in **Photo 2**. In summary, the feeder cable's conductors were soldered to centre and outer of an SO259 single-hole socket. Then a short length of 20mm diameter conduit was slid over the soldered joints and held firmly against the base of the SO259 socket using insulation tape. With the SO259 socket firmly held vertically and the feeder cable extending above it, sufficient epoxy resin was poured into the space between the feeder cable and the conduit's interior then allowed to set forming a waterproof joint. Once set, the insulation tape was removed.

When using a doublet in the '*Comudipole*' configuration, the impedance presented at the end of the feeder cable may require either a 4:1 or 1:1 balun to enable the antenna to be matched (as described last month). The construction of baluns was described in the October 2016 Antennas, where further details can be found. However, a 1:1 choke balun can be formed by passing 12 turns of the coaxial cable through a FT240-31

Mike Parkin, G0JMI
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PHOTO 3: A 1:1 broadband balun based on the W1JR design using 12 turns of coaxial cable wound onto a FT240-31 core.

PHOTO 4: A radiant rook. Note that not all ATUs are rated to load up wildlife (and the RSPB / RSPCA etc might want to express some opinions if you try).

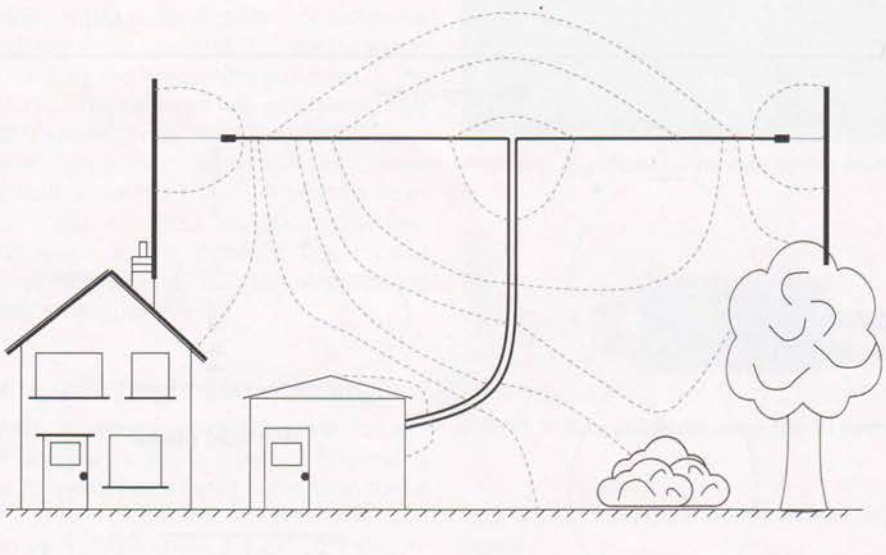

FIGURE 3: Concept of how nearby objects can affect the RF field associated with a dipole or doublet antenna.

ferrite core, with cable ties used to hold the turns in place, as shown in **Photo 3**. This balun can be used from 3.5MHz to 30MHz for transmit powers up to about 100W. However, higher transmit powers can cause the balun to heat up, leading to the possibility of the ferrite's magnetic permeability collapsing and the subsequent failure of the balun. This 1:1 balun design was developed by Joe Reisert, W1JR, and published in 1978 **[1] [2]**. When measured, using an antenna analyser, the balun introduced an impedance of about 500Ω into the coaxial cable's outer shield. However, above 30MHz the impedance decreased, making its use unacceptable at on 50MHz and above.

The 1:1 choke balun described above is often shown in various publications as being formed using just six turns of coaxial cable. Recently, Bob Houlston, G4PVB wrote in to say that he had encountered difficulties with this type of balun when using only six turns and that he had found by experiment that using 12 to 14 turns was preferable. Bob's findings seem to be in agreement with W1JR's original 1:1 balun design. The 1:1 balun was shown in the original article [1] with six turns and this was probably for ease of explanation. It seems the illustration showing the six turn version of the 1:1 balun has found its way into several publications, with the details of the balun's actual construction being omitted. Thanks to G4PVB for bringing up this apparent omission for this design of 1:1 balun.

Comparing the doublet and G5RV

As described previously, the wire span's length used for a doublet could be electrically 3λ/8 long. A full-size G5RV antenna has 31.1m of wire, fed at the centre. If this wire span length is divided by 3/8, this gives an effective wavelength of 82.93m (since 31.1 / 0.375 = 82.93), equating to a frequency of 3.62MHz. This calculation illustrates a relationship between the wire lengths for a 3λ/8 doublet intended for use on 80m (and above) and a full-size G5RV antenna.

And finally

Having taken the trouble to install a doublet as clear of near-by objects as possible to maximise its performance, unfortunately there are still other causes of why the antenna's performance suddenly worsens, as shown in **Photo 4**!

References

[1] A Simple and efficient Broadband Balun, Joe Reisert, W1JR, *Ham Radio Magazine*, September 1978, pages 12 to 15

[2] *Amateur Radio Techniques*, 7th edition, Pat Hawker MBE, G3VA (reprinted 1991), Aerial Topics, Broadband Balun, page 334

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Edited by Mike Browne, G3DIH

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View of Motu Ko, Pukapuka Atoll.

E51LYC DXpedition to Pukapuka (OC-098)

Pukapuka is located about 1200km northwest of Rarotonga, among the North Cook Islands. The Pukapuka Atoll counts toward the IOTA group OC-098, which is in demand by 92% of the IOTA members and was last activated in January 1995.

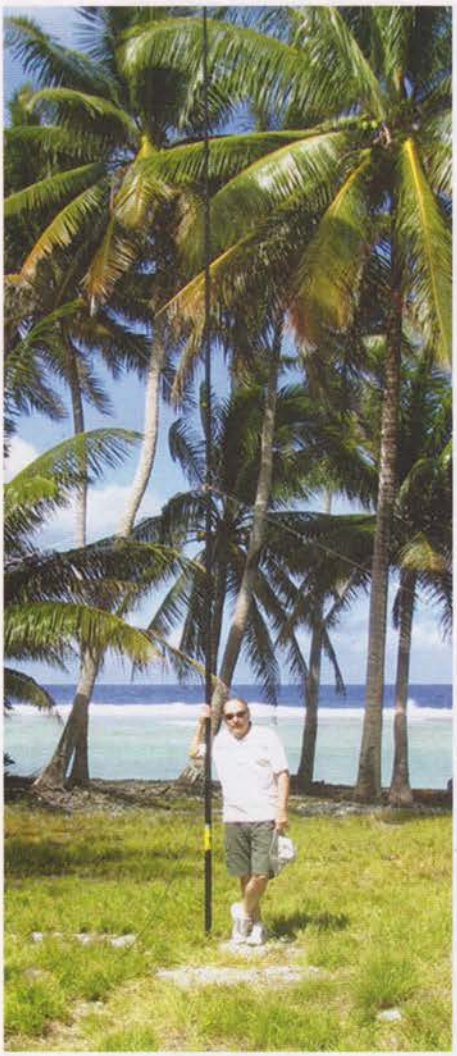
The reef has three dry islets and a sandbank, amounting to about 3km^2. Radio activity took place between 12 and 23 May 2017, from the south side of Wale, the only inhabited islet, near the island administration offices.

While archeological research indicates that human settlement dates back 4,000 years, the island's history is marked by severe cyclones. The population recovered from only few individuals who survived a cataclysmic storm occurring around 1700 and in the years following cyclone Percy of 2005, more than 30% of the population emigrated, leaving just over 400 people on the island at present.

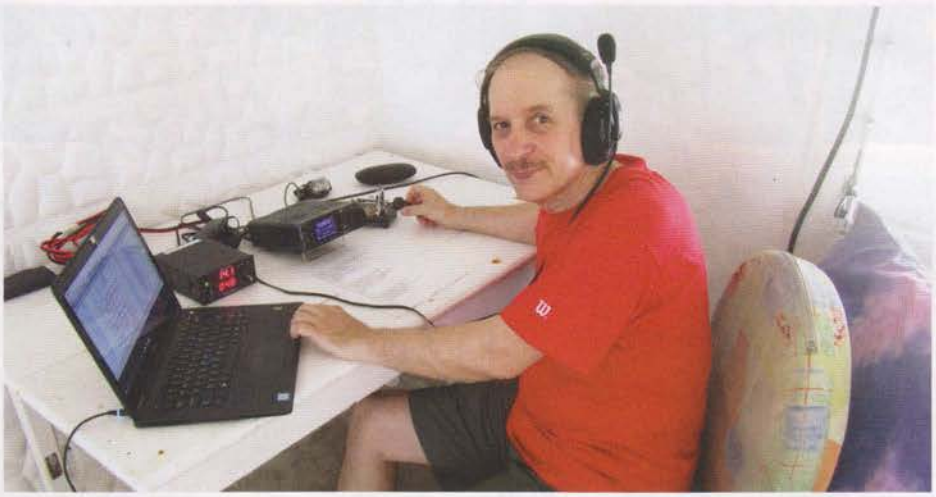
Pukapuka's lagoon has only one entrance, created in 1957 by the US Navy at the locals' request. Prior to that, traditional fishing boats were carried over the reef for fishing expeditions. The entrance gives locals easy access to fishing grounds outside the reef, but doesn't allow for circulation of the seawater inside the lagoon to support marine life. As such, the island is not a tourist destination and visitors are rare. The locals speak a language related to Samoan, unique within the Cook Islands. Fishing and taro plantations provide the two main sources of food. Family fishing is still done at low tide in large shallow pools on the reef. Taro is cultivated in marsh areas, and plant beds are prepared using pukapuka leaves. Its corms are consumed roasted, baked, or boiled.

The DXpedition station

The rig used was an Icom IC-7000 with a multi-band vertical wire antenna and



Cezar, VE3LYC leaning aginst the mast supporting the multi-band vertical wire antenna.



CQ IOTA de E51LYC!

The station used on Pukapuka.

spare components for everything. AC power was available from the local solar power station. The temperature oscillated between 33°C during the day and 28°C at night, sometimes higher, with a relative humidity no less than 80-90%. The station's south-eastern location near the reef provided some reprieve from the heat thanks to a breeze brought on by the seasonal southern trade winds. When the breeze shut off, however, the combination of heat and humidity was formidable. Fortunately, coconut water is rich in electrolytes and best for rehydration – and there are plenty of coconut trees on the island.

Propagation conditions were best during the first three days, when I was able to log about 3,400 QSOs. During the remainder of my stay I logged just 2,200 more. This gave a total of 5632 QSOs with 3308 stations in 79 DXCCs on 6 continents. More than 47% of all contacts were on 20m, with somewhat equal share on 40, 30, 17 and 15m, and a few on 12 and 10m (see **Table 1**). About 76% of the QSOs were in CW, with the rest in SSB. The continental distribution of stations is shown in **Table 2**. The top five DXCCs by number of stations were JA, K, UA, DL, and I, accounting for 75% of the QSOs (**Table 3**).

One of the difficult paths was to Europe. Over several days, the 20m band enabled contacts with various areas of the old continent between 0500 and 0830UTC. However, every day I looked for possible openings on other bands between 1200 and 1600UTC. I was able to copy very faintly some activity on 40, 30 and 17m during this time, but I was only able to log EU stations on 21 and 22 May, and only on 40 and 30m. Given the tough propagation conditions, a few EU stations decided to beat them using either remotes located overseas or outright third parties calling on their behalf. When signals from EU were typically coming in at S1-3, with a certain QSB and often some flutter, it was impossible to accept that callsigns at S9+10dB or stronger were legit. This suspicion was confirmed later on, through direct correspondence, which is why I removed them from the log. I appreciate that keeping them would have harmed the integrity of the IOTA Programme.

Since propagation conditions to Japan were good for extended periods of time, many JA stations seemed compelled to compete with themselves and each other for who will log me on the most band/mode slots. This might have been acceptable in view of the Club Log's Super League competition, had only E51LYC been among the accepted operations. However, this was not the case! The fact that this operation was mainly directed at the IOTA chasers, for whom one contact would have sufficed for credit, along with the high level of activity from this DXCC and its proximity to Japan, all made it difficult to understand the incentives behind the intense slot-logging activity.

Since I never explicitly indicated prior to

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Pio Ravarua (Admin), Cezar, Brian (Police), Levi Wale (Mayor), and Pataku (L to R).

The antenna as you look towards the ocean.

The antenna with my accommodation at the rear of the photo.

the operation that chasers should limit their QSOs, I went along with this for a few days. This allowed 126 JA operators to log five or more QSOs each, for a total of 773! Later on, however, I alternated periods of time when I accepted any call to periods when I would only take new stations, who had never logged me before.

Thanks

I would like to thank Andy, E51AND for his help with the logistics. I remain indebted to Milan, E51DWC and his family for hosting me during my stay in Rarotonga. A huge thank you to Pio Ravarua for his invaluable assistance on the island, and also for sharing with me some of the local legends, myths and facts about the people. Johan's, PA3EXX help at various stages of the project is also acknowledged. I wish to express my gratitude to the German DX Foundation, DX News, International Radio Expedition Foundation (IREF), Icom, Clipperton DX Club, CDXC: The UK Foundation, Swiss DX Foundation, RSGB, EUDXF, The Daily DX, and DX World who generously supported this project. I remain indebted to Al, W3AWU, Toshi, JM1PXG and Mike, W5ZPA for their exceptional support, to the top donors AB6QM, DL6DQW, JF4VZT, JJ8DEN, K9RR, KD1CT, KO8SCA, N4WW, PA3EXX, PT7WA, SM5NXS, VE7QCR, VK2DX, WC6DX and many others who offered financial assistance.

TABLE 1: Continental statistics.

Continent	stations	%	QSO	%
AF	9	0.3	12	0.2
AS	1483	44.9	3065	54.4
EU	848	25.6	1077	19.1
NA	832	25.1	1263	22.4
SA	22	0.7	31	0.6
OC	114	3.4	184	3.3
Total	3308		5632	

TABLE 2: Band QSO statistics.

Band	CW	SSB	TOTAL	%
40	557	17	574	10.2
30	788		788	14.0
20	1741	922	2663	47.3
17	773	223	996	17.8
15	417	153	570	10.2
12	38		38	0.7
10	3		3	0.0
Total	4317	1315	5632	100.0

TABLE 3: Top DXCCs logged.

#	DXCC	Stations
1	JA	1365
2	K	747
3	UA	162
4	DL	116
5	I	89
6	UA9	70
7	VK	61
8	VE	59
9	UR	55
10	SM	54
11	F	46
12	SP	42
13	OH	34
14	G	27
15	ON	26

CW Field Day 2017

The Sunspot cycle ensured that conditions were relatively poor, but that did not stop entrants from enjoying themselves over this field day weekend.

The number of UK portable station entries has stabilised at around 40 over the last few years, although there was a reduction in entrants compared with 2016.

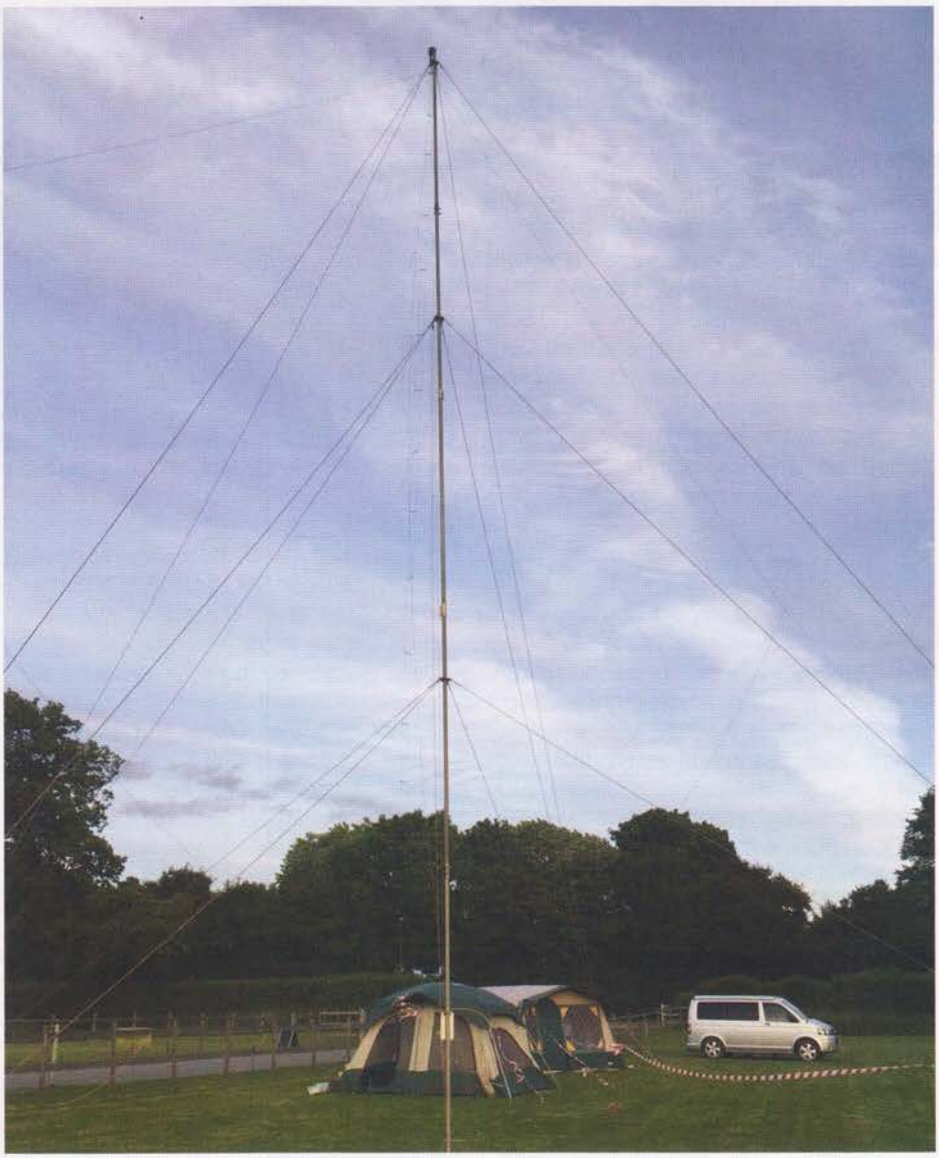
However, the addition of a Fixed Station section encouraged other clubs and individuals to participate, helping to increase activity. The new scoring system, with DXCC multipliers, was generally welcomed as a worthwhile change. This meant that stations had to Search & Pounce carefully – not just to find as many portable stations as possible, but also to locate multipliers on all the six contest bands.

The winners

The Low Power Unassisted Portable section was won by the North of Scotland Contest Group, GM2MP/P, who have in previous years been close to the top position several times. They experienced better conditions on 10m than those further south, and took advantage of this to win the NFD Shield. The Sussex Downs Contest Group, G4FNL/P, moved up compared with last year and achieved second place. Nick, G4FAL, operating M3W/P, won the G3MZV Memorial Cup for the leading Single Operator station. In the Low Power Assisted Portable Section, the winners were De Montfort University ARS, M2A/P, who were second last year, winning the Bristol Trophy. They took full advantage of the rule changes to interleave QSOs between two transceivers. Stockport RS, G3LX/P, came in second. The QRP Portable Section was won by Horsham ARC, G3LET/P, who win the Reading QRP Shield, with MOP in second place. This five watt section has always been a 'specialist area', but those who participate seem to have no trouble in making plenty of QSOs. The new Fixed Section attracted 16 entries, with G9F, operated by G4BVY, in first place. In second place was G3RLE, who made more QSOs than G9F, but fewer multipliers.

Ed Taylor, G3SQX
Ed@g3sqx.net

Brian, G8AOE and Ian, 2E0GBA operated from above the village of Osmotherley using G8AOE.



G3RCV/P operated by Cray Valley RS.

Antennas and equipment

Many of the antennas used by portable stations in the QRP and Low Power Sections were the 264 foot doublet, some with variations. These included feeding off-centre, using removable links, and transforming the doublet into a diamond shape. There were no restrictions in the Low Power Assisted Section, and the leaders (unsurprisingly) took full advantage of this rule, using beams, dipoles and verticals.

As far as equipment was concerned, the Elecraft range was again popular, with their K2, K3 and K3S transceivers featuring in well over half of the portable entries. Some clubs entering the QRP and Low Power Unassisted Sections made good use of their single additional receiver, allowing them to check for band conditions and activity levels to initiate band changes.

Clubs entering the Low Power Assisted Section now have no restrictions on equipment, and the top stations used their teams of operators to full advantage in finding QSOs and multipliers. Second (and third) transceivers were clearly sourced from willing club members, and they were used to provide valuable multipliers.

De Montfort University ARS, M2A/P, winners in the Low Power Assisted Portable Section.

Band reports

1.8MHz: The usual procedure is for entrants to switch to 160m at around 2100UTC, after they have made the most of daylight possibilities on higher frequency bands. Then they will move between 80m and 160m throughout the night, while checking 40m and 20m from time to time. This year was no exception, and the band provided a good source of contacts within Europe. There was some North American activity, but perhaps not as much as expected. Mention must be made of G1FCW/P (Essex CW Club), with a total of 151 QSOs from six hours of activity from sunset onwards.

3.5MHz: This is a band that can provide QSOs at almost any time, but will generally give best results between sunset and sunrise. Of course, groups must decide how to split their time between the three lower frequency bands, also bearing in mind that 20m can often provide multipliers in the early morning. Several entrants made over 200 QSOs on 80m, with a sprinkling of DX, most activity however, being within Europe.

7MHz: A few stations decided to use 40m for single-band entries, with surprisingly high scores. For example, GU4YOX/P made 800 QSOs on the band, running for most of the time, with occasional Search & Pounce forays for multipliers.

A couple of the multi-band entrants made over 400 QSOs, notably (in the Portable section) M2A/P, who benefited from a 40m beam. Stations from the USA were coming through for most of the night, providing a useful addition to QSO totals.

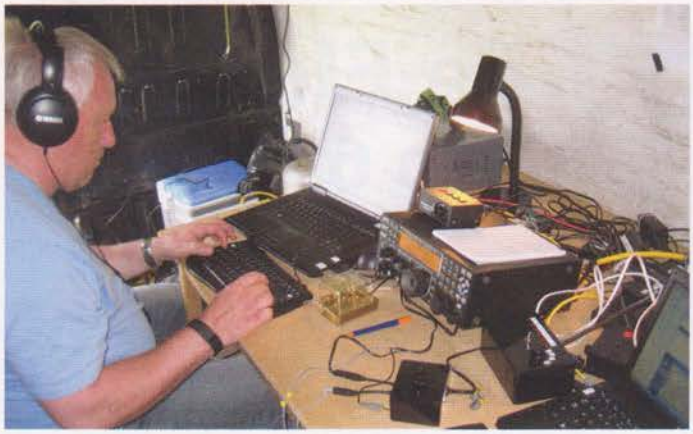
14MHz: Although the band was 'open for business' during most of the daylight hours, groups had to choose between 20m and 40m, as well as checking the higher bands, to gather QSOs and multipliers. Overall conditions, with sunspots currently rather scarce, meant that DX stations and new multipliers were not so easy to find. Nevertheless, there was sufficient activity for assiduous Second Operators to recognise scoring opportunities, such as new multipliers, and to monitor variations in conditions throughout the 24 hours, so that time spent on the band was not wasted.

21MHz: Those who carefully monitored this band were rewarded during the openings available. Conditions favoured more northerly stations, with GM2MP/P achieving 238 QSOs on 15m, and a very respectable number of multipliers. However, things were not so straightforward further south, but the band was by no means dead, with many stations making over 100 QSOs and several twice as many.

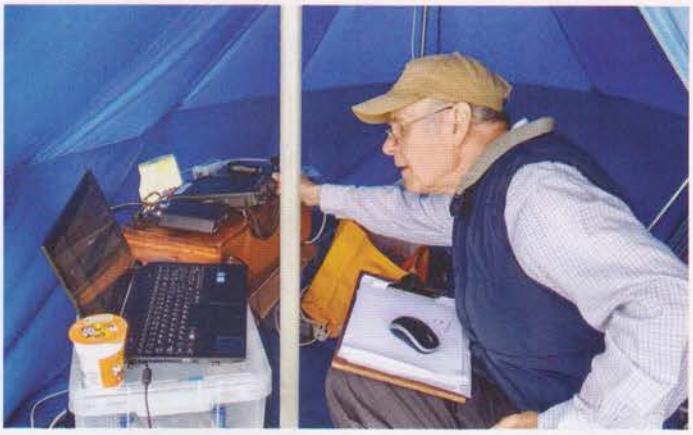
28MHz: Most groups did not spend too much time on 10m, although there were some interesting openings during the weekend. As with 15m, conditions were better in the North of the country, from where GM2MP/P made over 200 QSOs. Together with their 15m score, this made quite a contribution to their winning position. G3RCV/P were surprised to be called by KC1XX around midday on Sunday – a new multiplier.

Rule changes

There were some significant changes to the rules for the contest this year. The scoring system was changed in several ways, perhaps the most controversial being the addition of country multipliers. In the event,

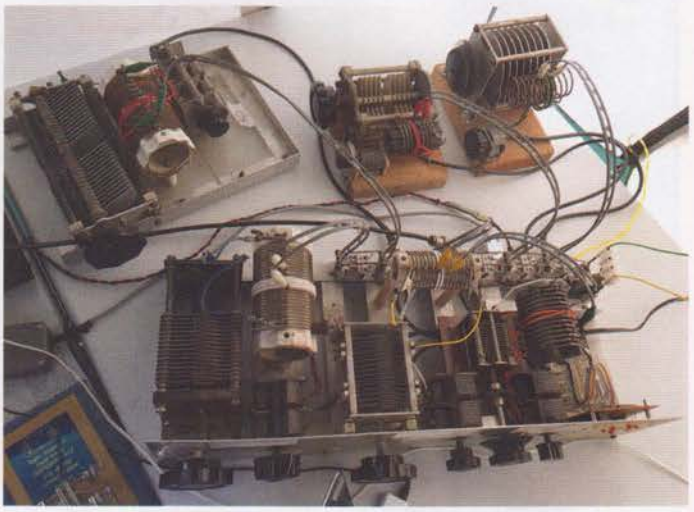


Sussex Downs Contest Group, G4FNL/P.



Hambleton ARS member Brian, G8AOE who took a chilly night shift.

U4YOX/P made 800 QSOs, running for most of the time.



G3RCV/P were surprised to be called by KC1XX around midday on Sunday.

the experience of most entrants was that it added an interesting new element to the contest, with club members needed to act as 'second operators' – monitoring and spotting new stations and multipliers.

The Low Power Section was divided into Unassisted and Assisted Sections, each attracting a reasonably sized entry. As expected, the results showed that Assisted stations would make more QSOs and find more multipliers, although the difference was perhaps less than some predicted it might be.

A Fixed Station section was added – and welcomed by those who were not able to join in as portables. Of course, fixed stations operating in a contest where finding portable stations is all-important will not achieve high QSO totals, but entrants enjoyed the opportunity to participate.

Comments

There were the usual mishaps during setting up of Field Day stations and throughout the weekend, but everyone seemed to enjoy themselves, as ever. From GOFBB/P, "Had a few problems getting the antenna and tuners

Kilmarnock & Loudoun ARC operated GM0ADX/P.

to work together on all bands but eventually came up with a solution". G3LET/P noted that "Poor organisation meant we started nearly 90 minutes late", but that did not stop Horsham ARC winning the QRP Portable Section. Addiscombe ARC had "few problems except usual generator hiccup at start".

Several entrants remarked on the new rules, being generally in favour, with M3W/P commenting, "Having DXCC multipliers certainly made the contest more interesting and made sure that 10m wasn't neglected". G3LX/P agreed, "We all enjoyed the new contest format". G4BVY was guarded but supportive, "The fixed section together with country multipliers made it somewhat more interesting".

G4ALE/P need more convincing, "not sure about G/p participation with new height and mults and QRP rules".

Wind-up

Participants always enjoy the two Field Days, and with pan-European participation there are plenty of stations on the air. The development of the contest, with rule changes from time to time, has stimulated interest since the first NFD in 1933.

Clubs often report that the social aspects of the weekend should not be overlooked. Even total newcomers to amateur radio can help with setting up the station and keeping it going.

Although Morse speeds are generally too high for beginners to follow, those who are persistent can monitor what is being sent, and they will soon start to decode and learn their own club's callsign in CW.

Next year's Field Days are on the 2-3 June (CW) and the 1-2 September (SSB).

Please join in the fun, and good luck!

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This month I want to talk about RF noise. Many of us can no longer enjoy HF operation because of noise. BUT there is a viable solution. Take a look at the new MFJ-1886x receiving loop. Magnetic loops excel themselves in offering superb noise rejection combined with excellent reception. Lucky owners of the K3 series can make use of the separate receive antenna input option. At the press of a button the transceiver is set up for using a separate receive antenna. Use it with the MFJ-1886x and hear the noise drop away, particularly on the LF bands. **Peter Waters G3OJV**

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Microphone and key not included

Kit £999.95
Built £1,079.95

4m or 2m Option

- Total portability SDR design & DSP
- Includes 5MHx band + receive 1.5-30MHz
- SSB CW AM and FM modes
- Tx and decode RTTY and PSK32
- External 9-14v or (optional) 8 x AA cells
- 8 band graphics in Tx and RX
- Digital Voice and CW Player
- Direct keypad entry and A/B vfo
- Full QSK with variable selectivity
- Notch filter and AF filter
- Speech Compression and VOX

It is hard to believe that to beat the receiver performance of both these radios you would need to spend another £3,000 at least! You get top base station performance in a radio that you can take anywhere. No other portable HF radio gives you so much functionality and flexibility. The KX2 even has a built in mic., whilst the KX3 offers 2m or 4m options. It is not difficult to see why more and more operators are moving up to Elecraft. And to add to the fun, you can even opt to build the KX3 yourself if you wish. Both are available as ready built.

KX2 80m - 10m

Microphone and key not included

Built £859.95

- Pocket portable HF transceiver
- Built-in internal microphone
- SSB CW AM modes
- Same SDR and DSP as KX3
- Optional Li-ion battery or external 9-14V
- Variable selectivity and AF filter
- Speech compressor and full QSK
- Includes the 5MHz band
- Receiver matches the best base stations!

KX2 ACCESSORIES

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

Elecraft K3S 160m-6m 10W or 100W

Join the "Club" and Experience Real Performance

100W Kit £2849.95
100W Built £2999,95

10W Kit £2999.95
10W Built £2449.95

- SSB CW AM FM
- New low noise synthesizer
- USB Port & 12m-6m extra pre-amp
- Multiple Attenuator
- Improved AF output design
- Now includes rx 470kHz band
- Combines superhet and SDR
- 32 bit DSP design
- Built in RTTY and PSK send/decoding
- Firmware update USB via web

The K3S is the "sports car" of ham radio transceivers! Its under the bonnet that counts. The K3S certainly can out perform almost any other ham radio transceiver. Its fun to own and fun to operate. It is the most popular radio for DXpeditions for both performance and reliability.

Elecraft Receive Ratings*

1st	Flex-6700	£7800
2nd	**K3S**	**£2999**
3rd	**K3 no longer available**	
4th	IC-7851	£8,000
5th	PT-8000	£12,000
6th	**KX3**	**£1,000**

The performance positions are based on independent tests by Sherwood US Check: **www.sherweng.com**

The Optional P3

The optional P3 enable you to see any part of the RF spectrum from 2kHz - 200kHz wide. It has both spectrum and waterfall displays. Can also be use for Tx monitoring with Tx monitor option.

Kit **£819.95** Built **£859.95**

K3 POPULAR ACCESSORIES

KRX3A	2nd Receiver	**£789.95**	
8 pole Roofing filters	20Hz-13kHz	**£184.95**	
MH2	Electret Microphone	**£79.95**	
KDVR3	Voice Recorder	**£179.95**	
KAT3A	Automatic ATU	**£449.95**	
K144XV	2m Transverter	**£449.95**	
KBPF3	Gen.f coverage BP Filter	**£229.95**	
KTCXO3	High stab. Ref. oscillator	**£149.95**	

Elecraft Accessories

KAT500 1kW Auto ATU

Ideal for use with the KPA500 amplifier, it matches coax systems to enable full power output. Kit **£799.95** Built **£839.95**

PX3 Spectrum Display

Plugs directly into the KX3 to give same spectrum display as P3. Bandwidth 2kHz-200kHz

Kit **£569.95** Built **£629.95**

XG3 Signal Generator

A highly accurate portable signal source with spot frequencies on all bands 160m to 2m with levels of:
107dBm (1 uV)
-73 dBm (50 uV, S9)
-33 dBm (S9+40)
0 dBm **£199.95**

T1A Portable Auto ATU

The T1A is a fully assembled auto ATU that covers 160m to 6m up to 20W and matches whips, end fed wires and coax cable. Great for FT-817 etc. Totally self contained **£194.95**

KPA500 600W HF-6m Amplifier

Matches Any HF Transceiver

Kit **£2449.95** Built **£2699.95**

- 600W Solid State FET
- Same Size as K3D
- Built-in AC Power Supply
- Low noise analogue AC Supply
- Instant Operation
- RF sensed Band Change
- Ultra High Speed QSK
- No switching noise
- Able to receive band data
- 6 Speed temp. Sensing fan
- VSWR Protected

The KPA500 easily delivers 600W output and can be driven by any HF transceiver that can provide around 30W of drive power. Instant operation from switch on means that DX is not missed. The large bar graph give true pep indication and the small foot print will enable it to fit onto almost any desk.

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ICOM

ID-5100E Mobile

+ FREE MFJ 10% Discount Voucher

Dual band 2m / 70cms mobile offering 50W output on both bands and includes DTMF microphone **£574.95**

ID-4100E Mobile

It's the latest mobile form ICOM and includes terminal mode and airband AM monitoring as well as being a dual band D-Star radio. **£469.95**

Part Exchange Saves You Money PHONE TODAY

IC-7100 Mobile/Base

+ FREE MFJ 10% Discount Voucher

The IC-7100 is a complete HF-70cms radio that also includes 4m operation. You get a remote unit with extension cable and D-Star capability. **£998.95**

IC-7200 HF Base Station

+ FREE MFJ 10% Discount Voucher

We like he IC-7200 a lot. It is a very rugged HF transceiver and covers all bands from 160m to 6m. The picture shows the side handles which are extra, but really gives it a military look. **£799.95**

SP-10 Mobile Speaker

Get some decent audio in your car with this dedicated Icom mobile speaker. **£51.95**

IC-7300 HF - 4m Transceiver

Extra RX Antenna Input Option

Almost every ham operator knows somebody who owns an IC-7300. That in itself is a great recommendation. It is the most successful radio for many years. Primarily because it is based on SDR that offers so many advantages and results in such a great receiver. And the added bonus with the IC-7300 is the 4m coverage. It's a great all in one station with lovely colour screen full of information. The internal ATU copes well with most antennas and the touch screen makes operations much easier to navigate the various functions. **£1199**

New!

The New IC-R8600 Receiver

A Great Receiver at a Great Price **£2499**

- 10kHz - 3GHz SDR Wide Band Performance
- Absolute S-Meter Measurements
- Supr FPGA for ultimate processing
- Great Dynamic Range for modern band conditions
- 2000 Memories with full scanning
- Spectrum Scope with Waterfall
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ICOM

The NEW IC-7610 Transceiver

The new IC-7610 transceiver is now a reality. Few can fail to be impressed with the advanced technical promises. And nobody should be disappointed once their new radio arrives. We have good orders in for this radio and so will be happy to bring your dreams to reality. And if you need any additional items to go with your new radio then we are sure that we can delight you a great deal.

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- 100W HF Transceiver
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- Dual Antenna inputs plus BNC Receive
- Tuning steps down to 1Hz
- SDR Design throughout
- Dual select Pre-Amps
- Auto Antenna Tuner
- Ethernet and USB Connectors
- External Display Connector
- External Keypad and S-meter jacks
- Reciprocal Mixing DR 110dB
- Ultra low phase noise
- Dual Receive (Separate bands)
- Live Spectrum Display 5kHz to 1MHz
- 7" Colour Display
- SD slot for saving settings

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

£599

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TS-590SG

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

Call for best price

KENWOOD

TS-590SGE2 Limited Edition

Based on the current TS-590SG HF/50MHz transceiver, this Special Black version features a distinctive front panel, main dial and glass screen. It's a classic radio that you will be proud to own and will love to operate

£1699.95

AOR of Japan

AR-DV-10

At last!
A True Digital Scanner

New!

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- 10 Digital Modes
- inc Icom, Yaesu, DMR
- Auto Mode Detect
- Water Resistant
- Micro SD card backup
- Lithium Battery
- Data Management

At last, a scanner that will allow you to listen to digital signals. It automatically detects the mode. Of course it also works on AM and FM as well. A total communications monitor in the palm of your hand.

Available early 2018
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£995

AR-8200 MkIII

This 100kHz-3GHz scanning receiver covers all the popular modes including FM, AM and SSB. It is regarded as the industry standard by many and is also supplied for commercial use. Includes a ferrite LF antenna system for LW and MW and MW reception

£459.95

ACOM 1200S

1200S

A great new Desk Top amplifier that offers robust construction and excellent protection.

- 160m - 6m
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- Approx 70W Drive
- Colour Data Display
- Internal AC Power Supply
- 418 x 372 x 162mm
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BEKO Amplifiers

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70cms 770W Amplifier 25W Drive
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New!

FT-991A

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

Call for best price

New!

FTM-3200DE

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

Call for best price

FT-891

New!

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

Call for best price

FT-2DE

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

Call for best price

FT-857

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

Call for best price

FT-450D

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

Call for best price

FT-DX1200

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

Call for best price

FT-817 BHI-DSP

FROM STOCK

BHI DSP Filtering This micro size board fits inside the FT-817ND. A mini press button & LED are installed beneath the top cover for switching. The unit cycles through 4 levels of filtering and then reverts back to 'out of circuit' mode.

£769.95

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Variable 5W output
£129.95

FT-25E
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Transceiver with variable 5W output
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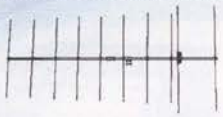
A great range of 6m, 2m and 70cms light weight Yagi antennas rated at 100W with Japanese engineering



A-502HBR....6m 2 El. Phased 6.3dBi 400W.....**£89.95**
A144S10R....2m 10 Element 11.6dBi 2.13m boom .**£73.95**
A144S5R.....2m 5 Element 9.1dB 1m boom **£39.95**
A-430S10R ..70cm 10El, 13.1dB 1.19m boom.....**£52.95**
A-430S15R ..70cm 15 El. 14.8dB 2.24m boom.....**£62.95**
A-1430S7.....Dual 2m/70cm 7/9dBi 1.25m boom..**£129.95**

WATSON Base Verticals

Colinear (fibreglass) with 2" mast fittings

W-30
45 Amp variable voltage switched mode power supply with 'noise shift' feature. **£54.95**

W-50
2m/70cm, 4.5/7.2dB gain and 1.8 meters long. **£64.95**

W-300
2m/70cm, 6.5/9dB gain and 3.1 meters long.
.....**£104.95**

W-2000
6m/2m/70cm, 2.15/6.2/8.4dB gain and 3.1meters long.
.....**£104.95**

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2-way Coaxial Switch N-type or SO239 connectors.
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.....**N-type £41.95**

CX-SW3PL / CX-SW3N
3-way Coaxial Switch N-type or SO239 connectors.
.....**PL259 £54.95**
.....**N-type £59.95**

CX-SW4PL / CX-SW4N
4-way Coaxial Switch N-type or SO239 connectors.
.....**PL259 £69.95**
.....**N-type £79.95**

WATSON PSU Power-Mite

20 Amp micro PSU variable voltage switchmode power supply, excellent value.

£84.95

Power-Max-45
45 Amp variable voltage switched mode power supply with 'noise shift' feature.
.....**£119.95**

Power-Max-65
65 amp variable voltage heavy duty switched mode power supply with 'noise shift' feature.
.....**£259.95**

AMERITRON USA

AL-811XCE

- 160m - 10m
- 600W Output
- 3 x 811 Valves
- Low Cost Valves
- Desk Top Size
- Buil-in PSU
- Easy set up

The ever popular Ameritron amplifier that is ideal for UK licence. Low cost valve replacement is a big plus point.

£995

BUDDIPOLE

The Buddipole is the world's leading portable HF band antenna system. It allows you to put it in a rucksack and enjoy true portable DX operation. It covers all bands from 40m to 2m.

Buddipole
The complete dipole system with elements, coils, versa-T, Balun and 25ft of coax with BNC and SO-239 adaptor.
£234.95

Buddipole Deluxe
All you need for working DX with a setup that goes together in minutes. You get the Buddipole as above, telescopic mast, tripod, rotating arm kit and extra coil taps and robust carry bag.
£470.95

Buddipole Deluxe - Long
If you want extra height (up to 20ft) then this package with the extra long mast is just the job!
£512.95

TYT DMR Radio MD-2017

Here's a great new DMR radio that features dual band operation and includes a FREE programming lead. It also offers FM on both bands

- Dual time slot
- Point to Point or Repeater Division
- Multiple-Access
- Compatible with Mototrbo
- Lone worker
- Encryption function
- Analogue & Digital
- Single or Group Call
- Remote kill/stun etc.
- Firmware upgrade-able
- IP67 Water resistant
- inc FREE program lead

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

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

6BTV
This antenna is identical to the 5BTV above but has the 30m band added. Again it handles full legal power and stands 7.3m high. **£289.95**
All antenna are rated at 1kW.

Diamond HF Mobile Whips

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

HF-10FX.....10m whip 1.1m long **£58.95**
HF-12FX.....12m whip 1.1m long **£58.95**
HF-15FX.....15m whip 1.2m long **£56.95**
HF-16FX.....17m whip 1.2m long **£40.95**
HF-20FX.....20m whip 1.2m long **£63.95**
HF-30FX.....30m whip 1.4m long **£63.95**
HF-40FXW.....40m whip 1.4m long **£64.95**
HF-80FX.....80m whip 1,4m long **£71.95**

W-300S Magnetic Mount
This is a 3-way mount that is great for HF operation. SO-239 socket and 4.5m cable terminated in PL-259....**£39.95**

Mosley Mini Beam 5 Bands

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

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The Ultimate Compact Antenna

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- Dipole Efficiency
- Remote tuning
- Controller included
- Mast mount kit
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MFJ-1788.....7MHz - 21MHz Continuous **£589.95**

Palstar ATUs

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

AT-500.....Differential Tuner 160-6m 500W **£529.95**
AT2K.....Manual ATU 160-6m 2KW.....**£599.95**
AT2KD.....Differential 160-6m 2kW.....**£599.95**
AT4K.....Hefty 160-10m 2.5kW Tuner **£1024.95**
AT5K.....160m-16m 3.5kW **£1249.95**
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These are ideal for 3-4 element HF Yagi or large VHF arrays.

RC5-1 ..Rotator with control...**£509.95**
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SDR Receivers

Airspy H+

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- 60MHz - 260MHz
- High Dynamic Range

A serious HF receiver with a great dynamic range. It also has VHF coverage for the ham radio 4m and 2m bands.

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- 1kHz - 2GHz • All Modes
- Great Price!

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All you need is a laptop and a copy of Windows software.

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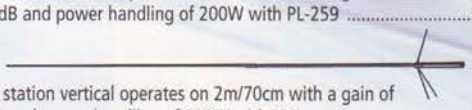
DIAMOND

V-2000
Triband base antenna operating on frequency bands 6m/2m/70cm utilises a linear phase shift design £99.95

CR-8900	4 band mobile whip antenna that was designed with the FT-8900 quad band mobile in mind but works with over radios	£89.95
X-30	Fixed station vertical operates on 2m/70cm with a gain of 3/5.5dB and power handling of 150W with PL-259	£48.95
X-50	Fixed station vertical operates on 2m/70cm with a gain of 4/7.2dB and power handling of 200W with PL-259	£59.95



X-200N	Fixed station vertical operates on 2m/70cm with a gain of 6/8dB and power handling of 200W with N-Type	£84.95
X-300	Fixed station vertical operates on 2m/70cm with a gain of 6.5/9dB and power handling of 200W with PL-259	£89.95
SRH-701	SMA 2m/70cm Dualband Telescopic Whip with power handling of 10W and 19cm long	£14.95
SRH-771	SMA 2m/70cm flexible Whip antenna with power handling of 10W and 40cm long	£14.95

SRH-815	High gain 15cm antenna for 2m/70cm/23cm power handling of 6W with SMA plug	£27.95
SRH-999	6m/2m/70cm/23cm Quad band HT Antenna that is of high quality and high gain	£35.95

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MFJ-928	200W ATU	£229.95
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MFJ-939K	Auto ATU for Kenwood	£176.95
MFJ-939Y	Auto ATU for Yaesu cable	£176.95
MFJ-941E	Manual HF ATU	£165.95
MFJ-945E	Mobile HF ATU	£154.95
MFJ-948	Manual ATU 300W	£187.95
MFJ-949E	Above + Dummy Load	£209.95
MFJ-962D	Manual ATU 1.5kW	£352.95
MFJ-969	Manual 160-6m ATU 300W	£253.95
MFJ-971	Portable HF ATU	£143.95

MFJ-969

HF+6m 300W antenna tuner with roller, antenna switch and XMTR. £249.95

MFJ-998

ATU with full 1500 Watts SSB/CW Digital & Analog SWR/WattMeter. 1.8-30MHz.

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MFJ-16010

200W variable random wire antenna tune capable of matching almost any length wire from 160-10m.

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MFJ-223

A compact handheld antenna analyzer that covers 1 - 60MHz. It features a high quality colour screen. It not only measures VSWR, but reactance and resistance with graphic plots. £532.95

MFJ-225

This wide range analyser covers 1.5 - 180MHz. It has USB connection and internal battery that can be charged. The screen has large clear characters. A graphic display provides response curves of VSWR and impedances etc. £472.95

MFJ-259C

This is the antenna analyser that started it all. Covering 1530kHz - 230MHz. If you prefer analogues metering then this meets the bill. But you can measure a lot more than resonance with all kinds of impedance and reactance figures to enable antenna adjustemnts, coax measurements, lengths, short circuits etc.

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MFJ-269C

Here's one of our best selling analysers with a very wide coverage from 530kHz - 470MHz. It is capable of handling very complex impedances and reactances. It's a great investment that can save so much time with antenna design and matching. But there is much more that it can also for for RF work.

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Review

SDRplay Radio Spectrum Processor 1A (RSP-1A)

The original RSP-1 was launched back in 2014 and provided a very useful wide coverage SDR platform at an affordable price point, see the review in the March 2016 *RadCom*. Since then, a more sophisticated version of the processor has been released in the form of the RSP-2. This used the same chipset but provided more user control with 3 optimised antenna ports that could be software selected along with external clock synchronisation and other enhancements. These enhancements came at a price and the RSP-2 currently costs £164.

PHOTO 1: The new RSP-1A builds on the original RSP-1 design.

The new RSP-1A builds on the original RSP-1 design with the same Mirics chipset but the SDRplay team have both refined the design and lowered the price. The result is a straightforward SDR receiver with continuous tuning from 1kHz through to 2GHz that costs just under £100 including VAT and DHL delivery.

RSP-1A improvements

I've summarised the improvements over the RSP-1 in **Table 1** and will run through them in a bit more detail here. Whilst the stability of the original RSP-1 was very good, it didn't use a temperature controlled crystal oscillator (TCXO). That has been rectified in the RSP-1A, which now has a 0.5ppm TCXO, along with a software option to trim the oscillator to within 0.01ppm. One of the problems facing wideband SDRs with analogue front ends is mixing artefacts. When the analogue mixer is exposed to 10MHz of RF bandwidth you need a very good quality mixer and excellent local oscillator purity to avoid generating spurious signals. You must also protect against overload/non-linearity in both the mixer and any RF amplifiers in the signal path. The conventional solution is to include, software switchable, RF preselection filters to tame the incoming RF and so minimise the problems. Following extensive experience with the RSP-1 and 2, the SDRplay team have increased the number of preselection filter bands from 8 to 11, see **Table 3**.

In addition to increasing the number of filters, the order has also been increased so the new filters are sharper. The filtering is further extended through the addition of a switchable AM/FM filter that attenuates the strong broadcast signals in the medium wave and VHF/FM broadcast bands. A second switchable filter has also been provided to deal with the commercial DAB signals in the 160MHz to 235MHz band. The filter profiles have been specially developed for the Mirics tuner architecture and are based on practical experience with the SDRplay receivers.

One of the shortfalls of the RSP-1 was very limited control of the low noise amplifier (LNA) in the front end. The only option was to switch it on or off and this was often too crude an adjustment. That is rectified with a new, 10-step variable gain control that makes it much easier to match the RF gain to the prevailing conditions.

Whilst the original RSP-1 had a tuning gap at 380MHz and a low frequency limit of 100kHz, the RSP-1A now features continuous coverage from 1kHz through to 2GHz.

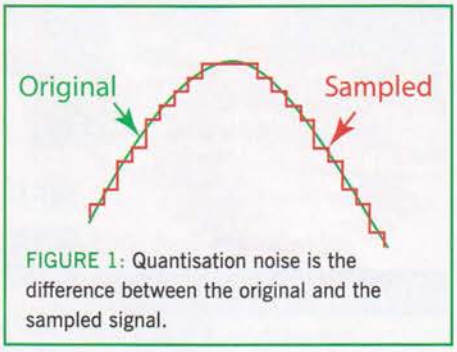
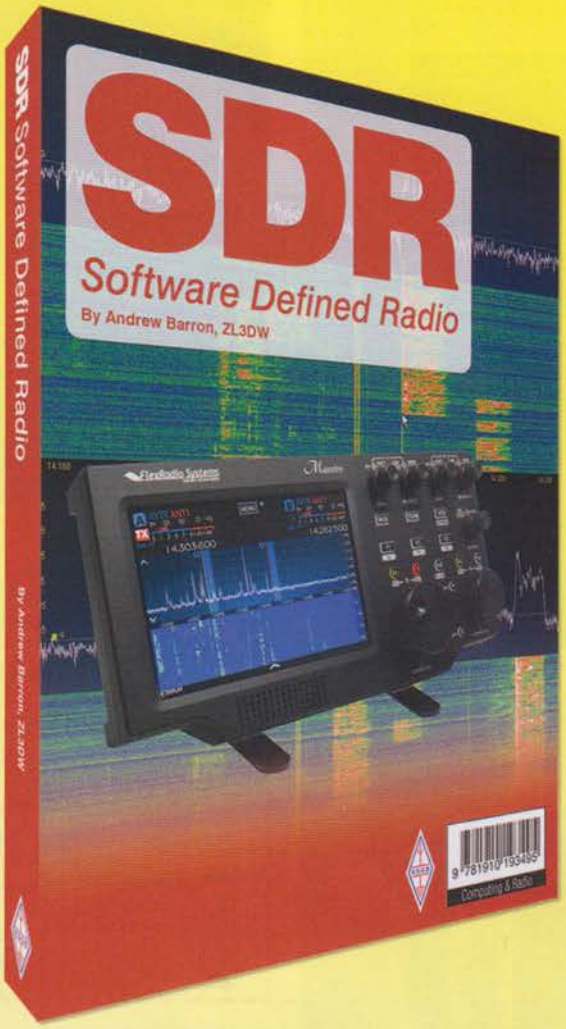


FIGURE 1: Quantisation noise is the difference between the original and the sampled signal.

The inclusion of a software controlled bias-T power feed is very welcome, especially for those with an interest in the higher frequency bands, where masthead preamps are often used. The bias-T also provides an opportunity for some DIY external antenna switching. Another small but useful improvement is the conductive screening finish that's applied to the inside of the case, see **Photo 2**. I'll cover the analogue to digital conversion (ADC) enhancement separately but the final point is the cost. The original RSP-1 retailed at £175 and the drop to just under £100 makes the RSP-1A a very attractive proposition.



NEW TITLE

Software Defined Radio

You wanted it, here it is!

By Andrew Barron, ZL3DW

Everyone is talking about software defined radio (SDR) but is SDR right for you? *Software Defined Radio* sets out to explain the basics without getting to technical and is written to help you to get the most out of your SDR. It will even help you decide what to buy.

Written by New Zealand based and acknowledged SDR expert Andrew Barron, ZL3DW, *Software Defined Radio* covers a huge range of material. The use of SDR by radio amateurs is growing rapidly in popularity as they become aware of the great features and performance on offer. Not only does this book cover how SDR works there are details the different types of software that are available, what is different about them and even what is better. There is a wealth of useful information included and even guides to what to look for when you are buying equipment. There are guides to using SDR with CW, Digital Modes, Contesting, EME, Microwaves, Satellites and much more. You will find information on over 60 SDR radios that you can buy today featuring leading brands such as FlexRadio, Elecraft, Anan, Expert, Elad, Icom, WiNRADiO, SDRplay, FUNcube and many more.

Software Defined Radio is intended for radio amateurs, short wave listeners or anyone interested in radio technology. If you are interested in the technology of what was once, the domain of a few dedicated hackers and experimenters, the future of this exciting and fast developing area of radio or simply want to buy a SDR radio, this book is thoroughly recommended reading.

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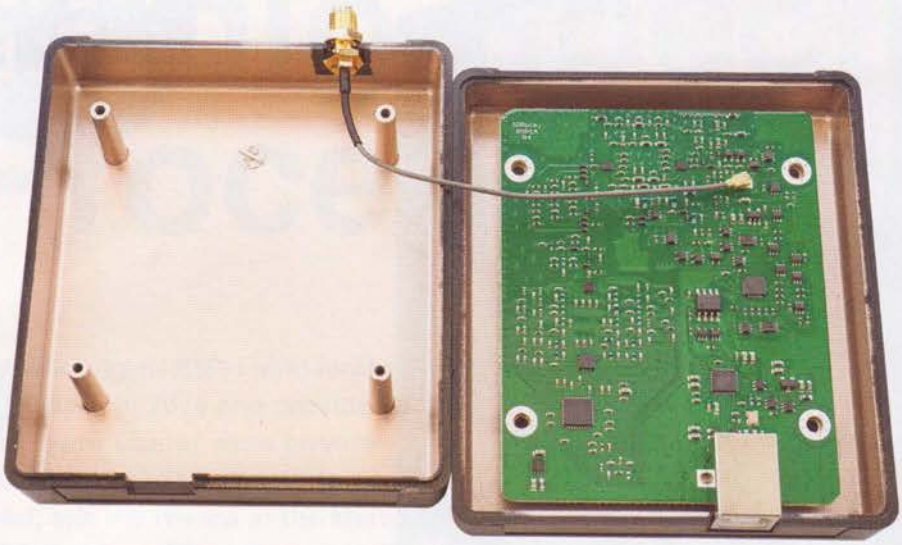

PHOTO 2: Inside view of the RSP-2 showing the silvery conductive internal finish.

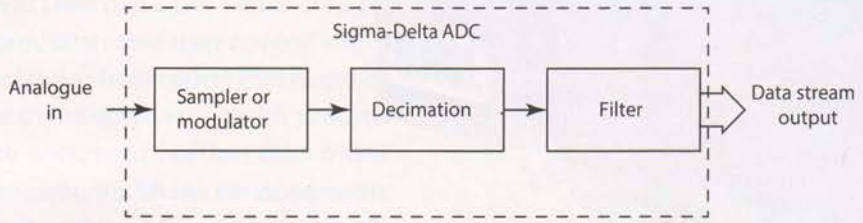

FIGURE 2: Simplified illustration of a Sigma-Delta ADC.

14-bit ADC

When I first saw the promotional material on the RSP-1A I was curious how they had managed to increase the ADC resolution from 12-bit to 14-bit without changing the chipset. A quick note to the SDR play support team revealed a very clear explanation and I'll try to cover it here. The ADC is crucial to any SDR as it's the device that converts the incoming analogue RF signal into a digital format that can be processed by the SDR software. The basic ADC conversion process is straightforward and requires a series of voltage measurements to be taken to capture the incoming signal. The frequency of the voltage readings is clearly important if we are to faithfully capture the analogue signal. Harry Nyquist was the man that developed the theorem that you are probably familiar with where you need to sample (take voltage readings) at twice the rate of the highest frequency signal you want to capture. As an example, if you want to capture the RF spectrum from 0–10MHz you need to take measurements at greater than 20 million times per second. The output this type of ADC is a stream of numbers containing the voltage readings. The resolution of these voltage readings depends on the number of bits used for each reading. I've shown a table of the relationship between resolution and bits in **Table 2**. Like all devices, ADCs introduce noise into the system and the main culprit is quantisation noise. This is caused by the sampling process and is simply the difference between the original smooth signal and the digitally sampled signal. The digital signal will comprise a series of steps for each level change as shown in **Figure 1.** The ADC used in the RSP-1A is a more complex device that employs what's known as Sigma-Delta sampling, **Figure. 2**. In this technique, the core ADC samples with much fewer bits than the target output but it does so at a much higher sampling rate. This can be many times the basic Nyquist rate that I mentioned earlier. Although the sampling uses fewer bits, so has less resolution than we want, this is compensated for by the much higher sampling rate. To transform this high-speed data into the target bit rate (14 bits) the ADC includes a 'decimation' (or under-sampling) stage. One of the advantages of this technique is a reduction in quantisation noise. This occurs because the high sampling rate includes frequencies beyond those we need, and these are filtered out, along with the associated quantisation noise during the decimation and filtering. This extension from 12 bits to 14 bits has been achieved using a decimation option that was not previously revealed in the Mirics chipset. This additional resolution is only available below 6MHz and is automatically activated when you're tuning in that range.

TABLE 1: RSP-1A Enhancements over the RSP-1.

0.5ppm TCXO
Enhanced RF preselection filters
Selectable AM/FM and DAB notch filters
Variable gain LNA
Improved intermodulation performance
Lower frequency coverage extended from 10kHz to 1kHz
Software controlled bias-T
ADC resolution increased to 14 bits (below 6MHz)
Conductive plating inside the enclosure
Lower retail price

On the Air

All SDR hardware is dependent on software developers providing the computer interface and access the SDR features we have come to expect. The SDRplay range of receivers have their own software support through the SDRuno package. This provides all the controls you expect to see and has been optimised for the SDRplay hardware. The software is a free download and is available from the SDRplay website at www.sdrplay.com. I've shown a screenshot of the software in operation in **Figure. 3**. One often overlooked feature of SDRuno is the RF signal level measurement. The software uses internal gain profile tables to calculate and display the RF signal level in dBm. This feature works with all the RSPs including the RSP-1A. In my tests, the accuracy is around ±1dB, making it a very useful measuring receiver. In addition to their own SDRuno, several other popular packages provide software support for the RSP-1A, including SDR-Console and HD-SDR.

Many of the improvements in the RSP-1A focus on minimising the spurious responses due to out-of-band or very strong signals so the benefits will only be noticeable when

Mike Richards, G4WNC
mike@photobyte.org

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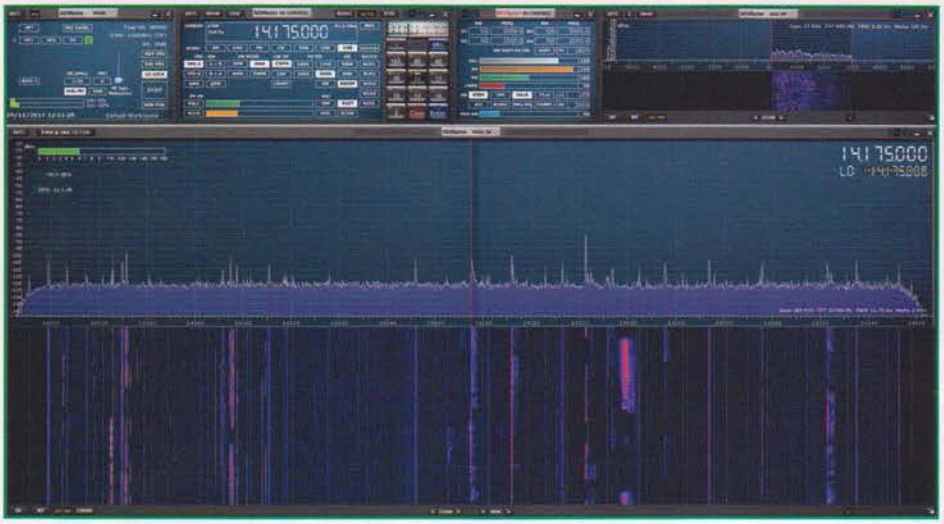

FIGURE 3: SDRPlay's SDRuno running with the RSP-1A.

those signals are present. I found the 10-step RF gain control to be extremely useful and a significant improvement over the on/off LNA control of the previous version. When working on 40m in the evenings, my antenna system can drive the ADC into overload, but I was able to fine tune the RF gain for maximum sensitivity whilst avoiding that overload. The TCXO was another important improvement especially as there are so many narrow band data modes around that require accurate tuning and low drift. The review model required just +1.2ppm correction in the SDR software to get it spot-on and it remained there despite the wide temperature fluctuations in the shack. The 14 bits of ADC resolution below 6MHz is good to have but you won't really see the benefit unless you have very low levels of QRM.

Summary

It's good to see that SDRplay have been listening to their customers and implemented an excellent range of enhancements, whilst delivering a very low price. The RSP-1A is now a very attractive proposition for those wanting a wideband, budget, SDR. The RSP-1A is significantly better than any of the RTL-based alternatives. Some will be wondering whether they should upgrade from the RSP-1 and I would say it's certainly worth it if you are experiencing strong signals. The combination of the new filter banks and the 10-step RF gain control make it easy to tame the incoming signal for best overall performance. Also, don't forget the bonus of RF level measurement. The SDRplay RSP-1A costs £99.60 inclusive of VAT and DHL carriage and is available from SDRplay (www.sdrplay.com). My thanks to them for the loan of the review model.

TABLE 2: Bits vs Resolution.

Data bits	Resolution (steps)
8	256
10	1,024
12	4,096
14	16,384
16	65,536
18	262,144

TABLE 3: RSP-1A filter bands.

Filter Bands	Type
2MHz	Low pass
2-12MHz	Band pass
12-30MHz	Band Pass
30-60MHz	Band pass
60-120MHz	Band pass
120-250MHz	Band pass
250-300MHz	Band pass
300-380MHz	Band pass
380-420MHz	Band pass
420-1000MHz	Band pass
1000MHz	High pass
85-100MHz	Notch
660kHz-1.55MHz	Notch
165-230MHz	Notch

Feature

Some simple tips to get the best from RSGB publications

Clubs and other organisations are welcome to publicise their events through the pages of *RadCom*, GB2RS, the RSGB website and social media. But there are some simple tips to getting the best results.

Club Events Calendar and GB2RS

A single database is used to produce the entries in Club Calendar and Local News for GB2RS broadcasts and online news. All entries should be sent by email to radcom@rsgb.org.uk – please DON'T copy the information to any other editorial or HQ address, because this leads to duplication of effort and, occasionally, entries falling through the cracks.

At the start of your email, please put the FULL club name (NOT just initials) and your RSGB Region. Keep your Calendar entries simple and short. Remember to include contact details explicitly: don't just assume we know that you (or Fred) are the club contact. Always include the contact's name, callsign, email and phone number.

An ideal calendar entry is along these lines:

Fraser Road Radio Club, Region 9
Contact Steve Thomas, M1ACB, 01234 832 700, email gm.dept@rsgb.org.uk
March 2018
3 Club night in shack
12 Club net, 145.525MHz, 8pm
23 Talk on meerkats, Bob, G9ABC
30 Club net, GB9ABC, 8pm

Events Roundup

Keep your news item concise, no more than about 175 words about each event. If you are sending a photo, please make sure to attach it to your email as a separate jpg – *never* embedded in the email or a Word document. Try and avoid lines of people, including those holding certificates. Pictures of people taking part in radio activities are always more interesting to *everyone* reading *RadCom*. We cannot print every photo we receive within the 3 pages available to Around Your Region, so preference is given to high quality, interesting images of club activities. It is essential that you are either the originator, copyright owner, or have the written permission of the copyright owner for all images that are included in the submission. If your photos include identifiable children, you MUST make sure you have the parent or legal guardian's permission before submitting their likeness for publication. Further info is at www.tinyurl.com/RadComPix

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Sport Radio

Happy New Year everyone. We start the new series of FM Activity Contests and UK Activity Contests this month.

The traditional RSGB HF events for January are joined this year by a third. CW AFS takes place on Sunday 7th and SSB AFS six days later, on Saturday 13th. The new event is a Datamodes AFS, on Saturday 20th. Each of them runs on 80m and 40m for four hours. With the solar cycle in its current state, I expect 40m will go long skip early and 80m will go long skip before the end. After that things get a bit scrappy, but that's where these events can be won or lost. Last year, as the skip was long, Scottish stations took all the top spots in the Open section. All three contests are Affiliated Societies Super League qualifying events. Please check the rules for changes in the maximum radius, and Local and National clubs.

Activity Contests

The new series of FM Activity Contests and UK Activity Contests starts this month. Will a team be able to challenge the 807ARO group in the UKAC Local Club section this year? This column was written in late November 2017, at which point it looked like they were going to sweep the board and win every band. The first FMAC and UKAC contests take place on 2m on Tuesday 2nd. The 70cm FMAC and UKAC take place on Tuesday 9th, followed by the NEW 6m FMAC and the 6m UKAC on Thursday 11th. The following week we have the 23cm UKAC on Tuesday 16th, followed by the 4m FMAC and UKAC on Thursday 18th. Finally, the SHF UKAC is on Tuesday 23rd. For those of you who've not tried the FMACs before, believing that you'll never get far on FM, consider the fact that the top 50 watt 2m entrants often make QSOs over 400km (250 miles) and the top 10 watt stations often make QSOs up to 300km (190 miles). Remember please that the scoring system for the UKACs changes for 2018.

Other contests

The WAB (Worked All Britain) Christmas Party started on Boxing Day and continues until Saturday 6th. It's an exercise in collecting WAB Book numbers. The UK Six Metre Group's Winter Marathon began at the start of December and

continues until the end of January. Collect Locator squares – and if you get the most, expect to be awarded a nice certificate like the one above.

On New Year's Day the IRTS (Irish) 80m Counties Contest runs for two hours. Work EI and GI stations only. The 32 Irish counties act as multipliers. The UKEICC 80m series recommences, after its customary month off. The event on Wednesday 3rd is SSB. The ARRL RTTY Roundup runs for 30 hours over the weekend of 6-7th. Entrants are limited to a maximum operating time of 24 hours.

Next come the two sessions of the European

Continued on page 52

Steve White, G3ZVW
steve.g3zvw@gmail.com

RSGB HF Events

Date	Event	Times (UTC)	Mode(s)	Band(s)	Exchange
Sun 7 Jan	CW AFS §	1400-1800	CW	3.5, 7	RST + SN
Sat 13 Jan	SSB AFS §	1400-1800	SSB	3.5, 7	RS + SN
Sat 20 Jan	Datamodes AFS §	1400-1800	Data	3.5, 7	RST + SN

RSGB VHF Events

Date	Event	Times (UTC)	Mode(s)	Band(s)	Exchange
Tue 2 Jan	144MHz FMAC	1900-2000	FM	144	RS(T) + SN + Locator
Tue 2 Jan	144MHz UKAC	2000-2230	All	144	RS(T) + SN + Locator
Tue 9 Jan	432MHz FMAC	1900-2000	FM	432	RS(T) + SN + Locator
Tue 9 Jan	432MHz UKAC	2000-2230	All	432	RS(T) + SN + Locator
Thu 11 Jan	50MHz FMAC	1900-2000	FM	50	RS(T) + SN + Locator
Thu 11 Jan	50MHz UKAC	2000-2230	All	50	RS(T) + SN + Locator
Tue 16 Jan	1.3GHz UKAC	2000-2230	All	1.3G	RS(T) + SN + Locator
Thu 18 Jan	70MHz FMAC	1900-2000	FM	70	RS(T) + SN + Locator
Thu 18 Jan	70MHz UKAC	2000-2230	All	70	RS(T) + SN + Locator
Tue 23 Jan	SHF UKAC	2000-2230 ~	All	2.3-10G	RS(T) + SN + Locator

Best of the Rest Events

Date	Event	Times (UTC)	Mode(s)	Band(s)	Exchange (info)
1-6 Jan	WAB Christmas Party	All	All	All	WAB Book number
1-31 Jan	UKSMG Winter Marathon	All	All	50	RS(T) + Locator
Mon 1 Jan	IRTS 80m Counties	1500-1700	SSB/CW	3.5	RS(T) + SN (EIs & GIs also send County)
Wed 3 Jan	UKEICC 80m	2000-2100	SSB	3.5	4-character Locator
Sat-Sun 6-7 Jan	ARRL RTTY Roundup	1800-2359	Data	3.5-28	RST+ SN (Ws send State, VEs Province)
Sat 6 Jan	EUCW 160m CW Party	2000-2300	CW	1.8	See text
Sun 7 Jan	EUCW 160m CW Party	0400-0700	CW	1.8	See text
Sat 20 Jan	WAB 1.8MHz Phone	1900-2300	SSB	1.8	RS + SN + WAB square
Fri-Sun 26-28 Jan	CQ WW 160m DX	2200-2200	CW	1.8	RST + CQ Zone (Ws send State, VEs Province)
Sat-Sun 27-28 Jan	BARTG RTTY Sprint	1200-1200	RTTY	3.5-28	SN
Wed 31 Jan	UKEICC 80m	2000-2100	CW	3.5	4-character Locator

+ VHF Championship event. § Super League event. ~ Different bands at different times. For all the latest RSGB contest information and results, visit www.rsgbcc.org

Design Notes

Readers' feedback

After reading November's column referring to the SKY12239-11 PIN diode attenuator, Peter, G3YYN wrote in to say "I'd like to raise a possible word of caution here about the internal biasing. A receiver project I was working on in 2015 had cascaded SKY12347-362LF attenuators incorporated in one of the IF channels. It turned out that those devices have a free-running oscillator operating around 4.58MHz in the internal negative bias generator. There is no mention of the oscillator in the data sheet.

"This oscillator resulted in a comb of lines extending up past 50MHz. I never characterised a single chip to ascertain the typical levels, however the comb lines rattled around this design at around the -55dBm level. Skyworks technical support USA were, at first, pretty much disbelieving of the problem. As the issue was escalated up their tech support food-chain the presence of the oscillator emerged, however it was suggested *... that this wasn't a problem for designers in the main intended application of level control in cellular base station transmitter drivers...*!

"Hittite's silent HMC624 devices, which do not have oscillators in their bias generators, were quickly substituted for the Skyworks product. I stress that I have no evidence that the SKY12347 device has a similar HF problematic bias generator, but it is possible. It is natural for device designers to reuse proven in-house library modules from previous designs in new products, so I feel there is certainly a risk of a problem."

Russ, G4SAQ received an email from Analog Devices advertising a new component, the ADL5920. He states "This device seems remarkable. The maximum power is 1W but I find it intriguing. I thought you might like to see it." The device is an integrated combined directional bridge and dual RMS detector covering 9kHz to 7GHz (and yes, I DO mean audio frequencies to microwaves). See the data sheet at **[1]** for more details.

Finally, Godfrey Manning, G4GLM says: "Throwing out old semiconductors? Surely not! Well, it depends on *how* old. I keep some germanium discrete devices in support of the vintage radios in my collection and certain types are hard to get. If you think of throwing anything like that away, please let me know first!

"Conversely, I also keep a bank of surplus older semiconductors that have shown acceptable results on testing. If anyone needs one for a genuine project (eg restoring an old radio) then they are welcome to enquire. If I have the device or substitute then I make it available free of charge as long you provide a reply-paid self-addressed mailer. I'm QTHR, or email cgmm2@btinternet.com. Please note that requests for OC44 will be met with the CV7003 metal can substitute. Your article also mentions another of my historic restoration projects. I have a complete but non-working Teletype ASR33 that communicates by current loop. Another restoration project, I think".

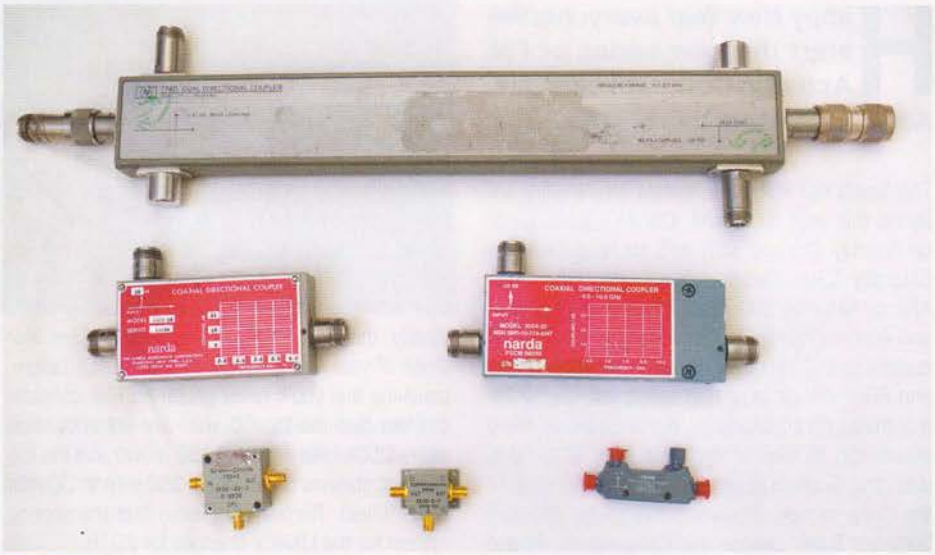

PHOTO 1: Several directional couplers. Top: test equipment standard 100-2000MHz with a directionality of at least 40dB. Middle: typical medium power rated couplers used for forward power monitoring, covering 2-4GHz and 4-10GHz. Directionality of both is only in the region of 20dB. Bottom: smaller 0.2-750MHz, 10-200MHz and 2-8GHz units for incorporating into equipment.

Measuring a mismatch

I recently needed to make a return loss (RL) measurement to optimise the match on a 3.4GHz antenna but don't have access to a network analyser covering that frequency band. I do, however, have other test equipment; namely a tuneable microwave source, spectrum analyser for power detection, and a directional coupler covering 2 – 4GHz with -10dB coupling. So the test setup in **Figure 1** was put together to measure the return loss.

The important item for measuring RF matching is the directional coupler and these were covered in some detail, particularly with regard to their use in SWR meters, in the July 2015 Design Notes. **Photo 1** shows several directional couplers covering a range of frequency bands.

Operating 'backwards' as shown, the directional coupler ideally responds only to power reflected from a mismatched load. Initial calibration is made by assuming that an open circuit (or an RF short circuit if one is to hand) gives complete reflection and the power seen at the coupled port under this condition is taken to be the reference. When a mismatched load is placed on the test port, the power seen at the coupled port should be lower than this reference by an amount equal to the return loss of the load. A good test is to use a low value (unterminated) attenuator; say a 3dB pad which should present a RL of 6dB. This comes from 3dB forward loss then another 3dB back from the total reflection.

When a perfect load is used the output should ideally be zero ('a lot of dB down'), but unfortunately mine didn't do all that well. I tried several known good loads, including several 20dB 18GHz pads but all resulted in a reduction of coupled power of only around 21dB. It was therefore going to be impossible to determine or adjust any return loss to better than this value **[2]**. The problem is caused by a property of the directional coupler known as its 'directivity' – the degree by which the reflected and forward travelling waves are isolated from each other, or balanced out. It is a function

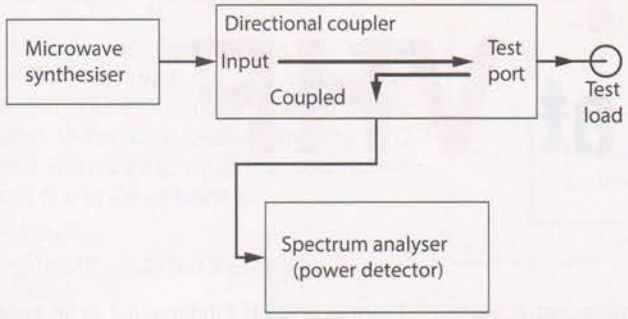

FIGURE 1: Setup using an RF source, directional coupler and power detector (in this case a spectrum analyser) for testing and adjusting the match of an antenna load.

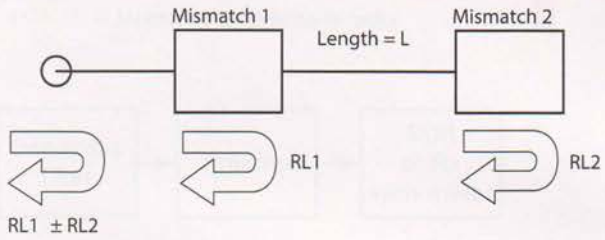

FIGURE 2: When two RF components each having a mismatch are cascaded, the return losses coherently combine with each other. Depending on the length L, the result can be to either reduce or increase the resulting input return loss when compared with the worst of the two individual values.

of how well the unit is made and its design purpose – when used for forward power measurement, good directionality often isn't important. In most low frequency SWR meters this is adjusted using preset pots or adjust-on-test components for zero reflected reading on a perfect load. But my directional coupler was a sealed unit and had to be used as-is. While OK for most practical purposes and just about adequate for setting up my antenna, for a test setup it would be nice to do significantly better. On other bands I have better directional couplers – the big one in Photo 1 covering 100MHz to 2000MHz, for example shows more than 40dB reduction when a good load is used. But return loss measurement accuracy can become quite a bit worse when directivity is poor.

Cascaded return loss

When two mismatched passive [3] RF components are cascaded as shown in **Figure 2**, the reflected powers, RL_1 and RL_2 both appear together at the input port. Now we have an additional complication as these don't just add numerically. We have to consider the phase shift caused by the length of line, L, between the two elements which the signal resulting in RL_2 has to pass through twice. This introduces an unknown phase shift between the two reflections that may either cause them to add in phase, to add in anti-phase or more likely just do something in between.

For example, initially assume that RL_1 and RL_2 both have the same value, say 20dB (or 0.1 if expressed linearly). If the two reflections, purely by fluke, add in phase, ie L is an even number of quarter waves, the return loss values add coherently. So $RL_{total} = RL_1 + RL_2 = 0.2 = 14dB$. So two 20dB RL values cascade to give a worst case value of 14dB. Conversely, if L is an odd number of quarter waves, the two RL components add in antiphase. Having the same amplitude the result will be total cancellation, with the input appearing as a perfect match.

Two rules of thumb can be applied to get a feel for the limits of such tests. One, quoted by Chris Bartram, GW4DGU in an RSGBTech exchange, uses the mismatches expressed as a VSWR. In that case the limiting values of possible VSWR caused by two mismatches is given by VSWR1 * VSWR2 and VSWR1 / VSWR2. So if we have two components, each with a VSWR of 1.2:1 the worst case is therefore 1.44:1 and the best case is 1:1. Most likely it will lie somewhere in between. The other way is add or subtract the return loss (in linear values) for the limits. The same uncertainty applies to the test coupler, so if I subsequently tweaked my antenna for zero coupled power, its actual return loss would be equal to the 21dB directivity of the coupler.

In practice, a value of around 20dB coupled power was seen once I'd finished tweaking. This means my antenna is either a near-perfect match or could be as bad as -14.4dB (VSWR = 1:1.5). Adequate, but a slight feeling of dissatisfaction pervades...

The network analyser

Using coherent detection, the reflected signal from the coupled port can be compared in both phase and amplitude with the output from another coupler configured for forward signal monitoring. By measuring phase as well as amplitude between the two, it is now possible to derive the actual impedance of the load and work out what is actually happening, instead of relying on worst and best case values. The effects of imperfect couplers can be taken out mathematically.

A calibration kit is essential. In its basic form the kit will consist of an open circuit with known dimensions, a well-defined short circuit and a good load. Before use, the network analyser (under automatic computer control, but with human prompting) goes through a calibration phase where each of these terminations is connected in turn to the measurement port. Each is measured over the range of frequencies of interest then, via some horrendously complicated complex arithmetic, all the unknowns in the RF path are solved and removed. Thus the complex impedance (resistance and reactance) of the test load can be determined without ambiguity. By adding another test port and phase/amplitude measurement path, two-port measurements can be carried out allowing transmission loss, gain etc to be determined. The calibration procedure here now has to be extended by making a through connection linking port 1 direct to port 2 to determine loss, mismatch and leakage.

Websearch

[1] Analog Devices directional coupler – https://tinyurl.com/DN-0118 or www.analog.com/en/products/rf-microwave/rf-power-detectors/rms-responding-detector/ADL5920.html#product-overview

[2] To relate return loss to VSWR, an RL of 21dB is converted as follows: 21dB RL expressed as a linear number = $10^{(-21/20)} = 0.089$. VSWR = (1 + 0.089) / (1 – 0.089) = 1.2:1 (well, near enough). Return loss is a quantity, a bit like voltage and current, that requires use of the 20.LOG form when expressed in dB and has to be squared when converting to power. As the term is return 'loss', a value that is always less than unity is therefore indicated by a positive value of dB.

[3] Clearly the rules cannot apply when an active component such as an amplifier forms one of the RF components. Power reflected from a load mismatch on the output usually just disappears inside the amplifier (often as dissipated heat or as a change in DC supply input) resulting in an unknown and minimal effect on its input matching.

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Measuring spectrum pollution at VHF

Introduction

In his lecture on 'Electrical Units of Measurement' given to the Institution of Civil Engineers on 3 May 1883, Lord Kelvin, one of the fathers of modern engineering and science, stated

"...when you can measure what you are speaking about, and express it in numbers, you know something about it; but when you cannot measure it, when you cannot express it in numbers, your knowledge is of a meagre and unsatisfactory kind; it may be the beginning of knowledge, but you have scarcely, in your thoughts, advanced to the stage of science".

This article is based on a talk [1] given by Alwyn Seeds, G8DOH at the 2017 RSGB Convention and aims to present simple methods to measure the received noise level at VHF/UHF. The received noise level at your location is critically important because it determines the weakest signals that can be received successfully. In many cases it defines the overall performance of your VHF station, and no amount of technology or expensive rigs and antennas can, in the end, overcome its influence. The article also covers an introduction to noise units and measurement, and describes some of the noise sources at VHF/UHF, including radiated noise from amateur transmitters.

Units of power

In SI [2] units, power is measured in watts (W) and it is often useful to measure the ratio between two powers, P/Pr, such as the loss or gain of a circuit; this is a dimensionless quantity and these ratios can sometimes be large – eg the path loss between two antennas. This ratio is usually expressed in decibels (dB), where power ratio (dB) = $10 \log_{10}(P/Pr)$. This should not be confused with dBW or dBm, which are used to specify *absolute* powers, expressed as the ratio of a power measured in milliwatts (mW) or watts to either 1mW or 1W respectively:

Power P in dBm = $10 \log_{10}(P/(1mW))$ and

Power P in dBW = $10 \log_{10}(P/(1W))$

Noise

Noise is defined as a random fluctuation in a quantity. In the field of amateur radio, we experience this noise as a background to the signals we hear at the output of our receiver. More specifically, white noise is noise that has uniform power with frequency. It has measurement units of power, ie watts (W). If we want to define the amount of noise in a given bandwidth, we define 'noise spectral density' (NSD). This is the noise power per unit bandwidth and has units of power divided by bandwidth, or watts per hertz.

Thermal noise

Thermal noise is fundamental to all systems above a temperature of absolute zero (0K) and is the noise created by the thermally induced random motion of charge carriers. The thermal noise power of a resistor P_n is proportional to the temperature of the system T and the measurement bandwidth B. It is equal to k times T times B (kTB), where k is Boltzmann's constant, 1.38×10^{-23}J per K. T is the temperature in kelvin and B the measurement bandwidth in Hz.

As an example of this thermal noise, in **Figure 1** a resistor at *standard noise temperature*, T_o, 290K (16.85°C) generates a noise power in 1Hz bandwidth of

$P_n = kTB$

$= 1.38 \times 10^{-23} \times 290 \times 1$

$= 4.00 \times 10^{-21}$W

$= -174$dBm/Hz

Received noise measurement

To measure received noise from a receiver with gain G and added noise power N_a, we can substitute the antenna with a 50Ω resistor as a noise source. **Figure 2** shows the noise produced by each. Power out with the load connected is equal to

$P_{outL} = GkTB + N_a$

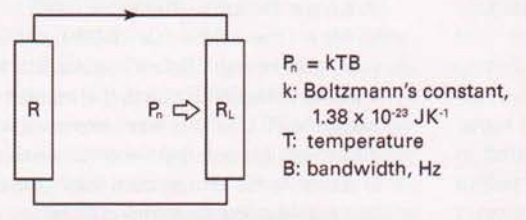

FIGURE 1: Noise power generated in a resistor.

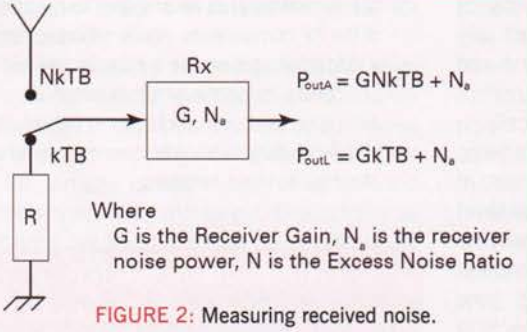

FIGURE 2: Measuring received noise.

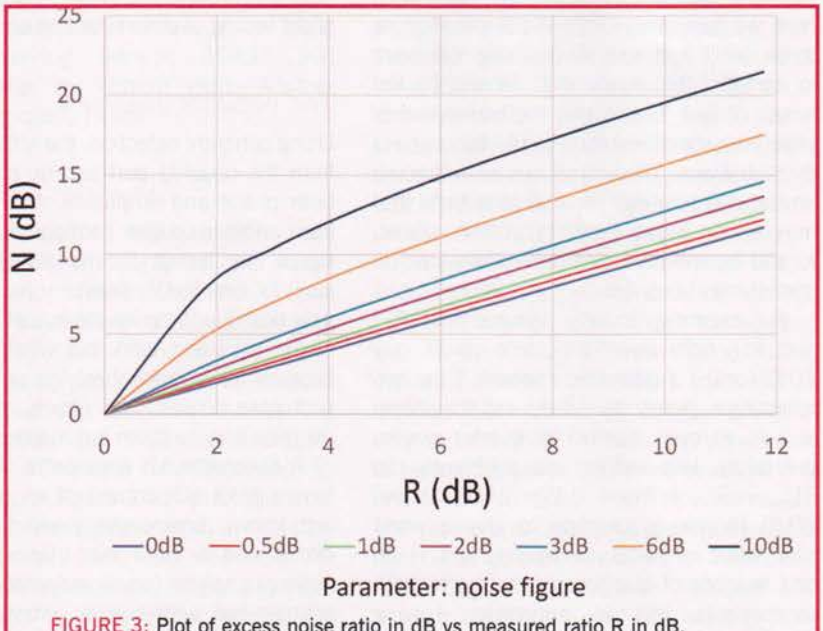

FIGURE 3: Plot of excess noise ratio in dB vs measured ratio R in dB.

With the antenna connected it is

$P_{outA} = GNkTB + N_a$

where G is the receiver gain, N_a is the receiver noise power, N is the excess noise ratio, the ratio of the noise received by the antenna to the noise received from the 50Ω resistor. Rearranging, we get the noise power ratio R due to the antenna as

$R = P_{outA}/P_{outL}$

$= (GNkTB+N_a)/(GkTB+N_a)$

or

$N = (P_{outA}/P_{outL})[1+N_a/(GkTB)]-N_a/GkTB$

For a receiver with negligible internally generated noise, $N = R = P_{outA}/P_{outL}$, so that we can determine the excess noise ratio simply by comparing the output noise of the receiver when connected to the antenna to that when connected to the 50Ω load.

For receivers with non-negligible internally generated noise the excess noise ratio is greater than the noise power ratio measured at the receiver output and a correction factor is required, depending on the receiver noise factor.

N_a can be expressed in terms of the receiver noise factor *F*:

$N_a = G\,[F-1]kT_oB$

where *F* is the noise factor and T_o is standard noise temperature, 290K. Thus, the excess noise ratio, N, in terms of the receiver noise factor is

$N = F(P_{outA}/P_{outL})-F+1$

Note that the familiar 'noise figure' NF is simply the noise factor expressed in dB:

$NF(dB) = 10\log_{10}(F)$.

If we take the example of a receiver with a measured noise figure of 3dB ($F = 2$),

$N = F(P_{outA}/P_{outL})-F+1$

$= 2(P_{outA}/P_{outL})-2+1$

$= 2(P_{outA}/P_{outL})-1$

If we plot the excess noise ratio in dB vs the measured ratio $R = (P_{outA}/P_{outL})$, between the noise with the antenna and the noise with the 50Ω load in dB with the receiver noise figure, also in dB, as a parameter, we get **Figure 3**.

The excess noise ratio, N, is found from the intersection between the measured ratio, R and the curve for the noise figure of the receiver.

Noise Factor measurement

The noise factor of the receiver can be found from equipment reviews or can be measured with a calibrated noise source, as shown in **Figure 4**.

The baseline noise power and excess noise ratio can be measured using a calibrated receiver. Computer software such as that used for many digital modes including the WSJT suite (using the spectrum/waterfall window) allows direct measurement of received power changes. Alternatively, a receiver with AGC switched off and a multimeter capable of measuring AC voltages at the receiver audio output can be used, as shown in **Figure 5**.

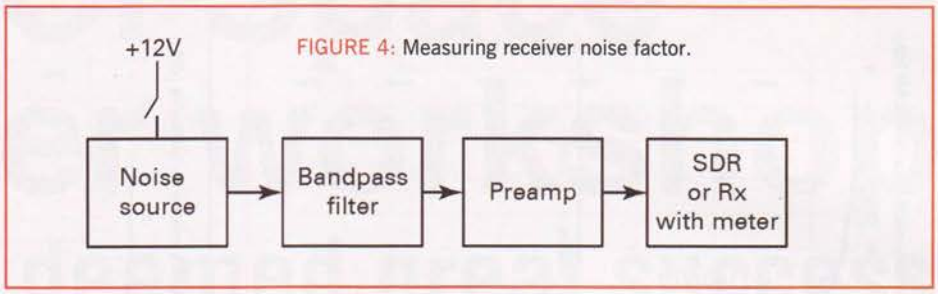

FIGURE 4: Measuring receiver noise factor.

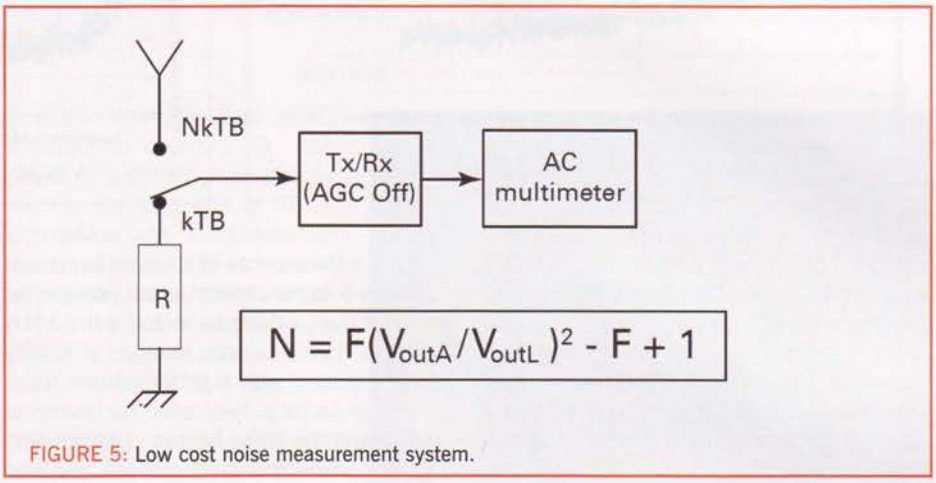

FIGURE 5: Low cost noise measurement system.

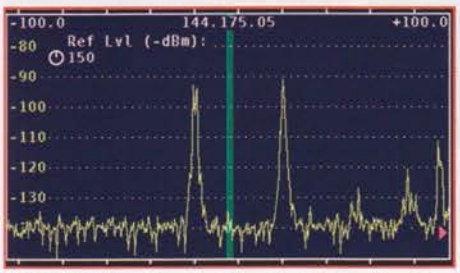

FIGURE 6: Spectrum with noisy transmitter off.

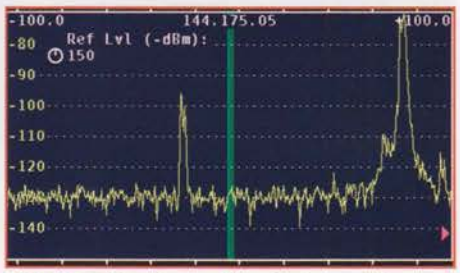

FIGURE 7: Spectrum with noisy transmitter on.

We need to test at several different audio levels to ensure that noise levels are within the linear range of the detector. The excess noise ratio is then found from

$N = F\,(V_{outA}/V_{outL})^2 - F + 1$

where V_{outA} and V_{outL} are the AC voltages measured at the audio output with the antenna and the load connected respectively.

Received noise

At a perfect quiet site with no man-made noise and with an antenna pointed at the horizon, allowing for the fact that at least half of an antenna's main lobe is looking at the ground and the other half looking at galactic noise, the lowest excess noise ratios we would expect to measure would be those shown in **Table 1**.

In practice, noise floors can be up to 10dB above these values and higher still in urban areas. Receivers should have internally generated noise less than these levels and transmitters within the band should not raise them.

Some real world measurements of band noise in rural Oxfordshire (IO92fa) were made by G8DOH and are shown in **Table 2**. These should be compared with measurements shown in **Table 3**, made in central London, IO91vl, where the received noise levels were much higher.

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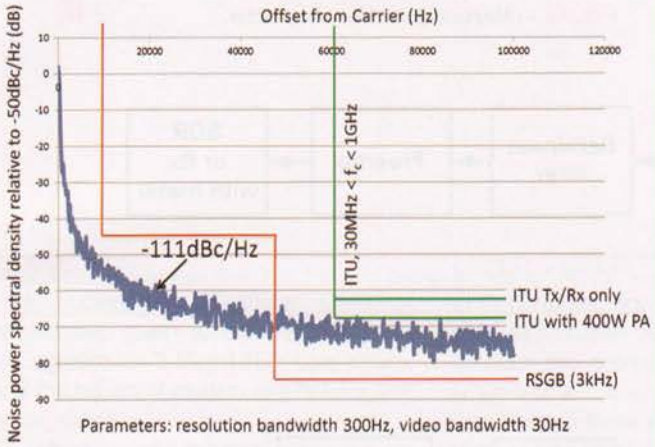


FIGURE 8: A 'noisy' 144MHz system – IC-910H + PA.

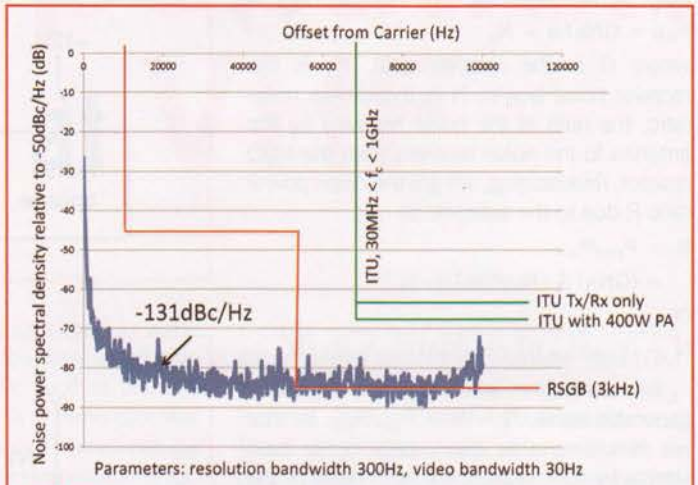


FIGURE 9: A 'quiet' 144MHz system – Elecraft K3 + transverter + PA.

External noise sources at VHF/UHF

Many items of electrical equipment can generate unwanted noise at VHF; these include switch mode power supplies for lighting, photovoltaic converters for domestic and industrial solar panels, IT equipment, Ethernet, including Power over Ethernet (POE) and digital subscriber line (DSL) wiring.

Transmitter noise

Radiated noise from a transmitter, on either side of the main carrier, is becoming a more important issue with modern, low voltage rail transceivers and software defined radios. As a general statement it can be said that the performance of commercial transceivers is getting worse, not better, as we add usability features at the expense of noise performance.

Figure 6 shows a spectrum analyser display of part of the 144MHz band during the 2016 144MHz Trophy contest, recorded at IO92fa when a station with high transmitter noise is not transmitting. Resolution bandwidth is 444Hz and the noise floor is -167dBm/Hz. **Figure 7** shows the same plot but this time the noisy station is transmitting. Although the station is 129km away and only producing a received power of -55dBm, the noise floor at IO92fa is raised by 10dB to -157dBm/Hz, masking weak signals across the band.

Let's put this in perspective. For the victim of this excess transmitter noise to continue hearing a 25W DX station at the same signal to noise ratio as before, the DX station would need to turn his/her power up to 250W! Some rigs are much worse than others and there's a good set of measurements that compare various different amateur radio rigs at SM5BSZ's website **[3]**.

If we look at the comparison between a 'noisy' and a 'quiet' contest system as shown in **Figure 8** and **Figure 9** we can clearly see the extent of the problem. The 'quiet' system is some 20dB better in carrier to noise ratio than the 'bad' one.

TABLE 1: Ideal excess noise ratios.

Band	Noise temperature	Noise spectral density	ENR (minimum galactic)
50MHz	2000K	-165dBm/Hz;	N = 9dB
70MHz	800K	-170dBm/Hz;	N = 4dB
144MHz	300K	-173dBm/Hz	N = 1dB
432MHz	180K	-175dBm/Hz	N = -1dB
1296MHz	150K	-176dBm/Hz	N = -2dB

TABLE 2: Excess noise ratios (ENR) measured in rural Oxfordshire.

Band	Noise figure (dB)	ENR (min galactic) (dB)	ENR (measured) (dB)
50MHz	12	9	14
70MHz	6	4	4
144MHz	3	1	3
432MHz	5	-1	1

TABLE 3: Excess noise ratios (ENR) measured in central London.

Band	Noise figure (dB)	ENR (min galactic) (dB)	ENR (measured) (dB)
50MHz	3	9	18
144MHz	3	1	17
432MHz	3	-1	5

Conclusions

To be able to hear terrestrial DX at VHF/UHF, very high dynamic range receivers are required, together with a low level of received noise. Received noise can be measured with simple equipment to a useful level of accuracy. In-band noise from poor quality transmitters is an increasing problem and is something that is within our control. It is recommended that you do not purchase any transceiver that has radiated noise of more than -130dBc/Hz at 50kHz offset from the carrier. Look for better performance. Older models are actually often better than current ones – and are frequently cheaper, too!

You can measure the received noise in your area using the simple methods described here, so that quantitative information on radio noise is available to influence policy. We will soon give details on how you can submit your results online. Doing so will help the RSGB in its dealings with the licencing authorities on noise and interference topics, for the benefit of all amateurs.

References

[1] see www.rsgb.org/videos and follow the links to Convention lectures 2017

[2] International system of units, https://en.wikipedia.org/wiki/International_System_of_Units

[3] www.sm5bsz.com/dynrange/rig_compare.htm

First UK HAMSCI Space Weather workshop deemed great success

The inaugural Space Weather Knowledge Exchange Workshop: 'HamSCI UK' was held on 13 October 2017 at the Kents Hill Park Conference Centre, Milton Keynes.

Organised by Professor Cathryn Mitchell, M0IBG, of Bath University, and held on the eve of the RSGB Convention, the event brought together academics, space weather experts and members of the RSGB's Propagation Studies Committee to share knowledge and see how the different groups could work together in the future.

The Ham Radio Science Citizen Investigation (HamSCI) was born in the US and is a platform for advancing scientific research and understanding through amateur radio activities – see www.hamsci.org

The event consisted of presentations from academics and radio amateurs, plus lots of networking.

Presentations

The first presentation by Professor Nathaniel Frizzell, W2NAF, of the New Jersey Institute of Technology, looked at the 21 August 2017 total solar eclipse in the USA. The HamSCI group looked at whether it could observe travelling ionospheric disturbances caused by the eclipse, measure Doppler changes in the WWV and CHU time signal frequencies, and much more. A solar eclipse QSO party was also held and software defined radios (SDRs) were used to create wideband recordings of the HF spectrum. Using data from the RBN, PSKReporter, WSPRnet and logs, more than 31,151 QSOs and 2.5 million data points were captured. The complete data set will now be used for further analysis.

Bill Liles, NQ6Z then looked at the historical use of radio to study solar eclipses and the ionosphere. He said the first use goes back to the solar eclipse of 17 April 1912 when clicks, strays and discharges were monitored on 54.5kHz. At the same time another group looked at transmissions from the Eiffel Tower on 115kHz and data were collected in France and Germany.

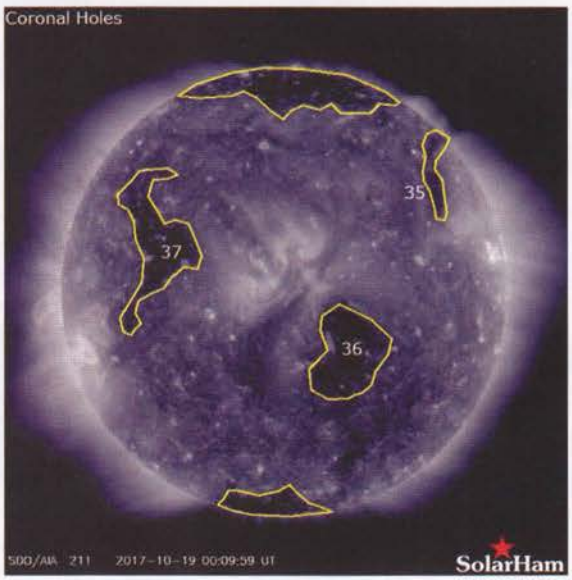
During the eclipse of 25 January 1925, *Scientific American* and ARRL managed to obtain 2,000 AM broadcast and 150 amateur radio reports. He said that in 2017 EclipseMob was a collaborative attempt to measure LF radio wave propagation during the 21 August eclipse. The WWVB transmitter on 60kHz and Dixon California Navy transmitter on 55.5kHz were both used and a kit was produced so that teenagers could build it and take part. Apps for both the iPhone and Android were also produced to collect data. The experiment may be repeated again in six years when another total solar eclipse will pass over the US on 8 April 2024. For more details see Eclipsemob.org

Dr Ben Witvliet, PE5B, who bridges both the scientific and amateur radio worlds, then gave a talk on antennas for near vertical incidence skywave (NVIS) propagation. Ben operated in The Netherlands, Monaco, Israel and Madagascar as a radio amateur and worked at the University of Twente (famous for its online SDR receiver) before becoming the radio science research manager in the Centre for Space, Atmospheric and Oceanic Science at the University of Bath.

He said that some myths are easily promulgated. For example, for NVIS propagation some say lower antennas work better. But a practical experiment he performed for his PhD, looking at NVIS antennas at 0.18 and 0.22 wavelengths above Earth, and showed the higher antenna was better. Ben said that the lower you mount the NVIS antenna, the more vertical the directivity becomes, but the higher the ground losses. This is an example of where professional research can directly benefit radio amateurs.

Carl Luetzelscwab, K9LA, who is well known worldwide for his HF propagation studies and is a corresponding member of the PSC, looked at outstanding problems in propagation. He said radio amateurs can make observations, scientists can understand the physics, so if we can bring the two together "good things can happen".

For example, he looked at 160m propagation.



Solar coronal holes - space weather has a profound effect on HF propagation.

Scientists discovered that the electron density valley above the peak in the E region was more well developed when the geomagnetic K index was higher. As the E-field goes up the electron density valley is more well formed, but too high an E-field and the valley starts to collapse. This is important as many radio amateurs believe that very long distance contacts on 160m and 80m are caused by ionospheric ducting, so there is plenty of room for experimentation.

He also talked about galactic cosmic rays (GCR) – very energetic protons – hitting the Earth day and night and causing collisional ionisation at lower altitudes. Carl said due to the weaker interplanetary magnetic field at sunspot minimum GCR can more easily get through to Earth. The subsequent ionisation can possibly degrade ducting on 160 and 80m. So will low-band propagation be adversely affected even more during the solar minimum we will see in 2019/2020?

Steve Nichols, G0KYA
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PSC member Dr Marcus Walden, G0IJZ talked about his summary findings of the UK's 5MHz experiment. This looked at NVIS contacts at up to 500km range from the transmitter. NVIS transmissions are used for military, humanitarian, aid agencies, governmental and amateur radio use, so the propagation mode is very useful. The UK 5MHz Experiment was launched in 2002. A number of beacons were set up and a massive database of reception reports was gathered. Using dipoles and small loops for receive, beacon measurements showed that NVIS propagation was detected when none was supposed to be there.

Marcus said when studying ionosonde data these showed the importance of considering both ordinary and extraordinary wave propagation. That is, when a radio wave is refracted off the F layer it splits into two due to the Earth's magnetic field. As a result the F2 region of the ionosphere has two critical frequencies – one for the ordinary wave and one for the extraordinary wave.

The difference over the UK is half the electron giro frequency, or about 700kHz. So calculating the critical frequency using the extraordinary wave (Fxf2) generally works better for short distances, but the effects fade away at longer distances.

Chris Deacon, G4IFX then looked at polarisation on 50MHz and whether Sporadic-E (Es) causes 6m radio waves to be returned as circular-polarised signals. Using an Anan SDR and twin vertical and horizontal antennas he first looked at the 58km signal path from the beacon at GB3RAL to his QTH. He also found that auroral contacts from G8BCG in Cornwall were louder on his horizontally-polarised antenna. The myth was that polarisation would be random. In fact it isn't random, but does vary in amplitude and angle. Horizontally-polarised signals on 6m tend to remain horizontal with auroral and tropospheric propagation. Sporadic-E signals have a strong net polarisation, but this rotates over a period of seconds to minutes. This polarisation rotation is observable in single, two- and three-hop Es.

The frequent short term variation seems to indicate that the incident wave is at least strongly elliptical. He said it is not uncommon for an Es signal transmitted from a horizontal antenna to arrive more or less vertically polarised.

PSC's Jim Bacon, G3YLA and Dr Gary Bust, of Johns Hopkins University, Baltimore, then looked at the possibility of new ideas for scientific experiments between amateur radio and scientists. Suggestions ranged from looking at wavelike variations in the ionospheric electron density due to travelling ionospheric disturbances to studying trans-polar paths using WSPR.

The event brought together academics, space weather experts and members of the RSGB's Propagation Studies Committee.

Dr Ruth Bamford, of the Rutherford Appleton Laboratory, then gave a talk about the Chilton ionosonde, which the PSC uses weekly to help with the GB2RS propagation forecast. She also talked about EISCAT, the incoherent scatter radar at Svalbard (Longyearbyen), Kiruna, Sodankylä (VHF) and Tromsø (HF heating), which are positioned to look at the auroral oval.

EISCAT 3D is an exciting new project with a phased array with a digitally-steered system that can produce vast amounts of data. Receivers will run passively all the time with 10,000 antennas. It will be used to look at meteor tracking, ion outflow, winds and waves, the solar wind and space weather monitoring. It will also contribute to space debris monitoring, help understand atmospheric drag and make direct observations of orbiting satellites. The peak output will be 1000W per antenna, giving a total of about 10MW with a centre frequency near 233MHz. The building of EISCAT 3D is now under way.

Professor Farideh Honary of Lancaster University then talked about magnetometers and riometers. Riometers measure the amount of HF absorption in the ionosphere while magnetometers detect changes in the Earth's magnetic field. Lancaster University's aurorawatch.net has magnetometers all over the UK and the data is available from www.aurorawatch.lancs.ac.uk. Magnetometers help us calculate the current K index, which is a helpful indication of geomagnetic disturbances as solar plasma hits the Earth.These can bring auroral conditions on VHF, cause short-lived ionospheric enhancements on HF, or then cause maximum useable frequencies to plummet as the ionosphere is depleted.

Dr Phil Erickson, W1PJE, of the MIT Haystack Observatory, Massachusetts then spoke about Anthropogenic Space Weather, that is human effects on space weather. He said high-altitude nuclear explosions in the early 1960s are now known to have caused electromagnetic pulse (EMP) effects, artificial ionisation belts, satellite damage and geomagnetic disturbances. He said the Starfish Prime nuclear test in July 1962 created an artificial radiation storm that lasted for three and a half years. The Telstar-1 and Ariel-1 satellites both suffered enormous damage as a result.

The first UK HAMSCI Space Weather workshop would never have taken place if it were not for the efforts of Professor Cathryn Mitchell, who not only organised the event, but received funding for it from the Natural Environment Research Council (NERC). Many new friendships were forged at the event and it helped bring together both radio amateurs and professional scientists, which is one of the goals of the RSGB Propagation Studies Committee. Incidentally, the next US HamSCI Workshop will be held at the New Jersey Institute of Technology in Newark, USA, on Friday 23 and 24 February 2018.

Sport Radio continued from page 45

160m CW Party. The first is on the evening of Saturday 7th and the second is in the early hours of Sunday 8th. You can work the same stations in each session. What you send QSO partners depends on whether you are a member of a club that's affiliated to the Association (in the UK that means FOC, FISTS, G-QRP and the Essex CW Club). If you are, send RST + name + club abbreviation + membership number; otherwise send RST + name + 'NM' (for non member).

The Worked All Britain 160m Phone Contest is on Saturday 20th. Tony Beardsley, G3XKT, WAB's Contest Manager, described it as "...usually our most popular contest".

The CQ WW 160m DX Contest runs for 48 hours, starting 2200UTC on Friday 26th. Remember that D-Region absorption will render the band pretty-much useless during daylight hours. The BARTG RTTY Sprint runs for 24 hours over the weekend of 27-28th. The exchange is a serial number only.

Finally, the UKEICC 80m series has a CW session on Wednesday 31st.

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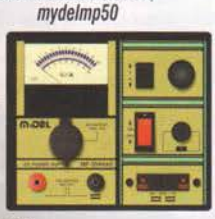

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DPD

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ATV

Portsdown DATV Tx developments

There are now well over 200 ATV enthusiasts building the Portsdown digital ATV (DATV) transmitter. Software development is continuing to add new capabilities, the most recent being a touchscreen-controlled signal generator covering 35MHz to 4.2GHz that simply uses the existing transmitter modules [1]. It is hoped to publish a user review of the full system in *RadCom* soon.

Receiving digital amateur TV

The receiver of choice for DATV is currently the home-constructed MiniTiouner used with the MiniTioune software by Jean-Pierre, F6DZP. Jean-Pierre has just released a new version of the MiniTioune software (version 0.7b) [2] that supports experimentation with very low bandwidth digital TV. The de-facto standard for reduced bandwidth TV (RB-TV) used in the 146MHz band is currently 333kS/s, occupying about 500kHz. The new version can demodulate symbol rates as low as 75kS/s, which means that the transmitted bandwidth need be no more than 100kHz. The software also supports AAC and AC3 audio modes, meaning that better audio compression can be used, leaving more data bandwidth available for video. The results with 320x240-pixel pictures transmitted using DVB-S2 are surprisingly good, as seen in **Figure 1**.

MiniTiouner hardware development

The MiniTiouner receiver that tunes and demodulates the DATV signal and then connects to a PC through USB has, up till now, been a simple design with no added features. A new design has now been published in France that incorporates an OLED display of frequency, symbol rate, RF amplitude and modulation error rate (MER) – a measure of signal quality – as seen in **Photo 1**. Modification details to add this feature to the BATC MiniTiouner design have been demonstrated in prototype form and will be published on the BATC Forum [3] as soon as they are finalised.

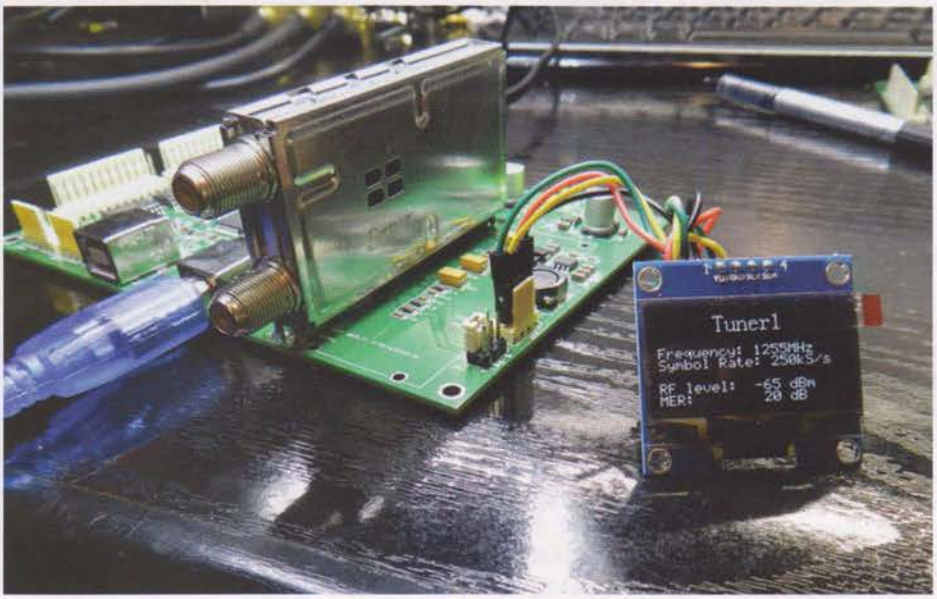


PHOTO 1: OLED status display on a MiniTiouner. (Image: F6DZP).

PHOTO 2: G0HIK with his 5.6GHz FM ATV receiver. Note the tiny PCB log periodic at the feedpoint.

FIGURE 1: MiniTioune 0.7b demodulating DATV at 88kS/s. (Image: F6DZP).

5.6GHz activity

The availability of cheap 5.6GHz TV transmit and receive modules continues to drive analogue FM ATV activity on the 6cm band. A club project by the Furness Amateur Radio Society in Cumbria has succeeded with good initial results. **Photo 2** shows Nick, G0HIK in the Cumbrian hills with his receiving system. A full description of how to build a 5.6GHz ATV system will appear in *RadCom* soon.

Websearch

[1] https://wiki.batc.tv/Portsdown_Signal_Generator
[2] www.vivadatv.org/viewtopic.php?f=60&t=450 (free user account required for downloads)
[3] http://batc.org.uk/forum/viewforum.php?f=105

Dave Crump, G8GKQ
dave.g8gkq@gmail.com

HF

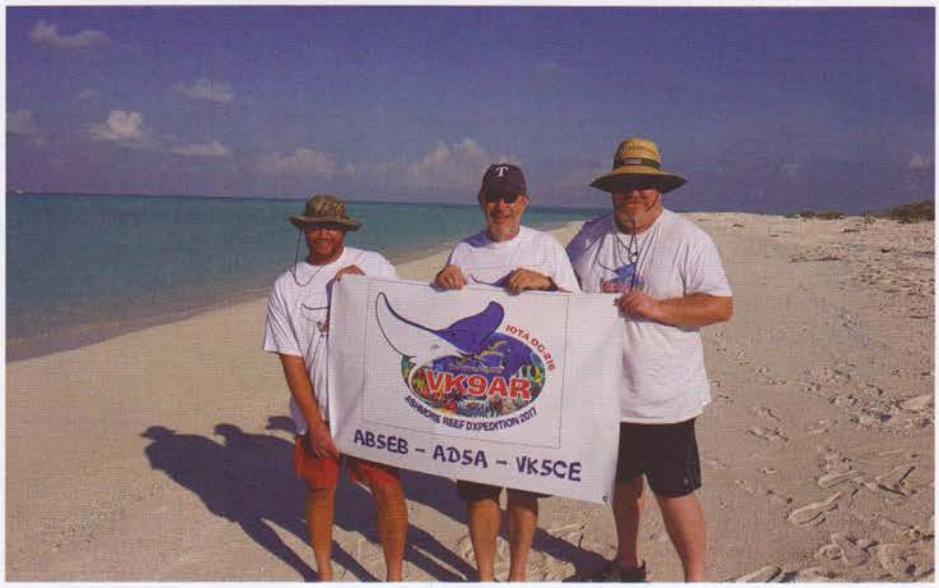
Solar activity remained low for most of November but there was still a lot of DX around even on 10m.

During CQWW CW the elusive long path to Hawaii finally kicked in with KH6J workable from around 0900-1130UTC on 15m via Africa. In principle that path should also work on 10m around 0900 so it would be worth checking from time to time. JAs, KH2 and VR2 were also workable on 15 up to the end of the month but US openings were limited to the mid-west rather than California. 20m continued to deliver worldwide DX for most of the day. It is worth remembering that Hawaii/French Polynesia and West Coast USA can be worked long path on 7-14MHz around 1600 on most days. Occasionally the propagation extends down to 3.5MHz.

The recent spate of African DXpeditions generated some large pile-ups but they were reasonably easy to work if you could establish where they were listening. Ideally this needs a transceiver with a second receiver so you can monitor the transmit frequency in one ear and the pile-up in the other ear. Then, when the DX station calls someone, you tune rapidly across the pile-up listening for the reply – often just "5NN TU" on CW. This *can* be done by flipping VFOs but it is much harder as you may not know that someone else has been called if you are still tuning across the pile-up. Which makes it rather odd that manufacturers are not including second receivers at least as an option in more of their transceivers. You have to pay quite a lot to get a second receiver as standard – which suggests something like a used FT-1000MP might be a better bet for DXing if you don't want the latest SDR display.

Mike, AB5EB (CW), Mike, AD5A (CW) and Craig, VK5CE (SSB) operated as VK9AR from Ashmore Reef (OC-216) for 2.5 days and logged 8173 QSOs with Asia (50%), Europe (33%) and North America (13%). On the return journey to Broome, there was an opportunity for the bird researchers they were travelling with to do a quick visit to Browse Island (OC-234). The IOTA team made 720 QSOs on 20 and 17 metres between 2131UTC on 11 November and 0040UTC on the 12th.

The Bouvet DXpedition scheduled for late January has published its operating frequencies including for FT8 that will be used if nothing else works on a particular band. Note that they will be operating split on FT8 so please read the instructions on their website at www.bouvetdx.org.



The VK9AR team on Ashmore Reef.

A team of five plans to put Rotuma on the air from 23 February to 16 March on 160-10m on all main modes. The ops are 3D2AG, DJ9RR, DK2AMM, DL6JGN and PA3EWP. They have requested the 3D2EU callsign. They will have two QTHs on the island, one in Fapufa, to the south, where 3D2AG has been operating from during previous visits. The second one will be in Maftoa on the north coast. See www.rotuma2018.de for more info.

Andre, ON7YK is active as C5YK until 30 January 2018. He operates digital modes (especially FT8) and some CW on 40, 20, 17 and 15 metres.

Erik, LA2US will be back on Bear Island (EU-027), Svalbard, in early December for a 6-month stay. In his spare time he will be active as JW2US and operate CW and digital modes (RTTY, FT8, BPSK).

Panamanian ops HP1MAC, HP1RIS, HP1YLS and HP1DRK are planning to operate as H91IT from Taboga Island (NA-072) from 6-9 January 2018. See https://www.qrz.com/db/h91it for info.

Andy, M0HLT will be on Ascension Island (AF-003) for the next two years, with the exception of a few return breaks to the UK. He has been issued the call ZD8AC and was recently QRV from the QTH of ZD8RY. Once Andy's equipment arrives he'll have a 100W TS-50 and Spiderbeam.

Correspondence

Andy, M0NKR found a lot of DX. His selection included: 10m – 3C1L, VK9CZ, 9U4M, J5T, 9G5W; 12m – V26E, VK9CZ, A5A, 3C1L, ZD7BG, C93PA, 9U4M, J5T; 15m – PZ5K, 3XY3D/P, J68GD, PJ4/NA2AA, EL2BB, FG5GP, VK9CZ, C93PA, 9U4M, J5T, TO2SP, PZ5V, 9G5W, KH6J; 17m – PZ5K, 3C1L, V26NY, VK9MA, VP2MDL, 9U4M, TI8II, J5T, PZ5RA, TO2SP, PZ5V, 5K1B, 5K0T; 20m – 3XY3D/P, YJ0CA, KL7HRN, VK9CZ, EL2DT, 3C1L, VK9/M0VFC, VK9MA, VK9AR, 9U4M, VP2MDL, J5T, FK4QX, TO2SP, PJ2/K2PLF, 9G5W, 5K0T, PZ5V, 6Y3M, V26K, 9G5W; 30m – 3C1L, VP2MDL, VK9MA, 5N7Q, C21JY, J5T, TO2SP, 9Y4/VE3EY; 40m – WL7E, VK9CZ, FT5WQ/MM docked in the harbour, VK9MA, VP2MDL, H44MS, J5T, PJ4/DL5CW, SV5/SV2MAC, 5K0T, TO2SP, 6W1SU, DU9/RZ3FW; 80m – VK9CZ, 4U1ITU, J5T, 9U4M, PJ4/DL5LYM, TO2SP.

Tom, G4IDL worked: 10m – ZS4TX; 12m – 3C1L, 3XY3D; 15m – PJ4/N2AA, PZ5K, 3C1L, VP2MDL, J5T, 5N7Q, 7Q6M, OH0V, 3B9HA, S79K, FG/F6ARC, P40L, V26K, VE3RZ/VP9, FM5FJ, ZF2MJ, V47T, 6Y3M; 17m – V26E, 3C1L, PJ4/DL5CW, TO2SP; 20m – PJ4/K2NG, XE1RK, EL2DT, VK9/M0VFC, VK9MA, 9U4M, VP2MDL, YJ0JA, PZ5V, FY5FY, C6AGU; 40m – H40GC, VP2MDL; 80m – VP2MDL, TO2SP (St Barts), 9Y4/VE3EY, 6Y0W, CN2AA, C6AGU, P40L, PJ2T, TI7W, PZ5V, ZF2MW.

Andy, G3SVD wrote that "... this past

The VK9/M0VFC QTH on Norfolk Island.

The VK9AR shack - AD5A (left) AB5EB (right) VK5CE (back).

month has been remarkable really, sunspot number around zero but the bands were alive with DX most of the time". During the first week he found an abundance of VK9s; the GM group VK9CZ on Cocos-Keeling was worked on 20, 17, 12 and 10m on SSB and CW, Rob VK9/M0VFC on Norfolk Is was worked on 20m SSB and CW, VK9AR on Ashmore Reef was worked on 20m CW, and he saw VK9VKL on Christmas Is on the screen using FT8 but was unable to work him. Other DX during the month included the various African DXpeditions plus TO2SP (St Barthelemy) and PZ5V on various bands and modes.

Peter, G4XEX was awaiting the result of his planning appeal so his antenna was still at ground level but he still managed to find: 10m – CW5W, VP8LP, ZS3ZH; 12m – ZS1AGF; 15m – 3C1L, LT1F, 8P5A; 17m – 9U4M, 3B9FR, HI3T, ZB2ER, HI8CSS, 4S6AB, ZP6ARO, ZS6JES, ZS6ZP;20m – VP2MDL, J68GD, PJ4Q, KL7RA, D4C, 9U4M, VU2IT, HP3SS, JW5E, YI3WHR, 5T2AI, ZS6UB, ZS6CR, VP8LP, YC0OSX, YB1UUU, YV1BMZ. His local club members were lamenting the lack of HF DX but also saying that noise levels (in a fairly rural area) were too high to hear anything so Peter (whose own noise levels are around S4) is on a mission to track down their noise sources.

Peter, G3HQT commented on the strong signals from Africa last month – including that from 5N7Q who ran 100W into a 20dB gain broadcast antenna for a few hours. He found: 15m – 3C1L; 20m – VK9/M0VFC, 9U4M, VP2MDL; 30m – TO2SP, 5N7Q.

Fred, G3SVK noted a marked improvement in band conditions last month although there was a solar flare part way through the period. He found plenty of DXpeditions to chase and was up to 92 countries on FT8. His DX included: 15m – A61X, 3C1L, 3B9FR; 17m – 8P9KZ, 3C0L, HP3SS, VP5/N2WKS, VU2GSM, PJ2T, VK9CZ, 3C1L, 9U4M (ATNO), J5T, J68JD; 20m – 3C1L, 3XY3D; 40m – PJ4/K2NG, VP5/N2WKS, 6Y4F, FT5WQ/MM, P40T, 9K2HN, 6Y1LZ, 3C1L, KH7XS, VP2MDL.

Nobby, G0VJG went 'portable' with his trailer tower and 2 element 5 band quad at 20m. His goal was to bag VK9MA but he had no joy on SSB as the VK9 was a good signal but working by numbers and only worked about 5 zeroes. But a few days later he got him on 20m CW for an ATNO (all time new one), plus another ATNO in the shape of YJ0CA on 20m SSB. Other highlights were 20m CW: HH2AA, VP2MDL, 3XY3D, 3C1L; 20m SSB – FK4QK, J5T, VP2MDL, ZL2BAQ, VKs; 15m J5T on CW and SSB; 17m SSB TI8II, J5T, 3B9FR.

Chris, G8APB commented, "Who said the bands were dead? With the release of FT8 there is no band that is dead. I worked a QSO on 10, 12, 15, 17, 20, 30, 40, 80 and 160m within 2 hours earlier this month, and set myself a challenge to work DXCC on the mode in just the month of November. I got to 80 worked and 62 confirmed by the 20th, more difficult as the number climbs." His best DX – exclusively FT8 I think – included: 15m – XE, HP, VE7, 5K, HC, ZP, CE, LU, VR2, 3W, HS, YB, FR, SU; 17m – XE, HI, JA, YB, VK2, VK3, VK5, VK6; 20m – 4S, VU, BV, JA; 30m ZL (the best of the lot and already confirmed on LoTW); 40m YV, 9Y, 4K, BD.

Gordon, G3PXT was as busy as ever with 2000 QSOs during the month. Some of his best DX included (FT8 in italics): 40m – *V26A, VK5PO, KD6MYY/VP9, A5A,* PJ4Q, JT5DX, *ZF1RC, HK4NLJ, 3A2MW, ZL4JW;* 30m – *VK3AKB;* 20m – KL7RA, KH6XS, *RI1ANC,*V26B, SU1SK, P40T, J5T, EP2C, V51WW, *VK2BGL, A92AA, 9U4M, VU2EEI, JAs, 9N1AA, HP1AVS, C5YK;* 17m – S21ZAS, 3C1L, J5T; 15m – LT1F, P49Y, HI3T, TR8CA, J5T, CX2DK, *ZP5DNB, OA1F, S79KB;* 12m – 3C0L, *8P9SL, PYs, XT2AW,* 9U4M, *OA6Q;* 10m – *XT2AW,* D41CV, CE2WN, WCX7CO, PJ2T, FY5KE, V55A, *VK9VKL, VP8LP, SO1WS.*

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

TABLE 1: 2015 Worked DXCC entities (ranked by All).

Call	CW	SSB	Data	All
M0NKR	211	229	138	270
G4TUK	197	190	189	266
G3TBK	255	174	140	259
M0IKW	161	107	42	258
G4PTJ	215	103	0	257
G3SVD	195	197	84	256
G4IDL	213	0	72	220
G3PXT	125	135	179	209
GI4DOH	202	29	77	204
CT7AGZ	186	-	99	193
G3HQT	193	0	0	193
G4XEX	132	116	117	187
G3SVK	180	0	92	180
G8APB	72	57	64	107

TABLE 2: Forthcoming DX activity.

Until 30 January	C5YK
Until end May	5V1JE
Until June	JW2US
17-30 Dec	3W9CW
6-9 Jan	H91IT (NA-072)
Early 2018?	D2 IOTA (AF-108)
End Jan 2018	3Y0Z Bouvet (AN-002)
23 Feb – 16 March	3D2/Rotuma
21 March – 3 April	7Q7EI
March 2018	Pajaros Rocks (SA-100)
10-20 March 2018	9M0W Spratly (AS-051)
April 2018	St Brandon by F ops

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VHF/UHF

Excellent tropo conditions on 70cm and high levels of EME activity on the bands this month.

November proved to be a fairly 'normal' month in terms of VHF/UHF propagation, albeit with some surprising enhanced paths for tropospheric propagation. The Leonids meteor shower occurs in November and it peaked in the overnight hours of the 17th. High levels of EME activity took advantage of the 2nd leg of the ARRL EME Contest and also two excellent DXpeditions were on the air from the Philippines and Belize.

As October turned into November, there were decent tropo conditions for a couple of days, with 1 November providing good European DX. Of particular note was the 70cm beacon HB9F (JN36XN) that was a good constant signal here in IO83PL for most of the day. The distance of 1082km from this QTH was quite extraordinary given that the beacon was spotted in quite an arc throughout Europe during the opening. There were no HB9 stations heard in IO83, however central France was worked with extraordinary strong signals, once again showing the tight footprints of openings on 70cm.

Sadly, the excellent conditions didn't last until the weekend of 4/5 November, which was the date for the 2m Marconi Memorial CW contest. This is an event that usually brings some surprise QSOs and excellent DX, but conditions were back to normal. The Leonids meteor shower certainly didn't live up to its forecasted high ZHR and nowhere near close to the major outburst of 2002. On this occasion and before the days of digital modes the SSB 2m MS calling frequency 144.200MHz was full of stations, with some bursts lasting 2-3 minutes long. As usual the media reported the possibility of a significant visual display that didn't materialise.

DXpeditions

DX7EME Philippines: Taking advantage of the low EME degradation conditions during 1-14 November, Erwin, DK5EW and the DX7EME team (DK5YA, DL8FBD, DU1EV and DK5YA's XYL Gabi) were on the air from locator PJ19vn located on Panglao Island, Visayas, Philippines'. Bohol (IOTA OC-129) is located in the Central Visayas region, consisting of the island itself and 75 minor surrounding islands. Its capital is Tagbilaran. This magnificent undertaking was not easy and took months of planning. Numerous issues occur that are impossible to budget for until getting onto the expedition site. The team were able to be active on 2m and 70cm EME, however the 70cm station had some relay issues and indeed 2m also problems with local noise. The daily log looks like a 'who's who' of EME! The teams' blog [1] contains some impressive videos and all the stations worked throughout the activation. Another excellent expedition really at the extreme end of the hobby.

HB9F 70cm Cluster spots. Best DX is EI3KD at 1351km.

V31EME Belize: Uwe, DG8NCO was operating from Belize at the end of November from locator EK57nf. This 'solo' manned expedition was also operating on 2m and 70cm. The setup that Uwe transported to Belize included a 2m 2 x 8 element X polarisation Yagis with 15dBd gain, Beko HLV-1250 SSPA and Beko preamplifier. On 70cm there was a 2 x 25 element Yagi 19dB Beko HLV-1470 PA and Beko preamplifier. More information and photos are available on Uwe's expedition page [2].

Band Reports

Lyn, GW8JLY (IO81) says, "I was very fortunate to experience several 2m tropo openings throughout October and early November. On 11 October, I worked just one station in the south of France, F1MOZ in locator IN93RS. On the 15th there was a far more extensive opening and I was able to contact many stations throughout France. I also made a QSO into Switzerland when I worked Ben, HB9SJV/P in JN36DO. Surprisingly, I also made a QSO with Dan, OZ1BEF in JO46OE. Denmark was not in the tropo opening target area but Dan's signal was very good here when he peaked at the top of fading cycles. The best of these tropo openings occurred between 31 October and 1 November when 2m was open for almost two complete days. I was able to work stations in this tropo event in the following countries: Spain, France, Germany, Belgium, Holland and Switzerland. EA2TZ in IN83WE at 930km was the best DX (ODX) in these two days of openings. Other notable contacts made here were with EA1MX (IN73XK), EA2XR (IN83KI), HB9RDE (JN37LI) and DG7TG (JO43SV). Some of the French stations I worked had amazingly strong signals at my QTH. For example, I worked F5CAC in JN37LK (near the Swiss border) at 59 plus while I was beaming north east to Scandinavia and checking for propagation in that direction. The opening seemed to fade very quickly after 1330 but later in the evening the Dutch beacon, PI7CIS in locator JO22 became strong again and I heard a few Dutch stations in QSO with other G stations. On the following morning of 2 November the 2m band was back to its normal self again with no DX heard here at all."

Niels, G8RWG (IO91) reports, "Prompted by your coverage of EME activity on 2m and John, G4SWX successes reported in December's *RadCom* I thought I'd tell you what I've been up to recently. Since upgrading to 4 x 12 element LFA array in April this year, I've made steady progress in adding new initials and DXCCs using the JT65b mode. I have a WA2ODO preamp, (26dB gain, 0.06dB NF) at the mast head and run 400W from a Gemini 2 SSPA. Much like John's experience in October, I had similar success in early November with good moon conditions around the time of the second period for the ARRL EME contest. New DXCCs were VK3AXH (QF12), 9H1TX (JM75), DX7EME (PJ19), D44TVG (HK85) and TF3T (HP94). My current totals on 2m EME are 212 initials, 164 squares and 48 DXCCs. I'm just waiting for a couple more cards to arrive and then I'll be applying for WAC on 2m EME – a bit of a milestone for me!

Beacon Information

It's hard to keep abreast of new and deceased beacons in the VHF/UHF spectrum, there are so many even just across Europe. The team at Beaconspot receive regular updates from beacon watchers and DX Cluster nodes to keep the information as up to date as

possible. Beaconspot is run by members of the UK Microwave Group [3] with Alain, ON4KST supplying real time DXCC spots with additional cluster input from Pascal, F5LEN. Up to date information is vital, particularly in the weak signal world to test propagation conditions and providing 'something to listen to' if there are no humans on the bands at the time.

The Beaconspot project has grown considerably over the years and has now hit the staggering statistic of 3500 users registered up to November 2017.The database presents an accurate picture of microwave and VHF/UHF beacons in Europe, plus 6m beacons worldwide. Data may be retrieved for a particular beacon, for analysis. Maps show beacon distribution by band, and spots coverage of every beacon. DX Cluster incoming real time spots are collected, and outgoing spots can be sent to the DX Cluster. Beacon keepers are able to maintain data on their beacon(s), and can opt for E-mail alerts whenever their beacon is spotted. ODX is recorded for every beacon, and distance is shown for every spot for registered users.

Through Beaconspot news came of a new 2m beacon on the Faroe Islands that became active on 24 October. OY6BEC is/ was transmitting on 144.402MHz from locator square IP62MB and had already been spotted by GM3SEK on 28 October via aircraft scatter. The distance was 830km. This beacon should be a good indicator for meteor scatter, and auroral propagation going forward. Sadly some information from Trygvi, OY4TN was that is has gone QRT temporarily as it had sustained some damage at its location, however they hope it will be back on the air as soon as possible. There is also a cluster of beacons on others bands so OY6BEC is also on 432.402, 70.035 and 50.402MHz.

Information from the GB3VHF/UHF website and the Thurrock Acorns Amateur Radio Club shows that the GB3VHF/ GB3UHF beacons are ready for an upgrade with a request for help. The VHF beacon GB3VHF has been running for many years and in more recent times has been joined by UHF beacon GB3UHF. They both serve as an important propagation tool and frequency reference. Due to technical limitations in the existing simple PLL driver unit, it is intended to replace the driver unit frequency generator with a system based on the OZ2M new generation beacon modules. This will take place in the New Year and the intention is that the beacon will transmit the same information in the same formats as at present.

For more information please visit the GB3VHF/GB3UHF website as any upgrades of this nature are certain to be very expensive. See [4].

Colchester Contest Group 23cm station. Phil, G0JBA left, Joe, G0JJG right.

RSGB MGM Contest Series

The RSGB have a number of Flagship contests on HF and, controversially the UK Activity Contests have brought many stations on the various bands that would never have been active before.

The RSGB VHFCC has been working on an Machine Generated Mode (MGM) contest to become a major contest in the calendar. The term MGM can be interpreted as quite expansive. FT8 seems to have taken the HF world by storm with a number of UK/EU stations also transmitting on 6m on a daily basis. The VHFCC have therefore decided, after consultation, to create an MGM contest on 6m and 2m using any recognised MGM mode covering a weekend period that could support meteor scatter and tropo/aircraft scatter.

The first of the series is scheduled for Saturday 21 April 2018 to Sunday 22 April 2018 with the second session to be announced likely to be in the region of October/November 2018. It will run from 1400UTC to 1359UTC on the 50MHz and 144MHz bands. The RSGB band plan is to be strictly observed for each mode of emission and you can use any recognised MGM mode eg FT8, FSK441, ISCAT, JT65, RTTY or PSK, however CW and EME QSOs currently will not be accepted.

Only one scoring contact may be made with a given station per band. The exchange is signal report (as appropriate for the mode in use) and 4-character Locator (eg IO91). In contrast to normal VHF/UHF contests serial numbers are not required. The key is to work as many stations as possible but gain multipliers for the overall score.

On each band you score one point per kilometre. The overall score is total kilometres worked, multiplied by the number of large Locator Squares (eg IO91) worked. Distance is calculated to the centre of the large Locator Square (eg IO84MM to IO91MM). There will be four sections to include UK&CD low and high power and also EU/Overseas low and high power. For the low power sections output must be not more than 100W PEP at the final output stage or external amplifier connection to the antenna. Only one antenna may be used and stacked or bayed antennas are not allowed. In the high power section standard licence conditions and multi antennas can be used.

The RSGB VHF Contest General Rules apply. Logs must be uploaded with 7 days from the end of the contest. More information and a 'How-to' will follow in the coming months.

The purpose of the contest is to involve as many MGM operators as possible on 6m and 2m who maybe wouldn't enter a traditional VHF contest. The scheduling is designed to coincide with a weekend period for maximum activity, the beginning of the peak for the April Lyrids and also the chance of some early Sporadic-E that could benefit 6m operation.

More details will be announced as soon as possible but please keep checking in on the RSGB VHFCC web pages for more information but still put these dates in your diary [5].

A big thank you to all contributors throughout the year and for all the feedback I have received about the column and it has to be said very complementary for the most part. A good DX full New Year to all.

Websearch

[1] http://dx7eme.de
[2] http://v31eme.de/team
[3] www.microwavers.org
[4] www.beaconspot.eu
[5] www.rsgbcc.org/vhf/

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GHz Bands

Digimodes on the GHz bands

FT8, the latest digital mode designed for HF / 50MHz seems to have taken the lower bands by storm recently. Up on the GHz bands a growing group are experimenting with other digital modes, more suited to these bands. Last year I initiated a 'Digifest' on Wednesday nights to encourage activity above 1GHz (see News, December *RadCom* and p15 this month) – it seems to be growing.

On 1.3GHz we have been comparing JT65 and JT4, with the newer modes, on aircraft scatter (AS) and tropo paths. These paths are subject to multipath and Doppler effects so can be challenging for digital protocols. The new JT9 mode has some fast and wide tone spaced options and supports down to 5 second periods. It seems technically better suited to the GHz bands than FT8. Like FT8, it supports auto completion of QSOs, which can be very helpful with short duration AS 'pings'. You need your wits about you to use it without auto complete, hence the almost-automatic QSO structure and automated message box filling. On JT9F Fast mode with 15 second overs and auto sequence, the complete QSO is over almost before you realise what has happened! Not very personal, but great fun to see in action, especially with AS. At the moment, most of the Digifest activity is around 1296.165 and 2320/2300.165 and the relaxed pace of the non-competitive QSOs allows time to play with digital settings. Sam, G4DDK and I tried FT8 mode on our very dispersive 10GHz Troposcatter path just to see what would happen. As expected, the spreading on the signal was far too great to get any decodes. The dispersion was as wide as the tone spacing, so no surprise there, but worth trying. JT9F, on the other hand, performed flawlessly. This sort of experimentation is what the Digifest is all about.

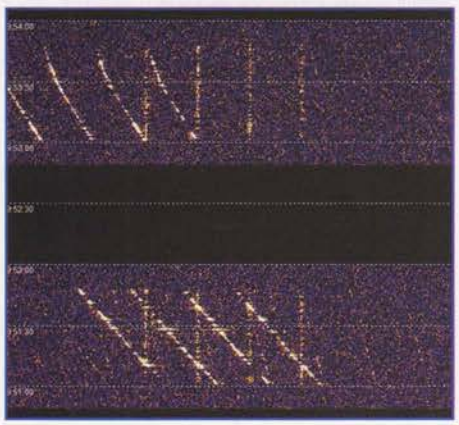

FIGURE 1: G4BAO's off-axis JT4F signal via Tropo + AS at G4DBM.

To use these fast modes in WSJT-X you need to go to SETTINGS and tick Enable VHF/UHF/ microwave Features to allow all the fast and wider modes

The Digifest has the big advantage of expanding the mainly contest-centric activity to another evening. The main aim of the initiative was to work out which modes are best where there is multiple aircraft scatter (AS) at different Doppler rates, plus some tropo. Neil, G4DBN (IO92NR) reported on a JT4F QSO between me and G4KVT (IO81RK). There was plenty of off-axis scatter from my transmissions and received signals were made up of three or more similar-strength traces on the waterfall display (**Figure 1**). In some cases, the Doppler shift went in the 'wrong' direction, where a plane was circling in one of the holding stacks somewhere out west. Neil was beaming 30-40° away from the direct path to me. This raises several possible use cases, such as off-axis QSOs where the direct path doesn't work because of local obstacles. Cases where the path is way beyond Tropo range and the AS is weak, short-lived and has a high rate of Doppler can be tried. For instance, on 1.3GHz into DL/OZ, where the common scatter zone on 23/13cm is maybe 50km at the most and only 5km wide and 2km deep. For that tiny volume, there are probably only two planes an hour, with the signal peak lasting maybe 12-15 seconds, so a 5 second period mode with error correction such as JT9 Fast is needed.

FIGURE 2: DJ5AR's digimode QSO paths during the Digifest. Maps © www.thunderforest.com, Data © www.osm.org/copyright.

On Wednesday 25 October Andreas, DJ5AR (JN49CV) joined in the fun and worked Conrad, PA5Y (JO21VO) on JT9F via Tropo plus G4DDK (JO02PB) and G4BRK (IO91HP) (703km) on AS. He also decoded two transmission periods from G4DBN (756km) and completed with me at 619km. The paths worked are shown in **Figure 2**. Despite his TS-2000 drifting due to the fan starting up, Derek, G8ECI (JO03AE) had his first 1.3GHz FT8 QSO with John, G4ZTR (JO1KW). There are details of an effective modification to fix this drift problem at mods.dk [1].

Digital modes may not appeal to everyone, but it was clear that people are enjoying playing with them – and, more to the point, they are boosting activity.

GM Microwave Round Table report

The regular round table meeting at Burntisland in Fife took place in November. Talks included ideas for 10GHz home stations, beacons and a report on 2.3GHz SOTA activities in GM. I particularly encourage this initiative by Jack, GM4COX and Andy, MM0FMF as a very good way of boosting non-contest activity. In the Edinburgh area, GM4BYF, GM8BFJ, GM4DIJ, GM6CMQ and GM8OTI are all active. Andy comments that even completely shielded stations are workable from local hills due to proximity and reflections. I hope the rest of the UK can follow their lead and make 2.3GHz a regular SOTA activity. There is an online group [2] to tie in non-SOTA people with activity, as well as somewhere for general 13cm chatter. The winner of the Scottish heat of the G3VVB construction Trophy was Kevin, G3AAF for his creative use of a repurposed Bluetooth module as a 2.3GHz signal generator/sweeper. Kevin is selling these units, so contact him for details and price via [3].

Websearch

[1] www.mods.dk/index.php?ModelId=543
[2] gm13@groups.io
[3] kevin.g3aaf@gmail.com

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Case studies on VDSL Radio Frequency Interference (RFI) levels

In the December 2017 *RadCom* (page 48) we presented the results of measurements of RFI from VDSL by 1200 amateurs, observed at their locations (QTHs).

Level changes between the VDSL guard-bands and adjacent upstream (U1 & U2) and downstream (D1, D2 & D3) VDSL bands (see also **Figure 1**) indicate the increase in RFI levels attributable to VDSL that is radiating from the telephone wiring. Over half of the survey reports showed RFI levels that would obstruct reception of communication by obscuring lower level signals. To quantify this Harmful Interference (HI), we need to determine how the levels vary in the areas close to the amateur's QTH.

To do this, recording equipment was fitted to a car and readings logged as the car drove slowly around the nearby streets. The readings were taken at the same transition frequencies as those used in the Member's survey. The loop antenna (shown fitted to the roof rack of a car in **Photo 1**) is fed to a WiNRADiO Excalibur SDR connected to a logging PC. The antenna arrangement shown in Figure 1 was found to be the best orientation for a single loop but ideally two loops would be used, one parallel to the direction of travel as shown and one perpendicular. All equipment was battery powered and isolated from the car.

The results presented here were recorded using a WiNRADiO field strength logging package provided by Radixon UK [1]. This package records the time, location and field strength at frequencies specified in a preset table. The receiver dwell was chosen as 200ms, meaning each of the 16 frequencies could be recorded every four seconds and written to log files. The readings between the adjacent frequencies were only a quarter of a second apart, ensuring they were comparable across the transition bands. Checks were made to ensure that the car's electronics did not change the readings, or introduce new noise sources, by comparing readings with

PHOTO 1: Vehicle mounted antenna for drive-by measurements.

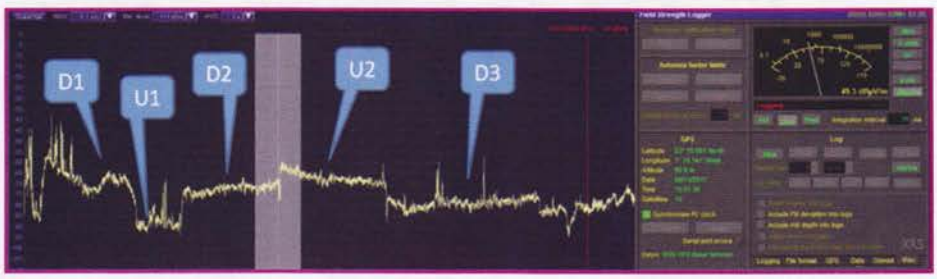

FIGURE 1: VDSL levels measured 10m from cabinet. Meter shows reading at top of Downstream 2, peak reading in U2 is 10dB higher.

FIGURE 2: Heatmap for Guardband between D1 and U1 note blue levels as no VDSL at this frequency.

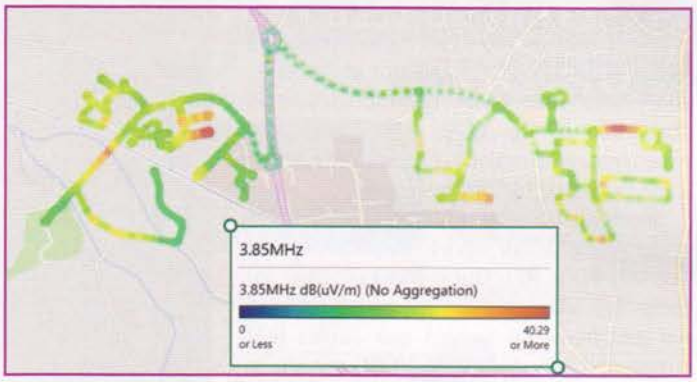

FIGURE 3: Heatmap bottom of Upstream 1 band.

FIGURE 4: Heatmap top of Upstream 1 band.

FIGURE 5: Heatmap bottom of Upstream 2 band usually most common source of RFI.

the car's ignition turned off. The logfiles were read into Excel and the 3D heatmaps shown in this article were produced. The first set compared field strengths at properties fed by three different nearby FTTC cabinets. The map is approximately 5km wide and 2km high.

The spectra of levels near to one of the cabinets are shown in Figure 1, which also labels the different upstream and downstream bands.

In the heatmaps (**Figures 2**, **3** **4** and **5**) blue denotes levels expected in a quiet rural area and dark green are levels expected in a rural environment (from standard P372.13). Yellow and orange would result in degraded reception and red would make communication very difficult with the majority of signals obscured by the RFI. In this example, green occurs in parks, light industrial areas, and on main roads where there is a low density of VDSL subscribers. Red, which represents signals around 40dBμV/m, occurs near cabinets where lots of up and downstream signals increase the RFI. These high red levels also occur over 700m from cabinets for the upstream bands as the modems operate at higher power to get the upstream signals through the lossy cables from modems that are close to the users antenna.

The four heatmaps shown are for the guard band at 3.75MHz and parts of Upstream bands. The levels are strongest where the distance from cabinet is greatest, when long overhead dropwires are used, and in dense housing areas where many subscribers have VDSL. In a couple of cases RFI from one line is much higher than others nearby suggesting line balance or equipment problems. One common finding with the results of the Members' survey is that Upstream 2 interference is strongest (8.5 to 12MHz); in many cases this obliterates the 30m band often used by amateurs for low power digital modes. These measurements give a good indication of relative levels at different locations. However, for absolute measurements in particular close to the noise floor a static measurement using an antenna that measures down to quiet rural noise levels and a calibrated CISPR receiver or spectrum analyser must be used. We have checked a number of the sites using calibrated equipment and found similar conclusions about the levels measured as reported here. In locations close to high power broadcast transmitters, additional filtering and/or the use of a tuned loop may be required to prevent overloading the instruments.

The second set of results was taken at a QTH reporting very high levels of RFI in the 80m, 40m and 20m bands (VDSL downstream bands D1, D2 and D3). The aerial photo of the QTH shown in **Photo 2** has yellow bearing line at the peak of the 20m RFI and red lines at the 3dB downpoints.

As the QTH is on the edge of the village and is near the top of a hill it looks over many VDSL installations in that direction; with the beam pointing in the opposite direction the RFI levels are more than 20dB lower (probably limited by the front to back of the antenna used). Measurements of nearby background noise levels were up to 50dB lower. The position of the cabinet is shown on Photo 2. A drive by spectra and level reading 10m from this cabinet is shown in **Figure 6**.

The three downstream bands predominate, as expected close to the cabinet where line losses will be very small, with D1 the strongest but D2 and D3 only a few dB lower. These are >40dB above the ITU P372 rural noise levels expected. An equivalent reading at a location away from VDSL RFI left edge middle of Photo 2 gave the readings shown in **Figure 7**. Note the large number of signals now visible at 80m and 20m bands. Readings without the VDSL RFI are close to 4dB(μV/m) expected on 20m in a rural environment.

Drive-by readings for three frequencies are shown in **Figures 8**, **9** and **10**. Of particular note is the guard-band at 3.75MHz is showing green levels denoting they are close to those expected at a rural location; note also the high levels in upstream 2 at 8.6MHz. Readings were confirmed using a calibrated tuned loop and a Rohde and Shwarz CISPR 16 receiver at the amateur's QTH.

To demonstrate Harmful Interference, equivalent SDR and antenna systems will

Dr John Rogers, M0JAV
Chairman EMC committee RSGB
emc.chairman@rsgb.org.uk

be set up at both locations and the signals received and logged. The signals received at the quieter location and not at the QTH will demonstrate that communication is obstructed by the VDSL RFI. One would expect the clear majority of communications to be degraded by this level of RFI.

Members of the EMC committee are undertaking further work to help identify and quantify VDSL RFI. Our investigations so far show that VDSL signals are being radiated not just from the twisted pair cables that supply the telephone and VDSL service to the customers' premises (particularly where these cables are over-ground), but also from the Openreach street cabinets, as well as the internal house wiring within individual customer premises.

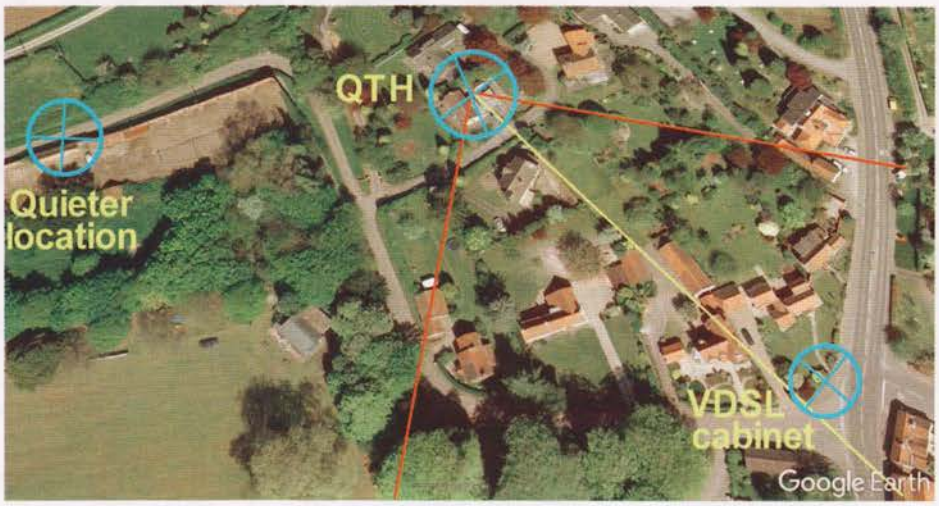

PHOTO 2: Satellite image showing a rural QTH and the peak bearings for 20m VDSL RFI. Google Earth image © Infoterra Ltd & Bluesky.

Future work planned

Martin Ehrenfried, G8JNJ, is in the process of developing a low cost 'Drive-By' VDSL measurement system, that he hopes will be able to be easily deployed by local clubs in order to help members localise and identify VDSL and other interference sources. The current system uses a low cost SDR dongle, GPS module and webcam combined with free software, which allows field strength measurements to be captured and plotted onto maps of the area concerned. More information relating to Martin's system and some short videos showing it in action can be found at [2].

As described elsewhere in this issue (p10) members of EMCC are developing software to measure VDSL noise power from SDR .WAV recordings. This allows measurement of the signal to VDSL2 noise level (SVNL) to quantify the extent of RFI attributable to VDSL. David Lauder, G0SNO and Martin, G8JNJ are working on designing and calibrating antennas to allow absolute electric/magnetic field strength measurements at HF. These can then be compared with levels predicted in P372.13 to show how communication is impacted by increasing RFI. We would be interested to receive offers of help to build and/or test these developments from members who want to reduce Harmful Interference from VDSL.

Details of this work on interference from VDSL will be reported at [3].

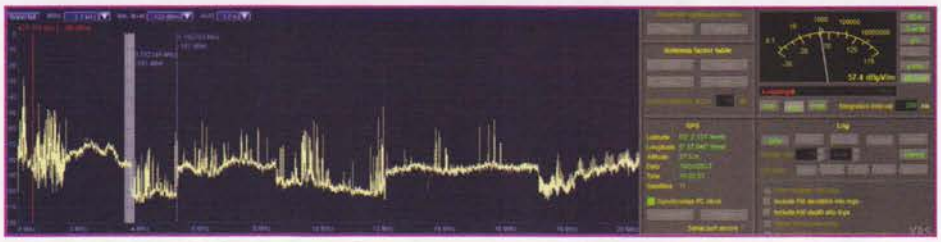

FIGURE 6: Spectra 10m from cabinet in Photo 2 clearly show high levels of VDSL RFI in Downstream bands.

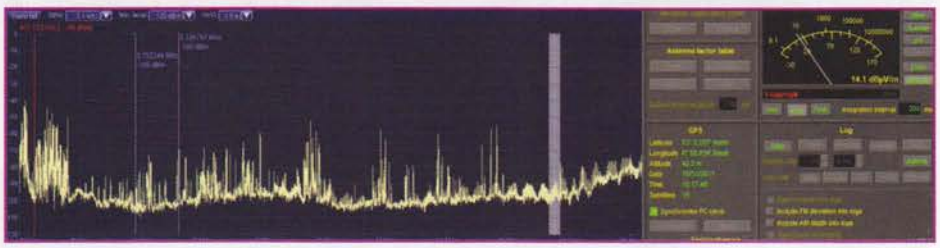

FIGURE 7: Spectra at nearby 'VDSL free' spot shown in Photo 2 clearly showing signals obscured in Figure 5 now visible.

Websearch

[1] www.radixon.co.uk
[2] http://g8jnj.net/vdsl
[3] http://rsgb.org/main/technical/emc/emerging-emc-problems/

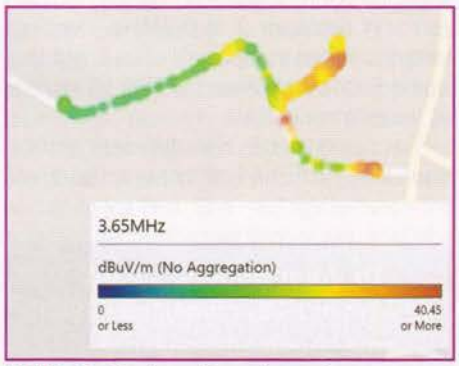

FIGURE 8: Heatmap Downstream 1.

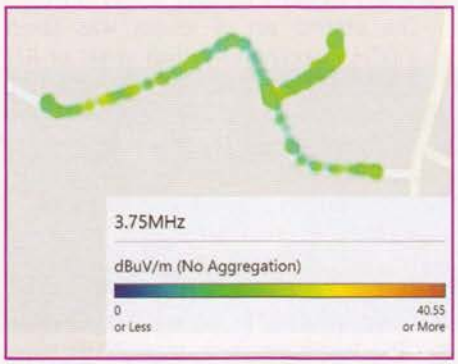

FIGURE 9: Heatmap Transition.

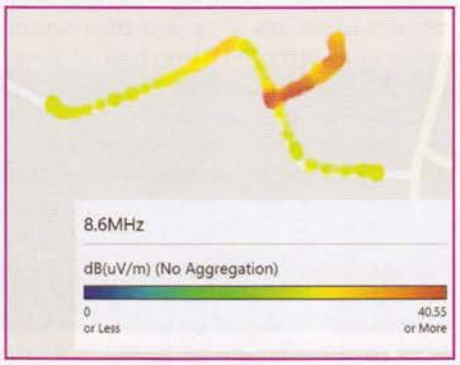

FIGURE 10: Heatmap Upstream 2.

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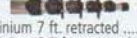

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The QCX
high spec, low cost
5W CW transceiver kit

This CW transceiver kit, named 'QCX' (for QRP Labs CW Transceiver), was designed for the 2017 Youngsters on the Air (YOTA) summer camp Buildathon hosted by the RSGB in August. It is a mono-band CW transceiver, now available as a kit for bands 80, 60, 40, 30, 20 or 17m. The YOTA attendees built the 17m version.

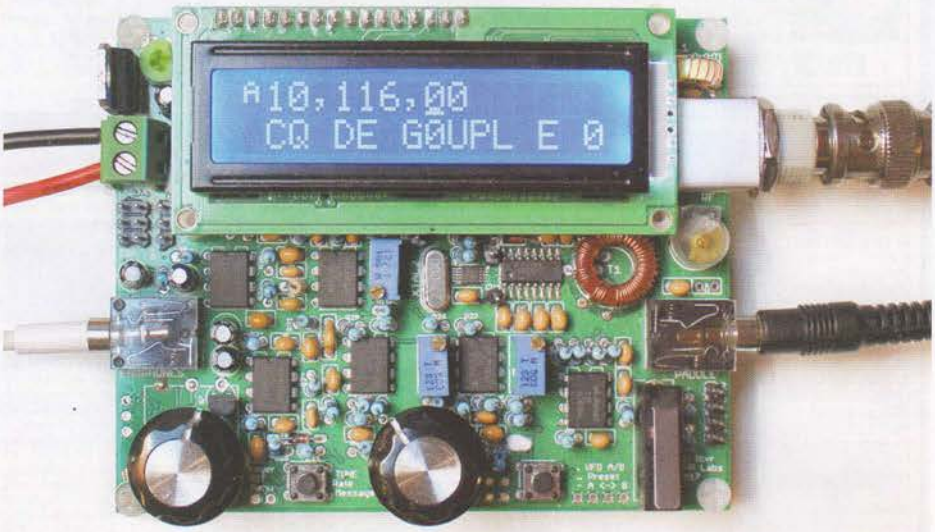


PHOTO 1: General view of a 30m QCX. Little else in this price range has a synthesiser and digital display!

The design process was very interesting, due to the numerous constraints. The kit needed to be simple enough to build in a relatively short time, by a group of young people with, potentially, a wide range of construction experience – including none at all.

The limited budget available meant the cost had to be low. But I was not interested in designing a 'toy' radio. It had to be a really high-performance design, packed with useful features and have a worthwhile 3-5W power output. It should also be interesting and useful to radio amateurs all around the world. I wanted to create something really special for each young attendee of YOTA 2017 to take home with them and operate; something that would set a new standard in amateur radio kits. I think I succeeded.

This is the story of the design choices implemented to achieve this goal, resulting in a radio kit that proves you actually CAN have high performance, simplicity, and low cost all at the same time!

Figure 1 shows the block diagram of the transceiver; the circuit diagram is in **Figure 2**.

A modern oscillator

I always start a radio design with the oscillator. It's fundamental to everything that follows. Two decades ago this meant battling with variable frequency oscillators (VFO) with an inductor-capacitor tank circuit, complaining that we couldn't find variable capacitors at reasonable prices any more, then weeks or months of struggling to try and make a stable

Hans Summers, G0UPL
hans.summers@gmail.com

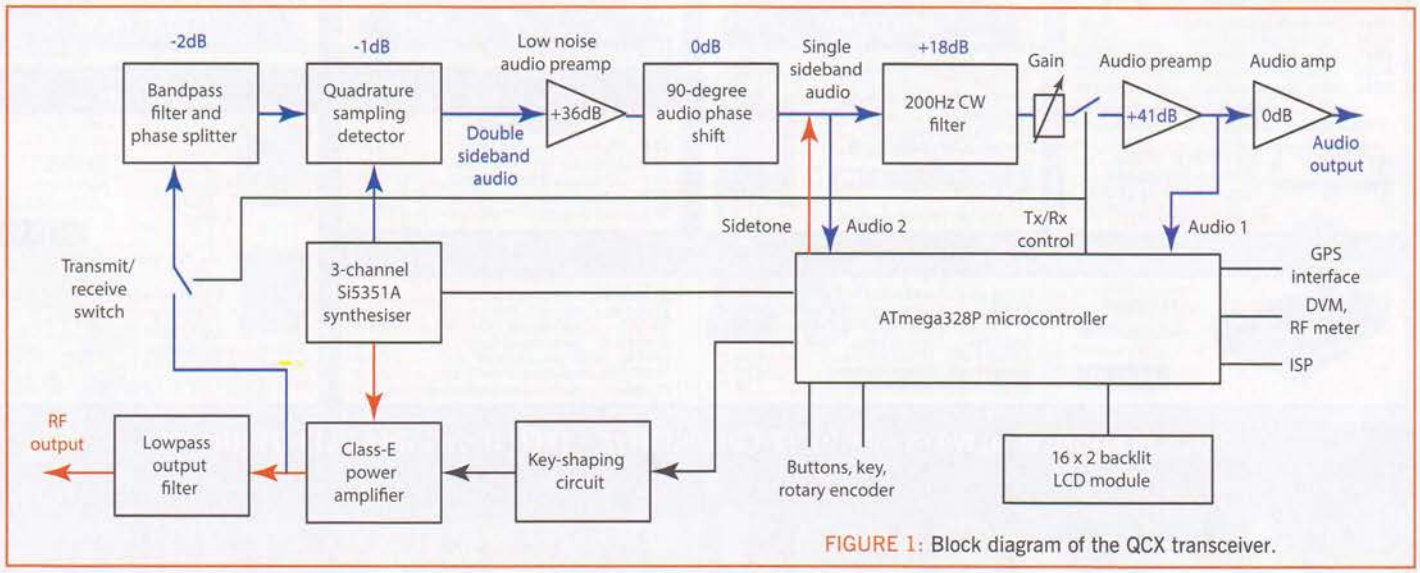


FIGURE 1: Block diagram of the QCX transceiver.

oscillator that didn't drift around *too* much during the course of a QSO.

The march of modern integrated circuit development (let's call them chips, from now on) gave us the direct digital synthesis (DDS) chips from Analog Devices. But they aren't cheap – and they suffer a lot of spurious outputs that cannot be filtered away. Mitigating this by going to faster, higher resolution devices in the range also escalates the cost. Then SiLabs came out with the famous Si570 synthesiser digital phase locked loop (PLL) chip, a little miracle with a wide output frequency range and built-in crystal. But, not a cheap component either. Then just a couple of years ago, SiLabs launched the Si5351A synthesiser chip. A cousin of the Si570, the new Si5351A has a frequency range of 3.5kHz to 200MHz. It has three individual outputs that can be configured on different frequencies or phase offsets. It has good phase noise performance and is starting to see use in commercial radios such as Elecraft's KX2. The frequency stability of the outputs is that of the 27MHz crystal oscillator reference. Best of all, this tiny 3 x 3mm black speck with 10 little wires costs under $1! The oscillator revolution is complete. The choice is easily made!

Microcontroller

Now that the Si5351A synthesiser has been chosen, it needs a microcontroller to configure it. The output frequencies are set up by programming a number of registers in the Si5351A over a serial data interface. We can easily add a rotary encoder for tuning the oscillator and a 2-row, 16-character LCD for displaying the operating frequency. I chose the ATmega328 microcontroller because it is commonly available, cheap and more than powerful enough for the application. It is the same processor used in the Arduino Uno microcontroller development platform. I'm also very familiar with programming this microcontroller, an important factor because it allows me to get the most out of it.

The ATmega328 microcontroller has lots of input/output pins that can be used to control aspects of the radio's circuits. It has six 10-bit analogue to digital converter (ADC) channels allowing analogue measurements.

Once the radio has a microcontroller, it becomes possible to pack in feature after feature – it's all just firmware development, with little or no additional hardware. This is not 'software *defined* radio', but certainly firmware-*assisted* radio. The microcontroller permeates the whole design of the QCX. It lets us add more easily features to the oscillator, including dual VFO A and B, split operation, and RIT. I implemented 16 frequency memories that can be easily loaded or saved to or from the VFOs with a few button clicks.

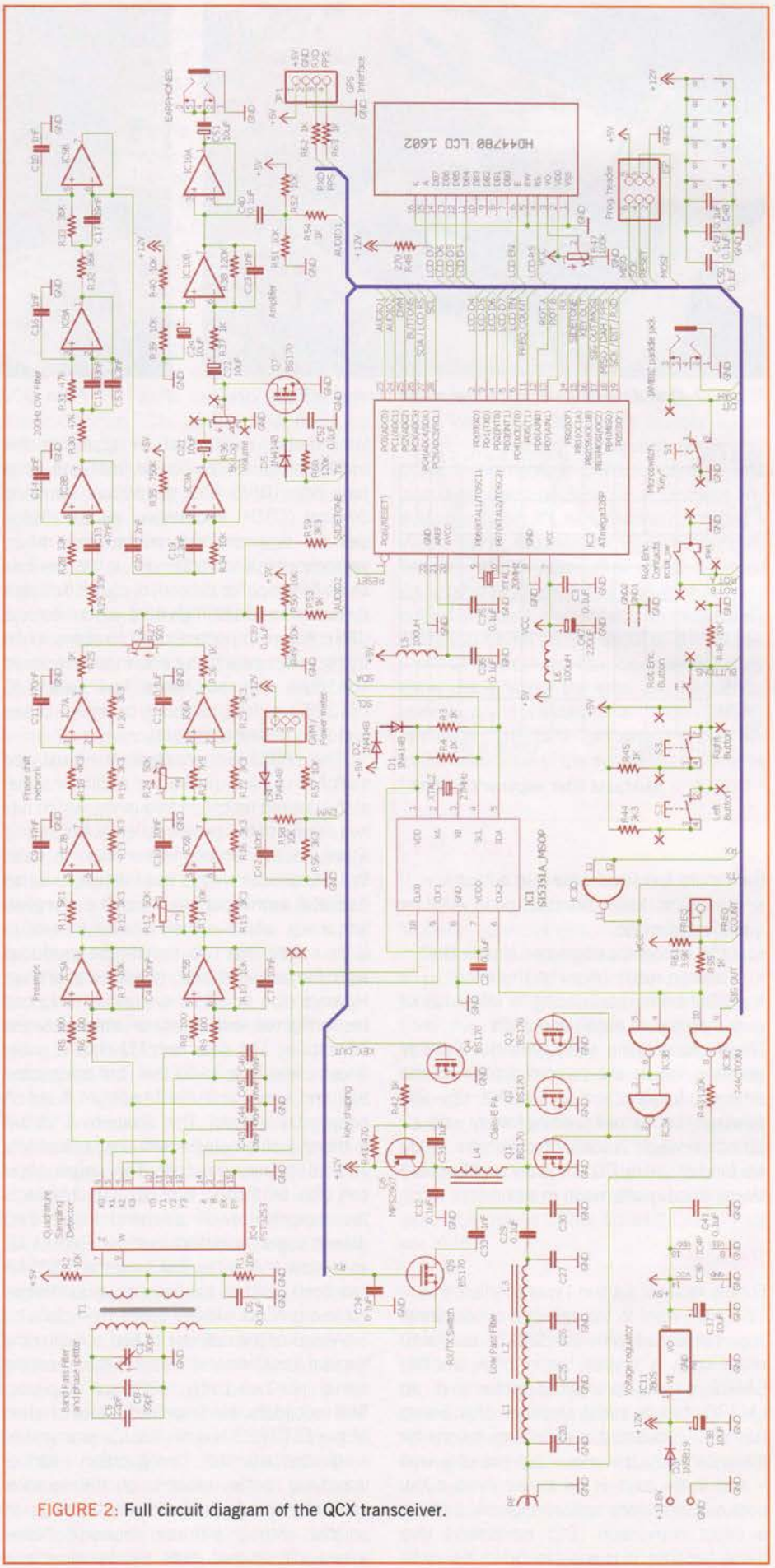


FIGURE 2: Full circuit diagram of the QCX transceiver.

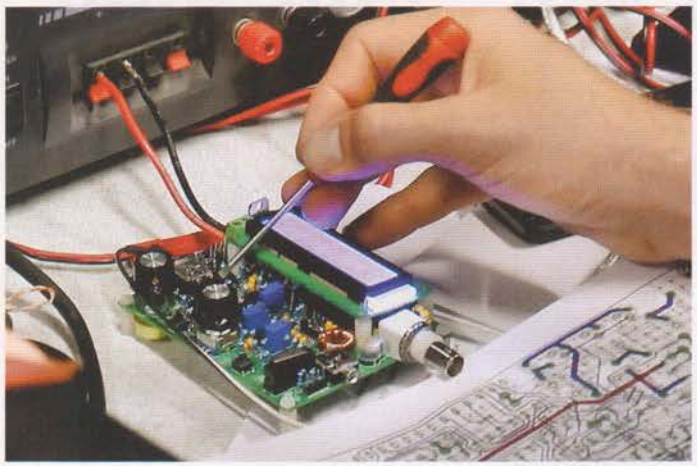


PHOTO 2: One of the QCX kits in the final stages of setup at YOTA 2017.

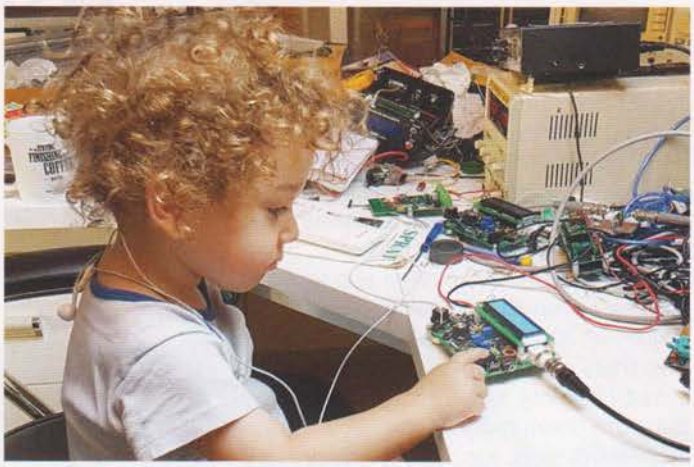


PHOTO 3: Aslan (GOUPL jr, age 21 months) learning Morse on a QCX.

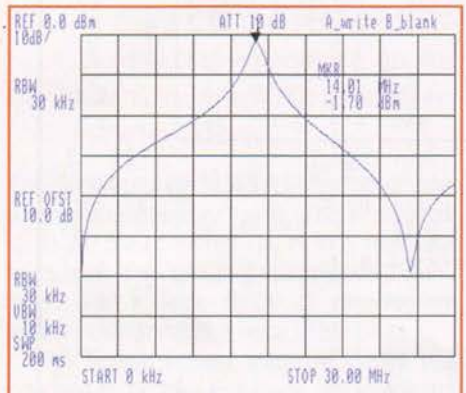


FIGURE 3: Bandpass filter response for 20m.

Even more functions were also added:

- an Iambic keyer (Iambic mode A, B or Ultimatic mode)
- a CW decoder, using some simple DSP
- a beacon mode (more on this later)
- Tx/Rx switch sequencing to allow full or semi break-in (QSK) operation.

The microcontroller even generates the CW sidetone, which allows configuration of the sidetone frequency and volume. Its CW message (or beacon) sending facility with 12 stored messages is useful, for example, if you are fond of calling CQ endlessly on 80m on a sleepy Sunday afternoon in summer.

Receiver

For the receiver section I was absolutely sure I did NOT want to regurgitate a conventional superhet circuit with the SA602 oscillator/mixer chip, a crystal ladder filter, another SA602 as the product detector and an LM386 chip as audio amplifier. This lineup has been circulating in various mutations for three decades. It works – but not very well – and these days is no longer even a low cost or convenient option. Instead, I chose a direct conversion (DC) receiver; I love these because it is easy to build the radio for different bands just by changing the oscillator frequency and the front end band pass filter (BPF). The quadrature sampling detector (QSD), also known as the Tayloe detector, is a very high performance mixer, yet inexpensive to implement. It has low loss so no RF amplifier is needed, plus it has high dynamic range and high third-order intercept (IP3). All are important considerations when trying to design a high-performance receiver. The dual 4:1 multiplexer bus switch IC FST3253 is used, as it is a common, cheap and high performance part.

The FST3253 multiplexer must be switched using a 'quadrature' oscillator signal at the desired reception frequency, which has two signals at the same frequency, but having a precise 90° phase relationship. To date, this has almost always been achieved by an oscillator running at four times the reception frequency, which is then divided by four in such a way that two signals are produced with the required 90° phase relationship. However, the Si5351A synthesiser chip can be configured with a phase offset between its outputs. The datasheet **[1]** doesn't make it very clear how to do this, but after some trial and error I managed to figure it out. A happy day indeed! The divide-by-4 circuit is thereby eliminated – reducing complexity and, of course, the cost. The phase offset can also be flipped to 270°, which selects the opposite (lower) sideband rather than default upper sideband used for CW. As far as I know this is the first time the Si5351A has been used in this way as a quadrature LO in a product with no divide-by-4 circuit.

Ahead of the detector I used a 4-winding toroidal transformer. This splits the incoming signal into two paths, 180° out of phase. Two secondary windings feed the two halves of the FST3253 bus switch IC, arranged in a double-balanced configuration, further improving some aspects of the receiver performance. A third, larger winding, in parallel with a trimmer capacitor, forms a tank circuit that gives the transformer a band-pass filter characteristic. Band-pass filtering is important to reduce the number of strong unwanted signals that could reach the detector and mix with each other, resulting in cross-modulation distortion products. The transformer thus achieves phase splitting, DC bias and bandpass filtering all in one go. It is a little tricky to wind but contributes to the project's simplicity and low cost. **Figure 3** shows the BPF response of the 20m version.

The detector needs to be followed by some really low noise audio preamps, since these determine the overall sensitivity of the receiver. Here I used the LM4562 ultra-low distortion, low noise opamp, designed for Hi-Fi applications. The same opamps are used throughout the rest of the receiver – this achieves economies of scale and eliminates the risk of accidentally mixing up the chips in the kit; all the 8-pin devices are identical!

This type of QSD front end is the same type used in most of the software defined radios (SDR) over the last twenty years. They use this detector to convert a section of the radio frequency band to audio 'I' and 'Q' channels, which are then processed using powerful digital processing techniques in a computer or sometimes with built-in DSP. The latest SDRs use direct digital conversion (DDC) to sample the RF directly. But all of these techniques require a computer, or are high cost options in other ways. Therefore, for the QCX project, I kept the receiver analogue.

So, what of the unwanted sideband? In an SDR, digital processing implements some audio phase shifts that result in cancellation of the unwanted sideband. Before SDR, this was done in hardware by analogue phase shifts. Here, four opamps are used in an active all-pass configuration to provide a 90° phase shift across the audio spectrum of interest, centred on 700Hz, which is optimal for CW reception. Simply adding these two paths cancels the unwanted sideband. The accuracy of the 90° phase shift and the amplitude balance between the two paths are critical to the amount of cancellation that

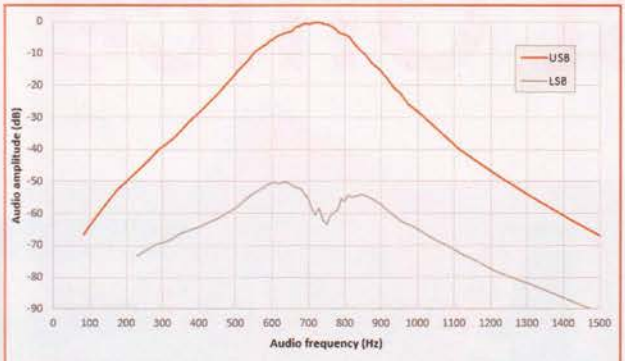


FIGURE 4: USB (wanted) vs LSB (unwanted) response.

can be achieved. More on this later.

The remainder of the receiver circuit consists of a 200Hz-wide CW filter centred on 700Hz, plus audio amplification. The frequency response is shown in **Figure 4**. All of these circuits use opamps. There's a MOSFET used as a mute switch, to eliminate signal leakage through the receiver during transmit. The sidetone signal from the microcontroller is fed into the audio chain *before* the CW filter to filter out its harmonics, resulting in a nice 700Hz sinewave that is pleasant to listen to. The audio opamps have enough output to drive earphones.

The microcontroller samples the audio output 12,019 times per second using one of its 10-bit ADC channels. There is enough processing power to implement Goertzel's algorithm **[2]**; this can be considered a single bucket of a Fast Fourier Transform (FFT). It forms a 250Hz wide DSP filter centred on 700Hz, additional to the opamp filter, used by the CW decoder logic.

Transmitter

I was keen to provide a reasonable QRP power output of 3-5W. This would allow the YOTA participants to have on-air contacts reasonably easily. The third output of the Si5351A synthesiser is used as the transmitter oscillator. It is offset by 700Hz from the receive oscillator. For the power amplifier (PA) I chose to use Class-E. It has the benefit of being very efficient: 80% to 90% is easily possible. This means minimum wasted power, which may be important in portable battery-powered scenarios. But more importantly it means 5W can be achieved by three inexpensive BS170 transistors, in parallel, WITHOUT heatsinks. Eliminating a heatsink keeps costs low, cuts board area and reduces shipping weight.

A 7-element low pass filter follows the Class-E PA to attenuate harmonics sufficiently to meet licence conditions **[3]**. Finally, there's a key-shaping circuit that provides a gentle 5ms rise/fall of the RF envelope. Without this, hard off/on keying would generate 'key clicks' that would disturb other band users. A MOSFET transmit/receive switch under control of the microcontroller gives easy and silent full break-in operation, which can also be configured to semi-break-in.

Easy assembly

There are two SMD components in the kit but to make assembly easy these parts are supplied factory-soldered to the PCB. All the other parts are leaded through-hole types, so construction is quite straightforward. This was an important consideration for the YOTA constructors, but applies equally to everyone.

All components are mounted on the professional-quality 100 x 80mm double-sided, through-hole plated, solder-masked and silk-screen printed PCB. There is even a microswitch on the board to use as a 'straight' Morse key, so that you can get started right away even if no 'real' Morse key is available – and it is surprisingly effective! The 138-page instruction manual guides the constructor step-by-step through the assembly.

Built-in test and alignment tools

So we now have a synthesised, high-performance receiver and an economic 5W transmitter. But the three-channel Si5351A synthesiser and microcontroller gives the opportunity for so much more! With only a handful of extra components we can include enough test equipment to be able to align and debug the kit. Quick and easy alignment giving a well-adjusted radio is a very useful feature, not only for YOTA but also for anyone else building the kit. Built-in test equipment (BITE) is usually only found in high-end professional and military equipment and is a feature rarely (if ever) seen in a low cost kit.

In ordinary use, the Si5351A's Clk0 and Clk1 outputs drive the QSD during receive; Clk2 drives the transmitter during transmit. Having three independent frequency generators means that we can also configure an alignment mode, where Clk2 generates a test signal, fed to the Rx input, which the microcontroller measures and displays as an on-screen signal strength bar. Peaking the radio is just a matter of adjusting the BPF trimmer capacitor for highest signal strength!

Other menu items cause the test signal to be positioned in the unwanted sideband. Three multi-turn trimmer potentiometers are used to fine-tune the I/Q amplitude balance and audio phase shift circuits. These are adjusted for *minimum* amplitude (since we don't want to hear the unwanted sideband). Within a few moments, it is easy to align the BPF and adjust the phase cancellation for better than 50dB suppression.

Just because I can – and because it's fun (and essentially free) – I added more test equipment: a digital voltmeter, an RF power meter (using a simple diode detector), a frequency counter for 0-8MHz and a signal generator covering 3.5kHz-200MHz or more. These are the core bits of test gear most useful in the shack and come at no extra charge!

Bonus: WSPR beacon mode!

To maintain some heritage with earlier QRP Labs kits – and to provide a very useful feature for testing propagation while not using the radio as a CW transceiver – and also, again, just because I *can* (without any additional cost: it's all firmware!), I added a Weak Signal Propagation Reporter (WSPR) beacon. WSPR warrants a whole separate discussion of its own, but enough has been published about it elsewhere; in the unlikely event you haven't heard about it, start at **[4]**.

A GPS receiver can be connected to allow discipline of the time and frequency, important considerations for WSPR operation. The GPS can also be used for initial calibration of the synthesiser reference frequency.

Conclusion

It was a lot of work, but very satisfying, and the design accomplished all its goals. Modern components, techniques and microcontroller were combined to produce a radio with high performance, tons of functionality and low cost. All the feedback from the YOTA attendees has been very positive. When it went on general sale in August 2017 the kit generated a frenzy amongst QRP kit builders worldwide and several more batches had to be prepared rather rapidly to meet the demand! Constructors report that the receiver is as good as or better than their commercial gear. Full details of the US$49 (~£37) kit are at **[5]**.

Websearch

[1] www.silabs.com/documents/public/data-sheets/Si5351-B.pdf
[2] https://en.wikipedia.org/wiki/Goertzel_algorithm
[3] see UK amateur radio licence clause 7 at http://tinyurl.com/UKARL and, for clarification, Ofcom's Guidance document; http://tinyurl.com/UKARL-G
[4] https://en.wikipedia.org/wiki/WSPR_(amateur_radio_software)
[5] www.qrp-labs.com/qcx.html

Batteries and the Post Office

I have heard several reports about fellow hams ordering batteries over the internet, but being informed by the Royal Mail that the package had been destroyed. No appeal, no compensation: that's it. So what is going on?

Some time ago postal regulations changed regarding what you may and may not send. This may affect all of us, particularly if you're trying to sell something like a used handheld.

I had a chat with the Dangerous Goods section of the Post Office. They told me about the relevant restrictions, which are kept up to date on the web [1]. Restrictions differ depending on whether you are sending things within the UK or internationally. And different rules apply for businesses who have contract arrangements with the Royal Mail.

Broadly speaking, international carriage limitations are more restrictive than UK-only. I'll only look at the UK restrictions for personal customers here: you can find the business and international restrictions on the Royal Mail website [1].

Batteries by post

Personal customers may only send packages containing cells and batteries via a Post Office counter. A *cell* is a single device (an AA 'battery' is actually a 'cell'). A 'battery' is two or more cells in one housing, for example a 9V 'PP3' *battery* normally contains six 1.5V *cells* in series.

Some kinds of battery cannot be sent by post *at all* by personal customers. These include those classed as Dangerous Goods, such as spillable (wet) lead acid batteries, or damaged batteries of any kind.

New alkaline, NiMH, NiCd or zinc-air batteries *are* permitted, as long as they are sent in their sealed original retail packaging *and* suitably protected, eg with bubble wrap. *Used* batteries may not be sent at all.

Lithium batteries

Lithium [2] cells and batteries are prohibited in many circumstances but the rules seem complex. First, the cells / batteries must comply with certain international technical and safety standards; anything one buys at retail is fairly likely to comply (but it's up to you to check).

The following applies only to new devices, as we've already learned that *used* batteries cannot be posted.

Lithium cells and batteries cannot be sent on their own, but they *can* be sent when contained in or connected to an electronic device – subject to certain packaging requirements. You can also include up to two spare batteries for a device, suitably packed, in the same package. The Royal Mail literature says "The maximum *number of lithium batteries allowed* in each parcel is the minimum number required to power the device plus two spares". There are also limits on the capacity: cells of up to 20Wh and batteries of 100Wh are allowed (for example, a 5Ah 3.7V lithium cell is 18.5Wh and the 7.4V 2200mAh battery in the photo is 16.3Wh).

The packaging rules for cells and batteries are that they must be completely enclosed within inner packaging so that they are protected from short circuit. There are further requirements about when you need to have rigid outer packaging, plus the cells/batteries must not be free to move around.

You can send several devices, each with their cells/batteries and spares in the same outer package so, for example, you could send four new handhelds each with its own battery and two spares (12 batteries total), provided you don't exceed a total cell/battery weight of 5kg. (There are also limits on the exact amount of lithium etc that can be contained in each cell or battery). It seems no battery/cell is permitted to be connected to and providing power to the device (which rather suggests that it's not permitted to send a mobile phone by post unless it's one of those rare ones where you can physically remove the battery – but, of course, if it's a secondhand phone the battery inside it will be 'used', thus technically not sendable).

It is a complex field. You can't, for example, send a battery charger and the batteries it's intended to charge, because batteries can only be sent with the thing they're intended to power, not the thing they're powered by.

Business arrangements

I mentioned earlier that there are different arrangements for businesses. Although there are still strict quantity and weight limits plus labelling and packaging requirements, businesses who have the appropriate contracts with the Royal Mail *can* send certain cells and batteries on their own.

Practical effect

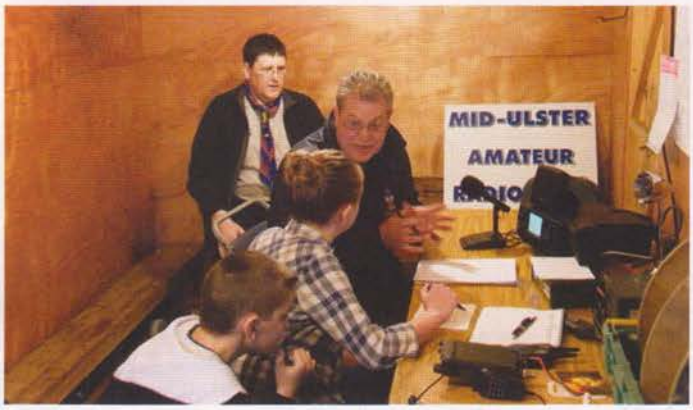
As a private individual, be wary of sending batteries or other restricted items [3] via the post. Do so only via a Post Office counter, and make sure you understand all the requirements (or ask the Post Office for guidance, to avoid potental danger and disappointment). If you are planning to *buy* batteries by post then it is sensible to make sure the vendor has the right arrangements with the Royal Mail. Alternatively, buy your spare batteries at a rally or visit an 'emporium' in person. Ignoring the rules leaves a package liable to seizure and destruction with neither warning nor compensation, as lithium batteries sent on their own are prohibited from being sent privately in the mail.

Websearch

[1] see https://personal.help.royalmail.com/app/answers/detail/a_id/96; for a free copy of *Prohibited and restricted items, a guide to what you can and cannot send in the mail* call Royal Mail Customer Services on 0345 774 0740 or download the 30 January 2017 version direct from https://tinyurl.com/RC0118-batts-A (or https://www.royalmail.com/sites/default/files/royal-mail-prohibited-and-restricted-items-jan-30-2017.pdf)
[2] For the purposes of this article, this includes lithium ion, lithium polymer, lithium metal & alloy batteries etc
[3] See tinyurl.com/RC0118-batts-B or https://personal.help.royalmail.com/app/answers/detail/a_id/94

Les Brown, M0LPB
lesdbrown@hotmail.com

Club of the Year 2016



Mid Ulster ARC won the 2016 Club of the Year 3rd place large club category. They reached out to the public and enjoyed many radio activities in the year.

Mid Ulster Amateur Radio Club won the 3rd place large club spot in the RSGB's 2016 National Club of the Year competition, sponsored by Waters and Stanton.

In 2016, MUARC ran four Foundation courses and all students who sat the exams passed. There was one Intermediate course that ran from January to April 2016 with ten students attending the class every week. Of the ten who sat the exam, nine passed. The club ran one Advanced course in 2016.

Special events

MUARC registered for SOS week and would have normally split operation over the two weekends, one weekend from Kinego Marina located on the shores of Lough Neagh and the other from the club shack. Due to flooding around Lough Neagh, members operated on both HF and VHF from the club shack during the SOS event. Funds raised were donated to the RNLI.

The club also operated the GB16YOTA YOTA special callsign over one weekend during December 2016. The station was manned by youth members of the club and operated HF and VHF making contacts across Europe and wider afield.

Meeting the public

Club members took the club's promotional trailer to the Lurgan Agricultural Show in June. The club gets leaflets printed and some members were tasked with handing out the leaflets to the general public, talking to them about amateur radio and directing them to the club trailer so they could see amateur radio in action. This combination generated a lot of interest from the general public.

The club set up and operated JOTA/JOTI for a Scout group based near Banbridge. There were 25 Cubs and Scouts along with Scout Leaders.

One of the advantages of operating during the Marconi weekend is the club get to take the promotional trailer and mobile mast to locations where they can interact with the public. In 2016 this location was Navan Fort. Navan Fort is a stone aged ring fort with a visitors centre located in rolling Armagh countryside a few short miles from Armagh City. Members set up the promotional trailer and mobile mast directly beside the visitors centre. Naval Fort attracts a lot of visitors who had to pass the club trailer while entering the centre. Visitors were intrigued with the amateur radio display and operation. Club members were on hand to explain what amateur radio is and demonstrate it. Some club members also used to opportunity to operate QRP portable in the scenic surroundings of the site.

The club was invited by the local BBC Community Arts Project to mount an expedition to Divis Mountain to put on a special event station at the sight of the old transmitter towers overlooking Belfast. This was to tie in with a radio communications event in conjunction with the BBC World War One at Home programme. The club was given special access by the warden up to the site. Members set up the trailer and mobile mast and started operating. The operation attracted a lot of interest from the public and club members took the opportunity to introduce and explain amateur radio to them. There was a BBC film crew on site and members were interviewed.

Other activities

Two club members attended the Train the Trainers weekend in July 2016.

Encouraged by John, GI4BQI, the club entered the 2016 CQ WW CW contest, mastering the contest logging program SD by EI5DI and actually submitting a low power all bands log that was accepted with 0% errors!

Members of MUARC are members of G-QRP and attended the QRP Convention in Yorkshire, gathering up components for the coming build season. Les has demonstrated his QRP boxes on a club night with much interest from some of the younger members who may be 'credit card challenged' but actually get the idea of radio amateurs texting each other (CW).

Three members of the club youth section were picked to attend the Youngsters On The Air event in Austria.

Shack improvements

The Club worked hard on its new premises in 2016. They have expanded the building and facilities. There is a dedicated shack with a fixed tower on which they have HF and VHF antennas. Many of the members have brought their skills to bear on this project. It will allow the club to expand the services and to accommodate larger numbers in a warm and dry, custom designed building.

Book Review

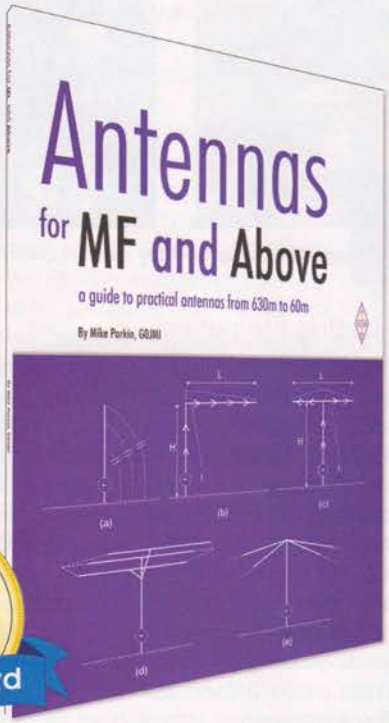
Our traditional three favourites from 2017 plus two completely new books for 2018

Antennas for MF and Above

by Mike Parkin, G0JMI

What do you get when you give an antenna guru free rein to write a book? If you're lucky, a very good book indeed – and that's exactly what Mike Parkin has come up with. He looks at antennas for 630m, 160m, 80m and 60m, describing various types and configurations in ways that will be instantly familiar to regular readers of his *RadCom* column.

A book's advantage over a monthly column is that there is much more space to explore your chosen topics and Mike makes use of this to the full, looking at the theory and practice of getting your signals to and from the atmosphere. I feel sure that it will become one of amateur radio's standard reference works and it is a very deserving winner of this year's first place.

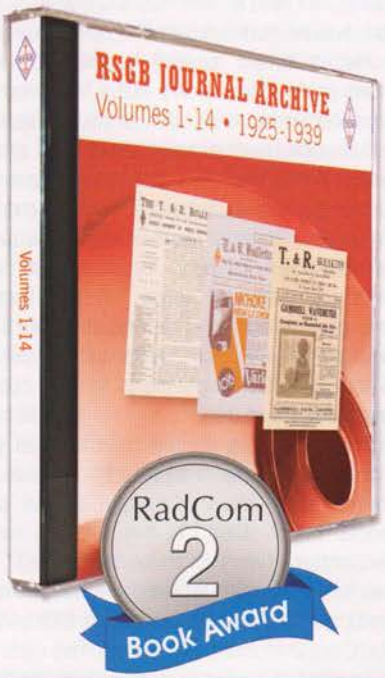


Size 174x240mm, 112 pages
ISBN: 9781 9101 9346 4
Non Members' £11.99
RSGB Members' £10.19

RSGB Journal Archive 1925-1939

We launched this electronic collection back in March without a huge amount of fanfare but it has been remarkably well received. And rightly so: it contains copies of all *RadCom*'s predecessor titles from its inception to the outbreak of the Second World War.

Those were heady times for amateur radio (and radio in general). The art and science of radio was developing at a prodigious rate. In 1925 the valve was still in its relative infancy, radio broadcasting had only recently been invented and a crystal set with a cat's whisker was still regarded as a thing of wonder. All sorts of developments followed – many by amateurs – and the RSGB Journal Archive provides a fascinating first-hand look at what actually happened as our hobby became more and more firmly established.



Non Members' Price: £19.99 Each
RSGB Members' Price: £16.99 Each

More Arduino Projects for Ham Radio

by Glen Popiel, KW5GP

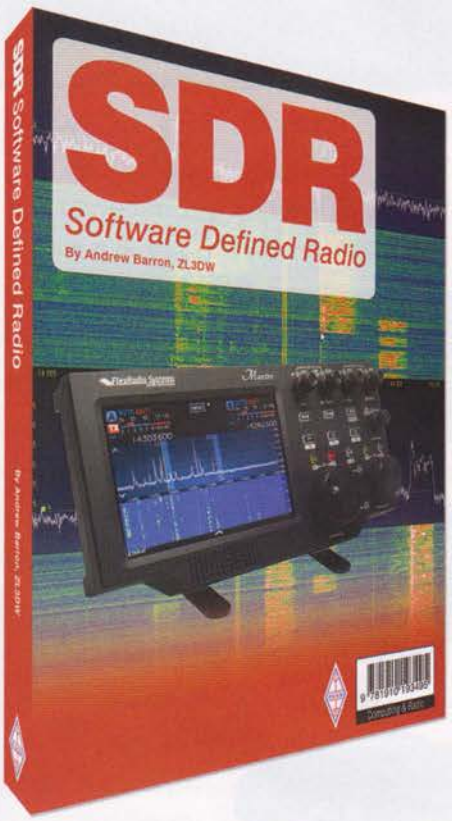
Perhaps this book is a topical choice (see Last Word) but it deserves a place on its own merits. We learn about the terminology (such as not all Arduinos are called Arduino, programs are called 'sketches' and the myriad expansion boards are 'shields'), how you can put together bits from the Arduino ecosystem to make projects useful for the average amateur – and learn rather a lot along the way. In fact, much of the learning will sneak up on you from behind as you go through this book, as you suddenly realise you understand things that once seemed to be a mix of magic incantations and gibberish.

It's an excellent introduction to the world of Arduino and, although pricey, well worth it for a book that offers so much.

Size: 208 x 276mm, 500 pages
ISBN: 9781 6259 5070 3
Non Members' Price: £39.99
RSGB Members' Price: £33.99

Software Defined Radio

by Andrew Barron, ZL3DW



This book is quite simply the best I have ever seen on software defined radio (SDR). It covers the theory, practice, hardware, software, techniques, equipment and, in fact, pretty much everything you could possibly want to know about this still-emerging yet surprisingly mature aspect of our hobby.

SDR was once the exclusive domain of professionals, with only the most dedicated hackers and tinkerers getting a look-in. For many, the whole subject remains in the realms of the Dark Arts (nodding to the Harry Potter afficionados), but this book changes everything.

An experienced author from New Zealand, Andrew brings his extensive expertise to the fore in this easy-to-understand work. He begins by considering the basics, such as 'what computer skills do you need?' His intriguing answer is that using an SDR makes using radio a bit like browsing the internet and strongly implies that if you can do that, you should be fine on SDR. This is typical of the book: it delivers its messages very clearly, and in a way that lets you cotton on to the concepts and techniques with the minimum of mental effort.

There have been several generations of SDR and these are all described in terms of their architecture and general performance; we also learn about the software, connections and so forth. Then several different use cases are considered – SWLing, CW, digimodes, contesting, interference monitoring, microwaves, EME, satellites and more. We then get a survey of different SDR radios that are available, ranging from the simple, inexpensive SoftRock up to the very recent, flagship Apache ANAN-8000DLE (which graced the November 2017 *RadCom* front cover).

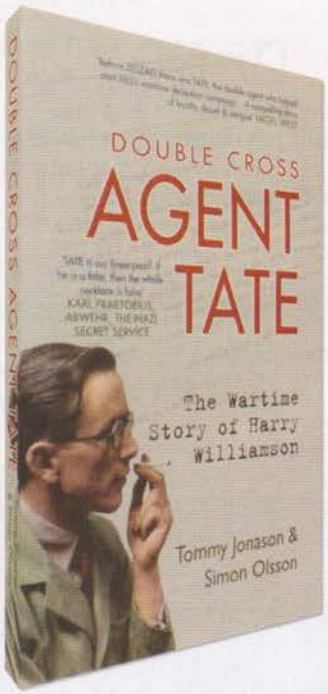
Only once we're well into the book and comfy with the gear do we start looking at the hard-core technical things like I/Q signals, sampling, direct digital synthesis, client/server architectures, fast Fourier transform magic, waterfall & panadapter displays and so on. By this time we're secure enough with what's going on to be able to make use of this more detailed technical information. There's even a section of SDR performance testing (which has some curious foibles compared to analogue receivers) and a comprehensive catalogue of software defined radio equipment that includes key performance data for each item. Over sixty different types of SDR are examined, giving an amazingly useful view of the current (and previous) state of the art in SDR. I think this will be particularly useful if you're thinking of purchasing an SDR of any kind either now or in the future.

This truly is the most wide-ranging, complete and, above all, accessible book I've ever seen on software defined radio and I heartily commend it to beginners and old hands alike.

Size 174x240mm, 304 pages, ISBN: 9781 9101 9349 5
Non Members' Price: £12.99, RSGB Members' Price: £11.04

Double Cross Agent TATE

by Tommy Jonason & Simon Olsson



Regular readers will know I like tales of derring-do, double-crosses and bravery in the face of impossible odds. This is the true story of Double Agent TATE – and the story is fascinating.

TATE, also known to a select few as Harry Williamson, was born in Denmark as Wulf Schmid, recruited by the Abwehr before the war and sent on some (largely unsuccessful) spying missions in England and elsewhere. He then received further training, was given some clumsily-forged documents and dropped by air into Cambridgeshire. He only evaded detection for a few hours, ending up being arrested and transferred to an interrogation camp. Wulf/Harry was 'turned' at the camp, by purely psychological means, and embarked on a new career as double-agent TATE, feeding back to Germany misinformation provided by his MI5 handlers.

And then it gets even more interesting.

We learn a huge amount about how the DOUBLE CROSS operation worked; the people involved; the techniques, tribulations and triumphs. TATE sent well over 1000 radio messages to Germany concerning everything in England from civilian morale to the (false) positions that V1 and V2 flying bombs fell. He was also instrumental in the deception campaign that lead up to D-Day, reporting carefully-crafted half-truths and outright lies that helped wrong-foot German High Command. the Abwehr regarded TATE as "one of the most reliable and trusted German spies in Britain". After the war he took British citizenship and ran a photography business; he passed away in 1992.

This great, true story will be of interest to a wide variety of people, young and old. It's well worth a look; I'm glad it has passed through my hands.

Size 124x198mm, 274 pages, ISBN: 9781 4456 0864 8
Non Members: £10.99, RSGB Members: £7.69 (30% off)

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Jamboree on the Air 2017

A Beaver enjoying JOTA with South Kesteven ARS.

Collecting a certificate of achievement from Andrew, M0NRD.

JOTA is the largest Scouting event in the world with over 1 million Scouts participating across 150+ countries during the third weekend of October.

Chertsey Radio Club ran a JOTA station with the 6th Staines Scouts, Cubs and Beavers. James, M0JFP and Bob, M6FLT set up and ran two HF stations and a DMR / analogue station. They also provided test sheets for each section to help the children pass their Communicator badge. Seventy five children send greetings messages over the air and they would like to thank GB3HL and its various users who facilitated this when HF conditions became unusable. They also had messages on the FUNcube-1 satellite and the children were able to decode and learn a little about that. All the Beavers and Cubs passed their Communicators badges and the club has been invited back to help finish off the Scouts badge over the following weeks.

James, M0JFP

Storm Brian this year threatened the Jamboree but fortunately the weather settled and remained dry. Angel of the North and Northumbria ARCs combined resources to run JOTA from the Tyneside Scout HQ, 'The House on the Hill', West of Newcastle. Using GB2TS they operated on 60, 40, 20 and 2m. Fifteen countries were logged and the 38 Scouts each gave at least two greetings messages while experiencing the world of amateur radio. An important part of the day was the opportunity to undertake the training needed to achieve their Scout Communicator badge. Five Scouts also requested to enrol on a Foundation course to be run in the coming weeks. The day was a great success and closed with 38 happy Scouts and 9 tired amateurs! Thanks go to the Scout support staff for making the event a success.

Nancy, G7UUR

For the second year running, North Kent Radio Society members took part in the 1st Foots Cray Scout group's JOTA event at Sidcup by hosting an HF and 2m station. Dodging the winds of Storm Brian and the frequent showers, a simple 20/40m dipole was carefully erected and driven by an FT-991 rig at around 75 watts to get GB2FCS on air. With over 100 Beavers, Cubs and Scouts attending, many contacts were made giving the youngsters chance to converse with their counterparts throughout the UK and Europe. Stephen, G8JZT, Robin, M0RJT, Peter, M0PBR, Tony, G4WIF, Frank, G3WMR and Kevin, G0MLO provided Morse code and 'walkie-talkie' practice sessions leading to on-air QSOs in order to assist them with obtaining their Communicator badge. An interesting addition to this traditional event was the use of social media and Skype over the internet to provide instant video contact with Scout groups in India, Australia and Malaysia to name but a few, all very exciting. Many thanks to Akela and her colleagues at Foots Cray for their hospitality and the club look forward to an even better event next year.

Kevin, G0MLO

Once again we had a great JOTA with GB2GCS and Grimsby Cleethorpes Scouts with around 80 Cubs, Brownies, Scouts and Guides. On Saturday they made contact with the USA to Lou, KE0HDU who was up at 4am CET to help them with their badge work. Their photo shows the Scout active support team (from left to right) Pete, G6NDH, Andy, G0MNI, Aidan, M6UTD, Sue, M6SSD, Dave, M6DCS, Tom, G4ZRV, Sue, M6CBP, Jean, M6EJP, Brian, M6LZX, Ade, 2E0GNW and Steve, M6SBE.

Brian, M6LZX

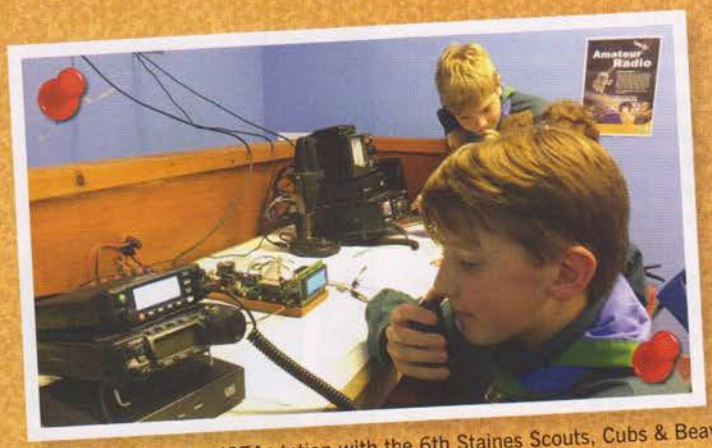
Over the weekend of 21 and 22 October, Harlow & District ARS opened their doors to Scout groups from Harlow District to participate in JOTA. This year was the 60th anniversary of JOTA, Beavers, Cubs and Scouts from 1st Nazing and 21st Harlow attended throughout the weekend and made contact with stations across England, America, and Namibia and many others. Operators from the club said it was good to see the youngsters communicating and completing parts of their communications badge and world challenge badge and look forward to next year.

Members of Gloucestershire RAYNET put on a station this weekend for the annual event, with some 65 Scouts and Guides of all ages getting on the air. Under the watchful eye of Dave Bunce, G0GAJ contacts were made on local 2m frequencies whilst George, G0AZD demonstrated CW operating – the item which most thought enjoyable! Using HF the team worked into the US and Europe.
Max White

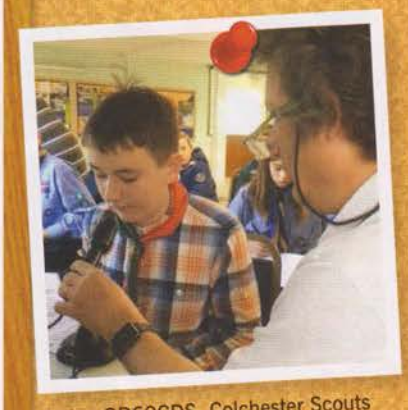
Essex Ham was proud to be asked to support JOTA 2017 at the Belchamps Scout Activity Centre. During the two days, over 220 Beavers, Cubs and Scouts from groups around Essex took part in the 60th annual JOTA, with many camping overnight. Two stations were active using GB1BEL: a basic 2m station for the majority of the greetings messages, and an IC-7300 for HF on 80m, 40m and 20m. Other radio attractions included a popular radio hunt, a Your Name in Morse activity (coded by member Nick, M0NFE), a map of live ADS-B data from a £10 dongle (courtesy of Ian, 2E0HPR), the RSGB's *21st Century Hobby* video playing on a Raspberry Pi, plus a design-your-own QSL card competition. Special mention goes to Gary, 2E0YRG who helped out at home, handling 36 greetings messages in a row, and to Derek, M0SCE and the team at the Belchamps Scout Centre for setting up the antennas in advance. During the event, the Essex Ham team made contact with eight other JOTA stations, and helped the Beavers, Cubs and Scouts to complete their booklets to allow them to obtain their prized Communicator badge at the end of the weekend.
Pete, M0PSX

Barnet District Scouts asked Southgate ARC to return to their campsite near Mill Hill and put on a JOTA station to complement the JOTI activities that took place in a separate building. The station was straightforward: the club's Kenwood TS-590SG, a 40m full wave delta loop at about 7m effective height with a remote ATU, plus computerised logging. We had a panadaptor using an SDRPlay 1 receiver driven from a Raspberry Pi3 computer, which functioned well. Unfortunately the Pi3 does not have sufficient computing power to control the rig as well as running the panadaptor software. There was also a physically small digital modes station comprising a Yaesu FT-817, tablet PC and a 20m vertical aerial, set up by Peter, G0KUX, which provided additional interest for the more computer-aware visitors. Propagation was okay on the Saturday, and the QRM from the photo voltaic panels on the roofs in the adjacent housing estate was very effectively suppressed by the delta loop to S3. The vertical was a different story, with S8 noise. On the Sunday, conditions improved markedly, with very high signal levels requiring judicious use of the rig's attenuator and reducing the RF gain to stop the rig overloading and producing horrible audio.

Members of Gloucestershire RAYNET put on a JOTA station.



Chertsey Radio Club ran a JOTA station with the 6th Staines Scouts, Cubs & Beavers.



Using GB60CDS, Colchester Scouts were back on the air for another JOTA.

Harlow & District ARS worked with Scout groups from Harlow District.

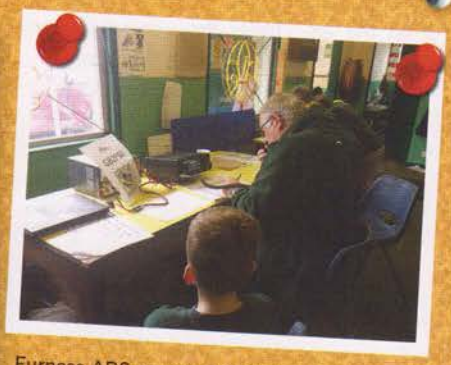
Elaine Richards, G4LFM
elaine.richards@rsgb.org.uk

We contacted around 26 stations, of which 13 were JOTA stations and only one of these was outside the UK. All were on 40m – we had major RF feedback on 20m affecting both stations. Propagation was unusual, with a shorter skip distance than many of the stations contacted had expected, and some very odd atmospherics producing peculiar audio effects. Big thanks to everyone we contacted to for their patience with the Cubs, Brownies, Beavers, and the sometimes rather confused operators. Operators were Mike, M0ASA, Peter, G0KUX, John, G0ESF and Keith, G8RPA, assisted by Graeme, G8DVJ, Nigel, G0RPM, Donald, G4DFB and Martin, G4GRS.
Keith, G8RPA

Torbay ARS paid the Scout troop an initial visit to introduce them to the concepts of amateur radio, JOTA and world wide communications. The evening went down very well, the young people were interested by our gear: A couple of weeks later we returned, and took this opportunity to get the Scouts thinking about what they wanted to say whilst on the air. We (that's me, M0TCF, Che, M3CHE, Kerry, M6KRE and Slade, M6SQB) arrived at the Bradninch Cricket Club (IO80GT) with rather more gear than necessary – having said that, remember the Scout Motto: Be Prepared! We were. The antenna masts used two antennas; a trapped fan dipole, which is a particular favourite of mine, on 20 and 40m and an off centre fed dipole running on 80-6m. We were kept busy through out the day; running two HF stations and a VHF/UHF link to our local repeaters. We had arranged to run back ground activities along with the radios ranging from the 'Bolivian Time Wheel' (from the Scout JOTA website) to a giant GB0FBS' collage, as well as simple antenna construction and tuning. Che took one of the Scouts outside and connected their antenna to his hand held radio and proved it worked and he caught an ISS pass and communications link up. We had something like 23 JOTA contacts logged.
Lin, M0TCF

Norfolk Coast ARS operated GB1HS for a second year at the HQ of the 1st Holt Scouts group. It proved extremely popular with the many Cubs and Scouts attending the event. There were three operational stations – SSB on 40m, CW on 20m and 2m FM. Band conditions were very good and every one attending successfully had a QSO. The antennas were a half size G5RV for 40m and a ¼ wave vertical for 20m. In addition the Cubs and Scouts were able to send their names in Morse code and were given a certificate for their achievement.
Steve, G3PND

George, G0AZD from Gloucestershire RAYNET demonstrated CW operating.



Furness ARS operated GB2FSR from 2nd Ulverston Scouts for JOTA.

Essex Ham supported JOTA at the Belchamps Scout Activity Centre.

Barnet District Scouts asked Southgate ARC to put on a JOTA station.

Norfolk Coast ARS operated GB1HS.

Using GB60CDS, Colchester Scouts were back on the air for another JOTA, made possible by the hard work of Colchester RAC who provided, set up and ran the radio equipment. 73 young people visited the shack during Saturday. On offer was HF, VHF, Morse (with Morse-mouse a winner again), phonetics and a receive only for tuning and logging. All of this geared to making sure the young people passed some of their Communicator badge. All passed a greetings message and showed great proficiency in spelling their name phonetically, we were also pleasantly surprised how quickly the

Zena, M6ZLA, operating a D-Star station for Norfolk ARC.

Robin, M0RJT of North Kent Radio Society assisting with the QSO.

young people picked up Morse code and how much it was enjoyed! We were pleased to be joined by Sir Bob Russell, President of Colchester Scouts and Colchester's High Steward.

Richard, G7BIV

Rhondda ARS and the 1st Tonypandy Scouts Group had a fantastic Saturday with lots of Scouts acquiring their Communicator badges. They took part in voice communications over HF, VHF and UHF, witnessed how digital modes allow worldwide communications using a handheld and also made some contacts over PSK on HF.

Mark Stevenson, DRM 73

October 2017 saw Furness ARS operate GB2FSR from the 2nd Ulverston Scouts for JOTA. At the request of the Scouts, this year only a Saturday event was required. Set up began at 8am with the rigging of a 10m mast to accommodate a 40m dipole for use with the clubs IC-7300. Other activities were set up including a CW station, where Scouts could practice sending their names. There was a simple design a QSL card activity as well as create your own phonetic alphabet, just for a bit of fun. One of the most popular items was the 'helmetcam', which is a wireless video camera mounted to a helmet that the Scouts wear and others watch their received signal on a TV screen and use a Yagi antenna to improve their reception. PMR radios are also used allowing the Scouts to communicate to each other. In total we gave out 26 badges and certificates for 'passing a greetings message' – some passed multiple messages and were very enthusiastic about radio. After an initial CQ we managed to stick to one frequency for nearly 7 hours of operating, with some mini pileups. The QSO count was 65 for the one day – no mean feat when some lasted 30 minutes or more passing and receiving greetings. With the exception of France and the Netherlands all other QSOs were inter-G. We worked 28 other JOTA stations, some numerous time, including GB2JAM – 1st Birkenhead Scout Group, GB1SJM – 1st Margate (St John's) Scout Group, GB2GU – Guernsey Scouts, GB1HS – 1st Hainault Scouts, GB5SUS – 5th St Ives Scout Group, GB1CUB – 1st Bromsgrove Scouts, GB2GCS – Grimsby Cleethorpes District Scouts and GB4PS – 4th Portadown Scout Groups to name but a few.

Chris, M0KPW

Norfolk Scouts and the Norfolk ARC joined forces to set up and run a JOTA station in Norwich. This was open to Scouts from across the county. GB60NFK ran from 10am Saturday until 1.30pm Sunday and attracted around 50 Scouts over the course of the weekend. On offer was a Morse 'taster' session, which also gave them some background on numerous radios and how they operate, including HF, D-Star, DMR and 2m/70cms (VHF/UHF). While weather and propagation conditions were far from ideal, HF contacts were made up to the north of the UK and near continent, but the digital modes worked well with contacts into North America, Canada, Qatar and the Middle East, albeit with the digital networks' help. Feedback from the Scouts and leaders who attended was very positive with comments made on how professional the amateur operators were. Many thanks to all of the leaders who brought Scouts and especially to the amateur radio operators without whom we could not have run the event – namely Stuart, M0JKB, Zena, M6ZLA, Paul, G1DXQ, Julian, 2E0DJR, Nick, 2E0NHJ, David, G7URP, Jim, G3YLA and Kevin, M0UJD.

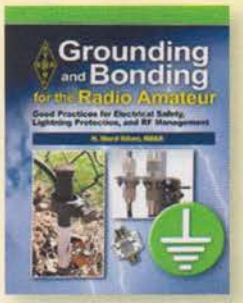
Simon, M0LDK
DDC Eastern Norwich Scouts

On Saturday 21 October South Kesteven ARS operated GB1GDS as part of the JOTA-JOTI event. GB1GDS operating from the 1st Foston Scout Hut and the event was attended by Scout groups from all over the Grantham District. Andrew, M0NRD, Stewart, M0SDM, Sean, 2E0ENN and Brian, M0YBX were in attendance. Andrew, M0NRD gave a brief introduction to amateur radio and what they would be doing and they were shown the RSGB video *Amateur radio – a 21st Century hobby.* As in previous years the main SSB station was in the store room to provide separation from the hubbub in the main hall and was manned by Stewart, M0SDM for most of the day. Using a FT-450D running 100W into an OCF dipole, excellent band conditions on 40m meant non-stop contact with other JOTA stations and amateurs around the country and Europe. In keeping with the aims of JOTA we didn't chase numbers instead we had some lengthy quality contacts with lots of two-way greeting messages being sent to really give the children a full experience of using the radio.

In addition to our own Scouts we were able to hold conversations with other groups and JOTA stations. Brian, M0YBX was the Morse code guru for the day, bringing along his radio a straight key, a Iambic key and his computer running the MRP40 decoder so the children could see the Morse code as well as hearing it and watch their attempts at keying being decoded in real-time. There was also another practice Morse sounder that proved popular for those bitten by the bug. A data station was setup also, running primarily the currently-fashionable FT8 mode using a FT-857D using low power (10W) on the 15m band with an end fed wire up a fibre-glass fishing pole. One bonus this year was during both sessions an ARISS school contact took place both in the morning and afternoon. Astronaut Paolo Nespoli on board the International Space Station was answering questions in Italian from schools in Italy. The children loved hearing the signal come in and then fade out as the space station passed overhead.

Andrew, M0NRD

Great



ARRL Grounding and Bonding for the Radio Amateur

By Ward Silver, N0AX

Proper Station Grounding is important and this ARRL book sets out to explain how to do it safely. This book is specifically aimed at US radio amateurs and provides an intriguing insight into a different electrical system even if it absolutely shouldn't be used as a guide to UK regulations and methods.

ARRL Grounding and Bonding for the Radio Amateur provides information on AC safety in the US and their National Electrical Code but there is much more. Many parts are useful regardless of supply differences and you will find fascinating information on for example lightning protection. The chapter on 'RF Management' is describes preventing unwanted RF currents and voltages from disrupting the normal functions of equipment whilst the 'Good Practice Guidelines' chapter contains a wealth of information that is applicable both here and internationally.

If you are interested in different electrical standards and how they affect station management across the globe *ARRL Grounding and Bonding for the Radio Amateur* provides a hugely interesting read.

Size: 184 x 229mm, 176 pages
ISBN: 9781 6259 5065 9
Non Members' Price £22.99
RSGB Members' Price £19.54

More Arduino Projects for Ham Radio

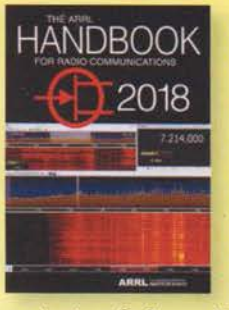
By: Glen Popiel, KW5GP

More Arduino Projects for Ham Radio includes 15 completely new practical and functional Arduino projects for ham radio. This book branches out to use some of the newer Arduino variants and devices. Each project is complete and functional but room has been left for you to add personal touches and enhancements. That's part of the fun of the Arduino and Open Source communities building on the work of others, and then sharing your designs and innovations for others to learn, modify, and improve.

More Arduino Projects for Ham Radio builds a solid foundation through descriptions of the many new Arduino boards and add-on components, followed by a collection of practical ham radio projects. Readers will find a wide variety of applications with projects including Wireless Remote Coax Switch, Yaesu Rotator Controller, Antenna SWR Analyser, two 40 Meter QRP Transceivers and much more.

There is something in *More Arduino Projects for Ham Radio* for everyone interested in Arduino.

Size: 208 x 276mm, 500 pages
ISBN: 9781 6259 5070 3
Non Members' Price £39.99
RSGB Members' Price £33.99



ARRL Handbook 2018

Every few years the *ARRL Handbook for Radio Communications* undergoes a major update. The 2018 edition is one of these editions. Readers will find new and updated content on Software Defined Radio (SDR) and Digital Signal Processing (DSP), Grounding and Bonding, Solar Cycle 24-25, Tower Safety, and Building Remote-Control Stations to mention but a few.

The *ARRL Handbook 2018* contains a host of new projects including: VHF/UHF/Microwave Filters and Transmission Lines, Software-Controlled and Manual Preselectors for 1.8-30MHz, Digital Mode Audio-Based VOX/PTT Interface, PICAXE-Based Timer, Arduino-Based CW IDer, 6-Meter Halo Antenna, Big Wheel VHF/UHF Mobile Antenna, Off-Center End-Fed Portable 40-6 Meter Antenna, Crossed-Dipole Omnidirectional Antenna for 1296MHz, Spudgun Antenna Launcher and CW Reception Filters.

This continues to be a cornerstone of radio experimentation, discovery, and achievement. It covers a wealth of information: Radio electronics theory and principles, Radio signal transmission and propagation, Digital modulation and protocols.

Size 208x274mm, 1280 pages
ISBN: 9781 6259 5071 0
Non Members' £49.99
RSGB Members' £42.49

Elimination of Electrical Noise (2nd Edition)

By Don Pinnock, G3HVA

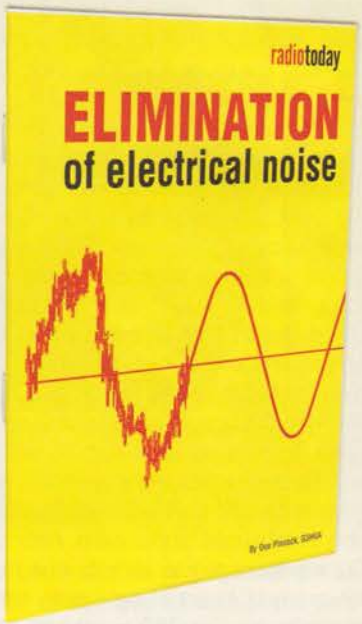
Electrical Noise is a problem for most radio amateurs today. Don Pinnock, G3HVA, is a firm believer that radio amateurs not be forced from the air but should deal with these problems. This new second edition of *Elimination of Electrical Noise* tells of Don's experiences and provides solutions to noise problems.

Elimination of Electrical Noise details the various types of noise, from computers to electrical light fittings. Faulty or maladjusted machinery or electronic devices can produce so much interference that normal reception is considerably affected. Computers are almost an essential in a modern shack. New to this edition is a chapter on how to reduce or eliminate noise from the computer equipment itself and from the numerous interconnecting leads. Even equipment operating below or close to International Standards can generate enough electrical noise to severely reduce the chances of a nearby amateur being able to enjoy his chosen hobby.

In *Elimination of Electrical Noise,* Don describes how to track down a noise source, how to deal with it at its source, and how to put up defences in your own station to reduce noise entering via the mains wiring.

If you suffer from electrical noise problems, Don's experiences and advice may well provide the solution you are looking for. *Elimination of Electrical Noise* provides the help you may need to take charge, tackle that noise problem and get the most from your hobby.

Size: 174 x 240mm, 64 pages, ISBN: 9781 9101 9314 3
Non Members' Price: £6.99, RSGB Members' Price: £5.94



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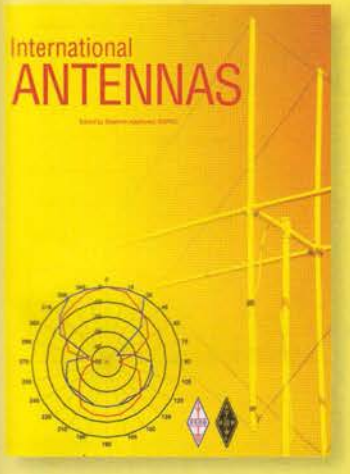


International Antennas

Edited by Stephen Appleyard G3PND

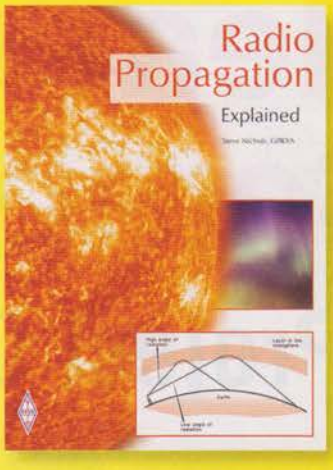
Much is published across the world about amateur radio antennas. *International Antennas* brings together some of the very best material that has been published in recent years. There are over 50 articles included with authors from Australia, Scandinavia, South Africa, United Kingdom, USA and more.

International Antennas has an emphasis is on practical rather than theoretical. You will find descriptions of the construction and performance of antennas enabling the reader to build their own versions. These articles have been written by experienced radio amateurs who have been so pleased with the performance of their particular antenna, that they have been moved to put pen to paper to share this experience.

There is a huge range of antennas included in this book, covering 17 bands from VLF through to 70cm. You will find articles covering the 'stealthy' antennas through to novel approaches to classic antennas. There are verticals, loops, beams and a host of unusual designs. There is so much in fact that the editor has provided a cross reference to see at a glance the bands antennas are designed for and if they are intended for fixed use or mobile/portable operation.

International Antennas is a fabulous collection of antenna articles from around the world. It is intended for everyone who is interested in amateur radio antenna design or is just looking for practical antennas to study and build.

Size: 200 x 234mm, 176 pages
ISBN: 9781 9101 9335 8
Non Members' Price £14.99
RSGB Members' Price £12.74



Radio Propagation Explained

Steve Nichols, G0KYA

Understanding radio propagation is essential for anyone with an interest in radio communication. Steve Nichols, G0KYA *Radio Propagation Explained* provides everything you need to know about this fascinating topic.

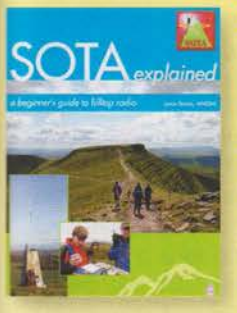
Looking at HF to VHF, UHF and beyond *Radio Propagation Explained* provides a practical understanding of radio propagation. It looks at the sun, sunspots, ionospheric propagation, ionospheric storms and aurora, tropospheric propagation, meteor scatter and space communications, including satellites and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

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

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

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

Also available on amazonkindle



SOTA Explained

By Jamie Davies, MM0JMI

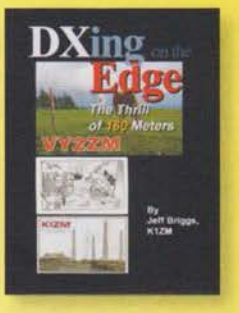
Summits on the Air (SOTA), is one of fastest developing award schemes that have come into existence in recent years. For the active hillwalker and the home based chaser of summits alike this programme offers endless fascination. *SOTA Explained* provides the essential guide to this programme.

Taking a portable radio station into the hills and operating from a summit is a fascinating and rewarding way to combine the very best aspects of walking and of amateur radio. SOTA activity is also inexpensive providing the opportunity to achieve a great deal in amateur radio. Many appreciate the freedom this sort of operation offers and the benefits of having a high radio station far from urban electrical interference.

SOTA Explained provides the ideal guide to the SOTA scheme and making hilltop operation easy, social, & fun.

Size: 174 x 240mm, 160 pages,
ISBN: 9781 9101 9336 5
Non Members' Price £12.99
RSGB Members' Price £11.04

Also available on amazonkindle



DXing on the Edge - 2nd Edition

by Jeff Briggs, K1ZM

For many radio amateurs operating on Topband or 160m is endlessly challenging, exciting and intriguing. Jeff Briggs, K1ZM, has extended a book that will appeal to all who operate Topband.

This specially produced RSGB edition of a US classic brings the best of 160m operating experience to everyone. The book covers the chronology of DXing on 160m across the years and the personalities involved. Aside from detailed historical information, the author describes many practical antennas and operating techniques. Successful DXing can be accomplished from the trickiest environment and the book includes lots of neat tricks and hints that will help you. In the 42 page colour section are new chapters for 'Modern "Off the Shelf" Transmit Solutions', 'Modern Receive Solutions for Smaller Properties' and more.

Beware though, as Topband can be addictive.

Size: 222 x 286mm, 256 pages
ISBN: 9781 9101 9333 4
Non Members' Price £15.99
RSGB Members' Price £13.59

Radio Society of Great Britain www.rsgbshop.org
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Noise Measurement Campaign – Project Completion

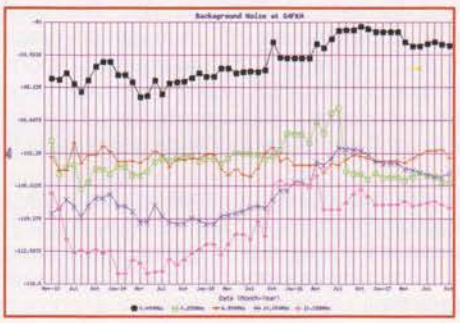

FIGURE 1: Situation at G4FKH.

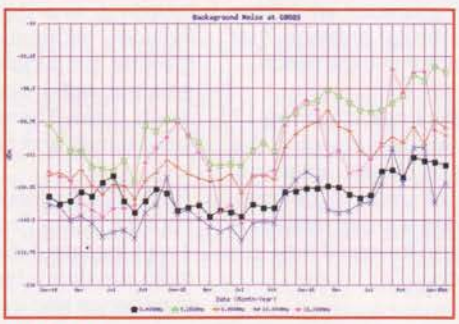

FIGURE 2: Situation at G0DQS.

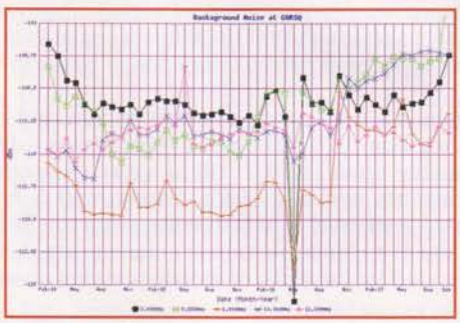

FIGURE 3: Situation at G0RSQ.

This project began in 2013 and has now completed its life span as agreed in the project specification. Sponsored by the RSGB's Legacy Fund, it is an example of outreach projects that are encouraged by the RSGB. That said, it would not have even started if it were not for the kind assistance of John Gould, G3WKL.

The project's purpose was to ascertain whether or not the HF background noise level was rising. To this end, volunteers were asked to participate in the project. Equipment needed was a Windows computer running under XP, a Cross Country Wireless Sentinel receiver and a Cross Country Wireless active aerial. The Sentinel receiver came already calibrated, but my own was tested monthly to ensure that the outputs remained the same. Throughout the life of the project the test figures were within 1dB, stable enough for this purpose.

The volunteers included G0DQS, G0RSQ, G3HYG, G3OYU, G3RTD, G4AHZ, G4FKH, G4KRW, G6BMY, G7CNF, GW8KCY, M0VFC and M0JFM. I will be utilising data from six of these stations during this article. The other stations were left out because either the data sets were not considered long enough or they were not participating for long enough periods. Because each of the participants have unique environments it was necessary for me to change the axis values to accommodate the graphs used. Nonetheless values shown on the axis remain correct.

How the project worked

Participating stations listened on five discrete frequencies, 3.499, 5.258, 6.999, 10.090 and 13.399MHz, all outside the amateur bands to avoid jamming. Cross Country Wireless (CCW) software written especially for the Sentinel receiver controlled the setup. Each frequency was listened to in turn over 10 minute periods, thus spending 2 minutes on each frequency. During the 2 minute period, 500 background noise readings were taken and logged onto the computer. The computer program then did some statistical calculations to produce the output as seen on the web page. The data stored was high/median/low readings for each 2 minute period. This data was sent to an ARPS server every 10 minutes and retrieved from there by a program residing on www.rsgbnoise.com The deployment for the excellent website as well as the background coding was all carried out by Roger Pettett, G7TKI. That website displayed the data graphically and in table format. Each month the website background programs computed two reports for each participating station, (i) Seasonal and (ii) Monthly, either in HTML or Excel format.

This is an opportune point in which to make some general statements concerning the background noise. Firstly, from a general rule, the noise should decrease as the frequency increases. Secondly, background noise is dependent upon the local environment, are the electricity/telephone services fed into the property by underground cables. Thirdly, is the property close to electrical noise sources? There are many more circumstances that have an impact upon the local background noise level.

Now that the project is over, the Sentinel receivers are not redundant; they have SDR receive capabilities from 3.5 to 15MHz and will of course work with any aerial type. Added to that, Chris Moulding of CCW has written extra software so that the Sentinel receiver may be used for WSPR and other digital modes.

Analysing the results

As just mentioned, I will be utilising data from six volunteer stations, including my own, that is data in the form of graphs. Some general conclusions should be apparent from studying this data. I will start with my own station because I am completely familiar with my own overall environment. **Figure 1** is a graphical representation of G4FKH's data from April 2013 to October 2017. The first thing to notice is that the HF background noise is not very stable. Taking the frequencies in turn; **3.499MHz** – this seemed to start deteriorating around October 2015, so I monitored the

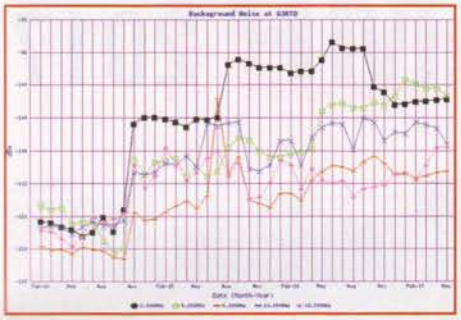

FIGURE 4: Situation at G3RTD.

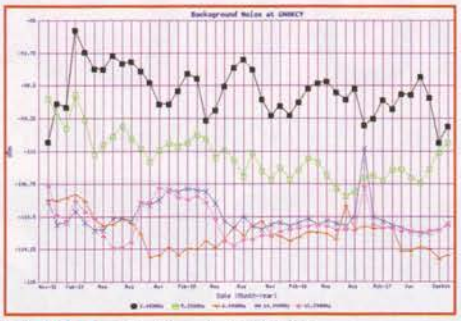

FIGURE 5: Situation at GW8KCY.

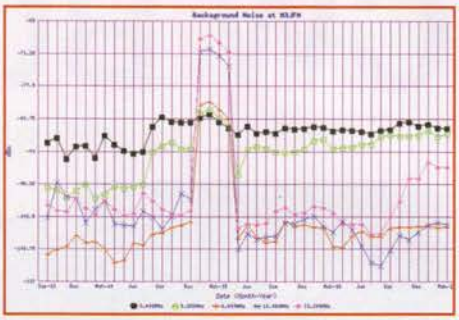

FIGURE 6: Situation at M3JFM.

frequency with my main station receiver and found that there was a transmission there (presumably legally) that remains to this day. It would appear that the actual 3.5MHz band remains within ± 2 or 3dB of the value in 2013. **5.258MHz** – I have a note locally and the graph line shows that this band has remained quite stable when no user was on the frequency. **6.999MHz** – the same comments apply here as to 5.258MHz, to be noted is that here the 7MHz band has remained just fine throughout. **10.09MHz** – I cannot find a particular reason why this band declined around October 2015 but it does seem to be recovering slowly. **13.399MHz** – this frequency was just fine until September 2014 and has remained noisy since. Unfortunately commercial users are utilising the frequency. The 14MHz band here has retained about the same levels as previously; I take measurements from time to time.

Taking the remaining stations alphabetically, **Figure 2** shows the situation at G0DQS. This station is obviously not in an ideal situation because the monitoring does not show my first general rule. 3.499MHz, 10.09MHz and 13.399MHz all appear to have been fairly stable over the covered period; however, 5.258MHz and 6.999MHz seem to have ended the period in a worse situation.

G0RSQ's data is depicted in **Figure 3**, the first thing to note is the inconsistency shown around May 2016, this was apparently due to a computer crash while the volunteer was on holiday. Apart from that 3.499MHz finished the period recording a lower level, 5.258MHz finished at the same levels as the start. 6.999MHz/10.09MHz finished off at a noisier level, and 13.399MHz finished at about the same level as at the beginning of the exercise. G3RTD's data is shown in **Figure 4**; apart from the first 9 months (unexplained) this data shows a gradual increase in background noise at all QRG's except 13.399MHz.

Next we have our only Welsh contributor, GW8KCY **Figure 5**, whose data on all QRG's shows a picture of improving background noise, I'm sure there are a lot of readers who wish they were in the same position.

Lastly, we have M3JFM, **Figure 6**, apart from a period of four months starting December 2014 caused by electric maintenance at St Catherine's College, readings except for 5.258MHz and 13.399MHz show stability.

ITU method

The ITU describes the HF background noise in ITU-R PL372-13 and uses a Seasonal tabular output to show the expected levels. This is the reason why the website calculates these figures for the individual stations. **Table 1** shows such an output for G4FKH. The procedure described in the recommendation calls for output in single frequency tables. The table for 6.999MHz is shown and closely matches Figure 1 for the same frequency. The other frequencies are also a close match, except as mentioned above. Please note that Table 1, shows figures in dBw, in order of to get dBm take 30 from the figures and remember the values are negative, therefore -130 is quieter than -120.

TABLE 1: ITU-R PL372-13 output for 6.999MHz at G4FKH: lat=51.75, long=0.47; 3MHz manmade noise = -122dBW.

WINTER	Median noise values in dBW			
Time block	ATMO	GAL	Manmade	Overall
0000-0400	-158.2	-171.4	-132.2	-132.2
0400-0800	-159.0	-171.4	-132.2	-132.2
0800-1200	-176.6	-171.4	-132.2	-132.2
1200-1600	-175.5	-171.4	-132.2	-132.2
1600-2000	-160.9	-171.4	-132.2	-132.2
2000-2400	-157.4	-171.4	-132.2	-132.2

SPRING	Median noise values in dBW			
Time block	ATMO	GAL	Manmade	Overall
0000-0400	-156.8	-171.4	-132.2	-132.2
0400-0800	-165.8	-171.4	-132.2	-132.2
0800-1200	-177.2	-171.4	-132.2	-132.2
1200-1600	-176.5	-171.4	-132.2	-132.2
1600-2000	-163.5	-171.4	-132.2	-132.2
2000-2400	-155.8	-171.4	-132.2	-132.2

SUMMER	Median noise values in dBW			
Time block	ATMO	GAL	Manmade	Overall
0000-0400	-155.9	-171.4	-132.2	-132.2
0400-0800	-163.2	-171.4	-132.2	-132.2
0800-1200	-177.1	-171.4	-132.2	-132.2
1200-1600	-176.0	-171.4	-132.2	-132.2
1600-2000	-163.5	-171.4	-132.2	-132.2
2000-2400	-156.4	-171.4	-132.2	-132.2

AUTUMN	Median noise values in dBW			
Time block	ATMO	GAL	Manmade	Overall
0000-0400	-158.1	-171.4	-132.2	-132.2
0400-0800	-162.7	-171.4	-132.2	-132.2
0800-1200	-175.8	-171.4	-132.2	-132.2
1200-1600	-174.4	-171.4	-132.2	-132.2
1600-2000	-161.1	-171.4	-132.2	-132.2
2000-2400	-155.8	-171.4	-132.2	-132.2

Where next

HF background noise is an emotive subject because everyone's situation seems to be different. The RSGB, in the guise of the Legacy Fund, has provided a means by which all UK radio amateurs could participate in a very worthwhile study.

Rationalising the output from all the separate stations; if a particular station has overhead power and telephone lines that environment is volatile from a HF background noise viewpoint. However, when local conditions are more controlled such as in the case where power/telephone lines are underground a more stable background noise situation is apparent. The work carried out in this study, whilst meeting its objectives, is sufficient I believe to warrant a further more comprehensive and scientifically acceptable project. Who should perform this further work is, perhaps, for others to decide.

At the 2017 Landshut conference IARU Region 1 decided to set up a region-wide noise measuring campaign to have an independent opinion on the noise situation in the bands. Brendan Minish, EI6IZ is leading this activity. – Ed

Gwyn Williams, G4FKH
g4fkh@sky.com

Essex ARC CW BOOT CAMP 2017

Essex CW ARC committee member Andy, G0IBN giving a talk on Morse keys.

Intermediate speed Morse group.

CW Boot Camp

Essex CW ARC held their CW Boot Camp at Witham in Essex on 21 October, and people travelled from all over Southern England to attend. It was kindly sponsored by Martin Lynch & Sons, who donated two PK-4 Electronic Keyers.

Experience has shown that just undertaking Morse all day is too tiring for this kind of event so the programme included a variety of activities to enable attendees to enjoy their day better and to get more out of it.

During the introductory speech, a prize was offered for the candidate who had travelled the furthest. This turned out to be John, M6KET, who had travelled all the way from Redditch. He was presented with one of the PK-4 keyers donated by Martin Lynch & Sons.

Into groups

Three different CW speed groups were organised – slow, medium and fast. During the next 90 minutes every attendee was assessed for both sending and receiving. Each was critiqued on formation of characters, spacing and sending style. For receiving, speed was gradually increased and many found that this technique helped them to receive at faster speeds.

After coffee the next item was a group session introducing Morse keys. This included demonstrations on pump and bug keys and a tutorial on how to set them up. Then a comprehensive talk with slides was given entitled *The Paddle Key* that answered many questions about the different types of key including the touch key, squeeze keying, Iambic A and B, the role of the keyer and good techniques.

At mid-day a second Morse assessment and practice session started with the same speed groupings and ran until lunch at 1300. The club had also provided hot soup and sausage rolls, so all delegates were well fed.

Afternoon session

After lunch, a slide-show talk was given on the design and build of a low-cost device to measure the Morse speed of a paddle key, followed by several short talks on various amateur software and contesting techniques.

Afternoon coffee was followed by a combined group receiving session in which the speed was gradually increased. The trick was to stay with it to as high a speed as possible.

With the day drawing to a close, a wrap up speech was given during which the second PK-4 was presented. One of the seats in use had a sticker concealed underneath it. The lucky occupant was the winner, who turned out to be Nigel, MOICH.

Two attendees had their own epiphanies during the day. Mick, M0GWD achieved his first-ever on-air CW QSO and Nigel, MOICH logged only his second HF CW QSO. They were both delighted.

Every attendee said how much they enjoyed the day and how much they got out of it personally. The event was voted an outstanding success, and the ECWARC team feel they achieved their goal: to preserve and widen the use of CW operating, and to help raise operating standards.

For further information please visit the club's website, www.essexcw.org.uk

PK-4 winners, (left) Mick, M0GWD, (right) Nigel, MOICH and Dave, G4AJY. The keyers were kindly donated by Martin Lynch & Sons.

Stephen Cocks, G4ZUL
info@essexcw.org.uk

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Please send news reports to radcom@rsgb.org.uk. To get future events listed here and put on GB2RS, email details of your meetings as early as possible to radcom@RSGB.org.uk. Include your club name, RSGB Region number, contact name, callsign & phone number, date and details of meeting. Example: Fraser Road Radio Club, Region 9, Steve, M1ACB, 01234 832 700, 29 Oct, On the Air. We normally acknowledge all submissions within 3 working days: if you don't hear from us, please phone. We don't normally include 'closed', 'TBA' or 'every Tuesday'-type entries. **The deadline for the February issue is 19 December and for March it's 24 January.** For GB2RS, the deadline is 10am Thursday on the week of broadcast.

CLUB EVENTS CALENDAR

INTERNATIONAL

Pafos Radio Club, Cyprus
Richard, 5B4AJG, 00 357 97 857 891, 5b4ajg@gmail.com www.cyhams.org
Meets 3rd Thursday at DT's Bar. Visitors and holidaymakers welcome.

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

NATIONAL

Amateur Radio Caravan and Camping Club
membership@arcc.org.uk, www.arcc.org.uk

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

British Railways Amateur Radio Society
membership@brars.info, www.brars.info
Nets Tue 7pm on 3.68MHz, Fri 4pm on 3.685MHz

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

CDXC - The UK DX Foundation
Welcomes all interested in HF DX and contesting. www.cdxc.org.uk

Radio Amateur Old Timers' Association
MemSec@RAOTA.org, www.RAOTA.org
Nets: Wed 3.763MHz 1000, 1.963MHz 2100
Thurs 7.163MHz, 1100, 3.763MHz 1930
Sun 3.763MHz 1000

REGION 1: SCOTLAND SOUTH & WESTERN ISLES

Regional Manager: Anthony Miles, MM0TMZ
RM1@rsgb.org.uk

Ayr ARG
Derek, MM0OVD, 0744 793 1941
5 Quiz night with Charlie, MM0GNS
19 Presentation by Jason, GM7VSB

Cockenzie & Port Seton ARC
Bob, GM4UYZ, 01875 811 723
5 Club night

Lothians RS
Mike, MM0MLB,
secretary@lothiansradiosociety.com
10 Video evening
24 3D printing, Neil Gillies

REGION 2: SCOTLAND NORTH & NORTHERN ISLES

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

Aberdeen ARS
Fred, GM3ALZ, 01975 651 365
11 Radio discussion evening
18 Quiz night
25 Construction and on the air evening

Dundee ARC
2M0KAU, 0776 370 8933
1-31 MM0RDA HF SSB trophy
9 College re-opens
16, 23 Club night and training
30 Talk

Glenrothes & District RC
Dougie, MM6KNR, dougie@digitalmaker.co.uk
17 AFS debrief
24 Field day programme chat
31 TX Factor

REGION 3: NORTH WEST

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

Chester & District RS
Bruce, M0CVP, 01244 343 825
2 Bring and tell
9 Committee meeting
16, 30 Construction competition/talks on entries
23 Surplus sale

Macclesfield & District RS
Greg, M0TXX, info@gx4mws.com
8 Shack on the air
15 Film night
22 Club project
29 Club maintenance night

Mid-Cheshire ARS
Peter, G8HAV, 0791 931 5547
3 Open evening
10 Committee meeting
17 VHF NFD discussion
24, 31 Radioactive/Norbreck planning

Stockport Radio Society
Heather, M6HNS, 0750 690 4422
2, 23 Radio/skills night
5, 12, 19, 26 Net 2pm on 433.525MHz FM
9 Net 7.30pm on 51.550MHz FM
11, 31 Net 7.30pm on 145.375MHz FM
16 Antenna feeders, Pete, M0PTB
18 Committee meeting
20-21, 27 Foundation course/exam

Thornton Cleveleys ARS
John, G4FRK, 01253 862 810
8 Natter night/club on air
15 My favourite circuit (various)
22 Video
29 Fusion & DMR by G4NVF & 2E0SGS

REGION 4: NORTH EAST

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

Angel of the North ARC
Nancy, G7UUR, 01914 770 036
8 On the air, Foundation exam
15 Training courses continue; on the air
22 Talk
29 On the air

Blyth Radio Club
John, 2E0DCV, 0191 237 1729
3, 10 Club night with Morse training
17, 24 Foundation training evening
31 Club night

Denby Dale RC
Darran, G0BWB, 0797 442 3227
3 Fish & chip/curry supper
7, 14, 21, 28 Club net via GB3HD 10.30am
17 RSGB Update from Ian, RM4
31 Real ale night

East Cleveland ARC
Alistair, G4OLK, 01642 475 671
5 Discussing New Year's resolutions
12 Want it or fling it night
19 Bring in something interesting evening
26 Discussing whether we are hoarders

Sheffield & District Wireless Society
Krystyna, 2E0KSH, 0788 406 5375
3 Closed
10, 24 Training & social
17 Awards night
24 Technical & training
31 Meal out

Sheffield ARC
David, G6DCT, littlewood20@btinternet.com
1 Closed
8 Shack night
15 Club night

Spen Valley ARS
Russell, G0FOI, 01274 875 038
11 AGM
25 Shack meeting

Tynemouth ARC
www.G0NWM.com
5 What Santa brought for Christmas
12, 26 Club night
19 Antennas for a small garden

REGION 5: WEST MIDLANDS

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

Bromsgrove & District ARC
John, G4OJS, 0788 967 8303
5, 12, 19, 26 Club night

Coventry ARS
John, G8SEQ, 0795 877 7363
1, 8, 15, 22, 29 Open net, 8pm, 145.375MHz FM and/or 7.16MHz ± QRM SSB,
1 G2FDC 2m DF Trophy, 11am
4, 11, 18, 25 Open net, 50.175MHz SSB, 8pm
12 Annual dinner, The Holyhead
19 Charity quiz
26 Video night

Gloucester AR&ES
Anne, 2E1GKY, 01242 699 595 daytime
1 No meeting
3, 10, 17, 24 Net, 145.475MHz FM, 7.30pm
4, 11, 18, 25 Net, 145.475MHz FM, 7.30pm, then moving to 80m SSB
5, 12, 19, 26 Net, 432.220MHz USB, 7.30pm
8 London Underground platform to train CCTV, John Rowing
15, 22, 29 Informal activities

Malvern Hills RAC
Dave, G4IDF, 01905 351 568
3, 10, 17, 24, 31 Club net, 145.350MHz FM, 8pm
9 PSK 31/63 & RTTY, Roger, G4BVY
23 Informal

Midland ARS
Norman, G8BHE, 0780 807 8003
3 Open meeting, boys and their new toys
10 Committee meeting and training classes
17 Shack on the air, ragchew and training classes
24 Open meeting and planning rallies to visit
31 Club equipment sell or update, training classes

Mid-Warwickshire ARS
Don, G4CYG, 01926 424 465
9 Club net on 145.275MHz
23 Mini talks

Salop ARS
salopamateurradio@gmail.com
2, 9, 16, 23 Club CW net, 4.30pm 144.070MHz
3, 10, 17, 24 Club net, 8.30pm, GB3LH
4 Natter night and committee meeting
11, 25 Video evening
18 Batteries, Richard, G3VZG

South Birmingham RS
Gemma, M6GKG, gemmagordon.m6gkg@gmail.com
1 Closed
2, 9, 16, 23, 30 Coffee morning in the shack, 11am to 1pm, visitors welcome
4, 11, 18, 25 Training classes with Dave Murphy, G8OWL
5, 12, 26 Work in the shack
8, 15 Tests on 70cm repeater
29 Deciding on 2018 rally visits

Staffordshire Portable ARC
www.m0spa.com
7 SOTA activation, Walton on the Hill
9, 13, 23 Meeting at Bolehall Manor Club, Tamworth
20 Wall Roman site
27 Chasewater Country Park

Stratford upon Avon & District RS
Clive, G0CHO, 01608 664 488
1, 8, 15, 22, 29 Club net, 145.275MHz FM, 8pm

Telford & District ARS
John, M0JZH, 07824 737 716
3 Club forum, planning for 2018
10 Committee meeting; GX3ZME OTA
17 The 'Flying-Laptop' satellite, Barry Cook
24 2nd winter projects evening
31 10 minute topics

Wythall Radio Club
Chris, G0EYO, 07710 412 819
2, 9, 16, 23, 30 Morse class from 7.30pm
2 Free and easy, 8pm
5, 12, 19, 26 Nibbles night in the shack, 7.30pm
7, 14, 21, 28 Club net, 8pm, 145.225MHz or GB3WL
9 Committee meeting
16 Results of Christmas contest
30 Radio astronomy

REGION 6: NORTH WALES

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

Dragon ARC
John, MW0JWP, 0751 503 1025
15 Antenna building by Danny, GW7BZR

Marches ARS
steven.bobby20@yahoo.co.uk
1, 8, 15, 22, 29 NE Wales open net, 9pm, 145.425MHz

North Wales Radio Society
Liz, GW0ETU, 0776 019 0355
4 General meeting
11 Technical topics for 2018
18 Night on the air
25 Bletchley Park, Peter, GW4UWD

Porthmadog & District ARS
Peter, GW0DFK, 0773 177 1319
18 Repeater building by G1KDZ

Wrexham ARS
steven.bobby20@yahoo.co.uk
3, 10, 17 Open net, 7.30pm, 145.300MHz

REGION 7: SOUTH WALES

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

Aberystwyth & District ARS
Ray, GW7AGG, 01970 611 853
7 Junk sale and Buildathon
11 Commercial test equipment, Dave, GW7ONS
25 Club net, 145.500MHz then 145.550MHz

Carmarthen ARS
Andy, GW0JLX, 0776 828 2880
2, 16 Social evening plus club on air

Cleddau ARS
Heinz, MW0ECY, 0774 804 7008
1, 8, 15, 29 Club night
22 Quiz night

REGION 9: LONDON & THAMES VALLEY

Regional Manager: Tom O'Reilly, G0NSY
RM9@rsgb.org.uk

Aylesbury Vale RS
vic@rakewell.com
10 Annual dinner

Bracknell ARC
David, M0XDF, M0XDF@alphadene.co.uk
3, 17, 24, 31 Open net, 8pm, 145.375MHz
10 AGM

Radio Society of Harrow
Linda, G7RJL, lcasey100@outlook.com
1, 8, 15, 22, 29 Net, 145.500/145.350MHz FM, 8.15pm
5 Test equipment, G3YXZ & G3YKB
7, 14, 21, 28 Club net, 1938kHz LSB, 12 noon
19 Magnetic loop antennas, T Brockman, G4TPH

Reading & District ARC
Laurence, G2DD, 0758 470 6625
11 The oil and gas industry, John Turner, ex-BG Group
25 Magnetic loops, Rael Paster, M0RTP

Shefford & District ARS
David, G8UOD, 01234 742 757
4 Welcome back
11 Presentation on PowerPoint by G4YRF
18 Discussion on garden aerials
25 2018 construction contest

Southgate ARC
Keith, G8RPA, g8rpa@arrl.net
10 No meeting
24 Social evening at the Beautiful South

REGION 10: SOUTH & SOUTH EAST

Regional Manager: Michael Senior, G4EFO
RM10@rsgb.org.uk

Bredhurst Receiving & Transmitting Society
Nicky, secretary@brats-qth.org
4 Committee meeting
11, 25 Club night
18 Bring and talk

Bromley & District ARS
Andy, G4WGZ, 01689 878 089
3, 10, 17, 24 Net, 145.400MHz, 9pm
16 AGM and programme planning
30 Club meal

Crawley ARC
Richard, G3ZIY, 01342 843 545
24 AGM

Cray Valley RS
Dave, G8ZZK, 0773 954 9822
18 Planning for 2018

Crystal Palace R&EC
Bob, G3OOU, 01737 552 170
5 Video evening

Darenth Valley Radio Society
Mike, G8AXA, 0788 415 7776
24 On the air/natter night

Dorking & District RS
David, M6DJB, djb.abraxas@btinternet.com
23 Ham radio yesterday, discovered today, M0SXD & G3NIW

Fort Purbrook ARC
Chris, G3WIE, g3wie@fparc.org.uk
1, 8, 15, 22, 29 Open net, 9pm. 144.275MHz
26 G3CNO on the air plus review of winter projects

Hastings E&RC
Gordon, 01424 431 909
24 On the air, operating, and chat

Hilderstone R&EC
Ian, 2E0DUE, secretary@g0hrs.org
11, 25 Club night

Horndean & District ARC
Stuart, G0FYX, 02392 472 846
5 Natter night
19 Club night

Mid-Sussex ARS
Peter, G4AKG, 01444 239 371
5, 12 Radio night
19 Meet the committee evening
26 Radio night and table top sale

Southdown ARS
John, G3DQY, 01424 424 319
3 Net, 145.275MHz, 8.30am; Hailsham shack, 10.30; café, 12.30; CW net, 144.060MHz, 7pm
8 Update on the Bluebell Railway by David Jones
10, 17, 24, 31 Net, 145.275MHz, 8.30am; café, 12.30

Next deadlines are (Feb) 19 December, (Mar) 24 January and (Apr) 21 February.

Surrey Radio Contact Club
John, G3MCX, 020 8688 3322
4, 11, 18, 25 Net, 70.300MHz, 8pm
5, 12, 26, 29 Net, 145.350MHz, 8pm
7, 14, 21, 28 Net, 1905kHz, 9.30am
8 Construction contest
22 Chat and fix-it, John, G8MNY

Worthing & District ARC
Al, M0OAL, information@wadarc.org.uk
3 Club tea and chat night

REGION 11: SOUTH WEST & CHANNEL ISLES

Regional Manager: Pam Helliwell, G7SME
RM11@rsgb.org.uk

Appledore & District ARC
Alan Fisher, M6CCH, 01237 422 833
15 Mini talks by members

Blackmoor Vale ARS
Keith, M0TMO, 01747 851 260
9 Video: Macau XX9D
23 HF evening

Bristol RSGB Group
Shaun, G8VPG, 01225 873 098
9 AGM

Callington ARS
John, G4PBN, 01822 835 834
3 Club night

Cornish Radio Amateur Club
Steve, G7VOH, 01209 844 939
3 Committee meeting
4 Main meeting
18 Social evening

Mid-Somerset ARC
David, G8BFV, 01749 670 085
8 Looking at winter projects
29 Social afternoon

Saltash & District ARC
Mark, M0WMB, 0781 054 8445
4 Programme review; video, Ian Dawe
18 Club meeting

South Bristol ARC
Andrew, G7KNA, 0783 869 5471
11 Committee meeting
25 Open house and on air night

Weston Super Mare RS
Martin, G7UWI, 01934 613 094
8, 22, 29 Construction, operating & natter night
15 AGM

Yeovil ARC
Rodney, M0RGE, 01935 825 791
4 Quiz, compiled by G8UED
5, 19 Construction and on-air at Sparkford
11 One transistor transmitter by G3MYM
18 Morse practice with G3MYM
25 Problem solving and committee

REGION 12: EAST & EAST ANGLIA

Regional Manager: Keith Haynes, G3WRO
RM12@rsgb.org.uk

Braintree & District ARS
Edwin, G0LPO, 01376 324 031
2, 16 Club net, 8pm, 145.375MHz
9 Prep for Canvey Rally and natter night
23 PAC / PAT testing

Cambridge & District ARC
Richard, G4AWP, 0770 229 5300
12 How to enjoy and win contests, G4AWP
26 AGM

Essex Ham
Pete, M0PSX, news@essexham.co.uk
1 Online Foundation course
6, 15, 22, 29 Net on GB3DA, 8pm, chatroom www.essexham.net
7 Essex YL net, GB3DA, 8pm

Harwich ARIG
Kevan, 2E0WMG, 07766 543784
10 My other hobby: discussion evening

Huntingdonshire ARS
David, M0VTG, secretary@hunts-hams.co.uk
11 Natter night
25 The RSGB, Steve Thomas, M1ACB

Leiston ARC
John, G4XVE, secretary@larc.org.uk
9 Quiz night

Loughton & Epping Forest ARS
Dave, M0MBD, 0798 016 5172
4, 11, 18, 25 Net, 144.725MHz, 8pm
5, 19 Club meeting
27-28 Foundation course and exam

Peterborough & District ARC
Alan, secretary@padarc.co.uk
2, 16 Club net, 145.400MHz
8, 15, 22, 29 Club net on 1.980MHz
24 Show and tell evening

South Essex ARS
Terry, G1FBW, 07986 070 040
9 Preparations for the 33rd Canvey Rally

Thames ARG
Patrick, G8JLM, 01621 855 461
5 Starting pedestrian mobile, Nigel, M0ICH
12, 26 Nets: 144.250MHz CW, 7.30pm; GB3DA 8pm
19 Practical radio projects

Thurrock Acorns ARC
Gordon, M0WJL, acorns@taarc.co.uk
2 2m SSTV open net 19:30 to 20:30 GMT
4, 11, 18, 25 2m FM open net, 7.30pm
16 Club meeting

REGION 13: EAST MIDLANDS

Regional Manager: Jim Stevenson, G0EJQ
RM13@rsgb.org.uk

Derby & District ARS
radio@dadars.org.uk
2 Junk sale
9 Committee meeting
16 Amateur radio in the digital age, Pete Watts, G0FQB

Hinckley AR&ES
Bob, G8BFF, 0792 876 9767
18 The work of AROS, Mark Jones

Leicester RS
Sandra, G0MCV, 0793 027 4044
1 Closed
8 Morse class then committee meeting
15 Morse class then free 'n' easy evening
22 Radio waves from the stars, Keith, G6UBP
29 AGM

Loughborough & District ARC
Chris, G1ETZ, 01509 504 319
2 Natter night
9 Open forum on construction and safety techniques
16 Transistors by Andrew, G7SEG
23 Another brush with art, Albert, G1KSC
30 Practical evening

Melton Mowbray ARS
Phil, G4LWB, 01664 567 972
19 FT8 mania, G4LWB

Nunsfield House ARG
Paul, G1SGZ, pr@nharg.org.uk
4, 11, 18, 25 Club net, 145.325MHz, 8pm
5 Surplus sale and club night
8, 15, 22, 29 Shack night
12 Programme planning and club night
19 Shack night and committee meeting
26 Club night and projects update
29 Committee meeting

Spalding & District ARS
Graham, G8NWC, 0775 461 9701
5 Club night or half-marathon around Pinchbeck
12 Club night
19 AGM, 7.30pm, Pinchbeck Hub
26 Off-grid radio, Nick, G4BMH

Worksop ARS
0789 062 6684, info@g3rcw.org.uk
4 Aircraft scatter & ON4KST
9, 16, 18 UKAC and FMAC
11 Technical night and 6m UKAC
23, 30 Club night
25 Introduction to APRS

REGION 2: SCOTLAND NORTH & NORTHERN ISLES

Dundee ARC held their annual general meeting and annual prize giving in October with new committee members being elected. Trophies were presented by Ally, MM0DRA. Garry, MM6KYW was awarded the Joe Kelly GM4AQM trophy for his novice construction project. Denis, 2M0DOI was awarded the Mark Dougan MM6DDX trophy for the most 2m QSOs over a set period in June. Finally, Martin, 2M0KAU, (in photo) received the John Martin GM4WEQ shield for services to amateur radio.

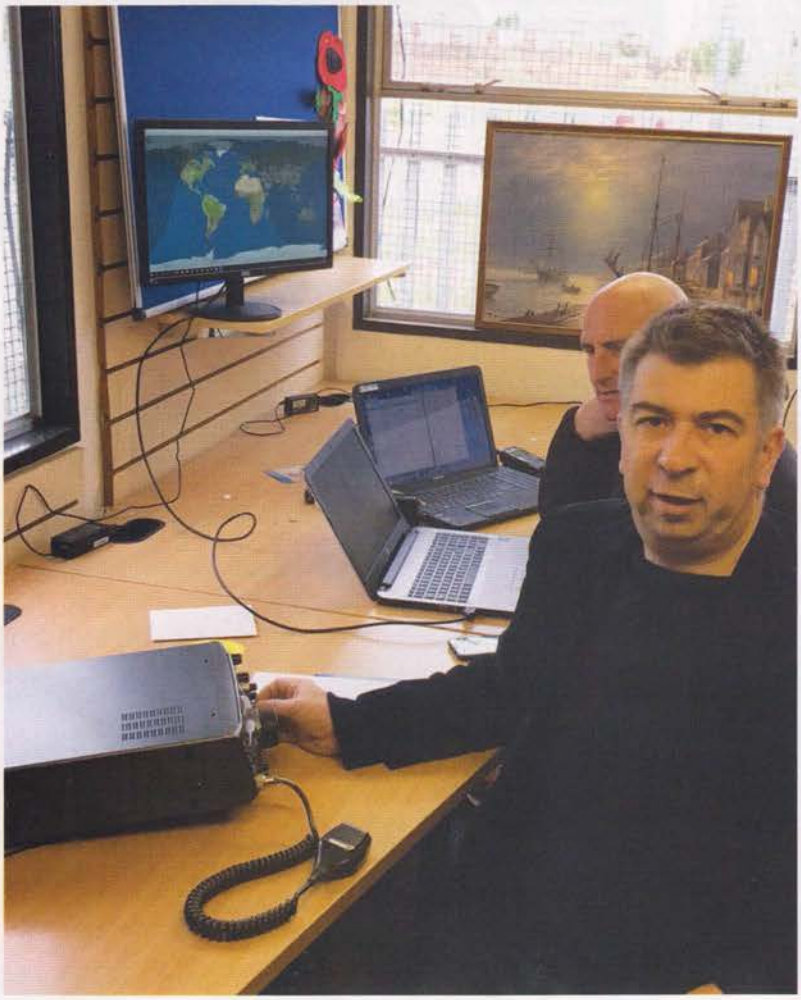
REGION 4: NORTH EAST

At **Bishop Auckland RAC,** training is provided by club members Tim, M0ACV and Bob, G0OCB. For any training enquiries or information, please contact the club online, via email g4ttf@yahoo.co.uk, or call Tim on 01388 832 948.

Denby Dale ARS held the bi-annual surplus sale that was well attended. In total it raised over £150 for club funds. Following the AGM, the club now has committee representatives at all licence levels. Jerry, 2E0EGS is the Museums OTA co-ordinator, Ian, M6ITH is Vice Chair and David, G0EVA took on publicity. The JOTA station (right) was run from the Bradley Wood Scout Camp. Using 80/40/20 dipoles and the DXCommander vertical antenna with the IC-7300 and the TS-590 they operated on SSB, CW, PSK and FT8. Visited by two different Scout Groups, they managed to pass greetings messages on HF. The weather was atrocious on Saturday night and the hall was invaded by Scouts who had abandoned their flooded tents to seek shelter, the weather didn't dampen their spirits and they were awake until 4.30am! There were some bleary eyes on Sunday morning.

REGION 5: WEST MIDLANDS

Midland ARS new member, Ottavio Caruso, sat his Foundation exam and passed with all 26 questions answered correctly, a full house. Congratulations Ottavio, and thanks to Ron, M0WSN the chief instructor.



REGION 6: NORTH WALES

Wrexham ARS were invited to the Brymbo Heritage's Open Day (left). Activating GB1BSW in a set of cabins (warm and with kitchen facilities) they erected a Crushcraft vertical antenna for HF and small Yagi beams for 2m, 6m and 70cm. Many visitors came in and out to have a go at using the equipment and contacts were made all around the globe with a little DX to Reching, Massachusetts and Greenland. European contacts reached far in to Eastern Russia, across to Greece, Turkey and the majority of Central Europe. Conditions were not the best at times but it didn't stop the club having an enjoyable event and social.
Shown are Paul, GW0MDQ and Eifio, 2W0ENA.

REGION 8: NORTHERN ISLAND

Bangor & District ARS had an interesting talk from Harry Kernahan in October on the evolution of amateur radio satellites that was excellent. Then the club held a surplus equipment sale in November with a record attendance. Towards the end of the evening the tables were almost cleared of a very wide range of surplus equipment. The next meeting, on 4 January, is the popular annual quiz (no monetary prizes). All are invited.

radcom@rsgb.org.uk

REGION 9: LONDON & THAMES VALLEY

At **Verulam ARC's** November meeting, Alex, MOUKR, gave an illustrated talk on his homebrew construction techniques using common, easy to obtain items, such as aluminium sheeting, pipe binders and U bolts fashioned from pre-threaded rods. The results of his efforts include loop fed arrays (LFA) for 23cm, 2m and 6m as well as a four boom array for EME. It was apparent that with a reasonable set of tools and plenty of determined experimentation it was possible to build robust antennas without having to dip too deeply into one's pocket.

Newbury & District ARS ran its annual Foundation Course over two days in November. One candidate came all the way from Scarborough because the course just involves two days of training. All 11 candidates passed. A follow-up Intermediate course is planned with tuition on 24/25 February, then the practical and exam on 24 March.

Radio Society of Harrow took part in the annual SSB NFD in September. This was the first attempt at a 24-hour event for several years and took considerable planning. It was designed to be an opportunity for newer licensees to gain contest experience in a supportive and unpressured environment and 20 operators took part. A fan dipole on 20, 40 and 80m was constructed on site and suspended between two disused telegraph poles. N1MM was used for the first time for computer logging and 239 contacts were made all over Europe. Ian, 2E0PPM set up a separate 144MHz operation using a Buddipole and a 7-element Yagi. Fortunately the weather was kind and the site was packed up an hour early to avoid the forecast rain. Thanks to Paul at the Lincolnsfields Centre, Watford and the organisers Tony, G7ETW, Linda, G7RJL, Mike, M0ITI, Colin, G1IGA, Peter, G3YXZ and Ian, 2E0PPM.

Edgware & District RS a visit from Mark Haynes, M0DXR and Geoff Peterson, G8SUG of JVC Kenwood. Mark (right) put on a very interesting presentation, firstly about various Kenwood/Trio models over the last 40 years or so, plus an illustrated chat about his passion for contesting. He also brought along a popular Kenwood model with a Wi-Fi capability built in, that would enable it to be used as a basis for remote control operation.

REGION 11: SOUTH WEST & CHANNEL ISLES

The Mid Cornwall Beacon and Repeater Group Communications Fair and AGM took place in October. The raffle was a great success and generated enough funds to pay for the hire of the hall; the Bring & Buy and subscriptions added to the group's funds. The RSGB donated a *2018 Yearbook* that was won by a local radio amateur. The RSGB promotion material from HQ went down very well. It was decided to hold another Communication Fair next year, building on this success. At the Fair there was a Test your Rig stand, a dynamic amateur television demonstration, a CW demonstration and refreshments were served by the wives of members, all adding to a very successful afternoon.

Riviera ARC will be celebrating its 6th anniversary in January. They are an active lively club that provides Foundation and Intermediate training as well as running special events. You can read more about the club at www.rivieraARC.org.uk

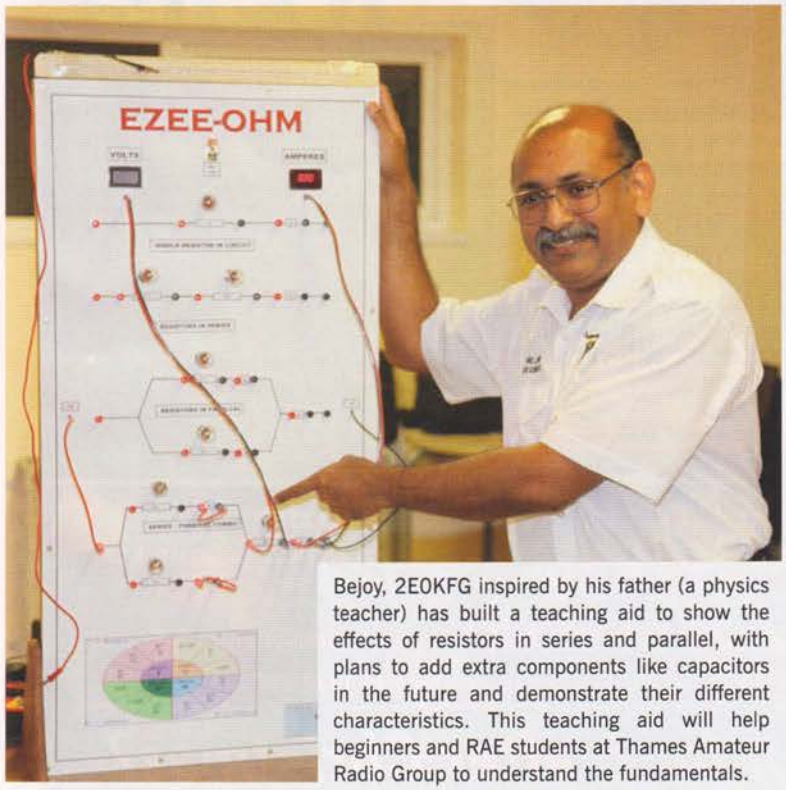
In November, Flight Refuelling ARS in Merley opened their doors to the 1st Longham Scouts for an introduction to amateur radio (left). Many of the young people who visited are preparing for their Communicator badge. The training team, Alan, M0VLT, Clive, G7SVI, Sherry, M0ODE and Sue, M0PSZ along with three volunteers from the club gave a brief presentation on amateur radio. The group had tours of the VHF shack with Richard, M0RHS and Dan, M0LXD, where voice communication was in use. In the HF shack, Romeo, YO0RDW gave CW demonstrations, even slowing down from his usual 50wpm, this proved very popular and there were many wide eyes. Sue ran PSK31 and a couple of other data modes to demonstrate low power RF and computer technology. Clive demonstrated the use of GPredict, running on a Raspberry Pi, to track satellites and the ISS and he also covered working through satellites with a basic handheld radio and Arrow antenna. Unfortunately, the band conditions weren't in their favour but there were several contacts into Europe as well as North and South America and Canada, and local on 2m.

REGION 12: EAST & EAST ANGLIA

Loughton & Epping Forest Radio Society held an Intermediate practical assessment course and exam. Subsequently John, M6JSU received an indicative pass, Toby, M6KQB is now 2E0OBY and Chris Young also completed the practical assessment and plans to sit the exam soon. The course was led by John, G8DZH who would like to thank Ron, G6LTT, Derek, M0XDC and Dave, G3ZXF for their invaluable support and assistance during the day.

Neil, M0NAS gave an illustrated talk on Digital Mobile Radio (DMR) to **Braintree & District ARS**. He described the Tier 2 DMR standard used in amateur radio and explained that different Talk Groups (TG) encompass different groups of repeaters. A home produced video was shown demonstrating in a controlled test that when an analogue signal was scratchy a digital signal gave better audio quality. Colin, M6NCU took over to describe the range of transceivers available to the amateur fraternity, and then made a contact using a Motorola 4600 through the repeater GB7HA (keeper Neil), with an operator in Birmingham. Owen, M3OIL was on hand throughout to answer any technical queries.

Following an invitation from the 1st Woodham Ferrers Hyde Cub pack in November, Jim, 2E0RMI, Bob, G4MDB, Kristian, M0SSK and Peter, M0PSD assisted 20 Cubs in working towards their Communicator badges (above). Armed with handhelds, a Morse trainer and a Slim Jim, the team from the Chelmsford ARS set up the demonstrations. They let the enthusiastic Cubs have a try with a Morse key (sending an SOS), before sending a short greetings message through the local repeater, where Steve, G8UDD was happy to make contact with the youngsters. At the end, CARS presented the Cubs with certificate to commemorate the event. Photo courtesy Kristian, M0SSK.



Bejoy, 2E0KFG inspired by his father (a physics teacher) has built a teaching aid to show the effects of resistors in series and parallel, with plans to add extra components like capacitors in the future and demonstrate their different characteristics. This teaching aid will help beginners and RAE students at Thames Amateur Radio Group to understand the fundamentals.

Peterborough & District ARC took part in JOTA with 2nd St Peters Scouts. Using two 26ft masts with an offset multi band HF antenna and a 2m/70cm collinear, the IC-7400 was used for VHF and TS-590SG for HF. Scouts were also given a talk about communication and coached on the phonetic alphabet, Morse code and greetings messages. There was also a demonstration station set up for data transmission and a DMR set up in the second training room. Over 40 Scouts took part and more than 50 contacts were made with some coming back several times to pass their messages. The final station worked was HB9S/J, the World Scout Bureau in Geneva. Tony, G0IAG gave a talk about sending CW without a radio. He gave a brief history of how the armed forces throughout the last 150 years or more have used mirrors and lamps to send messages bringing a display of heliograph's, trench signalling and Aldis lamps and military signalling torches, mostly working.

REGION 13: EAST MIDLANDS

Peter, M0XKF received the Harold Chadwick, G8ON Cup from Martin, M0ZMF. It is awarded to a **Worksop ARS** member giving outstanding service to the Society. Peter has been a long term Treasurer and then Trustee of the Society, and the club is very grateful for all Peter has done for the Society. He retired as a Trustee in 2017 and will remain a life member of **Worksop ARS**.

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ALINCO ALR 22E, VHF FM 25W, serial no 20978063, good condition but no history as from SK. Car fixing bracket included. £25. Collect or add postage. Mike, M1CCF, 020 8654 2582, MikeB@VMARS.co.uk (Croydon).

BEGALI SCULPTURE iambic, £330. Bencher Hex iambic paddle, £240. Schurr Profi iambic paddle, £300. All in excellent condition. Postage extra. Colyn, GD4EIP, 0762 441 3036, gd4eip@w2imanx.net (Isle of Man).

CLEARANCE OF WHOLE STATION including TS-2000 and lots of other meters, keys, tuners, switches and patch leads too numerous to list, frequency counter and indoor 40 and 80m aerial. All in good order. Must be sold. £1,250 the lot. Jim Harding, G4PFR, 01296 623 802, jimg4pfr@gmail.com (Wendover, Bucks).

COMET CAT-300 ATU. Switchable inductance plus two variable capacitors; may need external inductance to tune a random wire. Handles 300W. £50 plus carriage at cost, or collect. John Tuke, GM3BST, 0771 057 6590, tuke@btinternet.com (Loanhead, Midlothian).

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G1MFG modular 23cm ATV transceiver kit, 2 receivers (Gold & Platinum), 2 x 50mW transmitters, 15-18W PA, LCD controller, components, hardware, cabinet and info. £100. 3 HRO coil packs, 0.9-2.05MHz, 1.7-2.05MHz, 7.0-14.4MHz, £45. Free P&P (GB only). Eddie, G0ECW, 01273 300 772, eddie@zamboodle.uk (Brighton, Sussex).

HEATHERLITE EXPLORER amplifier, very good condition, fully working, serviced recently. Collection in person. £600 OVNO. C James, G0GFY, 0208 689 5149 (Croydon).

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KENWOOD AT230 manual ATU, £200. Kenwood AT250 fully auto ATU, £200. Kenwood SP230 speaker, £100. All in nice used condition but will show signs of age and wear. Free UK mainland postage. Joe, M0AJO, 0796 688 5638 after 7pm, axe.man@aol.co.uk (Watford, Hertfordshire).

KENWOOD TH-D7E APRS handheld. Standard plus large size battery, plus charger. Excellent condition. Hardly used. Original box. £125 plus postage – can't haggle, thanks. John Arrow, M0JWA, 0780 260 2139, johnarrow@me.com (Hants).

LEICA BINOCULARS 10 x 32 BA Trinovid. Excellent condition. Little used. Complete with leather case, £300. G4HUQ, 01254 813 757 (nr Preston, Lancs).

MARCONI Q METER 1245A, with matching HF and VHF signal generators and box set of test inductors. Good condition, working when last used. Buyer collects. Graham, M5FLY, 01226 288 718, gbeko@btinternet.com (South Yorkshire).

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YAESU FT-1000MP/DC transceiver in excellent condition. Boxed with original paperwork, leads and mic. £650, or £695 with MD-100A8X desk microphone. Martin, M0BJR, 0778 606 0100, mbb1976@btinternet.com (Saxmundham, Suffolk).

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YAESU FT-901DM HF transceiver. Good condition, can be seen working. Collection only due to weight, £300. Ian, G4ULN, 0794 462 1655, ianwpurdy@hotmail.com (Dronfield, Derbyshire).

YAESU FT-950 HF+50MHz transceiver in extremely good condition and original carton. No internal or external mods; exterior cabinet is unmarked. Very little used; non-smoker. £699, collect or plus shipping & insurance at cost. I could possibly deliver within 25 miles. Andrew Dermont, G8BGT, 0753 922 6334, andrewdermont@hotmail.com (Pershore, Worcs).

YAESU SP-901 ext speaker, £60. Daiwa DK-210 keyer, £50. Kenpro KP-100 keyer, £60. Kent keyer, £45. Datong FL-1 filter, £40. Nigel, G4KZZ, 01723 890 786, nipro@btinternet.com (Scarborough).

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DERIC+ or similar destination controller for flip disc display. Steve, G4YYI, 0773 813 3982, Steve.J.Tear@gmail.com (Derbyshire).

JOHNSON semiautomatic bug / Morse key number 114-501, anything or any condition considered! John, G4LGX, 01423 567 390, jra_hall@hotmail.com (Harrogate, N Yorks).

KENWOOD/TRIO TS-830S counter (display) unit, to complete restoration. I can't repair mine. Also used in models 530S and 820S. Good price offered for working unit. Richard, GM0OGN, 01871 810 024, gm0ogn@hebrides.net (Isle of Barra).

LARKSPUR ARMY C11 (SSB) transmitter – any reasonable condition, for refurbishment project. Good price paid, and can collect. Brian Blackwell, G3YVW, 0773 045 9769, blackwells5@aol.co.uk (Colchester, Essex).

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When you apply for a SES NoV please make sure you tick the box on page 2 or your event can't be listed here.

Start	Callsign	Name	Location
01/01/2018	GB2OWM	Orkney Wireless Museum	Kirkwall, Orkney

PYE SSB 130m, AT04433, Power Supply Module wanted. Ideally the AT04431/01 with the 12V input. Brook, G0VEB, 01626 773 525 (Teignmouth).

STRUMECH HEAVY DUTY TOWER. Any type base. Will dismantle and remove. Robert, GW0WAY, 0747 453 4699 (Aberystwyth).

TS-590S OR IC-7300 HF TRANSCEIVER. Must be VGC, preferably with original packaging and accessories. G4GZS, 0785 991 7317, keith4gzs@hotmail.co.uk (Warwickshire).

RALLIES & EVENTS

Members of the RSGB Regional Team will be present with a bookstall at the rallies this month marked with an RSGB diamond.

If *your* rally or event is not listed here,
PLEASE SEND US FULL INFORMATION
by email to radcom@rsgb.org.uk

14 JANUARY
RED ROSE WINTER RALLY
George H Carnall Leisure Centre, Kingsway Park M41 7FJ
Easily accessible from M60 J9 (opposite Trafford Centre). Wast hall all on one level with superb disabled facilities. Huge free car park. There is an excellent café on site. Doors open at 11am. There will be trade stands, a Bring & Buy, special interest groups and an RSGB bookstall. John, 0787 016 1953 [www.wmrc.co.uk].

27 JANUARY
HORNCASTLE RADIO RALLY
Banovallum School, Mareham Road Entrance, LN9 6DA
Entry £2. All on one level and all indoors, with all the usual attractions including bacon butties. Free car parking on site. Tony, G3ZPU, 01507 527 835, tony.nightingale@yahoo.co.uk.

10 FEB – BALLYMENA ARC RALLY

11 FEB – HARWELL RADIO & ELEC RALLY

18 FEB – RADIOACTIVE RALLY

25 FEB – BRATS MEDWAY RADIO RALLY

25 FEB – PENCOED ARC TABLE TOP SALE

4 MAR – GRANTHAM ARC RADIO & ELEC RALLY

4 MAR – EXETER RADIO & ELECTRONICS RALLY

11 MAR – DOVER RADIO CLUB RALLY

25 MAR – CALLINGTON RADIO RALLY

15 APR – W LONDON RADIO & ELEC SHOW

21 APR – INTERNATIONAL MARCONI DAY

22 APR – CAMBRIDGE REPEATER GRP RALLY

29 APR – NARSA EXHIBITION (Blackpool Rally)

6 MAY – THORPE CAMP HAMFEST

7 MAY – DARTMOOR RADIO RALLY

3 JUN – SPALDING DARS ANNUAL RALLY

10 JUN – EAST SUFFOLK WIRELESS REVIVAL

10 JUN – JUNCTION 28 RALLY

24 JUN (new date) – NEWBURY RADIO RALLY

24 JUN – WEST OF ENGLAND RADIO RALLY

7 JUL – STOCKPORT RS RALLY

29 JUL – CHIPPENHAM & DARC RALLY

10 AUG – MINI-RALLY NIGHT

26 AUG – TORBAY ARS ANNUAL COMMS FAIR

7 OCT – WELSH RADIO RALLY

4 NOV – WEST LONDON RADIO & ELEC SHOW

SILENT KEYS

We regret to record the passing of the following Members.

Name, callsign	Date
Mr C Farnan, EI7HG	3/2017
Mr A M B Hulme, G0CDY	4/10/2017
Mr R L G Surrage, G0MUQ	11/2017
Mr D Catchpole, G0PFN	17/11/2017
Mr J E Thomas, G0SDZ	15/11/2017
Mr E Troughton, G0VNV	17/11/2017
Mr M A Rowbotham, G1GQQ	25/11/2017
Mr D W Goodwill, G1VAB	11/02/2017
Mr D H Peck, G1XAZ	
Mr D R J Adair, G3BVB	1/11/2017
Mr C J Baker, G3HQS	25/10/2017
Mr W Hipwell, G3HTX	25/11/2017
Mr D C Mainhood, G3HZW	5/10/2017
Mr P J Gowen, G3IOR	17/08/2017
Mr P J Wright, G3JDM	15/10/2017
Mr G Jenner, G3KIW	11/2017
Mr P B Furminger, G3MZF	01/11/2017
Mr E H Matthews, G3NPL	16/11/2017
Mr A W Tomalin, G3PTB	2017
Mr G Henderson, GM3RTJ	16/10/2017
Mr R Pellatt, G4LJI	11/2017
Mr D Cressey, G4MQM	21/11/2017
Mrs L K Constantine, G6CQG	19/11/17
Mr L G A Spiller, G6VOH	7/11/2017
Mr D Payne, G8OBP	2/11/2017
Mr G A Shaw, GI3RBX	16/11/2017
Mr S M Hutchison, GM3WPA	14/11/2017
Mr S R T Henry, GM6RGZ	03/11/2017
Mr D G Bailey, M6XLS	14/10/2017
Mr C D Denman, 2E0IMI	19/10/2017
Mrs Louisa Clarke, RS214225	28/10/2017
Mr F Newton, RS304046	11/2017
Mr J A Rogers, VK7JK	8/2017

GB2SL from Spurn high lighthouse

GB2SL, operated by Humber Fortress DX ARC (www.hfdxarc.co.uk), was something a bit special. Spurn Point high lighthouse is the tallest lighthouse in Northern England, and is now owned by Yorkshire Wildlife Trust (YWT).

The third floor operations room.

Restoration of the lighthouse was completed in 2016 after a grant from the National Lottery, Heritage Lottery Fund and additional support from the Coastal Communities Fund and the Big Lottery Fund. The Spurn Point high lighthouse is UK0080 (with the low lighthouse numbered UK0081), the locator is JO03BN and it's in Worked All Britain square TA-41.

Saturday morning saw 10 club members turn up to Spurn Point to set out on what was to become a great weekend's event. Regrettably, this was one weekend when the less able bodied members were not able to attend, as you will see further later on.

Once all the equipment and the team were loaded on the YWT Unimog vehicle we were ready for the trip down the Spurn peninsula to the lighthouse. Adam Stoyle, from YWT, who had helped make this all possible was our driver and guide to get the 3½ miles down to the lighthouse.

The operating team for the weekend was Pat, M0PKE, Kevin, M0KVK, Sean, M0SLY, Paul, M6XPW, Charlie, 2E0CIK, Andy, M0TTL and Andy, G7LRR who was celebrating his birthday that weekend. Thanks also to Jon, 2E0ZRO, SWL Elliot and John, G6LNV who came down on Saturday to help set up the station.

The drive along the peninsula is part road and part beach after the road was washed away in 2013. The Unimog makes easy (if slow) work of getting over the beach.

Once down at the lighthouse, it was time to unload all our equipment and setup the station, all of which had to be carried up to the 3rd floor our operating room for the weekend. I think we were all a few pounds lighter after running up and down the stairs, there were 86 steps up to the third floor where we had the station. To add to our fitness, when the question of 'where's the loo?' came up, we were told 'it's a quarter of a mile down the road at the point, near the lifeboat jetty'. Once again the YWT helped us out and let us use a push bike. Humber Lifeboat is the only full time station in the UK; the crew are on a rota and away from their families.

Back on site and the team formed three groups. The topside rope job was given to Jon, 2E0ZRO – that was an extra 59 steps before his task started. The second group set up the station and the third group was outside setting up the antennas, with 200m of rope for antenna support.

The first antenna to go up was a 40m delta loop manufactured by Kevin. We made many contacts on the delta loop on Saturday, including birthday messages from Trevor, G1TDN for Andy, G7LRR. We took the Delta down early evening and put up a good old G5RV, this gave us a few more bands overnight so we would not have to alter antenna in the dark. There are no outside lights at the lighthouse, except stars, and although they are bright there, they are not bright enough.

On Sunday morning we changed over to a 40m dedicated dipole also built by Kevin. The rest of the equipment continued to work well.

Kevin and Andy demonstrated DMR from downstairs to members of the public in the lighthouse.

Andy, M0TTL also deserves a mention for

Spurn Point high lighthouse, at 39m high, is the tallest in Northern England.

Mike, G4VHM operating GB2SL.

Paul, M6XPW in the third floor operations room.

bringing a full kitchen with him, all set up in a garage 100 yards down the lane. Yes, the kitchen sink (bowl) came as well. We had to be careful; no food could be left out, as that would attract unwanted interest from animals.

Visitors

Sunday also saw some local amateurs turn up and had a go on the radio. Mike, G4VHM walked the full 3½ miles to do a little CW. It was great to see him. He also brought along Bernard, G0SWO who was lucky to get a lift out to the lighthouse from the YWT in their Land Rover. Bernard is well into his 80s but managed the 86 steps to work the radio, well done Bernard.

During the two days, many of the lighthouses visitors stopped on our floor for a welcome break on their way up to the top, with some of the younger ones passing greetings messages on the radio. We also had some Duke of Edinburgh's Award students pay us a visit.

Staying on site

One of the best parts for all of the team was been able to sleep over the lighthouse – and be given the keys to the lighthouse too. Kevin enjoyed locking it up and Paul was the keeper of the keys for the night.

The wind got up in the night to around 40 mph in gusts (apparently, these are *light* for Spurn) and, at the top where a few members stopped, the lighthouse moves a little. I am told it rocks you to sleep!

Not only is the lighthouse at Spurn a great place to operate a radio, it is a great place of interest, offering some spectacular views over the Spurn peninsula, river and coast. If you are in the area it is a 'must visit' for all the family. See www.ywt.org.uk/visit-spurn-lighthouse

Charlie Storr and Andy Nielsen
club@hfdxarc.co.uk

Thanks

A thank you to Sean, M0SLY and John, G6LNV who put in a lot of hard work into the setting up of the event so the club could actually activate the lighthouse from inside for the first time.

HFDXARC would also like to say a big thank you to Adam Stoyle, the Spurn Gateway Development Officer, Andrew Mason, the Heritage Officer and their great team down at Spurn point for making it possible and giving us all a warm welcome.

We can say that, after talking to Adam and Andrew, they would like us to go back next year for the International Lighthouses and Lightships Weekend. We all hope this is the start of what will be many events that can be held at the lighthouse working with and alongside the YWT.

Finally, some statistics. We made 467 QSOs with 45 DXCC countries worked. During the weekend, we worked 18 other lighthouses.

The GB2SL operating team with Yorkshire Wildlife Trust staff.

HF F-Layer Propagation Predictions for January 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	6662...16666	626432346666	1.2554452112	...66553....	...36561....	...1663.....	....321.....	....221.....
*** Asia								
Yakutsk	32.....14444	1..31..241.1	...3.....	.....	.....	.....	.....	.....
Tokyo	......22222.	...332332121	...22122....	.....	.....	.....	.....	.....
Singapore	22212	342212	.....143....	.....231....	.....21.....	.....1.....	.....	.....
Hyderabad	3......13332	3.....133331	......231...	...1.121....	...112.....	....12.....	.....	.....
Tel Aviv	552.....4555	5542...35555	2.5421242112	...54343....	...5443.....	...2321.....	.....	.....
*** Oceania								
Wellington	....12221...	...145542...	...14553....	....3431....	....121.....	.....1.....	.....	.....
Well (ZL) (LP)	.....	.....	.....	.....	.....	.....	.....	.....
Perth	.......1111.	......24322.	......331...	.....132....	.....12.....	.....	.....	.....
Sydney	......1111..	.....34321..	....2443....	....233.....	....212.....	.....	.....	.....
Melbourne (LP)	.....	...23.....	...23.....	....3.....	....2.....	.....	.....	.....
Honolulu	...12..2....	...122221...	.....1..1...	.....	.....	.....	.....	.....
Honolulu (LP)	.....	.....	.....	.....	.....	.....	.....	.....
W. Samoa	....2..1....	...14331....	....332.....	....12.....	.....	.....	.....	.....
*** Africa								
Mauritius	2........222	3......23333	1......321.1	......12....	......1.....	.....	.....	.....
Johanesburg	22.......133	33......2334	11.....12222	.......21...	.....111....	.....11.....	.....	.....
Ibadan	4442....2444	5541..13555	5.1521124533	...5322331..	...34334....	...14442....	....211.....	.....
Nairobi	331.....2333	443.....4444	...1...14211	...2..13....	...1..21....	......1.....	.....	.....
Canary Isles	6665....1566	666531.14666	662553335664	11.154445311	....222231..	....11112...	.....	.....
*** S. America								
Buenos Aires	2222.......1	3313......12	11.2........	.....	.....	.....	.....	.....
Rio de Janeiro	3323.......3	3424.....133	22.3.....221	....1.....	....1.....	.....	.....	.....
Lima	2212.......1	22.2......12	.....	.....	.....	.....	.....	.....
Caracas	33331.....13	33.43....123	...13....1..	.....21.1...	.....221....	.....12.....	.....	.....
*** N. America								
Guatemala	22222......1	22.23.....12	....21......	......1.....	......1.....	.....	.....	.....
New Orleans	33332......2	23.32......1	.....1......	......21....	......22....	.....	.....	.....
Washington	44442.....24	44.23....234	.....1.11...	......222...	......13....	.......1....	.....	.....
Quebec	44432.....24	24..11..1212	.....2212...	......331...	......33....	.....11....	.....	.....
Anchorage	2321....1..1	........3...	.....	.....	.....	.....	.....	.....
Vancouver	22221.......	1..11..1.1..	.......11...	.....	.....	.....	.....	.....
San Francisco	22122.......	22.131.....1	....1.......	.......1....	.....	.....	.....	.....
San Fran (LP)	.....	.....	.......2....	.......2....	.......1....	.....	.....	.....

Key: The figures represent approximate S-meter readings, whilst the colours represent expected circuit reliability. **Black** equals low to very low probability, **Blue** equals good probability and **Red** equals a strong probability. No signal is expected when a '.' is shown. The RSGB Propagation Studies Committee provides propagation predictions on the internet at www.rsgb.org.uk/propagation/index.php. An input power of 100W and a dipole aerial has been used in the preparation of these predictions; therefore a better equipped station should expect better results. The predicted smoothed sunspot numbers for January, February & March 2018 are respectively (SIDC classical method – Waldmeier's standard) 19, 17 & 16 and (combined method) 12, 11 & 9. The provisional mean sunspot number for November was 5.7. The daily maximum / minimum numbers were 25 on 17 November and 0 on 1-13 & 19-24 November.

COMPONENTS OF THE PAST?

Andrew W S Ainger, G1ZYJ

At heart I'm a 'components' sort of guy. Data by Andy Talbot in the December 2017 *RadCom* raised several intriguing issues. I have spent many happy hours with discrete components, transistors etc building all sorts of *stuff*. One day apparently I (was) 'volunteered' to design and construct a well monitoring unit for hand-pumped water wells in Tanzania. I sallied forth on the design, with components sourced from all over the world, it was component-perfect! Using a talking calculator together with numerous components I would be able to dial a well anywhere and listen to it and tell me how many litres of water had been pumped for that period. But (there is always a *but* isn't there?) unfortunately, the power requirements proved excessive.

The on-site solar cells could not supply the required current. So, now what? It was about then that I was playing with the idea of small microcomputers (Arduino Uno, Raspberry Pi, BBC micro:bit etc). Now as I have been retired for some years writing all this 'software stuff' did *not* appeal (old dog new tricks?). However I thought I'd give it a go, after all the microcomputer cost (from Europe) is less than a large pizza and (from China) slightly more than a pint of bitter. Well, the day came and *it* arrived.

With something approaching trepidation I opened the package, plugged *it* in to the USB socket of my PC. Then it happened. As John, G4BAO said in Andy's column, using my "*XYZ 12345 Linux the 7.5 build system I loaded PGA new radio and dragged and dropped each element ensuring main screen compliance and compiled it with the kit link library convector widget...*" Really?

Well no! What I did do was to load the *free* Arduino development environment and started to write code there and then. There were lots of simple examples and tons of help available on the web. Okay, it was only a flashing LED, but my first program from opening the box to that flashing light (including loading the development environment) was 60 minutes! Even I was surprised.

Anyway, I am now hooked. 30 minutes to write a 20Hz to 20kHz oscillator to test my brother's speakers, 25 minutes for my LED Christmas tree lights. And as for the watering hole monitor, well that's over 600 lines of code and counting. A real beast for my first real program. But it's great fun and it looks very promising.

I still think of myself as a 'component' guy, but my selection of components are now not just transistors resistors, LSI & VLSI chips, but I can now include microcomputers and even things called libraries (pre-built blocks of code!) So, in the New Year think of giving yourself a present. Buy a microcomputer (I use the Arduino range) and have some fun no matter what age you are! If I can do it, and school children can do it, then an electronic-aware *RadCom* reader (ie YOU) can do it in your sleep!

Have a great 2018!

PS: The books that helped me most were any from Simon Monk (no affiliation). Also the Arduino website (www.arduino.cc) is simply outstanding!

MODERN SOFTWARE ISN'T THAT BAD

Dave Crump, G8GKQ

I read G4JNT's account of John, G4BAO's views on modern software development (Data, December 2017) and could not work out whether I agreed or disagreed with him!

Yes – I agree that some classes or courses on software for the radio amateur would be a great idea. The challenge would be to pitch the course at an appropriate level for the target audience and to cover a relevant and interesting aspect. John's suggestion of controlling an RTL-SDR to receive an FM signal is good, but I would suggest using a Raspberry Pi 3 as the computer. This would be easily achievable 'from bare metal' in a day, and I'd be happy to be involved as a 'classroom assistant'.

No – I do not agree with John's assertion that you need to start with a lot of modern background knowledge and that the days of writing code line-by-line are gone. Over the last year, I have developed the Portsdown amateur TV transmitter software from an initial prototype by written by F5OEO. All the new code (over 5000 lines) has been written line-by-line, most of it in C, a language that I had never used before. The Raspberry Pi provides an ideal learning and development environment where most of the setup work that John seems to be so nervous of has already been done.

I am putting my money where my mouth is and have already promised a *RadCom Plus* article on this subject. In the meantime, take a look at the code at https://tinyurl.com/y95jfh33 (or https://github.com/davecrump/rpidatv/blob/master/src/siggen/siggentouch.c#L1642) where you will see some easily understandable code to control a signal generator from a touchscreen. Yes, there are some bits that you won't understand to start with, but it is easy to modify the bits that you *do* understand.

So, my advice would be to decide what you want to do with your project, pick up a Raspberry Pi and equip it with the peripherals you want it to control or interact with. Then load the Raspbian operating system (or buy a pre-loaded SD Card) and start programming. It really is not too difficult now that there is so much information online.

RAYNET INVOLVEMENT

Doug Willies, BEM, G3HRK

Reference the recent letter regarding RAYNET involvement.

Maurice George, M6GXZ, raises an important but often overlooked aspect of RAYNET activities. In my opinion, the broader issues of compassion, value to the community along with the satisfaction enjoyed by its members by putting our hobby to a genuinely valuable and recognisable use (*NB: involving hard work and persistence*) have never been fully appreciated, even amongst those within our own ranks and including many within our National Society.

To fully exploit these aspects by *elevating* our hobby into being truly *recognised* as a genuine asset to the Community, simply by highlighting the expertise and capabilities provided by a band of public-spirited volunteers available via RAYNET, must surely be for everybody's benefit? The public's perception of amateur radio would be greatly enhanced, many new Members would be encouraged to join the ranks of our hobby and, not least, the standing of amateur radio itself and, indeed, that of our National Society (provided full backing is provided) would benefit in the eyes of our 'Controlling bodies and Agencies' at both National and International levels.

As probably the only surviving member of the original Organising Committee formed by the RSGB to set-up the founding Radio Amateur Emergency Network following the 1953 East Coast Flood Disaster, may I make three more points:

1. One of my greatest pleasures from being involved with RAYNET in Norfolk and North East Suffolk for the *first* 35 or so years was to involve new recruits to amateur radio, of all ages and both sexes, many of whom obtained their licences *solely to enable them to support and to be part of the RAYNET organisation.* Thus demonstrating the desire of many to put our Hobby to a clearly defined usage – that of providing *a genuine asset to the community*. As in those days, these desires should still be consistently encouraged and this must stem initially from National level.

2. I was delighted to note the recent reversion to a *single* RAYNET organisation – well done.

3. Finally, to all currently active RAYNET members – very well done. Keep up the good work and continue to prove that amateur radio *is* of real value to our Communities and Nation. I hope that your efforts will be recognised and appreciated.

Since the letter in the December Last Word we have received one article on the work of RAYNET and it is most welcome. It is planned for the February RadCom. *We are still open to more reports on the work of RAYNET. Send in words and photos to radcom@rsgb.org.uk and we'll be in*

Letters published in 'The Last Word' do not necessarily reflect RSGB policy. 'Last Word' letters may be emailed to radcom@rsgb.org.uk Please note that letters submitted for 'The Last Word' may not be acknowledged. The RSGB reserves the right not to publish any letter, with no reason being given. It is a condition of publication that all letters may be edited for grammar, length and / or clarity. Due to the limited space available, please keep letters as short as possible.

touch with a projected publication date. We would also be happy to publish details of forthcoming RAYNET activities in the diaryon both GB2Rs and in RadCom.

DISPOSING OF COMPONENTS

Bruce Hepburn, G8BGI

Due to various reasons I am running down my shack and ceasing any form of amateur radio construction. What does one do with all the items bought or collected over the years, eg components, cables, tools etc?

There is no radio club in a reasonable distance from to me (I live in north-east Hampshire) and I know of no local organisation involved in amateur radio to whom items might be of use. Do I simply take them to the nearest recycling centre?

How do other radio amateurs dispose of unwanted items?

The RSGB Club Finder https://thersgb.org/services/clubfinder/ can be a handy tool for locating clubs that might be interested – I found 11 marked within 20 miles of G8BGI's town (seven within 15 miles) and know from personal experience that there are a lot of other amateurs in his area. Sometimes a garage sale can bear fruit, or perhaps a 'too much to list' Members Ad in RadCom *may be worthwhile.*

NO SUNSPOTS – BANDS ALIVE!

Ivor Wilkinson, G4RJA

I was cheered to read the letter from Sam Turner, G4UQB in the December 2017 *RadCom*. I too have found that activity on the otherwise 'dead' (according to propagation forecasts) HF bands seems to magically come to life at weekends during the now seemingly-interminable and ever-present contests. I do not decry contests *per se* as I have always believed that amateur radio really can be 'all things to all men' (and ladies, of course) and if anyone wants to spend their time gathering certificates that is entirely up to them.

The point I am trying to make, in agreement with Sam, is that perhaps the bands are not quite as dead as we sometimes think at sunspot minimum. I remember one morning many years ago when 20 metres seemed to be devoid of activity. I put out a CW CQ call more in hope than anger and was very pleased and surprised to get a 599 reply from a Canadian station who gave me 599 in return. The QSO itself was fairly 'rubber stamp', as I remember it, but at the end of that 10 minutes or so I tuned across the band again and the joint was jumping!

I should say that I was QRT from 1993 until 2015 due to personal reasons. My interest in amateur radio never declined during those years, but my exposure to it did. I was surprised, on becoming active again, how things had changed, mainly technologically but also in terms of operating practice. Thankfully though, I *can* still find other operators in many countries who still enjoy an old fashioned ragchew and are not themselves frequent contesters. Also thankfully, my CW skills are slowly returning and I am thoroughly enjoying my newly chosen path of QRP operation. Again, like Sam, I have often found that my 5 watts from the FT-817ND to a 66 foot centre fed doublet (300Ω ladder line to an MFJ 971 ATU) has produced amazing responses from QRO stations who have only given me one or two S-points less that I have given them! It's good to be back, but it *is* different!!!

Howarth Jones, GW3TMP

I felt I had to follow up on Sam Turner's letter in the December issue, particularly his mention of the 15m band being wide open on the contest weekend. Well, 15m has been a favourite of mine all my amateur radio life and I find the same. I have always listened to the NCDXF beacons, which by the way when I mention them to some amateurs they look at me and ask what they are? These are invaluable for checking propagation and this month (up to now the 23rd November) between 1100 and 1400 most days with my 2-ele Yagi beaming South I can hear VK6RPB, 4S7B, ZS6DN, 5Z4B, 4X6TU, CS3B, YV5B and 4U1UN. I can call CQ on CW for ages and not get a reply; I tune the band and maybe hear a EU or two but no DX at all. Come the contest weekends and you will work the world and yet the band is open a great percentage of the time.

Ian Johnson, GOSUQ

The letter from Sam, G4UQB comments on the CQWW DX SSB contest that actually took place on 28-29 October 2017. The 25 countries he worked on 80-15 metres is a prime example of what can be achieved on HF when the bands are seemingly 'dead' outside of contest hours. With the present solar cycle bumping along the bottom of solar minimum, contacts on HF at times can be difficult or worse outside of contests and during daylight hours. I find the welcome web page on QRZ.com with the graphic of solar activity, SFI, Ap, Kp etc far more relevant with respect to current ionospheric conditions. With the massive increase in activity during this and other contests the possibility of working some choice DX and giving points away can be exciting and fun, after all, it is Sport Radio. During this year's CQWW DX SSB party I used 200 watts into a wire dipole on 40 and 20 metres and worked 29 stations in Europe and North America. On 10 metres I used 200 watts into a mono band vertical and worked 10 stations in 4 continents, best DX to the west being CE2 AWW at a distance of over 11,000 kilometres and A44A to the east at 6,000 kilometres. The stations I worked on 10 metres were inaudible on the dipole, so three cheers for low angle radiation. I do not take part in the HF contests to work as many stations in different countries as is possible, but to assess where the ionosphere is supporting propagation to and add my support to the contest stations. Propagation predictions for 10 metres during October 2017 in *RadCom* were a 99% probability of no propagation to anywhere, that's why I find it good practice to check on current solar / ionospheric conditions and then join in the fun of the contest pile-ups. When the current solar cycle (the weakest solar cycle for 100 years) ends in about 18 months, hopefully ionospheric conditions will improve slowly and the bespoke dust covers can come off in anticipation of things to come. Contests are not everyone's cup of tea but they certainly breathe some life into 'dead' bands.

HULL: UK CITY OF CULTURE 2017

John Cunliffe, G6LNV
Vice Chair, HFDXARC

Hull, UK City of Culture 2017, is now in its final month and it has been a glorious year for the city. Humber Fortress DX ARC has held the GB0HCC notice of Variation (NoV) for most of the year, with Hull & District ARS also helping out. From our location at Fort Paull on the north bank of the river Humber we have worked most continents in this year.

We wish the next UK City of Culture well; this will be announced next month. To the radio clubs in the city chosen, it is time to join forces at village fairs, gymkhanas, sporting events, city centre tents – the list is endless. Under Ofcom NoV rules, any location to which the public has access can be used.

If you would like more information about how we set the event up, please email me via john.cunliffe@hfdxarc.

We would like to thank Ofcom who have extended the NoV for Hull UK City of Culture, GB0HCC, throughout 2018 to be operated from Fort Paull by Humber Fortress DX ARC. It will operate during club nights (Tuesdays and Thursdays) from 7pm to 9.30pm on HF (using the 160, 80, 40 and 20m bands) plus 2m.

WANTED

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